

## Design Thinking in Practice –Introducing Design for Renewing Bank Services

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**Cumulus REDO Conference**  
Proceedings  
Design School Kolding 30 May – 2 June 2017



## Cumulus REDO Conference Proceedings 30 May - 2 June 2017

[www.cumuluskolding2017.org](http://www.cumuluskolding2017.org)

Download the REDO Cumulus Conference 2017 app

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### Cumulus

Cumulus International Association of Universities and  
Colleges of Art, Design and Media

Aalto University, School of Arts, Design and  
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# REDO Cumulus Conference Proceedings 2017

It is with great pleasure that we present the online REDO CUMULUS CONFERENCE PROCEEDINGS 2017.

In this publication, you will find all 49 short and full papers in their full length and nine film abstracts including online links to several of the films. These papers and films were accepted for the REDO Research Sessions including oral presentation. Furthermore, you will find a series of abstracts introducing the 21 submissions that were accepted for the REDO Poster Session. Last but not least the publication contains a series of position papers authored by the PhD students attending the REDO PhD Consortium. In addition to all these exciting contributions, we have included the full programme in order to give you a comprehensive overview of the contents of the REDO Cumulus Conference.

We would like to take this opportunity to thank all the presenters for submitting and attending the conference at Design School Kolding in May-June 2017. Your support is of great value to the Cumulus International Association of Universities and Colleges of Art, Design and Media, and we believe that this body of knowledge will contribute to the continuous effort of giving these fields a strong voice.

**Immerse yourself and enjoy!**

Anne Louise Bang  
Head of Research & Development & REDO Research Chair

## About Cumulus Association

Cumulus International Association of Universities and Colleges of Art, Design and Media is a dynamic and flexible forum which brings together top level educational institutions from all parts of the world.

Cumulus collaborates not only with institutions and organizations from the field of art, design and media; the encouragement of co-operation with industry and business is important as well. Cumulus is a forum for partnership, sharing knowledge and practices, which inspires a more sustainable, human centered and creative future.

Cumulus, initiated in 1990, is the only global association representing education and research in art, design and media having close to 260 institutional members from 54 countries and representing around 400.000 students and 70.000 academics.



# About Design School Kolding

*“Design School Kolding may be small compared to others, but it is so big in terms of human interaction, skill and dedication.”*

Former MA student at Design School Kolding

Design School Kolding ranks as one of the world's leading academies of design. Our vision is to be an international talent workshop that cultivates Danish Design. Our programmes honour the values that Danish Design descends from, such as democracy and equality. We teach our students design methods including user involvement and co-creation – always with a view to create meaningful and aesthetic solutions in an international context.

The school has university status and trains designers at BA, MA and PhD levels within Industrial Design, Communication Design, Fashion Design, Textile Design, Accessory Design, and Design for Play.

To us, good design is meaningful solutions that support human beings in unfolding their full potential, that is to use their imagination. We want to empower people and communities to address challenges and possibilities – nationally and globally. This is one of the reasons we have chosen to specialise our knowledge building within three strategic areas where we believe Design School Kolding can make a difference: Sustainability, Welfare and Well-being, and Play. We have a special commitment to these issues and dedicate our MA programmes and our research to these areas.

We offer an international academic setting. At the same time we value professional practice and provide excellent workshop facilities. Our faculty are experienced practitioners in their field, and our esteemed visiting faculty ensures inspiration from current professional practice.



# Programme Day 1

Tuesday // 30 May 2017

08.00 – 21.00	Room
Information Desk	School Entrance
08.00 – 9.00	Room
Hello Coffee	Canteen
09.00 – 10.30	Room
Welcoming remarks	Canteen
<b>Keynote Speeches</b>	
Bo Stjerne Thomsen, Head of the LEGO Foundation Centre	
Rachel Cooper, OBE, Professor, Lancaster University	
<b>Future Conferences</b>	
Bengaluru, Paris & Wuxi	
10.30 – 18.00	Room
PhD Consortium	2.15
10.30 – 12.30	Room
REDO Impact Workshop	Canteen
12.30 – 13.00	Room
Lunch	Canteen and in buses
13.00 – 18.00	Room
<b>Field trips</b>	
LEGO	Departure in front of the School
Kolding Municipality	Departure in front of the School
Design School Guided Tour	Departure from the Canteen
18.00 – 22.00	Room
Danish Kitchen	School Area

## Programme Day 2

Wednesday // 31 May 2017

<b>08.00 – 18.30</b>	<b>Room</b>
Information Desk	School Entrance
<b>08.00 – 09.00</b>	<b>Room</b>
Hello Coffee	Canteen
<b>09.00 – 10.30</b>	<b>Room</b>
Official Partner Session	Canteen
Introduction to: World Design Summit 2017 by Sheila Copps, President, WDS	
<b>Keynote Speeches</b>	
Christian Bason, CEO, Danish Design Centre	
Tuuli Mattelmäki, Professor, Aalto University	
<b>10.30 – 18.00</b>	<b>Room</b>
<b>Working Group</b> X-Files	0.2
<b>10.30 – 12.30</b>	<b>Room</b>
<b>Parallel Sessions</b>	
<b>REDOING</b> Creativity, Design Process & Student Learning	1.2
<b>REDOING</b> Embodiment, Emotionality & Togetherness	2.15
<b>REDOING</b> Boundaries, Systems & Frameworks	2.3
<b>REDOING</b> Maker Methodologies, Citizenship & Research Communities	2.4
<b>REDOING</b> Narratives & the Role of Designers	3.21
<b>REDOING</b> Materiality & Intangible Design	3.6
<b>12.30 – 13.30</b>	<b>Room</b>
Lunch	Canteen
<b>12.30 – 17.30</b>	<b>Room</b>
New Members Fair	Lounge Area

13.30 – 15.30	Room
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**Working Groups**

Art and Design Teacher	1.2
Education and Pedagogy	
Gensai Design	2.3
ReVeDa	2.4
Leadership & Strategy	3.21
Sustainability	3.6

15.30 – 16.00	Room
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Coffee Break	Pick Up Areas
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16.00 – 18.00	Room
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**Working Groups**

Contemporary Art	1.2
Digital Culture	2.4
Industry & Innovation	3.21
Fashion & Textiles	3.6

Dinner on your own

18.30 – 21.30	Room
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Danish Design Award	Nordkajen 115, 6000 Kolding
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19.00 – 22.00	Room
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DESIIS Philosophy Talk	0.2
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## Programme Day 3

### Thursday // 1 June 2017

<b>08.00 – 16.30</b>	<b>Room</b>
Information Desk	School Entrance
<b>08.00 – 09.00</b>	<b>Room</b>
Hello Coffee	Canteen
<b>09.00 – 10.30</b>	<b>Room</b>
Official Partner Session	Canteen
<b>Keynote Speeches</b>	
Kigge Hvid, CEO, INDEX	
Mathilda Tham, Professor, Linnaeus University	
<b>10.30 – 12.30</b>	<b>Room</b>
<b>Parallel Sessions</b>	
<b>REDOING</b> Creativity, Design Process & Student Learning	1.2
<b>REDOING</b> Embodiment, Emotionality & Togetherness	2.15
<b>REDOING</b> Boundaries, Systems & Frameworks	2.3
<b>REDOING</b> Maker Methodologies, Citizenship & Research Communities	2.4
<b>REDOING</b> Narratives & the Role of Designers	3.21
<b>REDOING</b> Materiality & Intangible Design	3.6
<b>12.30 – 13.00</b>	<b>Room</b>
Lunch	Canteen and Pick Up Areas
<b>13.00 – 14.00</b>	<b>Room</b>
<b>Keynote Speeches</b>	
Canteen	
Margrethe Vestager, European Commissioner for Competition	
Ezio Manzini, Honorary Professor, Politecnico di Milano	

14.15 – 16.30	Room
<b>Design Conversations</b>	
<b>Design</b> for Democracy, REDO Kolding	Canteen
<b>REDO</b> Research Poster Session	Lounge Area
<b>Desis</b> Network Assembly and Conversation: Mapping the Lines of Work and Research	0.2
<b>Redoing</b> Theory and Practice	1.2
<b>Quality</b> Management & Communication in Multidisciplinary Universities	KUC, opposite the School 2.15
<b>Understanding</b> Attitudes Towards Cultural Diversity in Europe	2.19
<b>From</b> Diversity to Inclusion: a hands-on workshop experience	2.3
<b>Re-Use</b> of Building	2.4
<b>Design</b> competencies	
Futures Research Group	3.21
<b>Changing Education</b>	3.6
<b>Written World.</b> A Platform for Collective Research and Creation of Signs for Public Places	

17.00	Room
Opening of Exhibition	Koldinghus Markdanersgade 11, 6000 Kolding

19.00	Room
Dinner	Godset Jens Holms Vej 5, 6000 Kolding

## Programme Day 4

Friday // 2 June 2017

08.00 – 15.00	Room
Information Desk	School Entrance
08.00 – 9.00	Room
Hello Coffee	Canteen
08.30 – 11.00	Room
General Assembly	KUC, Opposite the School
09.00 – 11.00	Room
<b>Parallel Sessions</b>	
<b>REDOING</b> Creativity, Design Process & Student Learning	1.2
<b>REDOING</b> Embodiment, Emotionality & Togetherness	2.15
<b>REDOING</b> Boundaries, Systems & Frameworks	3.21
<b>REDOING</b> Maker Methodologies, Citizenship & Research Communities	3.6
11.00 – 11.30	Room
<b>Keynote Speech</b>	Canteen
Mads Nipper, CEO Grundfos	
11.30 – 12.00	Room
REDO Impact Revisited	Canteen
12.00 – 12.30	Room
News from the Cumulus Board	Canteen
Good bye	
12.30 – 13.30	Room
Lunch	Canteen





# Welcome to REDO Cumulus

Welcome to Design School Kolding.

We are very pleased to be able to celebrate our 50th anniversary with Cumulus, with you – friends and colleagues from around the world.

You have arrived at a school that offers design degrees at BA, MA and PhD levels. Our main knowledge areas are Design for Play, Design for Sustainability (planet), and Design for Welfare and Well-being (people).

Our ambition is to be an international talent workshop for the cultivation of Danish Design. That is coming along quite nicely, however we want more. In the light of the huge challenges that face our country and the rest of the world, design and designers should have a far greater impact. The same goes for art and culture in general. We should recognize the fact that the challenges we face and derived initiatives such as the UN 17 Sustainable Goals are also an opportunity for us to take a leading role in supplying the holistic, sustainable solutions the world needs.

We have never seen a bigger need for empathy and aesthetics as drivers for the development of new, meaningful solutions. We have never seen a bigger need for the designer's and the artist's imagination, dreams and ability to envision a future worth striving for; a future that is sustainable also for the millions of people in danger of losing their jobs in consequence of hyper automation or climate change. Still, design (and art/culture) fade on the political and economic agenda.

Why is it that our professions do not succeed in achieving impact? Why are there so few CEOs with a design background? Why is design not a top priority in national research policies? I could go on, so I will. Why do we know so little about the value of design? Why does the average income for a Danish designer correspond to that of an unskilled worker? Do we carry some of the blame ourselves because we have made design become too much about design thinking rather than design doing?

Here at our school we feel a great need to learn more about how our students, our staff and our many projects can achieve far more impact than they do today. We complete many excellent development projects with individual companies, NGOs and public institutions, but it is far too rare that we are able to transform an entire sector or the mind-set of society in general. However, there are positive and important exceptions, which we have also been able to discuss within the Cumulus working group on Leadership and Strategy. Here in Kolding, this working group will attempt to compose a declaration about how the design community, including Cumulus, can help our member organisations, our students and staff achieve more impact on community, democracy and industry. A declaration that we hope to be able to send to the World Design Summit in Montreal.

In Kolding we believe that we – the design, media and art schools – can become far better at taking and providing content for the establishment, yet it requires that we are prepared to REDO our practice, our research, and our education.

So thank you to Cumulus for agreeing to make REDO the focal point of this conference. Thank you to Rachel Cooper for supervising the peer reviewing of the many research papers that we received. And thank you to everyone who submitted papers and films. Also, I wish to extend my gratitude to our staff at Design School Kolding for all their efforts in organising this event. Finally, I would like to thank the many foundations and collaboration partners, who have offered us their support.

**Have a great conference!**

Elsebeth Gerner Nielsen  
Rector, Design School Kolding  
Vice President, Cumulus





# Introduction

What do we wish to REDO?

How and with whom do we REDO?

How do we teach students to REDO?

Being honoured with the task of organising a conference in the Cumulus series is a complex challenge. We are proud to present this inspiring programme for the REDO Cumulus Conference at Design School Kolding welcoming more than 300 delegates.

We have been asked to make room for working groups, research sessions, keynote presentations, various association meetings and social events, and as if this was not enough we have also chosen to include a PhD consortium, a poster session and design conversations.

In the research call we identified three questions: What do we wish to REDO? How and with whom do we REDO? How do we teach students to REDO? In order to open our forum to voices of academia and others, we asked for full papers and short papers as well as short films that touch upon the overall theme of the conference, and which explore exemplary and imaginative ways of REDOing. We have looked particularly for projects that develop, explore, investigate and generate new knowledge within the themes. Thus, all contributions contain and present relevant examples and opportunities for REDOing within the fields of design, media and art.

The conference call received a great international response with over 150 submissions from more than 40 countries spread over six continents. All contributions were double-blind peer reviewed by the international review panel of 150 reviewers. The submissions were interdisciplinary and stem from a variety of disciplines and discipline areas. The selected contributions reflect the cross roads that we face today by addressing environmental and societal issues discussing them with a starting point in design, art, media and education.

For the conference, 60 contributions were selected for oral presentation and 20 were invited to give a poster presentation. The selected full papers, short papers and short films will be presented over the course of three days in parallel sessions, and the posters are included in the Design Conversations. For the parallel sessions, we have identified the following six tracks: Creativity, Design Process & Student Learning; Embodiment, Emotionality & Togetherness; Boundaries, Systems & Frameworks; Maker Methodologies, Citizenship & Research Communities; Narratives & the Role of Designers; and Materiality & Intangible Design. Thus, each session will deal with different aspects of the REDO theme and there will be time for in-depth discussions that can feed back to the main conference.

During the conference, each session will address the three questions in various ways. It is our intention that the conference actively will inspire and motivate you, the delegates, to look at your own role and hopefully, you will leave with a new sense of direction and new partnerships. Therefore, we introduce a particular REDO initiative that encourages you to make a plan for creating impact on various levels of society.

This booklet contains the full programme, abstracts and information about the many parts of the programme. Additional information can be found on the official REDO app and website. Here you can also find the REDO Conference Proceedings.

We look forward to four joyful and inspiring conference days in Kolding, Denmark, with fruitful discussions and debate around the theme.

**ENJOY and REDO!**

Mette Mikkelsen  
Honorary Professor & REDO Conference Chair

Anne Louise Bang  
Head of Research and Development & REDO Research Chair





# Keynote Speakers

## Bo Stjerne Thomsen

Bo Stjerne Thomsen is the Head of the Centre for Creativity, Play and Learning at the LEGO Foundation with the aim of supporting the long-term impact of learning through play on children's creativity, engagement and lifelong learning.



How do we design for a future that involves a rapid shift in the future of jobs with the influence of emerging technologies and cultural change? Designing for play not only includes the ability to design the environments and systems around us, but also embodies a playful and iterative approach to how we learn and create our own lives. We need a different mindset and new language of playing and designing, which can revitalize all of our work, communities, business and life. When pursuing these questions, children are amazing role models.

## Rachel Cooper

Rachel Cooper, OBE, is Distinguished Professor of Design Management and Policy at Lancaster University. She was founding Director of ImaginationLancaster, an open and exploratory design-led research centre conducting applied and theoretical research into people, products, places and their interactions.



Rachel Cooper will give a keynote 'REDO Education REDO Design Education' based on her research looking at the Value of Design to academics and practitioners, her work with doctoral students in industry and also recent reports by the UK Design Council and other bodies in relation to the value of design to industrial strategy.

## Christian Bason

Christian Bason is CEO of the Danish Design Centre, former Director of the innovation team MindLab, and author of seven books on design, leadership and innovation – most recently “Leading Public Design: Discovering Human Centred Governance”. Christian is a member of the Danish government’s new Challenge Panel for reform of the public sector.



Christian will suggest that the design field has now been established firmly as a contributor to social and government innovation on a global scale, with Denmark as one of the frontrunners – at least until now. We have for more than a decade witnessed the rise of design for social and public sector innovation to a point where it is at the heart of several national reform processes. However, what has been the Danish experience and trajectory of design as catalyst of more inclusive and human-centred innovation? What has characterized the key projects and results? Where is the design ecosystem heading, what are the pitfalls we are facing, and what might be learnings for other societies?

## Tuuli Mattelmäki

Tuuli Mattelmäki is Associate Professor at Aalto University, Department of Design. Her starting point for research is in empathic design and explorative methods in human-centred design, and design probes in particular. Currently her work focuses on creative co-design methods in the context of design for services, as well as the new application contexts of design approaches.



In design, we seek novel points of view. We are sensitive to details and make sense of the whole, and, often through various practical means, we explore how they are, or might be, in relation with each other. The methods that were developed in and for design, and that we teach, offer a useful repertoire for approaching novel design challenges and societal concerns. This talk addresses empathic and co-creative practices where changing perspectives is the key to make a difference. Illustrated with examples from recent student and research projects with societal impact, it focuses on individuals and systems and the connections between the two.

## Kigge Hvid, INDEX

Founding CEO of INDEX: Design to Improve Life – a Danish non-profit with global reach. The organization works with design as a crucial element in any sustainable solution to global challenges, through its extensive award, education and investment programs.



**Design as a crucial element in solving global challenges.**

Over the course of the past 15 years, the global design communities have moved from being primarily focused on product design and aesthetic to understanding the crucial role design plays in the development of any tangible or intangible sustainable solution to global challenges. Through examples, data and trend analysis, the lecture will focus on clarifying the present and future role of design, design education and investment in design that will ensure environmental, social and economic prosperity.

## Mathilda Tham

Mathilda Tham's work sits in a creative, positive and activist space between design, futures studies and sustainability. Her work is informed by the notion of metadesign, design that supports complex collaborations and design for change. Mathilda Tham is Professor in Design at Linnaeus University, Sweden, where she leads the development of a new research platform, Curious Design Change.



**How can designers free design?**

The sustainability imperative requires that we REDO the products, systems and paradigms we are part of. Yet, our entangled habits and fear can stop us from engaging in profound processes of change. In this talk, I will creatively and critically explore the man-madeness of the systems we live by, and design's agile dance with them. I will draw on experiences from education, research and play to discuss both the promise and responsibility of freeing design.

## Margrethe Vestager

Margrethe Vestager, European Commissioner for Competition. She was a Member of the Danish Parliament from 2001 until 2014, representing the Danish Social Liberal Party. She was the political leader of the party from 2007 to 2014, and served as Minister of Economic Affairs and the Interior from 2011 to 2014.



Margrethe Vestager will speak about the democratic challenges facing the European Community and the world.

Drivers towards a more coherent society might be:

Mobilising competition policy tools and market expertise to contribute, where appropriate, to creating jobs and promoting growth.

Developing the economic and legal approach of assessing competition issues and monitoring the market.

Effectively enforcing competition rules in the areas of antitrust, cartels, mergers and state aid.

Strengthening the Commission's reputation worldwide and promoting international cooperation in competition issues.

## Ezio Manzini

He is Honorary Professor at the Politecnico di Milano, Italy. His interests focus on social innovation and in particular on design for social innovation. He started DESIS: an international network of schools of design specifically active in the field of design for social innovation and sustainability (<http://www.desis-network.org>).



Stand Up for Democracy is an international initiative motivated by the concern for the attack to democracy we are witnessing in several countries in the world. Its first aim is to be a strong political statement of the Design Community against these on-going highly concerning trends. But, facing this crisis, Stand Up for Democracy presents also a constructive side: it aims to create and multiply arenas of conversations and experimentations on how to conceive, develop and connect new possibilities for democracy. This initiative has been started in March 2017 by an Open Letter sent by Ezio Manzini and Victor Margolin to the Design Community. Now it is autonomously moving on and spreading internationally.

## Mads Nipper

CEO of Grundfos, an SDG 6 and 13 company that also happens to be the world's largest pump maker. Board member of Bang & Olufsen and Danish Crown, and proud former chairman of Design School Kolding. Hardcore AC/DC fan.



Apart from providing a personal perspective on Grundfos and sustainability, I will to the best of my ability, illustrate the true potential of design in the world. How design is critical to addressing the United Nation's Sustainable Development Goals, how design is fundamental to businesses embracing the digital revolution, and how design can play a pivotal role in shaping and creating a new understanding of what value creation means. Or in short, how REDO'ing design has a unique potential to re-shape leadership and pave the way for bridging "doing well" and "doing good". In terms of the last subject I am going to pass on some of my experiences with how you implement a good idea and sustain its implementation. In other words, I hope to be able to provide you with some ideas for your homework following this conference, which is to implement your personal plan for achieving more impact.



# PhD Consortium

Tuesday 30 May

Facilitators	Room
Kathrina Dankl, Design School Kolding Yanki Lee, Enable Foundation, Hong Kong and Linnaeus University, Sweden	2.15
Local contact: Anne Corlin Time: 10.30 – 18.00	

The overall agenda for the REDO PhD Consortium is to focus on the value of peer-to-peer feedback, and how interdisciplinarity, pitching the PhD project, and insights into other research projects can lead to an increased awareness of situated knowledge.

With the REDO theme in mind, the participating PhD students will be able to achieve an increased awareness about the methods and approaches they use and contemplate the potential impact of their project.

## Keynote Speech:

Tine Wirenfeld-Jensen, METoDo

## Discussion points:

- // What methodologies are used and why?
- // How can different kinds of methods be combined and inspire each other?
- // How are the projects rooted (in theory or practice), how does that influence the choice of method(s) and impact the final deliverable(s) of the design research project?

We, at Design School Kolding, hope that the REDO PhD Consortium will work as a lever towards a Cumulus PhD network.





# Working Groups

## Wednesday 31 May

### X-Files

Chair	Room
Aparajita Dutta, Royal Academy of Art The Hague	0.2

Local contact: Anette Flinck  
Time: 10.30 – 18.00

The Cumulus X-Files Working Group is a group of Heads of International Offices, policy makers and advisers, international exchange coordinators. They meet at least once a year at Cumulus conferences with General Assembly. Presentations, discussions and workshops in the working group are about:

- // Internationalization philosophy
- // Internationalization strategies
- // The European ERASMUS program
- // International partner programs
- // Hands-on and best-practice in Internationalization as a whole
- // Networking within coordinators

## Art and Design Teacher Education and Pedagogy

Chair	Room
Martti Raevaara, Aalto University	1.2

Local contact: Lone Dalsgaard André  
Time: 13.30 – 15.30

In the Cumulus network there is a lot of expertise in art and design pedagogy. Many schools offer an art and design teacher education degree programme or special study modules of art and design pedagogy. We are interested in aggregating this expertise within Cumulus and launch a working group under art and design teacher education and pedagogy. This will be the first and founding meeting of the group. The meeting will include some presentations of case studies and introduction, discussion and team work of ideas for our future collaboration in different forms. The methods, platforms and goals will be decided by the participants.

## Gensai Design

Chair	Room
Jiro Sagara, Kobe Design University	2.3

Local contact: Barnabas Wetton  
Time: 13.30 – 15.30

Design has the power to solve problems. The GENSAI Design is an example of this, that may solve a lot of problems happening in connection with any kind of disasters, such as earthquake, tsunami, volcanic eruption, hurricane, snow storm, including dispute or war. We can't control nature or settle a dispute, however we can reduce damage or victims by design. These damages are magnified by human error, wrong information and wrong behavior. In this workshop, some groups will discuss some topics of disasters after introduction of the GENSAI Design, then propose some ideas to solve some problems caused in the disaster.

## ReVeDa

Chair	Room
Lorenzo Imbesi, Sapienza University of Rome	2.4

Local contact: Richard Herriot  
Time: 13.30 – 15.30

The working group has a special interest in mapping design research. The workshop will consist of presentations on local research by Richard Herriot and others. We will also work on how to map research and a forward-looking discussion about future activities. An option could be to turn the knowledge of the working groups into a book edited by Lorenzo Imbesi and Loredana di Lucchio, Sapienza University of Rome

## Leadership & Strategy

Chair	Room
Elsebeth Gerner Nielsen, Design School Kolding	3.21

Time: 13.30 – 15.30

In this working group, we discuss, among other things, different kinds of political matters and how to excel in our leadership of the Cumulus institutions. In Kolding we will focus on making a Cumulus declaration for the World Design Summit in Montreal. A proposal will be launched on the REDO Conference website prior to our meeting.

We are happy to announce that Sheila Copps, President of WDS, will join our meeting and give a presentation of the WDS. Furthermore, we will discuss how the proposal in the Open Letter to the Design Community: Stand Up for Democracy, by Ezio Manzini and Victor Margolin, can be integrated in our work. Please come and join us.

## Sustainability

Chair	Room
Sara Hyltén-Cavallius, Linnaeus University	3.6

Local contact: Lykke Kjær  
Time: 13.30 – 15.30

The workshop will introduce the following activities:

// DOGA will tell us their story on how they are working with the 17 UN Sustainable Development Goals.

// Lykke Kjær, Design School Kolding, has used specific tools to work with Sustainability with students and municipalities, organisations and business. How can we all integrate this new knowledge in our educations? Continuing our discussion from HDKI, Hong Kong, 2016. Welcome!

## Contemporary Art

Chair	Room
Ann Albritton, Ringling University	1.2

Local contact: Maria Kirk Mikkelsen  
Time: 16.00 – 18.00

We will have 2 presentations during our working group session. We hope that as in Nottingham, we can meet another time to discuss the ideas more fully. Maria Kirk Mikkelsen, Design School Kolding, will introduce a practical research project that examines the relationship between the creation of color palettes, didactics and student learning. Sheryl Haler, Ringling College of Art + Design, will present the challenge of constructing a 3-dimensional costume made of unexpected, common materials to interpret a historical costume – from a semester course on Costume Design.

## Digital Culture

Chair	Room
Frédéric Degouzon, L'École de Design Nantes Atlantique	2.4

Local contact: Barnabas Wetton  
Time: 16.00 – 18.00

Digital Culture is dedicated to all things digital happening in the Cumulus network. Case studies, projects and research works related to digital innovation and its impact on design and design education are welcome, from both academics and practitioners.

Provisional program includes presentation of the Experimental Interface Lab by Mr Brad Tober (University of Boston and member of AIGA).

## Industry & Innovation

Chair	Room
Sam Bucolo, University of Technology Sydney & Marjolijn Brussard, ArteZ	3.21

Local contact: Jesper Legaard  
Time: 16.00 – 18.00

The Cumulus working group „Industry & Innovation“ will continue its discussions on curricular value, desired outcomes for higher design education and industry partners, financing models, and organisation of cooperation with industry partners.

## Fashion & Textiles:

Chair	Room
Nithikul Nimkulrat, Estonian Academy of Arts	3.6

Local contact: Helle Graabæk  
Time: 16.00 – 18.00

The working group will be introduced with a recently published book *Crafting Textiles in the Digital Age* (Bloomsbury, September 2016) that examines the intersection between craft and digital technology in textile practice. The questions regarding (1) how textile and fashion practitioners can integrate craft and digital technology in their practice and (2) how traditional and more advanced technology are learnt and taught in higher education will be the starting point of the roundtable discussion and workshop.

Specific questions that the working group will aim to address include: Can fashion and textile design abandon handwork completely? How? What is the best practice that craft and digital technology can go hand in hand?

## DESIS Philosophy Talk

Chair	Room
DESIS: Virginia Tassinari, Ezio Manzini	0.2

Time: 19.00 – 22.00

In response to the Open Letter: Stand Up for Democracy - in which Ezio Manzini and Victor Margolin stimulate the Design Community to react to the attack to democracy we are witnessing nowadays around the world - the DESIS Network replies with some initiatives carried forth by the different Labs across the world. One of these initiatives is a new DESIS Philosophy Talk series entitled: Collaborative Democracy? A design-based approach where the philosophical and the design traditions will be brought in dialogue together in order to reflect on the idea of collaborative democracy.

The REDO Cumulus Conference organized by Design School Kolding will kick off this important new series of DESIS Philosophy Talks coordinated by Ezio Manzini and Virginia Tassinari, harnessing the international perspective of Cumulus participants in a provocative discussion that will aim to confront different visions and approaches. This travelling academic seminar will be documented and made available to the larger public on the DESIS Philosophy Talk's website.

Join us!





# Design Conversations

Thursday 1 June // 14.15-16.30

In the 'Design Conversations' ideas and focal areas run parallel either in the format of workshops or presentations. Taking part in – and contributing to – a design conversation will give you an idea of what is cooking within research and other activities in many corners of the Cumulus network.

## Design for Democracy, REDO Kolding

Chair	Room
Arianna Mazzeo, Barcelona School of Design and Engineering	Canteen

The workshop allows you to learn how co-design Kolding with students and the real community. Digital beats is an open ending storytelling, where we will use mobile phones as artefacts to create relationship between people attending the Cumulus conference, the students and the public space of the city. The mobile platform is an enabler to co-design also with neighbours, volunteers and professionals, practitioners involved in the event and living in the everyday in Kolding eco-system.

During the workshop the attendees co-design to facilitate and improve human life conditions in the public spaces of the Kolding communities, together with the students and the young people, via their mobile skills, as catalyzer of a new open-ended participatory m-storytelling.

## REDO Research Poster Session

Chair	Room
Ulla Ræbild, Design School Kolding	Lounge Area

Due to a very high number of high quality research submissions for the conference we decided to launch the REDO Research Poster Session. All submissions have been double-blind peer reviewed by an international review panel. The result - 21 posters - will be exhibited in the Lounge Area during the Design Conversations. The authors will be present for indepth and thorough discussions about their research. The poster abstracts including contact info are included in the online REDO Conference Proceedings at: <http://cumuluskolding2017.org/redo/>

## Desis Network Assembly and Conversation: Mapping the Lines of Work and Research

Chair	Room
Carla Cipolla & Ezio Manzini	0.2

The DESIS Network Assembly and Conversation is an event required by the DESIS Network statute. It is the forum where formal collective decisions are taken and it also provides an excellent opportunity for networking and knowledge exchange between DESIS Lab members. Participants will be predominantly DESIS Lab members but, as this event is open, colleagues interested in the Network's activities and Design for Social Innovation are warmly invited to attend. At the core of this year's Assembly will be a conversation about the latest DESIS Network activities. A map will be developed that outlines the main areas of work and research being carried out in DESIS Labs. The ensuing discussion will then highlight potential convergences and collaborations.

## Redoing Theory and Practice

Chair	Room
Peter Sonderen, ArteZ	1.2

In this meeting we should like to talk about the role of theory within art & design programs. At ArteZ University of the Arts we have recently developed the program ThINK (Theorie in de kunsten/Theory in the Arts) that has broken with many traditional approaches of the theoretical elements of art education such as art history and philosophy in relation to the art practices. Instead we have build, bottom-up, a program that gives both art and design students a firm and challenging common basis for their practices. The relationship between theory and practice comes to the fore by TIP, which stands for Theory in Practice, and research becomes an organic part of the curriculum as well.

## Quality Management & Communication in Multi-disciplinary Universities / Art and Creative Practices in Multidisciplinary Universities

Chair	Room
Saija Hollmén, Aalto University	KUC, opposite the school

Quality Management & Communication in Multidisciplinary Universities/Art and creative practices in multidisciplinary universities. Three presentations and cases steer for discussion on the topic. What is the role in strategy, education and research? Art and creative practices in Aalto University/Saija Hollmén (15 min). Art and creative practices in Central St. Martins/Jonathan Barratt (15 min). Art and creative practices in Politecnico di Milano/Luisa Collina (15 min). Discussion and ideas to take further (30 min).

## Understanding Attitudes Towards Cultural Diversity in Europe

Chair	Room
Venu Dhupa, VSDB Consultancy	2.15

With the support of the Embassy of the Kingdom of the Netherlands (UK), Professor Venu Dhupa conducted primary research to re-examine attitudes to cultural diversity across the EU. Supported by 17 EU networks, including Cumulus, this has turned out to be the largest piece of research on the subject since 2008 with responses from 27 countries. The aim of the research was to generate a short high level position statement on Diversity and Culture and to provide a basis on which groups and bodies can move forward with their strategies to provide improved policy, programmes and services. In this session, Professor Dhupa will share the findings and then involve participants in an interactive exploration of the subject.

## From Diversity to Inclusion: A Hands-on Workshop Experience

Chair	Room
Giuseppe Di Bucchianico, University of Chieti-Pescara	2.19

The workshop will investigate the concepts of human diversity and inclusion, exploring what they mean in contemporary society, the first step towards unleashing their enormous potential for innovation. Participants will push the envelope of their understanding of the concepts in a collaborative experience aimed at generating pro-active thinking for design teaching and its various scales of application.

## Re-Use of Building

Chair	Room
Bertrand Pascal, ESAIL LAB	2.3

ESAIL LAB is focused on the re-use of buildings. The starting point is an analysis of projects completed in the not-so-distant past. The work involved in this kind of project can be complex and one must scrutinize it in order to be able to explain it. The first objective is to bring to light the intellectual processes of the discipline by analysing good examples. The second objective seeks to contribute to a more general discussion on the possible theoretical tools of architectural re-use/transformation.

## Design Competencies Futures Research Group

Chair	Room
Job Rutgers, OCADU University	2.4

In order to better articulate the value, depth and validity of ‘design doing’ we have developed a framework of design competencies that may be helpful to design educators to define, organize and measure the value of ‘design doing’. In the workshop we will guide participants through a series of hands-on exercises and ‘visual thinking’ experiences that enable design educators and practitioners to define and detail dynamic, open design competencies in a playful, energizing way. The overarching aim of the workshop is to collaboratively develop a shared language and terminology that helps educators, practitioners and design students to understand, define and communicate the value of ‘design doing’.

## Changing Education:

*“We have to change to stay the same ...”*

Chair	Room
Jeroen Chabot, Willem de Kooning Academy	3.21

In 2012 we introduced a thoroughly new curriculum for our art school. As the programme now runs in all our departments, it is time to share our results and the lessons we learned. We need to develop a new pedagogy that puts students in the driving seat. In a world and time where students have to address sustainability issues, developments in nano- and bio-technology, the growing role of artificial intelligence and new forms of visual realities and where they have access to vast arrays of knowledge, experience and inspiration – students themselves must identify the areas where they need to grow, and choose where and how best to develop the required knowledge and skills.

## Written World. A Platform for Collective Research and Creation of Signs for Public Places

Chair	Room
Belén González Riaza, Escuela Superior de Diseo de Madrid	3.6

Vernacular signs are a valuable cultural heritage, an essential element in the definition and expression of the identity of a place, and a key factor in its legibility and liveability.

We would like to invite Cumulus members to work on a platform for the collective cataloguing of the most interesting signs in the World, to celebrate and preserve its diversity. It will include a database and a shared space for experimentation on meanings, forms and materials for communication in public spaces. Our aim in REDO is to create a small group to start working on this project in different locations.







**REDOING** Creativity, Design Process & Student Learning  
**Room** 1.2 // Wednesday 31 May // 10.30-12.30

Title	Presentation
Building on Design Thinking: The Contribution of Creativity & Knowledge. A Study of two Innovation Workshops	Paul McElheron
Exploring the Impact of Power Distance on Co-design Workshops	Yuki Taoka, Kaho Kagohashi, Robin Lhommeau and Céline Mougénou
[DiaGram]; Rethinking Graphic Design process	Dion Star and Andy Neal
I see, I see what you can't see	Anke Coumans and Herman Van Hoogdalem

**REDOING** Embodiment, Emotionality & Togetherness  
**Room** 2.15 // Wednesday 31 May // 10.30-12.30

Title	Presentation
Mind as a Thing. REDO-ing the Iterative in Design Education	Diana Nicholas, Elise Krespan and Shivanthi Anandan
Re-Embodiment. New Strategies for teaching Embodied Interaction	Susan Kozel
Here I am: Doing Culture Together. A Collaborative Exhibition Project that considers Cultural Ideas from New Zealand	Caroline McCaw and Kathleen Mahoney

**REDOING** Boundaries, Systems & Frameworks**Room** 2.3 // Wednesday 31 May // 10.30-12.30

Title	Presentation
Design of Education as Education in Design; Destratifying Fields and Subjects	Marc Boumeester
Governance Design	Tanja Rosenqvist
Disciplination – Design as Practice between the Disciplines	Tido von Oppeln and Christoph Schindler
Crossing over Boundaries through Experimental Pedagogy	Maarit Salolainen, Jouni Partanen, Oldouz Moslemian, Eeva Suorlahti, Panu Kivilahti and Kirsi Niinimäki

**REDOING** Maker Methodologies, Citizenship & Research Communities**Room** 2.4 // Wednesday 31 May // 10.30-12.30

Title	Presentation
Beegin: Redoing Beekeeping in Southern Africa by Designing for Outcomes	Ivan Leroy Brown and Angus Donald Campbell
Redoing by Repair: The search for Tacit Knowledge transfer in Furniture Design Education	Mehmet Ali Altın
Origami Meets Movement: A Collaboration between Diploma in Fashion and Diploma in Dance at LASALLE College of the Arts, Singapore	Ginette Chittick and Maria Walf
My Nesthouse: Action through doing Workshop	David Serra Navarro

**REDOING** Narratives & the Role of Designers  
**Room** 3.21 // Wednesday 31 May // 10.30-12.30

Title	Presentation
Craft Practice for Sustainability. Re-thinking Commercial Footwear Design Process with a Woven Textile Approach	Jenny Pinski, Faith Kane and Mark Evans
Crafting Immersive Narratives of the Future Design-doing as a Method of exploring the Meaning of Immersive Storytelling	Danielle Arets and Bas Raijmakers
Design Fiction Filmmaking as REDO	Jinyi Wang and Nathan Hughes

**REDOING** Materiality & Intangible Design  
**Room** 3.6 // Wednesday 31 May // 10.30-12.30

Title	Presentation
Earthy Textiles. Experiences from a Joint Teaching Encounter between Textile Design and Architecture	Paula Femenías, Kristina Fridh, Margareta Zetterblom, Svenja Keune, Riikka Talman, Erica Henrysson and Klara Mörk
“CHEMARTSING” – An Experimental, Multidisciplinary, Collaborative and Future Oriented Pedagogy with Wood Based Biomaterials	Pirjo Kääriäinen, Kirsi Niinimäki and Andreas Lindberg
Antibacterial Paper Made of Cellulose and Copper	Alejandra Amenábar Figueroa, Paulina Contreras Correa and Victor Apablaza
Resilient Rebuilt — A Regenerative Design of Waterfront Landscape in Urban Fringe	Lu Yao and Haoming Zhou

# Building on Design Thinking: The Contribution of Creativity & Knowledge. A Study of two Innovation Workshops

Paul J. McElheron

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**Abstract:** This paper explores design thinking's specific contribution to innovation. The data is drawn from two studies, the first was on multi-disciplinary teams of students selected on the basis of their individual creativity levels. Half the teams used a design thinking methodology to solve a well-defined design challenge and the results in terms of innovative content were compared to those of similar teams solving the same challenge but without using design thinking. The results suggest that design thinking does improve team innovation scores and we suggest why this is the case. In the second study, two teams of students applied design thinking to an ill-defined problem that relied on the acquisition of knowledge to solve it. One of the teams adopted a superior knowledge acquisition strategy which resulted in them developing a more innovative concept and their approach to collaborative knowledge building is discussed.

**Keywords:** Design thinking, innovation, creativity, collaborative knowledge creation.

## 1. Introduction

Innovation has been cited as a major source of differentiation and competitive advantage in an increasingly competitive business environment. Design thinking has been proposed as a potentially effective way of developing innovation capability across a wide range of sectors. This paper explores design thinking's specific contribution to innovation and will refer to two case studies carried out on teams of students engaged in innovative product design. The first study was on groups of design & business students working in multi-disciplinary teams on a well-defined product innovation design challenge. Half of the teams were asked to solve the challenge using a design thinking methodology and the results were compared to similar teams solving the same challenge but who did not use design

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thinking. Creativity is said to play an important role in design thinking so students were tested for individual creativity prior to the trial and this enabled teams to be put together made up of low, medium & high creative individuals. The questions we were trying to answer were:

- Would design thinking assist in the development of innovative product design solutions and if so – by how much & why?
- What is the effect of individual creativity on the level of innovative outcomes – how much does individual creativity contribute to teams working on creative product design innovation?

The second study followed a team of design, business & engineering students working over a longer period of time using design thinking on a less well defined problem. The question we were trying to answer was:

- What are the characteristics of the group dynamics in teams engaged in design thinking? Are there differences between effective & less effective teams?

## 2. Design thinking & innovation

Our research into design thinking over the past three years has included carrying out workshops where students and participants from the business & design communities are confronted with a complex, ambiguous problem and encouraged to develop solutions using a design thinking methodology. Innovative solutions are often generated, whether in the form of artifacts, processes, or systems. Is design thinking a route to innovation or are other factors involved? Do participants perform well because they know they are observed? From Chamniss et al. (2015) we know that social identity can be a factor in creativity. Simply suggesting to groups put together purely at random that they have been selected on the basis of their superior creative skills boosts their creative output. Perhaps, for the duration of the workshops facilitators were being good “managers”, i.e. motivating participants by setting clear goals, providing adequate resources, a creative environment and support & encouragement throughout the process? This paper reports from a project that seeks to isolate these effects and study the specific contribution that design thinking makes in terms of the level of product innovation.

No universally accepted definition of design thinking appears to exist and its underlying mechanisms are poorly understood, (Reimann & Schilke 2011). However, the increased focus on the design process and how it may be applied in other areas has provided substantial inspiration for design thinking and its role as an important tool for innovation, (Lockwood 2009, Martin 2009, Brown 2009). This has resulted in a quest for a common understanding and framework for the various elements included in the design process enabling designers and non-designers to communicate better and create a common culture and language. Integrating the design methods, design thinking & soft systems approaches has led us to view design thinking as comprising of three overlapping elements: a process, a set of practices & a mindset. This is in line with e.g. Hassi & Laakso, (2011) - practices, thinking styles & mentality and Di Russo's, (2014) - process, methodology & mindset.

### 3. Methodology

The design thinking methodology used in this trial comprised of a **process**, consisting of five stages starting with a research phase to establish stated needs, a re-framing phase where the problem is defined, an ideation phase where ideas are generated and refined using rapid prototyping followed by a test & implementation phase. The **practices** support the process by including such techniques as visualization, pattern finding, brain storming, use of multi-disciplinary teams, & a combination of divergent & convergent approaches. The design thinking “persona” (often referred to as a “**mindset**”), requires participants to assume the role of a design thinker which in turn requires a collaborative, ambiguity-tolerant, solution focused approach to idea generation that makes use of abductive as well as deductive & inductive reasoning and takes an optimistic future orientated, holistic view. We have found the idea of adopting a persona, that part of yourself you present to the group, helps team members to get into the role of a design thinker.

### 4. Case Study One: Design thinking with a well-defined problem

A cohort of 72 second semester BA fashion design & business students were presented with a product design challenge - to develop an urban bicycle concept. All students were taken through the design brief specifying the requirements of the design, (new generation of urban bike, quality of design, flexibility, integration of features, aesthetics, mandatory features etc.). A bicycle was chosen for the challenge as it was an item of technology that students are familiar with, (most of the students classified themselves as daily or frequent cycle users). None of the participants were aware of the purpose of the challenge, other than to develop an innovative urban bike concept or that the participants were to be treated in any way differently.

#### 4.1 Criteria for team selection

Creativity plays an important role in problem solving in design assignments and is widely regarded as an essential element in design thinking. We acknowledge though that characteristics other than creativity have also been suggested as being important to design thinking, (Owen, 2006). Creativity comes in many forms and there are numerous ways of attempting to measure various aspects of it. With an eye to the purpose of the workshops we designed a creativity test requiring students to quickly achieve end user empathy and generate, visualize & communicate ideas that would meet user needs. (See text box: design a phone for Else) The aim was to achieve some kind of creative productivity quotient that might be relevant to the design thinking challenge. We recognize that this was neither a generally applicable nor a comprehensive measure of creativity, for example there was no possibility for incubation time for ideas or the opportunity to build on the ideas of others. However, we believe the test served a purpose for this workshop which required us to evaluate a large number of students in a short time.

**Individual creativity test – design a phone for Else**

Students were presented with an end user profile, an elderly lady, Else (86), with failing hearing, eyesight, poor dexterity and difficulty in remembering numbers. Her major link to the outside world is to her family by telephone. Students were asked to design a land line telephone that would meet Else's needs and make using the telephone easier. Students were asked to generate as many ideas as possible in 15 minutes and list and/or draw them on paper. Students are informed that the number, variety and level of innovation would all be evaluated and an individual score calculated. Students were not permitted to use the internet to search for ideas. We used Guilford's, (1988) measures to evaluate student responses, specifically: fluency, flexibility, originality & elaboration. All ideas were evaluated by a single marker to reduce subjectivity. The research for this test revealed 34 features that can be incorporated into this type of phone and if scored using the above system, 18 would score 1 point, 11 would score 2 points and 6 three points giving a maximum score of 58.

The results revealed that there was little difference in average creativity score between the disciplines, (with the exception of Purchasing Management students, however this was based on a very small sample size). There were however large variations within subject areas, (see table 1). This allowed students to be separated into groups based on their individual creativity score, (from the test).

Table 1. Creativity Scores – design a phone for Else.

Area of study	n	Av. Score	Max. Score	Min. Score	Std. Dev.
<b>Branding &amp; Marketing Mgt.</b>	18	21.5	32	8	8.16
<b>Retail Management</b>	21	21.1	33	10	8.94
<b>Fashion Design</b>	30	19.1	39	3	9.74
<b>Purchasing Management</b>	5	11.0	19	7	4.85

Following a presentation of the design brief we formed twelve multi-disciplinary teams based on student's individual creativity score in order to explore the effect of individual creativity on the team's performance. At this point the teams were divided and relocated into separate auditoria. Six teams formed the design thinking group and six teams the control group. The students were informed they were taking part in a study examining how teams operate when faced with an innovative design challenge and were neither aware of the embedded "design thinking" experiment nor their "creativity" score from the test held several days previously. While all students in this trial had been introduced to design thinking earlier in their studies, the six teams in the design thinking group were given a short "refresher". The control group was given a short lecture on contemporary design. Here we deliberately left out the terms "design thinking", "strategic design" or any reference to the practice of design thinking.

All teams had a video camera and easy access to drawing and prototyping materials, flip-charts, sticky notes etc. For each group of six teams a facilitator was



present to observe how teams performed, answer general questions etc. The teams were given two hours to develop their ideas and a further 30 minutes to upload their final concept, (photograph or sketch and a brief description of the innovative elements) onto a crowd sourcing site for later evaluation.

## 4.2 Evaluation of the team concepts

All team concepts were evaluated by a panel of experts comprising of the head of the schools Innovation-Lab., and two senior lecturers who manage the school's innovation project. The panel was not made aware of the specific aims of the trial and had no knowledge of the team selection criteria. The panel was asked to use The Taxonomy of Creative Design, (Nilsson 2012) to assess the novelty and degree of derivation of concepts and assign each team a concept innovation score. The taxonomy enables the analysis of a work, (in this case a product – an urban bicycle) in terms of the originality of the solutions generated and it seeks to measure creative work in relation to other works.

In this evaluation, ideas classified as imitations, e.g. a standard locking or lighting system would score one point. Variation ideas, (LED lights, a folding basket, use of recycled components etc.), scored two points. Combination ideas, (GPS technology, certain phone apps, solar panels etc.) scored three points. Transformation ideas such as finger print activated locks scored four points, and ideas classified as original creations would score five points. Members of the evaluation panel were asked to agree on a score for each team based on each concept's innovative content with reference to the Taxonomy of Creative Design.

The breakdown of scores for each team is listed in table 2:

Table 2. Team scores based on the Taxonomy of Creative Design.

Team Number	1	2	3	4	5	6	7	8	9	10	11	12
Original Creation	0	0	0	0	0	0	0	0	0	0	0	0
Transformation	0	0	0	4	0	0	4	0	4	0	4	0
Combination	12	0	18	12	21	9	12	6	9	0	12	0
Variation	10	15	10	6	6	6	10	6	12	12	10	10
Imitation	5	1	5	1	4	3	1	3	2	1	1	2
Combined Overall Score	27	16	33	23	31	18	27	15	27	13	27	12

Design Thinking Group		Control Group	
Team 1 High C (27)	Team 3 V. High C (33)	Team 2 High C (16)	Team 4 V. High C (23)
Team 5 Medium C (31)	Team 7 Medium C (27)	Team 6 Medium C (18)	Team 8 Medium C (15)
Team 9 Low C (27)	Team 11 V. Low C (27)	Team 10 Low C (13)	Team 12 V. Low C (12)

(Innovation score): Taxonomy of Creative Design



*Figure 1. Group & team innovation scores (in) based on The Taxonomy of Creative Design*

There was a clear difference between the scores from the design thinking teams (“odd” numbered teams) and the “even numbered” control teams, (see figure 1 & table 2). The average innovation score for all teams was 22.4. The average score for the control teams was 16.2 and the average score for the design thinking teams was 28.7 – a significant 82% difference overall. It is also relevant to compare teams in the design thinking team with teams in the control group made up of individuals with similar “creativity” scores – team 1 with team 2, team 3 with team 4 etc. (See table 3).

*Table 3. Innovation scores for teams made up of individuals with similar “creativity” Scores*

Teams Compared	Design Thinking cf. Control
<b>1 with 2 (High C)</b>	+ 69%
<b>3 with 4 (V. high C)</b>	+ 43%
<b>5 with 6 (Med. C)</b>	+ 72%
<b>7 with 8 (Med. C)</b>	+80%
<b>9 with 10 (Low C)</b>	+107
<b>11 with 12 (V. low C)</b>	+ 125%
<b>Average</b>	+ 82%

The design thinking team’s innovation scores were higher as a percentage than the corresponding control teams in each case and this difference was more pronounced in the teams made up of low & very low individual creativity scores. The possible reasons for this will be discussed later.

It was also interesting to look at where ideas fell on the Taxonomy, (table 4). The design thinking teams scored higher in all categories particularly in the combination & transformation categories, (lock incorporating GPS technology, handlebars with built-in pulse monitoring, energy consumed, calories burned linked to an app, frames made from bamboo etc.).

*Table 4. Team ideas position on The Taxonomy of Creative Design*

Taxonomy Component	Average score – Control Teams	Average score – DT teams
<b>Original Creation</b>	0	0
<b>Transformation</b>	0.7	2.0
<b>Combination</b>	4.5	14.0
<b>Variation</b>	9.2	9.7
<b>Imitation</b>	1.8	3.0

None of the teams submitted ideas that fell in the “original creation” category of the Taxonomy of Creative Design but perhaps this could be due to the short development time available?

## 4.3 Discussion

To evaluate the results, we held de-briefing sessions with the facilitators of both groups who had observed the team’s performance throughout the challenge. We also examined photographs, video footage and held post-challenge interviews with participating students.

First the **Control Teams**, with the exception of teams 4, and partly team 6, the control teams worked very differently to the design thinking teams. They were not given a specific process to follow and they did not propose one themselves and thus went straight to “solution mode”. The teams tended to fragment early with typically two or three members researching bikes on-line, two members generating ideas and one or two members were not really engaged. There was often very little communication between these sub-teams. Ideas were generated but often not captured or developed. The two low creative teams experienced difficulty in generating ideas. Sketches were made but again not communicated or adapted. This lack of building on the ideas of others contributed to the low combination score (table 4). We observed significant social loafing in four of the six teams. When it came to upload the final concept the team was usually down to four members with only two members of the team, one drawing & one writing, uploading the team concept and again several ideas appeared to get lost in the process.



*Figure 2: Students using the Sudoku Model*

Observing the **Design Thinking teams**, all teams followed the design thinking process and associated techniques. They started with generating user needs using sticky notes and an Empathy Map and moved on to re-framing these needs into “real” needs. For some teams this meant prioritizing or simplifying them, for other teams reframing was based on their insights around what would be desirable for users, technically feasible & create business value.

*The Sudoku Model is based on The Lotus Blossom Creative technique proposed by Yasuo Matsumura of Clover Management Research, Japan, (Lillicrap, 2011). The technique starts with brainstorming around a central theme or problem, (the core of the blossom). As brainstorming proceeds the central theme is expanded into sub-themes, (the petals of the blossom), which are figuratively “peeled back” as the problem is explored to reveal the solution(s) to the central problem or challenge. This visualization of ideas provides structure to the idea generation process and aids pattern recognition and the forming of relationships between ideas.*

The teams then moved to the idea generation phase using a “Sudoku” model, (figure 2) to capture and structure groups of ideas. They frequently used sketches and low fidelity prototypes to “try out” ideas and communicate them to others. The facilitators observed several instances of abductive “what would happen if we did...?” reasoning. The video footage of the conversations within teams revealed they often took the form of cycles of: articulation of an idea, discussion, agreement/disagreement, understanding, selection of the most promising idea then action, (often prototyping) and learning. The Sudoku model was observed to help students to capture ideas, recognize patterns, see connections between ideas and enabled them to build on the ideas of others within the team. The results of this idea building can be seen in table 4. The “low creative” teams (9 & 11) did have some difficulty in generating ideas relative to the other teams, however the facilitator was able to direct them to techniques such as empathy mapping, visualization and prototyping that would help them get started. Both facilitators and team members assessed the dynamics in all teams to be generally good, ideas were listened to & recorded. Team fragmentation was rare and only happened by agreement, (the team splitting up to do different things), and in general, results were fed back to the team. No significant social loafing was observed. When it came to deciding on and finally submitting the teams’ concepts, the design thinking teams had a clear visual record of the ideas generated making them easier to capture in the final concept.

Since the students were fairly new to the “design thinking” way of thinking and the workshop was rather short, how much of the designer mindset could we have expected to observe in the teams using design thinking? A design thinking mindset would take extended practice to acquire and Nigel Cross has described expert designers as ill-behaved problem solvers (Cross, 2004). However, we did observe some practices that are associated with a designer mindset: a focus on user needs and some use of abductive “what if?” types of questions as part of the ideation process.

The control teams did not use design thinking though they had been introduced to it four months previously. There can be several reasons for this but regardless, it does raise a question concerning the “stickiness” of design thinking and should be cause for reflection for institutions that wish to reinforce learning.

## 4.4 Does individual creativity matter?

It would appear to have an effect in the control group. The best performing team in this group (group 4) made up of very high creatives had no problem generating ideas however they also performed well as a team, they focused on the challenge and communicated well. The teams with the lowest score were the teams made up of low & very low creatives. The average score for the high creatives in this group was 19.5, significantly higher than the average score for the low creatives at 12.5. For the design thinking group, the team made up of very high individual creatives, (group 3) did achieve the highest score but there was little difference between the other teams. Apart from teams 3 and 5, there was no difference based on individual creativity.

This result was initially something of a surprise. The difference in individual scores between the very high creatives (average score 32.9 on the creativity test), and the very low creatives (average score 7.8) was very marked – a difference of around 400%. That the design thinking methodology helped the “lower creatives” is not surprising as the process, practices & other techniques have been developed to foster & maximize creativity. Notable though that the high & very high creative design thinking teams did not out-perform the other teams. One potential way to study this further would be to consider how the design thinking process and the nature of challenges like this one, (a very well defined problem) influence the high creatives. The systematic combination of step-by-step techniques is a common feature of design thinking and creativity models, (Wallas 1926, Amabile 1999), and we know from previous studies that models are helpful but should not be adhered to too rigidly, (Runco, 1994).

## 5. Case study Two: Design thinking with an ill-defined problem

The second case study was part of a design thinking five-day Summer School. Two teams of six students, (Team 1 & Team 2), were observed closely while engaged in solving an ill-defined problem using the design thinking methodology used in case study one. The design challenge, posed by a company that designs telephone apps, was to design a mobile phone app that would provide sufferers of ADHD/Autism (AUT) with a means of monitoring, and providing feedback on, their emotions thereby reducing anxiety in their daily lives. There are numerous telephone apps available that help sufferers with ADHD/AUT to manage their daily routine, what the sponsoring company terms their “outer life”. However, the company was looking for was a system for managing the “inner” emotional life. As far as we were aware this type of mobile phone app is not currently commercially available. What form this app would take & how this could be achieved was unknown and to solve this challenge, the teams would have to acquire substantial knowledge of the ADHD/AUT condition and what it means in terms of problems with self-direction, executive function & problems with social interaction, communication & stereotypical behavior.

Both teams succeeded in developing and presenting solutions that the sponsoring company considered innovative and feasible in terms of functionality & cost and these ideas are currently being developed further. Team 1’s concept contained several innovative elements, for example how emotions could be linked to certain events and represented in a form understandable to sufferers of ADHD/AUT.

However, Team 2's concept was far more sophisticated combining several bio-monitoring features and an emotional feedback and anxiety reduction system that could prevent anxiety actually reaching problem levels. Team 2 differed from Team 1 in two important respects. Firstly, in the level of knowledge they demonstrated about the subject, specifically a deep understanding of the ADHD – Autism – Anxiety cycle that is typical for suffers of ADHD/AUT and how this might be disrupted. Secondly in the way they acquired this knowledge.

None of the team members (or the facilitators) had any prior direct experience or specialist knowledge of ADHD/AUT. However the teams did have access to expert knowledge, in the form of their own on-line research but also importantly, a representative of the sponsoring company and suffer of ADHD was available each day to answer the teams questions and give feedback on their ideas but not to provide solutions. Actually they did not have them, what they were looking for was a product that does not exist.

## 5.1 Observations & Discussion

The way the teams operated was tracked throughout the week. Team 1 followed the design thinking process and observations resembled those in case study one. Their research was confined to days one & two and by the end of day two they had fixed on a concept which they continued to prototype and refine in days three and four. Team 2 took a different approach. For the first day, the team followed the design thinking process & practices, empathy mapping as part of the research phase, gathering insights and generating initial ideas. However by day two they had started to follow a different pattern which is illustrated in figure 3. Team 2 were engaged in what Engle & Conant (2002:44) describe as *research – share – perform* cycles, where “students collaboratively construct meaning and action thereby transforming the classroom into a community of discourse”. The way Team 2 operated also reflected several themes associated with knowledge building as proposed by Scardamalia & Breitner, (2006). Their focus was on acquiring knowledge & knowledge was advanced as a community – not just individuals. The team frequently created what are termed in knowledge building circles as “epistemic artifacts”, these could take the form of prototypes & models but were often in the form of ideas, concepts or theories which were used to create further knowledge. Knowledge advancement was via the continuous improvement of ideas rather than a preconceived idea. At the start of the challenge, team members had no idea how to solve it, or if indeed they could solve it given their lack of knowledge of a complicated condition. Iteration sessions gradually became focused on idea improvement, not just idea generation and this guided the students towards a solution. The team's continued to pursue deeper knowledge of ADHD/AUT. The on-going team discourse was centered around collaborative problem solving, sharing ideas, critiquing these ideas and shared understanding. The discourse was more than just knowledge sharing, it had more to do with critiquing, constructing & refining this knowledge. Effective use was made of “expert” sources of information. In addition to their desk research this included company representatives, sufferers with ADHD/AUT and other external experts. They continued to reflect on what they knew, what were their most promising ideas, what they need to know & what action plan they would need to move forward & this action was often further research.

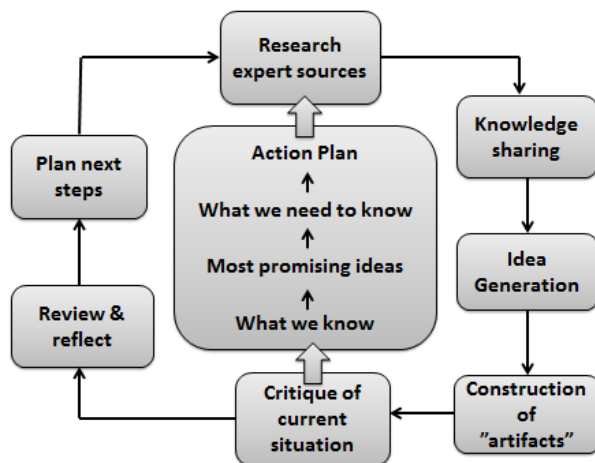


Figure 3. Model of Team 2's working style.

Their concept gradually emerged over the five days of the workshop as their knowledge of ADHD/AUT expanded. As they knew more, they could begin to develop innovative ways in which the condition could be bio-monitored and meaningful feedback given that would reduce anxiety provided via the phone app to both the sufferer and persons assigned to their care, (parents &/or medical professionals).

Team 2 had demonstrably acquired a great deal of knowledge about ADHD/AUT going from “very little” at the start of day one, to what the sponsoring company representative described as “deep understanding” at the conclusion of the workshop. This knowledge was built collectively in a knowledge sharing culture.

Team 2 had no prior knowledge of collaborative knowledge building and it was not covered in the workshop. Several models have been proposed aimed at explaining how knowledge management takes place at a communal level. In Nonaka & Takeuchi's (1995) model of knowledge creation, Knowledge is produced in a collaborative manner, not only in individual minds. In Engeström's Model of Expansive learning (1999), the questioning and criticism of existing practices is the base for the expansive knowledge cycle. In Scardamalia & Bereitner's, (2006) concept of knowledge building, questioning and problems of understanding are the driving forces for progressing knowledge building. What these models have in common is that they attempt to determine how communities should be organized in order to facilitate knowledge advancement & communication, (Paavola, Lipponen & Hakkarainen, 2004).

This is a work-in-progress and what we plan to explore further is the question: could design thinking's DNA be enhanced by including a strand of knowledge building? According to Nonaka & Takeuchi (1995) the key to innovation is knowledge. They have described innovation as a process of creating & defining problems and actively creating knowledge in order to solve them. Would an increased focus on the principles & techniques of knowledge building, combined with the processes & practices of design thinking, create synergy between the two approaches and further develop problem finding and innovative concept development? Could what some highly effective teams do implicitly be made explicit to all involved in design innovation, especially when innovation requires a high level of knowledge acquisition?



## 6. Conclusions & Further Research

Helping students think creatively and understand what is required to make innovative ideas feasible is becoming increasingly important and, as seen in this study, ideas are vulnerable in their infancy, (Blakely 2013). The application of a design thinking process, practice & persona to a well-defined product design challenge did result in concepts evaluated to be more innovative than the products produced by control groups without the use of design thinking, even in this short intervention challenge. Observation of the design process and idea generation & selection revealed that the design thinking methodology helped students spend more time evaluating & prioritizing real user needs. Design thinking practices such as visualization, pattern recognition and rapid prototyping helped communicate ideas and synthesize them into a final concept. Practices associated with a design thinker mindset, a focus on user needs and use of abductive thinking helped to progress ideas forward. Overall, the design thinking methodology appeared to facilitate team cohesiveness.

Individual creativity, as measured by our test, did appear to have an effect on team performance in the control group but less so in the design thinking group where design thinking seemed to raise the performance of teams made up of members with low & medium creativity scores. The observation that the design thinking teams performed significantly better in terms of innovation relative to the control teams is interesting as the majority of students, (people?) fall into the medium to low creativity range if the test used in this trial is a fair representation of creativity. This link between adopting a design thinking methodology and increased innovative output of teams of different creativity levels will be explored in further trials.

It has been said that design is a social process and should not only be regarded as a problem-solving activity but also as a knowledge generation & integration activity, (Hatchuel, 2002). In the second case study, design thinking was observed to organize team work around a project and projects present an opportunity for collective knowledge sharing via facilitated peer collaboration. Clearly learning was taking place in the design thinking teams. However, in this challenge, which required knowledge to solve it, one team adopted a superior knowledge acquisition strategy containing several features associated with models of collaborative knowledge building. This resulted in them developing a more innovative solution to the ill-defined problem presented to them. This is a work-in-progress and possible links between design thinking and collective knowledge creation will be explored further across a range of problem types and knowledge acquisition requirements.

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# Exploring the Impact of Power Distance on Co-design Workshops

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**Abstract:** Co-design is a design approach where people without design skills actively collaborate with people with design skills to create new products or services. This approach is widely used in Europe, especially Nordic countries, while it is not much developed in Japan. Cultural studies have identified major differences between Japan and Nordic countries. This paper explores the impact of Power Distance (PD), which illustrates way a person behaves in the presence of a person from a different “hierarchical” level, through a lab-based experiment: we observed the behaviour of groups with low or high PD scores engaged in creative design activities, and when a design expert joined the group or not. The findings show that, depending on the cultural background of the participants, their involvement in idea generation was affected by the presence of a designer. This work is expected to support the development of culturally-adapted methods for design collaboration and creativity.

**Keywords:** Co-design, cultural dimensions, power distance, design collaboration, design creativity

## 1. Introduction

In order to solve social issues that are too complex to be solved by a single stakeholder, several approaches have been proposed (Vezzoli, Ceschin, Diehl, & Kohtala, 2015). social innovation, as “new ideas of simultaneously meeting social needs and creating social relationship or collaborations”, is one of the promising ways to solve social wicked problems (Rittel & Webber, 1973), because it can make the traditional boundaries blur by creating new social relationships and collaborations. In social innovation approach, designers are expected to take a leading role, as the facilitators of a “co-design” process, together with citizens (Manzini & Coad, 2015).

International networks of researcher towards a sustainable society have been created. “Design for Social Innovation and Sustainability Network” (DESIS) is one of the networks aiming at using design knowledge to co-create social innovation. DESIS network consists of 40 labs worldwide, as of 2016 (“Design for Social Innovation and Sustainability (DESIS),” 2017). “Design and Social Innovation in

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Asia-Pacific” (DESIAP) research network observed a growing number of social innovation being established in Asia, especially Hong Kong, Singapore, Korea and Japan in 2016 (“Design and Social Innovation in Asia-Pacific,” n.d.).

We are especially interested in the situation of Japan where the main actors of social innovation are non-profit organizations (Fujisawa, Ishida, Nagatomi, & Iwasaki, 2015) and where the number of places like Living Labs, promising and dedicated spaces for co-design, (Følstad, 2008) is still very limited. (“Design and Social Innovation in Asia-Pacific,” n.d.) One of the few examples is the “Fukuoka Citizen-Led Innovation” and its “Pilot Lab”, led by Re:Public Inc. in a public-private partnership. (“Re:public Inc.,” 2017) While design for social innovation is widespread in Europe, this approach is still unusual in Japan.

Our objective is to develop social innovation initiatives in the Japanese society and to create new tools for that purpose, as it has been done in Australian context (Akama & Ivanka, 2010). In this paper, we describe how cultural differences can be taken into account in the practice of co-design for social innovation. First, we review various contexts of design for social innovation and related studies that explore the impact of cultural dimensions on the practice of design. Then we report the preliminary results of a lab-based experiment aimed at observing the influence of the cultural dimension of Power Distance (Hofstede, Hofstede, & Micheal, 2010), a dimension measuring the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally on the collaboration between designers and non-designers in a design activity and their creativity in this process.

## 2. Related studies

### 2.1 Co-design, a collaborative design activity between designers and non-designers

Design practice has progressively involved the end-users in the process of creation of new products or services, with two major approaches: “user-centered design” and “participatory design”. In the first approach, developed in the United States, designers interview and/or observe passive users. On the other hand, the participatory design approach, originated in Europe about 40 years ago, users actively participate in idea generation (Björgvinsson, Ehn, & Hillgren, 2012). Co-design appeared as a sub-branch of participatory design (Sanders & Stappers, 2008). Kleinsmann defined co-design as the process in which actors from different disciplines share their knowledge about both design process and the design content. They do that in order to create shared understanding on both aspects, to be able to integrate and explore their knowledge and to achieve the larger common objective: the new product to be designed.” (Kleinsmann & Valkenburg, 2008). It has the power to change users’ perception of things, which is sometimes necessary to implement social innovation (Vezzoli et al., 2015). Co-design has fundamental prerequisites which are inherited from characteristics of participatory design: Equality, Open discussion and Commitment from participants (Yasuoka, Nakatani, & Ohno, 2013).

The transition between classical user-centered approach and co-design differentiates the role of designer (Figure 1). In classical approach, researchers observe users and report to designers. The designers merge the information given by researcher and the knowledge of technology to add concept and idea of products. In co-design, the designer supports and facilitates the generation of

ideas by other participants and the development of knowledge with tools which are developed by the designer and/or researcher (Manzini & Coad, 2015).

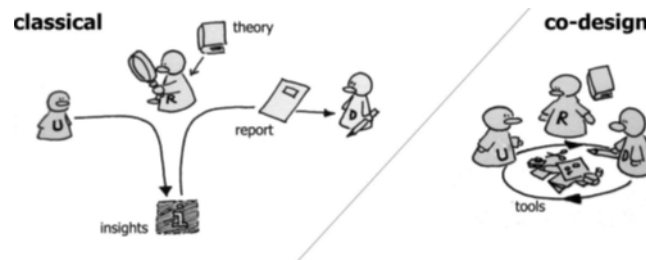


Figure 1. Classical roles of users, researchers, and designers in the design process (left) and how they are merging in the co-designing process (right). (Sanders & Stappers, 2008)

To summarize, co-design is a design approach where people without design skills - citizens/users - actively collaborate with people with design skills - designers -, in order to generate ideas and create new products or services. This approach is widely used in Europe, especially Northern Europe and Nordic countries ("European Network of Living Labs,," 2017.), while it is not much developed in Japan ("Design for Social Innovation and Sustainability (DESIS),," 2017).

## 2.2. Cultural differences between Nordic countries and Japan

Numerous studies have identified dimensions that conceptualize (national) cultures. Hofstede (Hofstede et al., 2010) advocated six dimensions of culture: individualism vs. collectivism, power distance, uncertainty avoidance, masculinity vs. femininity, long-term orientation, and indulgence vs. restraint (cf. Table 1).

Table 1. Cultural dimensions, as defined by Hofstede [12].

Criteria	Definition
Power Distance (PDI)	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally.
Individualism (IDV)	defined as a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families.
Masculinity (MAS)	The Masculinity dimension represents a preference in society for achievement, heroism, assertiveness and material rewards for success. Society at large is more competitive. Femininity stands for a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented.
Uncertainty Avoidance (UAI)	The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these.
Long Term	How every society has to maintain some links with its own

Orientation (LTO)	past while dealing with the challenges of the present and future.
Indulgence (IND)	Indulgence stands for a society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun.

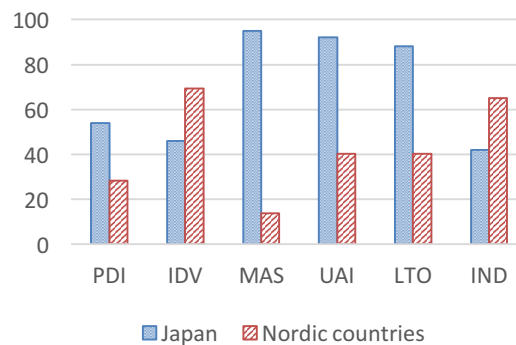


Figure 2. Scores of cultural dimensions for Japan and Nordic countries

Japan and Nordic countries (Finland, Sweden, Norway and Denmark) have major differences in all six dimensions (Table 1). More precisely Power Distance scores, 54 in Japan vs. 28 in Nordic countries, show that Japanese society is more hierarchically organized than Nordic countries' societies, which might be a barrier to a fruitful design collaboration between people with different backgrounds, skills and roles in the society. Individualism scores, 46 for Japan, and 69 for Nordic countries, show that Japan is a collectivistic culture, where people more value the harmony of the group they belong to than their individual expression. Uncertainty Avoidance is high in Japan, 92, one of the highest in the world, while it is rather low in Nordic countries, 40, which implies that Japanese people are reluctant to do things without any antecedent.

Table 2. Map of related studies

	Pre-design	Generative	Evaluation
Investigated design method national cultures of experimentation	Context-mapping [15] <i>The Netherlands - South Korea</i>	Generative session [24] <i>South Korea - Vietnam</i>	
		Group Discussion [14] <i>Finland - South Korea</i>	
		Focus group discussion [15] <i>South Korea - The Netherlands</i>	Think aloud / post-usage interview [17] <i>United Kingdom - India - East Africa</i>
		Design Game [26] <i>Japan - Denmark</i>	Think aloud / plus-minus method [11] <i>The Netherlands - India</i>

		/ Indonesia / China / Turkey / Sedan
		Questionnaire/ Think aloud/ Interview [8] United States - United Kingdom - The Netherlands - Japan
Cultural influence on design collaboration	N=1 emailed based interview with designer in Design consulting firm [23] <i>Europe-Japan</i>	
Socio-Cultural differences and design [3]		

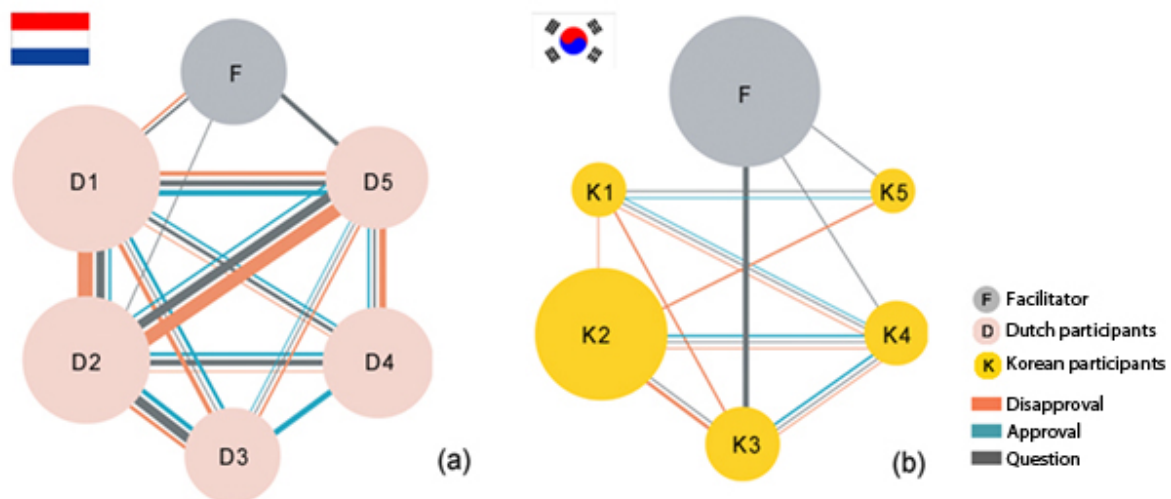


Figure 3. Each member's verbal participation and member-to-member verbal interaction (a) in the Netherlands and (b) in South Korea: the size of circles displays the number of utterances by each member and the thickness of the lines displays the frequency of member-to-member verbal interaction. The different types of member-to-member interaction ("disapproval," "approval," and "question") are symbolized with different colors. [15]

## 2.3. Dealing with cultural differences in design practice

Since designing is a social activity based on collaboration (Françoise Détienné, Baker, Vanhille, & Mougénou, 2016), we assume that the score differences for Power Distance, Uncertainty Avoidance and Individualism dimensions might have a major impact on the way people engage in collaborative design activities and especially co-design. There have been several research to take cultural differences into account for formulating design methods. The co-design process is divided into four steps; pre-design, generation, evaluation and post-design. (Sanders & Stappers, 2014) Table shows a map of eleven related studies, each one of seven studies belonging to one of these steps, two researches cover two phases and two studies cover all phases..

Lee & Lee (Lee, 2009) investigated differences in verbal communication styles in focus group discussion among two different cultures; Netherlands and South Korea. They analyzed two focus groups of five engineering students, with a focus on participants utterances and the direction of group interaction. Figure 3 shows that

Dutch participants made more utterances than South Korean participants and that the South Korean facilitator had a more prominent role as compared to the Dutch facilitator. Also there were fewer interactions among participants in South Korean group.

Based on these findings, tools and recommendations were created to support focus group discussion in East Asia, especially South Korea. For instance, Mini-me dolls (Figure 4) were proposed to avoid a too direct communication style between participants. On the “Mini-me dolls”, participants can draw a face to express their own identity, thus the doll can be used to express opinions indirectly.

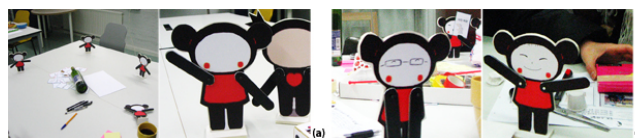


Figure 4. “Mini-me” dolls: (a) before faces are drawn (b) after drawing faces (Lee & Lee, 2009)

Also, the following five tips were proposed. (Lee & Lee, 2009)

1. Foster sensitivity and motivation by providing playful props and activities.

Utilizing playful stimuli allows participants from East Asia to feel comfortable with the interview situation and to become motivated.

2. Provide for indirectness by facilitating imaginary roles and situations.

Participants from East Asia become empowered in role playing and imaginary situations that support indirect communication.

3. Ice breaking is especially important for East Asians.

Participants from East Asia need more time to become accustomed to the interview situation and other members. Try to open dialogues before a focus group interview by providing pre-tasks or informal meetings. Playful props and activities will also help to break the ice in the beginning.

4. Place tasks of evaluation and critique in the latter part of focus group interviews.

Participants from East Asia tend to be reserved in the early stage of focus group interviews. However, they become more active once they gain familiarity with the interview situation and the other participants. Place tasks requiring criticism in the latter stage.

5. Visualize respect for their participation and information.

Showing approval of and respect for the participants’ opinions will give them certainty and motivation.

The findings about cultural influence on design revealed by the related studies were classified into six issues; sharing ideas freely within a hierarchy, collaborating with strangers, harmony of group, trust with facilitator, avoiding ambiguous assignment, and lack of a common language.

- Sharing ideas freely within a hierarchy

As East Asia is a hierarchical society, people are less comfortable to openly express opinions with people in a different position. Conducting workshops with different hierarchy positions leads to a situation where people in high position are the only ones to talk. (Boeijen & Stappers, 2011; Lee & Lee, 2009; Taoka et al., 2016; Yasuoka et al., 2013)



- Collaborating with strangers.

People need time to immerse in the context of workshops and to get comfortable in front of strangers. (Taoka et al., 2016; van Boeijen, 2015)

- No Trust with facilitator

The participants should feel respected and be convinced of the usefulness of their participation. They also need to trust facilitators' intention. (Lee & Lee, 2009)

- Harmony of Group

Due to high LTO, people hardly disagree with implicit conclusion/direction of group discussion. It leads to less diversified discussion. On the other hand, it is also reported that in a workshop with Japanese participants, they have tendency to listen to each other more and every participant gets a chance to speak out. This issue seems to have both positive and negative impacts in a design workshop. (Hall et al., 2004; Lee & Lee, 2009; Yasuoka et al., 2013)

- Avoid ambiguous assignment

Avoiding ambiguous assignment were recommended due to high UAI. People are uncomfortable with ambiguous design tasks. Consequently, the facilitator should clearly explain what is expected in the session. On the other hand, they seem to stick to the design assignment more rigorously. (Taoka et al., 2016)

- Lack of a "common language"

Facilitator should speak participant's language. It is not only about speaking languages. When participants who are not comfortable to draw, they sometimes feel ashamed. The confidence of "language" in design process is important factor to make sure participants contribute. (van Boeijen, 2015)

## 2.4. Summary of related studies

On one hand, co-design is based on an active collaboration between people with different levels of design skills (designers and citizens), in other words "experts" and "non-experts". On the other hand, cultural studies show that, depending on the Power Distance score of people in a group, the hierarchy in the group will affect their behaviour in a different way.

## 3. Research question and hypothesis

Based on aforementioned studies about co-design and cultural dimensions, this research aims at exploring how the Power Distance score impacts co-design workshops where experts and non-experts are invited to collaborate.

Our hypothesis is that nationals from countries with a high Power Distance score, such as Japan, might not participate in co-design workshops as much actively and/or freely as nationals from countries with a low Power Distance score, such as Nordic countries. Based on the description of Power Distance, we expect that Japanese non-designers, in a lower hierarchical position (or perceived as such) than design experts, would not feel the permission to fully contribute to design activities such as idea generation, unlike Nordic countries non-designers.

## 4. Experimental Approach

An experiment was conducted to explore the influence of the presence of a design expert (professional designer or design instructor) in co-design workshops. We observed lab-based design activities where a group of four participants was given two design tasks in two different conditions: with or without a design expert. We conducted four sessions (Figure 5) in two different conditions: one involving participants with low Power Distance Index (PDI) / Uncertainty Avoidance Index (UAI) and the other, participants with high PDI/UAI. Every experiment was divided into two design tasks, one with four non-experts (no or limited design experience) and one with three non-experts and one expert. The experimental design was counterbalanced, to avoid any order effect. Participants with similar PDI scores were randomly assigned to follow one of the two settings.

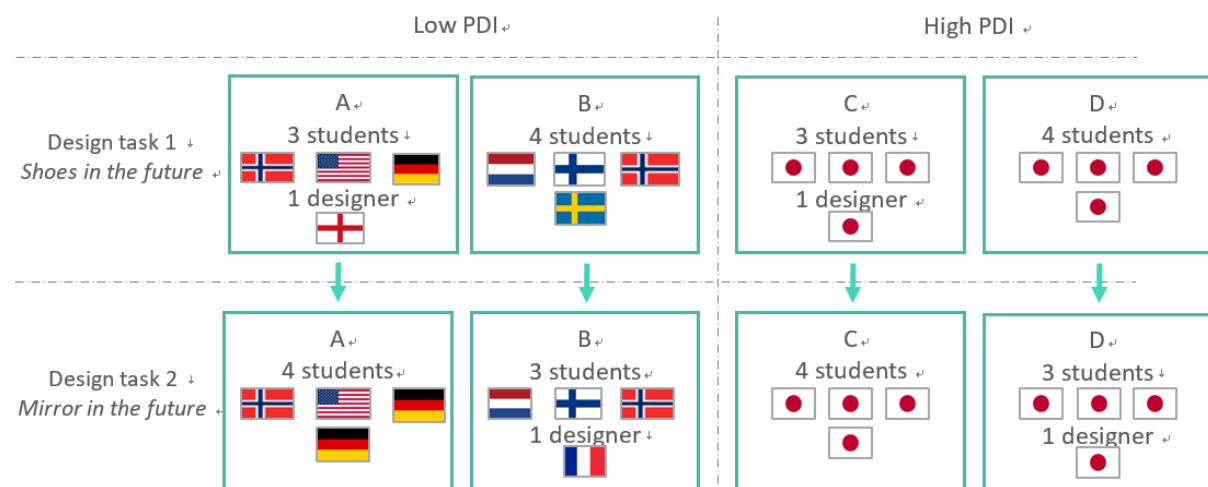


Figure 5. Experimental procedure

### 4.1. Participants

20 participants were selected based on two criteria: (1) level of design expertise and (2) scores of Power Distance and Uncertainty Avoidance.

**Level of design expertise.** 16 non-experts, i.e. students from Engineering/Science departments of a Japanese university, and 4 experts, i.e. 2 professional designers from design agencies and 2 design instructors in the Design department of a Japanese university, all being introduced to the other participants in the experiment as “design professionals”. The ages ranged 21-27 for students and 27-47 for designers.

**Power Distance and Uncertainty Avoidance.** The first screening consisted in inviting students from Japan and from “Western countries” to apply. Then their Power Distance and Uncertainty Avoidance were assessed by a questionnaire [22]. Only applicants with either low or high PDI/UAI scores were selected for the experiment, it was checked that the average score for both groups were significantly different. The batch of selected participants consisted in 8 Japanese students for the high PDI/UAI group and 8 students from various countries (Norway, USA, Germany, Dutch, Finland, Sweden) for the low PDI/UAI group. “Low PDI sessions” were held in English, while “high PDI” sessions” were held in Japanese.

The participants received a small reward for their participation. The experiment was approved by the ethics committee of Tokyo Institute of Technology.



## 4.2. Protocol

The participants were asked to join a co-design workshop, consisting in twice the same task based on two different briefs: (1) idea generation (generating as many ideas as possible), individually then in group, (2) idea selection (selecting one idea) and (3) idea presentation (sketching the idea and presenting it to the experimenter). After a short break, the second task followed. The design briefs, “Shoes of the future” and “Mirror of the future”, were kept simple, so that the participants could quickly start. Every session lasted 22mn. Participants were provided with sticky notes and pens. The experiment took place in a neutral room, with no visual stimuli that could obviously affect creativity, such as pictures on the wall. The experimenters were from Japan (2), speaking in Japanese, and from France (1), speaking in English.

## 4.3. Data collection

Questionnaires were given to the participants and the experiment was video-recorded. Questionnaires had two types of questions regarding quality of collaboration. In the end of a session questionnaire of quality of collaboration was given to measure each participant’s perception on collaboration process and collaboration outcome. The questionnaires were given either in English or in Japanese, so that the participants could accurately understand each question.

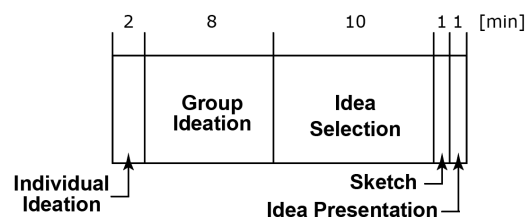


Figure 6. Experiment timeline

The questionnaire about the quality of collaboration was developed based on “QC2” questionnaire.[7] It is an updated version of proposed multi-dimensional rating schemes of evaluating quality of collaboration [5,6,19]. QC2 has thirty-three questions in eight dimensions which belongs to three categories. We kept questions which are both relevant to the design task and possible to be evaluated by the participants themselves. We also added new questions to ask their perception of their own group work. Each item is assessed on a five-point Likert scale, where higher score means stronger agreement. The questionnaire also has space for free comment regarding the session.

## 5. Results and preliminary analysis

In this part, we report the results from our analysis. First, we show quantitative results from questionnaires that were given to participants to evaluate the quality of collaboration. Then we present qualitative results from the analysis of the videos and participant’s free comments on the questionnaires. Figure 7 shows examples of the design outcomes generated by the participants, each idea has also been described in a one-minute video.

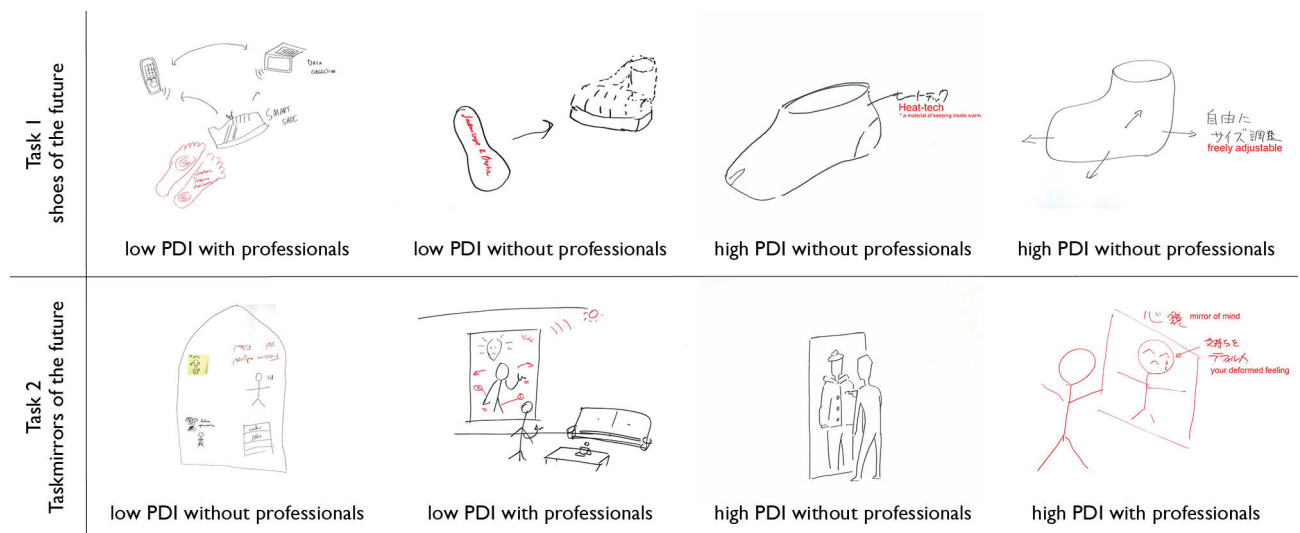


Figure 7. Outcomes of the design workshops

## 5.1. Evaluation of the quality of collaboration as perceived by the participants

As our goal is to compare the influence of the presence of a design expert on the participants, we only considered the results of the participants who took part into the two design tasks, one with an expert (A) and one without (B). Three participants per group took part into both, so we analyzed results from twelve participants. Our goal here was to compare if the designer's influence is bigger with participants having a high PDI than those having a low PDI. The questionnaires' results have been analyzed with Mann-Whitney test and Wilcoxon Signed Ranks Test. We found significantly different results for:

- “Q1: How should the interpersonal relations between group members be described?” (1.friendly - 5.conflictual),
- “Q2: Was it easier to talk with the group members after the experiment than before?” (1. not at all - 5. extremely).

Table 3. Statistically significant results from the questionnaire

	Low PDI group average	High PDI group average	Sig. (2- tailed)
Q1	3.67	4.83	p=.006*
Q2	3.33	4.83	p=.010*

## 5.2. Qualitative evaluation of the collaboration by experimenters

Based on experimenters' observations, video records and free comments of the participants on the questionnaires, we identified interesting facts about the designer' influence on:

- Individual collaboration: to what extent each participant speaks out.
- Collaboration style: how the discussion was organized, who took the lead during discussion
- Low PDI groups

About individual contribution, we observed clearly in both groups that there was a lot more discussion with the designer. With him, the discussion was denser and it

enhanced individual contribution for most of the participants. In one group, right after the end of the group ideation one of the participant said “Wahh, intense 8 minutes!” showing that the task with the professional required more contribution from them. Indeed, they were cut by the timer in both groups with the designer whereas on their own they usually spend the last minute reviewing their work. In one group the designer wrote that it was “difficult to fully explore people’s thinking with limited time” proving that he tried to get the best out of everyone and that he had the feeling that they could have gone even further. On the other end we also noticed that, among the three students who participated in both design tasks, when the two biggest contributors’ contribution raised significantly with the designer, the smaller contributor’s contribution dropped.

About collaboration style, during group brainstorming without designer, participants tend to mostly share their ideas generated in individual brainstorming and combine them. As a consequence, most of the ideas were generated in the individual idea generation. On the opposite, when the expert is involved, participants tend to debate more and build on each other’s idea. The designer brings his/her experience of design workshops and tends to enhance the synergy of the group. The group ideation generated more new ideas with him/her as they built a lot on everyone’s ideas and almost every idea was commented by the others and followed with related ideas. One of the participants wrote:

*“When there is a designer in the group, he naturally takes the lead. Without him, we would have combined more things”.*

- High PDI groups

About individual collaboration, in groups with professionals, we observed that before participants shared foolish ideas they hesitated, such as “this is a kidding”. It indicates that the participants were not so confident sharing their ideas and were afraid that some participants might criticize negatively their ideas. “I was a bit nervous” wrote one of the students about the task including a designer, showing how his presence influenced his/her contribution.

About collaboration style, as for the low PDI group, we observed that participants were building more on each other’s ideas when a professional designer was in the group. The collaboration style, as well as the topics of discussion, were mostly decided by the professionals. Whenever the latter suggested a way to proceed, it was automatically accepted by the students and the participants tended to follow blindly their instructions. One of the participant’s comment illustrated this well:

*“I felt that I tended to follow design expert’s opinion”*

Another phenomenon we observed was that, unlike the low PDI group, Japanese participants never criticized each other’s ideas. When they had to select the best idea from those generated by the group, the final decision was made by majority vote in both sessions without a design expert; on the other hand, with a design expert, although one group tried to decide by majority vote, they did not stick to the number of votes in the end, following the expert’s saying:

*“This is not a majority vote. The most important factor to decide is your enthusiasm for ideas assuming that now we are about to decide the theme of project we work for a year.”*

Finally, the decision was made by the design expert.

## 6. Discussion

### 6.1. Different reactions to be guided depending on PDI group

Based on written free comment of participants of both PDI groups, we observed that participants felt the influence of the presence of a design expert. One participant in the low PDI group mentioned:

*“When there is a designer in the group, he naturally takes the lead.”*

While a participant of high PDI group said:

*“I felt that we had tended to follow professional designer’s opinion”* (translation by authors)

However, the reactions to the professionals’ existence were different. Based on the Q1 on collaboration questionnaire, in workshops with high PDI group, they thought there were more conflicts in a session without a designer than with. There are no differences in low PDI group. Students of high PDI group might feel less conflicting because they just followed professionals, not opposed in a session because of their high PDI scores.

Based on the Q2 on collaboration questionnaire, in high PDI group, participants got closer to other participants through session with design expert, while the students in low PDI group answered the same as before. This proved their each PDI scores. With high PDI score, people feel uncomfortable and not easily becoming friendly without any interaction, when there is a person in a higher hierarchical position. Five Japanese participants mentioned their enjoyment in session in free comments:

*“We had fun during the session”*

is one of the comments, and it illustrates how the atmosphere influences their feelings to the hierarchy.

We might be able to conclude that there was less conflict, because the students were guided by a professional designer in a session and might have felt comfortable to be guided in a session. Also, there might have been implicit agreement of following professionals and letting professionals to make final decision among students’ participants. It reduces the possible conflicts during idea selection.

### 6.2. High PDI participants tend to follow the designer’s lead

As mentioned above, high PDI groups seem to “rest” on the designer and to follow his lead blindly. They seem to feel more at ease when someone experienced in this kind of tasks is involved. It can be explained by their high UAI scores, they are anxious about exploring new topics and participating to tasks they are not familiar with and so they feel reassured having someone with experience to lead them within the group.

For low PDI groups, it is a little bit different. They are aware of the importance of the designer’s contribution and they appreciate it, especially about his experience in group brainstorming. But where the high PDI groups seem to feel more at ease with him, they seem to find his presence challenging. Where the high PDI members see this as an opportunity to follow his instructions as like a teacher and

students, low PDI groups seem to see this as an opportunity to enhance their own contribution.

### 6.3. High PDI groups might need support to be critical or they might not need criticism in a session.

We observed that groups with low PDI commented a lot each other's ideas, especially when the designer was involved. They were encouraging debate and comments about ideas generated and thanks to this were able to go further and to generate new ideas. On the opposite, there was little criticism during every session regardless designer presence with high PDI group. It can be explained as a way to keep the harmony of the group. Two Japanese participants wrote that :

*"People who tend to deny other's idea are not suitable for this kind of task".*

They feel more uncomfortable to share their ideas if other participants are willing to criticize. Indeed, in order to reduce the conflicts within the group they agreed or responded favourably on every idea. Additionally, they often chose which one he/she liked most and gave reasoning. It might be because they might think it was the most democratic and equal way. Also, reasons why he/she like ideas drives discussion. It seems something similar to "I like, I wish" method.[31] With positive feedback they conduct discussion. As we observed less criticism in low PDI groups, we typically think that we need to create tools to support them to criticize. However, it might not be need to do discussion.

### 6.4. People with high UAI tend not to share their thought

In the low PDI groups, two participants (one in each group) suffered from the designer's presence for sharing freely their ideas. We noticed that these two were the ones with the highest UAI among the low PDI groups. One of these two wrote:

*"Your ideas might not be considered by the group"*

following the task conducted with the designer, proving here he/she was not comfortable sharing ideas in this configuration. Indeed, someone who is already not very comfortable sharing freely his/her ideas with some people in the same position will struggle even more with someone in a higher position. That may explain why Japanese sometimes struggle with expressing their thoughts. As Japanese also often have a high UAI, this could explain why they have issues sharing their ideas. Moreover, not being comfortable with your ideas lead to follow the participant supposed to have the best ideas, the designers.

### 6.5. Collaborating with strangers is a barrier for both groups

Time helps getting a friendly atmosphere as one designer in low PDI group highlighted saying "Time is important. It takes time for people to feel comfortable and share their ideas freely. It is only at the end of the session that we felt all ok and shared easily". This emphasizes how important it is to create a relationship between participants to enhance individual contribution as well as collaboration. It seems small talk among participants before the experiment helps them to be released from the barrier.

## 7. Limitations

We conducted a first series of experimental sessions and because of the limited number of participants (20), we can only draw preliminary conclusions at the time

of writing the paper. However, the materials collected so far enable us to finely describe how the participants perceived the presence, or not, of a design expert in a co-design group, and his/her influence on their participation in design activities.

## 8. Conclusion

Co-design is notably less developed in Japan than in Western countries, especially Nordic countries. There are several reasons for that and we assume that cultural factors are one of the most impacting factors. In this preliminary study, we identified Japanese cultural characteristics that might prevent the mapping of the European co-design model to Japanese society. “Power Distance” might prevent equal participation in a workshop with people with different roles or status. We conducted experiments to explore influence of employing people with different status, students and design experts. The preliminary analysis revealed that the participants were aware of the influence of a design expert in a co-design group. It seems that Japanese participants have issues to speak out in group design activities. New tools for co-design in East Asia could aim at increasing perceived individuality in design activities and/or give ways in which participants can “speak out” without verbal interaction. Through further analysis and interpretation, we aim at developing tools and guidelines for co-design in Japan, and more generally to understand what factors affect the success of a “group creative process” in a given cultural context.

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# [DiaGram]; Rethinking Graphic Design Process

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**Abstract;** Central to any graphic design education is the teaching of a design (or creative) process as an aid to problem-solving. This study draws upon experimental workshops within design education, together with current thinking from the broader arts, emotional psychology and the brain sciences, to explore the idea of repositioning process as the ‘main event’ – rather than it being a means-to-an-end. The study sought to frame learning experiences that enabled students to consciously become the object of their own study; including themes that explored ‘personal identity’, ‘dualism’, ‘mind-wandering’ and ‘habit’ as mechanisms to enhance our creative capacity, and evidenced significant improvements in the students’ confidence, dexterity and working methodologies (including the elusive ‘risk’ and ‘play’). The emerging conclusions propose key anchors (‘dissociative creativity’, ‘process as the main event’, ‘collaboration’ and ‘immersion’) that we believe ought to be central to the development of any new teaching (esp. within graphic design).

**Keywords:** Design, education, process, creativity, risk

## 1. Introduction

In this paper, we’d like to share some of the on-going developments to our teaching practice on the BA(Hons) Graphic Design Course at Falmouth, and the underlying principles that are fuelling these changes. In particular, we’d like to propose what we believe is a fundamental shift in the way we (and other courses) are starting to think about collaboration, immersion and the role of a broader design process in our teaching.

Falmouth University has grown from its early days as a provincial Art School in 1902 into what is now the No.1 Arts University in the UK <sup>(01)</sup>, and remains one of the few specialist Arts institutions in the country. The Graphic Design course at Falmouth is held in very high regard within both academic and industrial circles, and as part of the School of Communication Design we received the most Student D&AD Pencils of any department in the world in 2016 <sup>(02)</sup>.

The history of Arts Education in the UK has been well documented, and teaching at Falmouth broadly follows the pattern of many of the leading institutions in the country whose roots stretch back to William Morris and the Arts & Crafts movement in the late Nineteenth Century. These early models, with the heavy focus on the 'artist' and their 'craft', were later shaped by the Bauhaus' philosophy of a more integrated and unified education – where industry and efficiency embraced emerging technologies to create a brave new view of the world. Many vocational art & design courses, including our own, still bear the echo of Gropius' original vision.

However, with significant changes in the way that Higher Education is now funded, the commercialisation of the sector (students as 'customers') and the 'data-driven' management models utilised to drive efficiency and hit targets, we find ourselves in a very different landscape to many of our predecessors. Education is big business. Our experience has been that this can be quite depressing if you dwell on it for long enough, ultimately arriving at a point where you either accept the inevitable and go with the flow, or vote with your feet and get out. Or, perhaps, you start to re-question what you do, why you do it, and begin to re-invent the nature of your teaching from the inside out – which is what we are in the process of exploring.

## 2. Context

Central to any graphic design education is the teaching of a design (or creative) process. We have our own version (*Figure 1*), as does the UK Design Council (*Figure 2*), most design agencies, and pretty much every other design course in the country. Design doesn't claim ownership of creativity but perhaps it is the discipline that has focused the most attention on identifying what 'it' is and on finding ways of communicating 'it' to others. This focus has intensified in recent years, an unintended consequence of which has been the rise in 'Design Thinking' courses within business schools, but also – and perhaps more surprisingly, has been the convergence of the 'designer' and the 'self-help guru' that we see unfolding with increased frequency on social media platforms such as Twitter, Medium and LinkedIn. Perhaps, 'a Culture of Fame meets the Society of the Spectacle'.

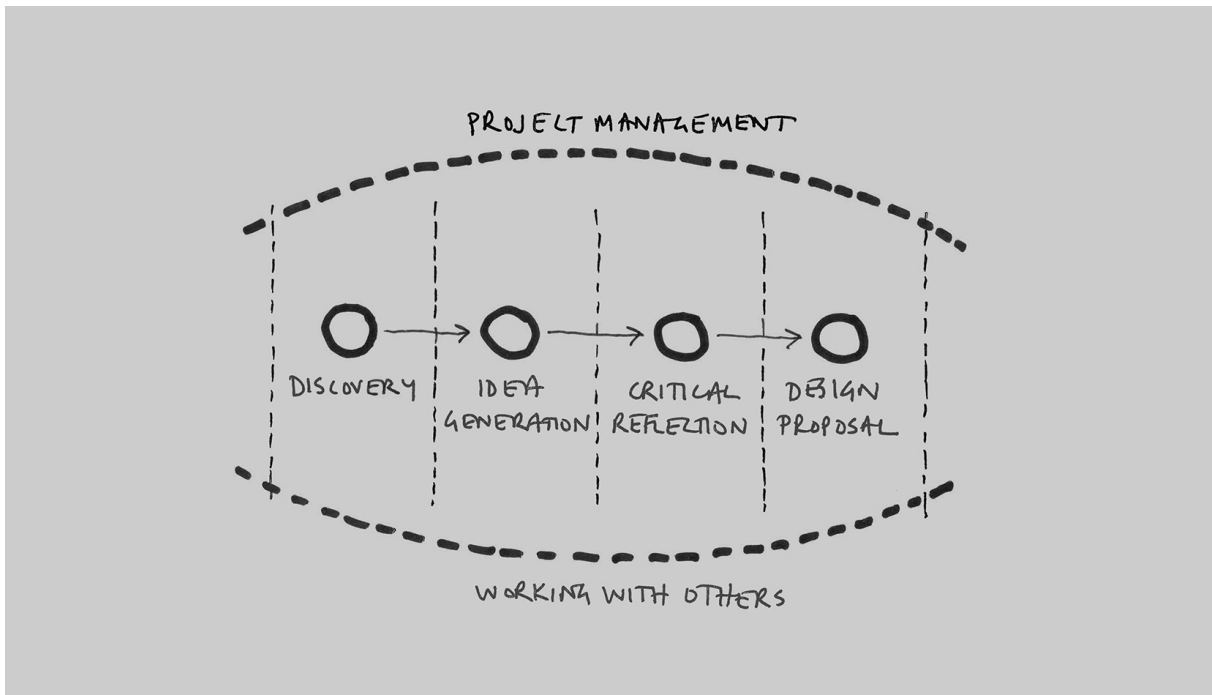


Figure 1. Falmouth University, BA(Hons) Graphic Design process diagram.

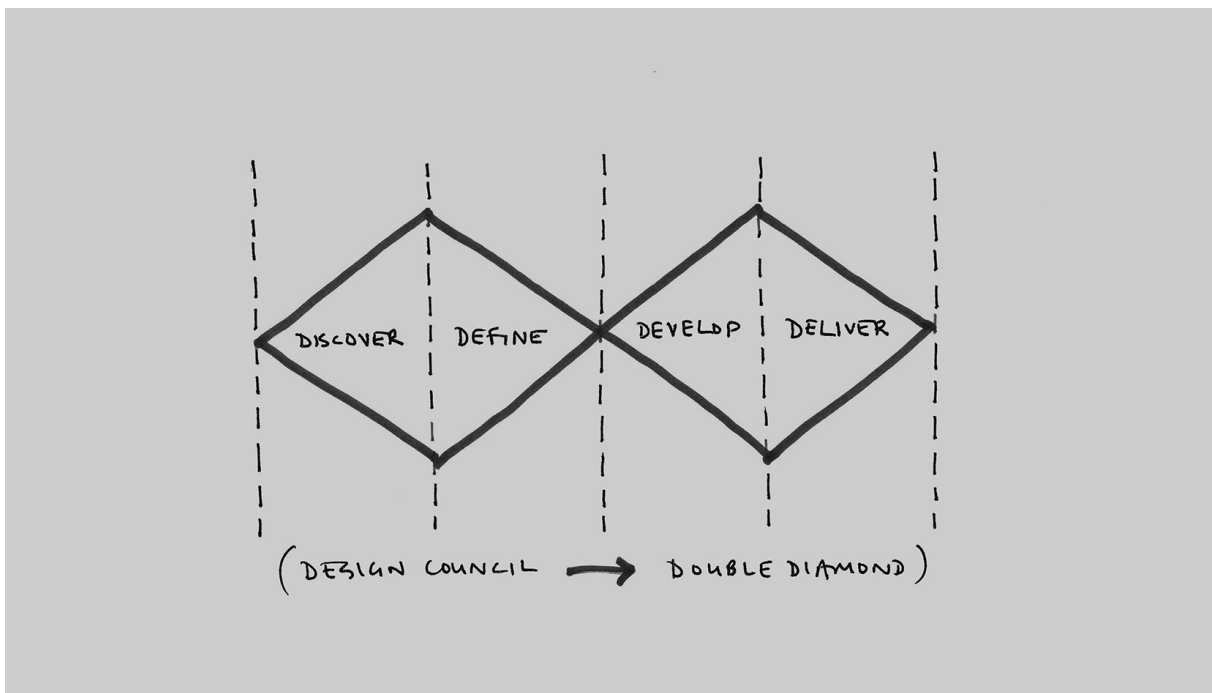


Figure 2. UK Design Council 'Double Diamond' process model.

Change really is the only constant for staff & students in an educational environment. Our graduates encounter shifting business models, new technologies, and platforms that become obsolete almost as quickly as they are introduced. If design really does play a central role in at least focusing the question of what 'it' is (in the broader sense), the need to develop an emerging designer's ability to shift, evolve and adapt in their capacity to frame (and respond to) 'it' becomes even more compelling.

The commodification of design thinking (in education & industry) through attempts to package and market a repeatable formula that promises to guarantee success compromises creativity in a way that misses a fundamental point; there are many ways to skin a cat. **There is no 'one' true creative process**, and this thought has become a key factor in our emerging thinking about the way we teach. "...To suggest is to create; to describe is to destroy..." (Robert Doisneau) <sup>(03)</sup>.

Over a number of years, we have both developed a more overt interest in expanding our own understanding of the place of 'process' in our teaching, and this has led more recently to developing a series of workshops that begin to **'frame a student's own working methodology as the main event'** - rather than their process being a means-to-an-end.

We'd like to go on and highlight some of the themes we are exploring, and then draw some of that thinking together in the light of collaboration, immersion and the role of design process(es).

## 3. Ways of Operating

### 3.1. Identity

We've always been interested in the individual. As part of our application/interview process, we still invite students to come down to meet with us (we are forging relationships with people at the end of the day). The structure of our course progressively encourages students to frame their own educational experience beyond the light of the curriculum, and to develop a unique portfolio of work that reflects their view of design (rather than ours). We fundamentally value a student's journey-to-date, their inherent strengths, and their perspective as a crucial asset to their on-going creative thinking (rather than something they need to grow out of while they are with us).

In his book *'A year with swollen appendices'*, Brian Eno lists some of the qualities used to 'identify' him (including: a mammal, a father, musician, writer, grumbler and a drifting clarifier) <sup>(04)</sup>. There is a sense that by not being limited to traditional boundaries (you are one thing or another), a person is somehow free to be more fully who they are ("I am greater than the sum of my parts..." Aristotle) <sup>(05)</sup>. Rob Bell (American author, motivational speaker and former pastor) takes this idea further and talks about the integration of our relative parts;

"Holism is the reality that emerges only when all the parts are put together but can't be individually located, labelled, or identified at a smaller, component, parts level ... Novels are more than just the words, songs are more than just the notes..." (Bell, 2014) <sup>(06)</sup>.

We are increasingly interested in the idea that by encouraging a student to see their work, their studies (and by definition, their 'process') as part of a unique, one-of-a-kind 'perspective' that is holistically linked to who they are (and for which they have the sole privilege of ultimately nurturing), they will value their evolving methodology at a far more primal level than simply seeing 'process' as one-size-fits all bolt-on.

We've explored this idea as part of a series of workshops that look at 'Who am I?', and ask the students (often with no forewarning or guidance, and always at speed) a series of questions that begin to unearth some of their unique qualities (valuing them as a highly prized set of foundation stones to build upon). The workshop goes on to look at other process models and obstructions to our natural

creative process before inviting them to draw out a number of key themes that 'resonate' with them in some way <sup>(07)</sup>.

### 3.2. Artist | Guardian

Building on the idea of 'identity', we often talk about creative processes as different 'ways of operating'. At this point, it would be helpful to describe a working metaphor that we feel has helped us understand creativity better than anything else; the 'Artist' & the 'Guardian'. Think of yourself as having a dual personality. One side of this personality is emotional, playful, biased (The Artist). The other is organized, practical and considered (The Guardian). The Artist is the creative personality and is highly-sensitive, so one key role of the Guardian is to keep the artist at arms reach from any criticism that may make it upset. Think of the guardian like a bodyguard. This metaphor is borrowed from the work of Dorothea Brande, where she describes this particular relationship as being between the "unconscious and the conscious" <sup>(08)</sup> – though for reasons that should become clear, we prefer 'Artist' & 'Guardian'.

This duplicity has been described in many ways and with various analogies. John Cleese – the legendary Monty Python comedian, described it as the "open mode" (where we are relaxed, exploratory and at our most creative) & the "closed mode", (which is tighter, more rigid, more hierarchical) <sup>(09)</sup>. Hemingway allegedly said one should "write drunk, edit sober" <sup>(10)</sup>.

Whichever of these juxtapositions you prefer they all serve to illustrate the same position; the tension between 'that which we can control and that which we cannot.'

So how does this metaphor help us in terms of generating ideas? To answer this, we must first ask what is an idea, and what do we know about where ideas come from? "An idea is a sudden mental picturing of possibility – the realisation there is a possible way of doing something." (Ingledew, 2011) <sup>(11)</sup>. Ingledew goes on to say;

"...it is said the motivation of all human creativity is the desire to communicate. This means both 'to have an interchange of thoughts or knowledge between people' and 'to have or to form a connection'. Communication is therefore exchanging information and forming connections with people, and is fundamental to creativity in both art and the commercial world." (Ingledew, 2011) <sup>(11)</sup>.

However, that interchange of thoughts and ideas between people – the basis of communication, doesn't happen with complete success. The transference of ideas isn't (yet at least) direct; rather, it is a meeting of minds where both sides of the interchange are involved in a creative act in attempting to form a connection. The interaction between the creator (of an idea) and its audience creates a bond;

"...the viewer recognises, connects to and understands what the creator has set out to communicate because the connection in their mind is similar to the one that took place in the creator's imagination when he or she formed the idea." (Ingledew, 2011) <sup>(11)</sup>.

This connection is similar to the process of reading. Roland Barthes presented the idea that the key to understanding a text lies not in its origins (the knowledge of its creator), but in its destination (its audience). A given piece of writing contains multiple layers of meaning; "A text is a tissue [or fabric] of quotations, drawn from 'innumerable centres of culture', rather than from one, individual experience..." (Barthes, 1967) <sup>(12)</sup>.

Similarly, Wolfgang Iser with his Reader Response Theory (Iser & Iser, 1978) <sup>(13)</sup> describes the "Artistic" & the "Aesthetic" poles. The creator puts forward a text,

although the realisation is accomplished by the reader. There is a connection between these two 'poles', yet inevitably they cannot be identical for the reader has had to form a relationship to the text through personal recognition and their own attempts to find patterns that relate to their experiences. The creation of the text (or an idea) is important – yet in equal measure, so to are the actions involved in responding to it.

There is some correlation between Iser's twin poles and the Artist and the Guardian. We cannot control the formation of connections, but – with a little help from the Guardian – we can at least give them a better chance of occurring.

Ideas are a recombination of known elements and they are the result of 'unconscious recombination' (by our Artist selves). Nietzsche says "A thought comes when it wills, not when I will it." (Nietzsche, Hollingdale, and with an introduction by Michael Tanner, 1990) <sup>(14)</sup>. Often, the error in our collective understanding of a design process (in Higher Education and in Industry) is assuming a relationship between cause and effect – do 'this' and 'this' will happen. It may do, yet it may not. We can provide the conditions for connections to happen, but that connection cannot be forced. You can lead a horse to water but you may not be able to make it understand Nietzsche's critique of phenomenology as a reliable guide to causation.

So we know we cannot control creativity, all we can do is try to 'harness' it. And that is where the Guardian can come in, by reconfiguring and presenting new information to the Artist in a way that may allow new combinations to occur.

If you analyse your work to date you may find that certain tendencies define your creative output. We fall into patterns and we find comfort in being able to repeat them. By "shifting our frame of reference" (Seelig, 2012) <sup>(15)</sup> and reconfiguring how things are presented (to the Artist), it is possible to encourage unexpected connections.

Our workshops have practically explored this idea further by inviting students to critically analyse previous work, mapping out historic processes as recorded in the visual research & development of their ideas after the project has been completed. Simply by stepping back from the subjective process of 'doing' to the objective process of 'critiquing' (Artist/Guardian at work), students became aware of issues that were there all the time but were often passed by, unnoticed.

### 3.3. Guardian: Principles of organisation.

So beyond identity and the idea of perspective, what existing models are there for harnessing creativity? Every design studio has their own version of an idea generation workshop, but rather than look at the specific steps taken in a given process let us instead look at the specific conditions and mind-states that can be set up that are conducive to having ideas.

Regarding mind states; we know that ideas arrive via an unconscious recombination of known elements, and when we look at what is happening in our brains during an act of creation (idea generation) we see that connections are facilitated by Mind Wandering, Chaos & Distractions. This is because, at a neuron level, creativity is slow & meandering.

The neurons in grey matter are fast and efficient but where creativity is concerned it is more useful to focus on the 150km of white matter connections that the average person has in their head. If we have less white matter, this area of the brain is less packed & less organised which makes the nerve traffic slow down.



This allows for multiple pathways to be created connecting different regions of brain rather than a simple & efficient pathway <sup>(16)</sup>.

Anecdotally, we often hear that great ideas seem to come when taking a shower or when thinking about something other than the problem at hand. Looking to Psychological Science for assistance as to why this is the case, we find data suggesting that by engaging in simple non-demanding tasks, we allow the mind to wander freely – facilitating an enhanced ability to creatively respond-to or solve problems. In a study led by Professors of Psychological and Brain Sciences at the University of California Santa Barbara, it was found that an activity that encourages mind-wandering, (i.e. a non-demanding task) subsequently led to more creative solutions than engaging in a demanding task or doing nothing at all <sup>(17)</sup>.

During our own experiments of this nature, with students at both Falmouth University, UK and Augsburg University of Applied Sciences, Germany, we identified various tasks (cleaning the windows, sweeping floors, meditating cross-legged with eyes closed, complex mathematics questions, etc.) prior to the students tackling a design problem. Through these experiments, we came to the same conclusions; that generally a non-demanding task – in this case cleaning the windows, created a mind-state much more conducive to creativity. There were, however, odd exceptions to this – one student in particular seemed to excel after the complex mathematical questions! Each to their own, we suppose – and this deepens our view that by ‘suggesting’ states that affect creativity (rather than ‘describing’ fixed methodologies) students can explore and discover their own process with far greater potential for long-term applications in the evolving landscape ahead of them.

As well as looking to our industry & educational peers in the pursuit of having a creative idea, we may also look for inspiration from the many great minds that have come before us and how they operate.

The Italian polymath Leonardo Da Vinci was arguably one of the brightest minds of all time. His daily routine involved (it is alleged) taking little naps of 15–20 minutes in every four hour period, or 10 minutes every two hours – a practice known as polyphasic sleep.

In his essay *‘Sleep we have lost’*, Historian A. R. Ekirch wrote that being immersed in dreams moments before waking creates a state;

“...thereby affording fresh visions to absorb before returning to unconsciousness. Unless distracted by noise, sickness, or some other discomfort, their mood was probably relaxed and their concentration complete”. (Ekirch, 2001) <sup>(18)</sup>.

Before electric lighting, night was associated with crime and therefore something to fear, so many would go to bed early and, as such, would often wake in the middle of the night for some time before returning to bed for a second sleep. The jury is out as to whether Da Vinci truly engaged in polyphasic sleep (this may be an urban myth) and there are many who believe polyphasic sleep to be an unhealthy form of chronic sleep deprivation, but historically, segmented sleep was commonplace.

Talking of electric lighting! Thomas Edison – as well as turning our lights on, was also interested in sleep patterns and reportedly slept only three to four hours at night. He believed there was a strong relationship between sleep and creativity and so, in an attempt to utilise this link, devised a thinking chair – around which would be gathered an array of small metal pans. Here he would sit in an attempt to slowly drift off, whilst clutching a number of ball bearings in each hand. At the

point at which he would fall asleep, the ball bearings would drop – clattering in to one of the pans, when he would then immediately rise and write down exactly what he was thinking <sup>(19)</sup>. Edison was utilizing what is known as hypnagogia – which is the dreamlike state (actually a variety of differing states) that can be experienced as we hang onto consciousness while moving towards sleep. In hypnagogia we get the benefit of a kind of emotional and cognitive wandering, which as described earlier can facilitate creative thinking.

Creative heavyweights through the centuries have used many approaches in formally preparing for creativity, and often a simple routine can become a necessary ritual to unlock the inner artist. For example; the Austrian composer, and one of the most important figures in the development of the Classical music during the 18th century – Franz Joseph Haydn, couldn't achieve a mind-state where he was comfortable composing unless he dressed in full formal attire, including wig and lipstick. Again, each to their own!

When all else fails, we can rely on random acts to offer something to cling on to.

In 1920s Hollywood, when writers were working on set preparing the following day's scenes or perhaps even rewriting scenes on the fly, there could come a point when things were not working. On these occasions, slapstick comedy film director Mack Sennett would turn to his 'Wild Man', a man hired for the sole purpose of providing an alternative and random suggestion. Usually dim witted or drunk, he would only be called upon if a particular scene was lacking a certain something. One such cited example involves Laurel & Hardy moving a piano across a narrow bridge over a jagged ravine. For Sennett, the scene didn't have enough drama and so the Wild Man's suggestion was that half way along the bridge they should encounter a Gorilla <sup>(20)</sup>. Theory's of the Wild Man variety can often be utilized as a last resort (in this case) or even as a warm up exercise via creative games to prepare the mind for making connections.

### 3.4. We are creatures of habit.

Models for harnessing our creativity are great and there are of course many more. But there is one thing we have learned from them above all else, one thing we think is important to mention. We are creatures of habit, and habits are hard to form.

The process of habit-forming happens after we learn something new and engage a part of the brain located in the prefrontal cortex that controls movement and emotions. It is called the basal ganglia. Charles Duhigg, author of *'The Power of Habit'*, describes what is happening in our brains as a three-step process he refers to as a 'habit loop'.

“First, there is a cue, a trigger that tells your brain to go into automatic mode and which habit to use. Then there is the routine, which can be physical or mental or emotional. Finally, there is a reward, which helps your brain figure out if this particular loop is worth remembering for the future.” (Duhigg, 2012) <sup>(21)</sup>.

For example; the cue might be our alarm clock going off, the routine is going for a run, which in turn makes us feel great, meaning we repeat the process. Or another version (perhaps more familiar); the alarm goes off, we have a lie in which makes us feel great, and repeat.

As the evidence suggests picking up good working habits is hard, what is the use in searching for various creativity-improving methodologies if we (and others) find them hard to adopt? Our research is asking the question; 'What happens (to the habit loop) when the Guardian behaves in a provocative way – not in an attempt



to organise your thinking, but to find ways in which to disorganise it?' As a result of this, we seek to encourage students to act contrary to habit.

Much has been written in recent years on the theme of Disruption, which unfortunately has become a marketing buzzword within brand creation – just login to LinkedIn for five minutes and you'll see Marketeer's extolling the values of having a 'disruptive' brand. This, unfortunately, may cloud our opinions on the value of disruption in the creative process \*opens thesaurus, looks for synonyms!\*

In the context of communication it may well now be a little passé "...Even previous fans of 'disruptive thinking' (i.e. Advertisers) have moved on from jumping out at you to inviting you into a conversation ... more succinctly known as an 'engagement model'." says Simon Manchipp in his recent article in Branding Magazine. (Manchipp et al., 2016) <sup>(22)</sup>. Yet in the context of creative education disruption is still vital. Anything that stops you doing what you would normally do will elicit a creative response and facilitate creativity in some way. Remember (and please excuse this oversimplification), 'you normally do what you normally do', any disruption to that system will force you to do something 'you don't normally do'. This, for many reasons is important for both staff and students, particularly in that it adds novelty, and it creates a puzzle to solve – both of which invoke curiosity (a fundamental driver of creativity). Your brain seeks the comfort of its normal pattern and strives to find it – yet, as the starting point is in unfamiliar territory, its journey back inevitably covers new ground.

## 4. Moving forward

### 4.1 How does this all inform how we teach design?

As our interest in 'process' has grown, several of the ideas above have found their way into more formalised teaching experiences at Falmouth. The most notable of these has even taken the on moniker [*Disruption*] <sup>(23)</sup> in an attempt to create workshops that sequence the disparate 'identity, methodology, perspective, habit (and so on)' themes in a more co-ordinated way. We have been experimenting with various ways of disorganizing or disrupting the students, and then allowing them time and space to find their way back 'home', to see which methodologies (if any) resonate with them. Similarly, our [*Störung*] workshop <sup>(24)</sup> with students from Augsburg focused on 'immersion' and 'play' as catalysts for creativity. Our continuing wish for these workshops is that through a process of 'discovery learning', we can encourage as many students as possible to shift their perspectives again and again until they are able to naturally find their own points of reference, and to propose their own processes, tools or routines that reflect their unique creative personalities.

Interestingly for us, most of this progress is happening 'outside' our existing course framework – or, at best, within modules that are sufficiently broad in their focus to allow a significant degree of flexibility. We believe there is a need for the academic structures that exist within education to be re-imagined and to allow a greater sense of risk, play, and spontaneity, both experientially and operationally. Given the lack of 'agility' we now encounter (certainly in the UK) – largely through the 'business' of education (timetabling, space-charging, data-tracking, strategic-targets and so on), it is no surprise to us that a conference like ReDo is hosted by a Scandinavian nation – where forward thinking, common-sense and a grass-roots, long-term-view regarding the future of 'education as a practice' seems to prevail.

As education lurches ever closer in the direction of industry – with a focus on vocational skills and employability driving the decision-making, we find that industry also has its covetous eyes on education. Stand back and watch, and you'll see a battle unfolding between David and Goliath; one free, agile and ruthless and the other powerful yet slow and cumbersome. In this inevitable impending collision there can only be one winner. Unrestricted from archaic frameworks, Industry can 'do' Industry better than education can.

If we wish to hold onto the principles that lured many of us into education in the first place, perhaps it is time for us to jump ship in an attempt to steer industry in such a way so as to create the least damage – or perhaps to phrase this more optimistically, create a more meaningful private sector education programme. If Higher Education disbands the ambition of delivering excellence in favour of delivering to the balance sheet, does that create a gap in the market for high quality provision? With the rise of independent schools such as Shillington<sup>(25)</sup> (and others) promising an oven-ready portfolio for designers within three months, Industry is already picking off the low hanging fruit, so what will that leave to the Universities?

This flanking manoeuvre should scare those in Design Higher Education into re-embracing the pursuit of excellence and its core principles of both theoretical and applied learning inside and outside the context of capitalism – rather than just within the applied context of design, for and within capitalism (although those who manage higher education institutions may not share this view).

## 5. Conclusions

Despite all the concerns, we are finding that the new process-orientated work is re-energising our teaching, and the knock-on for our students is significant – creating some of the most productive and deeply rooted learning we have seen in our careers. In summarising some of our thoughts-to-date, we believe there are four 'anchors' that are now central to the development of any new teaching (esp. within graphic design);

Firstly, **Dissociative creativity**; essentially the Artist/Guardian metaphor we have described in some detail already. The principle of this (*Figure 3*) affects both an academic's responsibility to both partake-in & protect a student's education, as well as the student's own care for their personal creative journey, be it specific to a particular design problem, or the broader nature of how they are learning at that point in their career. Artist/Guardian, Subjective/Objective, Internal/External, Wood/Trees...

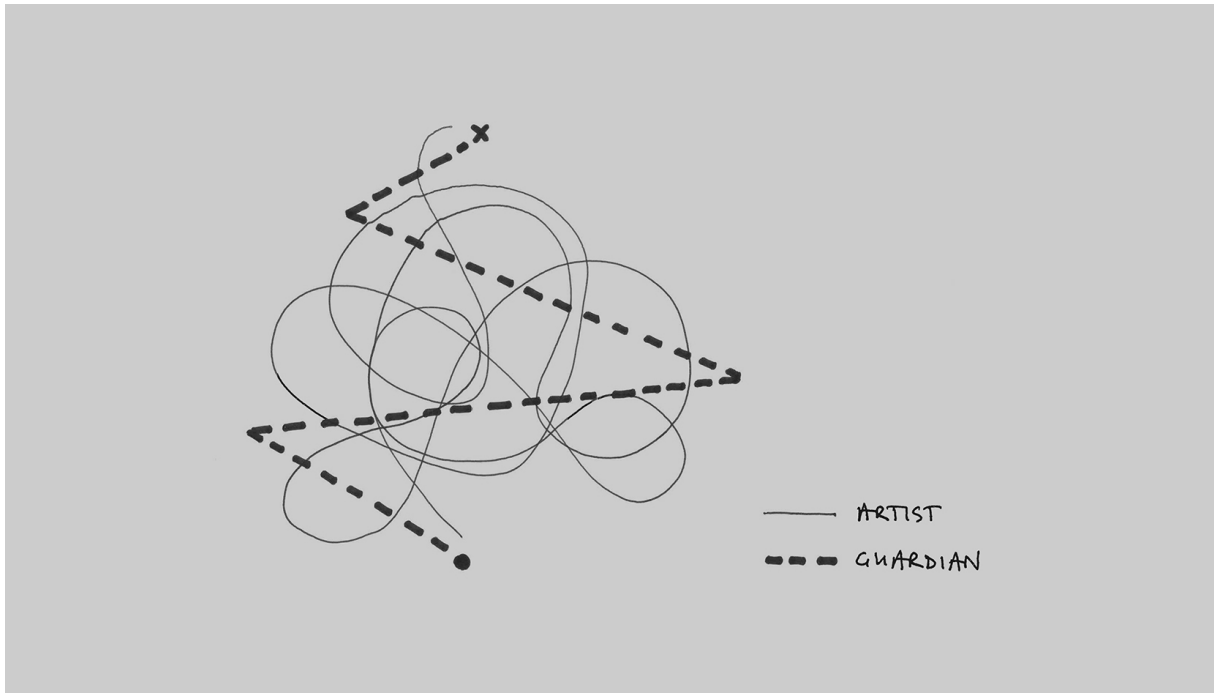


Figure 3.

Secondly, **Process** (or Processes) as the 'main event', rather than as a means to an end (*Figure 4*). Traditional design teaching has always involved a process of one form or another, but it has largely been about getting you somewhere (and many would argue this is still its purpose) – a view perhaps driven more by capitalism than the art of developing young minds. However, as the pace-of-change around us continues to accelerate, the capacity for students to be comfortable within a fluid rather than static world-view has never been more important. "We are all on a journey... All your work is just experience. What you are drawing... [designing, making, writing, etc. Ed.] maps ... your experience." (Warwicker. J, 1994) <sup>(26)</sup>

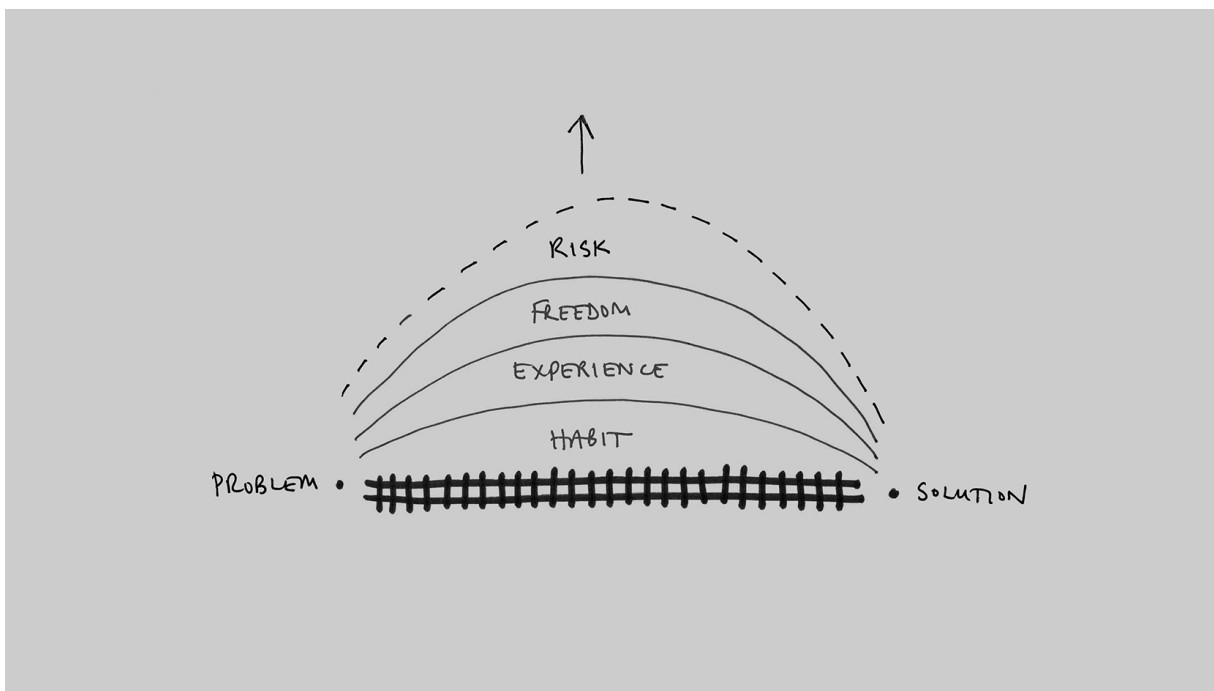


Figure 4.

Thirdly, **Collaboration**; historically difficult to assess (so we tend to shy away from it), but experientially proven to encourage 'risk', 'play', and 'spontaneity' – essential qualities in most, if not all innovation. Importantly, collaboration is a central component of communication itself – which, as we have already discussed, isn't always successful and benefits hugely from the space and time to 'explore' and 'refine' exactly what 'it' is. Collaboration encourages dialogue, has positive efficiencies, offers new perspectives and, when fully embraced as a learning environment, can accelerate the growth of an individual – whatever their position on the learning spectrum (*Figure 5*).

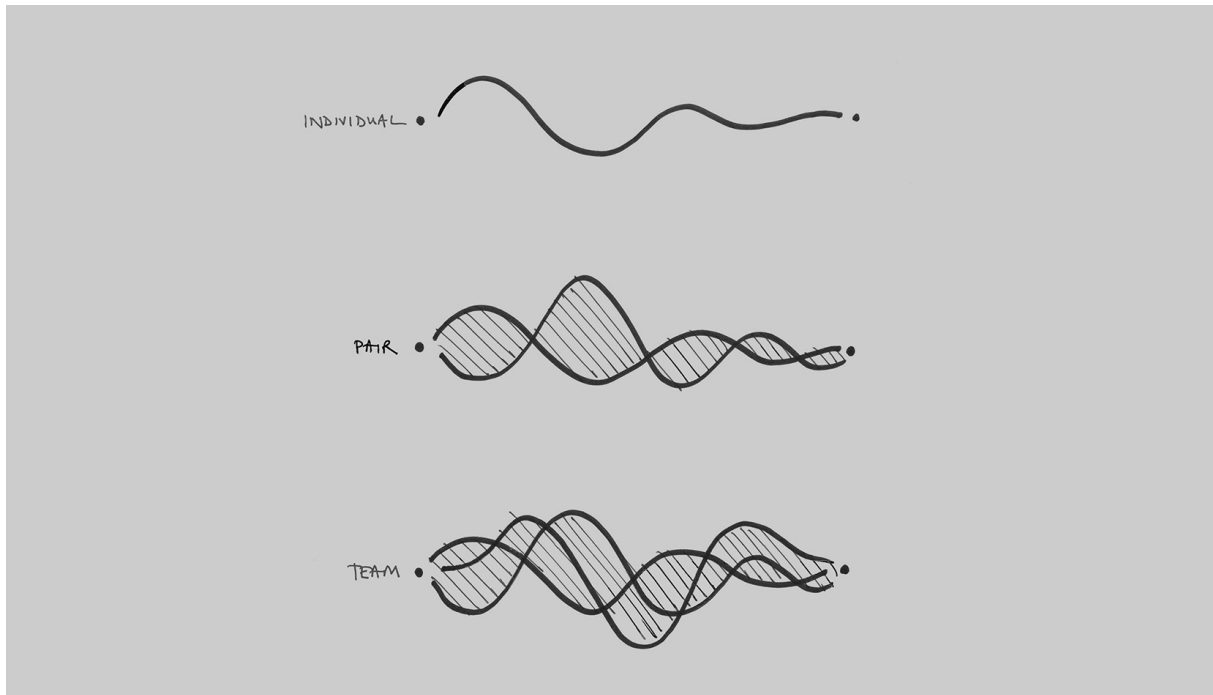


Figure 5.

And finally, **Immersion**; not underestimating what a student can achieve in a given moment and creating environments that frame and protect sustained periods of focus (for a project, an idea, a question...), utilising 'speed' as an asset, and 'intensity' as a 'controlled friend' (*Figure 6*).

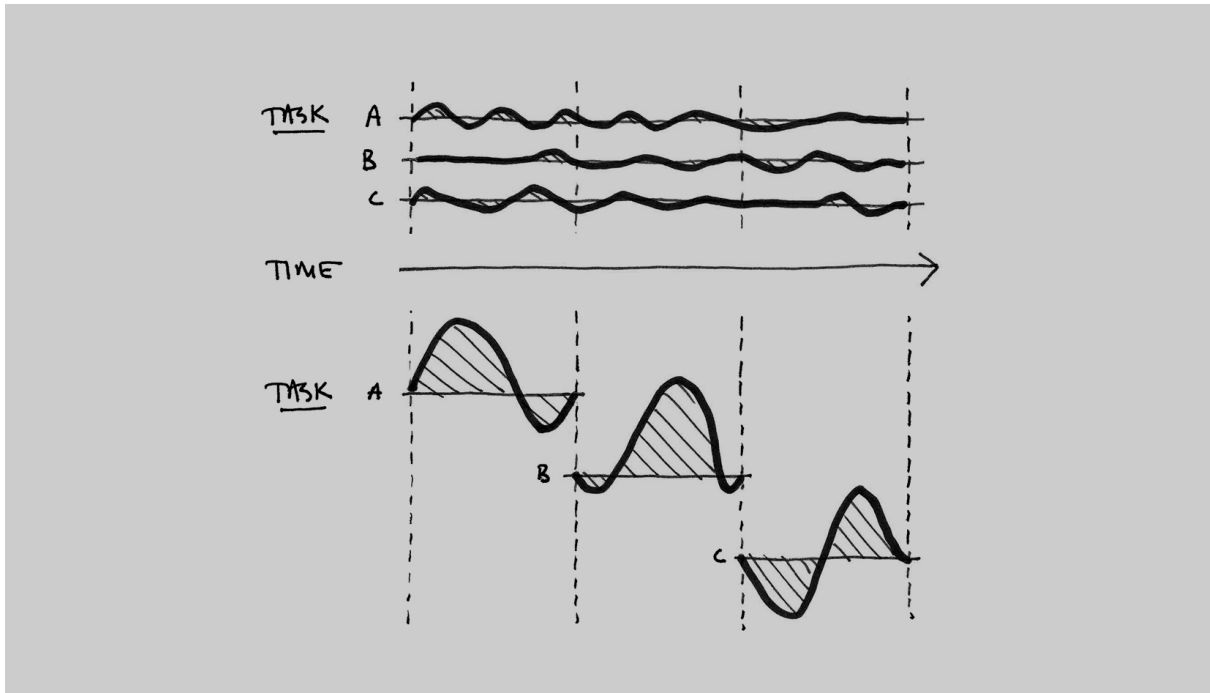


Figure 6.

Interestingly, immersion (or a sustained-focus-on & conscious-awareness-of the 'now') also works against the notion of multi-tasking – historically the holy grail of any efficient business model. However, studies on the effects of multi-tasking suggest that it ultimately results in cognitive overload, and therefore is counter-productive to any creative task (we need the 'space' – 'creativity is slow & meandering...'). Dr Susan David (award-winning Psychologist on the faculty of Harvard Medical School) describes multi-tasking as rendering us “emotionally in-agile”, creating “dissonance”, “ambiguity” and as “the equivalent of drunk-driving”<sup>(27)</sup>.

These thoughts are very much a work-in-progress – reflections on our own journey-to-date if you will. We don't have any real clear answers to some of the big issues we are all facing – ReDoing Education is clearly a complex and delicate subject. However, our focus on these anchors is shifting how we think about the way we teach – and this, at the very least, is a step in the right direction.

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#### About the Authors:

**Dion** has a rich and varied background including significant experience in music events management, running a screen-printing business and owning an independent record shop. He has maintained his own professional practice as an Independent Designer for the last 12 years, and both his research & creative practice are based on the premise of conceptual logic and a drive to reduce process, material and production to their essence. His studio practice has centred around collaboration, opening up opportunities to work with film directors, sound designers, writers, poets & artists. His work has been exhibited at (amongst others) The Royal College of Art (London, UK) and The Eden Project (Cornwall, UK). He has been teaching at Falmouth since 2011, working to explore connections between people and process to help enable both new 'works' & new models of 'making'.

**Andy's** career began as a musician before studying graphic design at Edinburgh College of Art and then working commercially in Scotland, UK with Millhouse and later Navyblue as a New Media Designer. He started teaching part-time in 1998 at Glasgow School of Art, set up [nbuffalo] in 1999 as an informal umbrella for his own commercial & personal work, and has been teaching at Falmouth since January 2000. He continues to design under the [nbuffalo] name, and his wider design & research interests include recording & re-utilising creative processes, together with exploring the broader communication complexities of liturgical form and space. He doesn't like 'categories', but is equally at home lecturing about process or typography as he is playing guitar in experimental rock & electronica outfits or in liturgical spaces. He is a member of the International Society of Typographic Designers Education team, and has won awards for his typographic & educational exploits.

[ **DiaGram** ] is the Research Collective spilling out of Dion & Andy's teaching and research projects. <https://www.falmouth.ac.uk/diagram>

# I see, I see what you can't see

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**Abstract:** For the last two years students from Minerva Art Academy in the Netherlands worked on portraits of people with dementia. By making personal connection with their extraordinary models the most personal and poignant portraits came into being. The concluding exhibition offered a first glimpse into the confusing world of mostly alternating moments of clarity and emotion. In our paper we talk about the educational, the social, and the artistic value of this project. The paper is connected to a film that shows the student portraying the people and talking about the influence of the environment on their artistic practice and choices. While the artistic space that surrounds the person makes an encounter possible, it is the freedom and space that a person with dementia takes that establishes it. A person with dementia guarantees the unexpected, the new, and the different, to which the artist has learned to be open.

**Keywords:** Art and dementia, portraying as encounter, artistic research learning environment

## Film Contribution



# Mind as a Thing. REDO-ing the Iterative in Design Education

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**Abstract:** Iterative thought and production are at the heart of changing current and future design practices. New design “disciplines” are emerging to address the complex problem solving and trans-disciplinary thinking that is needed to overcome the future challenges human society faces. Such research-driven motives, outcomes and processes in design education, design practice and design research are evident in the nexus of work produced by students in this new Master of Science in Design Research. Predicated in a philosophy of iterative, investigative research and applied projects, that explore current and future issues are a focus in the program. Here, the authors will trace an investigative process that is rooted in both disciplinary expertise and experimental thinking. Trans-disciplinary work is an integral part of this RE-DO for design, including a subtle set of skills at the intersection of research, making, and trans-disciplinary practices.

**Keywords:** Design research, iteration, human centered, biology, biophilia

## 1. Introduction

Design “disciplines” are emerging to address the complex problem solving and the trans-disciplinary thinking that is needed to overcome the future challenges human society faces. (Lally, 2009) To quote Helen Furján in her paper for the Journal of Architecture Education White Issue: “Design-research follows a methodology that combines scientific rigor with innovation, intuition, and opportunism”. (Furján, 2007) She posits, among other things, that new ways of understanding and iterating around information are driving design forward with research as a central practice. As such Furján maintains that graduate education is squarely at the centre of design problem solving in ways it had not been before. (Furján, 2007)

Such research-driven motives, outcomes and processes in design education, design practice and design research are evident in the nexus of work produced by

students in this new Master of Science in Design Research at Drexel University. This program, allows for a cohort of students exploring a range of topics through the shared core curriculum that is the cornerstone of their first year. The program is predicated in a philosophy of iterative, investigative research and applied projects. Projects that explore the big problems of our current and future global societies are a focus of the learning that students undertake in the program. As stated above, as students progress in their exploratory projects, they will come in contact with diverse faculty research possibilities within existing labs on campus to drive their investigative learning. The core curriculum contains two courses focused on the research development and creative processes in each student's novel project. This essential core work trains students to research and produce iterative knowledge as well as iterative artefacts. The courses build to a thesis in the second year of the program. This short paper will examine and trace the progress of one such trans-disciplinary project, in order to explore a new type of iterative thinking occurring in the program. The project described here is aligned with a research lab and faculty in the program where trans disciplinary thinking creates an environment laying the groundwork for this program.

## 2. Design Lab: novel iteration and testing

### 2.1 Hand as a Thing/Mind as a Thing: research thinking and research doing

Richard Sennet in his book "The Craftsman" describes his idea: "being as a thing" in which he explains the process of attaining mastery due to many hours of work. Once one has attained this mastery, the individual skill no longer resonates, but the larger moves and adjustments are what create possibilities in one's work. He estimates the amount of time this higher level of achievement takes to be 10,000 hours.(Sennett, 2008) Design research is driven by a kind of production beyond that of hand based expertise, however it draws on the same processes of consideration, production and reconsideration that occurs in artisanal training described by Sennet.(Sennett, 2008) As mentioned above, the core courses were designed to create a process in which student would build their iterative skills and practice in research design and design research.

"Vertical thinking is analytical, lateral thinking is provocative....  
Lateral thinking is closely related to insight, creativity and humour....  
whereas insight, creativity and humour can only be prayed for,  
lateral thinking is a more deliberate process. It is as definite a way of  
using the mind as logical thinking-but a very different way..."(de  
Bono, 2010)

In order to engage in iterative thinking students are asked to participate in multiple loops of convergent and divergent thinking. In addition, they were asked to document this process both with physical artefacts and research based outcomes. Divergent and convergent thinking are problem solving counterpoints. Divergence is sometimes equated with de Bono's concept of lateral thinking as stated above, it is about generating unexpected ideas and concepts in problem solving processes. Convergence is the synthesis of concepts and their testing against each other.("Idea Generation," 2015) Convergent and divergent thinking are both deployed in creative thing methods. Charles Owens, in his lecture and article on design thinking, describes these different ways of creating knowledge through the terms, "finders" and "makers". What he ultimately describes are iterative thinking processes that channel different ways of gathering, observing,

and synthesizing information in any problem solving process.(Owen, 2008) His framework calls for a set of iterative procedures that draw on values, knowledge and measures for effectiveness. In our terms what Owens calls for is the thinking version of Sennet's "being as a thing" in which the problem is considered both through creative thinking and analytical thinking repeatedly.

### 3. Design Research: core learning

#### 3.1 Core Courses and Collaborative Practice

*Design Problem Solving* is a course that examines different methods of design problem solving and its role across disciplines. The intention is to give the student a basis to approach interdisciplinary projects in an innovative way. In addition, the practice of design problem solving is examined from multiple viewpoints including human centered and technology centered approaches. The course is designed so that the student is able to examine and experience the following through a series of invited practitioners and researchers who will interact with the instructors and class to broaden the information presented in the class.(“Design Research Catalog Entry; Drexel University,” 2017) The invited practitioners have expertise in architecture, biology, and engineering, and bring their discipline's methods of problem solving to the class. During this interaction with the practitioners to, students are exposed to two different concepts: the first that the basic idea of problem solving across disciplines is very similar, and second, that in practice, there are discipline-specific themes to problem-solving. They begin to understand that problem solving can be viewed as a fundamental concept across disciplines, one that allows researchers from all discipline to successfully and collaboratively work together on complex problems. The course is novel because it deploys techniques that are both specific to the student's creative trajectory and their project interests. Students learn both product and process in the core curriculum. The idea is to inculcate them in processes that they can then use to move the project forward on an independent basis in their thesis.

*Translational Design Research* is a seminar course that examines and builds on the students' core skills in design research to understand the ways that research can drive innovation and iteration. The goal here is to engage with different types of research including diverse cultures and communities and a variety of stakeholders.(“Design Research Catalog Entry; Drexel University,” 2017) The course is designed so that the student is able to examine and experience the following through a series of case studies and interaction with design research professionals: User/Human centered research practices; Qualitative and Quantitative research related to methods for design; Technology Research relating to systems of intelligence; Cross cultural and global design research and research ethics. Students identify the appropriate research methodology for problem solving; the methodology will be specific to the nature of the problem. Students also learn how to strategize their own research plan suited to their future projects- the novelty in the core courses arises from the creative trajectory students follow to build their own core of knowledge and practice on the subject at hand.

The Master of Science Design Research participants work to build facility and skill in identifying the main constructs for design research and the appropriate uses and applications to understand and utilize a range of design research methodologies. The program and courses are structured so that the students examine and understand information synthesis, their own process and research.

Through discussions and writings in their projects the candidates develop a final project relevant to their chosen area of study, and generate new knowledge within the area of interest that will ultimately become their thesis.

Course methodologies include: discussion, readings, invited guests, lecture and student collaboration. In order to think iteratively the group engages in the cycle of methods and reflections described below in Figure 1. Here students participate in tasks such as sketch-noting their thoughts, collaboratively diagramming, and examining their gathered research. They then work to re-present their thoughts to the group and their peers. Tools used to present, imagine and re-present include: creative maps, mind maps, creativity matrices, and affinity diagrams. Students rely on the sketch-noting workbook for personal information filtering. Each person builds a cycle of gathering, considering, synthesizing and generating knowledge around their topic, this is where the novel process and ideas are developed. Deliverables for these courses include videos, research binders, research abstracts, and a project mini-pilot. Based on IDEO's mini-pilot from The Human Centered Design Handbook, the mini pilot asks the students to provisionally create and test a part of their idea.(IDEO, 2011) This idea has been adapted and here becomes a way of creating a process prototype to test with selected members of the user group.

This novel iterative cycle of creativity, reflection, and feed-back affirm to the students that their creative ideas are meaningful and that collaboration and feedback are essential parts of the creative design and research process.

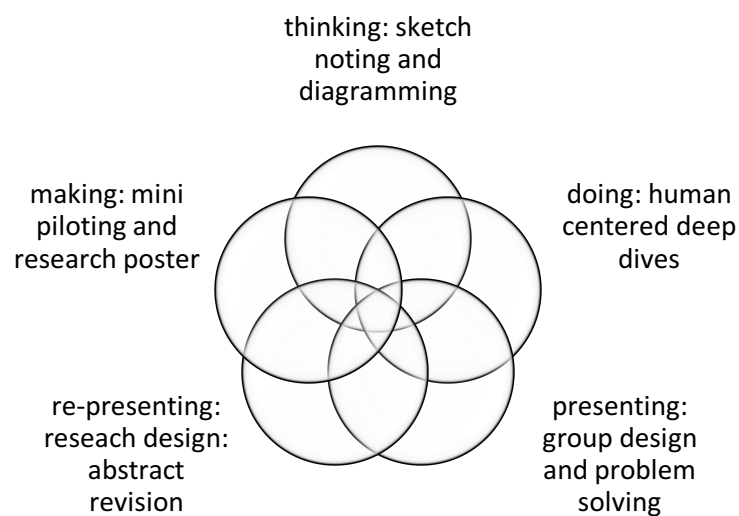


Figure 1. *Biophilic Living: student bio-design process*

The student project described in this instance is focused on urban sustainable design and indoor environments. As is well known, the United Nations Environment Program (UNEP) has declared that the current trend in urbanization is expected to continue, and predicts that more than 80% of humanity will live in cities by 2050.(Vidal & editor, 2010) Taking this information to heart, the team works to create health within the urban environment, the threshold of humanity's future. Exploring algal nitrogen fixation and hydroponic plant-growing building systems. A larger project team works to produce building systems for interior Biophilic living, this student has isolated one area of the larger project and is working on it within the Design Research program. The student whose work is presented here has a background in both design and biology, and undertook her project as part of this small diverse team of investigators pursuing the design and

innovation of products and solutions for sustainable urban living. The methods already deployed by this lab cross the disciplinary boundaries between design and biology. The team has developed a novel method for introducing human centered design into the traditional Science, Technology, Engineering and Mathematics (STEM) disciplines, while at the same time driving design with these research outcomes. The novel methodology of this lab includes physical iteration and prototyping with creative bench science driven lab testing. Prototypes are developed in a design studio environment and then tested in a bench science lab. Students are mentored in the processes of both bench science and iterative design, as a new hybrid process.

This lab plans and designs through a collaborative process in which research, and design activities fuse to mentor young researchers and designers. Lab activities address and expose students and faculty to sustainable building strategies with multiple threads of investigation and multiple teams approaching the problem. Using research, design, design thinking and prototyping, this lab responds to the challenges to develop strategies that will have measurable outcomes for urban living. The lead faculty in this lab are an architect and a bench scientist in biology who strive to think in a trans-disciplinary manner and lead students to do so as well through the work processes that they deploy. The team holds weekly joint group meetings where the activities and designs of the students are discussed. These discussions are seen and discussed through two different lenses: that of design and design thinking, and that of experimental biology. Discussions range from the aesthetic aspects of architectural design to whether the nitrogen fixing algae will grow successfully in the hydroponic system designed. Designs for the hydroponic system are again viewed through the two lenses mentioned above: is the design sufficiently human-centered, and will the algae and plants grow successfully?

### 3.2 Design Research Student Abstract:

The students' research abstract and project process is presented here as a representation and example of her progress around a piece of the lab's work. She has produced this portion in the courses described above. The student developed this abstract in her second semester in the program, it is based on a process of human centered design and design thinking and doing, including literature review, expert and user interview, precedent research and environmental testing:

Many urban areas lack green space and cultivable land. Many of these same areas are also underserved by grocery stores. Access to fresh produce and natural environments is limited, creating conditions that are detrimental to the health and wellbeing of the residents of these communities. Neighborhoods in North and West Philadelphia are among the communities affected by these issues. Empowering residents with the tools and understanding that would enable them to have more control over their food sources and improve their environment through green space would be beneficial to these communities.

### 3.3 Student Process:

In this selected text, the student describes current iterative thinking and making processes that feed into the research, and drive her design interests:

This project uses photosynthetic, nitrogen-fixing cyanobacteria to power solutions to these issues. It focuses on a 3-D printed hydroponic unit that would allow residents to grow their own produce, giving them more control over their food sources. The

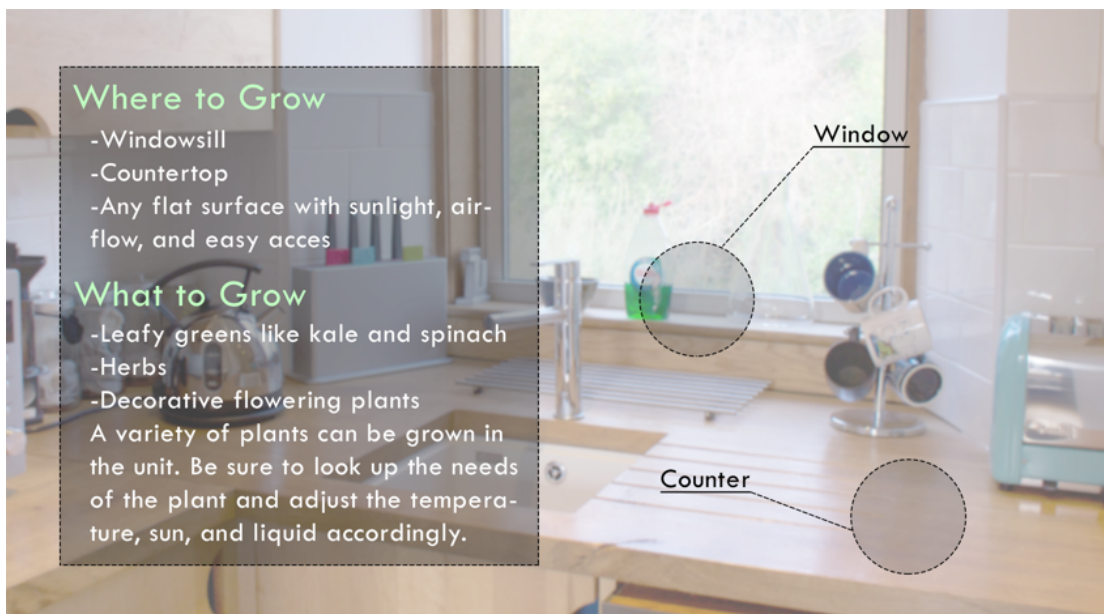


cyanobacteria in the unit provide fertilizer to the plants through nitrogen fixation. These units would also be capable of growing a variety of plants in order to increase green space in urban homes. Other beneficial applications of 3-D printed, cyanobacteria-fueled solutions would be investigated, such as lighting units and power cells. Encompassing the design, construction, testing, and future community cooperation required for these units, this project combines science, sustainability, and human-centered design to develop an innovative, trans-disciplinary solution to alleviate a complex problem. Prototypes were designed in Sketch up and constructed using Makerbot 3-D printers. Through a constantly evolving, iterative design process, multiple variations on shape, color, and material were produced. Scientific knowledge of cyanobacterial growth preferences and human-centered design principles were used to optimize designs for growth and for prospective intended users.

Several successful prototypes were externally coated in silicone for water tightness then tested for suitability for growth of the nitrogen-fixing cyanobacterium. Testing also was performed on printing filaments and other materials, such as NinjaFlex and Makerbot brands of flexible filaments. In a mirror of the design process, the testing process is also iterative. Although scientific testing is consistent and measured, the repetition with gradual changes further optimizes the methodology of testing and eventually the finished unit. Future community cooperation is important to the success of this project and the human-centered design process is crucial to understanding prospective users.

### 3.4 Student Outcomes: Infographic, Persona, and Poster:

The student created an early poster, infographic and persona profile for their first iterative work that culminated in the initial term and included concept mapping, affinity mapping, and stake holder mapping. This work included an idea synthesis process called Rose, Thorn, Bud that was drawn from the Luma Institute's human centered design materials and gave students a perspective on their work.(Institute, 2012) The samples below represent iterative design and design research that has led to students' operating with new awareness and openness to how research can drive their ideas.



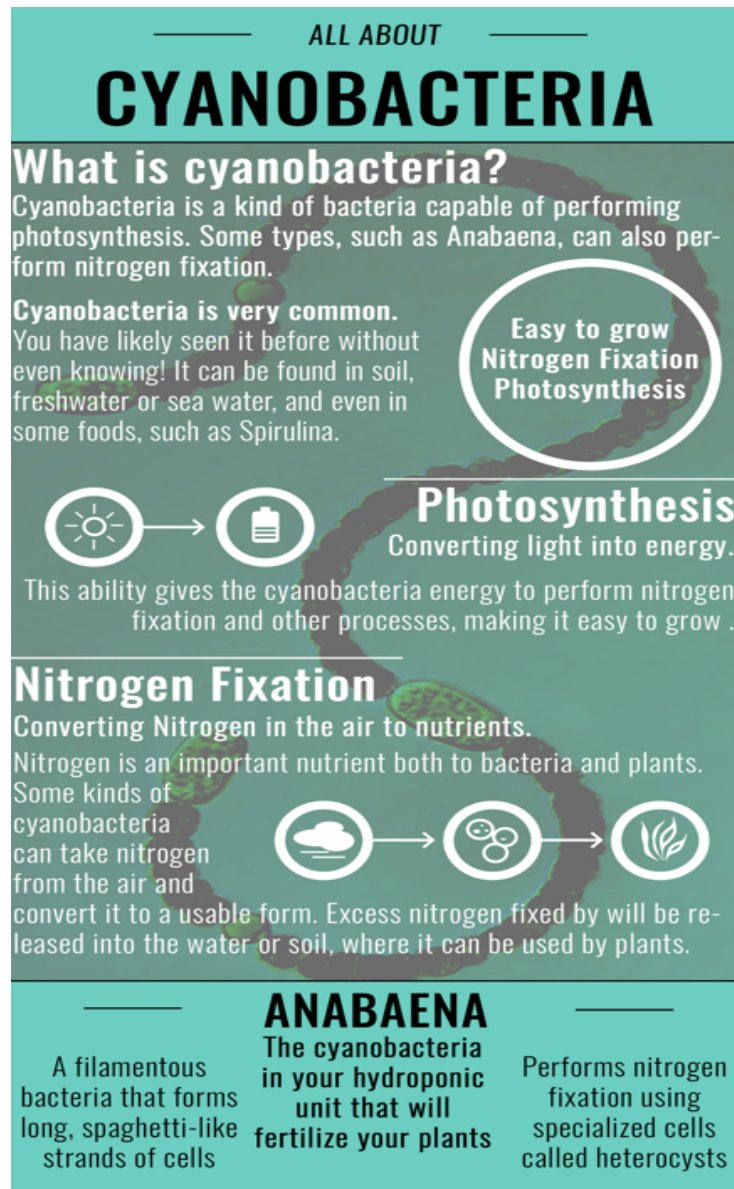


Figure 2. Outcome examples on the importance of nitrogen-fixing cyanobacteria in a plant hydroponic system: infographic and poster.

Persona Description: Mary is the matriarch of a multigenerational home. She often spends her day caring for her grandchildren. In her free time, she enjoys cooking and watching Lifetime movies and soap operas. Although she is now retired and relies on social security, she used to work as a receptionist at a small office. Healthy habits haven't been a priority for her until recently, when she noticed she was having a difficult time keeping up with her grandkids and her doctor spoke with her about prediabetes and osteoporosis. Time and money are tight, but she would like to find simple ways improve her health. Distinguishing Characteristics: • Elderly • Retired • Low Income • Multigenerational household • Prediabetes and Osteoporosis Needs and Goals: • Improve health • Maintain previous lifestyle as much as possible • Stay with family • Introduce healthy habits to younger generations of family

### 3.4 Student Reflective Essay:

This course has affected my development by increasing my focus on human centered design. The previous work I had done on my project was largely based on model design and accommodating the cyanobacteria, while the work I produced for this course emphasized accommodating the potential users of the hydroponic system. The readings, such as the Field Guide to Human Centered Design and many of the hand-out materials, and the exercises in class helped develop my skills in user empathy and organizing complex information.

My problem solving process has been affected by this course in that it has expanded on methods I was already familiar with and introduced me to many new ones. I found that some of the problem solving methods I already employed were delineated and identified and given a name which allowed me to better understand and use these methods, and know when they are appropriate to use. An example of this is affinity clustering. This course also introduced a lot of other options and methods. I now have a wide range of techniques to use and apply toward my project, as well as resources like IDEO's Field Guide and a general understanding of the process that allows me to seek out other techniques. How one solves a problem is just as important as the solution to the problem, and affects that solution. By reviewing and attempting all of these different methods, I became more conscious of my own methods: how I solved problems, what methods I used, when did I use them, and what could I have done differently. The in class group work throughout the course influenced me and my project. Working with this group of people and being able to discuss topics, bounce ideas off them, and collaborate with them was a great experience. Another example was during the Rose Thorn Bud exercise where I worked with Nicole, where we each brought different perspectives to each other's projects. I found that when we actually did the technique in class I was much more likely to understand that technique and use it later on.



Figure 3. DESIGN RESEARCH SCENARIOS: techniques and tasks students accomplish in order to think iteratively



## 4. Conclusion: REDO-ing the bounds of process

What Owen, de Bono and Sennet share is a desire to understand and calculate the bounds of process and progress in design and problem solving. The novel processes that the students here undertake in their projects lead us into a territory where students are able to navigate methods, processes, tools and techniques in order to identify complex strategies to interrogate a thesis they are developing about design, culture, society and discipline. As the above processes are deployed and discussed, students work to develop a process centered on iteratively considering research. The challenges of working in ideas and development of ideas through physical artefacts, and conversation has created a willingness to explore, discuss, team up, and reach out. Thus the students in this program are beginning to have the ability to assess and create ideas from research, their disciplinary boundaries are only as stringent as their process is broad, and they will move into a thesis that begins to take on increasingly complex territories for design research as an emerging discipline. We work to cross disciplinary boundaries so that our students are prepared for the challenges awaiting them in the workforce. Our conception of how we “redo” design education starts here, lets build the mind and hand to have an awareness of iteration that will lead to complex problem solving for a new century.

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# Re-Embodiment. New Strategies for teaching Embodied Interaction

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**Abstract:** This paper considers the role of the body and embodiment in design education. It offers a “re-do” of the Embodied Interaction course on the Interaction Design Master’s at Malmö University. This conceptual and pedagogic redo coincides with the increasing relevance of the field which now can be seen to include physical computing, wearables, haptics, and networked devices for transmitting bodily data. Three conceptual shifts are emphasised: embodiment redefined as materiality; critical engagement with contemporary politics and economics; methodological awareness and experimentation. This is not an abandonment of previous approaches, but a revision to coincide with developments in practice and scholarship, both within interaction design and in relevant related disciplines. It also reflects the current cultural and political educational climate by emphasizing a porosity of education, and a flow-through between the university and the world outside its walls.

**Keywords:** embodiment, interaction, materiality, critical, methodology

## 1. Introduction

Embodied Interaction has become an established sub field in Interaction Design. In an educational context it has developed into an umbrella for addressing physical computing, wearables, haptics, electronic prototyping (using platforms such as Arduino, LilyPad and Raspberry Pi) and networked devices and systems that access and distribute bodily or personal data. It relies on Paul Dourish’s book *Where the Action Is* (2001) as a respected anchor in the field, and has fed into a range of related scholarship encompassing performativity (Bentford & Giannachi, 2011; Wilde, 2012; Dalsgaard & Hansen, 2009; Fischer-Lichte, 2008), somatic approaches to design (Schiphorst, 2009; Höök, Ståhl, Jonsson, Mercurio, Karlsson, & Banka Johnson, 2015), postcolonial design approaches (Irani, Vertesi, Dourish, Philip, & Grinter, 2010; Mainsah & Morrison, 2014), phenomenology (Svaenes, 2013; Koziel, 2015), queer bodies (Light, 2011; Blas, 2006) and closely allied media art practices.

Embodied Interaction generates enthusiasm for its ability to open a niche for practical designing, critical reflection and methodological questioning. However, when it is taught a paradox frequently emerges: over-generalization at the same time as over-specification. The generalization is the risk of becoming overly diluted, with embodiment escaping definition entirely or coming to refer to everything; the over-specification is when the teaching becomes overly determined by a particular platform or set of technical skills. Methodological awareness, criticality and a clear sense of what embodiment means can be lost.

The re-do discussed in this paper relates to a specific Embodied Interaction course (it can also be called a module). It is a first year course on the 2 year Interaction Design Master (IDM) at Malmö University and has a student enrolment of between 18-22 students from around the world (it is common for a minimum 10 countries to be represented). It is taught in English and it lasts 10 weeks. It follows the studio-based design teaching model whereby students are expected to be in the studio working full days, five days a week. The prior educational training of the students varies. Increasingly students from the humanities apply out of a desire to integrate their previous cultural and intellectual backgrounds into design. These students don't always have significant prior design experience but provide interdisciplinary perspectives in combination with intercultural ones.

The re-doing of this course took five years, and it is a continuing process of development and iteration. It is, in other words, a design project in itself that has integrated the voices of approximately 100 students. Significant revisions to the course occurred in the past two years in response to cultural, political and design developments in the wider world, in particular, the expansion of Big Data and the Internet of Things (IoT); the need for increasing attention to whose bodies we are designing for (attending to race, class, age, gender, ability, legal status); and the awareness of waste and excess (taking in environmental questions, asking if we need more “smart” gadgets, questioning advertising hype). It must be stressed that this is not an abandonment of previous approaches, but a revision to coincide with developments in practice and scholarship both within interaction design and in relevant related disciplines. It also reflects current cultural and political dimensions thereby emphasizing a porosity of education, a flow-through between the university and the world outside its walls.

Three conceptual shifts in how the course is taught will be emphasised:

- embodiment redefined as materiality;
- critical engagement with contemporary politics and economics;
- methodological awareness and experimentation.

## 2. Three conceptual Shifts in the Teaching of Embodied Interaction

### 2.1 Embodiment Redefined as Materiality

Dourish famously framed embodied interaction as “interaction with computer systems that occupy our world, a world of physical and social reality” (Dourish, 2001, p.3). He shifted the focus to social context and challenged designers to get out of the lab and into the field. This was incredibly valuable for calling attention to real people and real lives, and for revealing how social relations integrating people and designed objects have histories and embedded realities before, during

and after the latest system or object reaches the market. It was an ethnographic move, informed by phenomenology, and continues to be a starting point for the course. But like any good starting point it opens itself up to critique and expansion, not least by Dourish himself. As such, in this course we read his “Epilogue” in conjunction with his earlier writing and attend to some of his self reflection, including his acknowledgement that the body “has very little presence” (he reminds us that this was not the focus of the book), and his pointing to several important related developments that his book fed into: considerations of ubiquitous computing, attending to queer bodies, and a connection with artistic experiments emerging in the media art community (Dourish, 2011).

The crucial shift in teaching this course is not just recognising that the body is under-determined in much embodied interaction or that bodies are swallowed up by context: it is a shift to understand embodied interaction as material interactions, and embodiment as a sort of materiality. Many designers work with the intuition that materials talk back to their hands and thoughts, and shape their processes. This points to an acceptance that matter is not passive, dull or inert (Bennet, 2010). At the same time, we know that the human body is not bounded or limited by its skin, nor does it exist in isolation. In other words, there is more to matter than passivity, and there is more to a body than its individual, organic and bounded state. Consistent with tenets of New Materialism, it therefore makes sense to approach embodiment as a sort of materiality (Connolly, 2013). This reframing yields relationality, extension and agency to Embodied Interaction, and it opens up a critical perspective that is “materialist and vitalist, embodied and embedded ... suited to the complexity and contradictions of our times” (Braidotti, 2013, p.51-52). However, it does not mean losing the human body. This will be explained in the next conceptual shift.

## 2.2 Critical Engagement with Contemporary Politics and Economics

The implications of framing embodiment as materiality in the teaching of embodied interaction are deepened by asking “whose bodies?” or “what bodies?” and by pointing out that this is not the same as eliminating the presence of the human body. The subtlety and complexity of human bodies are not nullified by a materialist approach that accounts for nonorganic or nonhuman bodies. They can be enhanced.

A political stance on embodiment starts with the simple questions of whether we are designing for a single body or for multiple bodies. Attention is called to whether designs intended for multiple bodies are actually based on the model of the isolated body and mapped outwards (this is often the default case and it is not always ideal.) The next step is to ask what each student thinks embodiment refers to: this usually starts with a basic qualification of a body in terms of its five senses, but this model is rapidly challenged to ask whether there might be additional senses. The sense of time, sense of balance, proprioceptive sense, and other candidates for the category of sense emerge. Then the question of designing for body *or* mind, or body *and* mind arises: revealing that much interaction design in the 20th century related to interfaces to facilitate intellectual tasks with the support of eyes and fingers. Are we designing for whole bodies, or parts of bodies? Emotions, memories, affects (which are not the same as emotions), imaginations, fantasies and identity enter in to the mix, reminding us of just how multi-dimensional and multi-material embodied existence really is.

The question of whose bodies are being designed *for* is deepened by the awareness that bodies are designed through the design of bodily interactions. In

other words, we don't just design interaction but we can be seen to design bodies. Further, when considering existing related designed systems an implicit body may be assumed but not made overt. These questions and implications open considerations of race, age, ability and gender, and assert that expectations of the performance of identity and ability lie hidden in most designed systems (Nakamura, 1995; McFadden, 2014). With particular reference to gender and sexuality, Zach Blas writes that "formations of body and identity bare the mark of technological networks, systems, and machines" (Blas, 2006, p.1). Embodiment is a profoundly political notion with clear design implications: each system affords a balance between choice and constraint, freedom and control, shaping practices, actions and movements (Thacker, 2004). Whether we like it or not, our designs exist within power structures and societies of control (Deleuze, 1992).

The contemporary political climate has called increased attention to various domains of the immaterial or abstract side of materiality, leading us to ask "what bodies?" are being designed, and designed for. Consider data bodies when we design for our data-doubles and address issues of data protection and surveillance (Zuboff, 2015); legal accountability as we are asked to design for refugees with unclear civic status, government agencies, or for the security industry (Schuppli, 2015); and economic agency as both world trade and personal finances become more complex (Lanier, 2014; Piketty, 2014). What seems to be the disintegration of bodies is actually a form of re-materialisation. Bodies are not dissolved into the digital and rendered easier to control, protect and preserve, in fact their materiality only becomes more complex.

In asking into the embodiment of Embodied Interaction it is possible to be overwhelmed by the range of options or complexity. The desire to return to a simple default assumption of a white, heterosexual, able-bodied, young man (who is employed and has money to spend on gadgets) may seem like a better option. It is certainly easier. This course expands the sense of what bodies might be, at the same time as stressing that *designers cannot design for all potential variations of embodiment*. At times we may design for the young white man mentioned above. Students are asked to define what they mean by embodiment based each specific design project. The pedagogic motivation is twofold. We aim for design students:

- to take note of latent but not-acknowledged assumptions regarding the bodies for whom they design
- to realise that they do not just design *for* bodies, they *shape* bodies with their designs.

Tacit knowledge is rightfully valued in design practice, but tacit assumptions can become blind spots and hinder the design process.

## 2.3 Methodological Awareness and Experimentation

The previous shift accounts for overcoming the void that can ensue when the application of skills occurs in a contextual vacuum. Here the focus shifts to the pedagogic handling of methodology and design processes, with the aim of promoting a reflective awareness regarding selection of methods most appropriate for the design project that students are asked to complete for this course.

From a pedagogic standpoint there is some controversy over whether it is wise to introduce methodology so early in Master's education, preferring to default to a one of the models for clear iterative process that provides scope for revision and experimentation. The critical skills developed by this course include the evaluation of a range of potentially relevant methodological approaches. This prompts



awareness into how designers choose to do their practical work, and validates the reflexive loop of questioning how and why one might select a particular approach for a particular project rather than using one general method for all design scenarios.

Simultaneous to the acquisition of hardware and software skills with a focus on Arduino, the methodological reflection begins with “Lab, Field, Gallery and Beyond” (Koskinen, Binder, & Redström, 2008). It is important to stress that no judgement is offered. The point is not to convert the students to a particular method, but to develop in them the awareness that it is possible to select a different method for each project. The article by Koskinen et al is useful for calling attention to the differences between a technologically-driven inquiry which, quite legitimately, might need to be located primarily in a lab environment and a field-driven enquiry which develops by designers being in the world interacting with people “in the wild”. Mild ethnographic-style data gathering is introduced, and the groundwork is prepared for participatory design. (It must be stated however that this course does not develop design ethnography or PD, we open scope for future courses to build upon these areas.)

From the Koskinen et al paper, we move to Critical Design (Dunne & Raby, 2001) in conjunction with a specific methodological example in the form of Cultural Probes (Gaver, Dunne, & Pacenti, 1999; Gaver, Boucher, Pennington, & Walker, 2004). The Critical Design perspective is important given the emphasis placed on the porosity of the studio: the fact that big questions occurring in the world can and should filter into the student project process. This is not to say that these problems will be solved, or that the process becomes so complex that the project sinks, but that education is not separate from the students’ lives as thinking, observing, acting, political beings in the world. Departing from the model of Critical Design, well established by Dunne and Raby, and opening a sense of critical design as interpreted through contemporary practices with repositioned technological, aesthetic and political qualities is stressed.

Cultural Probes prove to be useful for allowing a creative way to implement fieldwork in a condensed time frame and some students have used this effectively. This method of sending data gathering “kits” home with a limited number of people for a specified number of days in order to gain a glimpse of people’s lives, thoughts and imaginations provides practical and poetic grounds for design decisions (Gaver et al, 1999; Gaver et al, 2004; Hansen & Kozel, 2007). The combined qualities of playfulness and rigour are useful for opening out the students’ ideas of how to engage people in their design process, while at the same time providing a clear structure for data gathering and evaluation. It also permits a play across materials. Digital and analogue materials of all sorts can be included in the probes (such as notebooks, evocative objects like postcards or photographs, little containers with scented or tactile materials, and digital or analogue recording devices). The responses of the participants can be embodied in various forms.

Finally, body based methods – potentially a large field – are introduced with the assistance of two articles on bodystorming (Oulasvirta, Kurvinen, & Kankainen, 2003; Schleicher, Jones, & Kachur, 2010) These two papers work well together for identifying why designers might need to open out design processes to include bodily experimentation. This points to the possibility for using embodied processes for designing for embodied interaction. The second article critiques the first, but both are quite limited in focus and design objectives, making the point that there is scope for further development in this area. Bodystorming opens out to performativity in relation to materiality should any students wish to develop

this further in their projects or in their subsequent thesis projects (Jacucci & Wagner, 2007).

The fairly rapid overview of methods (technology-driven, ethnographic-style, critical and bodily) may have a weakness of being confusing, but this is outweighed by the pedagogic value of instilling an awareness that designers can choose to apply and/or modify methods for particular design contexts. The essential ingredient is a quality of meta-level awareness of why and how a particular method is selected and implemented, in combination with careful attention to how others may have used similar methods. Ethics and accountability are stressed. This contributes to the often repeated goal of developing a reflective practitioner. It also echoes a the priority placed on experimental methods and processes espoused by the inter-disciplinary field of New Materialism, where practitioners and theorists are called to “advance speculations about processes that exceed our current capacity to grasp them and [to] act experimentally on those very processes when a problem, danger or disturbance arises.” (Connolly, 2013)

### 3. Structure and Evaluation of the Course

The focus of this paper is primarily the three conceptual shifts in the redo a course in Embodied Interaction outlined in Section 2. This section provides some details on the practicalities of the course, such as its shape, instruction and basis of evaluation, to make clear that the course is not entirely abstract or theoretical. It integrates some approaches from the humanities, but is still a design course (Bardzell & Bardzell, 2016). A brief gallery of work is included.

#### 3.1 Seminars, Technical Instruction and Deliverables

The course balances seminar style discussions with an intensive workshop in technical skills, in particular hardware and software basics relevant to electronic prototyping using Arduino. This enables the students to achieve a basic level of functionality in the prototypes they develop for their practical project work. Variations in student technical skills are evaluated each year, resulting in modifications to the workshop process that may allow for two levels of instruction: basic and advanced. The work is practical and studio based, lasting between 7-10 days. Support by more advanced students of students with less knowledge has proven to be quite effective.

The seminar component of the course is based around the discussion of assigned readings. Seminars last approximately 3 hours, and particular students are assigned to open out the readings by leading the discussion with the support of the teacher. This can imply a steep learning curve for students who have not had to grapple with academic argumentation or writing style before entering the Master's, but it is necessary to support the educational development in criticality, reflectivity and academic writing. (Note: Most of the readings assigned in class have been used as references in this paper). The course relies on another body of writing we call journalism that refers to shorter articles from newspapers, blogs and other discussion forums. These include everything from articles promoting or censoring smart gadgets and pointless apps, to claims that embodied devices will save national health care systems, to celebrating wearables in fashion or deploring the fashion for hack-a-thons. In this category of required reading there is passion, irony and a proximity to the reality of what is happening now that balances the more sober tone of academic articles and recognizes that intelligent journalistic



commentary emerges more quickly than the (necessarily) slow academic publishing processes for books or peer reviewed journal articles.

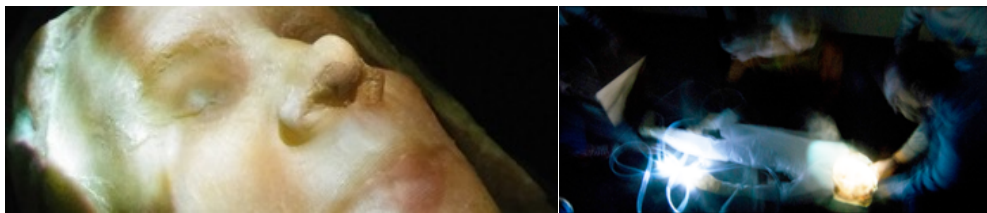
The deliverables for the course upon which students are evaluated include a project prototype and a paper. The project prototype is produced by a team of between 3-5 students. Emphasis is on prototyping and conceptual experimentation, rather than taking a safe route for producing a fully functional, sleek design – which is unrealistic anyway, given the multiple learning objectives and short time frame of a 10 week course. The project brief is quite open, with the instructor assigning a provocative and sometimes abstract theme and supervising the development fairly closely. Previous themes include: “Archiving the Intangible,” “Time Travel” and “Accidents.” These themes are selected with reference to active research projects in the Faculty, providing a link between the students’ work and existing funded research projects. Students are never told what to do by faculty, but see the wider relevance of the pedagogic processes.

The group project receives one evaluation applied to all of the students equally, but the papers are written by each student individually so that their separate voices can be heard and evaluated. They are asked to follow a strict short paper ACM format as an exercise in writing within formal constraints. They are, however, encouraged to experiment with their ideas while grounding their arguments by referring to their group projects, to the academic writing discussed in the course and to relevant design examples. They are given one group tutorial on writing.

In summary, three educational processes integrated into one course:

- Electronics skills acquisition in the form of a workshop component (a “crash course” in Arduino, sensors, and actuators);
- A theoretical and critical component based on readings and seminar discussions;
- A collaborative project producing a design prototype.

## 3.2 Gallery of Student Projects



*Figure 1 and Figure 2. Who Are Tina? (2014). Project intention: to awaken a fleeting memory of an absent person by using inflatables and a performative scenario. Designed by Kent Cam, Sarah Homewood, Petr Kozlik, Dennis Overhage, and Anna Navndrup Pedersen. (Photo: Sarah Homewood)*

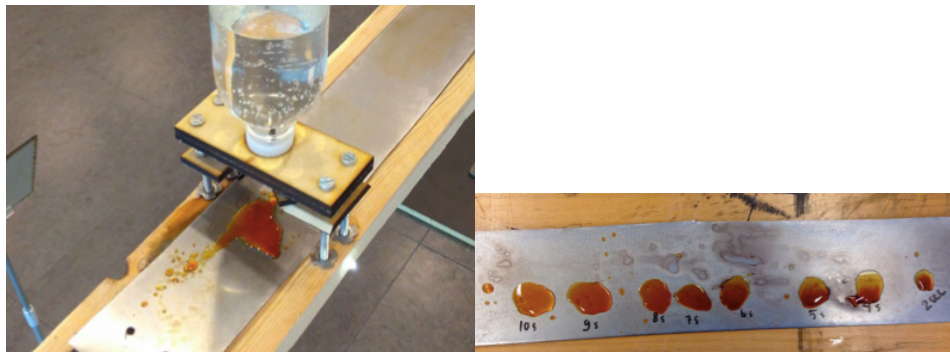


Figure 3 and Figure 4. *The Everyday Ephemeral* (2015). Project Intention: to re-evaluate the concept of the archive by recording with rust on metal some non-human traces of change over time. Designed by Ana Barbosa, Erica Coria, Laura Potenti, Emma Rugg & Marjo Tikkanen. (Photo: Erica Coria).



Figure 5 and Figure 6. *The Bernhard Savings Pod*, 2016. Project intention: to make consumers more critical about personal spending habits by inventing a product with strong affective and material qualities. Designed by Tomas Sandahl Christensen, Jesper Hyldahl Fogh, Nina Cecilie Højholdt & Victor Bayer Permild. (Photo and diagram: Jesper Hyldahl Fogh).

## 4. Conclusion

In reflecting upon the on-going design project that is this course on Embodied Interaction, a question emerged over who is doing the “redo” of bodies: the teachers or the students? In other words, are we, design professionals who teach for university departments, re-doing the body so students can learn Embodied Interaction with more contemporary and critical relevance? Or are we teaching them to redesign the body in Embodied Interaction, which is to say, redesign contemporary bodies?

Clearly the second version of this question is the more significant, with more profound implications for cultural transformation, but it builds on the first. We are not merely revising and iterating prior scholarship in embodiment, offering new marketable skills and techniques. In developing greater awareness of the material and political implications of embodiment we reveal the extent to which our bodies are already modified by existing designs, and will continue to be modified by future designs. We are not abandoning the body in a turn toward materiality, but acknowledging that there is no unwinding the material transformations that have occurred and will continue to occur. Above all, we demonstrate that interaction designers have the conceptual and practical tools to tackle difficult questions and problems.

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# Here I am: Doing Culture Together. A Collaborative Exhibition Project that considers Cultural Ideas from New Zealand

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**Abstract:** This paper outlines a collaborative design student project conducted in rural Northern New York. The collaboration required teachers and students from a range of cultural and environmental backgrounds, and enrolled in two different courses, to work together on a shared project. Central to the project was a visit and lecture by a contemporary artist and museum professional from New Zealand. The students were introduced to contemporary Māori art (reflecting indigenous art concepts and practices from New Zealand), and used this as a lens to investigate their own culture and ancestors. The resulting interactive exhibition connected Augmented Reality software with deeply personal stories to develop a new work that required – and shared – a common acceptance of both personal identity and difference. This practice-based research evaluates the importance of design students engaging with cultural material in tangible and personal ways.

**Keywords:** Art history, interactive media, intercultural collaboration, identity

## 1. Introduction

*Anei Au*, which translates as ‘here I am’, or ‘this is me’, was a collaborative student project – an interactive exhibition produced between two courses in Graphic and Multimedia Design at SUNY Canton in 2016.<sup>1</sup> This paper discusses the intercultural collaborative processes and digital tools employed through the concept and development stages of this exhibition, the project’s challenges and its unique outcomes. It reflects on how the project helped us to consider our own identity, our place in the world, and considers the importance of design students engaging with cultural material in practical and personal ways. This is positioned within a



deeper investigation into media ecologies as they offer an approach to reconsidering our place in a complex contemporary system.

Prior to the start of this collaborative project, students were studying in different courses.

In one course (GMMD 291), students studied the art histories, journeys and cultural contexts of the 'Arts of Oceania'. Across the hallway, at the same time, another group of students were enrolled in 'Programming for Visual Designers and Artists' (GMMD 121). These students studied an introduction to practical and technical aspects of interaction design, including the use of programming languages and applications for visual art design and interactivity. Halfway through their 16 week courses, the two groups – a total of ten students – brought their recent learning to this interdisciplinary project. The project was developed in an ongoing iterative design response, as a conversation with a given situation (Schön 1984), and as such no prior budget had been allocated. All but one student was majoring in Design, and tacitly this design language and process contributed to the students' understanding and experiences too.

## 2. Working together

The project embraced several layers of intercultural collaboration spanning the subject areas, the students and the professors. The first layer can be identified through the diversity of the two topic areas. 'Arts of Oceania' took a highly contextual approach to identifying and understanding cultural norms through arts and artifacts. In contrast, the 'Programming for Visual Designers and Artists' course considers interaction design as a-cultural – design using interactive tools that are human-centered but independent from a user's culture and context.

The second layer can be considered through the cultural diversity of the student group. Students at SUNY Canton fall into two main demographics: either from a very rural upbringing in the North Country of New York state, or from the five boroughs of New York City. The populations of towns in Northeastern New York are small. Canton has a population of approximately 6,000 that almost doubles when classes are in session. The students are exceptionally diverse, and this can be witnessed in a variety of daily practices, from their language and communication skills to the way they dress and the kind of music they listen to. Students at SUNY Canton tend to be socially divided too, often sticking together based on the geography of their hometowns (North Country or New York City). This lack of interaction and communication was an obstacle to overcome in planning this project.

The third layer of intercultural collaboration is found by comparing the two teaching professors. Professor Kathleen Mahoney was born and raised in the suburbs of New York City, spending a good portion of her childhood and early professional art direction career in Manhattan. Dr Caroline McCaw comes from a more academic background from Dunedin, New Zealand, a small seaside city quite different from either New York City or the rural upstate environment of the college. McCaw was teaching short-term as a Fulbright Scholar-in-Residence with the SUNY Canton program. Together however they shared personal interests and brought their understandings and experiences of both art and interaction design to the project.

### 3. Project inspiration

The project was launched with a public lecture by visiting indigenous New Zealand artist and museum professional Vicki Lenihan about 'Contemporary New Zealand Māori Art' which drew upon the history of art and ancestry in the work of her extended family. The combined student groups formed as team to discuss the lecture, and identified that all were particularly drawn to the art of *poupou*, carved images of ancestors on wooden posts traditionally found in New Zealand Māori meeting houses. The students were first introduced to *poupou* through a photographic image by artist Neil Pardington (of Kāi Tahu, Kāti Mamoe, Kāti Waewae Māori, and Pākehā descent) presented in Lenihan's talk. In this image the *poupou* depicted were archived in a museum, separated from the particular details of their cultural context. Pardington was photographing "the back-of-house vaults, archives and basements" as a way of questioning what we regard as important enough to keep and how these treasures are classified. On his website he reflects: "And in the end we may wonder which tells us more about ourselves." ([http://www.neilpardington.com/text/the\\_vault](http://www.neilpardington.com/text/the_vault) )

This led to further questioning of the 'proper place' for *poupou*. In New Zealand, Māori *poupou* – particular (respected) ancestors – are depicted in terms of social and spiritual connections. In this way the carvings may be said to hold the potential ability to listen and speak back.

In a facilitated group students decided to develop a collaborative interactive exhibition, taking the *poupou* as a source of inspiration. This allowed the students to both share their newly acquired understandings of their own course topics, and work together with the new information and understanding provided by Lenihan's lecture. In a facilitated workshop the students, with Lenihan's support, decided they wanted to create their own kind of *poupou*, drawing upon their own ancestors and skills as design students. They accepted that they needed to draw upon their unique cultural identities as the exhibition subject, and to present their work together in one space.

### 4. Project development and presentation

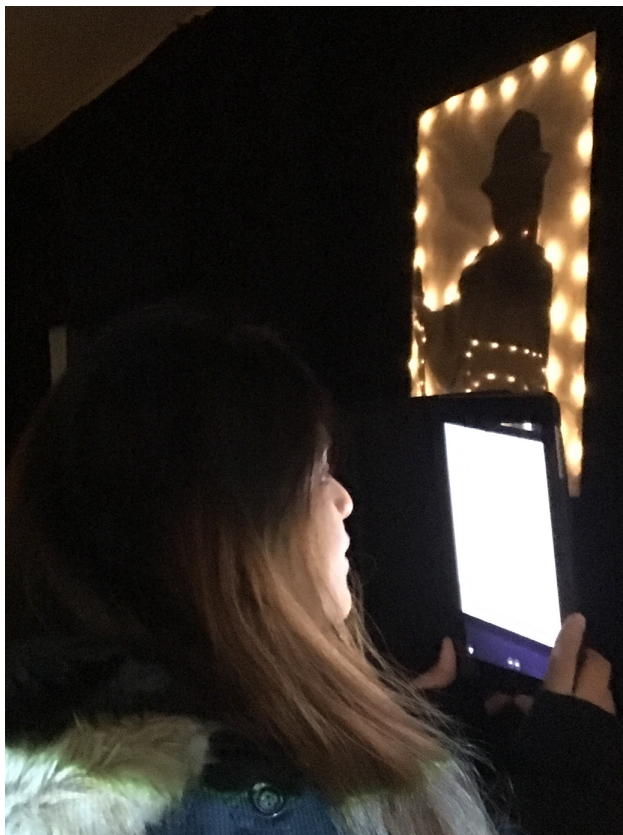
In developing *Anei Au* students began by considering their own ancestors – first identifying someone in their family they had spoken with and whose conversation had had lasting influence upon them. In this sense their ancestor continued to 'speak' to them, and at least metaphorically, the students themselves through their actions, could 'speak back'. The exhibition concept was to employ digital tools to create a visual and auditory narration of these past conversations extending and sharing them through time. The students wanted to create their own version of a *wharenui* or meeting house, where their diverse and personal stories could be housed and heard in one space. Rather than carved wooden *poupou*, the group eventually decided on wall-mounted lightboxes, using contemporary graphic representations of their ancestor, enabling them to draw upon the skills and resources readily available to them.

A number of U.S. festivals helped us in this development period. The first was a timely break, enabling students to reach out to family members. Not long after the decision to work with our own ancestors, the school took a mid-term break to celebrate Thanksgiving. Thanksgiving is a national holiday celebrated in the United States each November. Originally Thanksgiving was a festival to remember early Pilgrims in Plymouth, Massachusetts, who shared their first harvest with Native

Americans, the Wampanoag Indians. While little of the cultural background of this story remains in practice, the festival remains a family-centred one, more popular than others due to its encompassing national significance rather than religious denominational focus (Strauss, 2016). All students left campus to share the holidays with family members, and this provided an opportunity to connect and converse with and about ancestors.

Upon returning from their short break, each student reported a conversation, and developed their conversation into a short script. These stories were each unique and very moving. Students shared stories of sadness, strength, loss and pride through their relationships with particular and special elder family members. They were able to articulate the ongoing relevance that these stories had on their lives, as college students in their twenties. This was in stark contrast to earlier conversations we had had around culture: each of these students, despite their various cultural backgrounds, had argued that as Americans they “had no culture”, and as young college students they had left any of their family’s cultural background with them when they left home. Although students could not identify their collective culture, through taking ownership of personal stories and identifying the relevance of these stories, a language of culture began to emerge.

Ten wall-mounted lightboxes were developed, each with a student-ancestor depicted. Each student developed a visual representation of an ancestor that progressed into a silhouette of the person housed inside a lightbox. This enabled a consistent visual style, and connected the diverse students stories.



*Figure 1. An exhibition visitor hold the iPad up to the student lightbox. The ancestor's silhouette and lighting triggers an audiovisual file on the iPad, so that the iPad becomes a window through which we hear a narrative about the ancestor.*



We decided to employ HP Aurasma, off-the-shelf Augmented Reality software developed by Hewlett Packard, and installed on a set of iPads able to be loaned to the students through the SUNY Canton Library Learning Commons. The students wrote scripts, recorded audio together and created and edited video content related to their ancestor's story. Once the audio and video were complete these media files were uploaded to the iPads. Each student-ancestor conversation was able to be stored and then accessed through the iPads provided when entering the *wharenui*. A screenshot of the lightbox was used to trigger media files – audio and video content retelling the student's conversation with their ancestor.

The students' interpretation of a *wharenui* became the exhibition space, a small black-walled room. The *wharenui* (a former storage room) was developed to house the student *poupou* lightboxes, each lit by LED Christmas lights, sourced locally (from the second U.S festival during project development with timely effects).

The entrance to the exhibition space incorporated video projection and a soundscape of moving oceans to represent a pathway through the sea, referencing the islands of New Zealand and the Pacific from which they drew their inspiration and references. A set of boat paddles framed the entrance to the *wharenui* welcoming the viewer into the space, symbolically connecting the students and visitors through their ocean-faring ancestors to other peoples the world over.

For the exhibition opening twenty iPads were available at entrance for use by visitors. Visitors entered the space then held up the iPad in front of one of the lightboxes. This triggered the corresponding video and the visitor was able to watch the video and hear the story of the student's ancestor, narrated by the students themselves. Using Augmented Reality in this way enabled students to create a site-specific interactive installation that the visitor had to participate with to gain access to these personal stories (Paul, 2003). The exhibition sought to connect the diverse cultural identities of each student through the frame of a New Zealand Māori art tradition. It connected the subjects of two diverse courses of study, and it connected the interests, technical and cultural backgrounds of the two teaching professors. Feedback from visitors indicated that the exhibition was both conceptually and technically successful, resourceful and moving. The students celebrated their own individual and collective achievement, reporting a strong sense of common and personal pride.

## 5. Individualism and challenges of working together

A number of key challenges were identified through the project's development.

As identified, all students (U.S. citizens), despite their ethnic and cultural diversity, reported at the start of the project that they neither identified with the term 'culture', nor valued family connections. They shared a sense that their developing individualism and move into adulthood was achieved by shedding their cultural and family backgrounds, as part of their college experience. We encouraged them to identify and connect with a particular family member through visiting and having face-to-face or telephone conversations, coincidentally timed with Thanksgiving, a traditional family gathering.

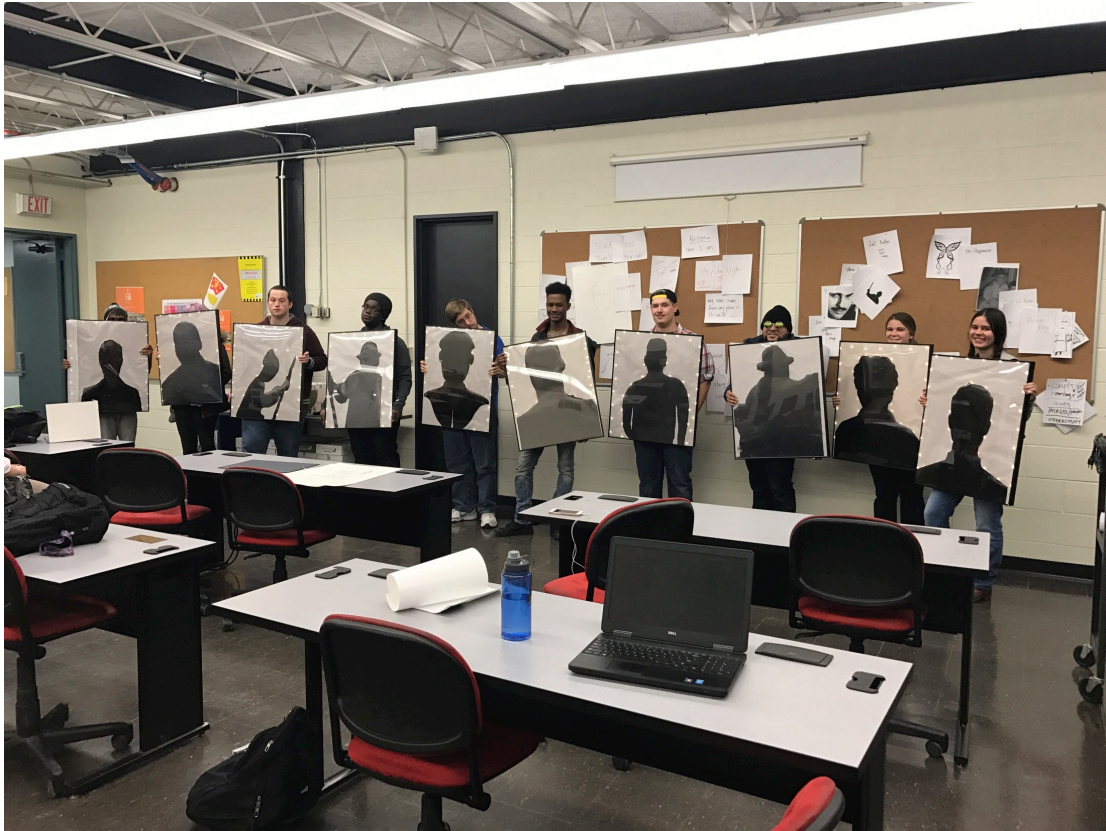
This project took place over the lead-in and event of the 2016 Presidential elections, with media rhetoric around what constituted an American, as opposed

to an immigrant. In class, conversations indicated further inability to grapple with issues of what counted as 'American Culture'. All of these students, whether first or fifth generation, had families who had immigrated to the U.S., and each maintained understandings of different degrees about their forebears' cultures. How these hybrid identities also constitute aspects of American culture was apparently too difficult for students to even start to recognize. The students' inability to articulate their cultural identity as individuals was being echoed by confused media parlance on a national level.

This same sense of individualism made even talking together a challenge, and more so in terms of working together and using collaborative design processes. This was magnified when developing a visual style for the exhibition. Students had agreed upon the terms of the exhibition, but they were unable to collectively imagine the designed space nor decide on the visual style of individual elements. Although students were assigned groups, each person in any given group moved away from the others in vision and concept. The faculty had to outline necessary decisions and physically leave the room to allow students space to discuss and develop a group plan. Even with these guidelines students preferred to work alone, asserting their culture of individualism above that of collaboration. Eventually the professors needed to collate and define visual guidelines, listening and feeding back to the students, allowing each student to frame a response that they felt they owned.

## 6. Connections and differences

As a requirement of the project students eventually overcame these challenges, through first developing, and then working together on a shared brief. Through the writing, design and development of their *poupou* each student discovered connections to the past, adopted their own tools and literacies to position themselves, and then shared their positions with others, in classes that were sometimes very moving. Feelings of pride, love and sadness and a sense of ownership, connection and empathy were enabled through the project.



*Figure 2. Students in class upon finishing their lightboxes, a moment of connection through collaboration.*

The first real experience of common connection and shared vision came about in the final stages of the exhibition production, where students helped each other willingly and constructively. This continued until the exhibition opening where students sat together and really began to have a discussion and relate to one another openly, with confidence and a spirit of celebrating their unique stories. We had expected this bonding to happen much earlier in the process.

By this stage in the collaboration students appeared to be confident in the presentation of their own identity: hybrid, complex and transitory. The differences between themselves and their chosen frame of “individualism”, and each other, had been replaced by a common acceptance of difference. By engaging with a family member, each student was able to consider their own identity from a safe distance. Their interpretation of a *poupou* became a useful window for examining and articulating their own identity, culture and experience, and one they found a confidence in sharing.

## 7. Outcomes

The resulting interactive exhibition employed design processes to deliver a unique exhibition design and experience, and one that found a ‘space in-between’: not defined by one discipline, toolset or cultural perspective. Drawing on definitions of digital art by Christiane Paul (2003), the exhibition was positioned between employing digital tools for the development of a traditional art object (in this case the students’ own *poupou*, developed as framed images) and art that employed

technology as its own medium. In terms of collaboration, some of our efforts were misplaced, and students would not collaborate in areas that we thought they needed to. In other ways, life and energy bubbled up from the results of these students working together that cannot have been imagined nor planned. The final exhibition was much more cohesive than we expected. The exhibition experience was surprising and deeply personal. The dark room with the only light coming from the lightboxes and the iPads, the recorded sounds of quiet youthful voices and oceans mixing, made for an intimate – and at times emotional – visitor experience.



*Figure 3. Anei Au: Here I am, a photo of the final exhibition, multiple ancestors presented together*

The exhibition outcome however was only part of the project's success. Students unfurled socially through their connections with family and each other. Through engaging with ancestors, students brought authentic experiences to the classroom, which helped to bridge their cultural and social diversity. The group implicitly agreed to the telling of intimate stories and through the design of an exhibition, learned how individualism is not necessarily threatened by working together. We all learned about ourselves as unique individuals as well through our shared experience.

This project enabled a diverse group to traverse cross-disciplinary and cross-cultural lines by using digital evidence and method and digital authoring. While a temporary installation employing digital tools, the concept and the stories of the students' ancestors will live on and be remembered in ways that are both auditory (traditional storytelling) and digital (presentation as an installation). Students used design processes and digital tools to generate new ways of seeing their ancestors, to make personal connections with their own histories and their new emerging selves, and to consider how these immaterial stories and values could be represented through a public exhibition format.

The students began with a shared belief that they had "no culture" and that they needed to discard their past in order to have a chance at a future. They felt that their terms as an individual had to be asserted above the needs of a group. This underpinned an urge to live in the moment rather than relate their experiences to those of their parents or grandparents and the past. In the face of fleeting connections through their common digital experience: browsing, messaging,



posting and searching, this collaborative project required deeper human connection and face-to-face communication, both as a research and design process as well as through the negotiated development of an outcome. Students had to record their memories, reconsider them and ask “why and how does this past conversation and relationship continue to affect me?”. Time was identified in a different way. Memories and experiences are re-inscribed as valuable and able to contribute to the present – and potentially to the future – in ways that are neither disconnected nor fleeting.

## 8. Implications for design education

Overall the project helped us to consider our place in an ecology that enables both cultural and media systems to inter-relate, be examined and shared (Fuller 2005). Through taking individual identity as a starting point the collaboration enabled a deeper investigation than we had anticipated, and helped us to reconsider our place in a complex contemporary system. We can consider this in terms of cultural engagement in and with media, in terms of collaboration and in our evaluation of an experiential learning approach.

The use of another’s cultural material must be carefully regulated, and this project could not have occurred without the careful mediation of Vicki Lenihan, and her generous critique of student interest and ideas. While carefully avoiding appropriation of another’s culture, we learned that in this case, the demonstrated role and value of ancestors in one culture was something each of us could relate to. The ensuing personal reflection that the consideration of our own ancestors enabled, helped us to develop important tools that moved cultural conversations beyond the general towards a specific, tangible and shareable experience of our own cultural positions.

Further to this, the interweaving of culture and media seems central to interaction design in ways that are more than transactional, although these subject areas are seldom taught together. The bringing together of these subjects certainly brought richness to the learning outcomes of both groups of students and lead us to question why this is not a more common approach.

It is unusual to approach subjects such as art history (in this case the arts of Oceania) by employing experiential learning approaches. Through this project we observed that while a clear understanding was gained of Oceania’s art history and contexts through a conventional lecture and written assessment format, a different type of engagement was achieved through a project-based approach. While only a single case study, it will be interesting to consider future projects and subjects with an open and collaborative brief, and test normally theoretical subjects using collaborative and culturally-centred approaches.

In this time and place, collaboration between teachers, students and subjects opened new ways of discussing our subjects as well as ourselves. In the U.S. it appears to be critical that we develop language and methods to understand culture and difference, in positive and shared contexts.

In this regard we did not openly teach how to collaborate, and if we had done this it may have eased our at times difficult process. Whether adding explicit methods for working together would have meant excluding other areas of learning in this short and ad hoc collaboration is difficult to evaluate. It is clear that the experience of connecting to their ancestors and the story-telling that comes with that journey was transformative for these students. These project methods and approaches may be able to connect with other contemporary aspects of design,

such as co-creating with communities, story-mapping narratives, a deepened respect for indigenous cultures, strategies for making personal connections in spite of difference. We recognize that the project opened doors for us all, and indicates room to extend and apply a project such as this to many other areas of design education.

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# Design of Education as Education in Design; De-stratifying Fields and Subjects.

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**Abstract:** The complexity of the problems we are faced with today needs to be addressed in a holistic and integrated way, rather than being portrayed as a highly stratified system of seemingly non-related fields and sciences. Artists and designers can envision and design a future that could be more adapted to this ‘relationality’ of the world, yet it demands a different mind-set in order to unlock that potential. Education in design is also about the design of education, and that is why we need to de-stratify fields and its subjects. The awareness amongst designers and design-educators rises that property related thinking (what something is), is rapidly losing ground to types of stability based on ‘relationality’ (what something can (re)do). This calls for a shift in (educational) perspective from an extensive hierarchy to an ontologically flat intensive thinking. This paper hands three instruments to start with.

**Keywords:** Assignification, design-philosophy, education, heuristics, affect

## 1. Introduction

The awareness is imminent that all (self-inflicted) difficulties humanity faces today have only a few causes. The quest for expansion, growth and progression (extensive thinking) has dramatically shown its own limitations, whilst it has never truly lived up to its expectations. Today’s ‘cultural ecology’ demands a far more active stance of all who participate in it and it is no longer sufficient to act indirectly i.e. through the acts of our students. After all, humanity has many problems with the world, but the world has only *one* problem, and that is humanity. High time to start ascertaining our *niche* in the world, and consider how to redo this negotiation on a fundamental level.

There are several good reasons for not idealizing the *Homo Universalis* as highest attainable state of human development, but to prefer the *Homo Connectus* (if such a thing exists). This is a networked human who not only always operates in partnerships, but perceives him/herself always in the larger framework of the cultural ecology. This non-egocentric, yet ambitious human sees self-interest and

collective interest as one and recognizes that there are no winners unless all win. Who leaves room for the unspoken, regards the virtual as real and valuable. Who does not think in terms of more or larger, but in terms of better and more precise. Who does not mix equality with uniformity. In order to install the fundamental changes very much needed today, we must push for a growing awareness of the (economic) validity and value of the design of affect, both autonomous and applied (intensive thinking). We, as educators should teach our students how to do this.

This calls for shift in (educational) perspective from an extensive hierarchy to an ontologically flat intensive thinking. While under the increasingly unsteady social-economic systems the need for stability is growing, the awareness amongst designers and design-educators rises that property related thinking (what something is) is rapidly losing ground to types of stability based on 'relationality' (what something can do). The complexity of the problems we are faced with is to be addressed in a far more integrated way. How can we expect our students to gain the essential insights on the complexity of the world if we treat the same world as a highly stratified system of seemingly non-related fields and sciences? Artists and designers are in the unique position to address these issues from another perspective. They can envision and design a future that could be more adapted to the 'relationality' of the world. For us, as educators of that particular group, it demands a different mind-set in order to unlock that potential. Education in design is also about the design of education, and that is why we need to de-stratify fields and its subjects.

A basic misapprehension in education exists because of the artificial separation of content and form and the synthetic divisions of theory, practice and skills (and professional development, social responsibility et cetera). Rather than to attempt to (re-) integrate these domains as is done in many institutions, I propose to implement a few overarching principles that enable the development of a more connected and interrelated worldview. This paper draws on a continuous line of development of some outstanding experimental educational programs that have been constructed on basis of the few principles:

- Asignification and non-representation; the complexity of the world cannot be reduced to either macro- nor microsystems or models.

Affects are not universal, all bodies stand for themselves. This means that no body can stand for another body, they cannot represent another body. Therefore its affects are 'asignifying', they do not represent anything but the affect itself. Espousing asignifying means leaving traditional semiology and semantics as basic systems for exploring significance.

- Heuristics and non-linearity; in a complex world there is no relevant linearity, learning can therefore only be useful in a nonlinear process of trial and error.

Methodology is based on similarities and representations of (future) conditions. As this representation fails by definition to include all relations in the assemblage it wants to explore, it is more useful to adapt to a system of trial and error to explore and design future conditions. This is called a system of heuristics, it is not precise, yet it is rigorous.

- Multiple optima; in a nonlinear process there cannot be a single relevant outcome, the outcome can only be established post ex facto, never as a result of a predefined procedure (not many roads lead to Rome, but one road leads to many Romes).



The outcome of any becoming is never product of a logical necessity. Yet this process is contingently obligatory, sanctioning the existence of 'Multiple Optima', meaning the possibility of the formation of different, yet equally important outcomes. The outcome can only be established after the fact, never as a result of a predefined procedure. In biology this would be exemplified by the formation of a variety of phenotypes on bases of the same genomes, when exposed to different conditions.

These three notions are put into action in art and design education through an organism that is called 'Intensive Thinking'. This essay will offer a theoretical framework to support intensive thinking as a basis of design-education, which will be supported and exemplified by practical case studies. It will become clear that in this process theoretical development and practical implementation are intertwined in a recursive double-bind that is both exiting and disturbing, yet most crucial to face today's challenges.

## 2. Decision-making

Philosophy and action are directly connected and do not feel the need to be translated through theory, as is often is the conviction in educational institutions. Theorization of concepts very often contains the addition of truisms and generalization. Theory evokes methodology, philosophy demands opinion. Methodology needs to operate at a high level of reduction and the assumptions that are needed to operate within methodologies bifurcate easily into political realms and open doors for opportunistic behavior. Methodology is a very crude system, that only offers a limited degree of certainty on its effects and excludes many alternative ways of development and exploration.

Especially in the education of the arts and design, methodology often works counterproductive and narrows the mind. Only in very specific cases one could fall back on a certain method, like in acquiring 'non-opinionated knowledge' such as software skills or the operation of tools and equipment. In other cases methodology only opens doors to already existing knowledge and insights, and that is exactly the opposite of what is needed in the creative industries. Therefore we need to think in terms of heuristics as the smallest common denominator to work with in a design process, whether that be an autonomous or an applied design. Heuristics include experience-based practices for exploration, gaining knowledge and solving problems as well as giving room to non-rational drives to be part of the decision making process. Heuristics are often seen as a sped up version of a process of which it is clear that exhaustive methodological exploration would be impractical or impossible and is applied in mathematical calculations in a number of ways. A special type of heuristic is that in which affect has a determining part. This shortens decision-making processes, by allowing subconscious processes to function without engaging in extensive search for all possible data and knowledge. Although one might argue that these decisions are rooted in the conscious, there are many more fundamental decisions that are driven in the asymmetry that can exist between the conscious and the unconscious. Cognitive and mathematical psychologists Amos Tversky and Daniel Kahneman have contributed much to the foundation of the study of heuristics in decision making processes, and their 'Prospect Theory' is often used and referred to in financial economics (Tversky, Kahneman, 2000). The usage of heuristic based theories demonstrated the asymmetry in human decision-making in a realm that is mostly regarded as being subject to mathematical operation and clinical precision. One of their arguments is that human decision-making is much determined by the way the problem is formulated and that humans would show different attitudes

towards dealing with potential gains, than with potential losses, despite the fact that mathematically there is no difference between two options. This is not seen as being irrational, but as asymmetrical, which I interpret as a constant shifting between relative and absolute gains or losses. Which is perfectly exemplified by Kahnemans classic demonstration, when he says ‘people may drive across town to save \$5 on a \$15 calculator but not drive across town to save \$5 on a \$125 coat.’ (Thaler, 1999, p. 183).

It is precisely this balance between relative and absolute values which I would call affect. Affect is the essential tool of the artist and designer, and therefore it is imperative to apply heuristic in a design processes. Artists and designers are attuned to connect with affective capacities by default. Not only the process is contributing to the outcome, but also the design of the very process. It is therefore that affect and heuristics are connected to the hip. Graafland argues to look for this beyond the conventional theory/practice distinction where:

it becomes relevant to distinguish broadly between practices that are primarily *hermeneutic* – devoted to interpretation and analysis of representations– and *material practices* like urbanism, ecology, fashion, film making and gardening. The vector of analysis in hermeneutic practices always points toward the past, whereas material practices analyze the present in order to project transformations into the future. This will be a useful distinction, as long as we see the actors, agencies and actants as both human and non-human. (Graafland, 2017, p.39).

Heuristic is not a method, but an approach through trial and error. The literal and metaphorical starting point of this line of thought is the premise that everything is contingently obligatory and not logically necessary. The theorem of logical necessity suffers from that critical flaw that comes with the oversimplification of the complexity of forces, drives, agencies and antagonisms that concretely form the fabric of life. The focus needs to be on life as a dynamic creativity (assemblage) rather than on the environment (territory) itself. Assemblages are configurations, nebulas of bodies (material or immaterial), which have no internal meaning or properties that can be evaluated without their relation to other bodies in the assemblage. Ecologies are local (material and immaterial) assemblages. These bodies produce force fields by which they claim their respective niche in the ecology they form, depending on their capacities (Exteriority of Relations). All assemblages are in turn also part of others, and in all continuous variations the capacities of the properties of its bodies are relative. The most constant aspect of a body to consider is the relative capacity to act and be acted upon, which is called affect. Affects are produced in the interplay between these bodies, and as these bodies reside in various assemblages at all time, these affects are not universal.

### 3. Intensive Thinking One

Most crucial for the understanding of intensive thinking is that it entails the constant readiness to engage every situation (actualized or virtual) from the middle. That means to say, to regard *all* on basis of its relation to others (its exteriority), rather than to emphasize its properties. This leads to the constant awareness of the assemblage one is part of. Explicitly including the ‘observer’ as these observations can only be subjective. Intensive thinking involves the fullest possible spectrum of sensory information, making way for a total somaesthetic awareness, meaning that any experience reaches us through a multitude of sensory channels, including the non-actualized. This subjective and full-hearted

engagement with other bodies (object, elements, life-forms) in our surrounding environment makes that we no longer speak of the experience *of* something (there is no external experience), but rather of experience *as being* something. Intensive thinking can be a program to open new ways in artistic and design processes, but it can also be purely a sterile exercise, with no need to push for a tangible outcome.

All bodies behave differently in various assemblages, and assemblages are never stable, they change constantly. Therefore, if the capacities of a body to interact with other bodies remains the same, the effect of these capacities would vary depending on the assemblage. I could claim that to truly understand even the simplest of bodies, one has to understand the whole universe. Intensive feeling can be thought through exercises, intensive thinking needs a theoretical and philosophical context to be effective. There is a good reason not to regard intensive thinking as being a method because of its own logic. Every process is a completely new assemblage, thus any linearity or causality that has been detected in previous assemblages might not occur. For this reason I would rather speak of an heuristic instrument rather than method. The interlocking networks of capacities, actualizations and flows connect bodies at different strata and locations (non-local causality) and its precise workings and effects are never truly foreseeable (heuristics).

It is paramount to understand these deliberations as part of a policy to become aware (and in charge) of detecting flows (both actualized and virtual) as the most real structure that underlies our world. Despite the natural appetency to reduce reality to that what is concrete, visible, tangible et cetera we need to force ourselves and shift to another realm of sensibility. We can only be aware of the forces that act upon all processes, if we try to distinguish strata that supersede and underlie the becoming of actualization.

## 4. On representation

We encounter an almost religious field of convictions when addressing the matters of representation, in which the sometimes sharply defined semantic and semiotic constructs occupy vast stretches of conceptual terrain. Seemingly, the topic is only approachable in schematic terms of investigation, in which it is not easy to avoid getting arrested in some type of structuralism. Moreover, some of these concepts are so much anchored in the respective disciplines that deal with representation, that they survive changing conditions rather well; if the context does not fit the schema, then we'd rather change the interpretation of the context than the schema itself. Allowing for temporal or geographical differentiation is after all not more than a post-structuralism.

Especially in the arts, these temporal shifts and changing localities can have a significant impact, probably more than in any type of production. Therefore the boundaries between figure and ground, between subject and context, are probably most translucent and should not be ignored, even not if one denounces the principle existence of modes of representation. Barthes denotations and connotations (Barthes, 1968) and Ranciere's speculative hyperbole of the unrepresentable (Ranciere, 2007) make us talk about fashion as modes of transformation, not as modes of transfiguration or deformation and force us to discuss a painting in its *gestalt value* or lure us to pursue fundamental deep readings of its composition and constructions. To put it very bluntly: for me a painting is no more than oil on canvas, and whatever anyone reads in that is not my concern. The only thing I am interested in is to see what this painting does,

how it provokes transfer of values or opens for affective relations. And this goes for all the media, my sole interest goes into their affective capacities, not towards their inherent properties or their respective place in any taxonomy or ontological setting.

On the other hand there is the issue of representation as a concept itself, being the dilemma of the reversal of *belonging to*. A representation can be seen as 'something that belongs to something else' and this is not to be mistaken with 'something that constitutes something else', it is a one-sided synecdoche, the *pars pro toto* without the *totum pro parte*. My aversion against representation is not just informed by my inclination to step away from anthropocentrism in the occupation of and dominance over desire in the relationship between human and matter. It also refers to a much deeper rooted believe that we have entered a new phase that describes future modes of existence much more adequate. This belief is based on the hope that we are able to re-adjust the narrowing effects of modernity and re-calibrate the over-widening effects of post-modernity. American philosopher John D. Caputo argues that it is the 'overgrown faculty of categorization' that philosophy calls modernity (Caputo, 2013). Modernism thinks in terms of unified systems in which everything has its place and its purpose, postmodernism views the world as being a web, an entanglement of forces in which there is no distinction between beginnings and endings, causes and effect and hierarchy of events. Jean-Francois Lyotard assigned post-modernism with an 'incredulity toward meta-narratives' (Lyotard, 1979, p.24).

Representation as an instrument allows for detachment of responsibility, accumulation of instruments of power (such as the monetary system) and a replacement of values. Essential for the progress of humanity is to stay away from representation and its bifurcations such as Identity, Narrative and Culture (INC). These bifurcations can be found in both modernism and post-modernism, and it serves no purpose to express myself in terms of either one of them. We need to focus on questions in the line of actions and not in lines of beings. It is not about what something is, it is about what it does. This does not mean that we can ignore or undervalue other points of view, yet it is my strong belief that the current debate is hindered by both modes of thinking that hinges on these binary oppositions between universal and diversity. What needs to be centralized is the difference that makes a difference and this can only be found in action, action in both theory and practice, a third perspective that calls for pragmatism and relationality.

## 5. Intensive Thinking Two

Almost by default, intensive thinking is at its strongest when the focal point of attention is very limited, it is a search for the lowest gear in the gearbox, making as many rotations as possible to amplify the strength of every meter covered. Extensive Thinking by contrast is mostly interested in covering as much ground as can be done, sacrificing not only details, but entire processes and concepts in its endeavor. Extensive Thinking wants to register objective terms, intensive thinking aims at registering intensities. Extensive Thinking lays much importance on the (relative) properties of its elements, and assumes that the totality of elements (a body) can be deducted from the sum of its elements (organs). In contrast, Gilles Deleuze has given us the additional 'Body without organs', which has become an often used lemma that describes the basin of flows, potentiality, relations, affects, engagements and so forth that is also part of our body-mind, but does not belong to the physical world. However, this extended part of the body is by no means 'unreal', it not influences all actualizations directly, but it also a place where

experience is actualized. With this is meant that many experiences do not have to be actualized in the physical world to be of great value to the experiencing of them.

You never reach the Body without Organs, you can't reach it, you are forever attaining it, it is a limit. People ask, So what is this BwO?—But you're already on it, scurrying like a vermin, groping like a blind person, or running like a lunatic; desert traveler and nomad of the steppes. On it we sleep, live our waking lives, fight—fight and are fought—seek our place, experience untold happiness and fabulous defeats; on it we penetrate and are penetrated; on it we love. (Deleuze, Guattari, [1980] 1987, p.166).

An assemblage has no precondition, its existence is always one hundred percent. There is no sense of duration attached to the concept of assemblage, meaning that the interplay of any set of actors and conditions has no pre-set requirement for time, nor for the amount of actors, nor for any parameter at all. Even the notion of interaction becomes very fluid; is it said that if two or more elements are at play, non-communicative, non-active, inert qualities displayed by an element do not influence that interaction? One could think of the example of standing on a beam of fifteen centimetre wide and four meters long, this is not a difficult task if the beam would be lying on the floor, but it becomes very difficult when this beam is attached between two buildings, thirty meters high. The void may not even been seen as an entity, its effects are very substantial nevertheless.

Another example is the 'interaction' between the motorist with car problems, standing at the side of a motorway eagerly awaiting any type of aid. Continuously cars pass by at high velocity, and in a split of a second the eyes of the person in the passenger-seat meet those of our stranded traveller. Although technically one could classify both in the same category (human, motorists, same heading etc.) they are still miles apart. It is clear that the stranded motorist is caught in an in-between stage, neither motorist (because of the defective machine) neither pedestrian (because of the unsuitable environment). The actor is unable to escape or change the environment, he is suspended between 'agreeable' ecologies. This state of *non-motorist-ism* is a specific mode of assemblage. Perhaps we could call this 'suspended assemblage', which is appositionally related to a 'transitional assemblage', which would indicate the moment of attaching to transitional capacities. For instance when a the person is getting in the car, and thus transitioning from being a pedestrian into a motorist, yet as long as the car is not moving he or she is technically not a motoring yet, though legally already a driver. This indicates that even if the elements are not operating within the same realm (the one operating in the mental-physical, the other in the virtual for instance) or within the same timescale (the non-motorist), they could still affect and interact.

Therefore this state needs to be connected to the assemblage, but specified to be able to even contradict its own workings. As all assemblages are always somehow connected to others through the 'participation' of its elements in a multitude of assemblages, it is clear that in particular cases the effect of the affect in one assemblage might be the opposite of that in another. Situated flows are perfect sources for investigation of these mechanics. Brian Massumi exemplifies this strikingly when following up Bruno Latour's interpretation of Michel Serres's notion of the quasi object which involved the football as a mode of rethinking the relation between the object and the subject (Massumi, 2002).

In the case of our example, the non-motorist could also be called the non-pedestrian, albeit for different reasons. In the first case the environment demands motoring and the subject fails to produce that capacity, in the second case the subject produces the capacity (to walk) but the conditions fail to allow for that. I



would be tempted to call for an overarching assemblage of these assemblages, but as there is no hierarchy in assemblages, that 'meta-assemblage' would be rendered a useless and untrue concept. It is precisely the difference in rationale between figure and ground, in this case that what is causing an element to be non-pedestrian or to be non-motorist, which is of importance for the understanding of the following. For now I will name it the *niche*, as to indicate that it has a specific space which is not predefined nor is there a preconception of its mode of existence. Yet it is always there.

## 6. Intensive Thinking in action

How can we put all all previously mentioned notions in to action in a program for design education? This part describes the testing of the validity of intensive thinking in design processes. I will use an elaborate example that draws on field work which has been used in my courses in the master-program at the Delft University of Technology. In the first section I deal with the cartography of urban fabric and its social and economic structures, with a particular interest in the exploration of the underlying and overarching virtual and actualized flows. The second section is dedicated to the enactment of this research into a design for an intervention to address very concrete issues.

A very interesting mode of investigation which I have used with students is to create an alternative cartography based on a taxonomy of the aforementioned *niches*, those places where the (urban) fabric allows for changing types of 'identity', from motorist into pedestrian and vice versa, motorist into theatre-audience and v.v. etcetera. Note that identity is not used as a pre-given, it is an indicative, meaning that it serves only as a posterior (contingent) label, not as necessary determinant. This transition is an event, not a process. Didier Debaise explains:

As soon as we say that all individuation is singular – an event – the limits, forms and consequences of which we cannot *a priori* determine, raise a question : how to describe or refer to a regime of individuation? There is, for Simondon, a limit to intelligence which approximates Bergson: all exclusively theoretical approaches to regimes of individuation, and thus of relation, necessarily transform, by cutting or stabilizing, their novelty (Debaise, 2012, p.8).

The assignment for the students was to investigate certain urban areas and analyse these using the aforementioned ways of intensive thinking. This meant that no 'traditional' instruments for probing were allowed: no measurements, no counting, no modelling, no photography, no drawing et cetera. The instruction was to regard the given environment as an assemblage, in which all and everything had its niche, including the observers themselves. The aim was to identify (potential) problems in this area and design solutions which disrupted the assemblage as little as possible. This 'asignifying cartography' was done with the aid of video cameras, diaries and sound recording, with the clear instruction that none was to be regarded as a representation of the situation, in fact, all cartography was to be regarded as part of the situation. After due deliberation, the students formulated an plan for action, which included many blank spots, meaning that they did not know yet what difficulties they might encounter, but they were prepared to address them. The main focus was to unravel the urban complexity on basis of capacities and not in terms of properties. This means that the entire research area could be described in mutually dependent relations and this would transform any given object into hubs, transformers, transformers, condensators, corridors, collectors and so on.

In this type of cartography, shopping centres become conductors of human activity: the shoppers arrive by car (medium-speed task) and transform into window-gazers (very slow speed reward), they would typically stay in such place for one point five hours, and then leave to become (medium-speed) motorists again. When they purchase some items, they transform into money-outlets, and the store becomes a conductor of cash, which will accumulate into a bigger stream that is taken by a money truck. This truck would arrive empty (low-priority) and would leave filled with the days turnover (high-priority).

An airport would be an transformer of even bigger capacity, not only it would stop motoring for a significant amount of time (fast driving into long standing), it also would transform medium-speed (motorists) elements into high-speed elements (aviators) . The biggest transformation would be that it would trade a number of elements (many people in one plane) , in return for the influx of another type of element (one plane bringing many different goods). An exchange portal of intercontinental magnitude. Theses analyses could go on eternally and meander through several domains. Hovering through a certain area, all the too familiar constructions, infrastructures and places (especially what Marc Augé would call non-places) could be cartographically denoted in a far more interesting way (Augé, 1995).

The taxonomy of the urban fabric on basis of intensive thinking proved to be a very useful tool to transform a very practical task into an abstract mental exercise, and vice versa. All urban elements, big or small, known or unknown would have a completely different prominence when judged on their capacities rather than their properties. And still this would not be a type of representation. As all elements where only measured against their own capacities, no single piece of information about the whole body was ever discarded. No reduction of information was applied (as in the case of representation), yet the relationality of the body had become the main indicator of analysis. We would call this asignifying cartography, because it does not represent, but it shifts the perception from an illusional objective to an empirical embedded perspective.

## 7. Vital Collapse

The second stage would prove to be more problematic. After the initial exploration, the categorization on a more refined level proved to be more demanding. How to deal with different types of hybrid allowances (eating/driving, flying/reading etcetera) for instance? Many 'targets' in the cartography-process became on closer inspection more and more difficult to put in a selected category on basis of the discrepancy between their functionality and their actual usage. In order to suit all needs, the categories need to be expanded to such extend that most elements existed in their own class. For taxonomic purposes, this is a very unfavourable position to move into, as obviously it serves no purpose to refine the classification to a point where the overlap with the analysis material becomes visible in a structural sense. Automatically the students turned to familiar and proven methods to fill in the gaps created by their classification. Program, function, demographics and narrative are familiar representational tools for architects, so it is understandable that students automatically revert to them when they are lost.

The problem was that because of the data collected form the analysis, many of the preconceived instruments the students were familiar with, did not fit on the problems they had found. Yet this 'problem' was not unforeseen, in fact we call it the 'vital collapse'. The vital collapse occurs at the point when existing



methodology is 'hollowed out' or 'overloaded' by the introduction of a dataset stemming from another type of analysis. This meant that the students were forced to progress on new grounds that had not been charted yet, they were persuasively engaged in a heuristic process of design. The cartographic work was done collectively, meaning that they all started in the same research area. As the familiar methodology had broken down, the students were left to other forms of decision making in the design process. They had to constantly shift between relative and absolute values, and as I argued before, it is in this tension between values where affect is the major determining factor of decision making. What came out of the design process was a wide variety of interventions, including cinema and poetry, as well as architecture. The heuristic design process on basis of asignifying cartography had produced a multitude of optima, each specifically designed for a certain niche in the urban ecology. Obviously for practical reasons some of these interventions needed a translation (into architecture) to fulfil certain needs, but that was seen as a minor detail of the operation.

Everyone involved was fully convinced that the outcome of the design processes would have never been the same when traditional methodology would have been applied. The most spectacular effect of the design was that the interventions were so adjusted to the 'natural' flows and habitats of the urban fabric, that they used only a fraction of resources, energies and footprints in comparison to traditional solutions. It needs no argumentation that a very well applied pressure on the exact right spot is far more effective than the application of a 'blind' instrument that always does the job in the same way, but at a very high price. For us educators, that was the most valuable lesson to be transferred from these experiments. They formed the basis for several new educational programs, such as *ALEPH* at the Royal Academy of Art, The Hague, yet for reasons of brevity they cannot be fully exposed here.

## 8. Conclusion

The examples given set into perspective that the much of the concepts I am exposing here have been developed with proper and prolonged testing, or in fact *through* proper and prolonged testing. This is to indicate that however experimental and speculative this all might seem, its capacity to produce very concrete structure for education and subsequently concepts and products has been well proven. Some points related to the design of design education will be formulated that transgress the boundaries of content and form constantly, but it is exactly this fluidity between concept and shape that exemplifies the rationale behind the development of the mentioned educational programs. Intensive thinking is scale invariant, it knows no boundaries in a formal sense, it only differentiates (if at all) in terms of nesting: any concept hosts another, which is nothing else than the same concept in a different assemblage. The concept is basically hosting itself, just like the Escher drawing that is drawing itself.

It is a fundamental misconception that the individual equals the private, and the collective equals the shared. When we focus on the capacities, rather than properties we can achieve a fundamental shift in the way we perceive the world. And with this we can start to design on a proper sustainable foundation, rather than to continue with trying to create a sustainable design on bases on a false worldview. There is no such thing as an 'environment as such', let alone *the* environment. Levy R. Bryant points out that 'environment's cannot be treated as something that is simply given or there such that the organism subsequently fills a niche that already existed in the environment.' (Bryant, 2011).

It is for this reason that a urge for a consideration of educational programs based on the aforementioned principles and philosophies: asignification, heuristics and multiple optima, all hosted under the umbrella of intensive thinking. There is no room for a division between content and form, figure and ground or inside and outside when we want to address those issues that are in increasing need of attention. It is our job as educators to integrate de-stratification and holistic approaches within design processes and these processes include the design of the education itself. The best solutions are those which are given by not causing problems.

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# Governance Design

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**Abstract:** This paper proposes a new field of design – Governance Design. Governance Design draws attention to the role of design in producing, reproducing or questioning how societies and societal issues are governed, by whom and based on which norms and values. It considers governance something distinct from government and acknowledges that design, both the product and process of design, plays a significant role in societal governance – sometimes intentionally but more often unintentionally. Governance Design therefore urges designers to become more critically aware of the role design plays in governance. Drawing on recent STS and governance literature, the paper further proposes a theoretical foundation for Governance Design, and through an example demonstrates how Governance Design might look in practice.

**Keywords:** Governance design, governance, norms, values, societal issues.

## 1. Introduction

We are, across the world, today witnessing an increasing dissatisfaction with governments and how they deal with contemporary issues. Throughout 2010 and 2011, millions of protestors in countries such as Tunisia, Egypt, Libya, Yemen went to the streets chanting the slogan ‘Ash-sha`b yurid isqat an-nizam’ – the people want to bring down the regime (Eldin & Salih, 2013). More recently, citizens of Great Britain voted to leave the European Union, citizens of United States of America elected Donald Trump who promised to ‘drain the swamp’, while in Australia and in countries across Europe (e.g. Switzerland, Austria, Denmark, France, Finland and Hungary), right-wing nationalist and Eurosceptic parties are rising to power. For better or worse, the peoples are calling for change.

In parallel with, and most likely directly related to this political transition, the global society is finding itself with an ever-increasing list of complex and large-scale societal issues. Many of these issues, such as climate change, increasing inequality, lack of water and sanitation services, food shortage, military conflicts, migration, ageing populations and economic recession, call for urgent attention.

Against this backdrop of political turmoil and complex societal issues, design is undergoing its very own transformation. Designers are increasingly venturing into the public sector, where they for example: take part in rethinking public service

provision (Bason 2013; Botero, Paterson, and Saad-Sulonen 2012; Briggs 2011); explore the role of design in policy-making (Bason 2014; Neilson 2008); and are involved in changing the mechanism of democracy (Crabbe, 2013; Disalvo, 2010). Designers are also increasingly supporting citizen involvement in societal governance for example in; large-scale transformation (Manzini & Rizzo, 2011), urban planning (Munthe-Kaas & Hoffmann, 2016; Palmås & von Busch, 2015) or in public service provision (Julier, 2011; Tonkinwise, n.d.). Simultaneously, the very nature of design itself and *what* is designed, is also shifting. New fields of design such as design activism (Fuad-Luke, 2009), critical design (Dunne and Raby, 2013), social design (Manzini and Coad, 2015) and adversarial design (DiSalvo, 2012) are emerging and re-emerging. In each their unique way, these new fields encourage designers to engage more directly (and critically) with complex societal issues – to explore, highlight or even solve such issues. As a result of these and other recent changes, designers are today found across private, public and the non-governmental sectors, where they design products, services or systems, but also increasingly design Things - socio-material assemblies (Björgvinsson, Ehn, & Hillgren, 2012; Ehn, 2008), make publics - gather people around shared issues (Disalvo, 2009; Disalvo, Lodato, Jenkins, Lukens, & Kim, 2014; Le Dantec, 2016; Lindström & Ståhl, 2016) or are involved in ‘infrastructuring’ - building and supporting long-term relationships (Björgvinsson, Ehn, & Hillgren, 2012; Hillgren, Seravalli, & Emilson, 2011).

With these movements in politics, society and design in mind, I will in this paper suggest designers, as they move into governments or explore the role of design in dealing with complex societal issues, should not only look for practical solutions, but also raise important and critical questions about governance: Who is best placed to deal with societal issue? Who should be held accountable to whom to ensure it is done? Which norms and values underpin how societal issues are currently dealt with? Is this fair, legitimate and morally and ethically sound? In other words, I argue that designers can play an important role in exploring and questioning how and by whom complex societal issues are governed. To be more specific, I argue that we need a new field of design – I call this *Governance design*.

This paper has six sections. After this introductory section I explore the difference between governance and government and show that governance is clearly distinct from government. In the third section, I take a closer look at recent design literature related to governance and argue for a more critical engagement with governance. In the fourth section, I draw on contemporary governance literature and argue that design can and already does play a significant role in societal governance. I specifically show that products of design mediate governance relations and that societal norms and values underpin governance and design. This leads me to introduce Governance Design. In the fifth section, I draw on an example to describe how Governance Design might look in practice. Finally, I finish the paper with a conclusion and raise some important questions for further research into Governance Design.

## 2. What is governance?

The term governance has a long history, but has recently gained renewed interest. Etymologically it dates back to the ancient Greek verb *kubernân*, meaning to steer or pilot and was for example used by Plato in reference to developing a system of rule (Kjær, 2004). It re-emerged in the 1990s after the role of governments had undergone some significant shifts. Governments had after the Second World War played a larger role, especially in economic redistribution, and were generally considered “the appropriate, legitimate and unchallenged vehicle for social

change, equality and economic development” (Pierre and Peters 2000). This changed in the 1980s, when market-based approaches to public service delivery were introduced through New Public Management (Manning, 2001). Governments became smaller through privatisation, deregulation and tax cuts. In the 1990s, it was argued that *governance* was something clearly distinct from government and new approaches to public governance emerged.

Despite its' widespread use, governance is a notoriously abstract and ambiguous term. It is used across several disciplinary fields and can refer to either; a specific reform objective (Leftwich, 1994), a process (Pierre and Peters, 2000) or an analytical framework (Kooiman et al., 2008). Looking across the governance literature, the complexity and diversity of the term becomes particularly apparent. Rhodes (1996) has identified six types of governance, Kersbergen and Waarden (2004) no less than nine and Kooiman (1999) a total of twelve different approaches to governance. In the words of Björk and Johansson (2001); “[T]here are almost as many ideas of governance as there are researchers in the field”.

While there are many perspectives on what governance is and how it should be done, it is generally agreed that governance is distinct from government. Ruhanen et al. (2010) for example concludes that: governance is not a synonym with government, and is much broader than government; governance suggests less government control, but government may have an overseeing role; and governance implies that multiple stakeholders are involved. Governance is from this perspective a form of *networked* activity in which a wide range of actors take part in the pursuit for common goals. Government is in other words not the only ‘governing’ actor (Kjær, 2004).

Considering governance clearly distinct from government raises important questions about the distribution of roles and responsibilities, not only within government, but also among other actors: What is the role of private sector, civil society organisations and citizens in dealing with societal issues? Some authors like Pierre and Peters (2000) argue that the state should play a key role in societal governance, while others like Bowles et al. (2002), suggest communities can have superior governance capabilities - Rhodes (1996) has even introduced the notion of ‘governing without government’. Others yet again argue governance should be shared (Ackerman, 2004).

### 3. How are design and governance related?

Designers and design researchers have already recognised the close relationship between design and governance and are, as suggested in the introduction, increasingly moving into governments or are exploring the role of design in relation to democratic processes or citizen participation. Descriptions of governance found in recent design literature, however seems to represent a narrow perspective on governance.

Some design researchers have written about the role of design in governance *within* governments or in relation to democracy. Tunstall (2007) for example suggests design can make governance tangible to everyday people, but largely describes governance as policy-making, i.e. an internal government process. In the proceedings of the fifth edition of the Design Public Conclave held in 2014, governance was furthermore defined as; “The practice and process of administration, management, regulation, organization and coordination of the machinery and apparatuses of the state” (CKS, 2014) - in other words the internal practices and processes of government. Lastly, DiSalvo (2010), who has written extensively about design for politics, describe the design of ballots as a way of

supporting and improving what he terms the ‘mechanisms of governance’ and thus seems to equate governance with democracy.

Other researchers have explored the role of design(ers) in shifting responsibilities from government to citizens – implementing a specific governance agenda. Julier (2011) for example describes how designers in the UK could play a role in supporting the ‘downloading’ of previously held government responsibilities to civil society or citizens, in line with the UK government’s ‘big society’ strategy. He specifically suggests designers might help deliver better services, cut costs and relieve the burden on the governmental budget (Julier, 2011). Citizens have, as part of such downloading, been expected to voluntarily take on the process and sometimes cost of public service delivery and Julier has suggested designers could help aid this transition. Tonkinwise (2017) on the other hand has noted, that people are no longer waiting for government or businesses to develop more sustainable ways of living or working. They are instead taking matters into their own hands through social innovation projects, and Tonkinwise (2017) suggests design(ers) can help enhance the effectiveness of such initiatives. From this perspective, governance relates to a specific agenda or goal.

Designers can, as shown by Tunstall and DiSalvo, for example play an important role in reshaping governance structures and processes *within* government (see figure 1 below), or in implementing a specific governance agenda, e.g. ‘downloading’ responsibilities onto citizens as shown by Julier and Tonkinwise (see figure 1 below) – but which role might design(ers) play in governance more broadly? Which role might design(ers) play in governance as a *networked* activity, involving a wide range of actors in the pursuit of common goal?

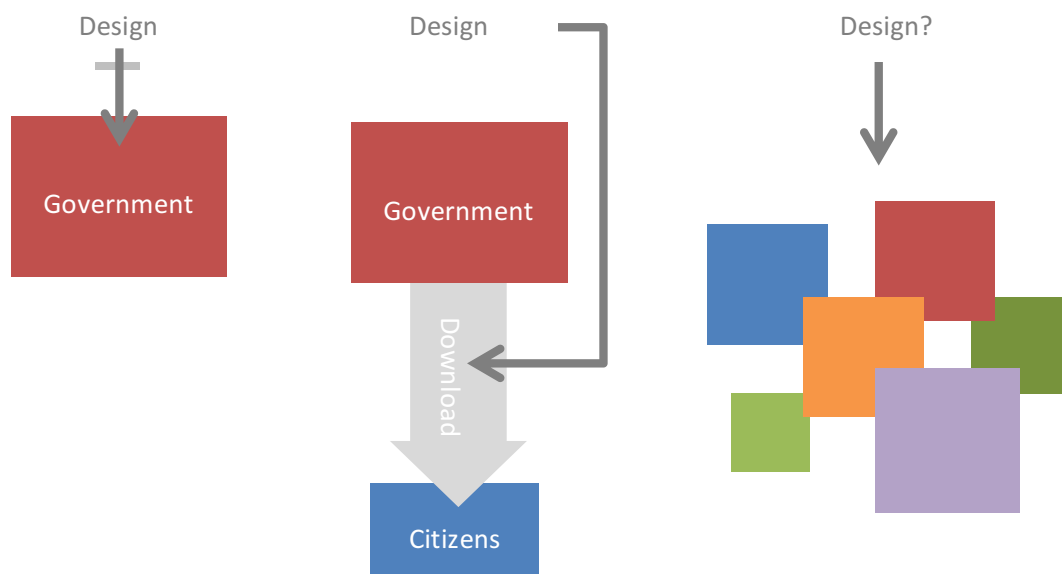


Figure 1. (Left) The role of design in governance within government as described by e.g. Tunstall and DiSalvo. (Middle) The role of design in ‘downloading’ responsibilities from government to citizens explored by e.g. Julier and Tonkinwise. (Right) The role of design in governance as a networked activity involving a wide range of actors.

In the remainder of this paper, I suggest designers should become more critically aware of their involvement in governance. I show that designers can (and already do) take part in producing, reproducing or questioning how societal issues are governed, by whom and based on which norms and values. To develop this argument, I will in the following sub-sections explore the relationship between design governance further. I do this by introducing two theoretical perspectives on governance, which fit particularly well with recent design literature; Mundane



Governance and Meta-governance. Mundane governance applies an object-oriented perspective on governance, and draws from Science and Technology Studies (STS) and authors such as Latour, Foucault, Shove, Suchman and Haraway (Woolgar & Neyland, 2013). It takes its point of departure in the role of everyday objects and technologies in governance – the designed ‘stuff’ we are surrounded by. Meta-governance on the other hand brings attention to the importance of societal norms and values in governance and how they shape or in fact ‘govern’ governance interactions. I draw on meta-governance to argue that norms and values are *inscribed* into the product of design.

### 3.1 Mundane governance: Governance through everyday objects

Mundane governance takes its point of departure in everyday objects and technologies. It specifically draws attention to people’s increasing concern for how their lives are regulated and controlled by mundane objects and technologies (Woolgar & Neyland, 2013). Woolgar and Neyland, who introduced mundane governance, show how mundane objects such as a waste bin or a water bottle can give rise to governance and accountability relations and how this can lead to frustrations.

Mundane governance represents an object-oriented perspective on governance and suggests objects *mediate* governance relations. Woolgar and Neyland (2013) specifically play on Bruno Latour’s famous statement that ‘technology is society made durable’ and suggest that; “objects (and technologies) are governance and accountability made durable”. They for example describe how, with the introduction of a waste bin, the household and its waste *become* governable entities. The introduction of the waste bin – a product of design, gives rise to shifts in governance and accountability relations and the waste bin becomes a form a physical and very durable form of governance.

When the physical objects we surround ourselves with, the things designers design, give rise to relations of governance, then design and indeed designers, take part in governing and in shaping governance and accountability relations. This suggest designers can use design to create change in how society and societal issues are governed, but also highlights that designers need to be aware of how their designs influence governance relations.

### 3.2. Meta-governance: Norms and values underpin governance

Another perspective on governance relevant to design, is the interactive governance perspective and specifically the notion of meta-governance (Jentoft & Chuenpagdee, 2013; Kooiman et al., 2008; Kooiman & Jentoft, 2009). Interactive governance brings attention to the interactions, which are part of solving societal issues. Kooiman and Jentoft define governance as: “the whole of interactions instigated to solve societal problems and to create societal opportunities” (Kooiman & Jentoft, 2009). From this perspective, design processes, especially processes including elements of shared problem solving, such as co-design, participatory design or ‘infrastructuring’, can be considered governance – in other words; from an interactive governance perspective, designing *is* governing – at least when the design process deals with solving *societal* problems or creating *societal* opportunities.

The interactive governance perspective also introduces the notion of meta-governance, which suggest societal norms and values underpin governance. Kooiman and Jentoft, for example outline three ‘orders of governance’: first,



second and third order or 'meta-governance'. At the first order people and organisations interact to solve societal problems and create opportunities, at the second order governing institutions (such as roles, policies or regulation) come into being, are cared for and maintained, while at the third order or meta-governance level, norms and principles are formulated and applied (Kooiman & Jentoft, 2009). At the meta-governance level norms and values therefore, can be said to govern *how to govern* – norms and values govern, for example, who take part in governing, how roles are divided, which policies or regulation is developed and ultimately which interactions takes place and how.

From a design perspective, interactive governance and meta-governance, implies that design (first order governance), both the process and product of design, is influenced, not only by existing institutions, such as rules, regulation and organisations (second order governance), but also largely by societal norms and values (meta-governance). With a design term, we might say that societal norms and values are (inadvertently) *inscribed* into products of design – the products, which come to mediate governance relations.

## 4. Why we need Governance Design

Designers do not only play a significant role in shaping our physical world, but it could seem, also in how societies and societal issues are governed, by whom, how and based on which societal norms and values. What designers design, through all their many varied endeavours, become physical and/or social manifestations of existing or new governance relations. We could say that designers, through the product and process of design, come to produce, reproduce or question governance relations and thus take part in (re)defining who governs whom, what, how and based on which norms and values. When Björgvinsson et al (2012) and Ehn (2008), building on work by Latour (2005) (who draws on Heidegger), bring attention to the ancient Nordic and Germanic meaning of the term *Thing* - a governing assembly, they are therefore on to something fundamental to design - designing *is* governing and a design *is* governance made durable. When designers develop things or facilitate Things, they therefore (often unconsciously) govern.

By turning our attention to governance we can become more attuned to how design products and processes work to produce, re-produce or question governance relations - mundane governance and meta-governance can provide important entry points. Mundane governance highlights how 'stuff' – designed objects and technologies, come to mediate governance relations, implying that designers should reflect critically on the relations they take part in producing or re-producing. When supporting the 'download' of responsibilities from the UK government onto citizens, as described by Julier, or assisting communities taking matters into their own hands, as described by Tonkinwise, we might for example ask: Which governance and accountability relations are produced or reproduced through these endeavours? Who come to govern whom and how? Which concerns or frustrations do the changes lead to? Meta-governance further reminds designers that norms and values govern governance (and thus design) itself. Meta-governance therefore, opens the opportunity for designers to *critically* question underlying norms and values either through the process or product of design. Designers might for example ask; Which societal norms underpin the idea of 'downloading' responsibilities onto citizens? Which norms and values are motivating communities to take matters into their own hands? Is it fair, legitimate and ethically sound to 'download' responsibilities?

Designers should, as they take part in exploring, defining or solving large-scale and often complex societal issues, critically reflect on for example the legitimacy and moral sensibility behind the norms and values, which govern such issues and how they feature in designed things and Things. When Papanek (1971) many years ago suggested designers have a social and moral responsibility, he largely referred to the responsibility of industrial designers in shaping our physical world. By proposing Governance Design, I suggest the moral and social responsibility of designers (also designers of services, systems, 'publics', 'Things' etc.) goes far beyond the physical - designers are also responsible for ensuring that the governance relations they take part in producing or reproducing are for example equitable, fair and just. If they are not, it will be more beneficial to use design to question the existing governance relations and the norms and values that govern them. Buchanan for example highlight how Robben Island and Holocaust represent 'good' example of wrongful use of design and suggest that design should be grounded in human dignity and human rights (Buchanan, 2000). For that reason, we are in need of a new field of design - Governance Design.

The foundational principle of Governance Design is, regardless of purpose, method and the designer's impetus, to bring a *critical* awareness and concern for how design produces, reproduces or questions governance relations, norms and values, and to hold that awareness throughout the entire design process (and ideally beyond). Governance Design therefore, does not relate to a specific 'product' of design (e.g. interaction design, product design or service design), or specific design process (e.g. co-design or user-centred design) - Governance Design instead urges all designers to be aware of existing and future governance relations and the norms and values that give rise to these. Governance Design might therefore involve designing a product, service or system, publics or Things. It might involve elements of co-design, participatory design, user-centred design or infrastructuring. Governance Design might be activist, critical or agonistic. Then again it might not - it might be something completely different. Any process or product of design might falls Governance Design, if it demonstrates a strong and *explicit* critical awareness of how it works to produce, reproduce or question governance and accountability relations.

Of course, not every single design project calls for Governance Design. When designing an aesthetically pleasing living room lamp or an ergonomic drill, taking into consideration how the product or process of design might produce, reproduce or question governance relations, would likely be going one step too far (then again - it might be interesting to explore how such products influence governance within households or how capitalism more broadly influence societal governance). Designers are, as highlighted in the introduction, increasingly engaged in projects where governance is extremely important, such as projects concerned waste management, sanitation, health care, taxation or migration, to mention just a few. In any such projects, where governance and societal norms and values, are inherently intertwined with the issue at hand, a designerly awareness of governance and how the process and product of design will influence governance relations, is essential. For these reasons Governance Design should be explored further.

## 5. How might Governance Design look in practice?

To understand what Governance Design might be and how it might look in practice, an example seems necessary. I will here draw on my recent experience in

the project ‘Governing Futures – Voices and Wastewater’ (more information about this project can be found in (Rosenqvist & Mitchell, 2016)). The purpose of this project was to question how urban wastewater in Indonesia is currently governed and especially the norms and values that underpin current relations of governance and accountability.

Government of Indonesia (GoI) has recently, as part of a strategy to ensure 100% access to sanitation by 2019, invested significantly in so-called decentralised sanitation systems (more than 13,000 have already been implemented). These systems provide sewers or shared toilet facilities to low-income urban communities. GoI and international donor organisations fund the systems while responsibility for ongoing operation, is handed over to community-based organisations (CBOs). While the significant investment is admirable, recent research has found that many CBOs are not collecting enough user fees or sufficiently maintaining the system (Eales, Siregar, Febriani, & Blackett, 2013). This raises serious concerns for the long-term sustainability and health and environmental impacts of the systems.

Approaching this issue, we might consider how to increase CBOs ability to maintain the decentralised systems or their capacity to collect more user fees – indeed most efforts in Indonesia have so far gone in that direction. From a design perspective, a graphic designer might develop an information leaflet to remind communities to maintain their system, handbooks or posters showing how to maintain it. A product designer might develop a device to make maintenance easier. An interaction designer might choose to develop a simple payment system, such as a phone application or a website, to aid user fee collection (this was the chosen approach in a recent co-design project in Uganda (Ssozi-Mugarura, Blake, & Rivett, 2017)) . Applying Governance Design however calls for a more *reflective* and *critical* engagement with the issue at hand.

Applying Governance Design in the ‘Governing Futures – Voices and Wastewater’ project, brought my awareness to the existing governance relations and the norms and values that underpinned them. Taking a mundane governance perspective, I explored how communities, through the implementation of a decentralised system (a mundane object) became governable and accountable entities. How in other words, the implementation led to shifts in accountability relations – communities became accountable to local government. Taking a meta-governance perspective, I explored *why* responsibility for ongoing operation and maintenance was handed to communities and which societal norms and values might underpin the idea of communities as wastewater managers. I found that ‘empowering’ (especially low-income urban) communities to take care of e.g. roads, basic healthcare, water treatment, storm water drainage and sanitation, is common practice and largely a societal norm in Indonesia. In this context, it is generally believed that communities should be independent from government. Through conversations with community leaders, I furthermore found many were frustrated by the lack of ongoing support from their local government. Rather than reproducing existing governance and accountability relations, e.g. by making it easier for CBOs to collect user fees or maintain their system, I decided to question the existing governance relations and the underlying norms and values of empowerment and independence.

Taking a designerly approach to questioning governance relations I drew inspiration from participatory design and recent literature on the role of designers in making publics. Rather than *making* a public I however focused on *redirecting* an existing public towards a new matter of concern – a concern for the legitimacy of community-management (Rosenqvist, forthcoming). I did this through both

interviews with community members and local government staff as well as through a shared workshop. During both interviews and workshop I used design games to aid communication and collaboration (Brandt & Messeter, 2004). I specifically developed two games; one game to support conversations regarding which post-construction responsibilities could and should be placed with which stakeholders, and another game which allowed workshop participations to build comprehensive governance models and initiate conversations regarding the need to rethink e.g. regulation or funding mechanism.



Figure 2. (Left) Design game allowing participants to discuss which responsibilities can and should be placed with which stakeholders. (Right) Design game allowing stakeholders to build comprehensive governance models, including discussion e.g. regulation, funding and communication channels.

The design games allowed for shifting conversations towards the meta-governance level. Both NGO representatives and I actively used the games to propose specific governance changes, i.e. that local government should take on key responsibilities in relation to system rehabilitation or the biannual desludging. This led participants to explore, not only which institutions, such as e.g. rules and regulation, would limit such change, but also, and more importantly, their own norms and values - why they believed communities *should* be responsible for operation and maintaining and whether handing responsibility to communities was legitimate.





Figure 3. (Left) CBO members use design game to discuss which responsibilities they believe should be placed with whom. (Right) Community members, NGO and local government representatives use design game to explore potential alternative governance models.

Rather than re-producing the idea that communities could and should manage decentralised sanitation systems, I took a Governance Design approach – I explored which norms and values underpin current governance relations and questioned the legitimacy of these. Rather than supporting government ‘downloading’ responsibilities onto citizens, I asked the question – *should* communities be expected to take on this responsibility? Or could it be otherwise?

## 6. Conclusion

I have in this paper proposed a new field of design – *Governance Design*. Governance Design is not about *what* to design or *how* to design, but rather about the mindset the designer brings to the process of designing and builds into the product of design. It calls for designers to bring an awareness of and concern for existing and future governance relations – for the designer to consider governance a networked activity involving a wide range of actors, including objects, technologies, people, norms and values. It calls for designers to be aware of how the process and product of design, work to produce, reproduce or question governance relations, and to question the legitimacy and moral sensibility behind such relations. As designers increasingly get involved in, for example, rethinking public service delivery, finding ways of dealing with climate change or how to handle the global refugee crisis, more awareness and concern for governance relations is needed.

With this paper, I invite designers and researchers to explore Governance Design further; What is Governance Design? How is it done? By whom? With whom? And what is designed? How might the quality of Governance Design be measured? Who (beyond designers) should be involved in deciding whether to produce,

reproduce or question governance and how? How might designers' own personal political beliefs play into governance design? And probably most important - Which ethical considerations does Governance Design call for? I also invite designers to develop case studies exploring Governance Design in practice, the tools applied and the outcomes. In the 'Governing Futures - Voices and Wastewater' project I used design games to question governance relations - this however is just one of endless possibilities. We need to explore others as well. How might e.g. interaction design, service design, product design etc., be utilized in Governance Design?

Governance Design offers an opportunity to redo design and in turn redo society. It allows designers to explore how norms and values govern complex societal issues and to cater for peoples' increasing call for change. It builds on and draws from a wide range of existing fields of design and provides an opportunity to draw together various contemporary design practices that deal with complex societal issues through critical, activist or agonistic designerly means.

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# Disciplination – Design as Practice between the Disciplines

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**Abstract:** Four Bachelor's programmes at the Lucerne School of Art and Design – Interior Architecture, Object Design, Textile Design and Material Design – joined forces in a joint project during the autumn semester of 2010. The joint module has been this term for the seventh time with the same participating programmes, but with different interpretations of interdisciplinary. We want to take this as an opportunity to look back and compare our approaches of interdisciplinary, multidisciplinary and transdisciplinarity.

**Keywords:** Interdisciplinarity, multidisciplinary, transdisciplinarity

## 1. Introduction

Since all the aforementioned disciplines were involved to the same extent, the autumn semester was deemed interdisciplinary from the outset. An intense period of preparation was needed to coordinate four different programmes with four different curricula. We lecturers soon realised that the Lucerne School of Art and Design on the one hand, and students on the other, harboured relatively unconsidered and vague expectations and hopes in respect of the outcomes. What both sides were expecting was everything that arises (in some kind of shape or form) from interdisciplinary work, which was completely (or at least in some way) different from monodisciplinary work. The interdisciplinary autumn semester continues to this day and has become a very successful and popular fixture in the curriculum. Recent years have found lecturers and students making wide-ranging and interesting discoveries, with both sides learning a great deal. The object of this paper is to reassess some of the ideas we harboured about interdisciplinary or transdisciplinary working and, by reflecting on our own practice in the classroom, help improve them or at least achieve set objectives in the training of designers. The paper also looks at the vague expectations for interdisciplinary work by examining more closely the opportunities and limitations of transdisciplinary and interdisciplinary approaches.

## 2. Between the Disciplines

First, though, some of the concepts require definition, namely the now immensely popular terms monodisciplinarity, multidisciplinarity, interdisciplinarity and transdisciplinarity:

**Monodisciplinarity**, perhaps less prevalent as a concept than the other three, describes the straightforward realisation of a project using the methods and tools of one discipline. This kind of disciplinary monoculture is usually considered the most appropriate for the world of work. It is used for tackling a standard task in as time-efficient and cost-effective a way as possible. In most cases, this makes it the most apposite approach.

**Interdisciplinarity**, by contrast, occurs when more than one discipline is involved in cooperative activities: in an interdisciplinary project, the individual participants contribute their own particular disciplines. The outcome of the project, however, is so complex that it is achievable only through the collaboration of the various disciplines. Like monodisciplinarity, this approach is prevalent in the real world and often leads to tension between the disciplines obliged to work together.

Professionals from all trades as well as architects and engineers know only too well the absurd problems that can arise from projects of this nature. The worlds of mechanical engineering and architecture are constantly grappling with the pros and cons of interdisciplinary working: the various trades have to cooperate when, for instance, building a house, and the interfaces between them can be a source of discussion as well as disharmony. The parties have to be clear and negotiate the point at which one discipline ends and the next begins. Although the desired outcome is impossible without input from the various disciplines, the disciplines themselves do not change.

**Multidisciplinarity** describes more-or-less the same process. The term is often used in the world of research, where different disciplines research the same object, each employing their particular methodical approach.

It is only under transdisciplinary conditions that the borders between the disciplines in a project become permeable. This occurs when disciplines adopt or appropriate the methods and strategies or *modus operandi* of other disciplines, i.e. where a discipline opens itself up, as it were, to having its borders transgressed. In essence, transdisciplinary working is also, by definition, a form of experimentation and a questioning of one's own discipline. Under transdisciplinary conditions, the point at which the various disciplines combine gives rise to an opportunity for innovation and specialisation. Incorporating a new practice into a discipline has the effect of changing and extending that discipline's foundations. It is a strategy that is educative but not, as you might expect, always successful, a fact which makes transdisciplinary working inefficient in terms of the outcome achieved: in the act of negotiating the borders of one's own discipline, the focus – unlike with monodisciplinarity, multidisciplinarity and interdisciplinarity – shifts from the goal to the process. Accordingly, the most important “output” of this approach is a change in the way one works, not necessarily a particular result or more efficient way of achieving that result. On the contrary, Ronald Jones, Professor of Interdisciplinary Studies at Konstfack University College of Arts, Crafts and Design in Stockholm, is keen to emphasise in the talks he delivers that transdisciplinary working produces more errors and leads to more impasses than it delivers excellent results (Jones, 2012). The evidence suggests that working at the limits of a discipline does not raise productivity.

Why, then, is this approach so interesting? Why is it, despite all the disadvantages, of appeal to students and of interest to the work of designers and architects? Professor Jones likes to explain this using a diagram from Lee Fleming (Figure 1).

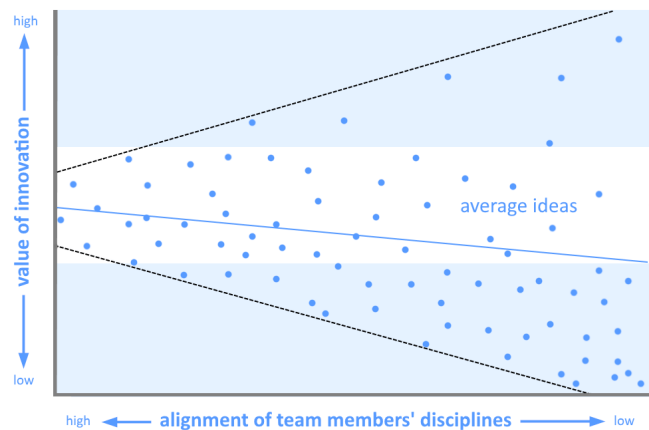


Figure 1. Lee Fleming's diagram illustrating the benefit of interdisciplinarity (Fleming 2004)

Transdisciplinarity is a way of visualising one's own practice and its encounter with other, different methods. Here, the intersections exhibited by the cooperative disciplines are a key determinant. The less they have to do with each other, the greater the potential for collaboration, but also the greater the chance of failure. The relationship essentially takes the form of a risk diagram. The greater the distance between the disciplines, the higher the frequency of unsuccessful developments and the less likely the occurrence of a useful result. If, however, the work does lead to a result, there is a chance of some innovative potential and possibly even a conceptual or technological breakthrough.

### 3. Case Studies

In the interdisciplinary autumn semester project at the Lucerne School of Art and Design, the disciplines involved – Interior Architecture, Object Design, Textile Design and Material Design – are not far from each other. Even though, unlike design, the focus in Interior Architecture is very much on issues surrounding space, and the relevance of the action in Object Design is possibly more pronounced than in Textile Design, they are all disciplines that make a design-related contribution to daily life. According to Lee Fleming's diagram, the risk of failure would be deemed correspondingly low. Nevertheless, we are confronted with the mechanisms as described. Even in our work, it is apparent that interdisciplinarity and transdisciplinarity lead to a reflective practice and that there is a need for students and lecturers to communicate and to be flexible. In our work, the process, i.e. the path to a design, is an important, if not central, outcome of the semester. By confronting the students with disciplinary borders, we increase considerably the complexity of what we teach. Through its self-reflecting character, the training serves to strengthen the identity of the up-and-coming designers. By having to consider, in a host of individual design steps, their attitude to their discipline, our students consciously adopt positions in their practice. An anthology of design research has appeared in the context of the work conducted by the Swiss Design Network, an association of designers and design enthusiasts advocating a culture of design and the academisation of design in Switzerland. Even if the question of research in design is not necessarily related to transdisciplinary work in the narrow sense, one of the articles in the anthology is

of relevance. Using the expression "the disciplination of design", sociologist Franz Schultheis discusses changes in the discipline of design which have come about through the influence of scientific methods. He speaks of a structuring force that differentiates between permissible and impermissible working methods to create a canon of methods:

The "disciplination of design" is, at this level of individual manifestations, first and foremost a "disciplination of actors" who practise design, and the enforcement of a disciplined, that is to say, scientised, habitus. The latter acts initially like a system of borders: borders of the conceivable, of the sayable, of the doable. On its way to becoming a discipline, the practice is becoming ever more comprehensive and more deeply codified and regulated, spontaneity is being relegated to ever-narrower limits, rooms for manoeuvre are being defined and constrained, practitioners regulated, etc. Figuratively speaking, not only is "voluntariness", heretofore predominant, being displaced by "compulsoriness", but "voluntariness" is itself perfecting the art of self-restraint through a process of in-depth incarnation or assimilation of socially produced and standardised techniques (Schultheis, 2005).

The process that Schultheis observes and describes here is work in progress. Design is undisciplined and thus predestined for interdisciplinary and transdisciplinary practice.

## 4. Conclusion

In our interdisciplinary and transdisciplinary autumn semester, we saw just how productive the effect of reflecting on one's own design practice can be on the outcome of design processes. What we have learned is that interdisciplinary and transdisciplinary practice is a resource and as with every source one has to invest time and effort into it, to be able to work with it. Transdisciplinary practice is not easy-going with a giant output but it can be a self-reflexive method that enables designers to work critically in their field. We would conclude that for a school of art and design, like the one in Luzern, it is an important goal to make designers to think about their aims and practice. Not only because they become through this more sensitive and open to questions beyond their own discipline regarding ethic and sustainability Moreover, it builds a foundation of what we would call Design as an undisciplined discipline.



*Figure 2. Multidisciplinary team "Cirqu'eau", multidisciplinary project 2013/14: two interior architects, one textile designer, material designer and object designer design an object each*





Figure 3. Interdisciplinary team “Die Gute Stube 2.0”, interdisciplinary project 2015/16: three interior architects, one textile designer and one object designer design a non-textile carpet that is printed on the floor with large MDF panels



Figure 4. Transdisciplinary approach, project 2016/17: A class of interior architects develops furniture objects at the workshops of the School of Art and Design

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# Crossing over Boundaries through Experimental Pedagogy

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**Abstract:** This paper describes an experimental teaching platform, which aims to cross over boundaries to educate future designers and engineers. The Experimental Textile Design module (ETD) is a multidisciplinary set of courses developed under Fashion, Clothing, and Textile Design program within School of Arts, Design and Architecture in cooperation with The School of Engineering at Aalto University. Through redoing design pedagogy by opening the world of engineering to design students and especially by exposing design methodologies and the visual research processes to engineering students, we can help collaborative teams to redo the future.

**Keywords:** Experimental teaching, multidisciplinary, collaboration, textile design

## 1. Context and objectives

The very essence of textile design lies in cooperation and multidisciplinary approach. Textiles are commonly implemented as material or component with variety of purposes in clothing, interiors, medicine, architecture and other technical applications. Educating individuals with abilities to work in multidisciplinary environments with “hybrid” skills and knowledge, capable of rethinking design futures, should be encouraged.

The Experimental Textile Design module (ETD) is a multidisciplinary set of courses developed under Fashion, Clothing, and Textile Design program within School of Arts, Design, and Architecture in cooperation with The School of Engineering at Aalto University. The main objective of this module is to provide a platform to share knowledge and open the realm of textiles to a broader audience. It encourages students to develop ideas among peers from different backgrounds through collaboration and implement their skills into other disciplines. The module provides an opportunity for design and engineering students to explore experimental design approaches and fabrication processes. New and innovative products can result from interdisciplinary projects, in which textile logics and



construction methods are applied to non-textile materials or inversely innovative textile compositions can emerge from integration of new technologies.

## 2. Structure and Teaching Methods

The ETD module is offered to first year master's students during the first semester. In 2016, this module involved 28 participants with various backgrounds, including 22 students from the School of Arts, Design and Architecture and 6 students from the School of Engineering (Table 1).

*Table 1. Provides information on participating students and their study backgrounds.*

Aalto University Schools	Program of Study	No. of students
School of Arts, Design, and Architecture	Textile Design	7
	Fashion Design	10
	Ceramics and Product Design	2
	Spatial Design	1
	Visual Culture and Contemporary Art	1
	Industrial Design	1
School of Engineering	Mechanical Engineering	4
	Engineering Physics	1
	Automation and Information Technology	1
		28 Total

Adaptive to students' skillsets and in accordance to their personal study plan, the structure of the ETD module allows the students to take part in a number of courses based on their necessities for knowledge and areas of interest (Table 2). This eight weeks intensive module is comprised of the following sections:

- Research and Concept Development course
- ARTsENG Collaborative project
- Photo and Presentation workshop
- Basic Studio Workshops: Knitting studio, Printing studio, and Woven Fabrics studio

Table 2. Presents the weekly schedule of the EDT module in which different sections of the course are studied.

Course Schedule	Research and Concept Development	Printed fabrics Studio	Knits and knitwear studio	Woven Fabrics studio	Photo and Presentation Workshop	ARTsENG Collaborative Project
Week 1						
Week 2						
Week 3						
Week 4						
Week 5						
Week 6						
Week 7						
Week 8						

This multidisciplinary module concentrates on teaching core skills of visual research, concept development, and textile techniques through learning-by-doing. The teaching methods are based on constructivist teaching approaches in which the growth of knowledge is the result of individual constructions made by the learner's understanding (Piaget, 1973). Teachers guide each student to realise their projects through continuous and active dialogue with the learner in individual and group tutoring sessions (Bauersfeld, 1995; Rhodes and Bellamy, 1999).

This paper focuses on the multidisciplinary aspects of Research and Concept Development course, ARTsENG Collaborative project, and Photo and Presentation workshop sections of the EDT module.

### 3. Research and Concept Development Course

The multidisciplinary Research and Concept Development course establishes a platform for students to generate and solidify their concepts through visual communication and research. The course includes production of mood-boards, research books and experimental samples reflecting upon the students' visual research.

The Initial task is to develop two mood-boards through translation of notions into visual elements. The students first open a discourse within their topics, by drawing associations and references through variety of aspects such as cultural, social, political, economical, and emotional, as well as techniques, products, and materials. To further solidify the concepts, the students are acquainted with notions of mood, context and target to establish the themes and identify the objectives of the projects.



Figure 1. Examples of Visual Research Books developed by students. Left Image: Elina Äärelä, 2016 (photo credits: Elina Äärelä) – Right Image: Matilda Tuure, 2016 (photo credits: Eeva Suorlahti)

To translate their visual research into tangible objects, the students are encouraged to challenge conventional methods of production. Based on their individual ideas, wide range of techniques and materials are examined through explorative methods and continuous iterative approaches. This experimental process allows the students to confront their initial ideas to materialisation. This material input provides insight and raises new questions that focus the project's direction.

The research books are the principal outcome of the visual research. They constitute an essential tool and are constructed by continuous collection of visual references and process works utilizing sketching, photography, writing, and other means of documentation. Documentation process is fundamental to record and illustrate both empirical and technical aspects of the experimentations. They crystallise the simultaneous iterations between the conceptual research and the material experimentations.

Through visual research, students extract images from their context and create new ideas. The abstraction of the images' content allows for versatile interpretation and is used as an inspirational tool for conceptualization and defining problems. While manipulating concepts and communicating ideas through images is familiar to design students, engineering students are often assigned a predefined problem to be solved. The open and explorative approach of visual research in generating the design objectives moves beyond the commonly linear and analytical engineering studies.

More importantly, the organization of thoughts through diverse visual media creates a communication “bridge” among engineering and design students that allows for crossing over field specific terminologies and mind-sets.





*Figure 2. Experimental Sample Collection through Visual Research, Helmi Liikanen, 2016 (photo credits: Helmi Liikanen)*

## 4. ARTsENG Collaborative Project

This multidisciplinary project establishes an innovative platform for students to merge technology and design and to explore unique ways of developing experimental textiles, materials, structures and fabrication methods. In 2016, 18 students formed 6 groups of 3: including 2 design and 1 engineering student.

Through lectures and presentations, the students are familiarised with subjects encompassing responsive and kinetic systems, hybrid or composite materials, as well as digital design and fabrication methods such as 3Dprinting and Laser Cutting. Student groups are formed through gaining perspective of their areas of interest and an active conversation surrounding the abovementioned topics.

Directly linked to the approaches of Research and Concept Development course, the students develop their project ideas in groups. The teams conduct their experimental work through iterative approaches and explorative prototyping. These prototypes operate as means for learning, communication, integration, and milestones (Ulrich & Eppinger, 1995). This method is linked to Constructive Design, which defines “a design research in which construction [...] takes center place and becomes the key means in constructing knowledge” (Koskinen, et al., 2011, p.5). The method of research through design suits this course as the experiment and its outcomes are the key elements of producing the research question or the problem to be solved. This framework embodies perspectives of action and practice as the main elements of knowing (Schön, 1983; Johnson, 2007).



*Figure 3. Material research process and prototyping in ARTsENG Collaborative Projects. Left Image: Atso-Kasper Costiander, experimentation in ceramics and electronics, 2016 (photo credits: Mikko Hoffren) – Right Image: Electronics prototyping for “Lucidum” Project, 2016 (photo credits: Carolina Forss)*

As a complementary pedagogical approach aiming at further integration of disciplines, students from both design and engineering department are accountable to provide workshops relevant to their area of expertise and knowledge to their fellow students. These workshops include introduction to knitting, weaving, and printing techniques in textile design and workshops concerning 3D modelling, 3Dprinting and basic electronics in engineering. This knowledge construction enables students to transfer information and “acquire creativity, independence, self-confidence and key competencies, such as the ability to work in teams, the ability to communicate, complex thinking [...], and the ability to structure information and generate knowledge” (Grzega and Schöner, 2008, p.169).

This collaboration allows the students to familiarise themselves with experimental research methods, concept and product development approaches, and broader potential application areas of their knowledge beyond the conventions of their study realm.



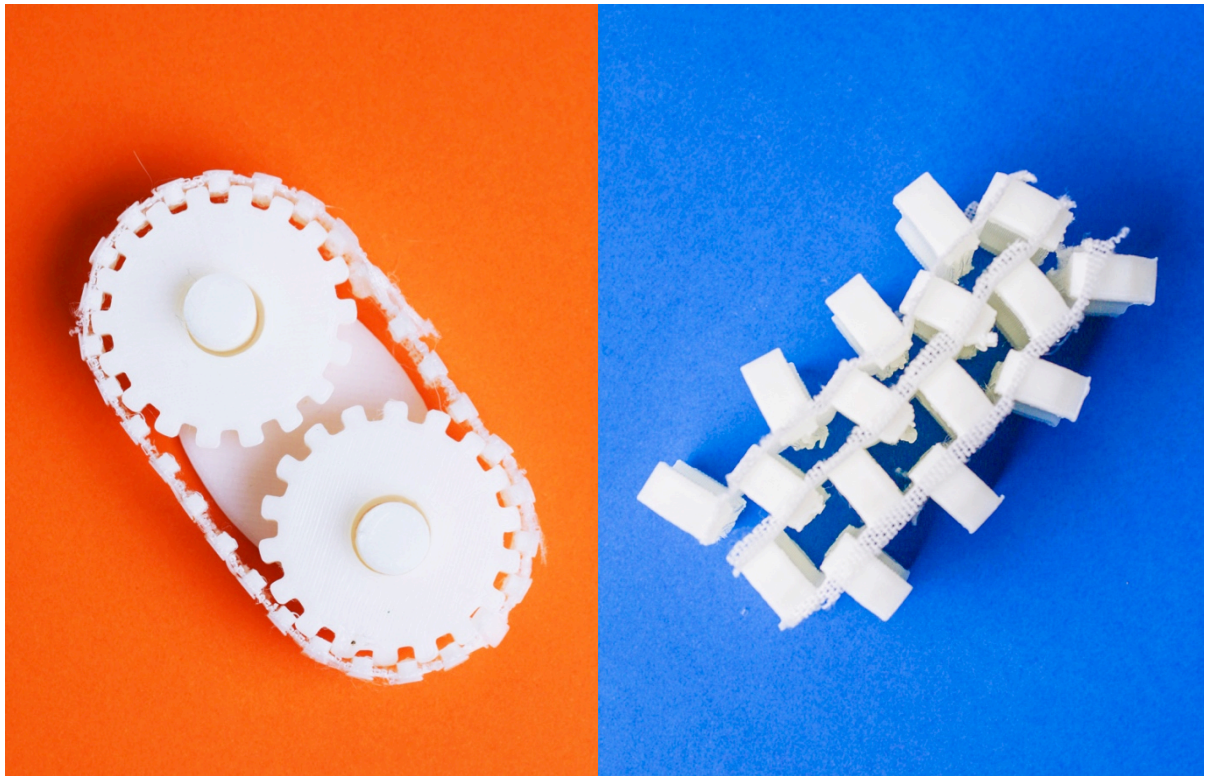
## 5. Photo and Presentation Workshop

The concept of the Photo and Presentation workshop relates to marketing and branding of a developed product. Conducted as the final stage of the ETD module, in this workshop all students document the outcomes of their research, experimental samples, and collaborative projects. Students creatively produce powerful graphic content by means of set-ups, still-photos, videos and animations within the photography studios. Employing a hands-on approach, this workshop is used as a story telling tool for students to cohesively communicate the concepts and statements of their projects through high-quality and impactful visual presentations. This workshop highlights the importance and power of well-executed presentations to effectively communicate the outcome.



*Figure 4. Photo and Presentation Workshop, Photo-Shoot session of student Kia Rossi, 2016 (photo credits: Eeva Suorlahti)*

## 6. Case Examples of Experimental Samples



*Figure 5. Challenging paradigms of one's field by exposure to another. Experimental Textile Sample, "Textile mechanics", Max Cedercreutz, 2016 (photo credits: Max Cedercreutz)*

"Textile mechanics", developed by engineering student Max Cedercreutz, showcases an experimental sample project incorporating textiles as integral components within mechanical structures. Cedercreutz investigated opposing notions of rigidity and flexibility during his visual research. Experimenting with textile materials inspired him to design a series of prototypes by 3Dprinting on textiles, in which the latter behave as structural components and hinges in mechanical structures. Although the realm of 3Dprinting is familiar to most engineering students, this project demonstrates the potentials of collaboration and exposure of students to materials and methods of production from other disciplines.



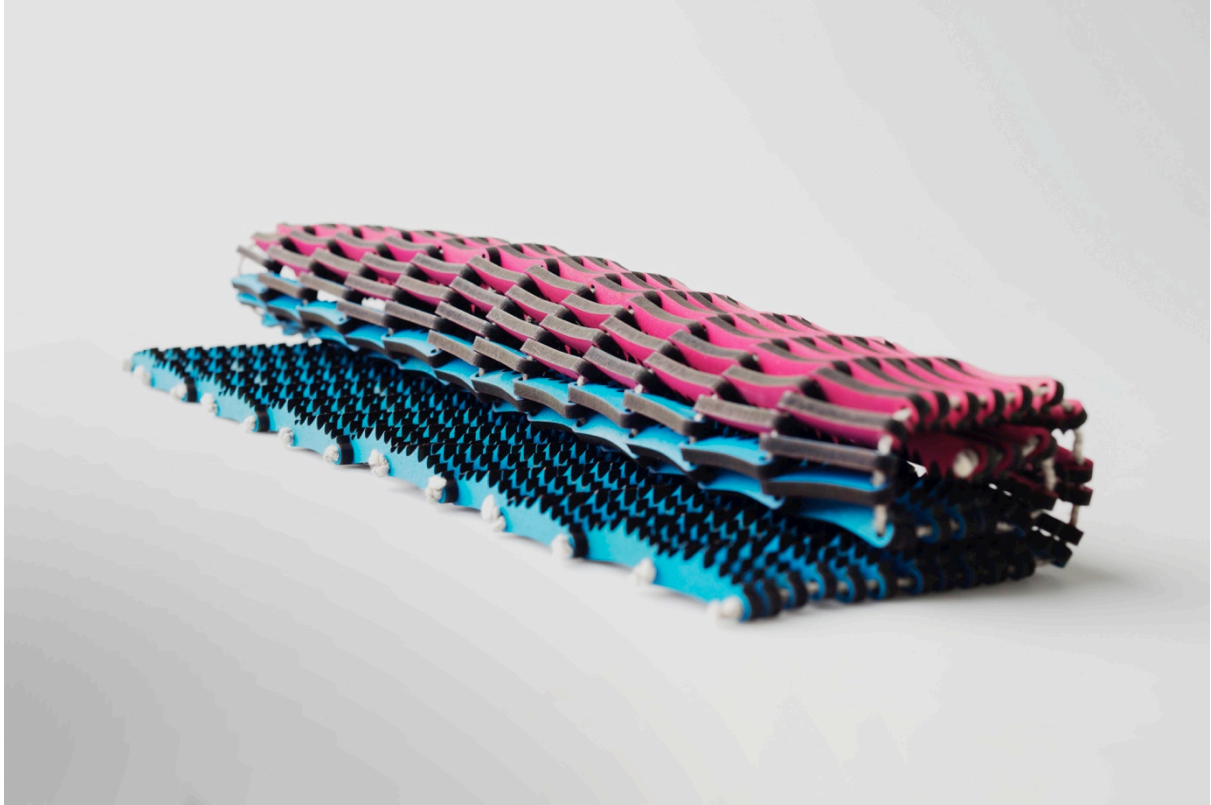


*Figure 6. Interaction with other fields sparking inspiration and diffusing knowledge. Experimental Textile Sample, “High Tide”, Matilda Tuure, 2016 (photo credits: Matilda Tuure)*

Inspired by notions of viscosity and control, design student Matilda Tuure investigated the visual potentials of magnetic phenomena through experiments with ferrofluids and iron oxide. The “High Tide” project is an artistic exploration of movement and patterns generated with variety of magnetised viscous mixtures on different surfaces using magnets as a tool. Tuure took the initiative of communicating with the Aalto University, Applied Physics department, acquiring insight and material samples. This example demonstrates how the interaction with other fields of study can stimulate innovative approaches and instigate diffusion of knowledge.

## 7. Case Examples of ARTSsENG Collaboration

The “JMW-Textile” project was developed by design students Walter Götsch and Justus Kantakoski in cooperation with engineering student Masi Tammela. The main goal of the project consisted of exploring alternative methods of creating malleable textiles with inflexible materials. After research into geometries and modular compositions, samples were generated from numerous laser-cut wooden elements attached in diverse configurations. The project resulted in series of experimental prototypes that embody the functional and aesthetic characteristics of textiles, while presenting properties uncommon to traditional textiles.



*Figure 7. Unconventional textiles through integration of alternative fabrication technologies. ARTsENG Project, “JMW-Textile”, Walter Götsch, Justus Kantakoski & Masi Tammela, 2016 (photo credits: Walter Götsch)*



*Figure 8. Innovative yet realistic product development. ARTsENG Project, “Lucidum”, Carolina Forss and Helmi Liikanen & Teresia Borgman, 2016 (photo credits: Teresia Borgman)*

“Lucidum” is an e-textile project reflecting upon the ideas of lost and found. Design students Carolina Forss and Helmi Liikanen in collaboration with engineering student Teresia Borgman conducted this project through a more conventional and linear design approach. The goal was to propose a functional solution to the problem of finding items in deep and dark handbags and pockets. The project resulted in the design of a system of pocket that lights up when opened, using the pocket’s flap as the light switch. The technical challenges were addressed through experimenting with materials such as fibre optics and luminescent textile coatings, and embedding of electronic and conductive components. Collaboration of different disciplines can result in innovative yet realistic design solutions.

## 8. Conclusion

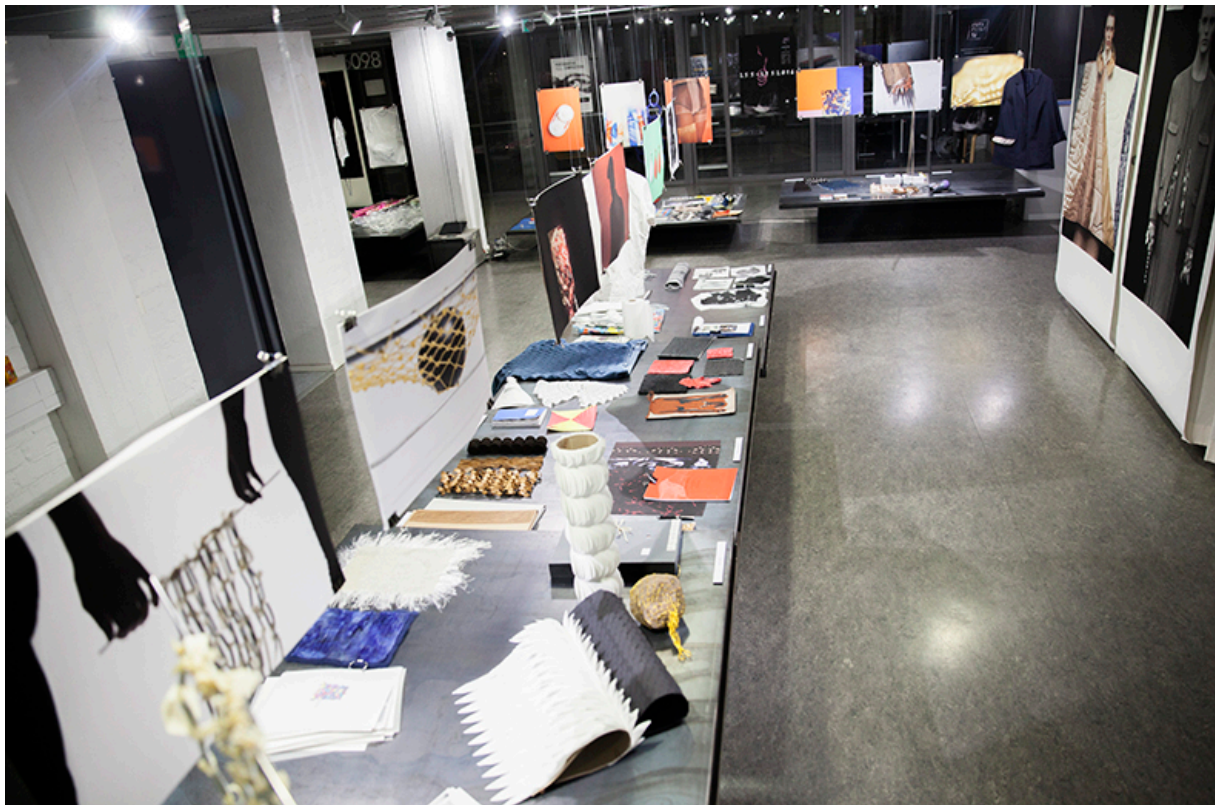
In the ETD module, students learn how to manage creative processes resulting in innovative products and combining textile techniques with skills from the fields of art, design, science and engineering. Design and engineering students learn to collaborate and conduct experimentations in multidisciplinary groups and to develop strong communication skills. The activity of designing and the designed object as the outcome is a valid source of data for reflection, analysis, and knowledge development (Pedgley, 2007; Bye, 2010).

The pedagogical purpose of the module is to cross the boundaries between disciplines. The aim and challenge of establishing fruitful collaboration is to overcome the conventional role distribution between engineers and designers based on their knowledge, background and skillsets. It is important to equally



involve students throughout all phases of the course such as concept development, visual research, experimentations and technical research.

By disseminating knowledge, multidisciplinary platforms such as the ETD module build links between fields that will flourish within the academic system and provide future professionals with essential communication skills. Through redoing design pedagogy by opening the world of engineering to design students and especially by exposing design methodologies and the visual research processes to engineering students, we can help collaborative teams to redo the future.



*Figure 9. ETD Exhibition, School of Arts, Design and Architecture, Aalto University – 2016 (photo credits: Eeva Suorlahti)*

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# Beegin: Redoing Beekeeping in Southern Africa by Designing for Outcomes

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**Abstract:** The importance of socially responsible design and participatory methods for solving problems in developing nations is unquestionable, however there is debate about the level of follow through and impact achieved by such design research projects. Too often social design seems to end at the solution, with the implementation falling short. Designers have therefore begun to focus on strategies like *design for outcomes* that lead to verifiable impact. In this paper, we elaborate on this with literature and a case study of a project, which aims to support emergent farmers and the sustainability of beekeeping in South Africa, through the participatory development and implementation of an appropriate technology system. Demonstrating that a design research project that defines success in terms of outcomes requires scaled implementation to verify impact on peoples' capabilities. We present this paper as it relates to the Cumulus Conference's *Theme 1 - What do we wish to REDO?*

**Keywords:** Appropriate technology, capabilities, beekeeping, participatory design, design for outcomes

## 1. Introduction

It is widely accepted that designers have a role to play in developing interventions for marginalised people, yet the ability to effect measurable impact through their philanthropic endeavours or to make a career in responsible design is seldom achieved (Margolin, 2007:1). Glossy images of hand-pumps, latrines, stoves and water filters paint a rosy picture of socially responsible design (Pilloton 2009). However, the success of many of these projects lies more in the quantifiable impact of their implementation<sup>1</sup> than in their design development (Smillie

<sup>1</sup> Implementation refers to the commercial roll-out, or commercialisation, of the solution, requiring a system that can be scaled to provide different markets with access to the technology through a sustainable business or businesses.

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2000:249-250). Although an outcome<sup>2</sup> may be theoretically successful the realistic impact of a design is often limited due to constraints of implementation. Lisseden, Maley & Mehta (2015:32) highlight that, “definitions of ‘success’ have transitioned from laboratory practice into practical application and long-term usefulness”. This focus on impact has led researchers to move away from the term ‘socially responsible design’ since “Socially responsible suggests certain subjectivity around some undefined principals - whereas social impact implies impact must be demonstrated” (Cooper Hewitt, 2013:24). Accurately assessing success or impact through implementation is therefore a critical phase of the design process, generally resulting in unexpected issues that require further iterations of the solution (IDEO 2011:149).

Timothy Presterio, CEO of Design that Matters, explains that, “compared to the whole process that leads to implementation - which includes financing, manufacture and distribution, training, and adoption - design is the least hard part” (Cooper Hewitt, 2013: 24). Presterio has developed a new approach to social impact design called “*designing for outcomes*”, focusing on designing for manufacturability, distribution, actual use and visual appearance simultaneously to guarantee the products’ delivery and uptake (Presterio, 2012). In this approach, the designer is continually assessing and refining the system of delivery during the development of the product and, importantly, continually integrating the various role-players into the system (Presterio, 2012). Additionally, Louis Boorstin (2013), who worked as deputy director of the *Water, Sanitation and Hygiene Program*, at the Bill & Melinda Gates Foundation, defined three goals for successful social innovation projects:

- Impact: Does it demonstrably improve the health and socioeconomic well-being of the poor?
- Sustainability: Does it have enough resources to keep running for many years?
- Scale: Does it have the potential to reach millions of people?

Boorstin (2013) believed there is a need for a research and development stage in-between the “pilot-stage” and “widespread adoption”, where the intervention is “tested at scale”.

In academia, there are many socially oriented research projects that are never implemented and, while the researcher may be rewarded for the theoretical results, the project participants may be taken advantage of if they receive not tangible benefit in the process (Smith, 2012). The Department of Industrial Design, at the University of Johannesburg (UJ), South Africa, encourages designers to start making good on their promises, and to do so they need to be more concerned with the implementation of their systems (Campbell & Harrison 2015; Brand & Campbell 2014). The key to achieving outcomes during design research projects, as we have found in the following project, is for designers to adopt a process that is participatory both in developing and implementing interventions.

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<sup>2</sup> Outcomes refer to the original problem being addressed in the design research project such as food-insecurity, clean water, sanitation, etc. (CSIP 2007).

## 2. Case Study - Beegin



*Figure 1. Entry level cardboard and permanent lightweight concrete beehives developed and used in the Beegin project.*

Beegin is an ongoing participatory design research project, that aims to contribute towards food security in two ways: indirectly by bringing additional income to marginalised, small-scale farming communities and directly by helping to protect the pollination source of 70% of food-crops (UNEP, 2010: 1). The project has been running for two-years, extending from a final fourth-year industrial design project into a Masters' research project. It has followed a revised, iterative, human-centred design (HCD) approach that focused on participatory implementation and scaling.

Beegin began with a search for new income opportunities for urban farmers through either bettering existing crop yields or the benefit of honey as a high value crop to sell (see UNEP, 2010: 4). Research showed that South African beekeepers can earn up to €2800 per hive annually; with several successful rural development beekeeping programs having taken place locally (TTA, 2008: 74; Johannsmeier, 2001: 5). In interviews with local urban farmers they expressed an understanding of the benefits of beekeeping and a desire to keep bees, but were unable to do so due to a lack of access to skills and equipment.

It became clear from research into beekeeping that the South African beekeeping industry was facing serious problems from theft, vandalism, fires, diseases, pesticides, monoculture and pests. This resulted in 30% asset (equipment, hives and colonies) losses annually, in line with the decline of the global beekeeping industry and bee species over the past two decades (UNEP, 2010: 1). A recent Harvard study indicated that up to 56% of people in developing nations are at risk

of becoming “food insecure” because of this “pollinator crisis” (Ellis, Myers & Ricketts, 2015: 1). Numerous beekeeping for development projects have battled these issues and it is clear that a sustainable solution requires both beekeepers and farmers to be part of the process (Hilmi, Bradbear & Mejia, 2011; see also Illgner, Nel, & Robertson, 1998).

In the Beegin project, three groups of role-players were identified: the beekeeping industry (expert beekeepers), farming end-users (emerging urban farmers) and design academia (the design researcher and industrial design department) (Fig. 2). The intention of such a collaborative research effort was to create an accessible and sustainable system. This system needed to be appropriate for all these role-players: meet existing beekeeping industry needs; be accessible and operable by urban farmers; and ultimately be implementable by the design researcher. Based on a combination of Appropriate Technology<sup>3</sup> development principles and the Capabilities Approach<sup>4</sup>, a conceptual framework and methodology was developed to encourage an alignment between the technology and various role-players’ values.

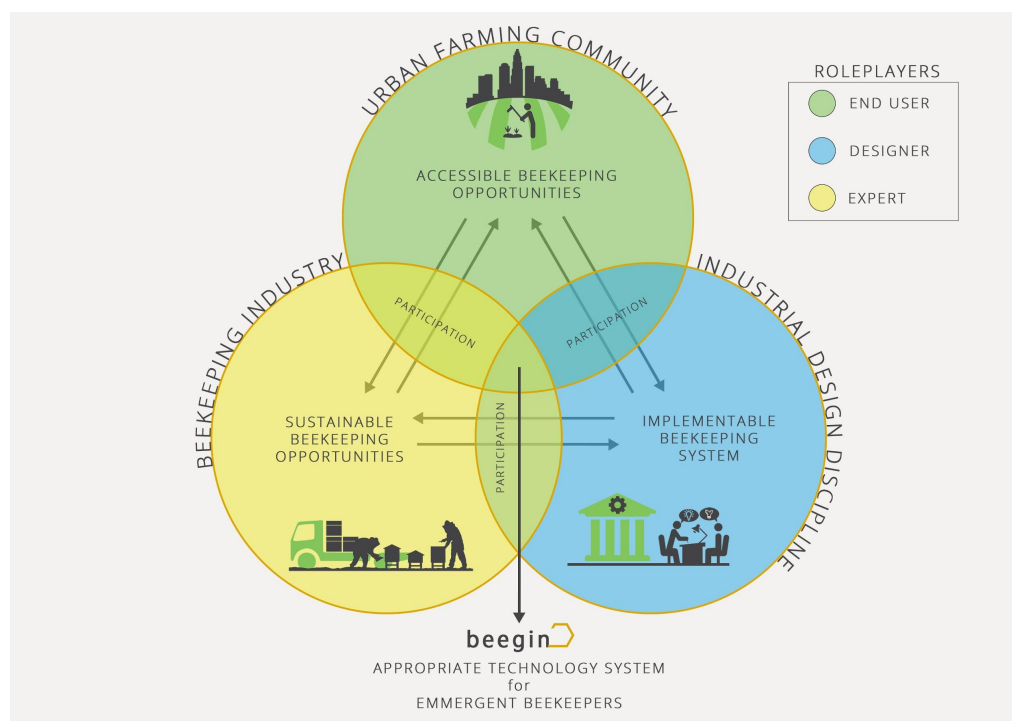


Figure 2. Diagram of the participatory design research role-player contributions.

## 2.1 Appropriate Beekeeping Technology System Development

Through participatory research (interviews, site visits and discussions) with the role-players, beehive design criteria were identified that benefitted both the human users<sup>5</sup> and the bees themselves - this was important to realise viable

<sup>3</sup> Appropriate Technology: “meets the needs of the majority”, “employs natural resources, capital and labour”, “is ownable, controllable, operable and maintainable within the community it serves”, “enhances the skills and dignity of those employed by it”, “is non-violent both to the environment and to the people”, and “is socially, economically and environmentally sustainable” (Smillie 2008: 91).

<sup>4</sup> The Capabilities Approach describes the freedom that people have to do and be what they value (Sen, 1999; Nussbaum, 2011).

<sup>5</sup> Beekeeping relies on beehives, gear, knowhow and extraction equipment. The top-bar (€42) and the Hoffman frame beehives (€62) dominate the practice. The former is suited to marginalised

outcomes for both humans and animals. These criteria were then used to develop new beehive designs and low-tech<sup>6</sup>, community-driven production mechanisms for the new hives. The HCD process resulted in low-cost, durable, easy-to-make, highly insulated and easy-to-use beehives. The product outcomes were: an entry-level cardboard beehive (retail €19), a permanent concrete beehive (retail €55), the mould and die production equipment for each of the hives (retail €300) (Brown, 2015).

These components catered to a conceptual, staggered initiation process, conceived to help low-income novices learn to keep bees and set up sustainable apiaries. The entry-level beehive, through its low-cost, could be incorporated easily by low-income farmers and used to house a swarm of bees for up to two years. The farmers would become acquainted with beekeeping and begin harvesting honey to be sold to raise money to invest in permanent beehives, gear and equipment.

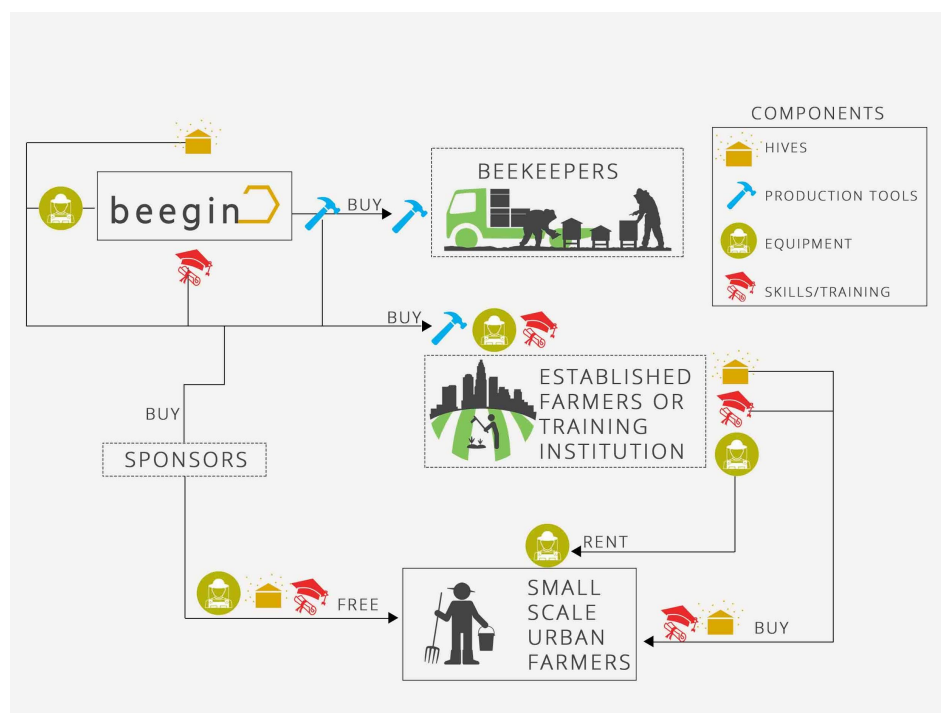


Figure 3.: Business model for the Beegin appropriate technology beekeeping system.

The implementation system and business model (Fig. 3) was developed, in conjunction with the participants to achieve maximum impact, scalability and sustainability. Central to the accessibility and implementation of the Beegin system was the localised, community-based production of the beehives. Instead of the design researcher setting up a business to retail the products directly to the community, the low-tech production tools could be sponsored or subsidised (through sales to existing beekeepers) or sold to individuals who could become an access point for others in their community, creating additional community-driven businesses. This way at least the tools and skills would be owned by the urban farmers, immediately benefiting their participation in the project. This would allow

communities through its low-cost and simplicity, the latter to commercial apiculture through its efficiency and standardisation.

<sup>6</sup> 'Low tech', short for 'low technology', is a term used to describe technologies that can be produced and delivered with minimal capital investment, specialization or compartmentalisation (Encyclopaedia Britannica 2015: sp).

the design researcher the flexibility to undertake further design refinements, if necessary, or to move on and scale the system rapidly in other locations.

## 2.2 Implementation and Refinement

The graph below (Fig. 4) illustrates the revised, cyclical human-centred Beegin design process with continual refinement and scaling. Each new phase would begin with implementing the system on a larger scale, hence increasing the potential for a successful outcome.

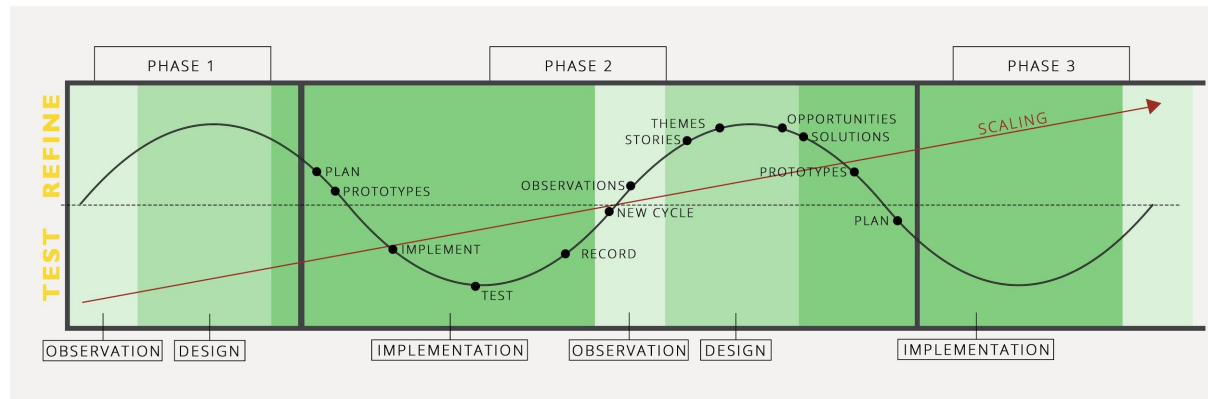


Figure 4. Cyclical testing, refinement and scaling process for citizen design projects (based on IDEO HDC, 2011).

The design researcher was particularly focused on refining the production and initiation process of the Beegin system. In order to do this, ten sets of hives were manufactured and delivered to ten different sites. They were then intensively field-tested over a beekeeping season to gather data for further refinement. Five expert beekeepers and five urban farmers were chosen as participants for the field-testing. In the spring of 2016 the expert beekeepers were tasked with integrating the Beegin beehives into their existing operations and comparatively measuring their function against their standard hives. The urban farmers were provided with an entry-level beehive, complete with a swarm of bees, to test the initiation process (Fig. 6). The expert beekeepers operated autonomously, whilst the urban farmers were assisted by the design researcher to inspect, document and keep their hives through monthly site-visits. The initial batch production of the beehives was useful in developing insights into more efficient community production, with one farmer and one beekeeper volunteering testing the hive production tools themselves (Fig. 5).





*Figure 5 (left). Participants producing concrete beehives and testing production tools.*



*Figure 6 (right). Urban farmer testing the cardboard beehive*

## 2.3 Outcomes

Within five months of testing the participants had already begun harvesting honey (Fig. 7) and were requesting to buy additional hives and the hive production tools. Two of the expert beekeepers simultaneously placed new swarms in a standard wooden hive and the Beegin concrete hive at the start of the testing. One beekeeper witnessed a 40% increase in productivity in the concrete hive. The second beekeeper recorded that whilst the concrete hive yielded 10kgs of honey the wooden hive had produced none. We consider this significant increase in bee productivity due to the insulating properties of the concrete hive, requiring the bees to spend less time and energy regulating hive temperatures.





*Figure 7. Beekeeper participant harvesting honey from their permanent concrete hive.*

Although the testing is still underway, the participants have identified some early issues. Many did not see the benefit of buying a temporary hive indicating they would prefer to purchase permanent concrete hives outright. As testing has progressed, some evidence of the bees 'eating' the cardboard hives may exacerbate concerns for its longevity. Role-player feedback from testing the production tools contributed towards simplifying the demoulding and reassembly times of the moulds. The participants requested the price of the moulds to be reduced so that they can purchase more tools and produce beehives more rapidly.

It is clear in the initial field-testing that good theoretical design intentions do not supersede the capabilities of those being designed with, whether human or animal. It is also clear that the participants see value in the concrete hive. Further testing and buying by the participants will be required to form a sustainable decentralised business for the Beegin project, but the progress thus far is significant in terms of returning the benefit of the design research back to the participants. No promises have been made that could not be met, and even if the project does not roll out into a fully-fledged business, all stakeholders have benefited to some extent from their involvement.

### 3. Conclusion

The business model for the Beegin system has been reliant on limited funding and resources necessary to undertake the implementation. The time span of the project has allowed for meaningful relationships to be built between role-players,

which brings with it more authentic trust and honesty in feedback. This is particularly important in iterative projects where people's capabilities are amplified through continuous participation. Without the field-testing of both the beehive and the implementation system many of the issues identified above would have gone unresolved and led to failed implementation. By working with the role-players to develop and implement the beekeeping system we have designed for manufacturability, distribution, actual use and visual appearance simultaneously, hence ensuring the meeting of intended outcomes. The design researcher must accept that the design process extends beyond design development into implementation. In this way, we re-do the design process and re-develop the implementation system as the project grows and begins to create valued impact.

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# Redoing by Repair: The Search for Tacit Knowledge Transfer in Furniture Design Education

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**Abstract:** Michael Polanyi indicates “We know more than we can tell”. He points a hidden and greater dimension - the tacit knowledge. Tacit knowledge is also the personal knowledge which is hard to transfer and in reality people use it more effectively than the other explicit dimension.

Cognitivist, rationalist and utilitarian approaches made the reality be understood as explicit and knowledge has been reduced. Except a reduction, better ways of knowledge transfer are being researched. The transfer of tacit knowledge is an important point, especially between design and production. And furniture design is no exception. In a design approach which is isolated from production the tacit knowledge from production phase will be missing. From this perspective, an applied class for furniture design has been setup on the theme “repair”.

In this paper, tacit knowledge and its transfer methods, repair as a constructive element for dialogue and observations will be discussed.

**Keywords:** Tacit knowledge, explicit knowledge, repair, furniture design, education

## 1. Introduction

One of the most prominent elements in Interior design is the furniture. For this reason interior designers must have knowledge about design and production of the furniture. Some of this knowledge is given in schools but most of them are acquired in professional life by practical experience. Interior designers must have relations with craftsmen in order to direct them to make produce his/her desired custom furniture. In order to have this relation correctly, designers need to speak the same language as craftsmen do and have similar production knowledge. Most of this knowledge depends on the know-how and practice which is developed during production. Practical knowledge depends mostly on skill and skill depends on hand-eye coordination or manual dexterity. (Christopher Winch, 283) In the case of interior design education, it would be impossible to expect a bachelor's

candidate to reach this type of experience, knowledge and skill. It is also unnecessary. It will be easier to establish a dialogue with craftsmen for interior designer if he/she experienced furniture production, observed the use of material, production techniques and necessary tools during his/her education. If interior designer has experience in production, it will be a benefit for him/her to have empathy with craftsmen to the problems in production.

For interior designer candidates it is also important to have personal experience in furniture production for revealing the unforeseen design inputs that come out of contact with material and production techniques. In many cases furniture design classes are held in such a manner that design and production are continuous but separate phases. Conceptual structure and finding brilliant ideas are well evaluated but other facts that are more important in design and production of unique furniture could not be practiced. Some of these are facts as production techniques and details, materials and designer-producer dialogues. These diverse facts need diverse types of knowledge.

## 2. Knowledge

Aristotheles, classifies knowledge to 3 main topics: Techne is the knowledge of how a thing is made. It is context based and cannot be generalised. Phronesis is the deep thinking on doing something. It is the wisdom on doing something, is context based and pragmatic and aims the action on doing something. Episteme is the general scientific knowledge. It is theoretical and free from context and variables (Pitman & Kinsella, 2012) (Smith, 2015). Aristotheles puts episteme to a higher place than other (Long, 2001). Episteme is more open and it spreads. At the other hand techne is full of secrets; it depends on the harmony of hand and the tool and it is grown by this harmony. Techne primarily was a word in ancient Greece which is referred to knowledge of art and craftsmanship. In present time, know-how is a word referring to Techne (Brogan, 2005). Another word which refers to episteme is knowing-that which is also known as theoretical knowledge (Gascoigne & Thornton, 2013). The relation between know-how and knowing-that is the topic of a continuing debate. According to Ryle's anti intellectualist approach know how and knowing that are different from each other. Stanley and Williamson assert that know-how is a part of knowing that (Fantl, 2008) (Stanley & T., 2001) (Ryle, 1946).

There are also differences between two types of knowledge in the sense of transferring the knowledge. As an open source knowledge, knowing that is transferred freely from past to present. At the other hand, know-how supports practical transfer. Craft knowledge depends on tactile experiences therefore it cannot be transferred written or verbally. Christopher Winch uses words "technique" and "skill" in order to define the difference between know-how and knowing-that. In order to do a task, it is necessary to know some kind of techniques but knowing those techniques does not mean that it is solely sufficient for doing the task (Winch, 2013). Most of the techniques need special skills depending on the task and the material. It is possible to transfer techniques by demonstration but the same is not possible for skill. Michael Polanyi defines this kind of knowledge that depends on skill as "tacit knowledge" which is also designated as personal knowledge (Polanyi, 1966). Skills are indescribable interactions between the material and the tool, the hand and the mind.



## 2.1 Knowledge transfer

Theoretical knowledge is also termed as explicit knowledge. It is also the written and tellable information that is transferred via diverse mediation. Cognitivism and rationalism evaluated knowledge of the world as an independent fact of the human body and emotions and utilitarianism took the reality as an objectively codified data. Cartesian theory separates the mind from the body and the mind becomes the source and engine of human knowledge (Gill S. P., 2015). In fact this is a very old dualistic paradigm since Sokrates and Plato. Many philosophers as Husserl, Merleau-Ponty, Gadamer, Buber, Heidegger and Wittgenstein developed new conceptions of knowledge that include spiritual, the body, culture and emotions. Polanyi termed the untellable, bodily knowledge as tacit knowledge and he dealt with transfer of the tacit dimension. Polanyi claims that we can understand something explicit if we can relate to it through practice (Gill J. H., 2000). Polanyi describes the knowledge as a whole and he criticizes the attempts to break it apart to make it explicit. Brock exemplifies the fact on a well-known experiment proposed by John Searle (Searle, 1980)

“Imagine a person, who doesn’t speak Chinese, is locked in a room. Inside the room is a set of instructions, written in English, which link sets of characters in Chinese to other groups of Chinese letters. If questions in Chinese are fed into the locked room, the imprisoned person can follow the instructions and pass seemingly fluent answers in Chinese out from the room. To an observer outside, the room’s occupier appears to be fluent in Chinese, but the person is merely following a series of procedures, without comprehending the meaning of the output they produce (Brock, 2017).”

Polanyi exemplifies practical classes and the act of pointing to things to connect words to things as methods of passing on tacit knowledge. (Gill S. P., 2015). John Dewey describes learning by doing as:

“In attempting to practice an art or skill, we indwell it to the extent that it eventually comes to indwell us, even though we generally cannot say how this happens. In learning a new dance step, a new language, or how to think philosophically, there is no substitute for practice (Dewey, 1975).”

Figure 1 shows a graph demonstrating the condition of knowledge while it’s being transferred from tacit to explicit and vice versa (Talisayon, 2017). It can be seen that there is a reduction in knowledge while going from tacit to explicit and a growth in knowledge while going from explicit to tacit. It also could be seen that knowledge acquisition is more in practice while going from explicit to tacit.



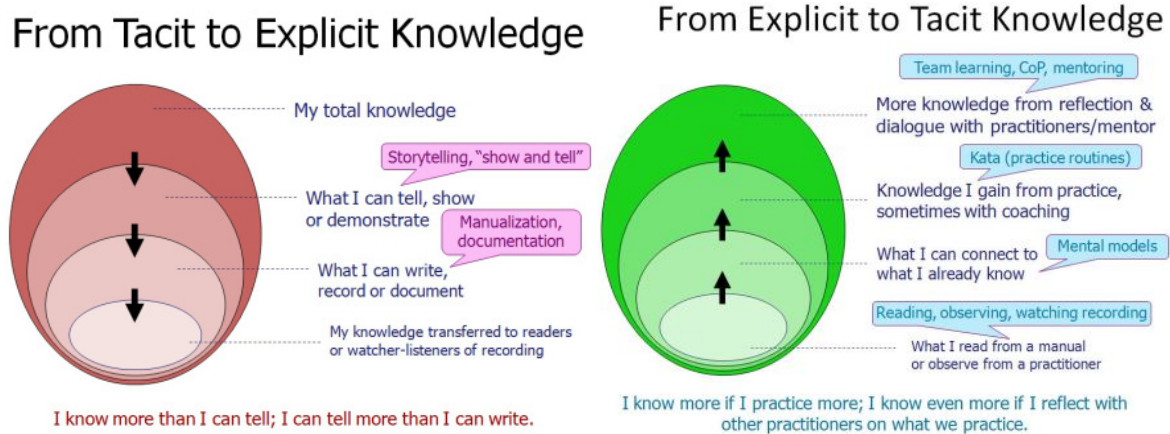


Figure 1. Transfers from tacit to explicit and explicit to tacit

Differences in explicit and tacit knowledge can be discovered best in the comparison between the novice and the expert, the apprentice and the master. The famous example of an expert pianist explains it well. The pianist plays intuitively without concentrating on his finger movements, he plays the score without any mistake but if he began to think of those movements he will be mistaken by pressing on a wrong note or untimely stroke. An expert uses more of the subjective and less of the objective aspects of the knowledge. An expert has the ability to grasp the situation in front of him and make judgements about it. A novice at the other hand, can only calculate by using explicit rules to make sense of what appears to him to be a mass of data (Cooley, 1987).

Organizations are mostly dealing with transfer of knowledge between diverse groups in the organization. Nonako & Takeuchi (1995) proposed the SECI model for making it clear. Figure 2 shows the diagram of the model. The model is consisted of 4 diverse ways to combine and convert knowledge, it explains how knowledge is created and shared in the organization. As seen from the figure Tacit to tacit knowledge is shared from individual to individual by direct experience, tacit to explicit is externalization and the knowledge is shared by dialogue, from explicit to explicit is a combination of the knowledge systematically, from explicit to tacit is an internalization process and knowledge is learnt through practice.

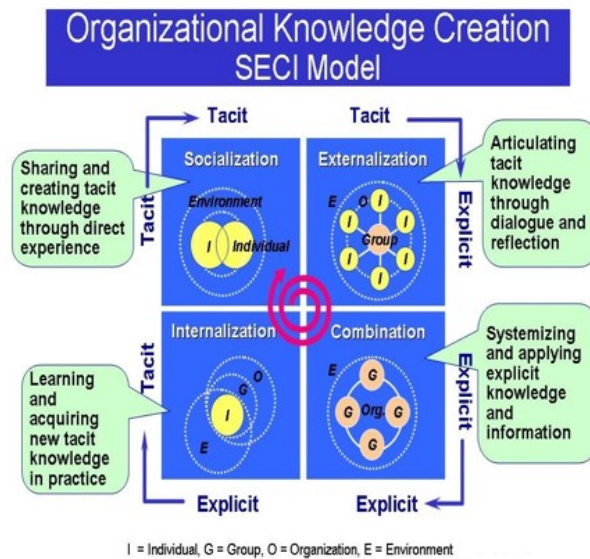


Figure 2. The SECI model

Dialogue creates a string between the expert who has the tacit knowledge and the novice who has the explicit. In order to create the dialogue a kind of mediator is needed. In most cases this mediator is a third person who keeps the dialogue. The mediator could be a situation through which the dialogue continues. The dialogue continues on practice of a subject and the knowledge transfer occurs.

### 3. “Making Repairs”

According to Aristhoteles, *eidos*(form) of a being is determined before *techne* takes action. Process of being doesn't possess design or planning as we understand today, design and planning is embedded in the action of *techne* which also means design and planning is in crafting. After industrial revolution, there became changes in the structure of working process of crafting and in the relationship between the artisan and his apprentice. By mass production machines took place of skill. Rationalization of mass production and new labour division principles rearranged the work system, and then it was impossible for workers to be aware of the whole process. Ancient synergy of production of an item and its repair is also rationalized and the image of assembly line became also image of repair (Harper, 1987).

Afore mentioned situation suits for most cases of mass production but for unique products, the production goes on in craftsman's workshops. Even though formal education has taken the place of apprenticeship, skill improvement, watching and repetition are still basic parts of craft education.

"Making and fixing are eventually guided by different kinds of knowledge, making being dominated by the limited knowledge of the machine tender and fixing by the knowledge of the earlier mind that stood in the same relation, as its inventor, to the technique. This, however, is a lag rather than a permanent separation. As making becomes increasingly rationalized there are, for a time, individuals with knowledge that allows them to see beyond the elements of a technique to its overall purpose and coherence. This knowledge is the 'live intelligence, fallibly attuned to the actual circumstances' of life. It is the knowledge in which making and fixing are parts of a continuum (Harper, 1987)."

“Put simply, it is by fixing things that we often get to understand how they work. The simplest way to make a repair is to take something apart, find and fix what’s wrong, then restore the object to its former state (Sennett, 2008).”

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In this sense, it is a must to understand the object in whole and to achieve this, it must be disassembled to its smaller parts. This process compels to understand the parts relationship between each part and their associated functions in order to assemble them to form the object again. In order to do this parts are examined for their conditional states and their functions and it is tried to be understood in whole. After all the processes, the malfunctioning part could be discovered and repaired. In rationalized repair of mass produced products, the part, which is an assembly of several sub-components, is replaced completely. The worker doesn’t ponder how the malfunctioning part works or how it could be fixed. In repair of unique craft products parts are not in stock for replacement they have to be reproduced or have to be fixed with accessible materials, tools and repairman’s skills. In crafts production craftsman is a repairman and the repairman is a craftsman also. Repairman’s knowledge in the process is a tactile, experience based and difficult to transfer tacit knowledge. While repairman is working on a piece, he interprets the know-how which is embedded on that piece with his own know-how. While repairman is disassembling a piece and trying to analyse relations of parts, he aims to reveal the embedded know-how.

Repairing is also an exceptional situation to identify the explicit and tacit knowledge. In automation while producing something, instructions and rules are followed in the best available way for efficiency (Winograd & Flores, 1986). But when a breakdown occurs in the course, computers lack to innovate or improvise

a way to fix the problem. Repair needs the tacit knowledge of the experts. Because human's rule following is dependent on the situation of the user, it is dependent to personal knowledge and intuition. Repair could be the mediator for the dialogue between the expert and the novice, between the tacit and the explicit.

### 3.1 Repair as a tool to transfer the tacit dimension

In most design courses, usually, design is handled as a brand-new problem. Students are encouraged to develop ideas for a production start-up. In order to make students understand the wider tacit dimension of furniture design and production an applied studio has been set up. Studio is set up on the classification of repair that is previously mentioned by Richard Sennett in his well-known book "The Craftsman".

Studio is handled in two main topics: Static and dynamic repair. According to Sennett (2008), static repair is finding the problems of an object, fixing them and putting it in its initial state. If the functionality and/or form of the repaired object changes, then the process is a dynamic repair.

Sennett's classification for repair has been helpful in the construction of the studio. Studio aims the applied experience of static and dynamic repair on a very common object in furniture design: the chair. The other aim of the studio is revealing the imbedded tacit knowledge of material and craft techniques through the theme "repair" which is the mediator for the dialogue between workshop craftsmen, tutor and the students. In this sense tutor (T) is the resource for explicit knowledge, workshop craftsmen (C) are the resources for the tacit knowledge. T and C are analogous to experts. Students (S) are analogous to novice who receive explicit (E) knowledge from T and interprets and transfers E to C then receives the tacit knowledge through techniques and skill.

As a furniture repairing subject, the most common, easily found object, the chair is chosen.

In order to hold a hands-on experience, materials and production techniques are limited to wood crafting. This approach also provides a vision to capture the limits of design which are determined by production.

The course has been divided into two phases as mentioned in Sennett's repair model.

#### Static repair

Static repair is evaluated as an effort of recovering the chair to its initial brand-new state. In order to achieve that extensive analysis is necessary. Sub-phases of static repair in analysis are as follows:

- Measuring and drafting the chair,
- Questionnaire,
- Removing the finishing material on chair,
- Disassembly of the chair,
- Creating the build of materials (BOM).
- Documenting

The effort of restoration of the chair to its initial state was consisted of below sub phases:

- Restoration of parts,
- Assembly,

- Documenting.

### **Dynamic repair**

Dynamic repair includes an upgrade in design and production. These changes effect the product design. For this reason, instead of holding a successive process dynamic repair phase aims a harmony of design and production. It is aimed for students to reveal production related tacit knowledge and know-how which is imbedded in chairs.

Dynamic repair was divided into two phases:

- Design,
- Production.

Design phase is divided into sub phases as:

- Design research,
- Elimination,
- Selection,
- 1/1 scale modelling,
- Documenting.

The production phase is consisted of following sub phases:

- Production research,
- Material selection,
- Production method selection,
- Finishing method selection
- Creating the production patterns,
- Parts sizing,
- Parts processing,
- Assembly,
- Finishing,
- Documenting.

In each phase students worked in the wood workshop of the institution by guidance of the tutor and the wood workshop's craftsmen.

At the end of the class students are asked to create a comprehensive report of the whole process from the beginning to the end.

### **Classroom progress and Observations**

Students are asked to find and bring an old chair from their surroundings or buy an old wooden chair from flea-market. They are not informed about the schedule and program of the class. Required aspects of the chair are explained. In the second lesson students brought their chairs which are mostly bought from flea market. Chairs were varying in design and functionality aspects. (Figure 3)

Students are asked to draw 1/5 scaled drawings of their chairs. They measured the parts and transferred their data to drawings from facades and top view. They are asked to draw whatever they see on the chair including malfunctioning parts and obsolescence and all the invisible production details are ignored. By this exercise analysis phase initiated.

In the third lesson, students are asked to evaluate their chairs themselves. Evaluation requires 3 main topics:

- esthetical,
- functional,
- production techniques.

These main topics and evaluations related to them then are used to create a questionnaire. Students are asked to have interviews with at least 10 people who are then requested to experience the chair and answer questions. Questionnaire includes questions about user experience but also about user himself or herself.



*Figure 3. Students found the chairs from flea market*

In the fourth lesson, students are asked to disassemble their chairs until they reach the raw materials. This procedure has been taken in wood workshop by guidance and support of workshop's craftsmen. (Figure 4) Students marked every piece with a number and they created a BOM (Build of Materials) explaining every part on a table about their condition and how many of those parts were used to manufacture that chair. Every moment of disassembly has been documented by photos and remarks. Every piece has been taken to a procedure of renovation. Bended, broken parts are repaired individually. At the end of the disassembly procedure students are asked to redraw the chair with its assembly details. They are also asked to draw an elaborated exploded view of the chair explaining the assembly process.





*Figure 4. Disassembly*

In the fifth lesson students are asked to realise static repair on the chair. They are asked to determine malfunctioning parts and find solutions to repair unusable parts. Students repaired some parts and renewed some others that could not be repaired. At the end of the repair and renewal of parts chairs are assembled. Assembly is not applied as a permanent procedure in order to use same parts in the dynamic repair phase for this reason assembly methods such as gluing which are difficult to reverse back are not used. After the temporary assembly, chairs are documented with photos. (Figure 5)



*Figure 5. The initial chair and the one after static repair*

In the sixth lesson, students are asked to research about improvements that they will make on their chair in dynamic repair phase. Some of the students found images of other chairs which look like similar to their chairs and tried to figure out visual changes that were made on them. Some students found examples which are totally different from their chair and have multifunctional features. Most of the information was delivered from internet and most of them were visual. Most of the students took dynamic repair as a functional upgrade to chair. For this reason, most of the proposals were about hybridization. For example, cloth- hanger + chair, storage unit + chair or ladder + chair.

Redesigning phase was compelling for students. They had spent so much time on developing a concept. They are encouraged to focus on design of the tactile product instead of its concept. They were still avoiding to enter an unknown world full of requirements from craft experience. In order to have 1/1 scaled real dimensions, students are guided to use cardboard mock-ups in order to develop new ideas. This approach has awakened them to proceed.

In the eighth week, matured primal designs are planned for production. Production planning started with research of additional material and parts to be used in production. Additional needs of wood have been provided by institute and other more specific materials have been provided by students. This made students check for a specific component in stores and catalogues.

Students created drawings of the desired parts in order to be used in assembly. With guidance of the workshop craftsmen they organized a request for the limited wood to be cut effectively to avoid material waste. After consent of tutor, students could make the cut be done through their 1/1 scaled templates.

Students rearranged their design through the critics of the tutor and the workshop craftsmen. For some of those, design has been changed or evolved due to crafting limits and production requirements. Each student has had an individual approach to production. Some of them has chosen to have a hand-on experience and tried to craft themselves, some others have had dialogues with craftsmen and experienced management of the process but did not use power tools. (Figure 6)



*Figure 6. Hands on experience and the final product*

The final evaluation was mean of 2 different types of submissions. These submissions were finished prototype of the chair and a comprehensive report on the course which explains all the phases based on the timeline. This report was as a written documentary of the course containing photos, sketches and drawings. For evaluation of the incomes, a survey has been prepared and shared online with students.

## 4. Methodology

The course has been evaluated through observations in class and final reports. The research includes findings from 3 years and 45 students. The same program has been held and the same research methodology applied on all of them.

### 4.1 Findings and Review

Course observation evaluation:

From the dialogues with students it was understood that the explicit knowledge gained from the tutor, interpreted by the student and it is transferred to the craftsmen, the tacit feedback reflected from the craftsmen to the student and it was transferred to the tutor. The loop was cycled several times during the course. (Figure 7)

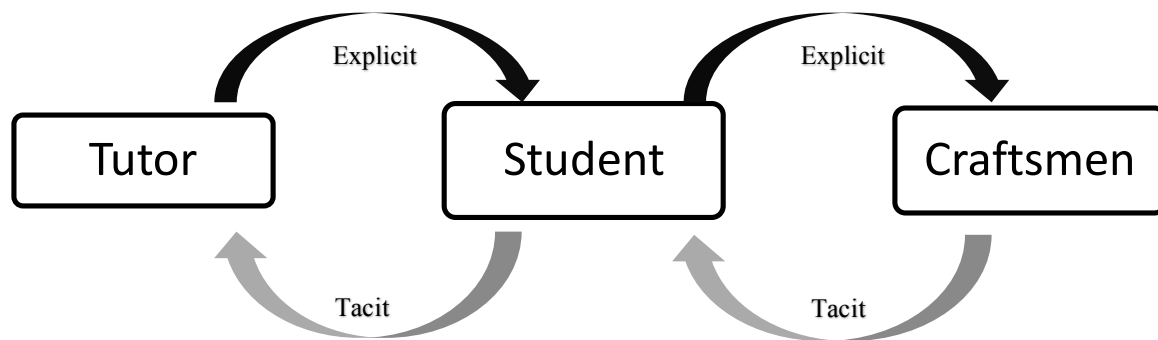


Figure 7. Knowledge transfer in the class.

The transfer of tacit and explicit knowledge and their interpretations varied during every phase of the course. Students received most of the explicit knowledge from the tutor but for reaching other explicit knowledge referring to production was achieved by coaching of craftsmen from catalogues or with direct dialogues with other craftsmen whom are referred by wood workshop's craftsmen. Tutor directed students to internet resources in order to receive explicit knowledge especially for the design sub-phase of dynamic repair. In some phases students needed physical support in some of the sub-phases of production and analysis. They needed knowledge support in some sub-phases and guiding in others. Figure 8 shows the phases and types of support by craftsmen or tutor.

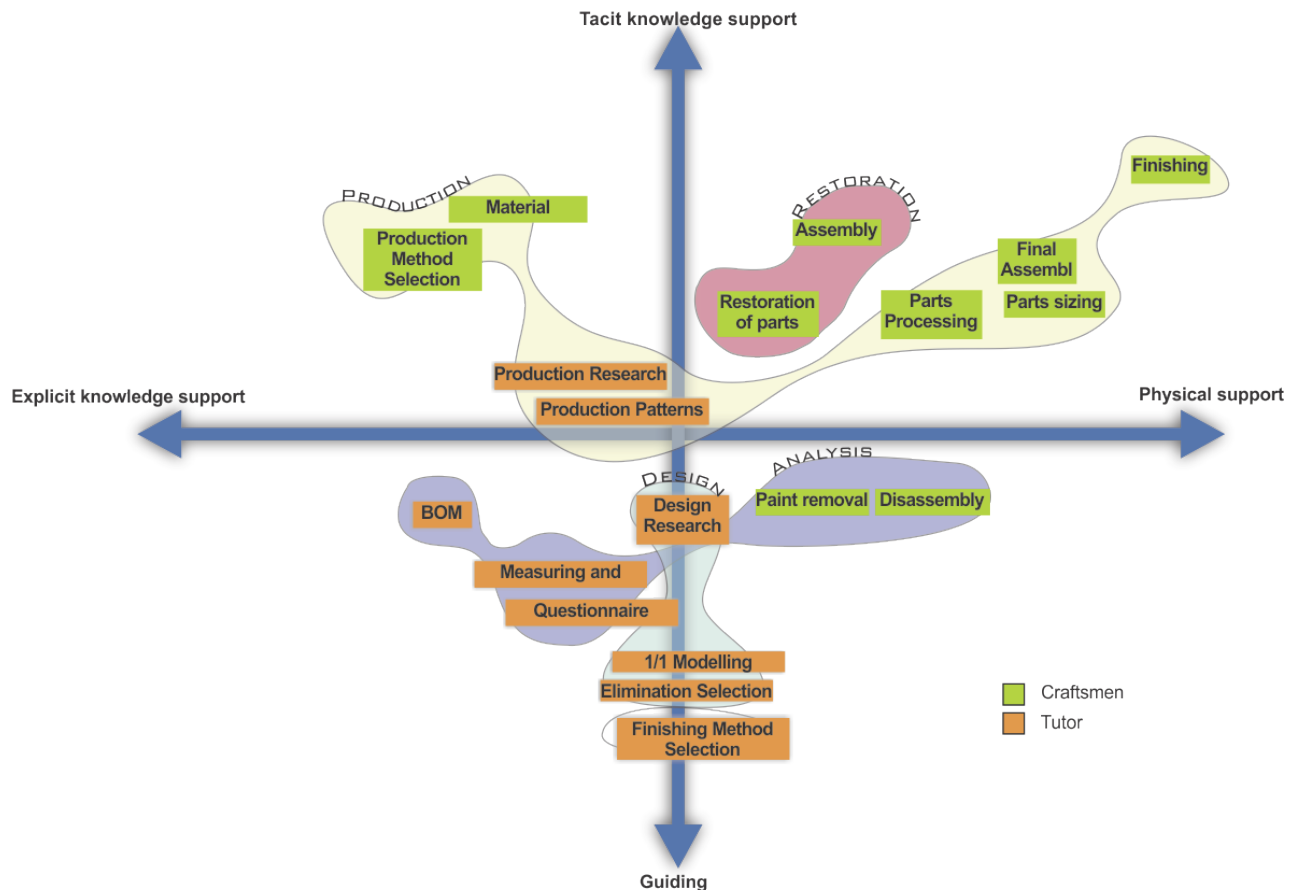


Figure 8. Graph showing the participation of the tutor and craftsmen in classroom phases

### Reports Evaluation:

Students, mentioned in their reports:

- They have learnt, materials, production techniques and names of production tools,
- the dialogues between craftsmen and the designer.
- They have comprehended that new techniques and methods could be developed during production which will affect the design also.
- They have learnt the production order while they were disassembling the chair.
- They have understood that during production not only tools are used but also hand crafting is necessary.
- They have learnt to plan the production phase and the importance of getting involved to production to optimize the plan.
- They have understood that different user types have different needs and these needs affect the design.

Most of the reports show that students have got involved in every phase of the production. It is also understood from reports that students have had lots of mistakes and these made them to return and change the design.

## 5. Conclusion

The famous quote from Polanyi (1966) “We know more than we can tell.” explains the most for tacit knowledge. Tacit knowledge is the untellable knowledge embedded in the product. The best way to reveal it is to have a dialogue who has the knowledge. Once the tacit has been made explicit to make it one’s own tacit knowledge it is needed to be practiced. In interior design furniture class these methods are evaluated through repair theme as the mediator of the dialogue.

Repair is an act of seeing the product as a whole and not as the parts specifically. This situation suits to Polanyi’s thoughts on tacit knowledge that knowledge is a whole and cannot be separated. In furniture class, the chair is treated as an object to be repaired by a craftsman. Students approached the chair to reveal the tacit knowledge and create a dialogue to whom have this knowledge.

The purpose of the class has not been to make each student a repairman or a crafts person. It has been to make students understand that there is a greater tacit dimension in production of furniture, even greater than the explicit knowledge thought in the class. And this knowledge can change the design itself. There must be a dialogue with the producer during the design of the furniture and it should not be forgotten that design does not finish before the production of product finishes.

Through the evaluations of the reports and outcomes of the class it could be understood that students comprehended the purpose. The practical class has been a great fun for them to see the production phase.

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# Origami Meets Movement: A Collaboration between Diploma in Fashion and Diploma in Dance at LASALLE College of the Arts, Singapore

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**Abstract:** A cross-disciplinary collaboration took place between Diploma in Fashion and Diploma in Dance at LASALLE College of the Arts. A group of forty-nine Diploma in Fashion students and fourteen Diploma in Dance students participated in the project which began in August 2016 and ended eight weeks later. Each group consisted of three to four Diploma in Fashion students to one Diploma in Dance student. The theme of the project was Origami and students of both disciplines took part in parallel Origami and movement workshops. On working on an unacquainted subject matter, the impetus for the students was to find solutions to problems in ways less conventional. The resulting garments were worn in performances choreographed by the Diploma in Dance students. Participants positively reported that they were challenged to think outside the norms of how they frequently viewed Fashion and Dance, expanded their knowledge and deepened their understanding of their practice.

**Keywords:** cross-disciplinary, collaboration, fashion, dance, curriculum

## 1. Introduction

Cross-disciplinary projects of a collaborative nature consisting of students of different disciplines are oftentimes viewed upon as valued catalysts for enhanced learning for all involved. Students are exposed to the possibility of working in mixed teams, and apply their higher-order thinking skills to challenging topics of problems that they are not completely familiar with, and that perhaps only cross-disciplinarity can produce creative solutions to. Cross-disciplinary practice sees members of a collective producing an outcome while staying within the

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boundaries of their disciplines and reflecting upon their practice with the perspective of another. Projects such as this will also prepare the students for collaborative systems that are the fashion and dance industries. This paper will detail a cross-disciplinary collaborative project, that started in August 2016, between forty-nine Diploma in Fashion students and fourteen Diploma in Dance students at LASALLE College of the Arts, and evaluate its aims, goals and delivery.

## 2. Background

Many designers, such as Christian Dior, Christian Louboutin, Christobal Balenciaga, Yves Saint Laurent or Rick Owens have successfully found inspiration in dance and subsequently collaborated with choreographers in order to examine how each discipline could be expanded beyond its traditional system (Steele, 2014). According to Vestoj Editors (2014), “collaboration is a term that is used (and sometimes misused) heavily in the art and design world in linking different entities together to achieve a new finished product or project. Used frequently as a marketing buzzword for fashion brands, a recent notable example is Maison Martin Margiela’s collaboration with fast fashion behemoth H&M” (Vestoj Editors, 2014). Vestoj Editors (2014) highlighted that collaborating outside the fashion system can not only broaden our understanding of what clothing can be capable of functionally, but also encourages us to look at a garment or a designer from a new perspective.

The role of the costume designer has been critical to a performance; this is quite different from the role of a fashion designer as costumes are designed with the intention of being visible from a distance (the distance between the stage and the audience) and a fashion garment is not necessarily so. In working with a fashion designer, new perspectives are brought to the production. In cases that have worked exceptionally well, each collaborator puts forth unique approaches to the project and allows for more varied responses to the brief. As the scopes of practice are expanded, so does one’s perception of the work. This effectively pulls each discipline away from its usual *mise en scène*: for dance, the stage and for fashion, the catwalk.

Vestoj Editors (2014) stated that the collaboration between choreographer Merce Cunningham and fashion designer Rei Kawakubo in 1997 is another famous example for dance and fashion collaborations. Merce Cunningham invited Rei Kawakubo to collaborate with him on a dance piece. This partnership developed into the dance piece ‘Scenario’, which was performed in October of that year at the Brooklyn Academy of Music in New York. Both virtuosos brought their own singular creative voices in the working process. The difference in each artist’s work and creative process is what is essential in creating cutting edge and novel aesthetics (Vestoj Editors, 2014). Cunningham, going against the traditional perception that dance should be elegant and harmonious, juxtaposes and layers the bodies on the stage; in the same way Rei Kawakubo breaks from traditional notions of fashion, or womanhood, with her conceptual and often disruptive designs (Vestoj Editors, 2014). Critics stated that this collaboration was unsuccessful as the padded protrusions deformed the dancer’s bodies and hindered movement (Lille, 2015). Yet, it seems the debate focused solely on the function of the garments in aiding movement, and disregarded the purposeful hindrance of movement as part of the motivation.

In 1917 a revolutionary collaboration in dance took place when artist Pablo Picasso designed costumes for the ballet “Parade”, choreographed by Léonide Massine, conceptualised by Jean Cocteau and performed by the Ballet Russes. Originally

founded by Sergei Diaghilev, the Ballets Russes is held as the most influential ballet company of the 20th century. Whilst the 19th Century ballet world was focused on simplicity and romanticism, Sergei Diaghilev encouraged seminal collaborations amongst emerging choreographers, composers, dance and designers, introducing madly colourful sets and costumes that were heavily influenced by the Ancient East and abstract, cubist, and surrealist art. Picasso's cubist costumes for the Parade were made from solid cardboard, allowing the dancers only a minimum of movement. There was no attempt to achieve decorative effects as in previous performances when traditionally theatre was the art of illusion. The intention in this collaboration was borne from determination to heighten "detail of daily truths and rhythms into the vocabulary of dancing" (Peterkin, 1919, p.427). The premiere of the ballet resulted in several scandals. Many of the oppositions were focused on Picasso's Cubist costume design (Peterkin, 1919).

Taking these past notable fashion/dance collaborations of the past into consideration, the collaboration, on which this paper is based, saw the students asked to set a clear objective with the garments and dances they developed. They were to consider intents that either allowed for movement to be restricted or facilitated. Throughout the creative process, the Diploma in Dance students (dancers) responded to the Diploma in Fashion students (designers) and vice versa. It was through this dialogue that the garments and choreography evolved. The main objective of this project was to foster cross-disciplinary collaborations in order to encourage students' learning by exposing them to divergent types of knowledge and to increase understanding of their own discipline by sharing experiences, knowledge and perspectives. By presenting the students an encounter with an unfamiliar subject area such as Origami, a traditional Japanese paper folding technique, each collaborator could bring their respective artistic approaches to the project, and in the process expand their own scope and practice through this collaboration. This also allows for learning to be contextual and influenced by activity (Gerlach, 1994). Inter- and cross-disciplinary practice is often introduced in education in order to prepare students to move across different fields and/or apply their skills in other contexts. As fashion designers, we often have to consider the factor of "movement" when designing garments. Often, it is at most to the level of functionality regarding daily bodily movements like walking or sitting down. However, this unique collaboration between the Diploma in Fashion and the Diploma in Dance students brought the consideration of "movement" to a level of higher expression.

Many design courses increasingly implement cross- and inter-disciplinary projects in their curriculum to equip students for the changing landscape in the design industry. According to Reynolds (2012), many studies show that cross- and inter-disciplinary thinking are important for problem solving and critical thinking and it does so by bringing together people from different disciplines. Reynolds (2012) suggests, that cross- and inter-disciplinary collaborations in education can often erupt into tumultuousness and unpredictability as both lecturers and students operate outside their comfort zone. However, this also forces students to come together, however uncomfortably, where they might ordinarily not and is an effective way to produce results with novel and inventive approaches.

### 3. About the project

This collaboration saw two programmes of quite different student cohort numbers for Diploma Level 3 come together. The Diploma in Fashion Major B (Fashion

Design & Textiles) was made up for forty-nine students while the Diploma in Dance has fourteen students. Each group consisted of three to four Diploma in Fashion students to one Diploma in Dance student. This, however, turned out to work well to the project's benefit. As there was only sufficient time for a seven-week project, having design-heavy groups allowed the designers to work together in teams that mimicked real workplace structures and sped up the production phase.

What made this project unique and also engaging is the multi-layered interaction between the designers and dancers, while also exploring secondary elements like spatial awareness and flux through sound and music. Neither the choreography nor the accompanying garments were decided beforehand; everything was done simultaneously and as a response to each other from a verbal and visual discourse. Hence, the dance piece in general evolved and magnified into a result that had evident contributions from both sides.

At the beginning, both the designers and dancers attended an Origami workshop (Figure 1) conducted by visiting artist and expert Clothilde Dupont in preparation for this project. In this workshop they explored the ways in which traditional Japanese paper folding techniques could be utilised in fashion design in order to create structure, volume and progressive silhouettes. The age-old conventions of origami are at first applied: start with a square piece of paper, make no cuts, gluing to secure edges to each other is not allowed and only one structure constituting a form qualifies. The techniques were taught and translated onto fabric. After which, the students were challenged to viewing folds made by the fabric as a space in which the body can or cannot inhabit thereby facilitating or restricting movement.



*Figure 1. Diploma in Fashion and Diploma in Dance students participating in the Origami workshop.*



## 4. “Folding and Enfolding” - the creative process

In response to the Origami workshop, dance expert Susan Sentler conducted an experiential workshop on “Folding and Enfolding”. In this workshop (Figure 2), Susan addressed folding in a larger context, taking the folds inward inside a body rather than purely external: “Our bodies are like paper Origami. We shape and reshape our bodies all day long without giving it a second thought. Folding is how we got here – the history of our biological development and a living archive of the body’s dimensions” (Batson and Sentler, 2016). The dancers’ part of the workshop adopted the approach of looking at macro landscape outside of the body then journeying into the micro where folds fold onto themselves over and over until the inner landscape emerges; here was where the dance phrases were then developed.



*Figure 2. Diploma in Dance student participating in the “Folding and Enfolding” workshop conducted by Susan Sentler. Photo by Susan Sentler.*

Similarly, the designers participated in a parallel workshop conducted by Sentler (Figure 3). The techniques in this experiential workshop were vastly different from what the designers have been used to thus far in their time studying in the Diploma in Fashion. The designers were given large tissue paper to play with while contemplating “folding as a second skin”, working on a wayfaring paper folding sculpture taking it from two dimensional to three dimensional form, then further crumbling to form infinite shapes. After which, the designers took a moment to sense by closing their eyes as they were talked through embodying the awareness

of the folds of their bodies as they sat on their chairs, and the folds of the fabric as their clothes encompass their bodies.



*Figure 3. Susan Sentler conducting the workshop to the Diploma in Fashion students.*

The goal in having students of the two programmes to attend the cross-disciplinary workshops was to enable the participants to gain more insight into the creative processes and languages of each discipline and in turn facilitate in communicating ideas and needs. Through the workshops, a theme that was clear was - “within” and “without”. The designers were challenged to think about the spaces created within the structures made by the folds and that the realisation that their practice is patently regarding the exterior of the body - the “without”. Whereas for the dancers, their practice is given wider breadth in understanding that movement may come from the micro “within”. The two parallel perspectives confronted the students with a unique and jarring problem. This was a problem engineered by the Programme Development Team (PDT), that would go on to help the students produce novel outcomes.

Throughout this project several meetings between the designers and the dancers had been scheduled into the official timetables to allow time for discussions, brainstorming, fittings and rehearsals. Apart from the scheduled meetings, the students were encouraged to meet up and connect outside of class time. During the first few meetings, they would engage in discourse, discuss ideas and develop relevant concepts.



## 5. Rehearsals and review

Once the initial concept was agreed upon, the designers proceeded to create prototypes (toiles) using calico as the main material. They explored various techniques like pleating, draping, folding, drafting or gathering in order to create more structural clothing incorporating origami-like patterns and garments that would expand from two-dimensional geometric shapes into 3 dimensional sculptural outfits. Some teams focused on the transformational aspects of the garments where the dancer could morph from one character into another, others designed dresses, skirts or pants that could be approached from various points. Depending on how the dancers entered the garment, overall shape and function of the garment could vary. The toile was then fitted to the dancers, who could experience and practice their movements in the actual garment (Figure 4). A rehearsal was scheduled with all lecturers and students from both disciplines. During this rehearsal students and lecturers had a chance to critique the garments and movements in order to alter concepts and fit before final production. Taking this critique on board, designers and dancers reviewed their work and refined movements and garments. Additionally, the lecturers and peers gave critique in a session where common critique points during this session were the exaggeration and enlargement of key elements in the costumes and to place more emphasis on the origami nature and elements of the pieces. Lecturers encouraged the designers to comply with the origami philosophy in using larger pieces of fabric, which would be folded into the desired shapes as opposed to cutting and sewing. This was because as students, they were still slightly unsure with a concept such as the application of Origami techniques onto dressmaking. Hence they did not always venture into creating more voluminous garments but had to be persuaded to explore volume and texture created by the creases and folds.



*Figure 4 A Diploma in Dance student rehearsing at the toile-fitting session in a toile.*

The designers now started to work in the actual pieces. For the final outfits they were free to choose any appropriate material and colour. Materials ranged from synthetics such as fabric mesh, polyester, organza and viscose to elastic textiles, mat or shiny fabrics, cotton and silk. Colours were freely chosen in relation to each group's concept.

Two more fittings and rehearsals followed, allowing for optimising and synchronising the garments and performances before the final show (Figures 5, 6, 7). Students from the Puttnam School of Film & Animation then documented the final performance.



*Figure 5. A Diploma in Dance student rehearsing in an ensemble designed by a Fashion student.*





Figure 6. A Diploma in Dance student performing in an ensemble designed by a Fashion student.



*Figure 7. A Diploma in Dance student performing in an ensemble designed by a Fashion student.*



## 6. Methodology

The purpose of this research was to investigate how cross-disciplinary practice helps members of a collective produce an outcome while staying within the boundaries of their disciplines and reflecting upon their practice with the perspective of another; and if such a collaboration effectively expanded and deepened the participants' knowledge of their practice. The research was done using the interpretive paradigm as the authors sought to gain qualitative information such as *how* and *why*, that which may not be as well gleaned from quantitative results.

The questionnaire for the Diploma in Fashion students was formulated by the authors of this paper whilst the questionnaire for the Diploma in Dance was formulated by *Sentler, S. Dr. Batson, G.* Six students from each programme filled out the questionnaires. This use of differing questionnaires specifically targets subject areas unique to each practice. Additionally a focus group was done with three lecturers from both programmes regarding their observations during the delivery of the project and of the outcomes. Both the questionnaires and the focus group were done after the end of the project.

### 6.1 Student experiences

Student 1 (Fashion Design)

*Question: How did you feel about viewing folds made by the fabric as a space in which the body can or cannot inhabit - hence facilitates or restricts movement?*

For our design, we played around the idea of concealing and revealing one's personality. This idea was demonstrated through the contrast between restriction and liberation imposed by the garment on the dancer – which was made possible by creating deep folds that could be compressed or released. The space thereby represents one's hesitation to open up to others, which I thought was an interesting way to portray our concept visually.

*Question: How did you feel about taking fashion from its usual environment such as a catwalk onto a stage?*

Fashion, as most people usually see it, are usually on mannequins or on fashion week catwalks. The focus is to sell the collection to the audience, hence the emphasis on visual aesthetics over concepts. In this case, many consumers aren't challenged to find out the concepts behind these collections. However, when fashion is present on a stage, it is no longer just about being aesthetically pleasing. Fashion becomes a medium that supports the dance concepts, and in our case, the constricting versus dynamic dance movements. It is interesting to see how fashion is not seen as a single entity, but rather as a multi-disciplinary one.

*Question: How was this project different to previous fashion projects you have worked on whilst in the Diploma in Fashion? How did the intervention of the "Folding" and Origami workshops change/affect your creative process/outcome?*

In comparison to previous fashion projects, this collaboration showed me how fashion can be interconnected with other disciplines, in this case, dance; and how such collaborations can help to convey a concept(s) more strongly. When fashion and dance concepts exist separately, garments and dance movements are used to convey messages respectively. However when a garment helps to exaggerate the impact of the dance movements, and the dance movements reveals how the garments influence the dancers and their breadth of movements, the final result is much more all-rounded and dynamic.



The “Folding” and Origami workshops had influenced the development of our design through us attempting to drape with one large fabric, and find ways to displace excess fabric by turning them into design elements. By treating space as a design and conceptual element, we made use of it to amplify the contrast of constriction and freedom – akin to restriction and liberation of oneself.

*Question: How did the workshop by Susan Sentler on “Folding and Enfolding” affect the development of your work?*

The workshop changed my perspective on the construction of garments. It is not uncommon to draft paper patterns and have different parts of the garments being attached to each other by the use of seams. During the workshop, I explored some possibilities in which we can eliminate the use of seams and replace them with folds. I learnt to see excess fabric not as an obstacle to get rid of, but to make the most out of it by using creative methods to turn them into interesting elements. Space also is seen as a conceptual - aside design - element that could hold various meanings.

Student 2 (Dance)

*Question: Have you explored any other ideas around folding on your own?*

Answer: Theoretically it had inspired my solo composition for collaboration with fashion students. How folding isn’t just making a crease, but rather what really makes a fold visible are the shadows created. Shadows provide the dimension required to view things as 3 dimensional.

*Question: Have you gathered images/or using other imagery that has been stimulated from this experience?*

Answer: The imagery of stretching a fabric till it has to fold was created during this exploration and has been etched in my mind deeply.

Student 3 (Dance)

*Question: Have you gathered images/or using other imagery that has been stimulated from this experience?*

Answer: Mostly images that I’ve gathered stems from the visible folding marks left on materials. Other images include how the intestine in our body folds and compress in such a small area yet they are neither stiff nor stagnant.

## 6.2 Lecturer experiences

Lecturer 1 (Diploma in Fashion)

“The dance students provided the initial concept and choreography of the dance piece while the fashion students devised the garments as a response to the former, interpreting the concept further by allowing the dancers to move freely or to work around different deliberate obstacles in the garments that would impede movement.

The dance rehearsals and showcase, especially with the dancers wearing the garments and seeing all factors come together must have been gratifying for the fashion students as they rarely would have the opportunity to even interact with the dance students and hopefully from this project, they could understand that the future of expression and by further extension, design, could be propelled further by the spirit of collaboration.”

## Lecturer 2 (Diploma in Fashion)

“As pilot initiatives usually go, the brief was left relatively open for the students to interpret. The dance students had relative freedom to choose their own form of dance expression, which they discussed and demonstrated, to the fashion students. The fashion students were free to design the costume for their dancer in whatever way they saw fit, as long as they incorporated the use of origami techniques and considered the movements of the dancer. They could, for example, design an outfit which accentuated the movements or even restrict the movements.

On hindsight, things tend to become clearer and we felt that it might have been good to create additional parameters to the project brief that would help students be even more focused on the main design aspects. For instance, we could have asked all the dancers to interpret the same theme or perhaps emotion. And for the design students we could have restricted the use of colour, which would have “forced” them to explore the use of origami techniques in more depth to explain their design narrative. The additional design parameters might have also resulted in a “tighter” visual language in the final performance. And allow students to see different creative interpretations of the same theme and different ways of playing with motion and origami folds.”

## Lecturer 3 (Diploma in Dance)

“The dance students learnt that fashion was no longer just about the costume that they put on for the performances, it could also be the textile and fabrics that allowed the expansion of ideas and imagination. This exploration allowed them to have internal dialogues with themselves and to further their understanding of bodies as well.

I think that there can be bolder and deeper explorations between students from both disciplines with this new initiative. Due to the time limitation the students tended to fall back into their comfort zones, although the better students were able to push their imagination and experimentation further with their choreography. Nonetheless, many of the Diploma in Dance students were able to understand the functions and roles of the fabrics in relations to the movement, and to translate their understanding with the focus of the origami elements. A longer time frame of the collaboration could enable the students to experiment the movement qualities further with different drafts of the outfit.

During the critique sessions some of the common remarks or feedback that I had given to my students were:

- How was the theme being translated through the use of fabric elements together with the movement device?
- How did the fabric or the structure of the outfit affect their idea development, and yet not be an obstacle to the point that the choreography needed to be altered?
- How would they expand or revise their movement ideas according to the outfit structure?
- How did the elements of origami manifest in the work development?
- How did the theme tie to the overall structure of the work? Did it work for the fabric device or structure?”

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# My Nesthouse: Action through doing Workshop

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**Abstract:** Design has the ability to integrate the-everyday-processes. Through the methodology of design processes, based on action through doing (learning-by-doing), an intergenerational participatory design workshop is proposed. This initiative (pre-project) aims to stimulate values of co-creation and sustainability in which the reality, surrounding the user, is the starting point of design decisions, especially focusing on children. A learning that metaphorically mimics behaviour, cognition in experience-dependent, and that promotes DIY culture in a maker-community. An educational challenge to bring closer design and glocal action in a contemporary scene.

**Keywords:** Design workshop, DIY, collaborative design, user experience, intergenerational

**Film Contribution:** <https://vimeo.com/217656998>

# Craft Practice for Sustainability. Rethinking Commercial Footwear Design Process with a Woven Textile Approach

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**Abstract:** The role of hand processes in design has evolved through history and in the present day, designers frequently employ digital methods. This brings opportunities but can limit material knowledge and it is therefore timely to reflect on the significance of hand processes. This paper explores the potential of craft-based woven textile approaches to designing sandals for large-scale manufacture. It addresses the research questions: what is the current situation/market in footwear/woven textile design; what are the benefits/drawbacks of a hands-on/craft-based approach to footwear design; does the approach have the potential to facilitate improved sustainability and if so, in what capacity? The paper presents findings from a practice-led study and key advantages of a craft-based approach were identified in generating in-depth knowledge of constructions and materials. This led to design outcomes that have potential benefits in sustainability through a zero/low-waste construction. However, the findings indicate difficulties in logistics, timescale and cost efficiency.

**Keywords:** Design for sustainability, practice-led research, hands-on design, footwear, woven textiles

## 1. Introduction

Hands-on interaction with material leads to the acquisition of knowledge (Cross, 2001, p.54-55; Leader, 2010, p.408; Philpott, 2012, p.56; Sweet, 2013, p.32) and has the potential to facilitate innovation and creativity (Yair and Schwarz, 2011, p.312; Treadaway, 2007, p.35). Wallace and Press (2004, p.44) describe how “craft finds beauty and design puts that beauty to work.” This principle has relevance to this study and the exploration of how the utilisation of craft-based textile processes can promote design for sustainability in the ‘ready-to-wear’ market.

The proposal of an approach that has potential for application in a commercial market is an important aspect of this research, with the potential impact for sustainability being far reaching in comparison to the production of bespoke products or small-scale production runs. An investigation of footwear markets revealed opportunities within the 'ready-to-wear' sandal market. A study of textile manufacturing identified narrow weaving as having the potential to be an appropriate method of production of sandal uppers, with the opportunity to produce single piece woven constructions that could minimise the material waste usually associated with the footwear manufacturing process. In the footwear industry a large amount of waste from excess materials is generated during the production process and around 25-35% of leather and 20-25% of textiles are discarded (Afirm Group, 2010) and so a zero/low waste product could have a positive environmental impact.

Practice-led research in the form of a design project case study revealed a key advantage of hands-on approaches in gaining in-depth knowledge and was supported by the findings of the literature review. Potential was identified in increasing designer awareness through the knowledge gained, thereby providing a catalyst for innovation and sustainable production brought about by a holistic craft-based approach in which form, construction and material are considered in parallel.

## 2. Products and Markets

### 2.1 Sandals

Thornton (1970, p.21-23) presents the theory that any modern sandal can be classified in terms of a small number of basic types that are taken from the traditional footwear of different cultures. This is based on the premise that all methods of attaching a sole to the foot have been discovered since the first production of sandals in 3500 B.C. (O'Keeffe, 1996, p.22). Schaffer and Saunders (2012, p.132) state the importance for designers to have knowledge of basic types of footwear and reinforce that even the most directional designs are likely to refer back to a traditional style. Therefore, in a woven textile approach, designers will conceivably need to reference and have an awareness of a number of traditional styles. A list combining the categories defined by Thornton (1970, p.21-23) and Schaffer and Saunders (2012, p.132-134) is outlined below.

- Toe-peg/toe-knob
- Toe-band
- V-strap/thong
- Instep-band
- Crossed-band
- T-bar
- Sling-back
- Multi-strap
- Peep-toe

When referring to footwear in terms of a fashion product, three main market categories can be identified: bespoke/haute couture, ready-to-wear and mass-produced (Waddell, 2004, p.ix).

Within the ready-to-wear sector, novel/innovative design and quality are driving factors but, unlike bespoke/haute couture footwear, designs are produced on a



mass-scale. This makes them accessible to a wide customer base (Verdu-Jover et al., 2008, p.1881). The mass-produced market is not suitable in terms of timescale and efficiency as emphasis lies in price (Verdu-Jover et al., 2008, p.1881) and speed to market (Cohen, 2011, p.12; Patriquin, 2012, p.41).

## 2.2 Textiles

Wilson (2001, p.13) divides textiles into two categories: “constructed” and “printed”. Constructed is used to describe fabrics that are designed by determining their construction, for example woven or knitted, while printed is used to describe a fabric that has been worked into or embellished to generate a new design, for example dyed, printed or embroidered. Elsasser (2010, p.137) describes different categories of constructed textiles, grouping them according to how they are made. Fabrics can be constructed from chemical solutions, fibres or yarns and Figure 1 shows the types of material that fall under these categories. An important aspect of material selection for textile design is the consideration of relevant properties of fibres and subsequently the fabric. Glanville et al. (1934, p.103-104) describes the way in which the nature of materials affects design in the field of footwear and the essential balance between creativity and functionality. Schaffer and Saunders (2012, p.136-139) describe the way in which material selection is influenced by fashion trends and suitability for manufacture. Material choice is one of the main ways in which designers have addressed sustainability in textile design (Fletcher, 2014, p.3-4) and interacting with materials at the early stages of the design process has been found to have the potential to increase the designer’s focus on the qualities of a material (Bezooyen, 2014, p.286). In order for textiles to be sustainable, the whole product lifecycle must be considered (Fletcher, 2014, p.5) with the potential for the integration of textile and product design increases awareness of the lifecycle by embedding the material design into the creation of the end product.

Solutions	Fibres	Yarns
Films	Felt	Wovens
		Knits
		Braids
		Laces
Foams	Non-wovens	Knotted
		Stitch-through

Figure 1. A diagram showing categories of constructed textiles as identified by Elsasser (2010, p137).

Textiles can be manufactured using a number of different methods and may be done by hand or using digital technology. Integrated computer aided design (CAD)/ computer aided manufacturing (CAM) systems are common-place in

woven and knitted textile production and Grady and Hamouda (1995, p.24) describe how engineering technology for these types of textile manufacture lead the way in terms of utilising CAD/CAM. Woven fabrics are commonly fabricated on a loom, this piece of equipment is central to the construction process and exists in a number of different forms (Elsasser, 2010, p.141).

Narrow fabrics are woven textiles that are produced in narrow widths. From the mid 1600s it has been possible to produce several woven tapes on a single loom in a process that can now be mechanised (Thompson and Dick, 1952, p.14). This makes it a viable method of production for the ready-to-wear market where designs are produced on a large scale (Verdu-Jover et al., 2008, p.1881). The narrow width of the fabric also makes it applicable to sandal design. A number of structures can be achieved using narrow weaving and different classifications of narrow fabric, as identified by Posselt (1917) and Thompson (1952), are shown in Figure 2. Some of these structures have been identified by the authors as having potential for use in sandal upper construction as follows:

1. Open structures and leno – Sandals have an upper which exposes the foot and so open work has potential to be utilised
2. Multiple cloths – It is common for sandals to have multiple straps and so multiple cloths may be used in this way
3. Figured – Extra threads can be trapped in a figured weave, these could create straps while also providing potential for the introduction of pattern

The way in which a loom is set-up is dependent on the desired weave structure, therefore analysing relevant structures is not only important when considering manufacture but it provides design inspiration through the imposition of technical parameters. This can aid creativity by allowing the designer to focus on the possibilities of what might be achieved within the necessary constraints (Shillito et al., 2001, p.199). Additionally, this example demonstrates the way in which hands-on woven textile designers must possess an awareness of and consideration of construction from the beginning of the design process.

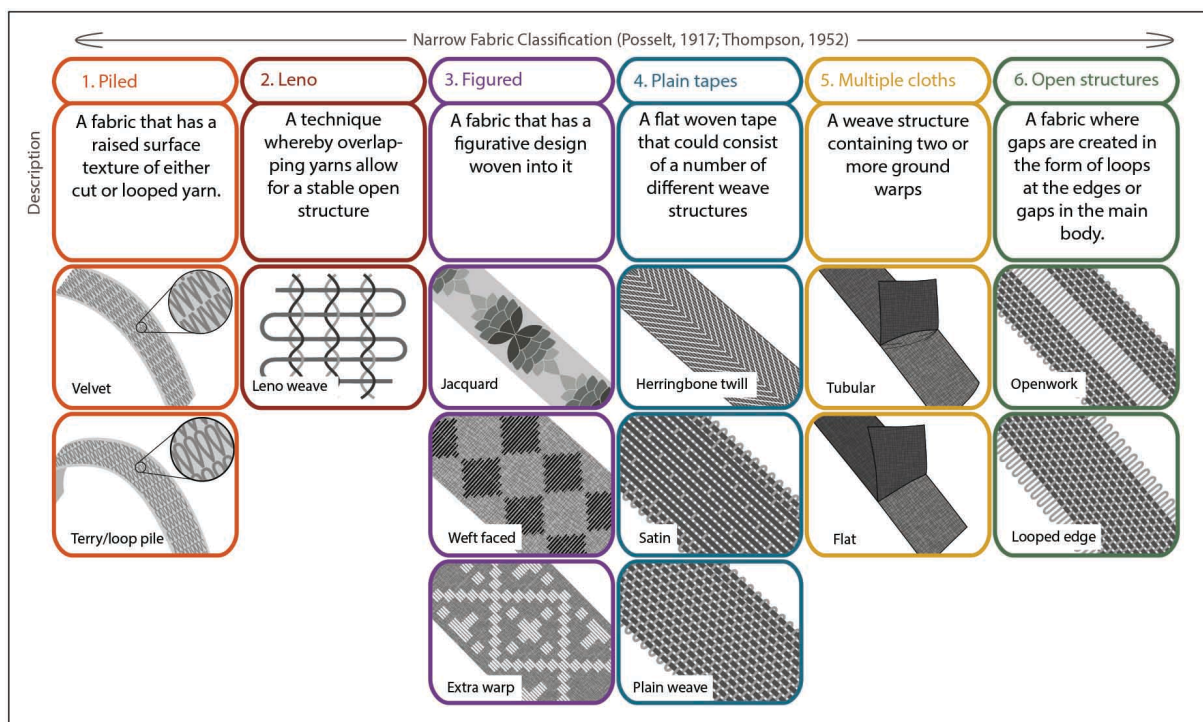


Figure 2. A taxonomy of narrow fabrics

### 3. Design Processes

Design is a decision-making process, using creative problem solving (Collis et al., 2007, p.2) to realise ideas, transform them into products (Wilson, 2001, p.13) and generate a solution to a design problem (Lawson and Loke, 1997, p.8). It is an activity that can become highly complex and there is a need for structure within it. Such structures often relate to the requirements and deadlines of an organisation (Tovey, 1997, p.13). Wilson (2011, p.58) developed a design process model and outlined the main activities as being: need/requirements, research, ideas generation, design development, design realisation/finished design, and evaluation (see Figure 3). Although designers do not necessarily follow a formal model, there are common elements (McDonagh-Philp and Lebbon, 2000, p.32) and innovation can occur when creative thinking is applied to existing knowledge and processes (Collis et al., 2007, p.3). The general design process is interdisciplinary (Wilson, 2011, p.57) and it is not uncommon for designers to experiment in disciplines outside of their own, which is a way in which innovation may occur (Lawson and Loke, 1997, p.7). While the researchers acknowledge that the design process is a personal activity and is not linear, in the context of this research, the division of the design process into stages based on the purpose of the activity has aided the qualitative analysis of the case study data.

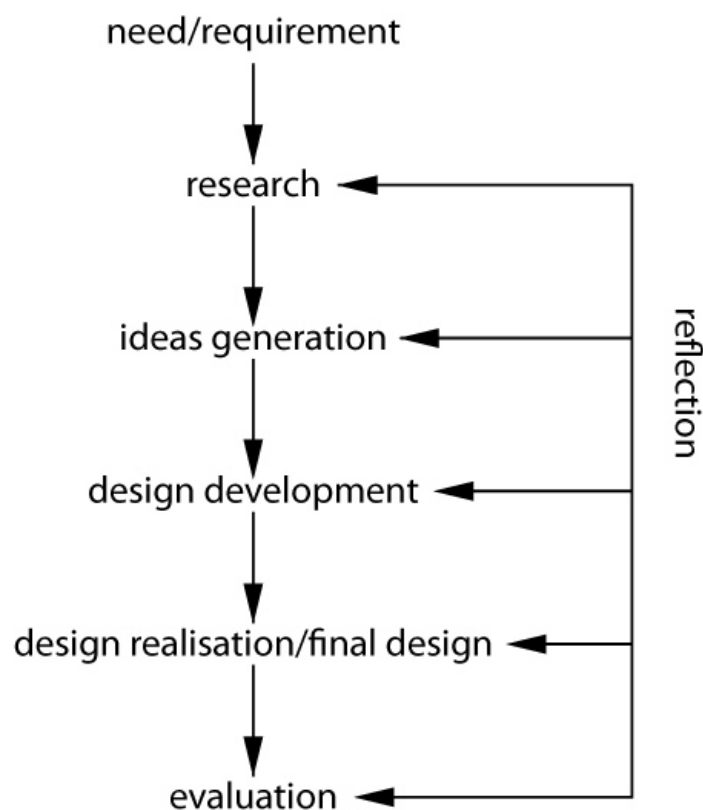


Figure 3: Design process model (Wilson, 2011, p.58)

#### 3.1 Footwear Design Process

The footwear design process has a number of possible approaches and, as with the general design process, it is not linear. Different companies/designers approach it in a variety of ways depending on product type, market and personal preferences (Wilson, 2001, p.19-20). This section focuses on design for manufacture as opposed to designer-makers, where the final design is also the

finished product (Schaffer and Saunders, 2012, p.157). Footwear design requires a balance of creativity and functionality (Glanville et al., 1934, p.103); it “combines a full spectrum of concerns,” and a successful design is “both an appealing object and a feat of engineering” (Huey and Proctor, 2007, p.165). With such complex products, accuracy and detail is key (Schaffer and Saunders, 2012, p.121) and this is reflected in the design process. The early stages of footwear design are commonly undertaken through drawing, either by hand or using digital software such as Adobe Photoshop (Schaffer and Saunders, 2012, p.150; Joneja and Kit, 2013, p.214). The shoe last<sup>1</sup> is also generally designed/selected at an early stage as it has a significant impact on the look of the shoe (Glanville et al., 1934, p.104). In the development stages of the process, the designer generally creates specification sheets (Schaffer and Saunders, 2012, p.156-159) so that the manufacturer can undertake rounds of sampling, before a final product is signed-off (Sterzing et al., 2013, p.611). So, generally, except in the case of designer/makers, footwear designers will have very little 3D hands-on interaction with the product or materials.

## 3.2 Textile Design Process

Wilson (2001) presents a comprehensive overview of the textile design process, where the main function is described as, to “design and produce, to an agreed timetable, an agreed number of commercially viable fabric designs” (p.10). The design process is usually one of intuition, based on experience and there is a certain amount of trial and error (Adanur and Vakalapudi, 2013, p.716). However, in the discipline of woven textiles, while there is an opportunity to generate unexpected results on the loom (Wilson, 2001, p.15) a great deal of planning is relied upon (Bate and Rudman, 2014). Weavers must work within the constraints of the warp whilst using creativity, intuition and judgment to make decisions (Hemmings, 2012, p.7). In woven textile design, inspiration may be gathered from a wide range of sources (Clarke, 2011, p.170) and design ideas may or may not be drawn prior to sampling. Once the concept has been identified and initially researched, it is possible to determine some of the details required in order to progress with generating design ideas. This includes the colour palette, which is generally an evolution of a current palette developed in response to colour trends (Wilson, 2001, p.15; Clarke, 2011, p.178-180). Once the colour palette has been developed, materials can be chosen, for example, in woven textile design this is the stage when suitable yarns would generally be identified (Wilson, 2001, p.15). In hand-woven textile design, specification sheets are required in order to begin to generate design ideas on the loom, they provide the details needed to set up the equipment and then begin weaving (Shenton, 2014, p.10). Designs are often made by hand, initially in the form of small “sample blankets” (Wilson, 2001, p.15) that test yarns, colour and structure before moving on to larger development samples. It is therefore more likely that the textile designer will engage in hands-on interaction with materials in comparison to the conventions of footwear design.

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<sup>1</sup> A foot shaped that mould determines the shape of a shoe

## 4. The application of craft-based textile approaches and sustainability

In the field of architecture, Oxman (2012) reports on an increasing interest in the role of materials in design and presents a theory of “informed tectonics” where there is a relationship between design, material and structure. This method of design is likened, by Oxman, to vernacular crafts such as weaving and describes how the logic of such crafts can be extended for use within design disciplines. This way of thinking can incorporate the utilisation of digital design and construction methods by considering design, fabrication, production and manufacturing in parallel and thereby employing craft-based principles within digital processes (Oxman, 2012, p.450). Khabazi (2010) has developed generative algorithms to design 3D digital structures based on woven textiles. Which, as with Oxman’s theory of informed tectonics, has potential for applications in the field of architecture. However, it is arguable that the generation of digital woven structures does not provide the designer with the same depth of knowledge and understanding as hand processes.

The concept of an informed relationship between materials and design is reflected in a theory of “materials driven design” developed by Bezooyen (2014). This is an approach in which materials are introduced at the early explorative stages of the design process. Initial findings indicate that in using this approach, “designers are more focused on thinking about surfaces, structures, colors, and sensorial qualities in their idea generation” (Bezooyen, 2014, p.286). Such qualities are commonly recognised as being important at the early stages of the woven textile design process (Wilson, 2001, p.14-15). Another example of the use of woven textile principles in other disciplines is the development of “a loom that weaves in three dimensions,” by design engineers who have combined the concepts of woven textiles with 3D printing to enable novel methods of creating 3D structures. This loom has the potential for use within the medical, architectural, automotive, aerospace and sportswear industries. Structures can be engineered according to the desired characteristics of the material (Magee, 2014), as is the case in woven textiles (Elsasser, 2010, p.143-159).

In addition to the application of craft-based textile design approaches to other disciplines, constructed textile designers are also considering and designing directly for end products or applications such as architecture and fashion. Designer Lucy McMullen creates 3D structures using woven textiles, thinking of weave as more than a method of creating fabric and notes its potential for use in engineering and architecture (Hemmings, 2012, p.65). Constructed textile design is currently being used in footwear but, due to the secretive nature of the industry, it is rarely written about, thereby limiting available information to patent applications and marketing material. An example is the Nike Flyknit, a running shoe with a knitted upper that was developed over a period of four years. The knitted construction of the upper claims to have benefits in performance, weight, form and sustainability (Nike, 2012). This is an example of how in-depth exploration of materials and construction can aid innovation, provide multiple benefits and enhance commercial appeal. Similar approaches are used in the fashion industry in the design of fully fashioned knitwear where garment panels are knitted to shape (Wilson, 2001, p.103). As the panels are made to the correct, shape little or no waste is generated and the concept of reducing waste through more informed design decisions is an area of concern for both designers and researchers and it is an area to which this research contributes. This is being approached in a number of different ways, with Rissanen and McQuillan (2016)



presenting a pattern cutting approach whereby designers create garments fashioned from a whole piece of fabric with no waste generated through offcuts. Niinimäki (2013) discusses zero waste fashion design where the textile process informs the garment. Aspects such as the width of the fabric and its properties are considered and it is concluded that where the designer creates their own fabrics, potential for novel outcomes is increased. Piper and Townsend (2016) build on this theory in their development of a “Composite Garment Weaving system” (p.4) whereby items of clothing are designed using woven textile approaches and methods allowing them to be woven as a single piece. This integration of woven textile and fashion design demonstrates a similar approach to that explored in this paper, with applications in a different discipline. Piper found that by designing the material and product in parallel there may be associated environmental benefits by engineering garments to minimise waste in production (Piper and Townsend, 2016, p.7).

The application of craft-based logic in the creation of an informed and holistic design process is a key area of investigation for this research. Some of the examples discussed incorporate digital methods into craft-based approaches and the integration of CAD/CAM may aid its application in a commercial design and manufacturing context where a number of constraints must be considered. For example, Oxman (2012) describes the way in which CAD/CAM can be utilised in order to employ such logic and it is conceivable that in order to make the processes developed during this study applicable to industry, they may need to be integrated with digital approaches. However, in order to develop digital systems, the physical processes must be practiced to understand them more fully (Philpott, 2012, p.61). Additionally, designers may not experience the same levels of knowledge gain and control when using digital methods.

## 5. Approaches to a hands-on textile-based design process

To investigate a craft-based approach to sandal design, an action research case study was undertaken in the form of a design project in which sandal uppers were created through the medium of hand woven textiles. Data collection was carried out through recording diary entries at the end of a day of designing (Pedgley, 1997, p.220-221) and data analysed through coding and clustering (Dey, 1993; Eisenhardt, 2002).

Tasks were categorised independently of the outcomes/consequences/what was involved and the relationship/links between them investigated. Tasks were assigned to a stage of the design process and then divided by the type of approach used. The approach referred to whether they were 2D or 3D and digital, non-digital or hybrid<sup>2</sup>, thereby allowing the process to be investigated in terms of these categories. The second stage of categorisation involved the outcomes/consequences/what was involved. It included the labels of “material/physical understanding” and “focus/inspiration/exploration” among a number of others relating to the data. They were categorised and linked to the approaches used. Three types of link were identified, led to/provided/aided, involved/used and informed. It was possible to apply these links to the majority of the data, thereby viewing them in relation to one another. This paper focuses on

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<sup>2</sup> Hybrid in the sense of using digital and non-digital methods in conjunction with one another



two stages of the design process outlined by Wilson (2011, p.58): the “research” and “ideas generation” stages. These were the two main areas addressed within the pilot study, with the “need/requirement” stage having taken place before the case study commenced and the latter stages being areas of on-going research. During the research stage three different approaches were used:

- 2D digital
- 2D hybrid
- 3D hands-on

2D digital approaches included the creation of digital inspiration/mood boards. This aided the development of a theme and provided focus and direction for the product to be designed. It also provided inspiration, informing subsequent stages of the design process. With large amounts of imagery readily available online, initially this led to excess information but also provided efficiency. Figure 4 shows an example of an outcome in the form of a digital mood board.



Figure 4. Example of a 2D digital research outcome

2D hybrid approaches were utilised to generate and refine a colour palette. The non-digital aspects provided benefits in accuracy of shade/tone but sometimes lacked time efficiency. Digital methods were integrated to improve efficiency, however, this impacted on accuracy. 3D hands-on research was initially used to explore potential yarns, involving testing and decision-making through tacit judgment to gauge the suitability of materials. As discussed in Section 3, stages of the design process may be revisited and this took place in the case study. Towards the latter stages, nylon yarns were tested through weaving and finishing processes. An understanding of the behaviour of potential materials was gained to inform future work. It also highlighted the potential for hands-on processes to be used to explore materials, providing inspiration and potential for innovation through exploiting the properties of those materials. This represented evidence of the designer taking a considered and informed approach. Along with these insights, data analysis revealed that the most prominent function of 3D hands-on research was 'material/physical understanding', contrasting with the two other approaches, both being 'focus/inspiration/exploration'.

The idea generation stage also revealed some insights. This stage of the design process consisted of three approaches:

- 2D hybrid
- 3D hands-on
- 2D non-digital

2D hybrid idea generation involved drawing. Sketching was used to perform the more intuitive aspects and CAD was introduced where higher levels of accuracy were needed. An example of a CAD template that has been sketched into, alongside a sandal design (also sketched) is shown in Figure 5. 3D hands-on idea generation was undertaken using two methods: model making with paper and weaving on six-shaft floor loom (see Figure 6). Model making aided idea generation, planning and visualisation, it was time and cost efficient. However, as it was representational it did lack in the generation of in-depth knowledge of materials. In some instances, weaving was used to visualise and evolve design ideas that had been conceived using 2D approaches. On the loom, the construction and materials could be understood in more depth. In some cases, ideas were generated on the loom with some designs inspiring future ideas. These evolutions were either trialed straight away on the loom or quick models were made on the last in order to provide measurements for weaving. During the case study, concerns arose over the effective presentation of 3D uppers with 2D sole designs. The sketches generated using 2D approaches were not accurate due to the designs evolving on the loom and they were not presentable. In order to address the issue, the uppers were photographed on a clear vacuum form of a last before being digitally placed onto the outsole design (see Figure 7). This digital approach was integral in bringing the designs together for coherent presentation.

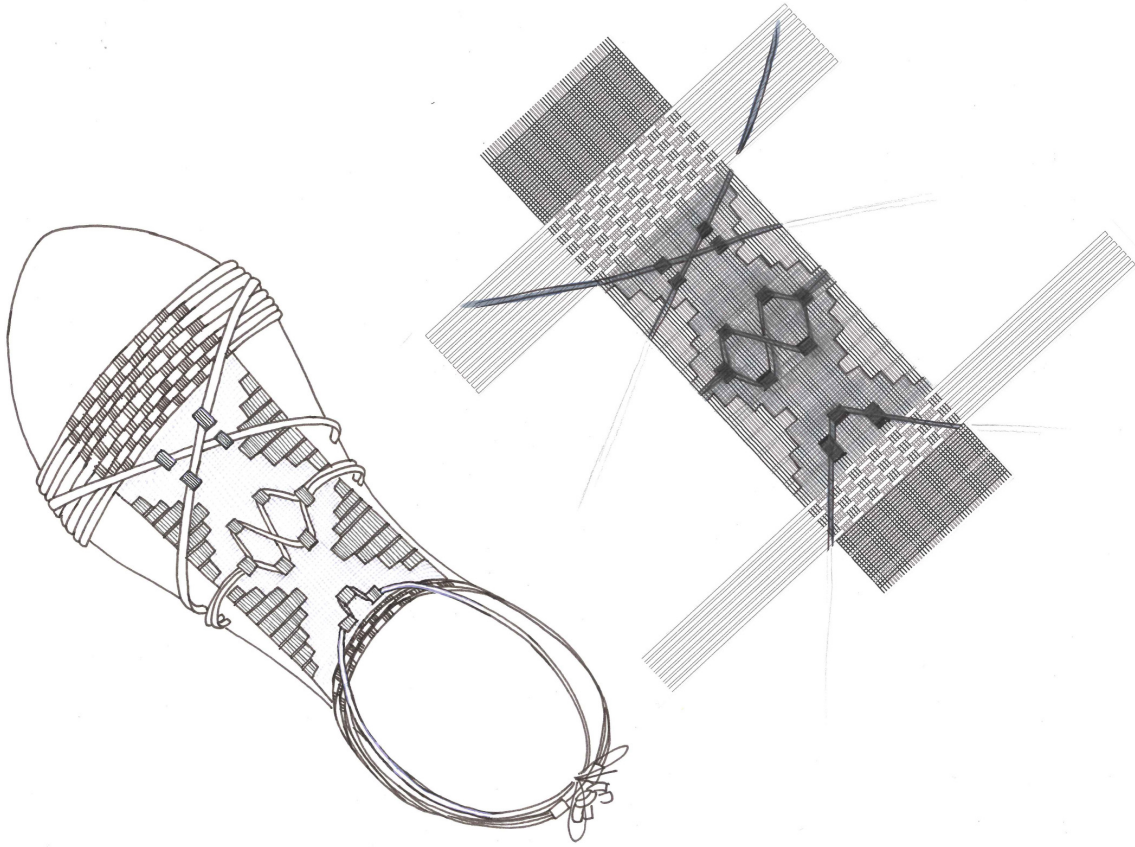


Figure 5. Example of a non-2D digital and hybrid design outcome

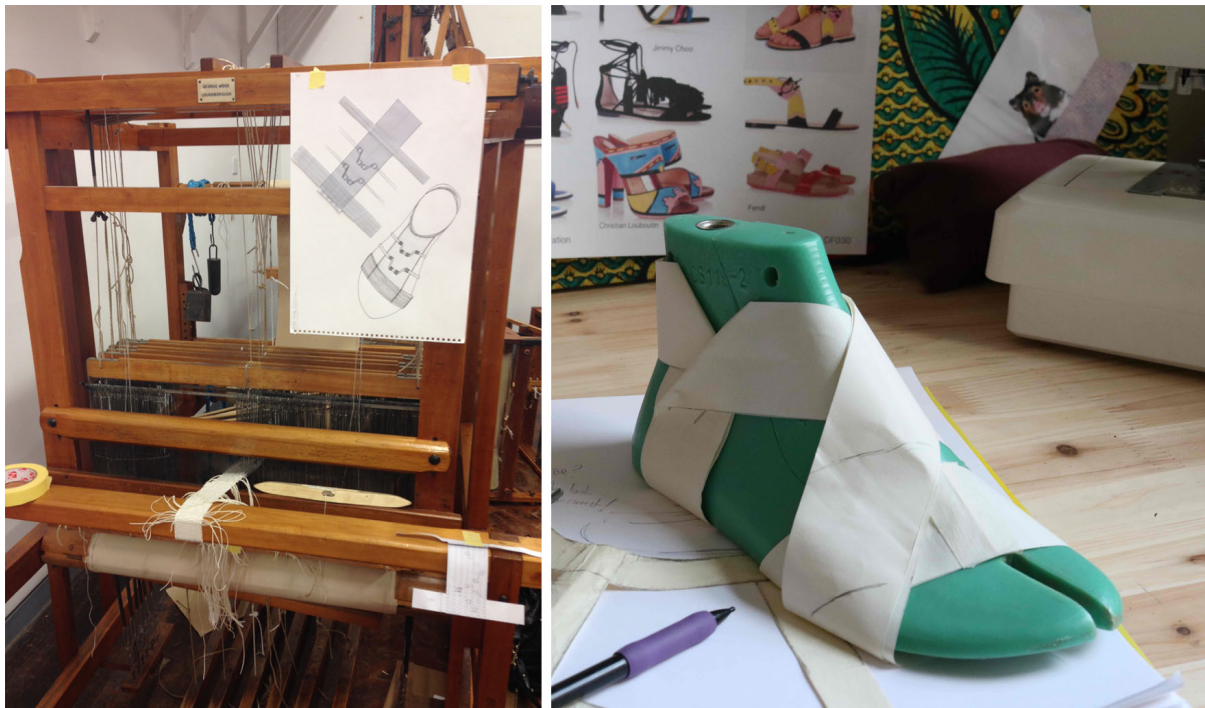


Figure 6. Examples of 3D non-digital design processes including paper modelling and sampling on a 6 shaft floor loom





Figure 7. 3D upper and 2D sole brought together for presentation using digital software

## 6. Conclusions

Craft-based processes explore form, construction and material as a single process whereas typical methods of footwear design explore them sequentially. Although these stages may be revisited, as Schaffer and Saunders (2012) describe, they are generally performed as separate actions. Figure 8 shows these approaches in relation to one another. This logic may be implemented through digital methods although the same benefits may not be seen with regards to innovation and knowledge gain. In addition to knowledge and innovation, the literature review revealed that a craft-based textile approach to design provides potential for improvements in sustainability. Designing materials and products in parallel can allow for materials to be constructed to the size and shape needed and therefore reduce waste. Empirical evidence revealed the potential in sandal design through the generation of uppers that can be woven as a single piece.

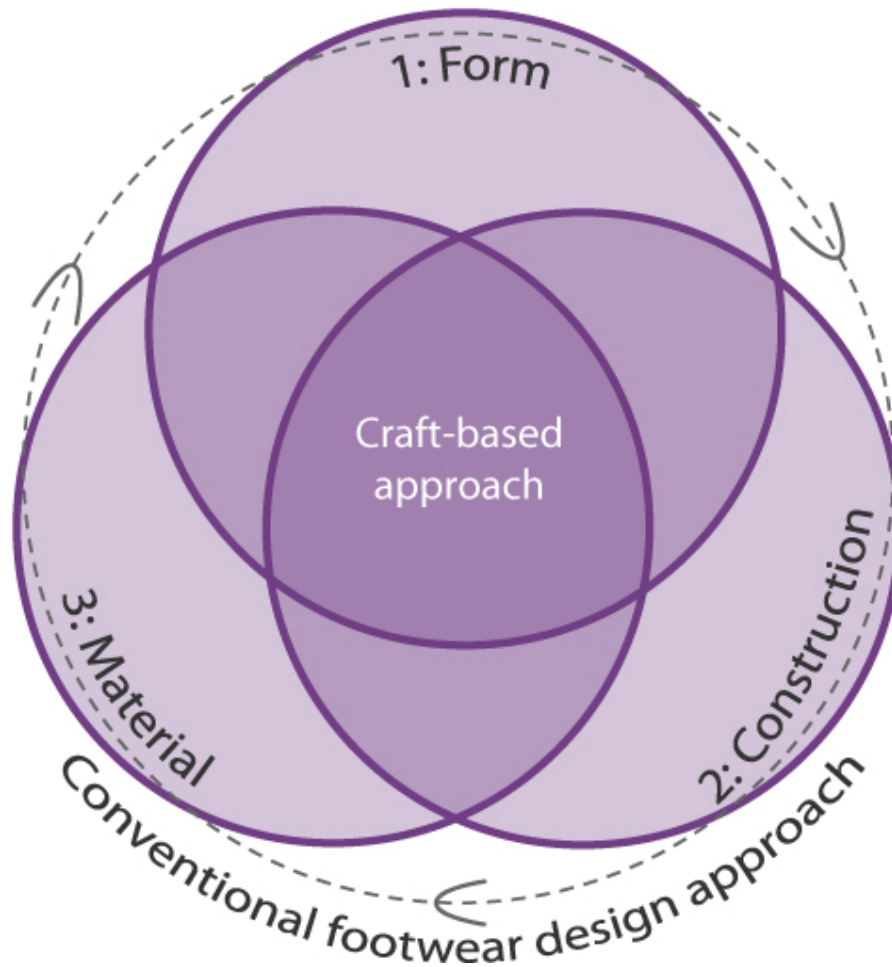


Figure 8. A Venn diagram showing a craft-based approach in comparison to more typical footwear design

It has been identified that a craft-based approach is applicable under some, but not all circumstances. Where innovation and sustainability in relation to construction and materials are important, it can be argued that hands-on design methods provide benefits. The introduction of automated manufacture would mean that there is the potential to produce woven textile sandal uppers on a large scale and, due to high levels of automation, production would not be restricted to countries where labour costs are low in order to be competitive. This could lead to a viable approach to 'on-shore' production in countries where the product is to be distributed and therefore reduce the environmental impact of shipping products from other parts of the world. A Hands-on approach has been identified as having the potential to aid creativity which could impact positively on the sandal industry in the form of economic growth (Lommerse et al., 2011, p.388). The ability to apply zero waste design generated via a craft-based approach on a large scale would mean that the benefits could have a far-reaching impact.

Initial findings suggest that the main benefits of hands-on approaches lie in providing an in-depth knowledge of constructions and materials. Therefore, there is an opportunity for future work to consider the impact of this on innovation for sustainability through this increased knowledge, understanding and consideration of product form, construction and materials in parallel. There is the potential for collaboration between designer and craft practitioners, providing a commercial outlet for their work and giving design teams the knowledge and experience needed in order to execute innovations within a craft-based medium. In light of

the potentiality discussed in this paper, further research is needed in order to consider different approaches to sustainability, including but not limited to, zero-waste production, local and socially ethical production, longevity and disposal. Additionally, due to the flexibility in of the production process, there is potential for the further research into the development of an on-demand system using digital co-design approaches and modular footwear components.

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# Crafting Immersive Narratives of the Future. Design-doing as a Method of exploring the Meaning of Immersive Storytelling

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**Abstract:** Creating a better connection between the audience and the news story is something many journalists aim for. Immersing the audience profoundly in the situation or event that is presented now seems possible by means of Virtual Reality. It is however, difficult to oversee, or directly experience, what the consequences of using Virtual Reality applications for journalism might be.

This paper outlines a roadmap for carrying out research into immersive narrative by means of a thinking-through-making approach. This approach, as a way to create knowledge by means of design, has deep roots at the Strategic Creativity Lab at Design Academy Eindhoven. The paper reflects on a design research project which followed this approach, exploring immersive narratives with VR technology. The project was executed by students of Design Academy Eindhoven and coached by author1.

**Keywords:** Virtual reality, immersive narratives, thinking-through-making

## 1. Introduction

Creating a better connection between the audience and the news story is something many journalists aim for. Immersing the audience profoundly in the situation or event that is presented seems now to be possible, by means of Virtual Reality. It is however, difficult to oversee, or directly experience, the consequences of Virtual Reality on journalism. Interactive narrative design is still mostly a Geheimkunst, a secret art, practiced by the initiated few and some academic researchers (Koenitz et al, 2014). Experimental research and designed prototypes are helping us create more knowledge in this field. How can design research help us to discuss the transformation in journalism that we are facing, and how can it offer us tools to (re)shape immersive narratives of the future?

In this paper we will look at the impact of Virtual Reality on journalistic news reporting. We will use the prototypes developed during a design course, 'Crafting Narratives', at Design Academy Eindhoven (2015-2016), as case studies for this research. First we will define Virtual Reality (VR) in relation to journalism. Secondly we will discuss the emergence of VR and Immersive Journalism. After that we will reflect on prototypes designed by design students of the design institute A, as well as the research-through-design methodology that was used on the course. We will conclude by discussing the results of the analyses and outline a 'design-doing' approach for designing journalistic narratives of the future.

## 2. Virtual Reality on the Verge

VR is defined as a computer-generated, three dimensional environment that is interactive and in which a person feels immersed (Reinholt, 1991). To create a virtual reality experience, one can either do so through video capture—recording a real-world scene—or by building the environment in Computer Generated Imagery (CGI).

VR can make you feel like you are mentally and physically in a specific 'created reality'. By turning your head, that is equipped with a display, the world turns with you – this creates a very immersive experience. VR has, previously, been used for training pilots or doctors in their practices. But the technology is now a being looked at by other disciplines, among them, journalism.

After several failed attempts in the 80s and 90s, VR seems now to be on the verge of breakthrough.

In July 2015, Wired.com mentioned that advances in processing power and sensor technology have reduced the cost of VR to a point where it can finally have an impact on numerous industries. Furthermore VR headsets and simulation software have become widely available, and mass media industries such as Facebook have embraced VR as the next big platform.

Journalist Nonny de la Peña, godmother of VR, is convinced that VR will deeply affect journalism. With her, Project Syria VR Experience, she aims to tell real-life stories that arouse deep empathy in the viewers – she calls this immersive journalism. De La Peña sees this as an innovative way to employ virtual environments to convey news, documentary and non-fiction stories. (De La Peña, 2015)

Alongside De La Peña there are others who are also convinced that VR can have a deep impact on journalism mainly because of its immersive qualities. By means of VR, people experience first-person involvement in the events or situations described in news stories. The fundamental idea behind VR journalism is to allow the participant to actually enter a virtually recreated scenario which represents the news story (Dominguez-Martin, (2015).

## 3. Immersive Journalism

There is hardly any consensus on how to name these new VR genres of journalism. 'Immersive Journalism' and 'Augmented Reality' (AR) both crop up in the literature on the topic, depending on the focus on reality. A clear definition, however, is lacking (Sirkunnen et al, 2016).

The fundamental idea of immersive journalism is to allow the participant to actually enter a virtually re-created scenario representing the news story (De La Peña, 2015). The reason for looking into these new immersive techniques is the overarching concern that, due to the overwhelming amount of audio-visual information available, audiences have become indifferent to topics involving human suffering (O'Neill & Nicholson-Cole, 2009). An important role for immersive journalism could thus be to re-engage the audience's emotional involvement in current events.

As mentioned, immersive journalism is still at an early stage of development, nonetheless, there are some interesting examples to be looked at. In November 2015, subscribers to the New York Times Sunday paper found a pair of foldable cardboard glasses with the print edition. Readers were invited to download the NYT VR-app, where they could experience abandoned war zones and the construction of a grand scale piece of street art – all in 360 degree virtual reality. For most people this was their first ever VR experience, and since then the New York Times has continued to produce news stories in full 360 degrees. At the moment they offer well-produced VR experiences, but the use of the medium is still experimental, and is mainly based on how stories can be made more powerful by letting the viewer experience situations in the first-person. The short videos work better as demonstrations of the technology than do actual journalistic pieces. Looking beyond the glasses themselves, it's hard to tell what value they have actually added in comparison to the regular version of the NY Times.

What is VR actually adding to the news experience? At the interactive documentary conference, Doclab (Amsterdam, 2015), Kathleen Lingo (creative lead, New York Times) explained the techniques in their first VR film *The Displaced* (a story of refugee children) that were very different from traditional reporting. Lingo suggested that the way the film director is hiding behind the sandbags, to create a more immersive perspective for the viewers, is creating transparency.

However, is hiding the journalist really supporting transparency?

In *Inventing the Medium*, Janet Murray (2012) points out that narratives are a crucial way of organizing knowledge into meaningful structures and helping individuals and societies to make sense of the world. Traditional linear narratives appear to no longer satisfy. Digital artefacts pervade our lives, and the design decisions that shape them affect the way we think, act, understand the world, and communicate with one another.

According to Murray, however, the pace of change has been so rapid that technical innovation is outstripping design. She proposes three design principles in order to design meaningful relationships with the digital environment which surrounds us – principles we can apply immediately to the topic of immersive journalism.

The first principle is *Designing the Unfamiliar*. There are no standards yet for designing new immersive narratives; there is no structure to build on or to relate to – designers have to invent a new framework, but at the same time they have to “become more aware of the process of design as the invention and refinement of media conventions in order to move more quickly toward mature, coherent, and expressive digital genres.” (Murray, 2012, p.5)

Secondly, designers are unable to apply current design principles directly to the new digital practice. The values of the new media need to be understood in order to make meaningful design contributions.

Finally, it is complicated to carry out user tests and investigate user needs in a practice that still requires development. A digital practice requires new design strategies, including strategies for user testing. At the moment making good choices is complicated, since the outcomes and effects of certain design choices have not yet been validated through practice.

Designing immersive narratives of the future is thus a pioneering activity. New design strategies are required, which in our opinion can be developed through a thinking-through-making approach. In the following section we will explain this by reflecting on a design research trajectory at [design institute A] that ran from September 2015 until June 2016.

## 4. Crafting Immersive Narratives

In 2016, the VPRO (Dutch broadcasting company), took the initiative in starting an experimental media-lab in Eindhoven. The VPRO recognises that there is a great need for experimentation within the changing media landscape. For the VPRO-lab, working with technology and design is a logical step in exploring the impact of technology on journalism. In order to more deeply explore the impact of VR technology on journalism the lab teamed up with the minor 'Crafting Narratives' at Design Academy Eindhoven. The minor is a 3rd year, design-research course, in which the focus was to stimulate the students to tinker with VR technology and simultaneously explore new narrative formats.

For this trajectory we worked with ten international students, two tutors, and several guest tutors with specific knowledge of VR, journalism, or a combination of both. We employed a research-through-design approach, using design itself as a tool to prise open the journalistic landscape. In order to find out how to create and edit a story with VR, students embarked on a journey during which they were introduced to design research tools (e.g. ethnography, mapping, critical data analyses, design probes) as well as to VR technology itself.

At the start of the design research trajectory, the students engaged with Virtual Reality technology, experimenting with the technology and exploring the possibilities. Although students of Design Academy Eindhoven usually don't have a strong technological background, they often do have an urge to turn things upside down, to tinker and experiment. This approach can give them an understanding of the technology very quickly, by merely using it and reflecting on the outcomes.

During the weekly minor meetings, the students and tutors discussed the potential impact of the technology on news reporting and on immersive journalism in general. We mainly looked into topics as the sense of presence in VR in a way that traditional filming cannot. But also more ethical considerations were discussed. Do we really want to be in a war zone and does being in such a situation give users a sense of empathy? All discussions and insights were captured on a blog, Crafting Narratives (Tumblr).

After only the first month, the students were asked to explore if this technology could enrich journalism. Student Jonas Ersland became very disillusioned in the promises of VR following experimental research in which he wore the cardboard goggles for 24 hours while constantly filming his experiences. He was surrounded by 360 degrees of images, but being this immersed is not necessarily a solid experience to build on. Such 3D immersion has neither created any new rituals, nor added significantly to our media culture, because it was never an answer to a specific question. Jonas felt wearing goggles creates a huge boundary between



the viewer and the footage, and one should question whether this already invalidates the claim of being immersive in the first place. Next to that, after wearing the goggles already for 2 hours he felt extremely nauseous.

Student Martina Huynh looked into the question of how to make sense of, or create depth in, non-linear narratives. How can a non-linear, or a-chronological storyline contribute to a contextualisation of the news? From her point of view, the newest portion of a news story in the newspaper often becomes non-linear because it is so disconnected from the whole body of events and causes that have proceeded it. She calls this the news cake. Huynh started her research by compressing small narratives/situations into ongoing loops (similar to giphys). In these experiments you see the end and the beginning at the same time, which enables the viewer to get an overall feeling of the situation, rather than being led at length through a chronological narrative.

A newest slice of news can be juxtaposed with a related event that happened perhaps 15 years ago (a slice of the same or different 'news cake'). By putting these events on the same timeline of perception for the viewer, the most recent slice of news, inserted into a wider context, can be understood in a new way.

Martina's research was about prompting the viewer to make connections between what is happening now, and events that occurred in the past. She connects current events to a selection of related events in the past by bringing the latter to the forefront again. The experiment mainly aimed at understanding how VR technology, that offers multiple dimensions to a story, can help us to create new meanings as well as affecting how we physically experience these stories.

The students presented their first prototypes and concepts during a live broadcasting event, Create Out Loud, during Dutch Design Week 2016. This is one of the biggest design events worldwide, and takes place annually, in October, in Eindhoven. The Create Out Loud show allowed the students to test their experiments with an audience and to get a response to their newly designed formats.

Huynh experimented, during one of the talk shows, with live reporting, using snapshots of the conversations, twitter feed of the audience and her own reflections all combined. It made her understand that the information given by the audience during the show (e.g. images that were sent via cell phones on Twitter) reflected the pace of the discussion. Capturing this data and adding it to the live event, created a new, reflective narrative, that could potentially add new meaning to a broadcast event.

Student Jasper de Graaf concentrated his research on subjective reporting. He investigated the possibilities of using VR to make highly subjective news and examined how this could result in a better understanding of the position from which the journalist is viewing the news event. By using VR to get inside the skin of a journalist – adding his heart beat, the smells, as well as his visual impressions to the news feed – we can create a highly immersive report that gives a very detailed, sensitive impression of the position of the journalist. Jasper designed a two-dimensional newspaper then added personal layers to it – smell, sound, heart beat – such that they reflected the feelings of the reporters.

The design experiments critically question the importance of narrative elements using VR, and its potential value in journalism. The immersive claim was questioned by Jonas who pointed out that goggles create a huge boundary. Although the created environment aims to resonate in a very immersive way with the issues being played out, we still have to critically question if this new medium

is so immersive after all. We still work within a frame and although there is more freedom for the viewer to take a position, the landscape is created for him or her, as is the way the environment is presented. The position of the journalist, and the creative design team involved in developing the scenery, is framing, and therefore strongly directing and partly controlling, the experience.

In this perspective it's interesting to look at the rise of direct cinema (early 1960s in the US) when for the first time it was possible to go out of the studio with a handheld camera and synchronous sound recording equipment. Filmmakers believed they could overcome the difference between reality and representation. For fly-on-the-wall practitioners and theorists observation and objectivity became synonymous (Raijmakers, 2006). Since then this notion of 'objective filmmaking' has been discussed often but actually even the initial direct cinema makers themselves, concluded that objective filmmaking is impossible and selection is always needed (e.g. Wiseman in Levin (1971)).

So why not focus more on the subjective side? Precisely this was the research question Jasper took, envisioning the journalist's perspective being emphasised by means of VR. By means of adding the journalist's perspective, surroundings and emotional experiences to the footage we can perhaps create a more empathic relationship with the audience. This very subjective journalism could be a key element for Immersive Journalism to investigate more thoroughly.

In a recent essay, Rob Wijnberg (2017), chief editor of the Dutch experimental online newspaper *De Correspondent*, pleads for a more subjective take on journalism in general; journalists need to tell their audience what is important and why.

Up to here, we looked mainly at VR as a medium that gives its audience more control over how they would like to perceive the content. However is that really what viewers want?

During a similar design research course at Stanford D school, students worked out several tests to explore this question and concluded: "It's actually not the audience that feels the need to influence the story – they have enough to 'do.'" Instead, the storyteller needs to shift how they think of themselves, moving away from "director" and towards the role of "influencer." After all, influencing the audience is all that directors can do: we can't frame the shot for them; we can't cut away. Instead, storytellers have to behave like a matador, waving the red cape in the direction they want the audience to run, knowing that the power ultimately lies in the audience's hands to see what they want to see, hear what they want to hear and form their own stories about what they have experienced."

These narrative qualities of VR have not yet been fully explored, nor has there been a lot of user-experience research to test the impact, effects and added value of immersive journalism. Martina's experiment shows that creating a narrative by adding multiple dimensions to a story was able to contextualise the news in a different way and she questioned how to actually cope with these alternative narratives. We try to combine stories and create a self-contained reality, but whether that leads to a better understanding of the actual reality, or creates a more immersive experience is questionable. In the aforementioned Stanford course, students concluded that if the story is not crafted clearly enough – with hardly any cues that viewers can follow – the audience starts to behave like a detective, and search for clues in every little detail that is offered. This detective mode makes that they investigate the scene from a distance.

We have to continue to experiment in order to understand what this means for journalism, and what added value VR brings to journalism, as well as how we physically deal with these stories in 360 degrees.

Kathleen Lingo of the New York Times, speaking at Doclab 2015, said that the best ideas come from the creators, meaning that experimenting is crucial to finding answers to these questions.

## 5. Research Through Design

Reflecting on this research journey ourselves, we have come to understand that the research-through-design approach deployed in this course is very helpful for experimenting with new storylines and storytelling formats. This research approach is strongly advocated at [design institute A], through its Strategic Creativity Lab that envisions the 'thinking-through-making' approach as a way to create knowledge. In the vision of our research lab, making and thinking are alternating all the time, in rapid iterations. As a result, the making and the thinking become very interrelated, opening up an opportunity to express knowledge not just through written, reflective text but also through the designs produced (author2, author 1, 2015).

During the minor, this approach turned out to be very valuable in creating new insights on immersive journalism. Looking at Murray's three aforementioned principles, the thinking-through-making approach helped us to first design the unfamiliar. The students started to experiment without prejudice with regards to VR and creating immersive narratives. By simultaneously developing prototypes and reflecting on these in the weekly meetings, we discussed the potential meanings and significance of their, as yet undeveloped, narratives.

This also made the design students realise that, not only do they need to understand the VR technology itself, but they also need to grasp how the newly created immersive landscape is perceived. The Create Out Loud event at Dutch Design Week 2016 provided the students with a testing ground for involving potential users in their designed experience and based on that interaction, make adjustments or different choices. These user tests are crucial in order to make more balanced decisions.

Finally, the essays that students were required to write at the end of the course helped them to reflect more deeply on how their pioneering practice can indeed be helpful in designing the narratives of the future.

At the end of the six month course, the students presented the outcomes of their research to a board consisting of a journalist and a VR specialist. Bart Brouwers, professor of journalism at Rijksuniversiteit Groningen, was intrigued by the aspect of subjective reporting, since it is an area that journalists, trained to present events objectively, simply overlook. Brouwers sees a need for designers to be involved in journalistic search for new narratives. Steye Hallesma, involved as VR expert from the VPRO lab, was very pleased with the results and especially praised the fact that none of the students took the 'immersive claim' of VR for granted. Almost all of them started questioning this unique technical aspect of VR by critically reflecting whether this would really add something to the existing media landscape.

## 6. Discussion

We strongly feel that a research-through-design approach, as deployed at the Strategic Creativity Lab (Readership) at Design Academy Eindhoven is a very valuable approach for exploring the immersive narratives of the future. Although the design course was too short to design full concepts, the aforementioned prototypes sparked interesting conversations between VR experts, journalists, and design researchers working in this field.

The making, the tinkering with the technology, and the designed prototypes also helped to get a better understanding of the characteristics of the VR medium. The possibilities and shortcomings of this new technique can only be fully understood by experimenting with them.

Furthermore we came to understand during the course that we were actually pioneers within the immersive journalism landscape. The technique is mainly used by technology-driven start-ups that use the qualities of VR to make impressive scenery for commercials, music videos or interactive events. Experimenting with immersive stories is important in order to understand the possibilities and constraints of the medium, as well as to be able to start designing new narrative formats around these. The course helped the students to better understand how they, as design researchers, could play a meaningful role in helping to shape or re-invent immersive narratives. Through being inspired by technical experts and journalists during the minor course, they came to understand that they have an important role to play in bridging these two fields. The thinking-through-making approach seems to be a perfect way to do so, since it allows both diving deeply in the technological qualities of the medium, as well as into its narrative characteristics. Furthermore, in order to understand how VR can have a really valuable impact on the near future, it is essential to understand the journalistic approach, common narrative formats and different ways to capture the news.

We lean strongly toward a research-through-design approach where we reflect more systematically on VR experiments in order to understand the added value of this new medium. If we don't experiment and design with the medium we will not be able to fully grasp either its narrative potential, nor the added value for the audience. The promise of immersive journalism can only be followed up on if pioneers in the field, like the New York Times or the VPRO Lab follow a strong design-doing approach. From what we have experienced from our design research, , immersive journalism can greatly benefit from designers to shape this new immersive narrative.

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# Design Fiction Filmmaking as REDO

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**Abstract:** Object is a speculative design fiction film exploring novel ways of sensing and interacting with our environment through technology. The protagonist's enhanced environmental interactions, enabled by the object, illustrate the tactile potential of interacting with technological objects, through touching, tuning and turning. We investigate performativity as a means to reimagine more meaningful environmental interaction through novel technologies; and also question our relationship with technological objects and their roles in mediating and co-shaping our relationship with the world. In submitting this film to REDO, we explore the question of how to REDO in the context of designing digital artifacts and propose design fiction filmmaking as a means of REDOing.

**Keywords:** Design fiction, filmmaking, speculative design, performativity

**Film Contribution:** <https://vimeo.com/217820883>



# Earthy textiles. Experiences from a joint Teaching Encounter between Textile Design and Architecture

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**Abstract:** This paper presents experiences from a two-day teaching workshop where first year students in architecture meet with first year students in textile design for an assignment on building structures with textile, soil and plants designing for indoor gardening with the aim of inspiring for more sustainable lifestyles. The background is a research project on textile architecture with the objective of exploring this new field and to establish a platform for long-term collaboration between the disciplines of architecture and textile design. The paper addresses pedagogical challenges in the meeting between first-years students of different disciplines and traditions, but also in the meeting between research and undergraduate teaching. The students produced creative results but had difficulties in exploring the full complexity of the task. An evaluative discussion is based on observations, photo documentation, notes during group discussions, follow-up questionnaires among the students and reflections among involved researchers.

**Keywords:** Textile design, architecture, indoor gardening, teaching workshop, bachelor students

## 1. Introduction

### 1.1 The research context

The unexplored synergies between textile design and architecture was the starting point for a joint project that was granted funding 2016 to 2018 through the Swedish Research Council programme for Artistic Research. The project “Urban Materiality – Towards New Collaborations in Textile and Architectural Design” brings together three design institutions: HDK – Academy of Design and Crafts, University of Gothenburg and Chalmers University of Technology, the Department of Architecture, and The Swedish School of Textiles, The University of Borås. The

theoretical part of the project examines, question and interpret the field of textile architecture. The empirical part focuses on the development of experimental prototypes (i.e. samples, mock-ups, contextual architectural models and drawings).

The relationship between the making of design and the decisions taken during the process are fundamental tools in the practice-based research as well as the meeting between theoretical and practical, making, approaches. The aim is to contribute to the development of design methodology that derives from collaborative processes delineating structures formed by textile design and architecture as well as to establish an interdisciplinary platform for continuous exchange and collaboration in research and teaching between textile design and architecture. The framework proposed in the project contributes to the development of design methods derived from an artistic, collaborative and generative process that delineates structures formed by the participants' fields of competence.

The primary field for experimentation is urban environments, an area where textile design is less practised. Central to these explorations is the creation of "textile disturbances"; imperfections and the unexpected that could bridge consciousness and matter, in a process of creating wonder. One background to that perspective is current aesthetic ideals of perfection which can be questioned with reference to more sustainable architectures, as ideals of perfection demand for constant maintenance and lead to premature replacement of materials and components.

## 1.2 Theory and method

As an initial activity to develop a long-term exchange between textile design and architecture, a joint teaching workshop was developed and tested. The workshop explores a meeting between two schools of design and architecture, and two traditions of teaching but also the meeting between research and undergraduate students. The workshop consisted of a shorter two-day workshop arranged as part of two existing courses with first year bachelor students in textile design and architecture. The first meeting will be evaluated as a basis for developing future joint teaching activities.

The assignment for the workshop was to explore solutions for indoor urban farming for home or work-place environments in a bid to reduce environmental impact from food production but also to inspire users to more environmental lifestyles by making natural eco-cycles tangible in daily life. The assignment includes the design and practical creation of a structure for indoor farming which also should be able to delimit a space. For the spatial part, the task was to create solutions to delimit different spaces in the studio where the architect students work. The workshop itself was only two days but the assignment includes the maintenance and documentation of the evolution of the indoor farming in the architect students' studio during the whole spring semester 2017.

Our pedagogical ambition for the workshop was to challenge the students to use new approaches, and materials, to exchange perspectives with students from another discipline and to work hands-on with sustainability in this case urban agriculture. Textile as a matter is an unexplored material among students of architecture as is spatial design for the textile design students. There are also differences in the approach to how design is taught between the disciplines. Textile designers are used to work hands-on with material and mock-ups while architects mainly work with drawings, visualisations, models and representations of reality. For the architects the societal relevance is always present. Architectural teaching is increasingly challenged to embrace the complexity of modern society

(Salama, 2016). Sustainability is one of them, digitalisation another. Architect students are taught to program their designs and to switch perspectives going from detail to the larger societal perspective and back again in an iterative process. A result of a process of “academisation” of architecture as a discipline, theory and method are often taught disconnected from studio work (Kurath, 2015). Practical skills such as hand drawing, model work and crafts have been compromised for other knowledge areas and material knowledge is increasingly lacking among architect students (Bell & Rand, 2006).

The education of textile design is also in a process of embracing more academic approaches. From being taught mostly as a field of practice, in the past decade, existing models of teaching has been challenged to shift from teaching textile design to textile design thinking (Dumitrescu, 2016), from tacit knowledge to training for design rationale (Kunz & Rittel, 1970). The textile students are challenged to reflect on their design explorations and to get critical perspectives on their design before they start to produce full scale mock-ups.

Teaching sustainability is a challenge in itself addressing complex problems with no simple solutions. We take our starting point in definitions of sustainability that emphasize on environmental protection and social justice (Raworth, 2012). Pedagogical literature highlight the importance of transformative learning (Lange, 2009; Widhalm, 2010) or regenerative ways of teaching (Hauk, 2011). Teaching should favour the realisation of pluralistic and interdependent dynamics between humans, society and the natural environment, be based on direct encounters and experiences with real life problems, and reach for emotional transformation through the students’ “*hearts and souls*” (Widhalm, 2010). Expressive ways of knowing are suggested, using art, movement, storytelling, and self-audits but also cross-disciplinary encounters and teamwork.

The workshop was intended as a place for observations and comparisons of similarities and differences between the students with respect to approaches, background, cultures and identities.

An evaluation was planned based on observations, photo documentation, notes during groups discussion, follow-up questionnaires among students and reflections among involved researchers. The research questions are defined as:

- What was the overall outcome of the cross-disciplinary encounter? How did the students manage the teamwork?
- Could differences in the approach to the assignment between the students be observed?
- Did the results from the assignment demonstrate a synergetic effect from the collaboration?
- Did the students find the meeting and the workshop enriching for their development as textile designers and architects?
- What can be learnt for developing future teaching exchanges between the disciplines?

## 2. Presenting the two courses

### 2.1 Textile design: Form and material I

*Form and material I: Expression and structure* is a 15 credits course at the Swedish School of Textile that aims at developing the textile design student’s ability to give form to textile material through colour, construction and material. The course is

given for the fifteen first-year students in textile design, all of whom have entered the programme through practical entrance exams including a portfolio, solving a task during an exam day and an interview. The course consists of a series of workshops with hands-on assignments on various topics exploring concepts such as line, direction, volume, form, texture, perspective, scale, two dimensions and three dimensions in textiles. The teaching is driven in the form of practical work, lectures, supervision and seminars. The course involves an individual reflection over the work and methods used in the form of a workbook where the whole design process is documented. Theoretical studies during the course include material science and colour theory with their separate exams

The workshop “Earthy textiles” is one among several during the course. It aims at questioning and redefining the aesthetics and management of interior landscaping, based on textile structures and soil as a fundament for living materials such as plants (Figure 1). The meeting with the architect students is a shorter event during a longer workshop. The workshop is supervised by doctoral student and textile designer Svenja Keune. Svenja has given inspiration for the workshop through her own work (Figures 1 and 2 to 4).

The thematic “Earthy textile” is designed as a response to current development of flexible systems that allows for cropping and harvesting of plants and vegetables for food as part of interior living in dense urban areas – as new solutions to gardening. References are given to contemporary examples of urban farming but also to “biophilia” (Wilson, 1984) and biophilic design searching for emotional affiliations of human beings to other living organisms. The workshop aims at questioning the relation between nature (vegetation), the built environment and humans opening new research perspectives in regard to materials, plants and processes of growing and harvesting in interior spaces.



*Figure 1a and 1b. Ongoing work by Svenja Keune “Earthy textiles”.*

Preceding the joint workshop, the textile students were active with sketching on solutions for urban farming as well as making material tests. Before the joint workshop, the textile students were encouraged to take a step back and come up with modular solutions that could be used as bases for building up larger structures together with the architect students. After the joint workshop, the textile students will continue on their individual design which might give a new direction.

## 2.3 ARK253, Architecture, environment and sustainable development

ARK253 is a 7,5 credits introductory course in sustainable building given at Chalmers for the first-year architect students. The course is attended by 80-90 students with a varied background in terms of earlier experiences. Up to 40 % of the students enter the school of architecture on practical tests and the rest on notes from college.

The course is structured around lectures, seminars, workshops and essay writing, and introduces the students to a broad overview of sustainability aspects. In the first weeks, thematic seminars accompanied with hands-on workshop give the students the possibility get acquainted with four aspects of sustainability: social & ethical aspects, materials & resource use, energy use and green & blue structures. Further, the students will make a shorter written assignment in which they are allowed to go deeper in one subject or question. Emphasise is on retrieval and critical analysis of information and literature as well as studies of current examples of sustainable building. The course aims at supporting an awakening process of personal identification and reflection in relation to more sustainable architectural design. The course is wrapped up by the writing of an individual intent on their personal view of sustainability to be used as a 'programme' for an up-coming studio called *Space for dwelling* in which they will design a detached housing unit. The joint workshop is given as part of the thematic green & blue structures and the outcome could give new input for the dwelling design.

## 3. The workshop

### 3.1 A preparatory meeting

The workshop was introduced to the two groups of students two weeks prior to the event at a joint meeting at Chalmers University where the students could socialise around a coffee. The textile design student had also brought their preliminary design and material experimentations which were exposed on a table to the architectural students. There was a lecture about the research project "Urban Materiality" and Svenja Keune gave some inspiration for farming structures where she had used woven textile in which earth, seeds, plants and even watering systems can be installed (Figure 4) and knitted tubes (Figure 5 and 6) which can be filled with earth and in which seeds or plants can be cultivated. The intention was that the architect students should prepare for the workshop two weeks later on their own by reflecting on what they wanted to do and gather some material. No specific time were scheduled for the architect students to prepare for the workshop as they worked on other topics in parallel.



**TEXTILE MATERIAL**  
POCKETWEAVE

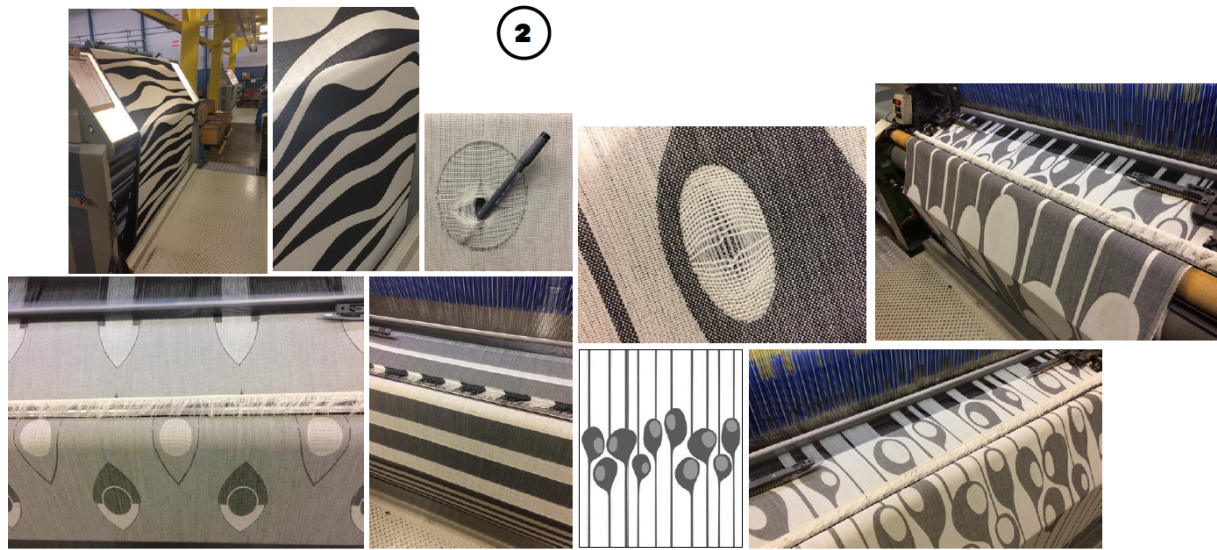


Figure 2, Example of design solutions that can be used for urban farming produced by Svenja Keune

**TEXTILE MATERIAL**  
TUBES



Figure 3, Example of modules of textile that can be used for indoor gardening, work by Svenja Keune.



## PRODUCING PLANT CONTAINERS USING KNITTED TEXTILES AND TUBES



Figure 4, Inspiration for producing plant containers by Svenja Keune.

### 3.2 The material library

In the morning of the first day the students had two lectures on more general topics relating to green and blue structures in urban planning, and specifically on indoor urban farming. The lectures were followed by a repetition of the aims and the organisation of the workshop (Figure 5). The workshop basically had three stages: design concept, construction and reflection & evolution. The evolution includes the continued maintenance of the structures. The “Earthy textiles” should be installed in the work space of the architect students and they should be responsible for taking care of the structures, water them and document how the seeds or plants grow within the textile structures. For the documentation part a card was to be filled out with expected transformations of the design and updated over time. A polaroid mobile printer was provided so that the students could complete their notes with photo documentations.

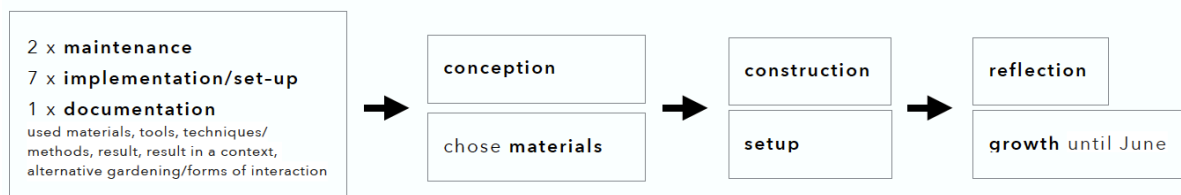


Figure 5, The layout of the workshop. The intention was that the students should divide their work with two students responsible for the maintenance of the structure including watering, one responsible for the documentation of the design process and the rest should implement/set-up the structure.

The place for the workshop was Chalmers University of Technology. Three different rooms were available: the art studios where a material library was set up, a large hall for experimentation “the concrete hall” and the working space studio for the bachelor students. The material library (Figure 6a and b) consisted of different textiles: raw textiles, textile produced by Svenja, textile tubes in different colours, and some textile modules produced by the textile design student in their course. Furthermore, there were earth, perlite, Leca pellets, pots, cultivation briquettes, seeds, plants, pipes, plastic bottles and different kinds of rope. For the

students' disposition, there was also a sewing machine. The workshop started with the students getting acquainted with the materials. The architect students had the possibility to ask the textile students about their modules and Svenja about her fabrics.



*Figure 6a and 6b: The students getting acquainted with the material library and the larger textile 6a, and 6b, example of pockets and modules created by the textile students prior to the workshop.*

### 3.3 Starting to design and forming groups

The students were first given time for individual sketching so that everybody would have had the chance to develop their own ideas before the group work started. The time for individual sketching was a bit less than one hour. A few “research questions” had been defined to lead the students in their work:

1. How to implement seeds/plants and substrate into textile structures?
2. How do these structures look like?
3. How do they form a spatial experience?
4. How will the structures be watered and taken care of (until June)?
5. How do humans, structure and space interact with one another?

The student groups consisted of 78 architect students and 15 textile design students. The first plan was to divide the students in ten groups with one or two textile students and seven to eight architect students. However, only twelve textile students were present at the workshop and they preferred to work in pairs. Instead six larger groups were formed with two textile students and twelve to thirteen architect students. The groups were too large to function and some divided into smaller groups. Some students had started discussions of a common idea over lunch and wanted to remain in separate groups.

The groups started to engage with the materials rather quickly. Some groups moved up to the architect students' work space while some remained in the “concrete hall”. Several groups seemed almost ready with their design on the first day and used the second day to plant seeds. Most groups decided to put the seeds and plants after they had finished the whole structure not at the same time as the earth was put in, as we had expected.

## 4. The final structures

In the end ten group designs were made, here we shortly present a smaller number.

### 4.1 The “intestinal lavage”

This group were inspired by the yellow knitted tubes which changed colour to an almost fluorescent green when filled with earth. Two bottles were added at the top to water the structure. The group remained in the concrete hall to carry out the project then moved it up to the architect studio.



Figure 7a and 7b, the student group working with the “intestinal lavage”.

### 4.2 “No name 1”

This structure was installed in the architect students’ work space. It was created with a grey tube filled with earth and perlite. Plants and seeds were added after the structure was installed.





Figure 8a and 8b, the installation of No name 1.

### 4.3 “No name 2”

This project was realised using one of Svenja’s fabrics. Double layers in the fabric were filled with earth and perlite during coordinated and hard team work. The group had difficulties to find a suitable structure to hang up the fabric.



Figure 9a and 9b, Project “No name 2”, using one of Svenja’s fabrics.

## 4.4 “The grid”

This groups based their design on fabric pockets that one textile student had brought. Another group did a very similar project but added tubes in the hanging line for watering.



Figure 10a and 10b, project “The grid”.

## 4.5 “Intestinal flora”

Intestinal flora was created by a red tube filled with earth. The project was realised in the concrete hall and then moved up to the architects’ work space. There was a lot of dripping of water initially so the realisation of the project would have been difficult in the architects’ work space.



Figure 11a, 11b and 11c, The “intestinal flora”



## 4.6 “No name 3”

Some groups made small individual devices without any spatial dimension at all, as this group no name 3. The group engaged quickly with the material and by the end of day 1 they felt ready. When approached and asked whether they could create a larger more spatial structure they actually took a step back and managed to link the smaller devices to a larger although in a rudimentary way.

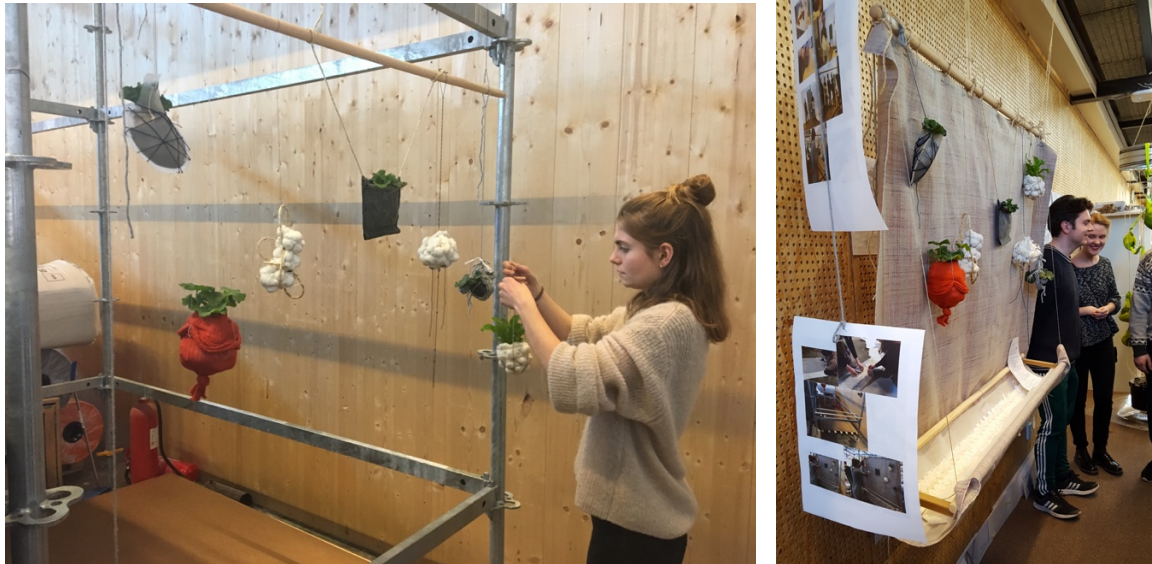


Figure 12a and 12b, installation of “No name 3”

## 5. Feedback from the students

### 5.1 Feedback from the textile students

An on-line survey was sent out to the textile students shortly after the workshop and a group discussion was held three days after the workshop. On the whole, the textile design students were very positive to working with the architecture students and would like to collaborate in the future, also with other design disciplines and universities.

What they had wished was more time to work together and that all students should start from the same point. The textile students felt that as they had already been working with the topic longer, they had come further into the process than the architecture students who came to the workshop more unprepared. While the textile students were ready to go up in scale and work with more experimental and spatial structures the architecture students were still on the prototyping stage making small flower pots. They also found it problematic that they had not visited the architect students' working place before the workshop. They would have liked to prepare for example by studying movements and spaces. As the architect students share the space with other students in the second and third year, they were also worried to disturb the others. The result was that they more or less choose the first available spot.

The textile design students felt that they would have needed more time to meet with the architecture students before the workshop to get to know them and how they think. The groups were also too large to be able to work efficiently. The textile students did not feel quite comfortable in the group work. They felt that they could not influence or contribute enough to decision making. They would have liked to have a longer workshop, at least one day more so that they would



have had time to experiment and realise more ambitious ideas. They said some of the architecture students had good ideas that they did not pursue simply due to time.

The modules that the textile design students had prepared and brought to the workshop were not used much, apart from some pockets. The textile students had expected the modules to be used more, perhaps combined in different ways. They felt that their work, which they had put a lot of effort into to finish in time got a bit lost on the table with all the other materials. The architecture students seemed to have seen the modules as finished products and did not add much to them. The textile designer's works and concepts could have been more thoroughly introduced to the architecture students. Here are three statements by textile students:

"I was disappointed by the fact that all the materials were mixed which meant a lot of things weren't even used. We put a lot of work and time into these materials and stressed to get them ready in time."

"Our modules were not used because they were already made. The architecture students did not use them because they were like already finished. They thought they were boring to use. So, the time we put in producing them were wasted."

Finally, the textile students observed some differences in working methods. They felt that they worked more experimentally, directly trying things out in the materials. The architecture students worked more with sketches and scenarios, some of which were very experimental and interesting but never realised as they thought they could not do it. The textile students found the architect students to be more systematic in their experimentation while themselves, they just tried something out. The architecture students were also perceived as much more practical, looking for solutions that they knew would work in practice.

## 5.1 Feedback from the architect students

An individual questionnaire was distributed to the architect students immediately after the workshop was finished. Unfortunately, there was a problem in the distribution and collection of the questionnaires and only fifteen filled in forms were received. However, the workshop was proceeded by a two-hour long discussion in five separate groups with all the students, and later by a one hour discussion with four invited student representatives. Notes from these discussions complement our feedback.

The architect students found the assignment exiting but complained about lack of organisation. They found it interesting to find new ways of using textiles and to experiment with greenery. The workshop was hands on and they liked to prototype. Approximately half of the group think that the workshop gave them new perspective to architectural design. Some architect students did not see the direct connection between the workshop and sustainability and found the assignment too simple to address larger societal questions. A majority thought that they had enough time for the workshop.

They found it interesting to meet with the textile students, but the short workshop did not give time for any real exchange. They would have wanted to be better prepared such as the textile students and have more time to discuss. The fact that they were less prepared made them look bad, said one student. Just like the textile students remarked, they recognise that they did not really use the modules that the textile students had prepared. Some perceived the textile students as

unengaged, the fact that the structures were to be put in their studio place contributed to a distance to the textile students. The architect students had the impression that the textile designers felt that it was not their project. They themselves also felt intimidated to put their structure in the design studio. One group said that they put their design close up to the wall in order not to disturb.

They architect students also found that the groups had been too large to be functional and creative. Some of the architect students noticed that some of their fellow students did not actively participate in the team work but failed to engage them. The smaller groups seemed to manage the teamwork better. Regarding working methods, the architect students recognise that they should have made more prototyping before deciding to go for one solution.

## 6. Discussion and conclusions

The results from the workshop shows some creative design and the encounter between the disciplines seems to have been a positive experience even though more time should have been given for exchange and meeting. A second evaluation later on during the semester will tell us if the meeting left some trace that can be shown in the design the student produce after the meeting.

As regards the planning of the workshop, this should have been better planned. A prime lesson is that we had underestimated the task of getting the students from two disciplines to collaborate. There was an unbalance as the textile students arrived more prepared. The textile students felt that the work they had already put into thinking about modules prior to the workshop was not used. The architect students needed to prototype themselves with the material before being able to go up in scale.

The students clearly did not fully use neither the spatial scale nor the time given for the assignment. Several groups finished already the first day and the structures were rather small, flat and two-dimensional. The impression is that they wanted to keep it safe not exploring their full creativity. The architect students also focused a lot on the technical part, the watering and the maintenance system. In some structures this was the starting point for the whole design. Instead of going into creative explorations they seemed to have searched for a quick solution to a given problem. This might also explain why the students did not integrate substrates and seeds at the same time, but planted plants and seeds in their finished structures in the end. Maybe they were looking for a finished result to present at the end of the workshop not thinking so much of the time perspective and the whole lifetime of the structure.

Comments from the students show that the architect students had not fully understood the complexity of the task. The textile students were outnumbered and felt that they had difficulties taking a place in the decision-making. They also felt intimidated working with the architect students' place of work, and were seen as uninvolved by the architect students. The architect students also complained that they felt that the assignment did not relate to sustainability or architecture although they had lecture presenting the sustainability of urban gardening. The architect students of the first year are still searching for an identity as architects, and the assignment did not correspond to their idea of what sustainability is in the built environment. What they might not have realised is that collaboration and cross-disciplinary teamwork is one very important aspect of sustainability.

The students approach to keep it safe and to focus on solving a problem can be understood as an uncertainty of handling the design process. A majority, two

thirds, of the architect students enter the school solemnly on high degrees. They are high-performing students used to be the best in their class and not all of them are used to work with artistic methods. This is different from the textile students who all enter the school on trials and earlier artistic work and used to show their sketches and material samples. The first-year architect students are still intimidated by exposing their sketches and ideas to a large group.

For future collaboration in teaching, our conclusion is that we should go for more mature students, on the master's level, post-graduate education or professional designers. There is a large interest in textile architecture among practicing architects that could be met with workshops.

Finally, the influence of the actual space where the workshop took place had been overseen in the planning of the workshop. The groups who worked in the studio space made flat structures and used neutral, grey or transparent textiles. The more creative structures were built in the concrete hall both in terms of form and use of colour. The architect students were worried to mess-up the space with water and dirt. Plastic bags had been provided to protect the carpet in the studio, and instructions had been given to be careful not to damage the carpet. The floor in the concrete hall is resistant to water and dirt contrary to the carpet in the architect students' studio. This factor could have been inhibiting for the exploration of the materials and the assignment in that working environment. One conclusion is that it might have been wise to advise them to sketch in the design studio, talk about the possibilities to visually or physically delimit a space, then move down to the concrete hall to do some prototyping and build the structure.

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# “CHEMARTSING” – An Experimental, Multidisciplinary, Collaborative and Future oriented Pedagogy with Wood based Biomaterials

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**Abstract:** Aalto University’s CHEMARTS is a collaborative platform seeking to combine design and science. CHEMARTS has two main objectives: to inspire future designers and material scientists to work together solving the complicated problems related to production and use of materials, and to create novel sustainable biomaterial innovations for the future. In order to enable these objectives in higher education, an environment dominated by disciplinary pedagogical traditions, a set of completely new pedagogical approaches needs to be constructed. This paper presents a case study of CHEMARTS courses where new experimental pedagogical approaches have been tested.

**Keywords:** Multidisciplinary, collaboration, experimental, biomaterials, practice based

## 1. Introduction

Aalto University was created as the result of a merger of three universities in 2010. From the start there was an increasing demand for a new form of collaboration between art, design, business and technology. However, the fundamental issue related to interdisciplinary collaboration was how to create collaboration between different disciplines in practice? In December 2011 the Department of Design organised a half-day seminar with the title ‘Fashionable Technology’, where professors from design, fashion and forest products technology presented their work and shared their ideas on how to collaborate around the theme of future of sustainable biomaterials. The participants were highly inspired by each other’s experiences and knowledge. This resulted in a pilot project, which was organised in summer 2012 to see how ARTS students (School of Art, Design and Architecture) could collaborate with CHEM students (School of Chemical Engineering). Special funding allocated by CHEM enabled recruitment of six

students to explore ideas and experiment with materials freely throughout the summer. As an outcome to their collaboration they named their joint project as CHEMARTS. This pilot project was followed by two additional summer projects, now funded by the University.

In nature tiny seeds grow into plants, and in favourable conditions these plants flourish and create a durable ecosystem. That has been happening within the CHEMARTS community. Several externally funded research projects have been initiated. The summer activities have been running since 2012, new introductory course 'Design Meets Biomaterials' started in 2014, and CHEMARTS minor program open to all Aalto University students began in 2016. This paper will discuss the foundations for this collaboration by describing the summer courses from years 2012, 2015 and 2016. These cases represent multiple approaches in pedagogy. Through descriptive analyses of the pedagogical approaches, methods and experimental settings, a conclusion will be drawn describing the collaborative and experimental pedagogy used to educate future professionals with a multidisciplinary mind-set and skills.

*Table 1. Introduction of CHEMARTS summer projects 2012-2014 and Summer Schools 2015-2016*

Year	Students (ARTS/CHEM)	Tutoring	Given tasks	Document
2012 Project Design meets cellulose	6 (3/3)	Coordinator CHEM	Collaboration Cellulose experiments	Brochure by the team Interviews (2015)
2013 Project A peak into the future	6 (3/3)	Coordinator CHEM	Textiles	Brochure by the team Interviews (2015)
2014 Project Lost in the woods	6 (3/3)	Creative workshop by fashion designer, Coordinator CHEM	Bio Textiles	Brochure by the team Interviews (2015)
2015 Summer school Inspired by the Forest	8 (4/4)	Creative workshop by designer, Coordinator CHEM	Innovative products and processes	Brochure Learning diaries
2016 Summer school Art & Science	10 (7/3)	Mixed team of tutors, Coordinator CHEM	Biomaterials	Brochure Learning diaries



## 2. Experimental Pedagogy

### 2.1 Case background

The general idea of CHEMARTS is to explore wood based materials and their applications for innovative uses through student-centred and experimental approach. The teaching in CHEM is still based mainly on traditional methods commonly used in natural sciences; lecturing, reading, writing and working in laboratories. On the other hand, pedagogy in ARTS is strongly based on learning by doing, having focus on traditional art and design experimentations. The main objective of CHEMARTS is to inspire students from different disciplines to work together, to learn from each other, to experience hands-on material research and to find new ways to communicate design and science. The approach to teaching is future-oriented and experimental. It is based on practice based learning and collaborative learning (e.g. progressive inquiry based learning). The inquiry based learning process can start before the problem is well clarified or framed (Hakkarainen et al. 1999) and through creative experimentations, collecting background information and team work the problem will be framed. The inquiry based and collaborative education process means learning through problem solving and working in a small cognitive community (Häkkinen & Arvaja 1999). The problem solving deepens from a dynamic and uncertain thinking into a clarified understanding of the problem until the new and collaborative knowledge is built.

Focus is given to the shared actions through which common understanding and new knowledge is constructed (Soini 2001). This pedagogical approach aims to deeper the problem solving and the opening of a complex phenomenon through shared expertise (different knowledge and disciplines) and collecting information collectively (Hakkarainen et al. 1999).

In CHEMARTS students work in multidisciplinary teams, and as teams define together the topics they want to focus on. No strict guidelines are given. The role of the supervisors is to provide some background information on wood-based materials, discuss the most relevant on-going research and describe the most applicable design methods. Students are encouraged to get out of their comfort zones: designers can become engineers and vice versa. As work safety is a top priority, the CHEMARTS student undergo safety training and are supervised by tutors throughout the course work. In the end of the course the collaborative process as a whole and the collaboration results are presented publicly through visual presentations and in an exhibition. Working methods and scheduling are analysed and further developed after each summer.

### 2.2. Case I 2012: Design Meets Cellulose

The first project was organised in summer 2012 with the title ‘Design Meets Cellulose’. The participants were recruited as trainees and the team included three graduate design students, three graduate students from the forest products programme and a newly graduated tutor from material sciences. The team was given two tasks: 1) to familiarize with the latest cellulose related applications, and to explore the potential of cellulose in the future and 2) to figure out how design and wood-based material sciences could collaborate in practice. After kick-off lectures by professors and experts from different fields, the participants were free to organise their work with the support given by the tutor. The team spend three

months familiarising with cellulose related materials and production processes as well as with each other's working methods. This pilot project set the foundation for the multidisciplinary collaboration and established the practice based working methods. The student team made a proposal on how the teaching collaboration should be organized and what kind of courses could be initiated in the future. They also created concepts of 'World of Cellulose' and 'Luxury Cellulose Finland', which were afterwards used as an inspiration for a significant strategic research opening 'Design Driven Value Chains in the World of Cellulose'.



*Figure 1. Case I: Students' comment in the project brochure: 'It turned out to be very different from our initial expectations; many preconceptions about designers vs. engineers were erased early on in the project. The engineers have learnt new techniques to problem solving, working methods as well as visualization whereas the designers have learnt more analytical and technical approaches and gotten material knowledge.'*

## 2.3 Case II 2015: Inspired by the Forest

In 2015 the first Summer School was organized. It was kicked-off by a four day workshop in the Finnish forest. The pedagogical idea was to let students learn about the main source of Finnish biomaterials by experiencing it by themselves, and by meeting people who are still working with traditional materials like pine bark flour ('pettu' in Finnish). Focus was on hands-on experimenting and prototyping first with wood in the forest, and later on in the laboratories with cellulose based materials. The concepts developed by the student included an eatable dish, wood-based water filtration, nanocellulose containing lampshades and personal hygiene products made from wood extractives. The outcome was presented publicly in several occasions. The mainly positive student feedback was gathered via learning diaries. Students from both ARTS and CHEM felt that they had succeeded in their projects, and learned from each other. One student would



have preferred to have a more real-life project with a company, but that kind of approach was not included in the course.



*Figure 2. Case II: To enhance the creativity from the beginning, the workshop was led by an internationally acknowledged designer. He took the team into the forest and gave the first task - to build a chair out of the materials found in the nature.*

## 2.4 Case III 2016: Artistic & Scientific Explorations

The 2016 summer school turned out to be even more experimental. Firstly, all registered applicants (16) were accepted. Secondly, for the first time an external project assignment, an artistic installation for Helsinki Design Week, was included in the course content. Thirdly, the primary activity for the course was not defined - students could focus their work on anything related to biomaterials. The summer became very experimental, and from a tutors' point of view also very challenging. As there was no entrance selection, some participants were lacking the required enthusiasm and motivation. Several students quit and only ten students went through the whole course as planned. The course content was not as consistent and clear as it had been during the previous years, which left some students to pick up seemingly random ideas and to work mostly alone. Sadly the art installation project failed as it was not clearly connected to other activities and also lacked relevant support. Nevertheless the most committed, motivated and self-driven students worked hard throughout the summer with excellent results.





Figure 3. Case III: Enhancing learning methods: learning through experiences.

### 3. Discussion

We have witnessed that the most important outcome of CHEMARTS courses is the overall learning experience. Collaborative learning is formed on cognitive, emotional and motivational aspects and their dynamic interactions and the outcome can be deeply shared meanings and new knowledge (Häkkinen & Arvaja 1999), and in our case also unique prototypes, which include and express collaborative knowledge. Deep and meaningful learning happens more often in complex and multilayered social situations than in individual learning situations (Lindfors 2009, 19). We can interpret that in these presented cases the experimental and creative approach has been the primary focus and through these multidisciplinary activities and actions new knowledge has been gained. According to student feedback, the CHEMARTS courses have opened up new perspectives and familiarized students with new working methods.

‘The course was really interesting and a new learning experience for me. It was great to understand that there are other ways to learn than mathematic exercises and report writing.’

‘CHEMARTS summer school gave much needed direction to my studies and maybe even pushed me towards certain path in my future career.’

During the CHEMARTS courses, students get familiar with different kinds of approaches and working methods. They are confronted with uncertainty, as they have to define their own goals and design their working processes by themselves. Material research takes time, and prototyping with experimental materials is

demanding. There will certainly be failures and those failures have to be accepted. A creative mind-set, a persistent way of working and respectful collaboration are the keys for a successful CHEMARTS project. In the future it would be interesting to enhance even more systematically the development of collaborative knowledge creation through constructive design research (Koskinen et al. 2011).

It has to be noted that this kind of experimental pedagogy requires a lot from the supervisors and tutors. The balance between freedom and guidance is a delicate thing. Regarding the course development in the future we have made three conclusions based on supervisors' experiences of all five summers (2012-2016):

- Student's personal interests and overall motivation have excessive impact on the outcome
- Clear context will help and speed-up students orientation
- Creativity and team building need support in very early stage of the course.

A successful multidisciplinary collaboration requires an open mind, curiosity, high motivation and respect for other's working methods and disciplinary knowledge. New kind of collaboration needs time and open dialogue to develop. There are many cultural challenges like the disciplinary language and working methods, which need to be addressed in order to be able to construct new knowledge and innovations for the future. The role of continuous dialogue and communication is crucial for continued success in the coming years. As one summer school student Tino Koponen concluded in his learning diary from 2016: *'It is all about chemartsing'*.

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# Antibacterial Paper Made of Cellulose and Copper

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**Abstract:** Although Chilean economy is ensured by its natural resources, the country demands expanding the scope to address the poor development of value-added products. This project complemented two key industries in the country, to develop a new material by combining the properties of its raw materials: cellulose and copper. The objective was to evaluate the feasibility of producing antibacterial paper with a level of biocidal effectiveness of 90%. An experimental investigation was conducted by an interdisciplinary research team working collaboratively with the company CMPC Celulosa S.A. It concluded in a scalable proof-of-concept with proven antibacterial effectiveness. State of the technique studies confirmed the invention is patentable and has high innovative potential. The project applied for two patent applications: nationally, accepted by INAPI Chile, and abroad, international PCT. Currently, the project is in the stage of industrial pilot validation, with the aim of achieving transfer and bringing the technology to the market.

**Keywords:** Copper, cellulose, antibacterial paper, design, innovation

## 1. Design research, born from Chilean raw materials

Chile has the largest reserves of copper in the world, accounting for 28% of the world total in 2011. Copper represents the largest share of exports and is the largest source of income for the country (Sernageomin, 2013), (INE, 2015), (Meller, 2013). Copper will continue to play a crucial role in Chile's economy, but there is a need to expand the gaze and address the low development of value-added products on the basis of its aesthetic, conductive, thermal, mechanical, energetic, ecological, and antimicrobial properties, among others.

In 2008, the Environmental Protection Agency (EPA) certified the antimicrobial property of copper, which became the first metal to be recognized for this quality. In addition, the International Copper Association (ICA) along with the Copper Development Association Inc. established the Antimicrobial Copper (Cu+) brand, a seal that guarantees antimicrobial products based on copper, which represents a great opportunity for the health care industry. Finally, the Canadian Network for Environmental Scanning in Health (CNESH) declared copper in the reference list of the 10 new most important emerging technologies in 2014.

The Design School considers it important to contribute to promote the development of products manufactured in Chile through design and interdisciplinary work. The National Council of Innovation for Competitiveness (2013) suggests strategic guidelines so that Chile may advance towards development by incorporating innovation in its public policies. It also emphasizes the importance of the role of designers in innovation; the designer being a key player in adding value to natural resources and transferring commodities to products. It is undeniable that natural resources are an asset and wealth for their country of origin, but it is essential to develop research and technological innovation to increase their value.

The Postgraduate and Research area of the Design School of Universidad del Desarrollo was formally created in 2012: Its lines of research are:

1. Interdisciplinary Innovation: research in education methodologies in design, applied creativity, and transfer of design to companies.
2. New materials: research for the development of innovative materials and their application to the industry through design.

The line of research in new materials was driven by the dean and researcher at the Design School, Alejandra Amenábar, who decided to explore the potentialities of copper as a real opportunity for the country.



*Figure 1. CMPC Plant: Nacimiento, Chile. Production of Cellulose Pulp.*

## 2. Validation of the research idea

The research was born of the idea to mix two key raw materials in Chile—cellulose and copper—to develop antibacterial paper. In order to verify the novelty, inventiveness and industrial applicability of this idea, an international search report was developed on the status of the technique and patentability of the invention: “Antibacterial paper made of cellulose and copper.” The status of the technique was studied by the law firm Castro & Sainz, considering patent databases of the World Intellectual Property Organization (WIPO), the Patent Office (EPO), the United States Patent and Trademark Office (USPTO), and a commercial database, with information available for more than 78 countries, including Japan, China, Korea, and the Inpadoc system. The search strategy considered two key elements: (1) The form of the biocidal agent and (2) The paper preparation method. Castro & Sainz selected invention patents to analyze whether there was any crossing with the objectives set forth in the project, and suggested potential uses of the technology beyond the biocidal properties.

The analysis of patentability determined that there is a wide range of development opportunities as the manufacturing processes and types of particles can vary widely. In addition, no industrial applications for antibacterial paper were found nationally or internationally, confirming the viability of this invention and giving rise to a highly patentable project. It was concluded that this project is an unexplored niche, consistent with the lines of research of the Design School, Interdisciplinary Innovation and New Materials. It shows a high innovation potential for the development and application of the technology to various fields through the design of added value in areas such as health, agriculture and gastronomy, among others. Also, an economic impact is viewed in the generation of new industries and the contribution to the social problems relating to public health, hygiene, food and waste handling, due to the widespread use and multiple functions that this new biocidal material will open.



Figure 2. Researcher Alejandra Amenábar in exploratory visit to CMP Plant Nacimiento, Chile.



### 3. Academy, Company and Interdiscipline for research development

The ability to perform interdisciplinary work to respond to the creative challenges imposed by the new and changing settings of today's productive world in the technological field and in the culture of organizations is a requirement for today's professionals. This complexity implies an overlap of responsibilities between professionals of different disciplines, and interdependence in the design and production of innovative goods (CINDA, 2013).

This project arises from an interdisciplinary team with experience and scientific and technological capabilities that complemented with advanced design, extending the projections of development and transfer of innovative products. The members of this initiative are researchers Alejandra Amenábar and Paulina Contreras Correa, the co-researcher and PhD, expert in materials development, Víctor Apablaza Barraza, and various guest researchers at the different stages of the project.

Innovation must be regarded as an interactive process in which the company, in addition to acquiring knowledge through its own experience in the processes of design, development, production and marketing, is constantly learning from its relations with various external sources, such as universities. With a clear focus on transfer, this research started in the academia but shortly established a strong connection with the company. Working together with CMPC Celulosa S.A. has been fundamental to execute a research project with real projections of developing at an industrial level, concentrated on the application of knowledge with a focus that will permit contributing to the Chilean society by encouraging economic and social development. CMPC Celulosa has provided specialized infrastructure for the production of paper at a laboratory scale, chemical, biochemical, physical and material resistance analysis equipment, and professionals who are experts in paper production. This has permitted experimenting and conducting research in situ, planning a rapid transfer of antimicrobial paper to an industrial level. The initial investigation, entitled: "Experimental study of the development of antibacterial paper by adding copper for medical applications", was funded by the Internal Fund of Universidad del Desarrollo.

For the development of the proof of concept of the antibacterial paper, an experimental research was defined in 3 stages that included: (1) development and definition of copper particles, (2) development and definition of prototype of the production process on a laboratory scale, (3) analysis and testing for the definition of physical-mechanical and biocidal features.

The choice of the copper format and its physical-chemical and size and shape considerations are crucial for the study. Several patents evidence the biocidal application of copper and copper salts, both organic and inorganic, in a variety of materials. It is scientifically accepted that the mechanism by which fungi, bacteria and viruses are inactivated and/or eliminated by the copper ions is their penetration through the microorganism's cell membrane, thereby altering their vital systems (membrane permeability, protein degradation, enzymatic reactions, among many other harmful effects).

Two types of copper formats were defined and paper samples were achieved in both cases, allowing us to compare the similarities and differences in the biocidal effects between the copper morphologies applied. The proof of concept of the antibacterial paper was conducted in the R&D Center of CMPC, in Nacimiento,

Chile. The standard paper manufacturing process according to ISO Standard 5269-1:2005 was modified in different stages of the productive process, by mixing 2 types of copper with cellulose pulp in various proportions, getting 12 different samples of paper and their copies.

Physical-mechanical tests were developed on the 12 samples obtaining positive results within the ranges of paper manufacture. On the same samples analysis were developed to determine their antibacterial and antifungal capacity. Qualitative and quantitative testing was performed using ISO Standard 20645:2004 and ISO Standard 20743 respectively, strains of *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Escherichia Coli*, *Aspergillus Niger*, *Candida Albicans*, *Penicillium*, and it was determined that 4 samples showed positive antibacterial and antifungal results. With these results the research team achieved an initial technology. It is necessary, however, to continue with a scientific technological study that addresses the room for improvement, looking for a highly-efficient viable process that can be used in the industry and the market.



*Figure 3. Analysis in the LAB R&D Center CMPC. Researcher Paulina Contreras and CMPC experts Orieta Cortés and Cristian Segura.*





Figure 4. 12 samples of antibacterial concept paper and its copies.

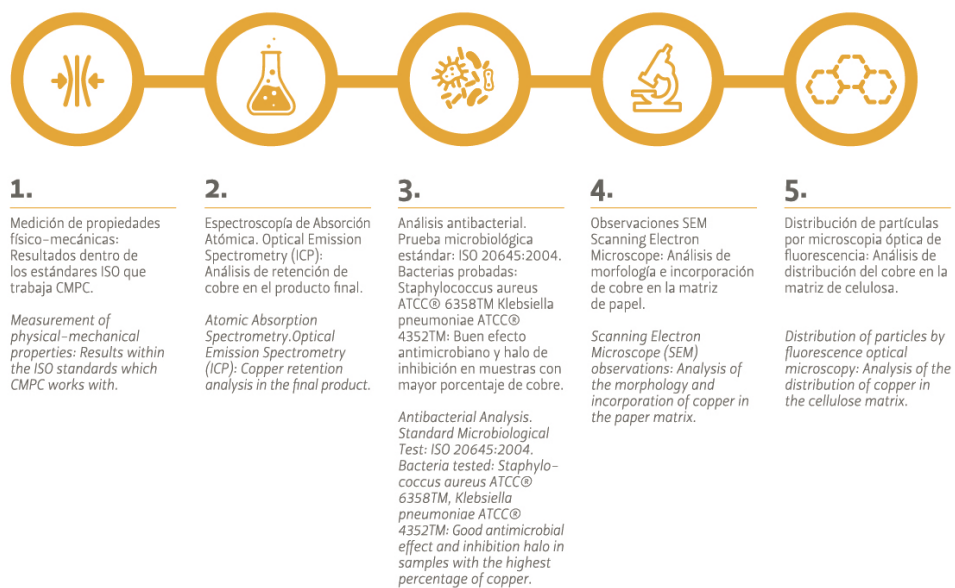


Figure 5.

Proof of concept analysis antibacterial paper.

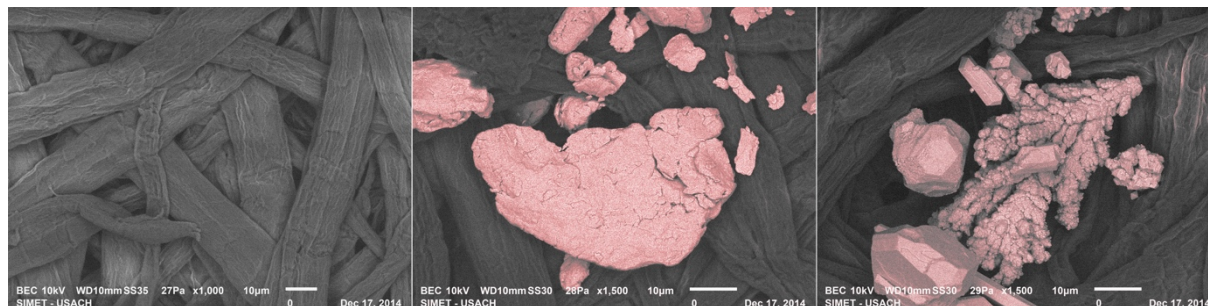


Figure 6. Proof of concept microscopy images taken with a Scanning Electron Microscope (SEM).

## 4. Protection of intellectual property rights and regulations for antibacterial paper

### 4.1 Patenting

Based on the project's potential, we participated in the 1st Patenting Contest VRID - iCono UDD 2014, and got financing to look for the state of the art, advice for patenting and protection of inventions, nationally (patent application before the INAPI) and internationally (starting patent application under the PCT agreement) in the countries that the Internal Committee determined. The results of the investigation were materialized in the application for a patent for invention: Title: Cellulosebased materials that incorporate a biocidal agent containing copper. Application number: 201500921. Applicant: Universidad del Desarrollo (UDD). The inventors of this application for a patent for invention are: Alejandra Amenábar Figueroa, Paulina Contreras Correa, and Víctor Apablaza Barraza, who were part of the research team. iCono UDD has been central in processing the intellectual property, collaboration agreements in research, and supporting to obtain public funds, facilitating the process, providing tools and strategies to ensure true innovation by transferring knowledge to the Company.

### 4.2 Analysis of Regulations

With regard to the regulations applicable to the use of bactericidal paper containing copper particles, we defined analyzing antibacterial paper in the food industry, as this is the application with the greatest restrictions and/or risks due to its direct relationship with human consumption. Article 125 of the Chilean Food Safety Regulation (D.S. N° 977 of 1996 of the Ministry of Health), could present difficulties because it establishes that: "Metals in contact with food and its raw materials shall not contain more than one percent of impurities consisting of lead, antimony, zinc, copper, chromium, iron, tin, altogether, or more than 0.01 percent of arsenic, or other contaminants consisting of metals or metalloids that may be considered harmful. Also, utensils, containers, packaging and equipment manufactured with metals, must not release the substances mentioned above in quantities greater than those indicated." The specific objectives of the project are adjusting and setting the minimum concentration of copper to achieve biocidal properties and checking the contents of copper in the paper matrix. This setting will be a key challenge to comply with the Chilean Food Safety Regulation. Other standards reviewed in the USA (Food and Drug Administration FDA) and Spain (Regulation No. 1935/2004 of the European Parliament and the Council) do not directly specify copper as a contaminant or harmful substance. The project contemplates conducting a study of national and international regulations considering regulations applicable to paper for food and health uses, as well as the environmental regulations of the production process of antibacterial paper.

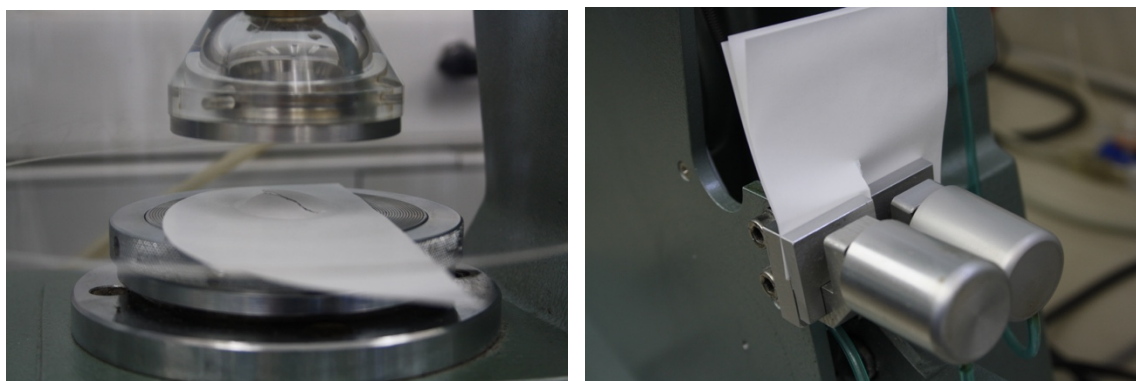


Figure 7. Physical-mechanical tests R+D Center CMPC.

## 5. Projections

The project has achieved a patent application and has applied to the external fund under the title “Development, validation and pilot of industrial technology for the production of antibacterial paper made of cellulose and copper.” The results justify the escalation of the research such as; preliminary information of the effects in cellulose intervened with copper in terms of its physical-mechanical, optical and atomic properties, the distribution and incorporation of copper in the cellulose matrix, and the biocidal properties of this composite material for two strains of bacteria. We obtained a paper with proven antimicrobial activity based on the incorporation of microstructures of copper in a matrix of cellulose. In a second stage we will seek to morphologically optimize microstructures of copper that will enable the industrial application of the laboratory test, thereby obtaining a material for commercial purposes with a characterized microbiological activity. We propose developing this material in three stages:

1. Development and definition of the copper format.
2. Development and definition of the prototype of the process.
3. Analysis and testing to define the paper’s biocidal, physical-mechanical, and degradation features and determining the new material’s operation standard.

Currently research is focused on optimizing the manufacturing conditions of the industrial pilot, where joint work with CMPC is crucial. We hope to produce a finished product with the required quality standard, and we will determine the scope of application and the knowledge generated about the manufacturing process. We also plan to implement a stage of knowledge transfer to CMPC, where we hope to develop the industrial test of the antibacterial paper, with a 3 year horizon to bring the technology to the market.

The Design School has started from the origin of the product, developing a new material with a strategic view, which required intervening from the productive process to obtain a result with high added value and differentiation. The process of innovation of the “paper made of copper” implies a giant step for the School, which has set itself the challenge of positioning design as a springboard for innovation in the industry, and preparing students and future designers aligned with the country’s challenge of adding value to domestic production.





Figure 8. CMPC Plant Nacimiento, Chile. Cellulose pulp storage for export.

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# Resilient Rebuilt —A Regenerative Design of Waterfront Landscape in Urban Fringe

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**Abstract:** Based on the consideration of urban fringe in rapidly developing large cities, this paper studies the design of waterfront landscape in urban fringe. Waterfront landscape in urban fringe are often affected by the dynamic changes of the natural and human environment. We take Beijing Dongba River as the research site, which faces the challenge of environment, urbanization and social culture now, and attempt to take “resilient landscape” as the design concept. The resilient design strategies are proposed, which mainly focused in the regeneration of water, land and materials, as well as the creation of biodiversity. The landscape design at key areas of the research site are demonstrated, in order to further elaborate design strategies and methods.

**Keywords:** Urban fringe, waterfront landscape, resilient landscape, regenerative design

## 1. Introduction

In the process of rapid urbanization, the problem of urban fringe is a hot issue for scholars. Urban fringe, which usually located in the surrounding area of the urban built-up area, is the border between urban and rural areas. In this region, urban-rural dual feature is presented in many aspects, such as the composition of personnel, natural environment, land use and economic form.

The waterfront landscape in urban fringe is often located by riverside, which acts as a border zone between urban and rural areas. In the rapid urbanization process, the mixed use of the zone by various people and the dynamic changes of both areas are very common, which usually causes fragmented spaces at both sides and environment pollution. On the other hand, the river in urban fringe always suffers the garbage and refuse. In northern cities like Beijing, the volume of the water in river can change severely among seasons, which results in wastage of water and environmental problems as well.

In this paper, we take the key section at Chaoyang District in Beijing of Dongba River as the research site. This section is highly typical and representative for the study of waterfront landscape in urban fringe. The resilience landscape design strategy is proposed to solve the problems faced by the waterfront landscape in urban fringe, especially in the research site. In this project proposal, regeneration design of several key elements of the landscape in the research site is expatiated, demonstrating how the resilience landscape design works in waterfront landscape of urban fringe.

## **2. What is resilience landscape?**

Resilience is first used to describe the physical properties of matter, which was introduced into the field of ecology later by Rolling, a Canadian biologist. Then, resilience was introduced into the field of urban planning, for example, the concept of “resilient city”. After that, “resilient landscape” was proposed in the paper “Resilient Landscapes—Dimensions of Future Landscape Architectural Practices” by Niall, a professor of Harvard Graduate School of Design (Niall, 2010, P.10-14). In this paper, he suggested that resilient landscape reflects the flexibility of the artificial and the natural landscape. The resilient landscape can react and recover from the mutation or gradual change of the environment, while maintaining or attempting to maintain artificial and natural harmony. Under the background of today’s environmental crisis and human history crisis, we can make use of the resilience of the landscape and ecosystem to resist the change of nature. Resilient landscape has the characteristics of adaptability, flexibility, and variability. It is a kind of sustainable landscape design.

## **3. Why resilient waterfront landscape in urban fringe?**

It is in urgent need to introduce the concept of resilient landscape in waterfront landscape regeneration of urban fringe. The waterfront landscape in urban fringe should play an important role in ecological purification, water conservation etc. However, garbage accumulation and wastewater discharge commonly occurring in urban fringe damages the natural environment of the waterfront landscape. Facing the phenomenon above, resilient landscape can be an effective way for landscape restoration. Further, the resilient landscape can act as a weaving strategy to contact the fragmented spaces and life on both sides of the river. For example, a tighter relationship between the people living on both sides can be established by the paths network. Otherwise, a resilient structure of waterfront landscape should be built in urban fringe to adapt the dramatic changing at the modern condition of urbanization.

## **4. The landscape design of resilient regeneration**

The design strategies mainly focus in the regeneration of water, land and materials, as well as the creation of biodiversity. The landscape design at key areas of the research site are studied, in order to further elaborate design strategies and methods.

## 4.1 Water

Water is the key element of waterfront landscape. In order to improve water resilience, the design strategies expand on three aspects: water storage, water purification and accessibility to water.

First, in order to improve the ability of water storage, hydrophilic area should be expanded. And the natural form of water system should be preserved rather than making a cutoff of the river-tidal channel, while ensuring the flood section wide enough. Furthermore, the river system needs to curve properly to form an abundant waterfront space. As a result, the abundant waterfront border not only improves the ability for water storage, but also makes a fantastic and interesting landscape. (Fig.1)



Figure 1. Master plan and section of Dongba River regeneration design (by author)

Second, the channel is broadened and the grass ditch is designed to control the flood, harvest the stormwater and abate water resources shortage problem. (Fig.2). In Beijing, the water level elevation of the river can change a lot between wet season and dry season. So how to take advantage of the different water level elevations challenges the design of waterfront landscape regeneration. In the research site, there have been some grass ditches already dug by the government, which provides a good foundation for our landscape design. Different design strategies are proposed to adapt different water levels. When it is normal water level, part of the water remains in the grass ditch, wetland landscape is formed by stone steps and aquatic plants, which are important for improving water quality. When the composite channel become filled with water in wet season, islands appear. The broad water can be an attractive scenery by stone steps leading to the viewing platform. As water level drops in dry season, the grass ditch ground exposes and transforms to a sinking style square. By the vertical design of trails, sunken square and viewing platform, multi-leveled spaces is formed to adapt to the changes of nature and meet different activity needs, such as walking, gathering and picnic, which represents the resilience of landscape. (Fig.3)



Figure 2. The grass ditch and the section (reprinted from Stormwater Design Specification)

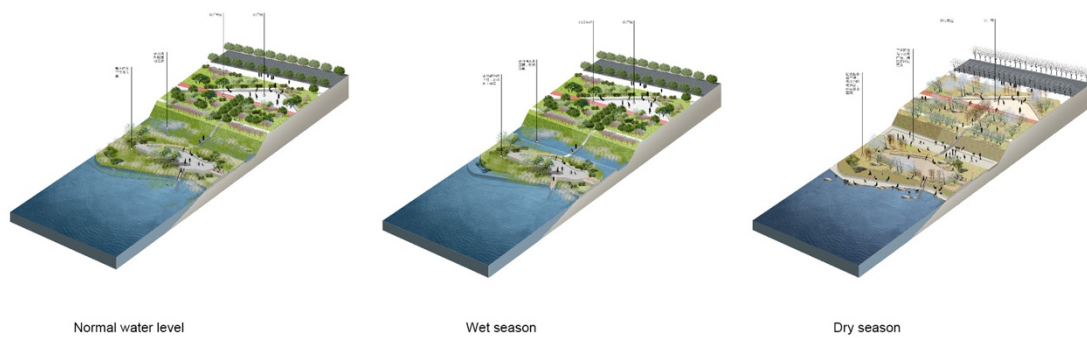


Figure 3. The resilient design of different water levels (by author)

Third, native aquatic plants and *sand island* with special structure shown as Fig.4 and Fig.5 are created to purify water for a healthy water environment. *Sand island* composed of gravels, coarse sand, cinders and rocks can purify water while providing nutrition for plants.

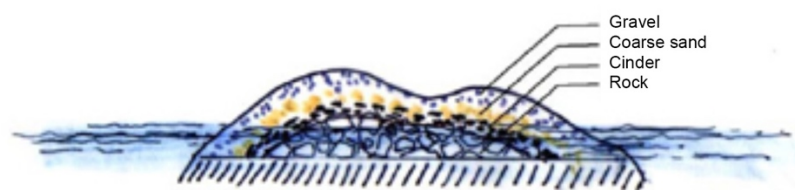


Figure 4. The structure of sand island (by author)



*Figure 5. The rendering picture of sand island (by author)*

## 4.2 Land

In this paper, the resilient design of land mainly focuses on the physical design of land shape. We design three types of land shapes, which named bubble wetland, river islands and terrace type revetment. The bubble wetland refers to the waterfront land composed with bubble-shaped low-lying land and small sand islands with special ecological structure, which improves water storage and water purification. The river islands are formed by widening the channel. The terrace type revetment refers to terrace-shaped ecological revetment to meet the changes of water level in different seasons, creating the interesting waterfront spaces. The physical design of land shapes above improve water conservation and rainwater collection, creating rich spaces to meet the different needs. (Fig.6)





Figure 6. The land shape design in Dongba River (by author)

### 4.3 Materials

The maximum utilization of the resource is a common result of resilient landscape. As we know, piles of construction waste and household waste in the waterfront areas of urban fringe keep people away. However, the effective use of waste materials not only embodies the concept of sustainability, but also can show the unique characteristics of the place. In the design of the structures and pavement, we try to make full use of the waste materials in the site to promote the recycling of the resources. For example, used steel plate is recycled back to make pavement and flowerbeds. And the pipes and building components which scattered on the ground are used to build structures.

A pavilion as seen in Fig. 7 shows the reuse of materials specifically. Recycled steel plates and pipes are used as the main materials, considering the surroundings and plants of the site. Therefore, it not only provides a platform for leisure, but also forms the focus of sight in the site, showing the unique temperament of waterfront landscape in the urban fringe.

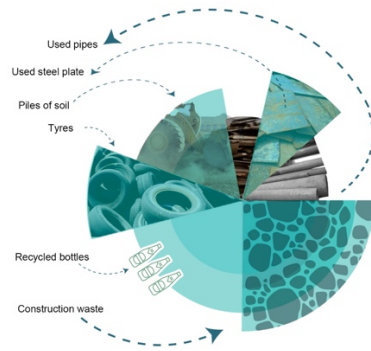


Figure 7. The pavilion design with recycled materials (by author)

## 4.4 Biodiversity

Biodiversity which contains plant diversity and animal diversity plays an important role in resilient regeneration.

The plant disposition in the project is mainly based on the native plants, showing various patterns and colors in different seasons. Plant distribution shows the transition from waterfront area to forestland by the growth of aquatic plants, ground cover plants, shrubs and trees. As the time goes on, plant diversity is increased so that the green space spreading from the river to surrounding areas, promoting the region to resiliently develop. (Fig.8)

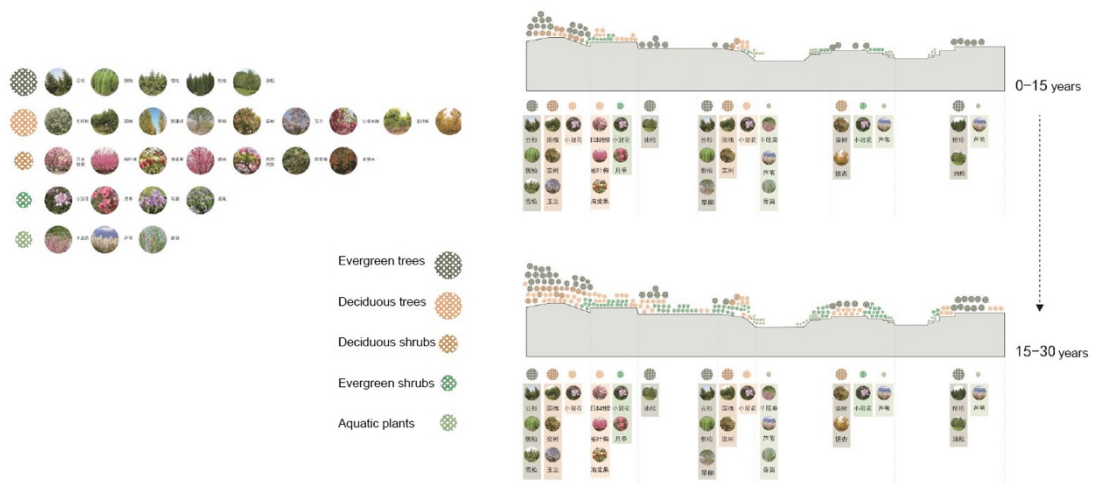


Figure 8. Plant diversity increased as the time goes on (by author)

The types of green land in both sides of Dongba river are woodland, grassland, farmland, wetland, water area and waterfront depression, where organisms live accordingly. With the improvement of the ecological environment, the diversity of organisms will increase. As a result, Dongba river will not only become a paradise for the surrounding residents, but also an ecological corridor of animals and plants in the future. (Fig.9)

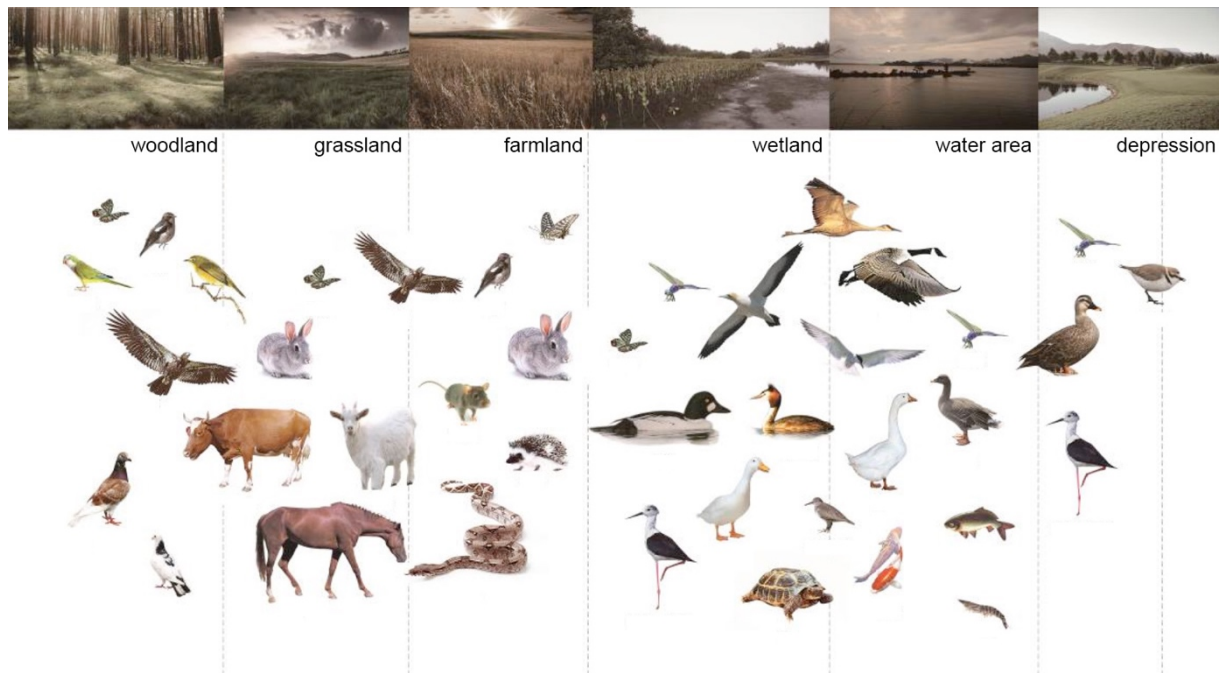


Figure 9. Dongba River acts as an ecological corridor of animals (by author)

## 5. Conclusion

Resilient landscape is a new concept of landscape design under the background of urban sustainable development. Taking the Dongba river as research site, this study proposes design strategies of waterfront landscape regeneration in urban fringe and elaborates the concrete landscape design methods. The design strategies mainly focus on the regeneration of water, land and materials, as well as the creation of biodiversity. The paper demonstrates how the resilience landscape design works in waterfront landscape of urban fringe. In this research, we suggest that resilient landscape is nothing of design style, but a design value to live in harmony with nature and culture, especially in the process of urbanization.

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**REDOING** Creativity, Design Process & Student Learning  
**Room** 1.2 // Thursday 1 June // 10.30-12.30

Title	Presentation
Convivial Café and the Design Process: Redoing Design Discourse on the Edges of the Academy	Cathy Gale and Darryl Clifton
Design Competencies Futures	Job Rutgers, Mo-Ling Chui, Matt Hawthorn, John Fass and Åsa Harvard
Re-do Moodboards: How to wear Milano	Anna Lottersberger, Sara Desimoni and Jih Ye Min
Re-do Bauhaus	Douglas Millar

**REDOING** Embodiment, Emotionality & Togetherness  
**Room** 2.15 // Thursday 1 June // 10.30-12.30

Title	Presentation
Three Dimensions of Psychologically Durable Design	Anders Haug
REDO Experience. Envisioning Clothes that can stand the Test of Time	Mila Burcikova
Redefining Sustainability Potential in Product Design	Alex Lobos
Becoming a Co-archivist. ReDoing Archival Practices for Democratising the Access to and Participation in Archives	Elisabet M. Nilsson and Sofie Marie Ottsen Hansen

**REDOING** Boundaries, Systems & Frameworks  
**Room** 2.3 // Thursday 1 June // 10.30-12.30

Title	Presentation
Bioinclusive Pedagogy: ReDo our Relationship with Nature	Louise St Pierre
ICT-empowered Collaborative Services: Technical Ecosystem and Social Forms	Joon Sang Baek and Ezio Manzini
Re-thinking the Approach to Environmentally Sustainable Fashion Design Praxis	Desiree Smal

**REDOING** Maker Methodologies, Citizenship & Research Communities  
**Room** 2.4 // Thursday 1 June // 10.30-12.30

Title	Presentation
Digital Designers as Democratic Innovators; Using a designing for one Approach to challenge Digital Natives	Andrea Wilkinson, Ingwio D'Hespeel and Frank Maet
User Evaluation of a Healthcare Product Design in Rural India. When Methods run short	Amar Nath Shaw, Mariana Salgado and Charlotta Liukas
Facing Major Challenges. Co-designing Radical, Reasonable Innovation	Hannah Glatte and Florian Schütz
Engage: Redoing how we talk about Depression	Daniel Coppen, Ralf Josef, Florencia Sepulveda Camposano, Hermione Townsend and John Stevens

**REDOING** Narratives & the Role of Designers  
**Room** 3.21 // Thursday 1 June // 10.30-12.30

Title	Presentation
REDOing Design Education: A Framework Proposal for a new Value Creation Process	Nicola Morelli and Amalia de Götzen
Designing Garments to Evolve Over Time	Vibeke Riisberg and Lynda Grose
New Visions and the Designer's Role in Strategically tackling Complex Problems and Conceptualizing Holistic Sustainability	Susan Evans
Learning through Disruptive Interactions	Circe Henestrosa and Harah Chon

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# Convivial Café and the Design Process: Redoing Design Discourse on the Edges of the Academy

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**Abstract:** In a convergence of Nicolas Bourriaud's relational notion of art and the Fun Palace, envisioned by Cedric Price and Joan Littlewood in the 1960s, a convivial approach to design thinking, making and discourse is proposed. Conviviality is framed in three ways here; as a design *method*; as a *place* for designing; as a mode of design *discourse*. The convivial café is conceived as space for informal exchanges, a workshop-studio space situated in the public/private threshold of the institution (architecturally and conceptually). The hybrid café-studio provides affordances for informal exchange through which student designers and diverse audiences can actively participate in the socially-orientated design process. In this way design becomes a reciprocal discourse and the power to make changes is shared. Designers are actors in this convivial discourse helping to bridge gaps that have emerged between the design community and (local) social need, politics, cultural diversity and complex urban identities.

**Keywords:** Convivial café, collective, critical design, design discourse

## 1. Introduction

In a convergence of Nicolas Bourriaud's ([1998] 2002) relational notion of art and the Fun Palace envisioned by Cedric Price and Joan Littlewood (Matthews, 2005) in the 1960s, a convivial approach to design thinking and making is proposed. Relational art is defined by Bourriaud (2002) as a discursive exchange of information between the artist (as a maker of meaning) and audience who gain power through the act of participation in a social context. Price and Littlewood's (Matthews, 2005) Fun Palace is a prescient convergence of art and public architecture, a fluid process rather than static place, that prefigures current socio-



cultural notions of the digital realm. From the perspective of the humanities, digital capabilities are conspicuously collaborative and generative (Burdick, et al., 2012, p. 14): the multivalent discipline of design is framed in this context as a transmedia mode of argumentation that brings about new systems, ideas and objects. Conviviality is interjected into this pragmatic and intellectual Redo-ing of (graphic) design in three ways; as a design *method*; as a *place* for designing; as a mode of design *discourse*. The three components of a convivial response to redo design outlined in this paper are:

- Method // conviviality is defined as a sociable, amiable method of facilitating collaborative design thinking and making: a more playful participatory mode of the design process (for students, makers, authors and users) to generate knowledge.
- Place // the café-studio is conceived as a less formal space for developing design knowledge than conventional academic or professional studios, a liminal communication zone and meeting place, a workshop full of possibilities, on the edge of the academy.
- Discourse // design 'problems' or themes are playfully explored through accessible design tools and digital platforms, facilitated by the sharing of food and the power of the collective in a 'critical materialism' (Bourriaud, 2002, p. 110).

By employing a convivial attitude to (graphic) design research and development in an outward-facing mode of collaborative action, participation in the process of making and thinking design is sought with new audiences and stakeholders. Design tools such as visual thinking, mapping, rapid prototyping, and Post-it note feedback are extended through social media platforms such as Snapchat, Instagram and Facebook and Twitter to operate on multiple levels of time and place. In the café-studio interventions and invitations bring the design process to life in a transparent and active approach which recalls Donald Schön's (1991, p. 4) transaction with a design situation. The designers' knowing-in-action (Schön, 1991, p. 13) is developed in 'conversation' with the intentions of the convivial café and its diverse participants.

Envisioned in improvisational terms the convivial café is conceived as a transparent window into the design process situated in the public/private threshold of the institution (architecturally and conceptually), a space traditionally occupied by the academy's glass-fronted gallery. By increasing transparency, the (graphic) designer's language can facilitate listening and learning more broadly across communities whether they be from business, academia, social services, entertainment. The boundaries of design are intellectually, architecturally and socially blurred in this space to generate new knowledge across the commercial and civic spheres of design. Access to the academic spaces of designing is often limited to a set number of 'open' days for the prospective student (and family-funder), while few practitioners reveal the inner workings of their studio culture to non-designers. Even though the home computer has given widespread access to the (digital) tools of page layout and design, this has not been accompanied by cognition of the discipline's conceptual scope or its ability to act as an agent of change.

The fundamentally social discipline of graphic design is far more multimodal and complex than appears on the printed surface or screen, it incorporates philosophical, anthropological, ecological, political and literary dimensions in the process of mediating messages. By opening-up the developmental stages of the design process, several entry points are offered to those who can bring technical, archaeological, linguistic or business knowledge to the more territorially-defined

spaces of the academy. The synergy of the café and workshop environments provides affordances for informal exchange through which to actively participate in the design process. The convivial café-studio is thus proposed, like the Fun Palace, as performative and variable, responsive to indeterminate and unknowable behaviour from its participants drawn from local community groups, industry, health organisation or policy-makers (Matthews, 2005, p. 81).

As designer-educator Darryl Clifton (2015, *npag.*) notes, rather than the art school merely mirroring industry models and demands this academic institution can exploit the potential of uncertainty in the world. The internal assumptions of art school as a humanist space underpinned by a set of idealistic principles is reconfigured as a two-way discourse in the convivial café-studio. The aim is to stimulate debate and action through design objects and images that are ‘gently provocative’ aiming to “engage people through humour, insight, surprise, and wonder” (Dunne and Raby, 2001, p. 63). Here, the autonomy and agency of the art school can be exchanged in a relational model bridging gaps that have emerged between the design community and (local) social need, politics, cultural diversity and complex urban identities.

## 2. Convivial // the method

Designing is a social process, an exchange between diverse stakeholders and audiences: it is defined as both a thought and an action (a noun and a verb), a process and a product, method and meaning: it solves problems and speculates on future possibilities. The process of turning ideas into concrete outcomes is an act of negotiation, a translation from the immaterial to the material or vice versa, a transformation. As a discipline in flux, therefore graphic design continuously absorbs new social strategies and technological tools to facilitate more effective communication and assist economic growth. For Bourriaud (2002, p. 26) “the emergence of new technologies, like the Internet and multimedia systems, points to a collective desire to create new areas of conviviality and introduce new types of transaction with regard the cultural object.” The new encounters or moments of sociability within technological ‘communication zones’ has created opportunities to ‘resist social formatting’ and engage in more reciprocal networks than conventional design artefacts permit (Poynor, 2006, *npag.*).

As a cultural communication system, the internet has produced new social relations in the guise of entertainment, information and education. However, technology is also increasingly promoted by business and/in politics as a panacea for today’s local and global problems, whether they be psychological, ecological, social or economic. In the convivial café binary schisms of culture and commerce, technology and society are collapsed by redrawing the boundaries of design to include an open zone, a relational space (Bourriaud, 2002). In *Digital\_Humanties* Anne Burdick, *et al.* (2012, p. 9) ask how “computational and digital environments [can] be designed to capture the fluidity of an intercultural dialogue between diasporic peoples?”. The convivial café-studio is proposed as a social extension of design’s fluid versatile processes in more of an open-ended context. In this workshop space the design student takes on the role of an actor or agent of discourse: a ‘semionaut’ creating new trajectories between signs and participants (Bourriaud, 2002, p. 113). This work-in-progress mode of design invites co-inhabitation from the broad disciplines of design within the art school/academy to illuminate the stage when meaning is formed through materials. Conviviality frames the café-design-workshop as an accessible idea enacted in an open

environment in which knowledge (and power) is shared between young designers and new audiences in an explorative investigation of themes.

In a spirit of rebellion and autonomy the material, conceptual, discursive, digital and rhetorical tools of design are deployed to disrupt reductive models of economic austerity that shrink intellectual freedom and creative play. In the words of Burdick, *et al.* (2012, p. 15), “Digital media have become the meta-medium par excellence, able to absorb and re-mediate all previous forms in a fluid environment in which remixing and culture jamming are the common currency”. That digital tools have simultaneously been exploited as serving corporate interests and hacking into them to gain some agency in the contemporary landscape enables alternative approaches to design to be launched. Conviviality is more than a method of feedback or even a service, it is about creating a live community in the process of sharing ideas and/or design problems over coffee/food in a transparent social context. Thus reconceived, the college studio-café facilitates the formation of micro design-communities that are fundamental to Bourriaud’s (2002) idea of giving value back to the unmediated ‘consumer’ or community.

### 3. The café-studio // a critical space

Relational design is not a new mode of building messages and meaning but an everyday component of contemporary art and design education: universities are polyvalent social environments, after all. Historically the (British) art or design school was formed to build closer relationships with industry, driven by a capitalist agenda of economic growth (Clifton, 2015; Gale, 2017). On the one hand designers are tasked with meeting the rapacious demands of consumer capitalism<sup>1</sup>, while also addressing urgent social and environmental challenges and economic inequalities that the capitalist system (arguably) creates. Therefore, the support or lack of government funding and affordable working environments implicate geographical location in the possibilities of unconventional design practice. For instance, a politics of austerity in the UK has led to funding being stripped from the arts and art education while elsewhere in Europe the arts and creative industries are supported nationally and locally. Therefore, the context of where and how new approaches to design are framed and enacted necessitates critical reflection on the matrix of possibilities and limitations that young designers in those locations must manage. How can the economic and/or academic infrastructures be transformed to alleviate the exponential increase in student anxiety brought on by unavoidable financial burdens and overarching pressure to achieve success? Within a capitalist agenda of infinite ‘economic growth’ we need to consider alternatives to industrial commercial production and the strategic discourse resulting from that focus.

As industrial designer-educators Anthony Dunne and Fiona Raby (2001, p. 59) argue many designers “see the social value of their work as inextricably linked to the marketplace”. The convivial café does not reject the commercial affordances of collaborative design discourse on the edge of the academic institution but is more critically and socially orientated. Described as a critical space in this proposal, the convivial café-studio is envisioned as a new communication strategy that encourages difficult questions to be asked about the role design and

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<sup>1</sup> Consumer capitalism is loosely defined as the orchestrated manipulation of consumer demand through mass-marketing techniques and advertising to control markets and increase sales.

technology play in industrial agendas (Dunne and Raby, 2001, p. 58). Through increased critical reflection greater power is sought through the mutual discovery of alternative ways of living and working. By reconfiguring the role of the design student as agitator and creative facilitator, the audience is no longer only a user or consumer but is reframed as a co-designer. Both the open-ended interior of the café-studio and the activities that occur within it form a material critique that is designed to reach unexpected and perhaps troublesome solutions through convivial discourse.

Design students act as technicians and co-ordinators of social processes that will generate new knowledge and understanding of design, its methods and capabilities, by exploiting the affordances of the café denuded of overt class associations yet not denied the familiarity of social comfort and exchange (Bourdieu, 1985). Designed to appear as a workshop containing tools and technicians ready to aid collaborative, community-based and co-operative design discourse the café-studio is aided by the underlying democracy of sharing food (Gurven and V. Jaeggi, 2015). In a collective and relatively neutral environment that could incorporate a community garden the convivial café aims to draw together otherwise disparate cross-cultural groups and diverse age ranges in a core socio-creative exchange. As a student-run space for exchanging ideas hierarchies of power can be collapsed by operating on the edges of conventional design education and professional practice, in-between the academy and 'real world', in a spirit of transparency (Bourriaud, 2002, p. 41). The convivial cafe forms an alternative to the institutional sites measured by occupancy rather than impact or experience, and the social behaviour of design students avoiding uncertain or risky approaches underpinned by the fear of failure and debt.

The inherently experimental Fun Palace devised by Price and Littlewood (Matthews, 2005) represents an adaptable model of social interaction in context this paper. As a context-dependent discipline graphic design can be both located and fictional in a similar way to the (utopian) architectural visions of Superstudio and Archigram, for instance. From a speculative perspective, the Fun Palace provides a concrete basis for a malleable social environment, an example of how the improvisational nature of the café's furniture and interior design can facilitate freedom of thought and action. Students would act as participants and project managers in this relational space (Bourdieu, 1985, p. 174): scene-shifters, constructing, dismantling and reassembling ideas as well as the screens (physical dividers and digital walls) to help open or enclose discursive spaces (Matthews, 2005, p. 79). Cycle-powered cinema/data projectors could embed participation in the form of community-dependent tools, communal gardens could grow seasonal food. The products of the dialogue and the gardens therein could be shared to strengthen the connection between space and activity, belonging and exchange, designer and participant.

Orchestrated by a weekly thematic 'menu' board in the form of a lightbox in the café-studio window, a public notice acts as an invitation to those in the geographically vicinity while the café builds a more interactive yet dispersed community online. Redundant information devices such as a cinema's film title display board or airport departure boards are already widely employed in urban bars and cafes as non-digital means of connecting with a local community. The 'menu' display acts as the spark for conversation in a non-scripted social interaction (Bourriaud, 2002, p. 26). The retro familiarity of these tools frames entry into the convivial café as an accessible and everyday occurrence, demanding no prior technological skills from the participants. Thematic and relevant to

current or ingrained socio-economic issues, the 'dish of the week' aims to provoke discourse through the tools of design, extending the digital engagement of a provocative Twitter comment in a more physical space. Sensory dimensions of the café-as-studio form a stage on which unscripted dialogue performs the act of (graphic) design, illuminating the possibilities of the discipline as an agent of change.

The first impression of the academic institution would not be a glass-armoured gallery – featuring sponsored representations of institutional pride – but a living process of designing: a zone in which (graphic) design is not conducted as a mysterious or hidden process but an open one. While many debating clubs and events aim to inspire social debate in urban environments, the argument itself and new perspectives that arise from this are rarely given visual form and fed back into the public sphere. In a collective and communal exchange, the design conversation in the convivial café becomes a product, embodied in maps, visual essays, interactive posters and so on, shared online. This alternative pedagogic community space aims to push the boundaries of design to encompass behavioural alternatives to the territorial exclusions of the academy and the industrial demands of corporate creativity.

## 4. Design discourse // rules of collective engagement

Each social space for sharing food has its own rules of encounter and exchange: the ritual meal, such as the wedding reception or birthday meal; the informal social dinner party or picnic. Often the formalities of working life are mixed (or muddled?) with more familial moments of sharing a meal, such as in the breakfast meeting, business lunch or awards dinner. So, although the rules of socio-cultural behaviour appear to be commonly agreed upon, each food sharing event demands mutually agreed roles of serving, giving and receiving. The participant in the convivial studio process therefore requires new or newly configured tools – linguistic, visual, conceptual, conversational, creative – to contribute without embarrassment. Just as cutlery, condiments and seasoning are available in the conventional canteen, appropriate resources for design dialogue are made accessible to 'design diners' in the convivial café. From pen and paper to Post-it notes, from spatial arrangements to touchscreen tables and interactive pens, diverse design media give visual and material form to complex or elusive ideas. Just as many restaurants encourage diners to draw on paper table cloths during a meal, the convivial café anticipates the table to be used as a sketchpad and notational tool. Students and participants would visualise the day's process online and in-café, mapping points of view as they converge and diverge, navigating new courses through re-orientation of ideas, skills, resources facilitated by digital media.

By identifying where networks connect – personal, social media, technological – the convivial café would aim to co-construct the voice of collective creativity through design. In its written and spoken forms the digital network connects intellectually and geographically disparate people, but a culture of trolling has also emerged in recent years, which seeks to silence those excluded from the (public) sphere of influence (Beard, 2014, *npag.*). For Max Bruinsma (1999, *npag.*), "designers should be re-evaluating their role in multimedia communication. The designer has effectively become a co-author and co-editor of messages, and



operates increasingly often in close cooperation with others.” Conviviality is framed, therefore, not only as a method of reciprocal discourse but also as a rule of amiable self-regulation to encourage those who rarely join the debate for fear of censure to be heard. An opportunity to share radical education experiences and knowledge, is provided by means of congenial conversations which take place in a (relatively) neutral and reciprocal context.

As a mode of connecting educational institutions with untapped local resources, the convivial café would seek to invite those with unrecognised expertise from the immediate area to add human knowledge to the design process in an outward-facing approach. This social form of interchange is similar to the human library where “individuals identify themselves as human ‘books’ with a specific ‘title’, in order to be ‘read’ by a member of the public” (Harris and Buckley, 2014, *npag.*). In the form of a technical skill or a historical narrative, the participant enhances the mediation of meaning by co-constructing its content and defining future networks leading to stronger community roots. Within the academy, students are also searching for more communal inter-disciplinary experiences at art school despite an increasingly connected digital social framework: a secure negotiation of differences and the delightful discovery of conjunctions. Design studio Europa’s ‘work for work’ project extends the idea of exchange as knowledge but focuses on two-way relationships in a smaller-scale operation. Skills are shared or swapped between student and tutor or technician in an exchange economy that shifts value from institutional marking criteria to actual use-value. In their words, the “exchange of labour allows each party to experience how the other works first hand, giving both a strong understanding of the other’s practice” (Frostner, *et al.*, 2007, *npag.*).

Confirmation that the convivial exchanges at art school or university have socio-economic value is evidenced by Google’s (2017) ‘Campus Cafes’ for young start-ups. Here, the spirit of the college campus is re-created without the accompanying cost or commitment. Tempted by free Wi-Fi, “an infectious energy, and lots of fellow founders, the Campus Cafe is a great place to get things done, take a break, or collaborate with like-minded people. The Campus Cafe sells fresh coffee and healthy food options to fuel great work” (Google, 2017, *npag.*). The opportunities that the academy offer society and business lie in its adaptability to new technologies and structures, despite increasingly rigid institutional systems. Yet critical reflection is important in a rapidly changing world, determined by digital behaviour and market forces. Therefore, the social spaces anticipated at art school or university are framed as material critical tools in the convivial café: not merely neutral rooms, blank pages, in which all context is created, this space anticipates productive discourse and unexpected possibilities.

The convivial café seeks to continue where Price and Littlewood’s Fun Palace left off, by synthesising critical design with socially-orientated theories derived from information technology, game theory, and performative design pedagogy to produce a new kind of improvisational discursive space (Matthews, 2005, p. 73). On the edges of the academy the convivial café-workshop-studio negotiates the constantly shifting contemporary cultural and socio-economic landscape by co-creating agency, which is enacted in an open-ended mode of design.

## 5. Summary and conclusions

The convivial café is proposed in this paper as an extension of two convergent approaches to design discourse. The first takes inspiration from the experimental architectural vision of Cedric Price and Joan Littlewood’s Fun Palace devised in

1960s London: a highly adaptable framework for social interaction. In this fluid form of architecture the walls are not only conceptually movable but also physically responsive to the actions of the people within it (Matthews, 2005). From a more theoretical analysis of contemporary culture Nicolas Bourriaud's (2002, p. 113) relational art takes human relations and their social contexts as the basis for initiating artistic practices.

In a radical reconfiguration of art school (and design education) the convivial café is conceived as both an interactive architectural concept and a productive mode of social discourse with diverse audiences. In this synergy of the café and design studio-workshop, convivial debate is identified as central to Redo-ing design: a collaborative response to the complex social and environmental challenges that face today's local and global communities facilitated by sharing food and drink (Cumulus, 2017). This café-studio for open-ended production and social exchange is designed to alleviate the pressure on students, encumbered with repaying vast debt and fearing failure through risky enterprises, on the one hand. On the other hand, the convivial café-studio sits at the entrance to the art school building, but on the edge of the academic institution, both conceptually and architecturally. The glass-fronted window into the art school is reconfigured as an invitation to local communities to participate on site and less geographically located audiences to join the process of design thinking and making online.

Framed as a design studio and workshop the convivial café is hybrid by nature and in practice, containing basic manual design tools such as paper and pens, scissors, glue, lightboxes, cameras but also advanced digital media. The humanity of exchange and co-operation is facilitated in the café through shared food and drink, which can help to break down barriers and opens discourse. Agile thinking is essential to the fluctuating contexts of design but not in a techno-utopian rejection of design's social value (Dunne & Raby, 2001, p. 6). Therefore, the social interventions of the café are interlaced with the playful actions in the design workshop to gain trust and to instigate discourse across diverse participants. In this human-centred approach to design discourse the convivial café-studio seeks to Redo design as an interface that is underpinned by amiability, play, invention and exchange. In this way, the institution starts a convivial conversation with community groups, policy-makers, activists and businesses, through which to pro-actively participate in the decision-making processes of life and work.

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# Design Competencies Futures. How do we REDO Design Education?

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**Abstract:** The REDO biannual Cumulus 2017 conference in Kolding describes “how designers struggle on many levels to gain influence on the decision-making processes” and that we need to “rethink design-doing.” In our professional and didactic experience, designers not always have the language or terminology to convey the depth, value or validity of ‘design-doing’ contributions to these decision-making processes. This raises the question whether design education can do a better job in providing language that can help design students articulate what makes ‘design doing’ so special and relevant.

In order to better articulate the value, depth and validity of ‘design doing’ we have developed a framework of design competencies that maybe helpful to other design educators to define, organize and measure the value of ‘design doing’, and help future design practitioners to better understand and communicate the value of what they have learned.

**Keywords:** Design competencies, curriculum mapping, design thinking, design doing

## 1. Pedagogical Context

The increasing attention for design and design thinking in academic (Dorst, 2011) and business discourses (Martin, 2009) warrants a more introspective attitude on what learning exactly is being acquired by design students. It is our hypothesis that the humble, everyday activity of learning to ‘make things’ or ‘design doing’ provides the fertile ground for the acquisition of so called 21st century competencies like creativity, collaboration, self-directed learning (Pellegrino, 2012) and the ‘creative confidence’ (Kelley, 2013) needed to embark on open ended projects without defined outcomes. Yet as educators of ‘design doing’ we lack the language to explain students what competencies are being developed within the iterative, reflection-in-action cycles (Schön, 1983) that characterizes design education. As educators, we need to better articulate the learning outcomes of design curriculum, and in a holistic way clarify how ‘design thinking’ is acquired through ‘design doing’, which in turn is driven by intrinsic motivation, curiosity and a passion for learning design. In

other words, the ‘what’ students are doing needs to be accompanied with a reflection on the ‘why’ this is important to their growth as a designer within the evolving context of the iterative design process. But do we have the language and terminology to name the many intrinsic, implicit characteristics of this deep learning process?

This need for clarifying the rich nature of learning design brought us to review the original three taxonomies of learning, developed by Bloom. Originally, Professor Benjamin Bloom and his colleagues at the University of Chicago identified three taxonomies of learning (1956) and then first detailed the cognitive domain, as this was closest to their own expertise and background. While the psychomotor domain and the affective domain were developed, and detailed by other learning and learning-assessment researchers, they are rarely seen as related or integrated. For instance, you would either learn something in a cognitive sense at the university or master technical skill or manual operation in the psycho motor domain.

Yet as designers, we know that the act of design is a closely interwoven mix of thinking, doing, and feeling. In our educational practice, when we explain to new students what design is and how they can learn it, we stress that professional designers use their hands, heads, and hearts. You need to learn to make things by using your hands and you need to feel what you are doing. This hands on, engaged heart process ignites thinking and reflection capacity. While this may sound obvious to design practitioners, most regular universities place strong emphasis only on the knowledge side of things - the cognitive domain. In our view, this privileging of the cognitive domain alone is one of the shortcomings of traditional university education. Design education is unique in that it connects learning in thinking, doing, and feeling right from the beginning of a student’s education. We frame this connected, integrated and sensorial learning as competency in design.

## 2. Levels of Design Education

Further to our identification of competencies as the main ‘currency’ within design education, we have identified three levels of how learning design may be organized in a curriculum map, while providing flexibility to educators and administrators in responding to the fast-changing profession of design. The three levels are; design context, design competencies, and design meta competencies. Figure 1 below presents a graphical representation.

- *Design Context:* This level defines the current and future context in which a designer operates. The term ‘Design Context’ levels introduces students to three granular structures in which the field of design is often understood, namely; ‘design process’, ‘design typology’ and ‘design themes’. The Design Context level is the most specific to the program, the design discipline being taught and the regional/national and cultural backgrounds, and is most easily adaptable to changing circumstances, something we aim to explore in the workshop. While themes like ‘Sustainability’ are nearly universal in its validity, each Design Program needs to assess within its specific cultural, economic and political context which themes are most strategic to the future professional landscape, an exercise that needs repeating every five years or so to be able to respond and resonate with ever-evolving changes in society.
- *Design Competency:* In our view, one of the hallmarks of higher level cognitive skills in diverse learning environment is that they are intricately part of hands-on, collaborative, integrated and iterative cycles of feeling, thinking and doing. Following Bloom, we have



framed these cycles of feeling (affective domain), doing (psycho motor domain) and thinking (cognitive) as competencies. (definition: behaviours, knowledge and skills in a certain content domain). In our workshop we aim to share, compare and develop up to twenty identified design competencies that may be of relevance to design schools depending on their program, region, discipline. In the workshop we aim to share, compare, develop and identify design doing competencies that may be of relevance to design schools depending on their program, region, discipline.

- *Design Meta Competency*: ‘Overarching’, higher order competencies, which facilitate adaptation of what students have learned and help them to become more flexible and resourceful when dealing with new, unknown challenges (Overbeeke, 2004). It is the so called higher level Design Meta Competencies (like creativity, originality, self-directed learning and creative confidence) that have gained so much attention within the discourse on design thinking, that are hardest to acquire and to embed in a meaningful way in curricula. In general, embedding meta competencies requires the biggest overhaul of the curricular structure. In our workshop, we will share an international perspective and a short list on Design Meta Competencies, discuss strategies for how to embed these in a granular, meaningful and effective way into design curricula, and to empower students with the tools to understand and communicate.

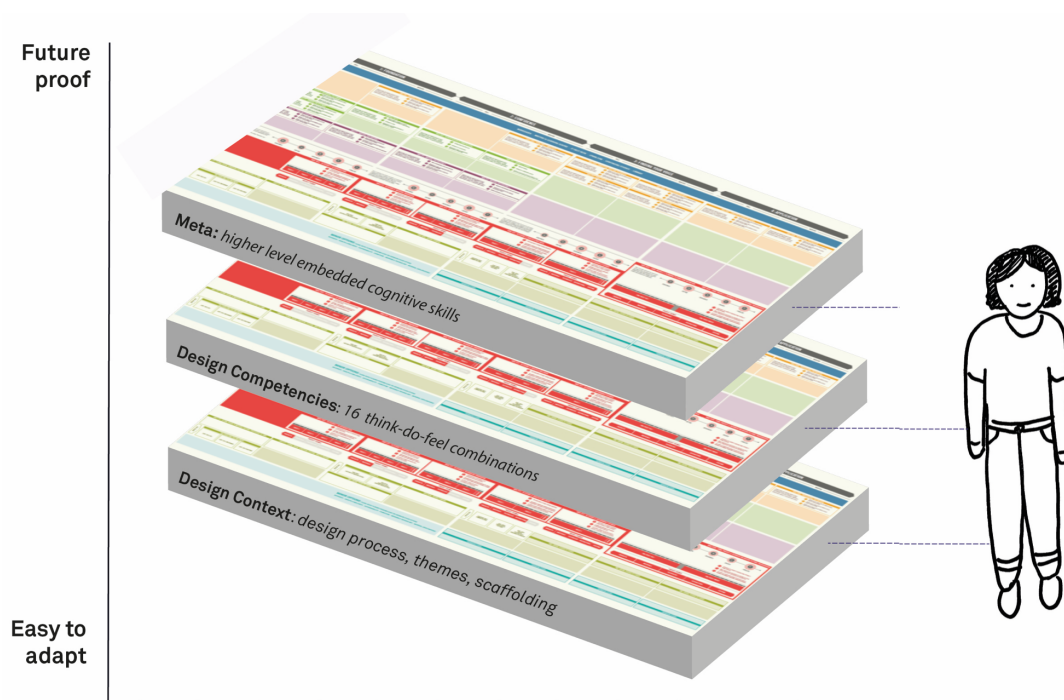


Figure 1. The Three Layer of curriculum mapping

### 3. Student Learning Example

To illustrate how Design Context, Design Competencies and Design Meta Competencies interplay at any given moment throughout a students' education, the example below describes a moment in the project of one of our fourth-year Industrial Design students designing furniture for a palliative care environment. The picture presents the student laying on a table. She is role-playing in order to

empathize with being a palliative care patient. She tries to imagine what it is to be lying on a bed knowing he or she will die in. While she is engaged in this immersion activity, she is sketching different functions patients and caregivers would need the furniture to fulfill. Previously, she has reviewed the available literature and spoken to a series of health-care practitioners; now, in the moment captured by the camera, she is identifying requirements for her project.



*Figure 2. Fourth Year Industrial Design student role playing in order to elicit design requirements for furniture in a palliative care environment.*

From a 'Design Context' point of view, the student in the example above is in the research stage of the Design Process, aiming to create furniture within the Design for Health domain (one of the Strategic Themes). Within the example presented above, the student is applying three Design Competencies, and one Design Meta Competency at the very moment of doing the exercise:

- *Understanding people Competency:* The student is able to use qualitative design research methods to iteratively evaluate design results). She can reframe her own project based on emerging user insights and is able to iteratively engage with users in all stages of the design process.
- *Visual Thinking Competency:* The Student can fluently use drawings, diagrams, thumbnails, charts to understand the world around her and is able to visually analyse, conceptualize and articulate product requirements, processes and interactions. She is able to use this competency individually, collaborative and in sessions with her clients.
- *Form Development Competency:* The Student can develop meaningful and aesthetic form solutions. She develops her own voice in form development while working within the constraints of structure, context and materials and apply role of semiotics within the development of a project.
- The meta competency at work here is that of having 'Creative Confidence'. The student displays intrinsic motivation and courage (to

do the role-playing exercise in public), which drives her to experiment, iterate, and take ongoing risks. The student is able to reflect on what she learns throughout this process and redirect when necessary.

We hope that this brief example illustrates the usefulness of identifying Design (Meta) Competencies and Design Context in order for students to find language and terminology to better express the value and depth of design 'doing' in decision making processes. Please note that the current overview of identified competencies is by no means complete. In the next section, we present an outline for a co-design workshop intended for educators to jointly discuss, define and develop competencies and strategies for embedding these in curricula.

The workshop proposal outlined below aims to introduce participants to a framework of 'design doing' competencies that allows for diversity and scalability in usage, while appreciating the different cultural, national and regional backgrounds and variations for different design disciplines. In the workshop, we will guide participants through a series of hands-on exercises and 'visual thinking' experiences that enable design educators and practitioners to define and detail dynamic, open design competencies in a playful, energizing way.

## 4. Workshop proposal

*Design competencies Futures Research group.* Four design schools from Europe and Canada have teamed up to initiate a discourse on the use of the Design (Meta) Competencies as a language to define, measure and communicate the value of design 'doing' education. Some of the current questions we are exploring in our curriculum design are: How does having access to a competency model affect how students see their own learning development? How can the design competencies be used for more effective learning outcomes assessment? How can we use the competency framework in hybrid courses like 'Design Management'? While we are exploring these questions in our universities, we hope to ignite a collaboration and platform on a larger scale, to create a 'movement' or a 'community' on design competencies, a shared platform through which we can elevate design education and curriculum design to a higher plane.

*Workshop outline.* In an interactive, hands on session, we hope to gather fellow educators and administrators in a working group, brainstorming and design thinking through a series of hands on exercises that aim to have very concrete results. The format is more of a participatory design session or co-design activity than a traditional academic workshop (of sharing case studies and methodology). Assuming a half day period with approximate 20 to 25 participants, we envision the following three exercises:

- *Exercise 1: Understanding differences and similarities in design education competencies.* In this first exercise, we propose to use a mapping of different design undergraduate programs (e.g. graphic design, interaction design, design management, and environmental design) and charting out a students' capstone project, identify which Design Competencies are program specific, which Design Competencies are shared amongst different programs, identify Design Competencies not yet mapped and what Design Meta Competencies programs have in common.
- *Exercise 2: How Meta Competencies can be embedded in curriculum.* In most research and discussions around education, Meta

Competencies like ‘creative confidence’, ‘self-learning’, ‘communication’, ‘being creative or original’ are highly valued, but it is less clear how to embed these Design Meta Competencies in the day to day curriculum, and be tracked or measured over time. In this exercise, we aim to use a series of curriculum mapping and visualization methods in order to articulate how Design Meta Competencies and their respective development could be engrained in (typical four-year duration) design program structures.

- *Exercise3: developing a Design Competency movement.* Based on the definition of the Meta, Design and Program competencies, the workshop will offer plenary discussion on how a shared and evolving language of Design Competencies can be instrumental in fostering collaboration, furthering the discourse on design thinking vs. design doing, initiate shared design research topics and in general; help develop a language in which we can better express the value of design ‘doing’ education within the larger context of 21st century skills and the overall creative economy.

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# Re-do Moodboards: How to wear Milano

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**Abstract:** How to Wear Milano is a fashion collection and a video moodboard created by Jihye Min (Master in Fashion Design 2016, Domus Academy), which shares in an understandable yet visionary way the iterative approach that led to her graduation collection. Jihye, who grew up in Korea and studied in New York, focused on her intimate ride through the city of Milano and manipulated it as the inspiration for her designs.

Once the collection was completed, Apple invited Jihye to reconsider her design path through visual thinking with an iPadPro and ApplePencil. The student relooked at her design journey and synthesized it into a short film, as an expression of her experience and an interpretation of design thinking within fashion design education. This project highlights students' potential for experimenting with technological tools, to do and redo designs and discover innovative ways to communicate unfamiliar creative processes to wider audiences.

**Keywords:** Moodboard, Fashion Design, Smart Education, Design Process, Visual Thinking

**Film Contribution:**

<https://www.youtube.com/watch?v=kkYcmH2YcRk>

# Re-do Bauhaus. Recreating the Spirit of 1923

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**Abstract:** Technology today is changing exponentially, outpacing our abilities of comprehension. Digital tools inform and shape our work in ways we are often not aware. There is anxiety caused by rapid change. However, designers faced similar circumstances after World War 1, when icons such as Le Corbusier and the Bauhaus led a vanguard for change and modernisation in the face of advancing mechanization. Re-Do Bauhaus is a proposal to recreate and reinterpret the famous Bauhaus Exhibition of 1923 using today's digital technologies. The intent is to connect today's students and practitioners across disciplines while reminding us of contributions from the past. The proposal is a grand collaboration, taking its structure from Le Corbusier and the Bauhaus. It is hoped that, by looking into our collective past while sharing tools and processes, we can recreate the spirit of collaboration and experimentation from 1923 while encouraging mastery of our digital tools.

**Keywords:** Technology, creative apprehension, collaboration, space-time, anxiety

## 1. Introduction

History is, by definition, the study of past events, interpreted through contemporary eyes. We study history to inform ourselves, to assist in making better choices moving forward in this rapidly changing, 'twittering' world. We look backwards to better go forwards. A more poetic view of history might be as a conversation between peoples across the canyons formed by time. We hear the echoes of those who came before, should we choose to listen. This paper proposes the design community embark on such a conversation, structured as an exercise to 'Re-Do', in hopes we gain insight and take forward lessons that inform and inspire in the face of rapid technological change and societal upheaval.

The action plan is to 'Re-do Bauhaus', for the Bauhaus is a simple and readily understandable reference for many in the design community. However, there are a multitude of voices from the past whose echoes should be heard for this action plan to truly resonate. There is the Bauhaus, the new school of Art and Construction formed in Weimar Germany by Walter Gropius in 1919, a merger of

the Grand Ducal School of Arts and the Weimar Academy of Arts. The Bauhaus was a place of interdisciplinary design study and integration, with a focus on collaboration and experimentation. The school was short lived, but its impact on modern design is still felt today, as it approaches its centennial. There is also 'Haus am Horn', a construction artifact left us by students of the Bauhaus. A house designed by professor George Muche, 'Haus am Horn' was furnished and outfitted entirely by the various departments of the Bauhaus. It was built for the Bauhaus Exhibition of 1923, the only time during its short-lived (14 year) existence that the school opened its doors to public view. Another voice is Swiss-born architect Charles-Edouard Jeanneret, better known to us as Le Corbusier, whose polemic essays were turned into a book on new architectural directions, also in 1923. Le Corbusier's action plan for post-World War 1 housing will also echo, as will his words on social upheaval. These particular voices help give our action plan structure, but other voices also echo across the canyon.

'Re-do Bauhaus' proposes to link contemporaries within varying design disciplines, and connect with our larger culture. The purpose is to spark dialogue that renews the spirit of collaboration and synthesis in design. We can create circumstances that allow the design community to consciously harness contemporary technology while optimizing collaboration. The proposal is to digitally recreate and reinterpret the Bauhaus Exhibition of 1923 under terms and conditions applicable to members of the design community today.

## 1.1 A Word on Progress

"Modern science has imposed on humanity the necessity for wandering. Its progressive thought and its progressive technology make the transition through time, from generation to generation, a true migration into uncharted seas of adventure." (Alfred North Whitehead, 1925, p. 298)

Where has time's migration led? Quantum computers, digital eyeglasses and self-driving cars are now reality. We control thermostats, program appliances and pay bills using smart phones. We heal using plastic tracheas and kill using plastic guns, all fabricated on the same 3-d printer. Last year's science fiction is this year's science fact. We are in the midst of great technological and sociological migration, drifting and bobbing into the unknown with navigational systems seemingly disabled and rudders similarly disengaged. Our last known reference points were somewhere between creative apprehension and social disquiet. We are an anxious society, and want to find our bearings.

"Society is an unstable thing and is cracking under the confusion caused by fifty years of progress which have changed the face of the world more than the last six centuries have done." (Le Corbusier, 1923, p. 101)

*Le Corbusier's* observations on technological change anticipated computer scientist and futurist *Ray Kurzweil's* '*Law of Accelerating Returns*' by 78 years. *Kurzweil's* law states that technological change happens not in a linear fashion, but exponentially. The rate of technological change is itself accelerating. As with the rest of society, architects and industrial designers are experiencing this acceleration. Our tools, processes, education, in fact our whole systematic understanding of design is undergoing massive transformation, similar in effect to what *Le Corbusier* experienced during the industrial revolution. We are not unique. We are merely further down the arc of change *Le Corbusier* previously observed.

With a multitude of choices in digital media and software, technologies influence our designs in ways we are often not aware. However, we have the capacity to understand and influence those forces affecting the migration referred to by *Whitehead*. We seek a collective understanding of where we as designers are, and how we, active in various and often overlapping design specialties, can interact using the expanding palette of tools and technology available. This paper will chart the evolution of graphic representation of buildings, to demonstrate how the tools and methods of representation affect creative apprehension. It will acknowledge the unease and challenges associated with societal and technological change and uncertainty. It will revisit actions of the *Bauhaus* and the call to arms issued by *Le Corbusier* back in 1923, before making its own recommendations moving forward, structured by the past.



Figure 1. Bauhaus Exhibition of 1923



Figure 2. Le Corbusier

## 1.2 What is Design

“When a problem is properly stated, in our epoch, it inevitably finds its solution. ... Let us state the problem.” (Le Corbusier, 1923, p. 114)

Design is problem solving, through a process of creative apprehension. Designers perceive an object or experience that has yet to be created, and identify and work through the steps necessary to bring that object or experience into being. The process is not always linear, and not always obvious. It is however a process, a method of thinking that one can be trained to apply. The training happens across a multiple of disciplines, with variants dependent on vocation. There is design training for architects, urban planners, industrial designers, interior designers, software designers, lighting designers, and on it goes. There are any number of fields that by their nature employ people who utilize skills of creative apprehension for development of a product or experience. There is a commonality to the processes we employ.

## 1.3 How is Design Conveyed

A key component of design, of creative apprehension, is information communication. Drawings are one such form of communication. For example, architects convey design intent through a series of representations culminating in fully developed construction documents. Each iteration of drawing builds on the last, and communicates design intent to parties such as the client, the community,

the regulatory bodies, and ultimately the builders. We do so graphically, by means of drawings, or at least that has been the traditional method until most recently. Other design disciplines employ other methods of graphic communication. Many feature commonalities. As technology advances, we collectively see advancement and changes in how design information is conveyed.

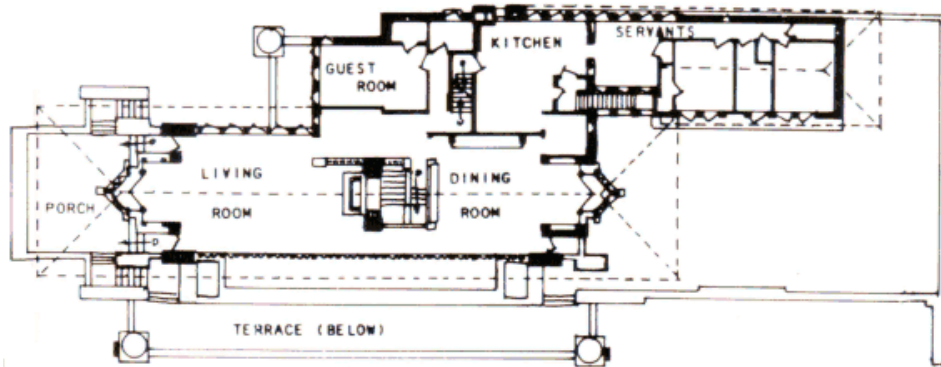


Figure 3. Floor Plan – Robie House (Wright)

In *Le Corbusier's* time, architects drew on linen sheets. The information being conveyed was limited. In the mid 20<sup>th</sup> century, mylar sheets replaced linen. Mylar's transparency allowed us to overlay multiple layers of information (i.e. structure, mechanical, plumbing, electrical) using pin registry. The accurate overlaying of information enriched our abilities to creatively apprehend the end product, as more technical information could be layered onto the document. Buildings became more sophisticated along with the methods of documenting them. Over time, Computer Assisted Drafting (CADD) replaced pin registry, and multiple disciplines began sharing information digitally. Time-consuming coordination processes sped up as information could be overlaid ever more quickly on the same electronic file. We now enter a new phase, where object information is inserted and modeled 3-dimensionally, and file manipulation opens to multiple disciplines. Buildings and their internal components can now be represented a multitude of ways, with a variety of results.

CADD technologically may replace pen and ink, but for some architects, standard representations (plan, section, elevation and detail) remain the preferred forms of design development and communication, much as they were 100 years ago. These methods reflect *Le Corbusier's* dictum '*the plan is the generator*' (*Le Corbusier, 1923, p. 45*).

Other designers incorporate a combination of the above with 3-dimensional tools (such as Google Sketch-up, Rhino or Modo). This allows designers to study form, before converting the information into a conventional drawing package where required. This is a more plastic approach – apprehending the building in 3 dimensions. Architects are learning to incorporate such tools. The influence of software in assisting to generate and inform the design cannot be overstated. To employ form-generating software prior to extracting the plan, to have the form inform the plan, changes the design generator. We see currently a multiplication of architectural designs based on form, with lesser attention paid to the expression of function. A myriad of form-generated buildings are being designed and executed currently which could not be imagined prior to our digital age.





Figure 4. Walt Disney Concert Hall, Los Angeles (Gehry, 2003)



Figure 5. New Dome over the Great Court at British Museum, London (Foster, 2000) Complex form buildings such as these such as these are not possible without today's computer-assisted design technology

A new form of building representation that is garnering momentum now is BIM (Building Information Management). BIM creates an interactive information model extending beyond graphic representation. The model becomes embedded with information pertinent to the life cycle performance of the building. The components embedded in the BIM model can be inserted by different parties; parties representing different building and design disciplines. This model holds particular intrigue as the model contains sophisticated information of interest to a broad spectrum of not only designers but also end users. This approach sees the building as preconceived bundles of data. Great Britain is on the vanguard of this

change, as the U.K. Government has mandated all government construction projects employ BIM.

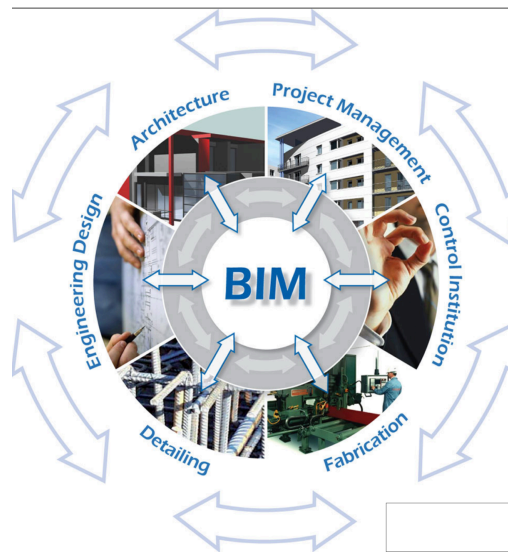


Figure 6. BIM

BIM changes the hierarchy of design in architecture. As the model is interactive, input comes from multiple designers simultaneously, allowing the design to evolve more organically; less hierarchically. Clients have access to information projecting future building performance, allowing for critical input from commissioners and users of a project. There is a more direct role for sub-disciplines as they embed their information into the model. There is also a need to maintain the digital model, creating a new and unique sub-role within architecture for active information management.

The BIM is at first glance operative independent of a design generator, be it a plan or form design. BIM deals with questions of material content and lifecycle performance within the building. It has potential to significantly alter the roles of various designers in the building industry, and increase the quality of input allowed by the non-designer. One question is whether the architect controls the design, or merely maintains the information being inputted. For example, direct feedback on façade performance may spark more direct interaction between client (who ultimately commissions the building) and the industrial designers at a window company, responsible for thermal performance and energy savings. Any direct interaction between such two parties resulting in changes to the building model reflects a change in how the design is being generated. This is one of many ways the interaction in building modeling may lead to a less hierarchical, more collaborative design model of future buildings. This alters the 'generator' of the design.

Cloud technology further enhances feedback. Drawings on paper now morph into images on a screen. Today's drawings can be uploaded to the cloud and updated via hyper-link technology, similar to a *Wikipedia* page. Live -time updates from multiple parties are possible, with all parties involved in the design able to access the latest version for review, action or modification, whether in the design phase or out in the field. For this to be managed successfully, someone must act as gatekeeper for the information upload.

## 2. Impact

### 2.1 The Impact of Tools on Design

“Humans do not choose technology ... technology forms the background for their choices.”(Peter-Paul Verbeek, 2000, p. 179 )

Any technology chosen for building representation will resonate in the final design solution. The designer, trained and comfortable with a certain form of software or digital technology, will find design solutions reflective of that particular vocational knowledge. We are not conscious of the extent technology shapes our design thinking. The example that follows is drawn from personal experience.

In 1993 I assisted in production of a play, a romantic comedy entitled *“The Contract.”* My role as graphic designer involved designed advertisements, including a logo the public would (hopefully) identify and associate with the play. One young actor appearing in the play had taken a desktop publishing course, and offered to take my conceptual sketches to production. After several days he returned my sketches, informing me the logo was unsatisfactory, and I had to design a new one. The problem, as he diagnosed it, was that my design contained curves that his computer could not replicate.

“...how do we become aware of the effects of alphabet or print or telegraph in shaping our behaviour ? For it is absurd and ignoble to be shaped by such means.... the influence of unexamined assumptions derived from technology leads quite unnecessarily to maximal determinism in human life. Emancipation from that trap is the goal of all education. ” (Marshall McLuhan, 1962, p. 247)

Technologies that assist in design limit us if we are not conscious of their trappings. We forget who is in control, and accept limitations imposed by the technology we choose to use. I finished drawing the logo for production using ink on vellum and employing a french curve. The object lesson is to use all the tools in the toolbox. If the supply of tools becomes exhausted, and the designer has still not achieved their desired goal, try reaching for a different toolbox.

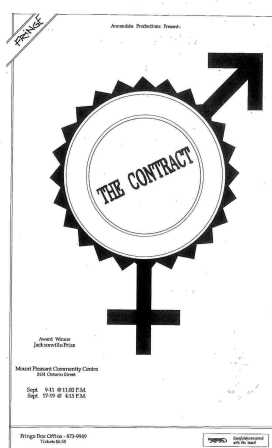


Figure 7. Logo for 'The Contract'

## 2.2 The Impact of Proximity and Collaboration

“Today, after more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned.” – (Marshall McLuhan, 1964, p. 03)

I practice architecture in Vancouver, Canada, a city of 2 million people. My product is mass housing, and my training broad. I work with engineers, industrial designers, interior designers, graphic designers, millwork designers, and software designers on a variety of design problems. I trained at the University of Oregon, a design school encompassing architecture, interior architecture, furniture design, fine art and urban planning. My school encouraged cross-disciplinary study, emulating the *Bauhaus* spirit. (On a more personal note, my mentor at University, the late Rosaria Hodgson, herself trained under Gropius at Harvard).

Communication, collaboration and interaction were hallmarks of my education.

That *Bauhaus* spirit has now dissipated, as planning courses were relocated, remote design campuses emerged, and cross-disciplinary dialogue eroded. Today the study of architecture is divided – there is one school with a design-based curriculum and one across town that is technologically based. Industrial Design is taught at an art college, while digital communications, non-existent 20 years ago, is taught yet elsewhere. Graphic Design is taught elsewhere again. This is not unique. Locations for study are spreading. While more educational programs is a good thing, the lack of proximity between campuses inhibits opportunities for young designers to physically interact, converse, and share perspectives. A collaborative design approach is thereby challenged.

One can counter that, with electronic media, and digital communications as they are now, there is no longer a need to be physically united on campus to learn the syllabus provided. But design is not learned by syllabus. It is learned by process. That process cannot be learned remotely. Digital means of communication, no matter how sophisticated, cannot replicate the quality of communication garnered from interaction and dialogue.

## 2.3 Impact of Changes in Digital Communications

“Electric media... abolish the spatial dimension, rather than enlarge it. By electricity, we everywhere resume person-to-person relations as if on the smallest village scale.” (Marshall McLuhan, 1964, p. 256)

According to the Radicati Group, A U.S. research firm, 205 billion e-mails were sent any given day during 2015. We work at desktops, screens in front of us. Our focus is ahead. Ear-buds drown out background noise. Screens alert us to incoming e-mails. Our phones connect us digitally as we move about our cities, assuring we are never far from our work.

Our computers connect us with one another, but screens blind us, the ear-buds we plug-in to eliminate ambient noise deafen us to our colleagues, and sheer intellectual laziness renders us mute with one another. How often do we send an e-mail, only to telephone the recipient to ask if they received it? Direct communication has become a back-up plan, a redundancy, used as a last resort. We have altered behaviour patterns to suit digital media, lessening our tendencies towards direct dialogue. This only increases the opportunities for misunderstanding.





Figure 8. Texting Lane



Figure 9. Fire Exit Sign

McLuhan could foresee that the telephone, '*speech without walls*', would enhance direct communication and close the gap in space-time. What he did not foresee was how the telephone would become supplanted by e-mail, a technology where statements can be directed at a party or multiple parties without the requirement of any further engagement. Statements can be issued at any time, whether others are currently involved in the 'dialogue' or not. With more involved or nuanced messages, it is up to the recipient of a statement to interpret its tone and meaning. Equally, McLuhan could not foresee other technologies derived from the advent of the personal computer. He did not anticipate government decrees by 140 character Tweets, or that telecommunications plans would shape language by promoting the use of acronyms and emojis that restrict the length of our messages. Space-time has been shortened even further, but at risk of bypassing direct communication. We are not always successful interpreting the messages, a cause of modern anxiety.

"It is impossible to accede to a fundamentally new environment without experiencing the inner terrors of a metamorphosis... for our mind to adjust itself to lines and horizons enlarged beyond measure, it must renounce the comfort of familiar narrowness.... The whole psychology of modern disquiet is linked with the sudden confrontation with space-time." (Pierre Teilhard de Chardin, *The Phenomenon of Man*, 1955, p. 226)

Communication technologies speed our transition through space-time and shrink our universe. This can enhance relationships, improve business, and affect positive change. But it is also disruptive, and provokes anxiety. Drawbacks are such that the French government introduced legislation restricting the use of e-mail, allowing workers the '*right to disconnect*.' Society is in the throes of a metamorphosis sparked by technology's impact on our concept of space-time.

"Our capacity to access information has grown to the point where we are in danger of overwhelming our capabilities to process it. The exponential growth in the power of our computers and networks, while opening vast opportunities, is outpacing our human abilities and altering our forms of communication in ways that alienate us from each other." (Neil Turock, 2012, p. 209)

That we are in danger of being overwhelmed by technology is a negative. However, by reflecting on change clinically, we have an opportunity to frame a discussion about how to navigate our ever-changing technological landscape.



## 3. Lessons

### 3.1 The Lessons of Collaboration

“Another great fact confronting the modern world is the discovery of the method of training professionals, who specialize in particular regions of thought and thereby progressively add to the sum of knowledge within their respective limitations ....This situation has its dangers. It produces minds in a groove. Each profession makes progress, but it is progress in its own groove.” (Alfred North Whitehead, 1925, p. 141)

Designers are separated by geography, discipline, training, and as significantly, by our technology, the tools we employ. Technological advances can be deterministic in our work, and we are not always conscious of our tools. As Marshall McLuhan elegantly offered, we haven’t yet designed our education to meet the new forms of media on their own terms.

There are ways to counter the new forms of media and traverse the chasms in our shrunken universe. One such way is to collaborate across disciplines as well as cultures. To do so effectively, we must gather to share our tools and experiences. As an example, the *World Design Organization* (formerly *ICSID*) periodically sponsors an event known as “*Inter-design*”. This periodic gathering of young designers from dissimilar backgrounds and countries, representing various disciplines, is one example of a grand collaboration. Designers are tasked with addressing a particular design problem, operating from one space, skilled in new digital tools, in collaboration with one another. The process reveals new possibilities.



*Figures 10 & 11. Pan- Nordic Embassy, Berlin (various architects – completed 1999). Six architectural firms collaborated, with one firm taking charge of the master plan and unifying ‘skin’, a ribbon of operable copper louvres that surround the complex, bringing cohesion to the design. This is a fine example of successful design collaboration.*

### 3.2 The Lessons of History

“Time present and time past  
Are both perhaps present in time future,  
And time future contained in time past.

If all time is eternally present  
All time is unredeemable.  
What might have been is an abstraction,  
Remaining a perpetual possibility  
Only in a world of speculation  
What might have been and what has been  
Point to one end, which is always present”

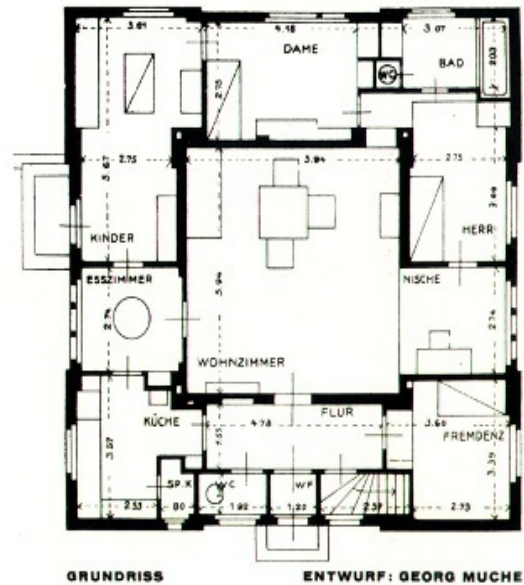
(T S Eliot, *Burnt Norton*, No. 1 of Four Quartets, 1943)

Looking backwards, the *Bauhaus* lasted but 14 years (1919- 1933). It collapsed under the weight of competing expectations and rising chauvinism. However, this era fascinates designers. Perhaps it is because of the talent involved, at the teaching level (Gropius, Mies, Mahol-Nagy, Paul Klee, Kadinski, to name but a few) and on the Board of Governors as well (notably Marc Chagall, Peter Behrens, and Albert Einstein). The *Bauhaus* is synonymous with modern art, architecture and design. It's core curriculum included:

- architecture
- sculpture
- painting
- crafts

“The Staatliche Bauhaus ... has set itself the task of bringing art education ... into close harmony with the practical demands of today.... it has merged in its educational program theoretical instruction with workshop training, which will be cultivated in light of today's technological and industrial methods of production. ... Hence “building” as a synthesis is the aim of the individual Bauhaus Workshops (Cabinetmaking, Sculpture, Wall-Painting, Glass, Metal, Ceramics, Weaving Workshops, and Architecture Department).” An Invitation to Join the “Circle of Friends” leaflet, Governing Board of the Bauhaus, 1924

From July to September 1923, the *Bauhaus* opened its doors to public view and professional scrutiny in a showing known as the *Bauhaus Exhibition*. ‘*Haus am Horn*’ became the first (and ultimately only) structure built and furnished entirely by staff and students of the *Bauhaus*.



Figures 12 & 13. Haus am Horn - To state today's problem - can we synthesize endeavors associated with building in a manner appropriate to the technologies of the 21<sup>st</sup> century? Can we recreate the spirit of the Bauhaus?

As previously mentioned, contemporaneous with the *Bauhaus Exhibit* were the publication of the polemic writings of *Le Corbusier*. *Le Corbusier* wanted architects to think like industrial designers, and consider housing in terms of mass production. He urged fellow architects to embrace emerging technologies. As the works of two iconic design entities approach their 100<sup>th</sup> anniversary, the design community is being presented with a wonderful opportunity to reconnect with its past, collaborate across disciplines and boundaries. In doing so, the design community can redefine and repurpose itself towards a better future for modern society.

The coming centenary of the birth of the *Bauhaus* is significant, and there are already plans afoot to mark it within and outside Weimar. A new building and a celebratory exhibit are on the books, as well as commemorative postage stamps. All this is well enough, but when travel is required to pay our respects, the celebration loses accessibility. The *Bauhaus* should be honored, but not just with static buildings or traveling exhibits of static artifacts. The largest honour our society can pay the *Bauhaus* is to celebrate through improved and spirited dialogue amongst members of the design community, using a technology that makes our efforts accessible to the masses via cyberspace. With a concerted effort by designers, design educators and design institutions worldwide, we can re-synthesize in a manner reminiscent of the original *Bauhaus* experiment.

## 4. Bridging Space-Time - "Re-Do Bauhaus"

*Le Corbusier* urged us to state the problem. We now see the problem is lack of direct communication, isolation within our disciplines, and the accelerating influence of our tools play in undermining our ideas. The solution then lies somehow in the realm of direct dialogue, word of mouth, and shared experience. This requires a grand collaboration.

“Collaborators already consecrated to the task (big industry, specialized factories)

Collaborators who must be brought in (financial organizations, transformed Architectural Schools)

The aim: mass-production houses

(Le Corbusier, 1923, p. 264)

*Le Corbusier* wanted to engage architects and industrial designers towards common cause. Let us look back to *Le Corbusier* and the *Bauhaus* once more, and offer a suggestion moving forward. The design community could lead a larger dialogue using the upcoming *Bauhaus* centennial as a vehicle for engagement. This could connect where we came from, and demonstrate in space and time the state of applied design technology today.

“Writing, printing and the Internet give a false sense of security about the permanence of culture. Most of the million details of a complex, living culture are transmitted neither in writing nor pictorially. Instead, culture lives through word of mouth and example.” (Jane Jacobs , 2004, p. 05)

The process of design has evolved. As an example, architectural design was once rooted in form proportion and order. It is now much more influenced by process. To reintroduce the *Bauhaus* spirit and reconnect with its fundamental aims on today’s terms, using today’s technologies, there should be a design competition emulating the original *Bauhaus* exhibit, ‘*Haus am Horn*.’ This competition, ‘*Re-Do Bauhaus*’, should be structured to promote dialogue and collaboration, and directed at various design programs and industrial interests. This will engage a range of talents from architects and industrial designers to software designers.

This exercise would promote collaboration and interaction, both physically through working in proximity, and digitally, through the use of interactive digital modeling tools. Teams of collaborators would develop their own digital ‘*Wiki*’, inputting and updated their digital prototype model in consultation with one another, across respective disciplines. This can help new generations of designers learn to collaborate in a manner reminiscent in purpose of the *Bauhaus*. We can study the pre-digital history of design, while moving forward with today’s most up-to-date tools. Using ‘*Haus am Horn*’, the original house built and furnished by the *Bauhaus* as a template –engaging a web of designers in contemplation of mass needs in modern housing. Today’s tools will inevitably produce different and insightful results.

Borrowing liberally from *Le Corbusier*, the proposed competition requires two stages of collaboration,

**Stage 1** involves “*collaborators already consecrated to the task*”. This list consists of design professionals, educators, corporate sponsors who show interest, and historians familiar with the *Bauhaus*. These collaborators would design the competition brief. A well-designed brief, tailored for unknown outcomes requiring cross-disciplinary input, can target various disciplines across a broad base of educational institutions simultaneously. This allows opportunity for input from collaborators with various concerns, from sustainability to profit, and points in between. Stage 1 can be open source.

**Stage 2** is the execution of the design competition itself. This stage reaches out to “*collaborators who must be brought in*”. This list of participants includes teams from various design schools, corporate entities in the design world wishing to integrate their products into the design model, and information technologists to manage the incoming information,

The design community, both academia and business, has a window of opportunity to begin collaborating for this competition, culminating in a centennial celebration by 2023. This design competition could manifest several positive outcomes, including:

- the historic celebration of and reconnection with a dynamic design movement (the *Bauhaus*)
- increased understanding and mastery of digital collaboration for business and students
- new interpretations on modern housing that adapts to and employs today's design and production technology

“The hybrid or the meeting of two media is a moment of truth and revelation from which new form is born. “

(Marshall McLuhan, 1964, p. 55)

To celebrate the history of design requires reflection. To understand the impact of accelerating technology requires analysis. To learn and apply lessons from history requires action. ‘*Re-Do Bauhaus*’ addresses these requirements. By engaging new designers and sharing processes, we broaden our individual ideas of design, and better understand our role as part of a larger collective. Working in proximity engages discussion, and sharing tools can provide a better understanding of the applications of new technology. By re-connecting with those who went before us, we become more comfortable with change. By employing new tools and by recognizing and collaborating with new colleagues, we uncover new forms and new possibilities. ‘*Re-Do Bauhaus*’ can track our migration through space and time.

“With the Drawing of this Love and the voice of this Calling

We shall not cease from exploration

And the end of all our exploring

Will be to arrive where we started

And know the place for the first time”

(T S Eliot, Little Gidding, No. 4 of Four Quartets, 1943)

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# Three Dimensions of Psychologically durable Design

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**Abstract:** An important means to ensure more sustainable designs is to create products that last longer. In this context, in particular, psychological durability has received attention in recent design literature, since many types of consumer products are often replaced before their physical function is compromised. However, there are still no exhaustive answers on to how to create psychologically durable designs. To provide some clarification on this topic, this paper defines three distinct dimensions of psychologically durable design: instrumentally durable design, hedonically durable design, and symbolically durable design. These are explained by defining their main internal dimensions. Finally, the paper demonstrates the relevance of the three durability dimensions by providing empirical examples for each dimension, organised under five categories of means to achieve psychological durability.

**Keywords:** Psychologically durable design, sustainability, product longevity, consumer products, industrial design

## 1. Introduction

The world today is facing great challenges with regard to creating more sustainable ways of living. An important sustainability means is to make products more durable, thereby minimising the need for new products. Since consumer products are often replaced long before their physical function is compromised, psychological durability has received increased attention in the design literature (Cooper, 2004; van Nes & Cramer, 2005; Mugge et al. 2005; Chapman, 2009; Fletcher, 2012). The literature includes several explanations of why well-functioning consumer products are replaced, as well as a range of design strategies to increase product longevity. There are, however, still no exhaustive answers to these questions (van Nes & Cramer, 2005; Chapman, 2009).

In order to design products that are more psychologically durable, there is a need to better understand what produces such durability. One of the most discussed means in recent years is 'emotional durability' (Chapman, 2005; 2009). However, there are also other perspectives on producing long-lasting product relationships than ones focusing on emotional bonds. For example, studies by Mugge et al.

(2006) suggest that an emotional bond to a product does not necessarily result in a long-lasting relationship with the product, which they explain as being related to fashion trends that may be short- or long-lived and thus cause consumers to be attached to products for shorter or longer periods of time. Also, in some cases, designing products that are appreciated for working or being operated in a particular manner is a more relevant approach for addressing psychological durability, as this can build performance confidence and a sense of usage safety, which for some product types can be more important. Thus, to understand the full scope of psychologically durable design, there is a need for broader definitions.

Based on the discussion above, this paper addresses the question:

*What is included in the concept of psychologically durable design?*

The paper is delimited to focusing on consumer products in the form of ‘durable goods’ and ‘soft goods’, i.e., tangible products sold for non-business purposes, excluding convenience goods. This focus is chosen to limit the extent of the topic so that it can be addressed in a more concrete manner.

The remainder of the paper is structured as follows. First, literature related to psychologically durable design is reviewed. On this basis, the paper defines psychologically durable design by identifying three of its dimensions. Next, each of the three dimensions is clarified and subsequently illustrated with empirical examples. Finally, conclusions are drawn.

## 2. Literature review

There are several literature streams concerning strategies to increase product longevity. This literature is, however, scattered across different areas of research (i.e., engineering design, industrial design, fashion design, and marketing). Overall, a basic distinction can be drawn between absolute and relative obsolescence (Granberg as cited in Cooper, 2004). Durability in relation to absolute obsolescence refers to 1) the ability to withstand ‘wear and tear’ and material degradation; 2) process quality (i.e., product consistency in manufacturing); and 3) factors relating to maintenance (i.e., ease of repair, availability of parts) (Granberg as cited in Cooper, 2004). This kind of durability is therefore, to a large extent, a topic related to engineering research. From an industrial, and fashion design perspective, on the other hand, means to prevent relative product obsolescence (i.e., factors other than physical functioning) are often particularly interesting. This kind of durability is, as mentioned earlier, the focus of this paper, i.e., what is referred to as psychologically durable design. In relation to such designs, the literature discusses a variety of strategies, some of the most commonly mentioned being maintenance, repair, upgrade, timelessness, aging well, personality, exclusivity, and personalisation. These are subsequently discussed.

The maintenance, repair, and upgrade strategies are related to both physical and psychological durability. More specifically, from a physical perspective, maintenance, repair, and upgrade may prevent loss of or restore product performance. From a psychological perspective, maintenance and repair processes can be perceived as part of the product use process, while upgrade may be seen as a means to improve and/or provide a new kind of product experience. In this context, van Nes et al. (1999) defined five approaches related to the maintenance, repair, or upgrade of products: reparability; element replacement for economic benefits; element replacement for ecological benefits; element replacement for aesthetic benefits; and adding new features through

modules. In a similar manner, van Nes and Cramer (2005) identified five design strategies for improving product longevity, of which three have a product maintenance, repair, or upgrade focus: design for repair and maintenance; design for upgradability; and design for variability (reconfiguration). In the context of electronic products, Walker (2011) defined five means of promoting longer product lifetime, four of which have a maintenance, repair, or upgrade focus: continuous product evolution; accommodation of component change; local maintenance, repair, and upgrade; and internalising impacts through new enterprise models (e.g., by including repair and upgrade services).

The timelessness design strategy concerns making designs that are resistant to changes in consumer taste and preferences. This may be achieved by focusing on long-lasting personal preferences and values, as opposed to what currently is in fashion. In this context, Aaker (1999) and Govers and Schoormans (2005) found that consumers generally prefer products and brands with personality characteristics that are congruent with their own, since these products can help to maintain and express their identity. Another perspective on timelessness concerns focusing on biological factors that may, to some extent, explain aesthetic experience (e.g., Hekkert, 2006; Norman, 2004). By focusing on inherent tendencies to find objects beautiful, as opposed to more cultural trends, products may become more resistant to changing fashions.

The aging-well design strategy to a large extent concerns choosing materials and constructions that make the product develop an appreciated patina. McCracken (1988) defines patina as a physical property that ‘consists in the small signs of age that accumulate on the surface of objects ... a gradual movement away from their original pristine condition’. Patina, therefore, is evidence of an object’s life. This is by no means a new perception. For example, Ruskin (1859) proposed the idea that instead of thinking of rusted iron as ‘spoiled iron’, rust represents iron as living and therefore should be seen as a ‘virtue’. Patina may be appreciated in various types of consumer products, not least furniture (e.g., leather and wood) and clothing (e.g., denim and leather) (Fenton, 2015; Robinson et al., 2015, p. 71). Because patina can give products character, it has also been related to emotional durability (Chapman, 2005; 2009).

The personality design strategy concerns designing products that are attributed a certain behaviour or even consciousness. Product personality refers to the set of personality characteristics that people use to describe a specific product (Mugge et al., 2009). A product’s human-like characteristics can serve as an analogy for personal behaviour and capabilities (Janlert & Stolterman, 1997; Aggarwal & McGill, 2007). Thus, product personality can shape users’ anticipation of how to interact with a product. The ‘personality’ category includes Chapman’s (2009, p. 33) emotional-durability dimensions, ‘fiction’ and ‘consciousness’, where fiction concerns the delight or enchantment with an object, as it is not yet fully understood by the user, and consciousness concerns the perception of an object as autonomous and in possession of its own free will.

The exclusivity design strategy focuses on making products appear as scarce resources, thereby making consumers treasure them more (Brown 2001). Producing in limited editions is one way of doing this, and it is something that many brands are currently applying to part of their product line (e.g., pianos, cars, and fashion goods) (Balachander & Stock, 2009). The scarcity of such products also implies that getting a similar object could be extremely difficult, for which reason the owners take better care of the products and hold on to them for longer. Another exclusivity approach is to design luxury products. Such products typically have higher quality and higher prices than non-luxury products of the

same type. Also, luxury products are generally more closely associated with style than with fads, and many of them never go completely out of fashion (e.g., watches, jewellery, furniture, bags, certain cars, etc.) (Wolny & Hansen, 2011). Thus, luxury products are often kept for longer, and when replaced, they are often sold to other consumers rather than being discarded.

The personalisation design strategy concerns involving consumers in the design process by letting them define or change the appearance or functionality of a product in order to increase the personal relevance of the product (Blom & Monk 2003; McKay, 2007). According to the definitions by Sanders and Stappers (2008), product personalisation can be regarded as a form of ‘co-design’ (Mugge et al., 2009). There is, however, a key difference between product personalisation and what co-design is normally considered to include, in the sense that product personalisation generally does not involve any direct discussions between designers and consumers; instead it means that designers involve consumers by creating possibilities for them to play an active role in the design process (Mugge et al., 2009). In this manner, product personalisation holds an advantage over other collaborative design approaches, as it involves the individual consumer in the process, as opposed to only including a sample of users who are supposedly representative of the entire group. Thus, the result of the product personalisation is a product that closely matches the individual consumer’s individual needs and preferences (Franke & Piller 2003; Schreier 2006).

### 3. Psychologically durable design

In discussions of consumer behaviour, a distinction is often made between instrumental (or utilitarian), hedonic, and symbolic value (Mimouni-Chaabane & Volle, 2010). Instrumental value refers to the value of objects, not as ends-in-themselves, but as means (or instruments) for achieving something else. Hedonic value refers to the capacity of objects to evoke pleasure, where ‘pleasure’ should be understood in a broad sense. More specifically, psychological hedonists tend to understand ‘pleasure’ to include all positive feelings or experiences, such as joy, satisfaction, ecstasy, contentment, bliss, and so forth (Bruton, 2008). Instrumental value most often concerns fairly measurable attributes, whereas hedonic value concerns more intangible, symbolic, and aesthetic aspects (Kahn et al., 1997). Symbolic consumption concerns the acquisition of products not for their functional benefits or capacity to elicit positive emotions, but for the culturally shared and idiosyncratic meanings they convey (Millan & Reynolds, 2014). In this sense, symbolic consumption can be seen as an act of communication between the consumer and other members of a society, as well as between the consumer and him/herself (Noth, 1988). More specifically, possessions function as symbols of one’s position in the social hierarchy (Carr & Vignoles, 2011) and are used to construct individual meanings pertinent to identities, life circumstances, and aspirations (Elliott and Wattanasuwan, 1998). The symbolic value of a product is often closely related to its brand, and, as argued by Millan and Reynolds (2014), in today’s marketplace most brands, even low-involvement ones, are typically promoted with image-oriented promotional messages.

A product’s psychological durability may be seen in an instrumental, a hedonistic, and a symbolic perspective. The latter two concern the longevity of a product’s capacity to evoke pleasure (i.e., hedonistic durability) and produce desired meanings (i.e., symbolic durability). Instrumental value in a psychological durability perspective, on the other hand, is not as straightforward to define, as it can be hard to separate from physical durability. Physical durability in an instrumental perspective concerns the durability of product performance



attributed instrumental value. However, although a product may, from a physical perspective, continue to perform at a certain level, at some point, the user may become dissatisfied with its performance, for example, if new, better-performing products emerge. Designing products that are not replaced in such situations, on the other hand, concerns psychological durability. So why would anyone keep a product, even when better-performing products are available? One motive may be an appreciation for how the product works. This is, for example, the case for mechanical watches, which have not been rendered obsolete in spite of being less accurate and durable than quartz watches (Kirkland, 2011). This kind of appreciation is closely related to hedonic pleasure, but the distinction here is, as mentioned, that instrumental value relates to a product being a means to do something, while hedonic pleasure relates to the pleasantness of observing or interacting with the product. Thus, from a hedonic perspective, a watch may be pleasant to look at and feel pleasant on the wrist, while instrumental value concerns its value as a means to tell time.

A product's psychological value changes over time, which is not necessarily a negative movement to begin with (e.g., it may develop appreciated patina) but typically eventually becomes so, unless the product stops functioning properly before then. Thus, psychologically durable design is about increasing the period of time from when a product is acquired until it is replaced for other reasons than functional failure. Based on the discussion above, it is possible to define three distinct design strategies for creating psychologically durable design (in many cases it will be relevant to apply more than one of these). The strategies are outlined in Figure 1 and discussed in the subsequent subsections.

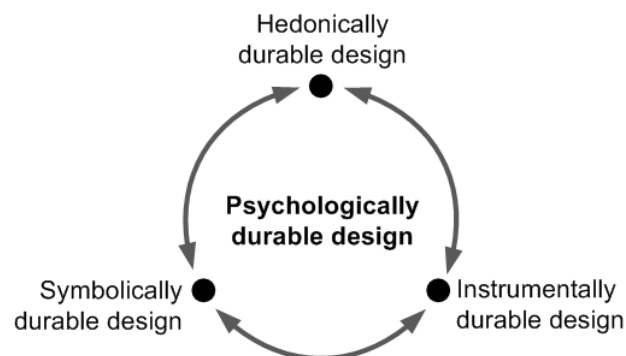


Figure 1. Psychologically durable design

### 3.1 Instrumentally durable design

The first design strategy, 'instrumentally durable design', is here defined as an approach aimed at making designs that for a relatively long period of time are perceived to have satisfactory instrumental value. In a psychological durability perspective, this involves designs that are appreciated for reasons other than their actual performance, as compared to alternatives. Returning to the earlier-mentioned example of mechanical watches, the capacity to tell time may be deemed valuable for the manner in which it keeps track of time, rather than how good it is at doing it, as compared to other alternatives (e.g., the more precise quartz watches). Another example might be a product that has relatively low performance in certain regards, but performs these functions in a sustainable manner, such as electric cars (at least the earlier versions). Besides the manner in which the product functions, the way that it is operated may also be perceived as having value. For example, although automatic espresso makers have emerged, many still believe that manual espresso machines are superior, because they offer

a higher degree of user control over the process (Rodricks, 2016). Obviously, some people may also derive pleasure or status from the longer and more elaborate process required by manual espresso machines, but in some cases they prefer it mainly because they perceive it as a better or more authentic way of making coffee.

Figure 2 illustrates the relationship between function-related and operation-related instrumental value as well as five problematic developments within these dimensions. These are subsequently discussed.

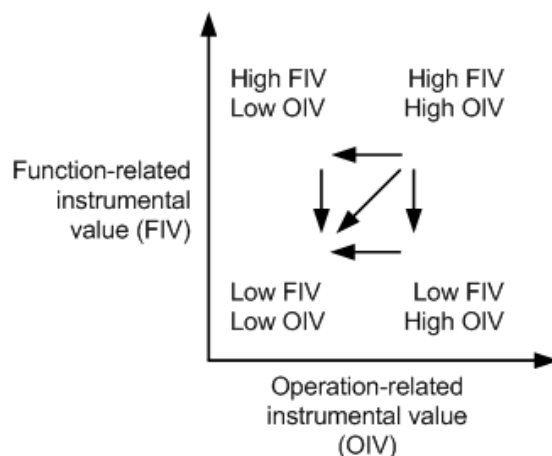


Figure 2. Instrumental durability

The five types of problematic developments in Figure 2 involve two kinds of instrumental durability issues that are to be avoided for as long as possible, namely a loss of function-related value and a loss of operation-related instrumental value.

The challenge with regard to function-related instrumental value is that the user may at some point lose his/her appreciation of the way the product works. This may be addressed by focusing on functional principles that are appreciated, regardless of the emergence of more efficient technologies. An example of this is the earlier-mentioned mechanical watch (Kirkland, 2011).

The challenge with regard relation to operation-related instrumental value is that the user may at some point lose his/her appreciation of the way the product is operated. This may be addressed by focusing on operational principles that are appreciated regardless of the emergence of more efficient technologies, such as the earlier-mentioned example of a manual espresso machine (Rodricks, 2016).

Some products are even perceived to become better over time with regard to their instrumental value, such as musical instruments (Gritten, 2011). In this context, it should be noted that musical instruments are, obviously, also related to hedonic value, in the sense that they may be pleasurable to operate, and the sounds produced may be found pleasurable. However, as the name suggests, a musical instrument is an 'instrument for making music', rather than the end that is enjoyed, i.e., the music.

In Table 1, possible means and empirical examples with regard to instrumentally durable design are shown for the five latter durability dimensions extracted from the literature review. The dimensions maintenance, repair, and upgrade are not included in the examples, since they are very similar across the three dimensions. More specifically, by making such processes convenient, pleasurable, non-pricy, and similar, there is a greater chance that they will be used and thus extend a

product's capacity to produce instrumental, hedonic, and symbolic value. Finally, it should be noted that the examples included also involve hedonic and/or symbolic durability aspects, but that the point of the examples is merely to demonstrate the relevance of instrumental durability, not to identify cases in which this is the only relevant dimension.

*Table 1. Instrumentally durable design*

Dimension	Example of means	Empirical example
Timelessness	Designing with a focus on simple or mechanical functionalities that are appreciated despite the emergence of more efficient functionalities.	Although, in many regards more efficient, automatic espresso makers have emerged, many still believe that manual espresso machines make better coffee (Rodricks, 2016).
Aging well	Designing products that maintain or even improve their performance through use.	Used musical instruments are often considered to be better at producing the desired sound (Grayck & Kania, 2011).
Personality	Designing products that perform tasks in a appreciated manner, making the user more forgiving of lower performance.	Mechanical watches are still highly appreciated and produced, although (in many regards) more efficient watch technologies have emerged (Kirkland, 2011).
Exclusivity	Designing products that provide exclusive performance because of the way they function or are operated.	In 1993, Dyson released the cyclonic vacuum cleaner, DC-O1, which was relatively expensive but removed the need for replacement dust bags, thus avoiding decreased suction power, as the bag fills up (Roy, 2016).
Personalisation	Designing products that focus on particular user preferences in relation to function, rather than focusing on maximal performance.	Some bicycle retailers offer pre-purchase customisation to enable a better match with customer characteristics and preferences (Zhang et al., 2015).

### 3.2 Hedonically durable design

The second design strategy, 'hedonically durable design', is here defined as an approach aimed at making designs that for a relatively long period of time are perceived to have satisfactory hedonic value. Hedonic durability, therefore, is related to the capacity of the product's appearance and functions to continue to produce pleasure. Figure 3 shows the relationships between hedonic appearance and use aspects as well as five problematic developments within these dimensions. These are subsequently discussed.

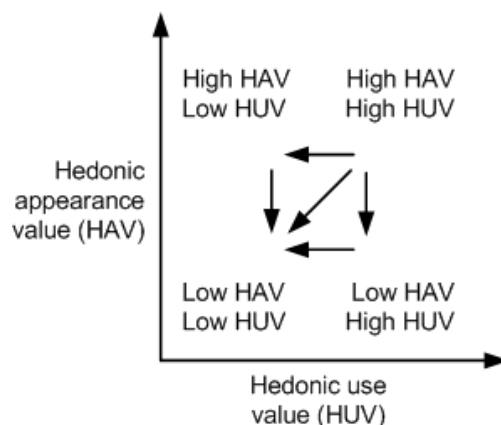


Figure 3. Hedonic durability

The five types of problematic developments depicted in Figure 2 involve two kinds of hedonic durability issues that are to be avoided for as long as possible, namely a loss of hedonic appearance value and a loss of hedonic use value.

The challenge in relation to hedonic appearance value is to avoid a diminishment of appearance-related pleasure over time. In this regard, some product designs seem to be more resistant to changes in fashion than others, which, for example, may be explained by simple, functional, and well-crafted appearances. An example of a design with an appearance that seems to have maintained its appearance attraction over time is the ‘super-elliptical table’ from 1968, designed by Danish mathematician, inventor, designer, author, and poet Piet Hein and produced by Fritz Hansen (Øllgaard, 1999).

The challenge with regard to hedonic use value is to prevent a diminishment in the pleasure produced by the use process over time. Such problems may, for example, occur for products that offer user-friendly guidance throughout the use process (e.g., televisions, smartphones, cameras, etc.). Although such user instructions provided by the product may initially be perceived as helpful (and more pleasant than having to read a manual), after some time, as the users learn how to operate the product, the guidance may become annoying (Quesenbery, 2003, p. 89). One solution to this problem, obviously, is to allow the user to turn the help functions off. Another type of problem related to short-term versus long-term product pleasure occurs for products that are aimed at providing a pleasant surprise stemming from their special appearance or way of functioning. In this regard, studies have shown that the appreciation of some products’ surprise qualities is often lost after a short period of time, as the surprise element diminishes (Ludden, et al., 2006). Thus, in many cases, designing for surprise-related pleasure would not be a good strategy if the goal is to ensure psychological durability.

Some products become more pleasurable over time. For example, to some, a pair of jeans becomes better looking with signs of wear and become more comfortable as they are used and washed repeatedly (Robinson et al., 2015, p. 71).

In Table 2, possible means and empirical examples with regard to hedonically durable design are shown for the latter five psychological durability dimensions extracted from the literature review. It should be noted that many of the examples also involve instrumental and/or symbolic durability aspects, but that the point of the examples is merely to demonstrate the relevance of hedonic durability, not to identify cases in which this is the only relevant dimension.

Table 2. Hedonically durable design

Dimension	Example of means	Empirical example
Timelessness	Designing products with relatively fashion- and technology-independent characteristics.	Furniture with the mid-century modern look (roughly 1933 to 1965) regained popularity in the 1980s, and this popularity continues to increase to this day (Fenton, 2015).
Aging well	Designing products that develop an appreciated patina and/or become more comfortable through use.	Worn jeans are often enjoyed more than new ones (Robinson et al., 2015, p. 71).
Personality	Designing products to which the user to some extent attributes personality or consciousness, thus making them more than a product.	Wegner is said to having been inspired by the paintings of Pablo Picasso when he created the Ox Chair, which has an appearance that sparks associations to a bull (Elish & van Breems, 2013, p. 45).
Exclusivity	Designing products for which the exclusiveness aspect makes users enjoy and treasure the products more.	Steve McQueen made the sunglass 'PO 714' model by Persol iconic. In 2010, Persol re-launched the model in a limited edition (Persol, 2010).
Personalisation	Designing products that allow for personal customisation, which may make users enjoy the products more.	Several of the big sportswear producers allow their customers to design their own shoes based on a basic model (e.g., Nike and Adidas).

### 3.3 Symbolically durable design

The third design strategy, 'symbolically durable design', is here defined as an approach aimed at making designs that for a relatively long period of time are perceived to have satisfactory symbolic value. Symbolic value can be divided into value stemming from cultural symbolic value (e.g., social acceptance and status) and personal symbolic value (e.g., personal expression and support of personal identity). Figure 4 shows the relationships between cultural and personal symbolic value as well as five problematic developments within these dimensions. These are subsequently discussed.

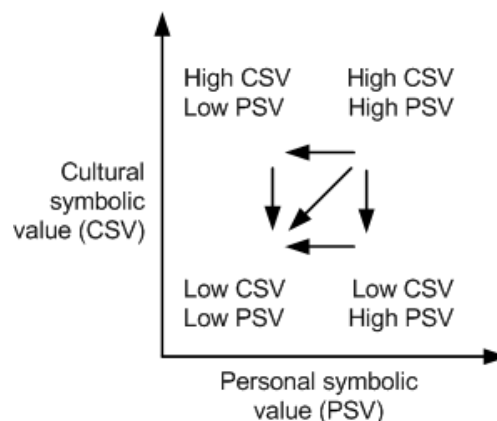


Figure 4. Symbolic durability



The five types of problematic developments in Figure 2 involve two kinds of symbolic durability issues that are to be avoided for as long as possible, namely a loss of cultural symbolic value and a loss of personal symbolic value.

The challenge with regard to cultural symbolic value is that it may be lost over time due to changing fashions or new technologies. To address such challenges, one approach is to focus on relatively fashion-independent characteristics and simple functional principles that have demonstrated their capacity to maintain symbolic value in spite of technological developments in this area. With regard to the first, an example of such a product is the ‘Windsor dining chair’ by Ercol, which was designed to be practical and cheap some 70 years ago, but which has still not gone out of fashion in certain segments (Goodhart, 2015).

The challenge with regard to personal symbolic value is that it may be lost over time due to the user changing ideals, preferences, or similar. Thus, the task for the designers of such products, in seeking to avoid this development, is to make products that are aimed at more long-lasting ideals and preferences. Donald Norman’s (2002) descriptions of his teapots may be seen as an example of personal symbolic value. More specifically, one teapot is described as being ‘so ugly that it is appealing’, while another is, in a special sense, practical, as it can be tilted to separate the leaves from the brew when the tea has steeped enough. The uncommon features of these two products are, to a large extent, decoupled from changing fashions or technological developments, while they may be seen as symbols of creative thinking, which some persons find appealing.

Some products even increase their symbolic value over time. Returning to the earlier-mentioned example of musical instruments, for some instruments, this also has a strong symbolic side. That is the case with electric guitars, for which many of the designs produced during the 1950s are still some of the most widespread models today, such as Fender’s Telecaster and Stratocaster and Gibson’s Les Paul. In this regard, for some musicians, a guitar that shows clear signs of wear is preferable to a shiny new one, for which reason some guitarists even distress their guitars to give a more used look, a practice known as ‘relicing’ (Pinch & Reinecke, 2009). One explanation of this phenomenon is that a guitar that shows signs of wear and tear symbolises that it has been worth keeping and using, as opposed to replacing.

In Table 2, possible means and empirical examples with regard to symbolically durable design are shown for the latter five psychological durability dimensions extracted from the literature review. It should be noted that many of the examples also have instrumental and/or hedonic symbolic durability aspects, but that the point of the examples is merely to demonstrate the relevance of symbolic durability, not to identify cases in which this is the only relevant dimension.

*Table 3. Symbolically durable design*

Dimension	Example of means	Empirical example
Timelessness	Designing products that focus on symbols with long-lasting positive meanings.	After 70 years, the ‘Windsor dining chair’ by Ercol, designed to be practical and cheap, is still considered fashionable (Goodhart, 2015).
Aging well	Designing products with symbolic aspects that improve over time, such as quality and authenticity.	The patina of, for example, a leather sofa may be seen to tell a story about ‘life well lived’ (Hubbel, 2015).

Personality	Designing products that are attributed personality characteristics with long-lasting symbolic value.	Philippe Starck's citrus squeezer, Juicy Salif, from 1990, is not a particularly efficient citrus presser, but its special appearance has made it appreciated for more than 25 years (Rosenbak, 2015).
Exclusivity	Designing products that provide status due to their exclusivity.	Certain so-called 'supercars' are so exclusive and popular that prospective buyers face long waiting lists (Halvorson, 2007).
Personalisation	Designing products with personalisation aspects to support the user's desired self-image.	In some segments, customised motorcycles are highly desired objects (Lavrinc, 2013).

## 4. Discussion and conclusions

This paper has defined three distinct dimensions of psychologically durable design: instrumentally durable design, hedonically durable design, and symbolically durable design. These three dimensions are by no means mutually exclusive, but often two or all three dimensions are relevant to consider for a particular consumer product design. For each of the three dimensions, the paper defined two sub-dimensions. More specifically, instrumentally durable design was divided into function value and operation value; hedonically durable design was divided into appearance value and use value; and symbolically durable design was divided into cultural value and personal value. Furthermore, the paper showed that the three durability dimensions each are relevant in relation to five types of durable design strategies identified in the literature. In this manner, the paper has defined 15 types of strategies for making product designs more psychologically durable.

All of the 15 strategies are not relevant for all consumer products. For example, the appreciation of certain products because of the way they work or are operated, although they are less efficient than many other products in many respects (such as mechanical watches and coffee pots), may seem difficult to transfer to other electronic products, such as laptops, smartphones, and similar. However, in some cases, it should not necessarily be dismissed. These days, for example, some people are discarding their smartphones and returning to simple old-school mobile phones to avoid the stress that may be associated with the many functions offered by a smartphone (Zolfagharifard, 2014; Smith, 2015). Another potential with regard to longer-lasting smartphones is to allow for functional upgrades, as exemplified by modular smartphones (Bolluyt, 2016), where it is possible to replace only the parts that the user is unsatisfied with, as opposed to replacing the entire product. An example related to changing fashions concerns furniture; as previously mentioned, mid-century modern furniture regained popularity in some cultural contexts during the 1980s and have continued to increase in popularity to this day (Fenton, 2015). This, if nothing else, demonstrates that it is in fact possible to design furniture with high psychological durability. With regard to clothing, it should be noted that in recent years, sustainability has become a key concern, and producing ethical fashion is becoming more of a priority for many brands (Claire, 2016). In this regard, apart from opting for more eco-friendly materials and production processes, psychological durability may also be used as a means to achieve increased sustainability.

The definitions of psychologically durable design and the means to achieve it, as provided by this paper, may be used to guide design practitioners towards more sustainable designs. For future research, distinctions and definitions provided may be used to organise approaches to psychologically durable design and for identifying areas of psychologically durable design that need to be further explored.

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# REDO Experience. Envisioning Clothes that can stand the Test of Time

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**Abstract:** This paper draws on my on-going PhD research which investigates how the concept of emotional durability can be applied in fashion design and making to enhance user experience of clothing. The paper presents a selection of garments created during the first, exploratory, phase of my project and discusses examples of design interventions that could contribute to increased satisfaction and well-being of users, designers and makers of fashion. It reflects on some of the challenges involved in designing for durability and proposes that these should be seen as opportunities for further research and exploration. Envisioning what currently seems unthinkable is a first step to materializing visions for the future, a task to which designers are well suited as creative problem-solving lies at the core of design thinking.

**Keywords:** clothing durability, emotional design, design for continuity, user experience, REDO

## 1. Introduction

This paper explores how designing for *continuity*, instead of *newness* (Skjold, 2016) can help REDO the everyday experience of designers, makers and consumers of fashion. In the currently dominant model of fashion production and consumption, designers are pushed to meet increasingly faster trend turnarounds, sometimes left with the pressure of only twenty-five minutes to produce a design (Rissanen, 2016). Fashion consumers, on the other hand, face frustration with low quality garments (Niinimäki, 2014) and uniform styles (Woodward, 2007), often feeling trapped in what Chapman calls “endless cycles of desire and disappointment” (2005, p. 17). In her *Craft of Use* (2016), Fletcher points out that the current business model encourages designers to imagine fashion objects that will sell but not those that will stand the test of use (p. 117).

My paper outlines a scenario in which *use* is at the foreground of the design process. Envisioning garments to be worn and enjoyed for extended periods of

time is hereby approached as both stimulating and rewarding design opportunity. The paper begins with an introduction of my designer-maker perspective which informs my position as a researcher. It then moves to a discussion of current research in the areas of clothing longevity, emotional design and sensory ethnography, to frame the methodology applied in this study. The case studies of garments created in the exploratory stage of the project then examine how some of the strategies identified through the contextual review could be translated to practice. The paper culminates with a reflection on some of the challenges involved in design for use and concludes with a recognition of the instrumental role that designers must play in addressing these challenges in the future.

My research interest in clothing whose appeal lasts well beyond the first few months or even years, has emerged from my practice as a fashion designer-maker. It has particularly developed over the last six years of interaction with the clients of my slow fashion studio [MISENSE by Mila B.](#) The studio produces original pieces, mini-collections and bespoke garments, all designed and made by myself in the UK. The studio also offers alteration and repair services and is a fully certified member of the Ethical Fashion Forum and Heritage Crafts Association. The *modus operandi* of the studio reflects my design philosophy in which personal contact with clients is at the core of all the design work. I entered the field of design practice with initial training in ethnology and cultural theory, maintaining a long-term focus on craft, activism and socially responsible design. My later professional involvement in *Design for All* consultancy significantly contributed to my strong belief that design professionals need to work closely with users and develop a deep understanding of users' everyday practices. As Norman remarks in his *Emotional Design: Why we love (or hate) everyday things* (2004) "designers who believe they do not need to watch the people who use their products are a major source of the many poor designs that confront us" (p. 74).

Each of my studio commissions therefore starts with an informal discussion during which I try to learn as much as possible about my client's lifestyle, the kind of clothes they feel comfortable wearing and their expectations of the garment I am making for them. I have found that these discussions become even more helpful if they can take place in the client's home. The home environment offers a valuable context provided by the rest of my clients' possessions and, importantly, their wardrobes (Miller, 2008; Woodward, 2007). Moreover, in comparison to a studio visit, clients tend to feel less self-conscious in their own home, less pressed for time and much more empowered to explain what they really want in terms of style, fabric choice and fit. The home environment helps them to think about potential new garments in relation to other things they already own, like or dislike (see also Skjold, 2014) which provides me with invaluable information for the design process. Over years of having these conversations, I have heard numerous stories of clothes that looked very exciting in a shop but somehow did not meet the same high expectations when brought back home. Many of them were worn once, or never at all, some were discarded straight away, others were kept for months or even years before they eventually ended up in a charity shop or a landfill (see also Woodward, 2007; WRAP, 2013). These "failed relationships" (Chapman, 2005) not only waste natural and human resources invested in garment production but they also perpetuate customer dissatisfaction, anxiety and frustration with the current fashion market (Woodward, 2007; WRAP, 2013; Twigger-Hollroyd, 2014; Skjold, 2014, Niinimäki, 2014). The overriding ambition of my studio has therefore been to offer a more user-centred alternative to the mainstream fashion market, with an approach that is informed by my clients' everyday experience of clothing. I aim to design versatile garments that will be

worn and enjoyed for a long time. The care and the attention to detail I invest in this process (Sennett, 2009) makes me want to create a piece that my customers will not want to throw away (Maclachlan, 2011). In the words of British potter Edmund de Waal, “you must hope, if you make things as I do, that they can make their way in the world and have some longevity” (p. 232).

## 2. Practice informs design research

Considerable scholarly attention has been given to the alarming social and environmental consequences of the current model of fashion production (Alwood et al. 2006, Fletcher & Grose, 2011; Black, 2011; WRAP, 2012; Fletcher & Tham, 2016). Consumption patterns associated with fast fashion often reduce active lifetime of a garment to less than a season (WRAP, 2013). On the other hand, a substantial body of evidence also shows that people often wear clothes for a long time and form a deep attachment to certain garments (Solomon, 1986; Schultz Kleine, Kleine III and Allen, 1995; Heti, Julavits & Shapton, 2014; Skjold, 2014; Fletcher, 2016). The stories I have heard through my studio clients also prove that despite the seemingly overpowering presence of the fast, disposable fashion scenarios, there also exists a parallel world in which garments have the possibility to transform from a product into a process (Fletcher, 2016), a world in which clothes are being appreciated for the layers of meaning and emotion accumulated through time and repeated use (Norman, 2007).

A long-term client initially brought two dresses to my studio during her first visit. She hoped they could get a second lease of life. Both dresses were over twenty years old, she said she “loved” them and she also liked the ever more prominent holes which reminded her of all the years she lived through wearing these clothes. The emotional value of her dresses did not depreciate because of the holes. On the contrary, as Woodward (2007) comments, the holes were there “to authenticate” that the dresses were much “worn and loved” (p. 55). My client however felt that wearing clothing full of holes was getting perhaps less “socially acceptable” [sic] at her age (over 60) and so I was given a free hand to repair or alter these dresses in a way I found most suitable and interesting for me. Later I heard that she received many compliments on her ‘new dresses’ (see *Figures 1 & 2*) and I have repaired many more for her and other clients since.



*Figure 1. Alteration of a client's dress, Mickey Mouse pattern (design Ernest Le Gamin). Replacement of the front panel where original fabric fell apart because of frequent wear. Photo: Author*



*Figure 2. Detail: replaced front panel. Black cotton mix decorated with white machine-embroidered stripes to match the original design. Photo: Author*

All these cherished garments I have worked on have made me wonder if there are design lessons we could learn from the stories of continuous satisfaction and pleasure that these pieces have brought to their owners. The idea of designing a piece of clothing that someone will still be keen to wear after twenty-five years



sounds exceptionally rewarding. Is this something that we, as designers, should now aspire to?

### 3. Design, emotion, durability

Numerous researchers (Mugge, Schoormans & Schifferstein, 2005; Chapman 2005; Norman, 2004) point out that no design can satisfy everybody and a truly timeless piece can rarely be created as a result of a conscious design decision (Mugge et al., 2005, p. 40). At the same time, emerging research suggests that durability of clothing can be enhanced at the design stage (WRAP, 2013; Connor-Crabb, Miller & Chapman, 2016). The *Design for Longevity* report (WRAP, 2013) highlights that changes at product design stage have “a significant impact on how long individual items remain wearable” (p. 3). The report proposes that the principal areas in which design impacts the active lifetime of clothing are: *size and fit, fabric quality, colours and styles* and *care*. A careful consideration of these and their appropriate balance in the design process can positively affect both physical and emotional durability of a garment. Where physical durability refers to a product’s robustness and resistance to wear and tear (WRAP, 2015, p.9), emotional durability affects how long can a product remain relevant and attractive to the user (ibid). Physical and emotional durability of products are therefore closely interconnected and the intricate relationship between the two is well illustrated by Chapman who notes that “there is little point designing physical durability into consumer goods if the consumer has no desire to keep them” (Chapman, 2005, p.52).

The complexities of physical and emotional aspects of products are examined in some detail by Don Norman (2004). In his concept of a three-level design (Norman, 2004), each of the three levels of design correlates with a different level of processing experience by the human brain. Norman, whose background lies in usability engineering, user-centred design and cognitive science, claims that humans process experience on three levels, associated with different levels of the brain. The first, *visceral* level, is ‘automatic’ and helps to make rapid judgments between good and bad, sending signals to the rest of the brain. Next is the more advanced *behavioural* level which affects most of the everyday human behaviour. The third and highest level is *reflective*, referring to the contemplative part of the brain. All levels play different, yet important, roles in our everyday interactions with the world around us, including, of course, the products we use. As experience is processed differently on each level of the brain, each of the three levels requires a different approach to design. The first, *visceral* level of *design*, requires a focus on appearance – the way things look. The second, *behavioural* level of *design*, needs to consider the pleasure and effectiveness of use – the way things work and feel. The third and last level, *reflective design*, is then directed towards self-image and memories associated with the product – in other words, the meaning of things. Norman’s approach shows some similarities with the research of Gerald Cupchik (1999) who studied the varieties in meaning attached to products and the ways they relate to emotional processes. Cupchik’s study identified the *sensory/aesthetic meaning* which includes qualities that have an immediate effect on experience, *cognitive/behavioural meaning* related to product’s performance and ease of use and *personal/symbolic meaning* which is not necessarily related to product function or appearance. In addition to Norman (2004) and Cupchik (1999), user response to products was also analysed by Jordan (2000), whose approach stems from his human factors background. Basing his argument on Maslow’s hierarchy of needs, Jordan claims that designers need to extend their design considerations beyond pure usability of products. His model of consumer needs adopts Maslow’s hierarchy (1943) and urges designers to acknowledge that

as soon as people satisfy their needs on one level, they will demand more. Jordan's model of consumer needs therefore starts with the most fundamental Level 1 – *functionality* (product performance). It then continues through Level 2 – *usability* (ease of use) and culminates with Level 3 – *pleasure*. According to Jordan, the implications of these hierarchies for the design profession are that once people have “become used to usable products” (2000, p.6) they will soon expect more than just *usability*. They will demand “products that are not merely tools but ‘living objects’... products that bring not only functional benefits but also emotional ones” (ibid). To illustrate his argument further, Jordan adopts four pleasure categories identified by American anthropologist Lionel Tiger (1992) to propose a framework of four pleasures to be considered by designers in the design process. These include physio-pleasure (bodily and sensory experiences), social pleasure (interaction and relationships with others), psychological pleasure (cognitive and emotional responses) and ideological pleasure (which is related to values) (pp.13-14). Jordan suggests that the four pleasures framework enables designers to gain a much more accurate understanding of the people they design for. In this way, the framework enables designers to develop concepts that will better respond to the pleasures which could be associated with particular products.

## 4. Design research informs practice

The links between the approaches taken by Norman (2004), Cupchik (1999) and Jordan (2000), with their respective focus on cognition, meaning and pleasure highlight the complex interconnections between the physical properties of products (including appearance and functionality), their symbolic meaning and their potential emotional value to users. The *Design for Longevity* report (WRAP, 2013) also illustrates the way design interventions aimed at functional and aesthetic aspects of clothing – such as *size and fit, fabric quality, colours, styles* and *care*, can positively affect not only physical durability of a garment but also its long-term relevance to the user, potentially contributing to the garment's emotional durability. Several researchers have pointed out that user-product relationships take time to develop (see e.g. van Hinte, 1997; Chapman, 2005) and a strong emotional bond can hardly be established without “sustained interaction” between the user and the product (Norman, 2007, p.46). To reiterate, physical durability has little relevance without emotional durability, as the possible danger lies in the “designing of durable waste” (Chapman, 2005, p. 53). Emotional durability, on the other hand, is rarely possible if products fail (i.e. deteriorate in terms of look or function) before the emotional bond between the user and the product has had a chance to develop.

In terms of fashion design, the complex relationships between aesthetics, utility and symbolic aspects of design are often apparent upon a closer look into people's wardrobes – as exemplified through wardrobe ethnographies conducted by Woodward (2007), Klepp (2010), Skjold (2014) or Sadkowska (2016). Woodward, who studied women's everyday decisions about the clothes they choose to wear, claims that for her research participants the moment in front of the mirror is not purely visual. In fact, it extends far beyond the aesthetic aspects of the garment and has a considerable impact on the extent to which women feel *comfortable* in their clothing. Comfort, Woodward claims, “is not natural feeling engendered by the softness of a fabric; instead, ... comfort emerges in a dialectic between how clothing looks and how it feels” (2007, p. 99). Visual/aesthetic properties of a garment therefore often cannot be separated from its more utilitarian aspects such as comfort perceived through the softness of fabric or fit.

Both aesthetics and utility then also impact the deeper symbolic perception of the garment, the extent to which it aligns with the current identity and values of the wearer, and how much it feels “me” or “not me” (Schultz Kleine et al., 1995).

In addition, the work of anthropologist Sarah Pink demonstrates that acknowledging the multi-sensory character of human perception can provide invaluable insights for those planning social or design interventions aimed at improving the everyday experience of products or services (Pink, 2015, p.21). According to Pink, we quite frequently focus our attention on one sense over others, without realizing their mutual interdependence. If we take fashion as an example, it could be argued that priority tends to be given to sight. Yet, on a closer inspection, there is a lot more to be accounted for when it comes to daily use and appreciation of clothing. For instance, the choice of materials and fastenings are not be underestimated in this respect. In a discussion over a party dress design, a client once told me there was nothing she disliked more in a dress than the feel of a cold metal zip right next to her body. Woodward also maintains that “memories through clothing acquire a particular poignancy as they are evoked through the physical sensuality and tactility of clothing” (2007, p. 52).

## 5. Envisioning clothes that can stand the test of time

One of the key rules of design thinking according to Meinel & Leifer (2011) is that “making ideas tangible always facilitates communication” (p. xv). The designs presented here are therefore seen as tangible examples of how the theories discussed throughout this paper could be applied in practice. They are a work in progress, started in the first, exploratory stage of my PhD research. The aim was to embrace the challenge of striking the elusive balance between aesthetics, utility and symbolic meaning in design, as discussed in previous sections of this paper, while simultaneously addressing the recommendations for key interventions in the areas of size and fit, fabric quality, colours, styles and care outlined in the 2013 *Design for Longevity* report (WRAP, p. 3). Special attention was also given to sensory experiences of all the garments through touch and feel. As a result, I was particularly interested to further some of the strategies already used in my design work by exploring ideas relating to:

- **Versatility and modularity**  
(addressing size and fit, fabric quality, colours and styles)
- **Easy care**  
(addressing fabric quality, care)
- **Easy repairs and alterations**  
(addressing size and fit, care)
- **Trans-seasonality**  
(addressing fabric quality, colours and styles)
- **Sensory experiences**  
(addressing size and fit, fabric quality, colour)

Numerous fashion designers and design teams across the world have focused their attention on exploring the wide variety of creative possibilities offered by implementing these strategies in design projects. The ideas of versatility, modularity and easy alterations have been addressed for example by designers Alice Payne with her ‘Grow-Shrink-and-Turn-Coat’, Holly McQuillan in her MAKEUSE collection or Anja Connor-Crabb in her ‘Cut, Pleat and Shorten’ project. The strategies for easy care and infrequent washing have long interested designer

Emma Dulcie Rigby and were explored for example in her project 'Energy Water Fashion'. Trans-seasonality and versatility have been at the core of the designs of Carin Mansfield (Universal Utility), Natalie Chanin (Alabama Chanin) and Amy Twigger-Holroyd (Keep&Share) - among others. The aim of my design research, however, was to explore how all of these strategies could be combined in one garment, in order to achieve a balance between aesthetics, utility and symbolic meaning in every design (Norman's *visceral*, *behavioural* and *reflexive* aspects of design - as previously discussed). Moreover, my designer-maker background enables me to have regular contact with users and their experience of clothing, which positions my research in a context rarely experienced by fashion designers.

In this research, pre-consumer waste materials were used for both toiling and final garments. Blend fabrics were consciously avoided since these require complex processing in order to enable recycling (Fletcher, 2008, p 106). For the same reasons, the use of fastenings was limited to a minimum, recognizing the need for easy disassembly in the recycling stage (ibid). The decision to reduce the use of fastenings was also based on the research evidence which shows that failure of clothing components (such as zips or buttons) is among the most frequent reasons for early clothing disposal (WRAP, 2013). All garments were made using a combination of machine-sewing and hand-stitching. Hand-stitching was used to emphasize the care invested in the making of each garment (Swindells & Burcikova, 2012) and to highlight the connection to the maker of the item. The opportunity to relate a product to its maker can contribute to a product's uniqueness and is discussed by e.g. Chapman (2005, 2009), van Hinte (1997) or Mugge et al. (2005) among strategies for encouraging the perceived irreplaceability of products. Moreover, unique and personal products enable self-expression and can thus acquire meaning which potentially leads to a stronger emotional bond between the wearer and the product (see e.g. Mugge et al., 2005). Design strategies that address users' values and identity correspond to reflective and symbolic levels of design as described by Norman (2004) and Cupchik (1999), respectively. At the same time, these strategies tap into ideo-pleasure identified by Jordan (2000). The use of hand-stitching techniques therefore reflected my aim to work towards a balance between aesthetics, utility and symbolic meaning. For the sake of brevity, I will here present two design examples out of nine garments in total.



Figure 3. Documenting the making process: hand-sewing of hems. Photo: Petra Lajdova

## 5.1 Design example 1: Casual wear

Strategies employed:

- Versatility
- Easy care
- Easy repair and alterations
- Trans-seasonality
- Sensory experiences

The first design example includes a casual top and a skirt in 100% cotton lightweight indigo blue denim. The design is trans-seasonal due to the classic material, neutral colour, as well as its style which is not trend-driven but inspired by Slovakian folk costumes. Both material and colour also contribute to the design's versatility as they encourage easy combination with other garments and accessories. The top and the skirt can be worn either together or separately in combination with other items and can be easily dressed up or down (see *Figures 6 and 7*). The style of both also reflects the recommendations of the *Design for longevity* report (WRAP, 2013) regarding design of casual wear. As in casual wear comfort plays a key role, accommodations for fluctuations in body shape (e.g. loose fitting garments, adjustable features) facilitate long-term use. The 'batwing' top will fit a range of figures and has additional benefits in terms of care as the loose style of sleeves is less affected by perspiration in comparison to more closely fitted garments. The skirt has an adjustable waist, making use of pleats and movable sew-on snap fasteners. Both the top and the skirt are machine-washable (recommended 30°) and if hang to drip-dry right after washing, they do not require ironing. Both garments have a generous hem allowance sewn in a long decorative hand-stitch which adds a personal touch and at the same time allows for easy length adjustments. The extra fabric can also be used for any future repairs. The skirt has no side seams which means that the full length and width of



the fabric can be used in case the owner decides to have the skirt re-made into another garment in the future.



*Figure 4. Design example 1 – frontal view. Photo: Petra Lajdova*



*Figure 5. Design example 1 – pleats for waist adjustment. Photo: Petra Lajdova*



Figure 6. Design example 1 – wear option 1. Photo: Petra Lajdova



Figure 7. Design example 1 – wear option 2. Photo: Petra Lajdova

## 5.2 Design example 2: Occasion wear

Strategies employed:

- Versatility and modularity
- Easy care
- Easy repair and alterations
- Trans-seasonality
- Sensory experiences

The second design example is a convertible cocktail/evening dress in 100% polyester chiffon produced in two colour versions – light pink and black. The dress consists of four modular parts that enable easy transformation from a semi-formal cocktail option to an evening version. They can also be variously combined in at least three other wear options and lend themselves to many more possibilities to be explored by the wearer. The loose-fitting draped style offers versatility in terms of size and fit and the modular parts also enable length adjustments. Similar to Design example 1, the style is not trend-driven and the choice of colours allows for variety of combinations with other garments and accessories. This further contributes to its versatility and gives the dress relevance across seasons. The dress is designed for travel and easy care and can be folded in a small bag which comes with it. The bag can also be used for machine washing of all parts of the dress at 30°. Due to the crinkled texture of the fabric, the dress can be drip-dried without the need for ironing. Most of the dress was hand-sewn to give all the hems a very soft drape and a hand-crafted finish. The draped style accommodates the need for any future alterations and repairs, which can be easily disguised in the volume of the fabric. Just like in the case of the skirt in Design 1, there are no side seams on the dress which means that the full length and width of the fabric can be used in case the owner decides to have it re-made into another garment in the future.

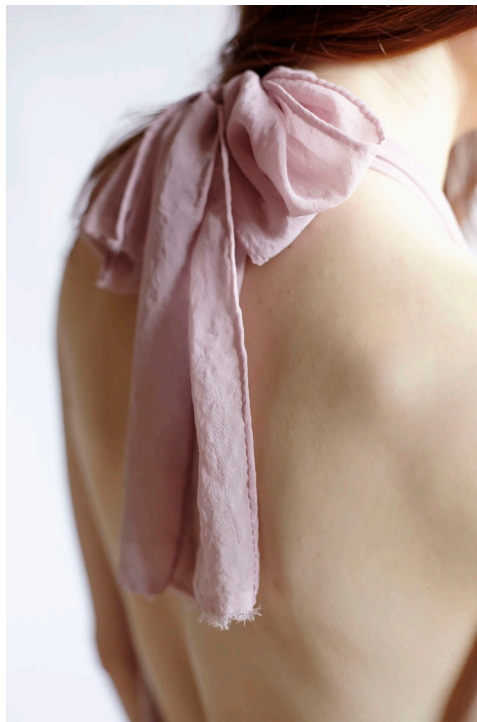


*Figure 8. Design example 2 (light pink version) – wear option 1, front. Photo: Petra Lajdova*





*Figure 9. Design example 2 (black version) – wear option 1, back. Photo: Petra Lajdova*



*Figure 10. Design example 2 (light pink version) – detail of hand-stitching. Photo: Petra Lajdova*



*Figure 11. Design example 2 (black version) – wear option 2. Photo: Petra Lajdova*



*Figure 12. Design example 2 (black version) – modular parts for wear option 3. Photo: Petra Lajdova*





Figure 13. Design example 2 (light pink version) – wear option 3. Photo: Petra Lajdova

## 6. Envisioning experience

Design researchers Forlizzi and Ford suggest that “as designers trying to craft an experience, we can only design situations, or levers that people can interact with, rather than neatly predicted outcomes” (Forlizzi & Ford, 2000, p. 420). The designs presented in this paper are therefore no more and no less than tentative examples that attempt to facilitate further discussion on how research on clothing durability can help us design, make and wear clothes that we do not want to throw away (Maclachlan, 2011). My own experience of this practical design experiment enabled me to further develop some of the strategies already used in my design work in a wider context of research on design and emotion and clothing durability. I have found that several of the strategies employed had multiple benefits, contributing to both the overall design project and my personal experience of the process. This is illustrated in the example of hand-stitching that was used to highlight the garment’s connection to its maker. At the same time, hand-stitching is a technique which I find particularly enjoyable, as well as effective, because it improves both the drape and the hand of seams. The use of hand-stitching in this project was therefore seen as having two key benefits. On the one hand, it enhances the sensory experience of the garment (and potentially also the garment’s appeal on the symbolic level), while, on the other, it also makes the creative process very enjoyable and rewarding for me as a maker. In addition to this, most of the nine final garments (except for *Design example 2*) have been worn by myself for a period of over 10 months and my observations from wearing and care for the garments, including washing and ironing were recorded in my research diary. As a designer-maker, I fully agree with Fletcher’s claim that “design is empty without use” and “use impossible without design” (2016, p. 78). A personal experience of the way my own designs perform and feel in use was therefore considered an important contribution to the first, exploratory, stage of my project. I found that wearing the garments further informed my thinking on some of the design decisions I had made, such as, for example, use of

pleats for waist adjustments. Although pleats are often considered a suitable solution for allowing flexibility in waist (see for example WRAP, 2013), their application in practice is not without challenges. Strategic placement of pleats in a design is crucial for a flattering fit as pleats generally add volume to the silhouette. Enabling users to move pleats from their original position (in my *Design example 1* this was achieved by using sew-on fasteners) can add extra volume and attract undesired attention to the parts of figure that the wearer would rather disguise (e.g. hips, buttocks or stomach area). Moreover, from the point of view of easy care, pleats can be a potential source of frustration when it comes to ironing. Although in my designs this issue was negotiated by careful choice of materials and care instructions that recommended to hang the garments to drip-dry right after washing, following care instructions may not always be practicable in the strains and stresses of everyday life. I too have experienced the challenge of ironing my pleated skirts more than once. Another important insight from wearing my own designs was that the garments became real conversation pieces, “communication media” (Meinel & Leifer, 2011, p. xv) which enabled me to obtain further helpful feedback that will be given careful consideration in the next stage of my project.

## 7. Conclusion

The aim of my PhD research is to investigate how the concept of emotional durability can be applied in fashion design and making, to enhance user experience of clothing. In the first stage, presented in this paper, my project aimed to critically review relevant emotional design strategies and explore the possibilities of their practical application. I here discussed the key theories that provided the theoretical ground for the initial stages of my research, presented two design examples and outlined some preliminary findings and observations from the practical part of the project. The next stage of my research (currently in-progress) includes a series of in-depth wardrobe studies (8-12) that employ sensory ethnography and visual ethnographic methods to study user experience of clothing owned and used for extended periods of time. During this phase, the aim of my project will be to identify how people’s unique personal stories determine their attitudes to the clothes they wear. Fletcher maintains that “durability, while facilitated by materials, design, and construction, is determined by an ideology of use” (2012, p. 222). The second part of my project therefore builds upon my ethnological background as well as on my experience of discussions with clients, which tend to demonstrate that wardrobes (as opposed to single garments) offer important contexts for understanding how individual users experience and consume fashion. It is anticipated that the gathered material will provide essential information for further development of the design element of my research. The expected outcomes will include practical interpretation of material collected in Stages 1 and 2 of the project, through a series of fashion artefacts proposing innovative ways of enhancing user satisfaction by designing for *continuity*.

Design that provides a vision beyond the point of sale, focusing on *use* and *continuity*, is likely to face unpredictable challenges because there is no ‘one size fits all’ option for human experience. However, due to the very nature of design thinking, which often involves divergent tasks (Lawson, 2005), designers are well equipped to embrace scenarios that may currently seem unthinkable. As Wood (2007) aptly remarks in his *Design for Micro-Utopias: Making the Unthinkable Possible*, “while theories... can be developed quietly in libraries, artists and designers must more often make judgments that have to work in ‘real-time’

(Wood, 2007, p. 87). Envisioning what now seems “unattainable” is a first step to materializing visions for the future. I therefore argue that a true impact in clothing durability will only be achieved with creative help of designers who are prepared to make ideas tangible and put theories to test in their practice.

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# Redefining Sustainability Potential in Product Design

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**Abstract:** Sustainability in product design is not determined only at the creation of an object; it can be acquired over time, just like a product that was designed with sustainability in mind is misused and underappreciated. Designers need to redefine how products and systems are created, and users need to reevaluate their relationship with them by engaging in sustainable behaviors at multiple points of their lifecycle. This paper introduces a categorization of products based on their ability to solve user's needs and to minimize environmental impact across the lifecycle. Categories range from sub and ephemeral products, which don't even serve relevant functions, to regular, superior and catalysts products that operate with minimal environmental impact while also promoting sustainable behaviors in their users. This categorization is not intended to be a comprehensive framework for sustainable products but rather an enabler of discussion around sustainability potential which be obtained in multiple levels.

**Keywords:** Sustainability, emotion, user behavior, industrial design, products

## 1. Introduction

As important as sustainability has become in today's society, it suffers from continuous clashes with unregulated manufacturing processes and unclear methods for product end of life (Robert, et. al, 2002). At the heart of this issue is the extreme consumerism that is result of planned obsolescence and frequent introduction of new products with only incremental improvements over their previous versions (Spangenberg et al., 2002). Companies are in the business of selling goods and services and designers, for better or worse, have the expertise to translate needs and wants into attractive, desirable products.

In recent years, there have been a number of key sustainability approaches that resonate well with new product development. These approaches include lifecycle assessment, whole systems thinking (Clark et al., 2009) and most recently, circular economy (Ellen McArthur Foundation, 2013). The main factor that they have in common is the understanding of the lifecycle not as a linear sequence but rather as a continuous cycle where stages are all interconnected and affect each other.

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Circular economy, in particular, makes evident that the latter stages of a system are critical for the initial stages of subsequent ones (Andrews, 2015). If this cycle is not seen as a closed, continuous loop as it occurs in nature, there will be environmental consequences that deplete natural resources and compromise quality of life.

While sustainable design develops products with the best intentions and potential, for many product categories it is not until their actual use stage that sustainability performance and benefits begin to be evident. Sustainable products that are used in irresponsible ways no longer fit in the category and can become as negative as products that are designed without particular environmental concerns in mind. In return, products that are designed with no special attention to sustainability, can still become sustainable if they are used in responsible ways and if their lifespan is extended considerable, which in most cases offsets their environmental impact generated during manufacturing.

With this perspective in mind, a categorization of products emerges, based on their innate value as useful objects and combined with their impact on the environment and society. The categorization starts with sub products, which have no real utility in them and are developed just for a quick reaction in their users, with no other benefit that keeps them useful after a first impression. Second are ephemeral products, which provide limited opportunities for a long lifespan, either by limited functionality or quality. Third are regular products, most of which are not designed with particular sustainability benefits, but that can become sustainable if used appropriately, beyond their typical lifespan. Fourth are superior products, which are designed with their lifecycle in mind, making them more efficient to manufacture, to use, and to dispose of. Fifth are super products, which are created and operate efficiently while also promoting better behaviors in their users that have positive impacts beyond direct user-product interaction. Reassessing products from this perspective provides a new hope for many objects that could be overlooked and underappreciated by users but that in fact can provide benefits short and long term.

## 2. From basic utility to sustainable attachment

At their most basic level, products are “a bundle of attributes (features, functions, benefits, and uses) capable of exchange or use (AMA, 2016).” In other words, products are objects that satisfy needs or wants. This definition frames a context or goal for products but it is hardly a matter of something being simply useful or not useful. This degree of usefulness defines the value of a given product and it is critical to determine its relevance in society, and consequently, its sustainability. Product value is a perceived notion from consumers who evaluate the cost of a good or service versus its benefit. The notion of value is critical to determine the success of a given product as it will drive how important a device can be in a person’s life. Value can be measured at different levels, ranging from utility to comfort and social status (Sweeney & Soutar, 2001). But no matter what specific measure is used to determine a product’s value, the higher that it goes, the further that consumers will try to maintain the product in their possession.

Determining the value of a product can vary significantly, depending on category and consumer expectations. Products used to be measured by their form and function. This was an effective way of understanding common attributes of a product but as their relationship with users has evolved, their value structure has become more complex, too. Since the 1980’s there has been more attention given

to holistic interactions with products and emotional design emerged as a way of understanding how products transcend notions of form and function. Hartmut Esslinger from Frog Design described how the concept of 'form follows function' had transformed into 'form follows emotion' (Edwards, 1999), while Donald Norman (2004) explored emotional design based on reactions caused by user interaction with products, ranging from visceral to behavioral and reflective. Jonathan Chapman (2005) proposed an integration of emotional attachment and sustainability into a model that promotes products that connect deeply with their users, leading to emotional durability and extended lifespans. Most recently, Pieter Desmet and Anna Pohlmeier (2013) have discussed design's ability not only for creating strong user emotions but also to promote positive behaviors and attitudes. Along with these angles for emotional design, a popular structure proposed by Patrick Jordan (2002) remains relevant today and is very helpful for understanding the progression of user-product interaction. At the most basic level, products need to have a function; they need to fulfill a need. Once a function has been established, products can aspire to be usable. Only when functionality and usability have been secured, then a product can provide true pleasure and enjoyment. Jordan's progression of product interaction is simple yet extremely insightful. Products that are convenient, comfortable and reliable are more likely to provide positive experiences to their users, enabling an emotional connection.

Along with improving user interaction, emotional design has the ability to give a sustainable advantage to a product that was designed with no particular considerations for environmental impact. The advantage comes from users that connect deeply with their products and use them beyond their expected lifespan. Users are also more likely to repair and upgrade their products, instead of replacing them (Lobos, 2011). Products with strong emotional charge can go beyond individual connection with a user, enabling experiences that transcend families, communities and societies across multiple generations (Chapman, 2009). Emotional attachment can come from many different levels of interaction, ranging from feel, fit and finish, to perceived quality, durability, reparability, sentimental meaning and graceful ageing (Lobos, 2014). Based on these layers of emotional attachment, products with no unique attributes in terms of sustainability end up being valued by their users at significant levels (Van Nes & Cramer, 2003). The result is an extended lifespan that offsets the embedded environmental footprint needed to create the product in the first place.

### 3. Categories of sustainability potential

With the objective of aligning value and sustainability potential, below is a proposed list of five product categories that explores their relevance in people's lives in order to determine their potential sustainability. These categories look at how different products satisfy basic notions of needs and wants, and from there offer superior levels of usability, pleasure, comfort, and sustainability. These levels can occur directly by means of materials and performance, and also indirectly by promoting sustainable behaviors. The categorization proposed below is not intended to be a comprehensive scale for assessing the sustainability of products as they are categories that wouldn't necessarily fit under any of the five categories proposed. Its main goal is to better understand how users perceive product value and the impact that this has on consumerism and product lifespan.

### 3.1 Sub products

If the primary reason for a product to exist is its ability to serve a function, sub products cannot fit in the category as they have no real function to serve.

Examples of sub products include a helmet to hold toilet paper, covers for phone covers, USB pet rocks, umbrellas for shoes, and countless other products seen at gag gift stores. They are designed simply to create a laugh or a surprise that lasts a few minutes (Monbiot, 2012). Once this initial reaction fades they have nothing else to offer, turning them into waste. Products that fall under this category are no true products and sit at the bottom of the chain. Sub products should not exist; they are like humans without soul, without a purpose in life.

Many products in this category are intended to be used just for fun, to create a funny reaction in whoever receives it. Even if products have a minimum level of utility to their users, society has gotten used to a throw-away model of consumption where products are underappreciated and easily discarded (Papanek, 2009). The issue with products that have extremely short lifespans is that they still require the same manufacturing efforts as useful products. Big Mouth Billy Bass, for example, was a sensor-activated signing fish that was fairly popular in the early 2000's (See Fig.1). People loved giving or receiving a Billy Bass fish but hardly anyone used after its novelty passed. But in terms of complexity, this product involved an injection molded plastic frame, a flexible fish body made out of latex, and elaborate mechanical and electronic systems that played songs and made the fish move and open its mouth in sync as if it were signing. Products like this create a large carbon footprint but their lifespan is dramatically short, turning them into waste practically as soon as they are unpacked. Sub products are good examples of how natural resources are taken for granted, assuming that fabricating products like these have no larger consequences and are justified for offering nothing more than a laugh.





Figure 1. Big Mouth Billy Bass signing fish. Photo by Rusty Clark (CC BY 2.0). Available from: <<https://flic.kr/p/cXrMj9>>

### 3.2 Ephemeral products

The next category looks at products that at least offer a function but they do it in a very limited way. Ephemeral products are those designed to sell but not to last. The reasons for this limitation could be either by limited usefulness, short-term interests, single use scenarios, or by inferior quality (Nava, 2016). It is common to see them in infomercials products that address needs with very low success but that are presented in a seductive way to lure consumers into purchasing them. Products under this category can meet all expectations of function, usability and pleasure, and might even be good at all of them. Their issue lies in the fact that they were not designed to last a long time, but still used similar amounts of resources into creating them as other products that will outlast them. The issues of products with little real utility not only have direct impact in terms of the waste they generate but also desensitize users by making them think that products can be created easily, without effort and without consequences. New product introduction failure in the marketplace is alarmingly common, ranging from 40% to 90% depending on the category (Sok & O'Cass, 2015) and key reasons for this failure are the lack of connection to relevant user needs as well as the large amounts of products that are develop with inferior standards of utility, usability or quality.

When driven by low cost, ephemeral products offer similar attributes to successful ones, except that they are manufactured with inferior materials and engineering details, making them fragile, unusable and unreliable. The increasing speed of technological innovation and manufacturing is making society more used to a

material culture that is expendable and disposable (Chapman, 2015). A common category for ephemeral products are knockoffs, which take advantage of popular products but create cheap versions, sometimes illegally (See Fig.2).



Figure 2. My Little Pony knockoff. Photo by Mike Mozart (CC BY 2.0). Available from: <https://flic.kr/p/h39hSN>

### 3.3 Regular products

Products under this category are not inherently sustainable. They are developed with traditional manufacturing methods that have no special considerations for reducing environmental impact. Additionally, they are subject to planned and perceived obsolescence, which deliberately limits their lifespan regardless of their actual performance (Lobos & Babbitt, 2013). Emotional design can be a key strategy to address planned obsolescence and turn regular products into objects that have long lifespans. If products are used long enough, chances are that users will become connected to them, extending their lifespan and offsetting whatever resources went into creating them. Emotional design is the key to turn regular products into special ones.



Achieving true sustainability is no easy task. There are plenty of examples of unintended negative consequences of design decisions, that even if made with good intentions, still compromise other stages in a product's lifecycle (Blevins, 2007; Fuller & Ottman, 2004; Bray & McCurry, 2006). Let's take for example a lamp made out of discarded computers or televisions. While the idea of keeping something away from landfills and giving it a second life is appreciated, a repurposed lamp could take electronic parts with delicate or even toxic components and put them in a context of general consumer goods. These materials could unintentionally be exposed to users, and when the lamp is discarded, would end up in landfills without special precautions and treatments that would occur if disposed as electronic waste.

For many people, sustainability can only be seen as a black or white matter, meaning that a product or system can either last forever or not. If its operation depletes resources, even at a very slow rate then it should be replaced by a better alternative that can last indefinitely. From this point of view, things cannot be *kind of* sustainable; they can either be carried on forever or they eventually will deplete resources. While this notion of absolute sustainability is valid, it also defines a practically unattainable goal and alienates most products out in the market. It is key that when products are evaluated in terms of their sustainability, this includes their emotional attachment and perceived value. Products that connect with their users offer an important sustainable potential that should not be overlooked. This potential would drive them from short-lived artifacts to objects that make a significant difference in their user's lives and that overtime offer significant benefits to sustainability issues.

MUJI is a good example of regular products that become special. The Japanese brand of household goods focuses on simple, timeless designs with good quality and accessible prices. MUJI's product development strategy includes selecting the right materials, optimizing production and simplifying packaging (Isomura, 2016). The simplicity and elegance of their products make them very attractive to consumers (See Fig.3) and their quality and durability assure that they can be used for a long time. This results in products that are valued by their users for a long time and that are built to last a long time. Not all MUJI products are developed in a "sustainable" way, meaning that they don't always use recycled/upcycled components, but they are definitely developed with minimalism in mind, removing excessive materials, details or complexity.



Figure 3. Muji Stuff. Photo by Peggy Huang (CC BY-NC-ND 2.0). Available from: <https://flic.kr/p/7fWRwp>

### 3.4 Superior products

Products under this category are typically used as benchmark for good practices in sustainable design. The most important element that characterizes them is that they are developed with the entire lifecycle in mind. For some products, the focus might be on reducing environmental impact during manufacturing and better selection of materials while for other products the goal will be to reduce energy consumption during their operation or to improve the way that they are disposed of at the end of their lifespan (Deng et al., 2011). Sustainability tends to touch on very complex issues that encompass multiple stages in a lifecycle so it's better to have specific goals that offer effective results rather than to try to solve every single issue that can occur around a product.

Once sustainability goals have been defined it is important to explore how different ways of addressing them would impact factors throughout the lifecycle. This step is critical to avoid unintended consequences and it also helps designers to keep a vision of all aspects of a given context even if they are focusing on specific problems (Mulder, et al, 2011). This exploration exposes tradeoffs that can affect a product's performance directly or indirectly, and that designers should be able to identify and address.

In 2016 Adidas released to the market a limited edition of an athletic shoe made out of recycled plastic, specifically plastic bottles collected from the Hudson River in New York City (McAlone, 2016). The shoe, developed in collaboration with Parley for Oceans, offers an attractive and dynamic appearance (See Fig.4). The technological innovations of the shoe include an upper section made out of recycled materials collected from river streams, reducing water pollution. The shoe is also easy to recycle, which is an important feature given how quickly products in this category wear out and become unusable.



Figure 4. Sneaker by Adidas with Parley for the Oceans. Photo by Design Milk (CC BY-SA 2.0). Available from: <<https://flic.kr/p/BKppJ2>>

The midsole of the shoe was designed using generative techniques. This means that instead of having a solid piece of foam, it is an open tridimensional mesh. Generative design in this case is used to compute multiple iterations of complex structures that eliminate unnecessary material and bulk, leaving an organic structure that provides the necessary integrity and flexibility, as determined by pre-established specifications (Autodesk, 2016). By 3D printing the midsole instead of manufacturing it with conventional large-scale processes, it is possible to take advantage of additive fabrication methods to reduce waste and complexity. The impact of these methods has become standard in the footwear industry as Nike has been using 3D knitted uppers for their shoes for several years and New Balance recently released a commercial shoe with a 3D printed midsole. Superior products often change paradigms, drive technology and establish new approaches that redefine industries and markets.

### 3.5 Catalyst products

Some products go beyond efficiency and ecology, promoting their users to adopt sustainable behaviors. Sustainable performance of products can be measured at two levels: first is the innate performance of products themselves. This includes the energy and resources that they need in order to operate, as well as the embedded energy needed to fabricate them and the potential impact that they will have when they are disposed of. Manufacturers have most control over this level and it is their responsibility to develop products that minimize the environmental impact. The second level is how users operate them and how their behaviors lead to better performance (Lockton et al., 2008). As much as products are designed to consume little resources, for many categories their real impact depends on how they are used. Ideally, efficient products will be used in efficient ways but there is always the risk of a rebound effect where they are overused due to their superior performance (Hertwich, 2005). Rebound effect is common in



energy efficient devices such as televisions and lightbulbs. If users overestimate their performance they will be likely to leave them on for hours at a time even if no one is using them, just because they consume little energy. It is also important to periodically assess the overall performance of a product and to know when it becomes more beneficial to replace it. This scenario is common in automobiles and major home appliances where older models are significantly less efficient than newer ones.

A good example of catalyst products can be found in household heating and cooling. According to the U.S. Department of Energy (2016), heating and cooling accounts for most than half of the total energy use in a typical home. While the type of system installed is key factor that determines energy consumption, residents' use habits determine about 1/3 of the total energy consumption (Tang & Bhamra, 2009). Temperature is typically controlled with thermostats, which residents program initially but then forget to check and adjust periodically. This means that the temperature is likely to be over or under set as activities change in the household. The company Nest has taken a very different approach to temperature management (See Fig 5). Nest thermostats allow users to set their preferred temperature but also use sensors to monitor habits around the house, from when people get up in the morning or return in the evening to specific times of day when users are more likely to adjust the temperature. Nest uses this information to automatically adjust the ideal temperature throughout the day, based on user behavior. What makes Nest a true catalyst product is that it also offers features that make users involved in the process, driving behaviors further. For example, the thermostat turns its screen on whenever someone walks into the room or whenever the temperature is being adjusted, helping in making users more aware of temperature changes in their home throughout the day. Additionally, the thermostat has a leaf reward system that is shown on screen as the system is used more efficiently. While the "leaf" rewards have no real value, users do know that the more leaves they receive, the more money they are saving in energy consumption.



Figure 5. Nest thermostat. Photo by Scott Cawley (CC BY-NC 2.0). Available from: <<https://flic.kr/p/ny1PvC>>

The idea of involving users in more responsible behaviors can be taken even further. Architecture firm ArchiBlox developed a pre-fabricated house that is carbon-positive, meaning that it produces more energy than what it needs to run (See Fig.6). In order to achieve this the house combines efficient cooling systems that run underground with an insulation system that minimizes energy waste (Frearson, 2015). In order for the house to be carbon positive, it needs to involve sustainable behavior from its inhabitants. The house's sunroom is a key space that provides an open space that is inviting and relaxing but also creates a natural buffer zone for neutralizing hot and cold air zones in the house. The space brings in large amounts of natural light and also includes sections for growing plants and produce. The activities that could happen in these spaces go well beyond environmental benefit. Inhabitants could feel more accomplished with the living choices they make and could also seek more interaction with other residents or visitors. All of these behaviors are critical for enhancing personal growth and positive well-being, which are becoming key design elements for positive user experience (Casais, et al., 2015). ArchiBlox offers several models, ranging from 53 to 88 square meters (570 to 950 square feet), meaning that its intended for home owners who feel comfortable with the tiny house movement. The house's design, however, is modular and resilient to eventual changes such as major repairs or expansions as needs of the homeowners change over time.



Figure 6. Archiblox. Photo by Alpha (CC BY-NC 2.0). Available from: <<https://flic.kr/p/qRni1p>>

## 4. Conclusions

Sustainability is a concept that cannot be oversimplified. From materials and embedded energy to manufacturing processes, shipping and distribution, to user behavior and end of life options, sustainable products and systems need to pay attention to all steps in their lifecycle. Making decisions too quickly without understanding consequences across a product or system's lifecycle can lead to unintended issues and environmental issues. But this complexity has also created the illusion of sustainable products being unattainable, meaning that they need to be developed in very special ways before they can be acknowledged as such.

Most products in the marketplace do not follow strict sustainability guidelines, unfortunately, and while industry is looking at ways of closing this gap, there exists an abundance of products that are not optimized for sustainable performance.

Taking a new look at what sustainability means for industrial design use might provide new opportunities for ordinary products to become sustainable through extended use that offsets their environmental footprint. Some people assume that their products are not inherently sustainable or that their behaviors towards their products are not special, while in fact they make valuable sustainable choices. From electronic devices that are kept and used for several years, even if newer models are available, to tools that are shared by members of the same community. People are redefining their relationship towards products and this is something that needs to be acknowledged and celebrated.

Today's marketplace unfortunately offers large amounts of products that don't satisfy minimum levels of functionality or usability. Many of these sub products and ephemeral products don't offer real value to their users, making them undesirable quickly but still needing large amounts of resources to be created and disposed of. Emotional design is an effective method for achieving this sustainability, by connecting products to their users in a meaningful way so that they can provide benefits over long periods of time. In order to achieve this connection, products need to have a solid foundation of functionality, usability and durability. Once these areas are covered, products begin to offer pleasure and superior experiences to their users. These attributes are necessary since adopted sustainability requires time for products to connect with their users. As sustainable product design evolves, products can aspire to offer superior performance as well as key sustainability advantages. They can also promote user behaviors that generate positive and permanent changes in society at large scale and for generations to come.

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# Becoming a Co-archivist. ReDoing Archival Practices for Democratising the Access to and Participation in Archives

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**Abstract:** This paper presents the second phase of the project Co-archiving Flight Documentation, aimed at exploring and prototyping co-archiving practices for involving underrepresented voices in sharing stories of our times from their point of view. The prototypes developed can be iterated and put in use, but may also potentially contribute to challenging the role of the archivist. What parallels can be drawn between the practices of a co-designer and an archivist interested in becoming a co-archivist? Building on outcomes from previous design interventions within the co-archiving research theme, we will run a co-design process involving practitioners and newcomers. Since the design process is not yet completed, we cannot present any concrete prototypes. This paper suggests imaginative ways of ReDoing by applying co-design approaches in other disciplines, and contributes to the discussion of how co-designers can step into other domains and be part of developing practices and approaches in other fields.

**Keywords:** Co-archiving, flight documentation, co-design, newcomers, archives

## 1. From archival appraisal to co-archiving facilitation

This paper presents the second phase of the research project Co-archiving Flight Documentation exploring collaborative (co-)archiving practices for involving marginalised communities in contributing to our common archives – and in the end, in writing our history. By Flight Documentation we refer to the documentation of the emergent refugee situation, its global and local effects, and the life situations of people who are on the run from terrible conditions in their home countries. The project is part of Living Archives, which is an interdisciplinary research project at School of Arts and Communication (K3), Malmö University

exploring archives and archiving practices in a digitized society from a range of perspectives<sup>1</sup>.

Derrida argues that “[t]here is no political power without control of the archive, if not memory. Effective democratization can always be measured by this essential criterion: the participation in and access to the archive, its constitution, and its interpretation” (1995, p. 4). The aim of our project is to explore and prototype co-archiving practices for involving underrepresented voices in sharing the stories of our times from their point of view. How do we give voice to the unheard? How do we create conditions for accessing records of human existence beyond traditional methods? How can we support archivists that strive to seriously engage the subjects (the “archived”) in the shaping of archives?

Within the field of archival studies there is an on-going debate addressing the underrepresentation of marginalised communities in archives, and how we can possibly provide the future with a representative record of human experience in our time (e.g. Johnston, 2010; Warren, 2016). Instead of continuing to document the “well-documented” archival professionals are encouraged to assume a more inclusive approach and open up the archiving process by inviting more people to contribute to our archives (Dunbar, 2006; Warren, 2016). The belief is that such approach would counteract bias in the documentation of culture and result in more representative archives. Despite serious attempts at addressing the shortcomings of our common archives there seems to be little change achieved over the past decades (Johnston, 2010; Warren, 2016).

The prototypes developed as part of this research project are co-archiving practices that can be iterated and put into use, but may potentially also contribute to challenge the role of the archivist. What parallels can be drawn between the practices of a co-designer and an archivist interested in becoming a co-archivist?

Thus, this paper specifically addresses the conference theme “how and with whom do we REDO?” by elaborating on how archival and documentation practices at public archives, cultural institutions, and museums could assume a co-archival facilitation approach by applying methods and practices used within the co-design community. How can co-design approaches contribute to the ReDoing of archival practices by encouraging archivists to assume a collaborative approach in solving the complex challenge of democratising the access to, and participation in archives?

## 1.2 Six co-archiving practices

As mentioned, this paper presents the second phase of a larger project that among other things has resulted in six prototyped co-archiving practices: *Eat a Memory*, *Plant your History*, *The Memory Game*, *Soil Memories*, *Mosaic of Malmö*, and *Designing an archiving practice using comedy*. All of these projects are designed to invite underrepresented communities to collect, store and share their memories and cultural heritages.

We will not go into detail on these prototypes since they have thoroughly been described in previous papers (e.g. Nilsson, 2016; Nilsson and Barton, in press; Nilsson, 2015; Nilsson and Wiman, 2015). In brief, we argue that the co-archiving practices prototyped assume an inclusive and a democratic approach since they allow for the involvement of many senses (working with food, soil, scents, poetry, comedy). Since many of the practices are independent of language ability, cultural heritage sources may be shared with or without using words. These prototypes

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<sup>1</sup> For more information about Living Archives, see: [livingarchives.mah.se](http://livingarchives.mah.se)

can also be seen as intimate kinds of archiving practices generating archive material on intangible cultural heritage in a concrete way, but without losing immaterial and sometimes poetic nature.



Figure 1. Documentation from Eat a Memory gatherings, Memory gaming and Plant your history (CC:BY-NC).

Initially our attention was directed towards marginalised urban communities and neighbourhoods (Nilsson, 2015; Nilsson and Wiman, 2015). As a reaction to the current world situation, and the large number of people that have recently sought asylum in Sweden, 162 877 people in 2015 (The Migration Agency, 2015), the focus has shifted towards asylum seeking newcomers (Nilsson, 2016; Nilsson and Barton, in press). This is also our focus in the second phase of the project.

## 2. Research approach

Our research approach is design research, often driven by a critical agenda, exploring alternatives and operating by interventions in existing cultural settings and characterized by the following aims:

- “*Prototyping* and design are part of the research activities
- Research involves *real-world settings and people*
- The research process is *iterative*
- Design research produces *design knowledge* intended for designers and practitioners”. (Harvard Maare, 2015, p. 41)

The research process is guided by principles and methods from the field of participatory design that implies active involvement of the people designed for in the design work (Simonsen and Robertson, 2013). This *direct* involvement of the users is one of the central principles of participatory design. Instead of designing *for* the users, the designers and/or researchers co-design *with* the users in a process of joint decision-making, mutual learning and co-creation (Sanders and Stappers, 2015).

For understanding the interactions between the participants in the co-design workshops organised as part of our project, we turn to theories of design practices as reflective conversations (Schön, 1987) and as translational processes (Callon and Latour, 1981; Simeone, 2016). In a co-design situation, participants typically might meet for joint explorations through various design practices (sketching, prototyping, roleplaying, scenario building), and using various materials (visuals, collages, cultural probes, design games). Through these practices the participants are given space to articulate, translate and materialise their ideas, requirements, needs and interests into visual articulations (sketches, diagrams, interfaces, prototypes) or other forms of articulation using various media (visual, music, video, photography, performance, or stories). Such design practices can be viewed as a translational process for expressing meaning in different languages, materialising different possibilities, and providing a form of connection between the stakeholders (ibid.). The framing, and re-framing of the problems or challenges are not done solely by one stakeholder, but in a reflective conversation between the different stakeholders (Schön, 1987).

### 3. Research setting and case

#### 3.1 Background: Co-archiving Flight Documentation

In September 2015, the three largest museums in southern Sweden, the Regional Museum in Kristianstad, Malmö Museums, Kulturen Museum, and the Department of Cultural Sciences, Lund University, initiated the project Flight Documentation aiming at documenting the emergent refugee situation in Sweden. Through this initiative, the museums have documented and shared some of the newcomers’ experiences and stories, as well as experiences and stories from the large number of volunteers and activists that engaged in welcoming the people arriving to the city of Malmö. The process of documenting and archiving within the project has up to now followed well-established methods and practices within the field of ethnology, such as participatory observations, interviews, video and audio recordings, and questionnaires. The documentation process has not only resulted in a large amount of archival material, but also in a series of new research questions dealing with methodological challenges regarding matters of inclusion and representation when documenting crisis situations (Nikolić, 2016). What are the roles of museums and other cultural institutions? How can we develop approaches, methods and practices for emergency museological ethnology characterised by an inclusive approach inviting people to directly share their experiences? Thereby avoiding seeing these experiences through the lens of the



“other”, that is, the person gathering the documentation, interviewing, filtering, selecting, and archiving.

Building on learning outcomes from previous design interventions within the co-archiving research theme, as well as the Flight Documentation project, we will run a design process involving both practitioners at cultural institutions as well as newcomers. The expected outcome of the process is a number of prototypes and design concepts of co-archiving practices for inviting newcomers to share and document their experiences.

### 3.2 The design process – two parallel tracks

As part of the project there are two parallel tracks running, both aimed at prototyping co-archiving practices for flight documentation focusing on newcomers. Since the practitioners at cultural institutions also play an important role, acting as gatekeepers to the archives, they are also crucial actors if we aim for more representative archives. Thus, the user groups/co-designers are:

- 1) newcomers that have recently arrived to Sweden,
- 2) archivists/researchers/practitioners interested in developing co-archival facilitation approaches.

#### *Design process I*

The first track involves five interaction design master students participating in a 10 weeks' course in Collaborative Media. Their design brief as part of the course is to design a collaborative media platform aimed at capturing newcomers' experiences. The concepts may be described as a distributed archiving system where the archivist is not the one collecting material or documenting experiences, but facilitating the sharing of histories. The master students will be responsible for planning and running the design process, including design workshops, building and evaluating prototypes. They will be supervised by teachers in the course as well as researchers from the Co-archiving project.

#### *Design process II*

The second track is planned and run by researchers from the Co-archiving project and involves four practitioners at cultural institutions, and four newcomers. The design process will consist of one research phase, followed by three co-design workshops yet to be planned in detail. The theme at the first workshop is “envisioning the archive” with a focus on meaningful content, issues of relevance, what, and what if? The theme on the second and third workshop is “doing the archive” with a focus on practices of accessing, capturing, documenting and how to create conditions for participation. At the workshops the participations will meet for joint exploration through a series of co-design exercises. In these processes of doing-and-thinking-together ideas and visions are articulated and materialised in form of prototypes. We expect to iterative the prototypes three times, and the final versions to be displayed and critiqued at a public seminar organised by Living Archives.

## 4. ReDoing by applying co-design approaches in other fields

The design processes described above are not completed as this paper is being composed. It is therefore not possible for us to present any analyses of co-design activities, concrete prototypes, or design proposals besides the prototypes



developed in the first phase of the project (see e.g. Nilsson, 2016; Nilsson and Barton, in press; Nilsson, 2015, Nilsson and Wiman, 2015). Nevertheless, we believe that this paper suggests imaginative ways of ReDoing by applying co-design approaches in other disciplines, and contributes to the discussion of how co-designers can step into other domains and be part of developing practices in these fields. We see this potentially as a useful way of dealing with extraordinary situations, such as the emergent refugee situation, where traditional or existing methods and practices do not seem sufficient. We expect that the forthcoming prototypes will come to represent concrete co-archiving practices and strategies that can be further iterated and eventually put into use. In addition to that, we aim to contribute to the archival discourse at large, and hope that the outcome of this project can be used as means for challenging roles and methodological approaches in the fields of ethnology, and museum and archival studies.

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# Bioinclusive Pedagogy: ReDo our Relationship with Nature

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**Abstract:** A bioinclusive ethic places both humans and nonhumans in the same moral camp. (Mathews 2011). The challenges of bringing a bioinclusive ethic to design pedagogy are many. These include historical beliefs that humans are superior to the rest of the natural world, the designer's pact with innovation and industry, and the open and fluid nature of design pedagogy. New curriculum approaches are necessary to educate designers so that we can confront the paradigms that we are caught within, and begin to design in fully engaged partnership with nature. I offer a *Bioinclusive Pedagogy* that will help design students access direct understanding of nature, and empower an uncompromising approach to working with contemporary natural system theories such as Biomimicry (Benyus 1997), and Bio Design (Myers 2012).

**Keywords:** Nature, bioinclusive, pedagogy, biomimicry, worldviews

## 1. Preamble

As a designer, educator, and researcher, my practice over recent years has veered into new territories: contemplation, Buddhism, and journaling. I turn to autobiographical writing to develop "direct sentient engagement with that world and all its ecological relations" (Hasebe-Ludt 2009:29). These practices might seem remote from the pragmatic applied discipline of design, which is most often about designing tools, digital experiences, or communication materials. I offer these practices as a way to craft new openings in the pedagogy of design. The voices in this paper include the personal, historical and spiritual; they do not offer a conclusion, but identify a valuable journey.

My father was fond of simple truisms, frequently repeated for his own amusement. I wonder what he would say about my desire to change the discipline of design. Looking back, it seems that as soon as I entered this field I began to try to change it. Am I, as dad would say, "Barking up the wrong tree"? My hope that design might find a way to work in partnership with the natural world challenges the very roots of this discipline. Industrial design was founded in the Industrial Revolution, a time made possible by how the Scientific Revolution had demystified the natural

world. The disciplines of design have been essential to the advancement of modern Western culture, a civilization that operates with the earth as a repository of resources to be controlled as a machine; nature's resources ready for excavation and transformation into circuits, garage door openers, iphones, blenders, the next generation iphone, driverless cars, flat screen monitors, yet another generation of iphone. And so on. It might be easier to start a whole new discipline than change this one.

"One tree that I am literally 'barking up' is on the North edge of Stanley Park, overlooking the sulphur piles on the banks of the North shore. I became friends with this tree one day last summer when I was sitting beside it eating a small picnic. Looking up from my rice curry, I noticed a nearby cedar covered with ivy, an invasive species here on the West Coast. I began to peel the ivy away – not a difficult task, since some pruning had obviously been done recently. After a few false starts, the ivy began to separate from the trunk in glamorous billowing sheets. I tramped the circumference of the tree, pulling at remaining stubs, and suddenly I felt a strange sensation of warmth, a sort of glow emanating from the tree. Shocked into stillness, I stood quietly. Yes, it was a palpable emanation. The tree was expressing her gratitude. My dad would likely scoff: "All in your head" was another of his truisms. If so, my head was a lovely place to be at the moment. I felt swelled with a new knowing." (St. Pierre Journal September 13 2016)

## 2. Introduction

Ideas carry forward from history in ways that we are often unaware of. Industrial design was an outcome of the Industrial Revolution, which itself was made possible by the Scientific Revolution. Design has been shaped by both movements and continues to be deeply influenced by them. This history creates tensions for designers when, with the best of intentions, they engage with theories intended for designing in harmony with nature: natural system theories. Conditions established over centuries make it challenging for designers to understand the natural world as an all-encompassing vitality that contains humans as one of many different life forms. New curriculum approaches are necessary to educate designers so that we can confront the paradigms that we are caught within, and begin to design in fully engaged partnership with nature: a bioinclusive approach that includes all elements of the larger life system (Mathews 2011). This is Bioinclusive Pedagogy.

Designers are gatekeepers. Our discipline has helped ideas come to fruition and economies grow and flourish. Over the past 30 years we have shepherded the culturally transformative transition to digital technologies. We create and shape visions that are welcomed in the cultural contexts that we are working for; we help people see possibilities. We have the capacity to shepherd understandings of nature that include more than human needs, and we can manifest a new spiritual, ethical and holistic understanding; an earth-centered spirituality. We have a way of making this real by design. To do this, we must first understand for ourselves the truths of the natural world. This entails confronting the misguided view that humans are separate from nature and have dominion over nature. We need find the intention and desire to open ourselves to resonant engagement such as I had with a cedar tree in Stanley Park.

Sustainable design theory has advanced rapidly over recent years, yet representation of nature remains superficial. While consideration of the natural

world, or ecology, is a consistent aspect of sustainable design theory, nature is delimited. Progressive theories of sustainability address intersecting problems in politics, culture, economics and ecology, but still portray nature as a separate and often secondary category to be addressed, or as an abstract model to be emulated through ‘ecological systems thinking’. Emerging schools of thought, such as neo-animism, that take the view that life is embedded everywhere, life is a quality of all that is around us, and within us, have not yet found their way into sustainable design discourse.

My quest for a wholehearted relationship with design and nature comes from a personal place. I have felt a disconnect between what I know to be true, what I have seen in design practice, and the shift that I know is necessary in design practice and education so that designers can respond to the deterioration of the natural world with knowledge, intuition and wisdom. Do other designers have a similar disquiet? Designers seem eager to respond to theories that claim to deepen the relationship between design and nature. When the book *Biomimicry: Innovation Inspired by Nature* (Benyus 1997), was first released, excitement spread quickly through academic hallways, social media, and conferences. *Biomimicry* falls in the category of ‘natural system theories’ along with *Bio Design* and other similar theories. These natural system theories purport natural values, ethics and ideals, but their application rarely meets their promises (St. Pierre 2015). This paper explores some of the reasons for this, and offers thoughts about pedagogy that will help designers renegotiate a bioinclusive relationship with nature.

## 2. A Relationship with Nature

In this paper, the term ‘nature’ is used in the bioinclusive sense: a “self-originating material/spiritual world, of which we are a part, including the powers that sustain and govern it” (Bonnett 2002). Humans are entities within this self-originating world. Nature is all encompassing: earth, bear, wind, salmon, sky, water, tree, crow, people, and bacteria. My experience connecting with a cedar tree in Stanley Park is an example of sympathetic resonance, which Heesoon Bai describes as “the perceiver’s participation in the perceived... a communion, a transfusion between them.” (2001:21). This type of communication with nature is considered extraordinary today. For Wilshire, this is a way of knowing that occupies a space other than the mind (2006:112). Others concur that it is not a ‘new’ way of knowing. It is an ancient organicist and animist way that has been discredited over time:

“Our civilization has entrenched itself almost completely in instrumentalism, making the intrinsic, animated perception of the world appear an outdated, primitive remnant of mythic culture.”  
(Bai, 2013).

I include personal stories in this paper as examples of ‘life writing’, the practice oriented inquiry of including the personal narrative in pedagogy as an intimate “counter-narrative to the grand narratives of our times” (Hasebe-Ludt 2009:09). Connecting the personal to the academic opens the potential for ways of knowing that are not logical, and for practices that are not based on scientific methodology. Life writing might challenge the “Western intellectual taboo on ways of knowing that do not conform to Cartesian contours of doubt.” (Stuckey 2010:184). When we are open to knowing it intimately, nature has a voice. This voice shifts the footing and branches of our relationship; nature is no longer a subjected other. When the voice of nature is felt tangibly and viscerally, it changes



us. It changes our priorities and our ontology, our very being. My research explores design pedagogy for transformative relationships with nature.

### 3. Nature in History

Designers are educated within a worldview that was conceived centuries ago, well before the formal emergence of many of the specific disciplines of industrial, interaction, or communication design. A continuum of changes began during the Scientific Revolution in the 1500's that continue to shape the view of designers. The impact of the Enlightenment and the Scientific revolution on design has been written about effectively by others (Irwin & Baxter 2008, Harding 2009, Sterling 2009). This paper highlights the history of the subjugation of nature that began in the 1500's. It is a subjugation that continues to persist throughout design movements, even those that aspire to re-kindle an emotional and ecological connection with the natural world.

#### 3.1 Legacy of the Scientific Revolution

Prior to the Scientific Revolution, people sensed magic and mystery in nature. Belief systems such as organicism held nature in intimate relationship with humans and set some limits on the exploitation of the natural world. Illustrations from that time showed plants and creatures in interrelated connection with one another. Nature was considered alive and vital. People were but one aspect of that vitality. In the 1500s, vitalism meant "the unity of matter and spirit as a self-active entity, in which the spiritual kernel is considered the real substance and the material 'cover' a mere phenomenon." (Merchant 1980:117). Spirituality was thought to be innate to all life. During this time, Bonnet's definition of nature as the "self-originating material/spiritual world" (2002) was implicitly understood.

By the 16<sup>th</sup> and 17<sup>th</sup> centuries, technological and commercial changes were in tension with the organicist concept of the world. Images began to appear that showed man as *the* superior being in the world order instead of among other beings in a non-hierarchical relationship. After this, images highlighted only the head of man as dominant, symbolizing the emerging belief that intelligence was of the highest value: the beginnings of rational anthropocentrism. Rational intelligence, thought to be held in the head, gradually became a standard by which to make decisions: "A new concept of the self was as a rational master of the passions housed in a machine-like body..." (Merchant 1980.214). Philosophers like Bacon and Descartes believed that the deployment of craft, innovation, and invention would extended rational man's mastery to control nature. This philosophy of mastery and dominance over nature continues to drive design to this day.

"On I go through Carolyn Merchant's text, seeing again and again how grounded I have been in the scientific and mechanistic paradigms. Right, wrong. If this, then that. Causality. Consequences. Looking at parts. Finding solutions. Common sense. Reason over emotion!!" (St. Pierre Journal October 20 2016.)

In the Scientific Revolution, the Earth was conceived as a lifeless mass that we could harvest as we wished. This permission to use nature set the stage for the Industrial Revolution, a time of rapidly advancing technology and resource extraction. Precision, invention and technology were considered desirable traits. Design disciplines like industrial design came into being as part of the new idealism around machines and industry. Design grew out of the mechanistic worldview, and remains identified with technology, notions of progress and ever-

accelerating innovation. The Enlightenment repositioning of man as dominator of all beings remained the underpinning of our relationship with nature.

### 3.2 The Romantic Movement: Seeking Connection with Nature

The Romantics, a number of Artists, designers and philosophers in the mid-late 19<sup>th</sup> century, rejected the mechanistic thinking of the Industrial Revolution and sought a return to nature and mysticism. Designers at this time advocated reverence for nature. Their works were passionate and emotional. William Morris and the Arts and Crafts Movement created fine handicrafts, wallpapers and upholsteries that were decorated with lush flowers “inspired by close study of nature” (Pevsner 1936). Similarly, the following Art Nouveau borrowed from nature to create “the long, sensitive curve...undulating, flowing, and interplaying with others.” (Pevsner 1936). Voluptuous chairs, lamps and table legs, walls and archways evoked branches, leaves and twining vines.

Borrowing imagery from nature is a superficial engagement with nature. The designs of Art Nouveau were later characterized as largely decorative, concerned primarily with surface concerns of form and style, and “a short but significant fashion in decoration” (Pevsner 1936). In most design conversations, the word ‘styling’ is pejorative. The term Romantic is also used today as a dismissive label for sentimental ideals and stylistic designs associated with nature, rather than designs that reflect knowledge, intuition and wisdom of natural systems.

The failure of the Romantic Movement to change design’s relationship with nature was in part due to the selective view of nature as decorative, safe, and beautiful. The movement was also limited by design’s relationship to nature as a subjugated other. While the Romantics reacted against the Industrial Revolution and rational scientific thinking, they remained true to the belief that man was superior and separate from nature; they remained humanists. Humanism has perpetuated in design since the Scientific Revolution.

## 4. Natural System Theories

There are strong similarities between the way that designers responded to the 18<sup>th</sup> century Romantics’ call to align with nature and designer’s responses to 21<sup>st</sup> century natural systems theories. Biomimicry, with its byline ‘innovation inspired by nature’ (Benyus 1997) appeals to both Romantic and creative impulses. Similarly, Bio Design, touted as designing with nature (Meyers 2012) is as alluring as the 19<sup>th</sup> century Romanticism. Where the Romantics exploited nature for its form and visual language, natural system theories exploit nature as a source of innovation, and even as a ‘technology’.

Design is suffused with theories of innovation. Much of design practice focuses on working with new materials, contexts, technologies and theories. The drive of the designer is to think critically, be experimental, and think imaginatively: seduced by the new out of thin air. The creation of something new sometimes becomes a goal in and of itself. This impetus for innovation permeates contemporary natural system theories for design. Biomimicry advocates looking to how nature does something and then applying that to a technological context. Hence the shape of a whale fin becomes a more efficient turbine, the spiral of coral a more efficient fan, and the self-cleaning capacity of a lotus bloom inspires a self-cleaning paint finish (Biomimicry Examples n.d.). Biomimicry has become the new Romantic design, taking ideas from nature and adapting them functionally as well as visually,

to improve on modern products and equipment in very human-centric and techno-centric ways.

Innovation with nature can also involve controlling, manipulating and attempting to improve on nature. Writing in *Bio Design*, Myers cover a wide compilation of projects about designing with nature, from constructive approaches to powerful evocations of how the applied arts can harness nature (2012), just as Bacon had first envisioned it. Myers picks up key themes from the Scientific Revolution: “Biology is both the subject and the medium, reflecting the unmet need to thoroughly examine and decode the culture meaning of accelerating scientific progress.” (2012:195). One project Titled *Life Support*, depicts a dog attached to a person with tubes, proposing “a scenario in which domestic animals function as external organs in a surprising extension of the service animal tradition.” (2012:163) precisely exemplifying the extent to which nature is subjugated. A designer in this text is quoted as saying “One of my goals is to completely design a new life form.” (2012:195). The ghost of Bacon would be thrilled; innovation furthers human dominance over nature.

“I was reading about how in the scientific revolution they were connecting artisanal work with economic growth, manipulation, and control. This is still chilling today.” (St. Pierre Journal Oct. 21 2016)

Natural system theories may be well-intentioned, but they are vulnerable in two ways. First, the conflation of nature and innovation inevitably leads to compromises. Innovation brings with it Modernist worldviews of control, mastery and a constant forward trajectory. This tends to subvert ethical frameworks. Secondly, the deeply held Humanist belief that humans are more important than a tree, a dog, or a river inhibits any critical questioning of how design subjugates the natural world. Designers with the most earnest intentions will inevitably operationalize an oppressive relationship with nature unless they examine the conditioning of past centuries. Wherever there is confusion or ambiguity, the deep beliefs of the Scientific Revolution hold fast. This is important when looking at design pedagogy for sustainability, as movements toward open and fluid pedagogy can foster unproductive ambiguity and neglect critical questioning.

## 5. Design Pedagogy: Context

There is an exciting pluralism of thought in design pedagogy throughout North America. Industrial design, communication design, and interaction design are taught in many different ways, including apprenticeship, atelier’s, field schools, and formal education. Within this pluralism it is difficult to find touchpoints for re-thinking our relationship with nature.

### 5.1 Malleable Curricula

Design curricula are highly agile. Programs are alert to what is leading edge, and are responsive to popular trends. Faculty and students respond readily to new design theories, methods, and approaches from external as well as academic sources, leaving it malleable to many influences. Corporations such as Microsoft and large design firms like IDEO engage regularly with design education by sponsoring school projects connected to their own work (Microsoft Design Expo.” n.d., d.school, n.d.) . Organizations like the Museum of Modern Art offer special competitions and lectures for partner schools (MoMA PS1, n.d.). Design education is permeated by businesses and special interest groups and readily shaped by industry’s view of innovation. Pedagogy is largely grounded in popular culture and propagates the techno-scientific rationalist worldview. As a result, most designers

are educated within the limits of industry centered and human-centered concerns. Natural system theories are easily distorted and diluted by these priorities. The open, diverse plurality doesn't offer a framework to reexamine our worldviews or challenge the West's entrenched dominant stance over nature.

## 5.2 Ecological Design Thinking to Organize Curriculum

It is challenging to bring an ethical relationship with nature into design pedagogy. Any ambiguities that pre-exist in biomimicry and bio-design are amplified by the loyalties that designers have to client, industry, innovation, and economy. Ecological thinking, modeled after how natural systems work, is one attempt to bring ecology directly to education as a framework for sustainability curriculum (Sterling 2009). Ecological thinking adds a further layer of pluralism to an already very open system.

Ecological or ecosystem thinking attempts to understand the way that natural systems function as a larger whole. Capra characterizes nature as an interdependent collection of parts and a complexity of relationships that includes nested and circular systems to create "a pattern that is common to all life. Wherever we see life, we see networks" (2002:9). This invites relational thinking; what I do here affects someone over there, and vice-versa. Nothing happens in isolation. This holistic view echoes the organicist thinking that was common prior to the Scientific Revolution, but does not include mystical or vital qualities of nature. Ecosystem thinking can underlie an approach to managing nature:

"Data are abstracted from the organic context in the form of information bits and then manipulated according to a set of differential equations, allowing the prediction of ecological change and the rational management of the ecosystem and its resources as a whole." (Merchant 1980:103).

Ecological theory also underpins systems theory: principles such as interconnected parts, stocks and flows (Meadows 2008), are often applied to non-ecological issues in various management contexts.

There are many benefits to a pedagogy based on ecological thinking. "Such learning will, ideally, be reflexive, experiential, inquiring, experimental, participative, iterative, real-world, and action oriented..." (Sterling 2009:82). Ecological systems thinking and open systems thinking in curricula support the shift from linear approaches to an organicist perspective. This encourages learners to look holistically at multiple implications and impacts on any given initiative, school of thought, or direction, and to consider connections between events. This form of curriculum encourages a great deal of creativity, and is very effective for design learning.

The highly creative outcomes from ecosystem and relational thinking are valuable but are not necessarily nature-centric. The Okala Guide, a sustainable design curriculum which was distributed to industrial design schools across North America in 2004 had a modular structure for flexible pedagogy (White et. al.). It was easy to overlook the modules on environmental ethics and social equity in favour of those on business and ecological impact assessment because design pedagogy is ambiguous about the tensions between ecological thinking and the modern worldview of ever-increasing innovation. Design pedagogy continues to attempt compromise between attending to the needs of modern industry and addressing the needs of the natural world. Within this vulnerable pedagogical context, proposals for ecosystem thinking to further diversify design education only leave pedagogy more vulnerable to dominant schools of thought. Even relational thinking within the "tyranny of modernity" (Malfouris:183) quickly finds

its own limits. It does not necessarily lead us into the kind of connection with nature that emerges from the awareness of ourselves as but “one manifestation of a web of relationships which encompasses everything.” (Loy via Bai, 2001). In this context, existing and emerging natural system theories are viewed without criticality. The primacy of human needs remains unquestioned. Fluid ecological curriculum does not challenge deeply embedded worldviews of dominance, and in fact, allows them to continue to thrive.

## 6. Bioinclusive Pedagogy

A bioinclusive ethic is one that “accommodates both the human and the nonhuman components of the greater life system” (Mathews 2011:365). Bioinclusive Pedagogy counters the worldview that humans dominate nature. According to Mathews, we need to

“truly get inside the mind-set of nature, so to speak, and start designing our world, nondualistically, from inside that mind-set.” (2011:368).

A meaningful pedagogy for reconnection with nature will set aside concerns for industry and innovation for a period of time that is long enough for students to gain direct appreciation of nature, unclouded by other priorities and loyalties. Clearing the space for design’s knowledge, intuition and wisdom within the ‘greater life system’ requires new ways of learning.

Following are a series of suggestions to foster Bioinclusive Pedagogy; they are offered as steps toward a growing and evolving methodology. Indirect methods include preparing the mind through contemplative practice and interrogating research ethics. Direct methods include experiential activities in nature that change preconceptions and cultivate direct attentiveness.

### 6.2 Indirect Pathways to Bioinclusive Insight

**Contemplative education** can help learners understand their place within natural systems (Bai 2003). It opens them to seeing themselves in relation to other beings.

“I want to see their eyes open. I want to see them come *alive*. I want to see their face light up (and I want them to see each other having this experience) when they suddenly see the bigger picture, catch an insight, and are moved by understanding.” (Bai 2007).

This openness allows new understandings. In my own practice I have spent time meditating and journaling to foster this openness. I attribute the depth of my experiences with sympathetic resonance to this practice, which fosters *being* over *thinking*. Recently I had resolved that as part of my research practice, I would begin to offer meditation during class. The first time I set out to do this, I was nervous:

“The class was so busy, the schedule changed around, and it started to feel like meditation was less important than everything else. But these students were willing to give it a try. They took a seat, closed their eyes, and breathed in. I could feel the energy in the room like a solid weight. Suddenly it was easy to find my voice, to talk through 15 minutes of guided meditation. I could see, when we ended the session, that it was working: relaxed faces, calm voices. I found an ease in the class afterwards... we could talk about just about anything.” (St. Pierre Journal October 16, 2016)



Following every meditation session, I found the students receptive and aware in the way Bai describes, ready to “see the bigger picture, catch an insight, and [be] moved by understanding.” (Bai 2007). The value of openness is that it can allow different experiences.

**Interrogating Ethics** looks at how a traditional research ethics framework applies to projects with other than humans. Typically, research ethics protocol requires that participants give their informed consent in order to be studied, observed, photographed or quoted. Bertulis poses these same questions to snails, rivers and fields, asking their permission to participate in her research (2016) and asks students to follow this protocol. This reframes the designer’s relationship with other-than-humans and directly challenges notions of human dominance.

## 6.2 Direct Pathways to Bioinclusive Insight

**Gardening:** Design students come to their education with a spectrum of experiences with nature. When asked to work in a local community garden, some of my students learned for the first time that a root grows underground. Others were amazed to learn the difference between weeds and strawberry plants. Still another gathered soil and brought it into the classroom to use as an expressive medium for visualizing garden plans. These examples show a great diversity of early conceptions about nature, and the tremendous potential for gardening to unlock new awareness. Gardening is an intimate first step to being in nature, and can be promoted as a service learning option.

**Zen Drawing:** For Franck (1971), Zen Drawing in nature engenders the kind of attention that leads to contemplation. I discovered that this is not necessarily the case for designers. Designers are taught to draw for several different reasons including ideation, expression, and communication. Drawing is a method with a purpose. Franck’s Zen drawing assignment in my class was a failure. Those students with avid drawing skills sidestepped the real purpose of the assignment (to spend time contemplating nature), and others expressed frustration over this unfairness. Curious, I decided to test this, and set a goal of doing my own Zen Drawings every day for two weeks. In a short amount of time, I found myself “re-experiencing [my]self as a learner” (Bullock 2014). I remembered clearly my first drawing lessons where I had been instructed to draw what I truly saw, not what my mind thought should be there. This took me into a space of intent focused observation. The daisy became an arrangement of lines, not a daisy. The same was true for trees, shrubs and dandelion. This was not Franck’s experience or intention. He and others (Bai 2003, Holdrege 2013) find that drawing in nature brings one into contemplative awareness and deep connection with nature. For the designer however, the conventions of drawing and seeing don’t necessarily leave room for being open to connection with the ‘other’. In fact, the reverse can happen, and the ‘other’ may become a captured object. The state of mind in which one approaches the drawing activity is crucial.

**Natural Science Journaling** can be more effective than Zen Drawing. I ask design students to imagine themselves as Thoreau or Darwin, and to sit, observe, draw, and write poetry in nature. This takes them outside of the ‘designer’s mindset’ and allows them to prioritize the phenomenological experience. Journaling activities may be furthered through a Goethean approach, which sets expectations that students observe phenomenon through intuition and direct sensing, while resisting “the tendency of the mind to impose an intellectual structure that is not really present in the thing itself.” (Seamon 1998). To this end, Goethe proposed a series of steps for students that include

“observing with patience and rigour; deepening a sense of wonder to the world; using sensual and emotional awareness to experience phenomena as fully as possible; and attending to connections between phenomena.” (Brook 1998).

**Repicturing and Unstructuring:** Holdrege’s (2013) work at The Nature Institute helps adult participants set intentions for direct awareness before and during nature walks. Holdrege primes participants to stop their mind from seeking, evaluating, and naming in order to allow open sensory experience. Exercises like *re-picturing*, imagining concrete qualities of what has been observed, encourage ‘exact sensorial imagination’ (56), and counter the mind’s tendency toward abstraction. Holdrege writes that during what he calls *unstructured walks*

“we must willfully try to open our attentiveness and invite the world in---we have little control, and that is both unsettling and cathartic.” (2013:53).

In this and other ways, The Nature Institute supports the possibility of sympathetic resonance with nature.

**Earthbond Prototyping** is a form of Experience Prototyping with nature (Camozzi 2017). Camozzi advocates bringing students into natural settings that may be unfamiliar and challenging to them, thereby disrupting any preconceived views of control over nature. Students then conceive and prototype their designs while in the outdoors, endeavoring to bring nature directly into the design process as a partner and influencing agent.

**Defining Appropriate Goals** helps to clarify intentions. This is illustrated by the difference between two activities that bring designers into direct contact with nature: Xskools (Thackara 2014) and Biomimicry (Alford 2015). Thackara’s adeptly titled, “How Does a Forest Think?” invites designers to immerse themselves in a camp in nature to gain a visceral sensory experience of and within the natural world. Thackara’s design outcomes are focused on relaying new understandings and designing experiences that invite others to enjoy direct engagement with nature, such as a ‘soil tasting’ and field walks. In contrast, Biomimicry field schools usually bring students into nature with explicit intent to find inspiration in service of humankind (Alford 2015), thereby invoking the instrumental modality that I described earlier. The instrumental modality of Biomimicry compromises and confuses pedagogical intent. Xskool, on the other hand, is bioinclusive. The difference between two is the intention that was set in beginning the activity.

## 6.3 Summary: Bioinclusive Pedagogy

Bioinclusive Pedagogy brings a clarity that will help designers to see beyond the superficial or compromised application of natural system theories. Important learning about the “self-originating material/spiritual world, of which we are a part” (Bonnet 2002) takes place when pedagogy is decoupled from the priorities of innovation and industry. Focused activities reset understanding of our shared place in the ecosphere. Clarity of intention is crucial; without it, we cannot find the momentum to counter the power of the techno-scientific rational worldview that design has been bound to. Bioinclusive designers will have the wisdom to recognize instrumentalist or Baconian detours.

## 7. Contemplations

"I returned to visit my friend in Stanley Park with some trepidation. I remember Kimmerer's discussion of pronouns (2015): this tree is a 'she'. Would she be unresponsive? Would I be found mistaken in my presumption of relationship? I tried to be open to what I might find, to maybe not even be able to find her. After a lovely walk, there she was, unmistakably denuded of the vines that clambered up nearby cedars. Holding my breath, I put my hand on her trunk. Yes, there was someone there. I leaned against her and waited. A sorrow moved through me, unbidden. I had not felt sad that day. Where did that grieving sensation come from? I tried not to analyze... stop thinking. It was her. She was sad. I don't know what that means." (St. Pierre Journal November 06 2016)

I have described how underlying beliefs established during the scientific revolution continue to shape design's relationship with nature. During the Romantic Period of the 18<sup>th</sup> century, designers re-kindled their love of nature. The 21<sup>st</sup> century resurgence of romantic and organicist views in design and design curriculum triggers similar emotions, but design's engagement with nature remains largely instrumental. Natural system design theories have been conditioned and limited by human-centrism; the thought that humans are separate from the rest of nature, more important than other life forms. Nature is still the subjugated 'other', conceived without mysticism, vitality, and integrity.

This is a significant legacy from the scientific revolution. Centuries of acculturation makes it very hard to see this legacy. Until designers challenge the beliefs of *superior man* and *inert Earth*, we are prone to misguided or compromised engagement with natural system theories. This in turn limits the potential for design to envision a wholehearted relationship with nature in modern Western culture. Given the urgent needs of the ecosphere, this is potentially a tremendous loss. Designers have great capacity to shepherd new ways of thinking, and transform our relationship with the natural world. I have articulated the critical importance of setting clear pedagogical intentions through a Bioinclusive Pedagogy so that designers can "truly get inside the mind-set of nature" (Mathews 2011:368). This carves new openings for designers to engage with the intrinsic qualities of the natural world, understand the vitality of the Earth we work upon, and imagine futures that will benefit all beings.

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# ICT-empowered Collaborative Services: Technical Ecosystem and Social Forms

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**Abstract:** This paper examines rapidly growing social innovations based on the end users' collaboration empowered by information communication technologies (ICT), namely ICT-empowered collaborative services. With an aim to understand the technical environment that supports these innovations and the manifestation of their social forms, case studies of ICT-empowered collaborative services were conducted. The findings include the technical ecosystem in which collaborative services are conceived and implemented, and the taxonomy of collaboration networks that underpin them. The paper discusses the reciprocity between the social form of collaborative organisations and the technical ecosystem they choose to adopt, and its implication to the design for collaborative services in the sharing economy.

**Keywords:** Social innovation, collaboration, ICT, sociotechnical system, social network

## 1. Introduction

The last decade has witnessed the convergence of technological and social innovations: information communication technologies (ICT) have brought people new ways to collaborate and produce. A few notable examples are the archives of distributed knowledge, information, and data; peer-to-peer platforms for sharing information and trading products; and co-production networks of open-source software and hardware. Collaborative production in virtual space is increasingly adapted by social innovators who seek to incorporate in their projects the qualities of anti-rivalry, inclusiveness, democracy, and efficiency<sup>1</sup>. Empowered by the advancement and democratisation of ICT (Hippel, 2005), social innovations have become increasingly resource-efficient to implement and available to participate, resulting in their multiplication (Mulgan, Steinberg, & Salem, 2005; Murray, 2010). An example is Couchsurfing, a non-for-profit initiative to share

<sup>1</sup> According to Cooper (2005), collaborative production in virtual space has the characteristics of anti-rivalry and inclusiveness. Benkler (2006) argues that it is politically more democratic and economically more efficient than traditional means of production in the market economy.

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couches and experiences among travellers, which inspired similar sharing services (Penn & Wihbey, 2015).

Couchsurfing was founded by Casey Fenton and his colleagues in 2004 with an aim to create an international network of people and places through mutual sharing of time and houses (“Couchsurfing”, 2016). In Couchsurfing, relationships are formed between hosts and guests. These relationships are primarily weak ties with a potential to develop into strong ones since there are ample opportunities for the two parties to develop their relationship during the visit which usually lasts from a few hours to weeks (Figure 4). After the visit, the hosts and guests are allowed to write a reference for each other, which improves the credibility of the service. Since its launch, the service has continued to gain popularity. By 2016, it has over 12 million members, who have organised half a million events in 200,000 cities.

Along with the convergence are growing opportunities for designers to support and facilitate social innovations by taking advantage of the technical ones. In this study, we draw a particular attention to the design for grassroots social innovations. Bottom-up social innovations that challenge conventions are known to introduce a set of new, different and intrinsically more sustainable solutions, thereby laying the groundwork for a major systemic change (Manzini in Meroni Eds., 2007). ICT combined with relevant design knowledge become the building blocks to develop empowering environments for these grassroots activities (Baek, Manzini, & Rizzo, 2010).

In design literature, grassroots social innovations have been considered as a type of service in which the end users, i.e. the owners of problems, collaborate to produce solutions to a wide range of social needs, and by doing so, transform a system or create a new one rather than responding to a given system (Jegou & Manzini, 2008; Sangiorgi, 2011). They are called *collaborative services*, and the people who create them *collaborative organisations* (Jegou & Manzini, 2008). Due to their positive impact to society, collaborative services have been a subject of design activities. Manzini (2008, 2011) categorises these activities as designing within collaborative organisations<sup>2</sup> or designing for collaborative organisations: in the former, designers participate in co-designing collaborative services with relevant skills, visions, scenarios, and product/services while, in the latter, they intervene to create favourable contexts for collaborative services through the development of dedicated platforms, orienting scenarios, and catalysing events. Kimbell (2011) also claims that designers can design for collaborative services by developing platforms for action, i.e. empowering environments, on which diverse actors will engage in collaboration over time.

Collaborative services are produced based on the end users’ collaboration networks, which makes a collaborative organisation a sociotechnical system (STS). According to STS studies, any human organisation is an integration of two heterogeneous and interdependent sub-systems whose interaction influences the performance of the organisation: a social system consisting of the members and their relationships and the technical system in which they perform the tasks aligned with the organisational goals (Trist, 1981). In a collaborative organisation, the social system comprises collaborative people and their relationships (collaboration networks), and the technical system is their activities leading to shared values (collaborative services) respectively (Baek, Meroni, & Manzini, 2015). The social and technical systems are mutually influential: in the process of

<sup>2</sup> In the original article, the author uses the term creative communities instead of collaborative organisations. We chose to use collaborative organisations to avoid introducing a new but synonymous term.

collaboration, relationships among users are built and reinforced. These social relationships, in turn, create a favourable environment for new collaborative endeavours, thereby creating a virtuous circle between the production of collaborative services and collaboration networks (Baek, Kim, & Pahk, 2016).

We posit that ICT amplifies this virtuous circle in a collaborative organisation: on one hand, ICT enhances the forming of collaborative relationships by allowing people to connect who would otherwise remain disconnected. These relationships tend to form and degrade quickly, and weak in strength<sup>3</sup>; on the other hand, ICT also support the production of collaborative services by providing tools and platforms for organisational growth and service operation (Figure 1). This proposition leads to the following question: *how do the technologies support the production of collaborative services and facilitate the forming of collaboration networks*. To address it, we conducted case studies of collaborative services where ICT are utilised to empower end users' collaboration (hereafter ICT-empowered collaborative services). The cases range from a local community that utilise the Internet to a network of virtual communities. As the result, we propose the technical ecosystem of collaborative services, and the taxonomy of collaboration networks. The result is confined by our limited case collection and is subject to expansion, modification, and refutation as the research continues.

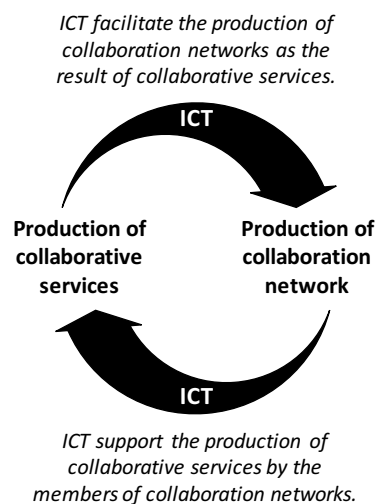


Figure 1. The virtuous circle of a collaborative organisation and its amplification by ICT

## 2. Method

### 2.1 Case selection

Case selection followed theoretical sampling in which extreme cases are chosen that clearly and transparently exhibit the characters of interest to extend emergent theory (Eisenhardt, 1989). In this study, the proposition that the virtuous circle in a collaborative organisation is amplified by ICT was considered as the emergent theory. Cases were selected in two steps: (1) a pool of candidates was created by collecting cases from multiple sources including literatures and social

<sup>3</sup> According to Granovetter (1973), interpersonal ties are categorised into strong, weak, or absent based on their strength. The tie strength can be measured in terms of the combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services that characterise the tie. Haythornthwaite (2002) introduced the fourth type known as latent ties which exist technically but yet to be activated.

innovation experts; (2) the final candidates were selected based on the criteria coherent with the aim of the study:

- A case utilises ICT to support operation, disseminate outcomes, and connect users;
- Collaborations occur in both physical and virtual spaces;
- A case is a collaborative service that provides sufficient information for investigation.

These criteria allowed us to focus on a specific type of social innovations in which the impact of ICT on the production of collaborative services and collaboration networks in the real world is evident. The description of the final candidates is provided in Table 1.

*Table 1. Case list*

Case	Description
Peladeiros	Peladeiros helps people in Brazil organise soccer matches.
Green Map	Green Map is a project to chart a sustainable map of the world through crowdsourcing by providing participants with a toolkit for mapmaking
Open Green Map	Open Green Map is an online version of Green Map using Google Maps® mash-up.
GROFUN	GROFUN is an urban gardening initiative rooted in Bristol, UK with an aim to strengthen the resilience of communities to withstand food shortages of the future and to respond to climate change
Couchsurfing	Couchsurfing connects travellers by allowing them to share accommodations and make friends.
Meetup.com	Meetup.com is a social network service for local groups aimed at supporting people to organise themselves into groups at local level, thereby revitalizing local communities and empowering them to make differences that can change the world.
Team Fighting Diabetes	Team Fighting Diabetes is a local Meetup group for diabetics in San Jose. Its members exchange useful information, exercise together and advocate healthy lifestyle.
PledgeBank	PledgeBank allows people to make pledges online that require other people's support to be accomplished.
Katrinalist.net	Katrinalist.net is a grassroots project organised by the PeopleFinder team and volunteers to restore family links right after Hurricane Katrina. A website was built to provide information of survivors to their families and friends.
Shelfari	Shelfari is a social network-based online book club service that helps people connect with other readers and enhance their experience of reading.
Bookcrossing.com	Bookcrossing.com is a global book sharing scheme in which one leaves a book in a public place to be picked up and read by others, who then do the same.
Activmob	Activmob is a service organised by the Design Council and Kent County Council with an aim to support Kent residents to exercise together in a context that is comfortable and social.
Carrotmob	Carrotmob supports the organisation of flash mobs that reward businesses who are making the most socially responsible decisions.

GAS	GAS is a national network of sustainable food purchasing groups in Italy
No 10 Petitions	No 10 Petitions in the UK collects and delivers people's petitions to the Prime Minister.
FixMyStreet	FixMyStreet collects reports by people on local problems such as graffiti, fly-tipping, broken paving slabs, and street lighting and delivers them to the local councils for resolution.
WiserEarth	WiserEarth is a social network service that maps and connects organisations and individuals addressing the issues of sustainability (closed in 2014)
Solidarius	Solidarius is a social network service on which people support, qualify and diffuse solidarity economic initiatives and local sustainable development.
Zero Relativo	Zero Relativo is an online bartering service that allows people to exchange second-hand products.
Timebanks	Timebanks is a global network of local communities where members trade time and build community connections.
Nabuur	Nabuur connects local communities in developing economies in need of help with volunteers all over the world.

## 2.2 Data collection and analysis

A within-case analysis was constructed to investigate: (1) the technical support for the production of each collaborative service, and (2) the form of its collaboration network. The data were gathered using both primary and secondary research based on the template developed by Meroni (2008). The template was designed for the case studies of grassroots social innovations and consists of four sections: background information, service, solution, and collaboration network. The primary data were collected from non-participant observation in online communities where the author requested membership, and observed the online platform and communal activities. If observation was not allowed due to exclusive membership (e.g. Activmob, Carrotmob, FixMyStreet, Time banks) or termination of service (e.g. Katrinalist.net<sup>4</sup>), we relied on the secondary data, which included historical data and service activities informed by community newsletters, news articles, and published reports. The result was a complete and summarised description of the cases.

During the analysis of the technical support for collaborative services, we investigated the followings:

- The background of each case including the title of a case, location, history, number of users, and the objective.
- Different aspects of service such as the aim, concept, stakeholders, and user co-creation.
- Key innovativeness of each case as a social innovation, and technologies that empower such innovation.

In analysing collaboration networks, qualitative social network analysis (SNA) was used. According to Edwards (2010), qualitative SNA is useful “to explore the content and processes of networks from an insider’s view”. We adopted it because: (1) we were interested in the content, i.e., collaborative activities, as well

<sup>4</sup> Katrinalist.net was only available from September 2<sup>nd</sup> to 7<sup>th</sup>, 2005. During this period, over 90,000 entries of “lost and safe” were input. The project has evolved into a standard format for entering data (PeopleFinder Interchange Format, or PFIF) for use in the aftermath of disasters.



as the structure of networks; and (2) people establish relationships through multiple media such as voice calls, text messages, emails, social networking services, and face-to-face meetings, which constrains the collection of quantitative data. SNA was conducted based on the primary and secondary qualitative data related to the background, service, and collaboration network of each case. It proceeded as follows:

- Define the temporal scope of observation. Given the relatively short history of the cases, the temporal scope is set to the duration of collaborative services supported by evidences.
- Define the organisational scope of observation. If the case under investigation is a single group or community (e.g. GROFUN, the Team Fighting Diabetes), the entire collaboration network is observed. If the case is a platform occupied by multiple groups or communities (e.g. Meetup.com, Couchsurfing), a sample group is selected for observation.
- Identify service users, and analyse their activities within group in both physical and virtual spaces.
- Analyse activities across groups in both physical and virtual spaces.
- Determine the tie strength based on the regularity of interaction: ties based on regular activities are considered strong; the rest are weak (Granovetter, 1976; Marsden & Campbell, 1983)<sup>5</sup>.
- Based on the observation of inter-group activities, represent in a schematic form the collaboration networks of the entire organisation. Activity-based collaboration networks consist of nodes (users) connected by links (relationships) formed via activities.
- If allowed, analyse the collaboration networks quantitatively and compare the result with the previous step.

The cross-case analysis revealed the technical ecosystem that ICT-empowered collaborative services are built on and the taxonomy of collaboration networks.

## 3. Results

### 3.1 The technical ecosystem of ICT-empowered collaborative services

The investigation of collaborative services and their empowering technologies led to the identification of a technical ecosystem in which these services operate and their evidences emerge (Figure 6). The ecosystem is composed of four layers: a platform base, an enabling solution, a collaborative service, and an event (Baek, Manzini, & Rizzo, 2010), and the configuration of the layers varies in case.

A *platform base* is a system of digital tools and resources, enabling people to create a digital solution to support and facilitate a collaborative service. It is also called a cyber space or what Jones (1997) described as a virtual settlement where collaborative organisations operate. For instance, a Yahoo Group members or Couchsurfers utilise a platform base, i.e. Yahoo Groups and Couchsurfing.com respectively, equipped with various tools and a database of user profiles to initiate and maintain collaborative activities.

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<sup>5</sup> In this study, we used the regularity of interaction to determine the tie strength as it was the only reliable data available across all the cases.

*An enabling solution* is a set of digital products, service and organisational tools that allow people to achieve a result using at best their skills and abilities (Manzini, 2005). It allows people to organise, manage and participate in collaborative services more easily and efficiently. For example, GROFUN uses a Yahoo Group equipped with digital tools that allow its members to organise events, share photos, and manage discussions. Likewise, Couchsurfers have a personal dashboard to manage to-do's, travel plans, upcoming events, and guests.

*An event* is the manifestation of a collaborative service, i.e. the physical evidence of a collaborative experience (Titz, 2001). An event may vary in the number of participants, degree of interaction and knowledge or physical assets required by the participants (Manzini, 2009). For instance, GROFUNners convert gardens, plant vegetables, and barbecue together; and Couchsurfers organise hangouts and meet-ups, and share couches with strangers.

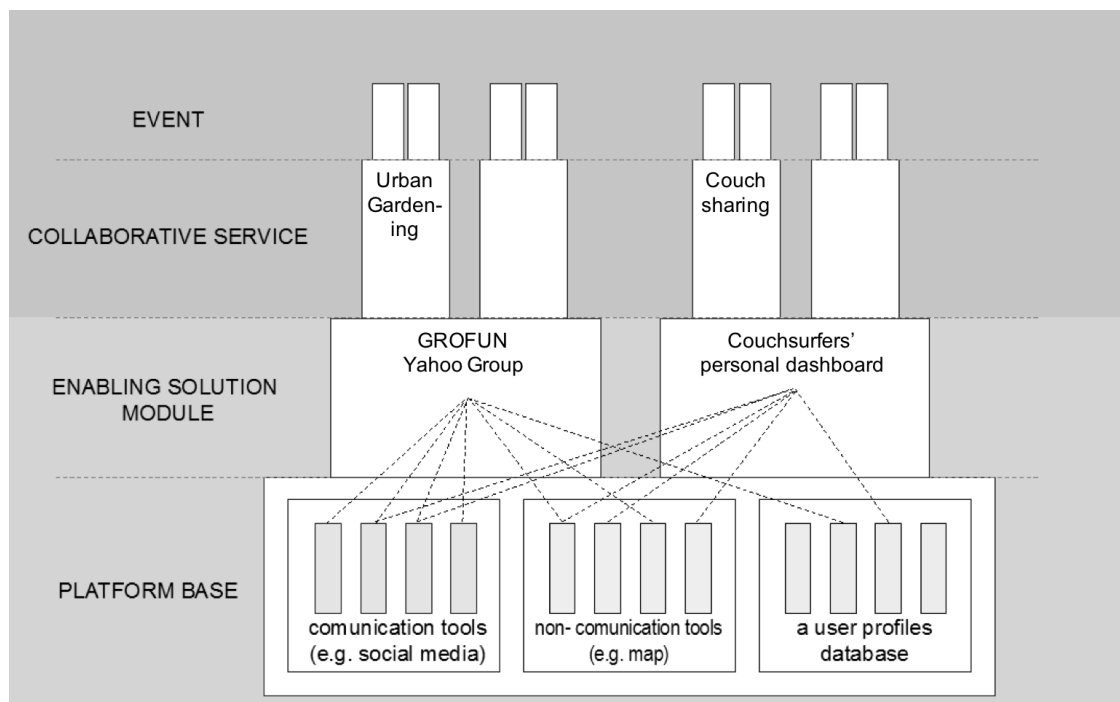
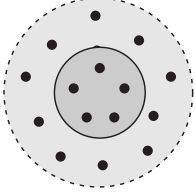
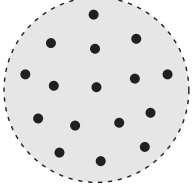
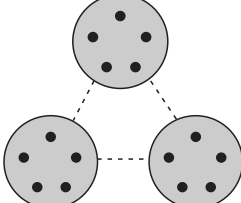
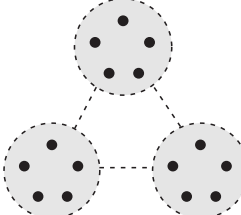
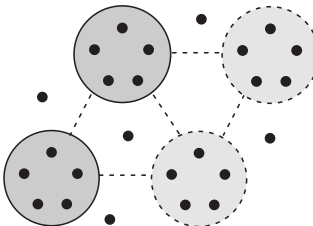


Figure 2. The technical ecosystem of ICT-empowered collaborative services

### 3.2 The taxonomy of collaboration networks

From the observation of collaboration networks in ICT-empowered collaborative organisations, different forms were discerned and a taxonomy was proposed. In this taxonomy, collaborative networks are categorised as a tightly knit group, a loosely knit group (or networked individuals), a network of tightly knit groups, a network of loosely knit groups, and a network of tightly and loosely knit groups (Table 2).

Table 2. A taxonomy of collaboration networks in ICT-empowered collaborative organisations

Category	Characteristic	Example
 1) A tightly knit group	Driven by a group of tightly knit members who share values and interests and often bounded by location Supported and endorsed by individuals who are weakly connected to the core group and within themselves	GROFUN Team Fighting Diabetes
 2) A loosely knit group	Members connected via weak or latent ties Intermittent or one-time interaction Members bounded by common values and interests but not necessarily by location	Fix My Street PledgeBank No. 10 Petition Zero Relativo Bookcrossing.com
 3) A network of tightly knit groups	Composed of multiple groups of tightly knit members who share values and interests and often geographically bounded Groups weakly or latently tied to other groups	Meetup.com GAS Activmob Timebanks Peladeiro Green Map
 4) A network of loosely knit groups	Composed of multiple groups Group members are loosely knit and bounded by common values and interests but not necessarily by location Intermittent or one-time interaction Groups weakly or latently connected	Shelfari Nabuur Open green map WiserEarth
 5) A network of tightly and loosely knit groups	A hybrid of the third and fourth categories	Couchsurfing Carrotmob (and possibly more)

A *tightly knit group* consists of individuals tightly knit via strong ties and possibly supporters or followers in the peripheral (e.g. GROFUN). The membership is typically defined by geographical or organisational boundaries. Cases in this category exist in the form of a hybrid of online and offline communities in which the collaboration networks are formed and reinforced by both distant and face-to-face interactions. Other examples in this category include an offline classroom utilising an online discussion forum, a group of scholars conducting a collaborative

project using digital tools, and a local time bank community supported by an online platform.

*A loosely knit group or networked individuals* is operated by the individuals who are loosely knit via weak or latent ties. The members are bounded by common values and interests rather than location or organisational affiliation. Hence their relationships tend to be functional and pragmatic. Collaborations occur at individual level and often reciprocal. What distinguishes it from the previous category is the strength of interpersonal ties among members which is influenced by the frequency and physicality of interaction. Repetitive interactions are not a required condition for accomplishing the goal. In some cases, face-to-face meetings do not occur. The cases in this category are Fix My Street, PledgeBank, No. 10 Petition, Zero Relativo, and Bookcrossing.

*A network of tightly knit groups.* Tightly knit groups can form a network of themselves and grow in scale while maintaining the core values. It allows users to initiate collaborative services of their own similar to the archetype by being a platform that provides an infrastructure, tools, and guidelines for replication. Services thus created are homogeneous in terms of the philosophy, values, and nature of interpersonal relationships that underpin them. Some cases offer a common technical platform base for its constituents to share, which contributes to homogeneity and inter-group connectivity in the network (e.g. Meetup.com, Green Map System, Timebanks, and Peladeiros) while others rely on more traditional technologies such as mailing lists and regular offline meetings (e.g. GAS, Activmob).

*A network of loosely knit groups.* Likewise, loosely knit groups can also form a network of themselves. This category is similar to the previous category in terms of the homogeneity of the constituents and the adoption of platform base, but distinct in terms of the weak or latent connections among groups. The groups are loosely bounded and the inter-group activities are rare. Examples in this category are Shelfari, Nabuur, Open green map, and WiserEarth.

*A network of tightly and loosely knit groups.* We speculate that the boundary between the third and fourth categories may not be as clear-cut as we might expect and networks may have both tightly and loosely knit groups inside. For instance, in the Carrotmob, a network of flash mobs that promote ethical and responsible consumption, some mobs are manifested as a one-time gathering while others are repeated events based on existing social networks. For instance, University of the Pacific social entrepreneurship students hold carrot mobs annually ("Carrotmob", 2016). The existence of a network of tightly and loosely knit groups is supported by the dynamic nature of social relationships: Some loosely knit groups may transform into tightly knit ones or vice versa as relationships develop or deteriorate over time. To conclude, cases in the third and fourth categories are categorised as such based on the dominant nature of the groups within, but may in fact be the mix of tightly and loosely knit groups whose configuration constantly changes.

### 3.3 The interaction between the technical ecosystem and collaborative networks

The virtuous circle of an ICT-empowered collaborative organisation (Figure 1) postulates a correlation between the technical ecosystem of collaborative services and the form of collaboration networks. In other words, we assume that there is an interdependence between the adoption of ICT by an organisation and its social form. This interaction between the social and technical systems manifests as an iterative process in which the selection of technologies influences the social form

of a collaborative service, and the dynamics of social forming in turn necessitates the adoption of new technologies for optimised service operation. For instance, we can imagine a hypothetical situation where a tightly knit group decides to promote and spread its initiative to the outside world by creating a blog. If successful, its collaboration network will grow into a network of its replicas, which may create a demand for a new technical environment optimised for its operation (e.g. a social network platform that permits interactions among the member groups). Based on this assumption, we discuss how the technical ecosystem of collaborative services and the taxonomy of collaboration networks may be interrelated.-

The tightly knit group and the networked individuals in the first two categories are a collaborative organisation supported by an enabling solution. For instance, GROFUN, a group of neighbours that cooperatively grow food in their own back yards, runs its Yahoo Group (enabling solution) and utilises a set of communication and task management tools provided by the Yahoo platform to manage its activities. These activities result in events such as Action Days, community meals, and public promotion. Another example in this category is the Team Fighting Diabetes, a group of diabetics in San Jose. Its members run a blog on Meetup.com, a social network platform for local activities, to exchange information about diabetes and organises activities that promote healthy lifestyle.

Similarly, the networked individuals in the second category is a collaborative organisation supported by an enabling solution whose members are mostly connected by weak and/or latent ties. The enabling solution is often designed to serve the specific purpose of the service, and allow users to make joint decisions to achieve common goals. For instance, the PledgeBank users achieve common goals through collective efforts by making and participating in pledges online such as raising a fund to scout a player for their local soccer team ("PledgeBank", 2005).

While the first two categories are represented by a single collaborative organisation, the remaining categories are represented by assemblies of such organisations. They are what Jones (1997) calls cyber regions/locales of virtual communities. Tightly and/or loosely knit groups in the network utilise the enabling solution provided by the platform base to organise and manage their collaborative services. In these categories, inter-group activities are often supported and encouraged with relevant technical features as they contribute to the innovation diffusion, liveliness, and conviviality within the organisations. An exemplar is Meetup.com, an international network of local Meetup-up groups. Another example is Couchsurfing, a global network of people from different cultures sharing couches and experiences.

ICT not only enable but also facilitate the growth of collaborative services. For instance, it took 15 years for Wendy Brawer, the founder of the Green Map project, to develop the initiative into a global project charting 400 cities in 51 countries. When the Open Green Map, the online version of the Green Map, was launched in 2007, it took only four months to chart 2350 sites in 12 countries. As of 2016, the project charts over 38000 sites in over 65 countries ("Open Green Map", 2016). In addition, all the cases except Activmob - a project led by a local government for local communities - have grown to a national or global scale in average 6.8 years. They all have evolved into the cyber region where collaborative services grow and multiply.

This finding is coherent with existing social network studies in that ICT foster weak social ties that are critical to innovation diffusion: According to Granovetter (1973), information tends to remain isolated in a group formed by strong ties whereas it is



likely to diffuse through weak ties. This is because people connected through strong ties share a large part of their social network and therefore they tend to form an isolated group. In such a group, information is self-contained and inaccessible by those outside the group. On the other hand, people with many weak ties often play the role of bridges that connect groups, and it is through these bridges that information, including social innovations, diffuses. Other studies report that the Internet contributes to creating and reinforcing weak ties. For instance, Rheingold (1993) observed social aggregations and forming of personal relationships in cyberspace when virtual communities first emerged. Wellman, Haase, Witte, and Hampton (2001) argue that the Internet strengthens interpersonal contacts, participation and community commitment. Kavanaugh (1999) claims that ICTs contribute to reinforcing the existing weak ties and building trust within a local community.

In the recent years, we have witnessed the explosion of sharing economy in which services that allow people to allocate resources more efficiently through sharing create economic, environmental, and/or social values (e.g. Airbnb, Uber, and TaskRabbit). In operating these services, ICT play a critical role in distributing resources in real time, enhancing the productivity, and empowering social relationship forming that underpin collaboration. While the relationships thus formed are useful to accelerate the growth of collaborative services and amplify their social impact, they are weaker in strength and less personal than the relationships formed through face-to-face interactions. In consequence, collaborative services may suffer from the reduction of relational intensity as they adopt ICT, what Parigi and State see as inevitable disenchantment in the technological progress (2014). It is noteworthy that for the development of collaborative services, both strong and weak ties are essential: the generation and incubation of an innovation are mainly achieved through strong ties while the development and diffusion are achieved through weak ones (Baek, 2011). We thus argue that careful and intentional efforts to balance the configuration of strong and weak ties are needed in the design for ICT-empowered collaborative services. This study responds in part to this argument by illustrating how strong and weak ties function in various collaborative services in relation to service goal and technology empowerment.

## 4. Conclusion

This study inquires how ICT support the production of collaborative services and facilitate the forming of collaboration networks. To answer these questions, we conducted case studies of collaborative services empowered by ICT. As the results, we propose a technical ecosystem in which these services are produced and the characteristics of their social forms which are presented as the taxonomy of collaboration networks. We also found that ICT amplify the virtuous circle of a collaborative organisation by supporting the production of collaborative services with the provision of necessary tools and resources and facilitating the formation of collaboration networks by fostering relationships in the virtual and physical spaces, particularly weak ties.

In the sharing economy, ICT have been increasingly adopted by collaborative organisations for distributing resources more efficiently in a greater scale. While they have contributed to the growth of collaborative organisations in quantity, they have inevitably weakened the quality of relationships, thereby raising the need for achieving the right composition of strong and weak ties to maintain the relational value of the organisations. The cases in this paper cannot be an exemption, and it remains to be understood how the technologies influence their

social system and how we can design the technical system to achieve the right combination of relationships of different strengths in alignment with the organisational goal. Future works include theoretical and methodical approaches to analysing and designing for the relational dimension of collaborative services.

This study targets the audience who are interested in understanding how a digital platform for social innovations interacts and co-evolves with the people engaged in them. It may also be useful for the platform developers in the sense that the technical ecosystem suggests an archetype of ICT-empowered collaborative services while the taxonomy presents a set of possible scenarios that these services may develop into.

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# Re-thinking the Approach to Environmentally Sustainable Fashion Design Praxis

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**Abstract:** This paper considers values and an ethical approach as a possible driver for the implementation of environmental sustainability in the fashion and textile industry. Although the context of the paper is South Africa, which has its own very particular environmentally sustainable problems, the finding that emanated from a doctoral study is applicable in any global fashion and textile industry and aligned design disciplines. The paper specifically considers how we wish to redo our approach to environmental sustainability. The finding that is reported on in this paper is the fundamental principle that underpinned praxis of the participants in the case. What is evident in the finding is that merely considering the practical aspects of applying environmental sustainability such as *reduce-recycle-re-use* is not enough to make an impact, and that a much broader, holistic approach to environmental sustainability is the only way to effect change.

**Keywords:** Fashion design praxis, personal values

## 1. Introduction

At the 2014 Cumulus conference held at my home institution, the University of Johannesburg in South Africa, I presented part of my doctoral research project. The presentation considered the challenges that environmentally sustainable praxis faces and, although I was in the middle of the project and was not done with analysing the findings, it was already apparent that the challenges in a textile and fashion industry such as the one in South Africa were profound and needed a re-considered approach to environmentally sustainable fashion design praxis. That paper suggested a need for an engaged designer who considers an impact-driven approach where design becomes the driver of change and who re-considers what and why we do that embody social and cultural values and, lastly, is a designer who becomes a strategist who embraces change (Fletcher & Grose, 2012; Smal, 2014).

The purpose of the research project was to develop an understanding of environmental sustainability in current fashion design praxis in South Africa. In the study I specifically focussed on the role of design in an environmentally



sustainable praxis that is both economically viable and considers sound environmental practices. Part of my discovery showed that a large percentage of the South African textile and fashion industry did not consider environmentally sustainable practices to be necessary. A survey undertaken towards the end of 2014 revealed that environmental concerns in the industry were not a primary concern and showed a marked absence of the need to understand what environmentally sustainable praxis is and how it can be applied (Mossgroup, 2014, p.20).

For this presentation at ReDo Cumulus, I briefly reflect on the research project by sketching an overview of the textile and fashion industry of South Africa and proceed to discuss one key aspect that emerged from the study, namely how personal beliefs and an ethical approach seems to be a fundamental driver of the meaningful application of environmental sustainability for the South African fashion and textile industry. In the concluding section of the paper, I very briefly touch on Stuart Walker's (2014) work *Designing Sustainability: Making radical changes in the world*. This work in itself warrants far more time and exploration than is given here, yet there are some aspects that emerged from the study that align with what Walker is referring to. This paper therefore focusses on one significant finding, the fundamental principle that underpinned praxis that emerged from the study.

## 2. The grim side of the South African fashion industry

The South African fashion and textile industry is referred to as a broken value chain and despite significant investment and support by government, the industry is struggling to move from survivalist to expansionist mode (Ndalana, 2016). In recent years, jobs in this sector have decreased by almost 50%. In 2013 the fashion and textile industry represented approximately fourteen percent of the country's manufacturing employment and contributed eight percent to the gross domestic product (The South African textile and clothing industry - an overview, 2014). Several government plans were established to assist this sector. One of these, the Clothing and Textile Competitive Programme (CTCP), was aimed at improving global competitiveness and included a focus on developing and growing sustainable clothing and textile products (Smal, 2016, p.4). The body tasked with this, the South African Sustainable Textile and Apparel Cluster (SASTAC), as part of their investigation commissioned a report on issues facing the local textile and apparel industry (Mossgroup, 2014). The report identified five significant challenges facing the industry. These ranged from a predominantly inwardly-focused industry concerned with short-term solutions to dealing with financial pressures, to a stressed labour-intensive environment, incoherent and constantly changing legislation, and unethical behaviour. The last concern presented in the report was the absence of a need of developing strategies for, and implementation of, environmentally sustainable practices.

Environmental sustainability is a highly complex issue in the fashion and textile industry, that consists of a long and fragmented supply chain, and is best visualised in the following figure that shows where and how environmental sustainability in this supply chain can be considered (Smal, 2016, p.84).

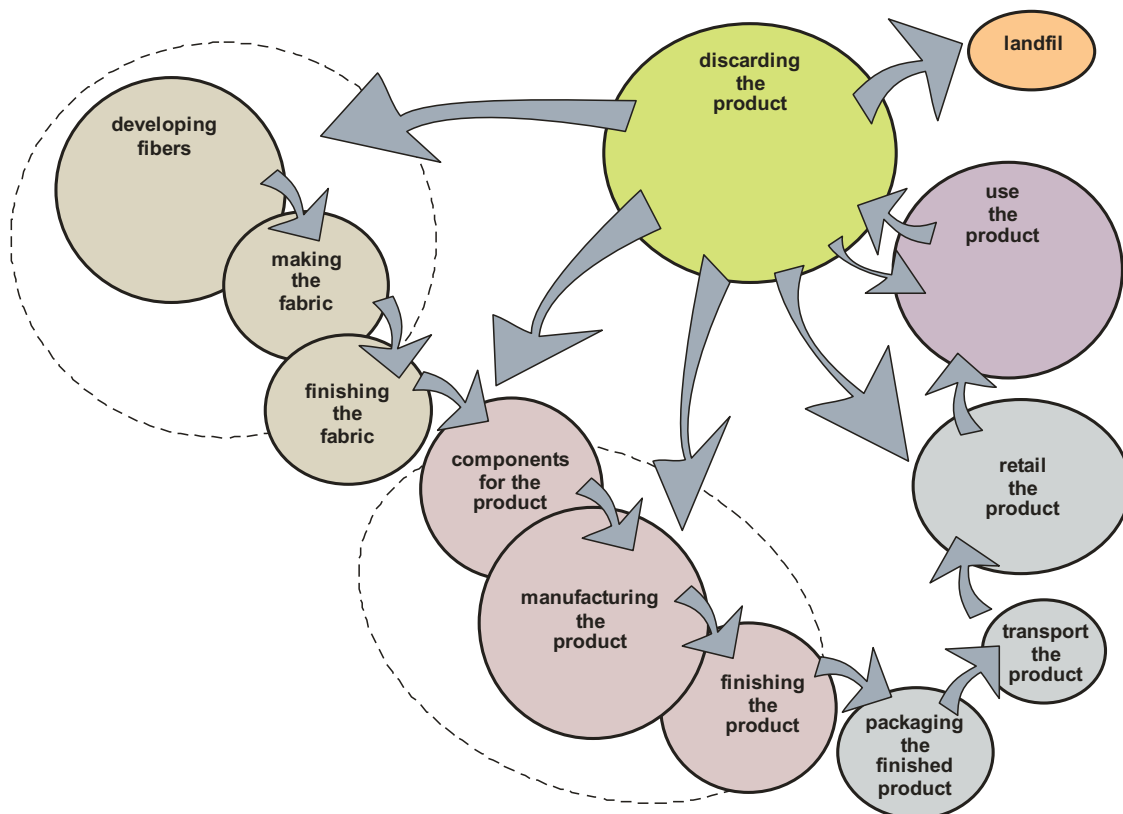


Figure 1. A view of the total lifecycle of a garment product (Smal, 2016, p.84)

Heightened production, increased consumer demand and the devaluation of clothing are all aspects of this supply chain (Smal, 2016, p.84; Black, 2010). Fletcher and Grose (2012, p.13) place environmentally sustainable efforts into four categories, namely, renewable source material, using natural sources effectively, fair labour and trade practices, and reducing waste where possible. Although all of these aspects are important and should be considered as part of the whole package of environmental sustainability, the question can be asked – is this enough, and should a change in approach be considered? The doctoral study answered some of these questions, but also presented new suggestions for a holistic approach to the implementation of environmental sustainability in the industry.

### 3. The case

The discussion presented in this paper is based on one of the findings of the case of the research project. The three purposively selected companies that formed part of the case are small to medium manufacturers. The case is not representative of the South African fashion industry, but can be considered a snap-shot of current environmentally sustainable praxis in the industry, thereby providing some sense of being representative of the field (Yin, 2009, p. 35-36) and of being embedded in the real world (Gillham, 2000, p.12-13). The single case study was based on a qualitative paradigm with an inductive approach in order to explore and understand the context of environmentally sustainable fashion design praxis

in South Africa (Smal, 2016, p. 37). The three companies that participated in the case design, manufacture and retail their products in southern Africa. In the study Mauritius and Madagascar were included as being part of Africa. The three were all well-established fashion businesses that retail in South Africa as reflected in Table 1. All three companies, who will remain anonymous and will be referred to as Companies A, B and C, publicly proclaimed environmental sustainability as a key approach in their businesses. The information in Table 1 was retrieved from each company's website.

**Table 1:** Profile of the case study participants at the time of the doctoral study (Smal, 2016, p.42-43)

	Company A	Company B	Company B
<b>SIZE</b>	Largest company in the case study Company consists of design, manufacture and 49 retail outlets in the country	Company is medium in size Owner is creative director with two additional designers Company consists of design, manufacture and own retail	Company is small, referred to as a design studio Designer is owner
<b>ESTABLISHED</b>	1992	1995	2004
<b>PRODUCTION</b>	Design and product development at head office in Cape Town, South Africa. All sourcing and manufacturing off-shore	Design and product development at premises in Johannesburg, Gauteng, South Africa Some manufacturing completed in-house, some outsourced using small CMT facilities in the Gauteng region Sourcing local and international	Design at home-based studio All manufacturing outsourced, using local and Africa-based CMT facilities Sourcing local and international
<b>LABEL(S)</b>	Ladieswear Childrenswear	Ladieswear Bridal wear	Ladieswear
<b>RETAIL</b>	Retail outlets in all major centres in South Africa	One retail outlet in Gauteng region	Supplies various types of retail outlets Markets products on-line
<b>ECO-PHILOSOPHY AND APPLICATION</b>	Responsible ethical values. Key words used: Family first Go organic Always ethical Lasting quality Give back Philosophy: "Creating relaxed and natural	Being sensitive to environmental concerns Making use, where possible, of natural fibres and pigment dyes Products include old-fashioned techniques, i.e. smocking, felting,	Clothing with a conscience, "what you wrap around you is a reflection of your soul" Socially and environmentally responsible company committed to sustainability through material

clothing in harmony with a return to nature” Purchase of products also contributes to social development projects in underprivileged Africa	knitting, beading and embroidery Sourcing fabrics naturally produced in SA (linen, wool, silk) Philosophy: Desirable clothes in natural colours that seemingly come from the earth using natural and eco-dyes Eco- and ethical brand, not an organic brand	selection and approach to design and manufacture Incorporating a certain measure of recycled material in a collection
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The strategy for the case study was to develop an extensive survey of scholarship, which became a conceptual framework for data gathering and analysis. The survey of scholarship consisted of three areas - firstly, environmentally sustainable design and economic viability which considered the importance of environmental sustainability within business and the economic advantage thereof. I reviewed a number of business strategies towards implementing environmental sustainability and considered the role of design within this. The second area in the survey of scholarship considered various aspects of fashion design praxis by reviewing the five clusters that the lifecycle of a fashion product comprises of, namely, fibre to fabric, product development practices, product from factory to retail, use of the product through pre- and post-consuming and, lastly, the disposal of the fashion product, as presented in Figure 1. The third area of the survey of scholarship considered design in a broader sense by reviewing design theory, design thinking and design activity. I then considered the above in relation to fashion design praxis and reviewed the paradigm shift to environmental sustainability presented by Armstrong and LeHew (2011). The three areas of the survey of scholarship formed part of the first principle the case study was based on, and thus formed part of the analytical strategy of the case.

The second principle of the case included multiple sources of data collection, which consisted of seven semi-structured in-depth interviews, a review and analysis of 32 related documents and a review and analysis of 28 products produced between January 2013 and December 2014. The above allowed for thick description and data triangulation and a comprehensive case study database (Yin, 2009). Triangulation enabled the lived experience to influence the emerging theory in the data collection and analytical strategy, and to guide the interpretation of the data in order to understand the lived experience and to interpret that through theory (Yin, 2009, p.130-131). As is often applied in a descriptive case study, pattern matching and explanation building was used as an analytical technique (Yin, 2009, p.136-160). All participants acted voluntarily and remained anonymous in the reporting on the study. Respondent validation assisted in ruling out misrepresentation or misinterpretation (Merriam, 2009, p.217). The conceptual framework, derived from the extensive survey of scholarship, was refined to essential keywords and became the guide to data collection. It was used as a tool in primary data organisation and data refinement, and informed the analysis and synthesis of the data. Although several interesting findings emerged from the study, this paper is a reflection on one of its findings, and it should be remembered that the companies might have changed since the study concluded. Company A, for example, was sold in 2015 to one of the larger

retailers in South Africa (Kew, 2014). To date, the composition of their products remains the same, but it will be interesting to see if the retail group will allow the ethos of the original company to remain the same.

## 4. The finding

Several key areas of interest emerged from the research project, however, only one of these areas of interest, namely fundamental principles that underpin the praxis, is discussed in this paper. The findings of the study emphasized a need for a broader, more encompassing approach to understanding, awareness and implementation of environmental sustainability in the South African fashion industry. This included considering suitable environmentally sustainable components, what Esty and Winston (2009) refer to as an eco-aligned mind-set, and an environmentally conscious approach.

### 4.1 The discussion

Personal core values, an inherently ethical approach to business and an innate sense of eco-consciousness and eco-awareness emerged from the study (Smal, 2016, p.216). What the case revealed is that all three of the companies considered a holistic consciousness of environmental sustainability to be essential. These three areas are presented in Figure 2 below. Companies that seem to have a holistic vision of the entire company adapt their strategies and change their way of thinking, embed environmental stewardship as a core value, and align with what Esty and Winston suggest as being the driver for their 'waverider' companies (Smal, 2016, p.247-249; Esty & Winston, 2009). Company A suggests:

"You can't . . . do it, as a, well this is our little eco-friendly gesture and the rest goes into that direction...that's never going to be sustainable. So actually the sustainability of it, as you say, it has to be at the heart of the business, it has to run through every sphere of the company, from retail, to procurement, to HR, to . . . social investment . . . it all has to tie together." (Participant 1 *in* Smal, 2016, p.154).

The finding discussed in this paper suggested that the participants in the case had factors that influenced them, and that these influences, whether sought for or as per result of, had a profound effect on their way of thinking, which, in turn, influenced their business strategies. In addition, environmentally aligned social projects, a spin-off from the above, seemed to underpin the fundamental principles of the companies. These projects included socially aligned interventions in primary education, projects that assist developing entrepreneurs, and advocacy of eco-awareness. The above finding alludes to the holistic approach that Ehrenfeld (2008) refers to as the *Tao of Sustainability*, where the three domains – human, natural and ethical – are addressed simultaneously.



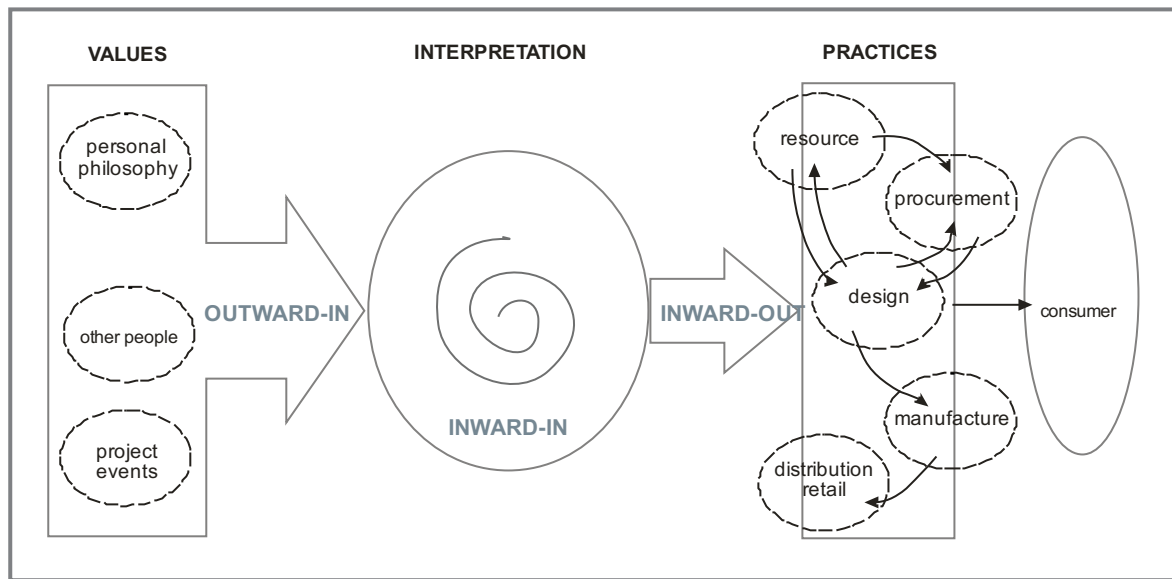


Figure 2. Influences (Smal, 2016, p.248)

In the figure, three areas are presented. The first, *values*, is based in personal values and how these influence what you do, how you think and how you interpret the world in which you function, and is referred to as *outward-in*. The second area, *interpretation*, refers to the context of your world and is referred to as *inward-in*. The third area, *practices*, presents how the context and how you think about your world influences action and is referred to as *inward-out*. Using the framework presented in Figure 2, specific examples that emerged in the case study are used to explain each area and will be referred to as *journeys*, as one of the interviewees of Company A suggested "... [it is] not just the destination, but the journey" (Participant 1 in Smal, 2016, p.150). Each company is discussed in relation to the above three areas.

## 4.2 The journey of Company A



Figure 3. The journey of Company A

At the time of the research project, Company A, founded in 1992, was the largest of the three companies that participated in the study, and considered itself a leading organic brand. Two brands, a childrenswear and a ladieswear brand, were the focus of the business. The general colour palette adhered to was one of muted, natural colours, with children's t-shirts specifically being used as billboards for statements reflecting the importance of caring for the planet (Smal, 2016, p.146).

The data for Company A clearly reflects how management chose or aligned itself with specific people or projects because of the influence the individual or project had on the business approach of the company. The owner of Company A explained how "... [for him] influential companies or people have either intentionally or unintentionally contributed to [their] socially responsible approach" (Participant 1 in Smal, 2016, p.149). They would not only familiarise themselves with the ethical approach of others, but would also actively seek their advice. One such company for them was the Body Shop and subsequently a retired director of the Body Shop became a director for Company A, specifically because of his ethical approach to retail. Brands that have meaning was another important aspect for this company. Interestingly, one of the company's young designers that I interviewed said she specifically sought out that company because she supported their ethical approach to business (Smal, 2016, p.150).

A spin-off of the above for Company A was involvement with social interventions outside of their business venture. Company A was part of a project called *Earth Child*, which, incidentally, was the name of their childrenswear brand. The founder of Company A explained that the name of the brand signified the two most important aspects of life, thus symbolising deeper meaning (Smal, 2016, p.149). In the *Earth Child* project marginalised and poor young children were, through the use of yoga, assisted in dealing with social issues and poverty in their immediate environment. The initiative focusses on environmental awareness, holistic education and the development of children and teachers in the Western Cape region of South Africa (Smal, 2016, p.150).

The word that was often used by management was the need to be 'genuine', or to create an inspiring environment, referring to their ethical approach to business. For instance, management deemed internal balance in the company so important that free yoga classes were offered to all staff once per week (Smal, 2016, p.196). The involvement with the *Earth Child* project influenced staff to start their own self-driven social project, named *iCAN*, which management supported by allowing time off during the workweek. In this project staff collectively spent one afternoon per month on selected projects to which they wished to contribute (Smal, 2016, p.150). The above is a good example of how influences can spin out into other environmental and social interventions as a result of the ethical approach and fundamental values of a company. Management viewed this as the follow-through of a socially conscious approach which leads to a meaningful operational environment. An ethical approach was carried forward in the directive to the design room, which Company A interpreted as being at the heart of their business approach (repeated below):

"So actually the sustainability of it . . . it has to be at the heart of the business, it has to run through every sphere of the company, from retail, to procurement, to HR, to social investment, it all has to tie together . . . I think that it's worth it, you know you can do business in a good way..." (Participant 2 in Smal, 2016, p.150).

The above was also considered to be the framework for design praxis which includes the name of the brand, the personal and company values, and the culture of the business (Smal, 2016, p.150). For example, in the childrenswear brand, the colour black was not deemed appropriate and slogans on products were meant to carry a positive message about caring for the earth. It has also influenced their practice from procurement of organic and natural material to the manufacturing of garments. Transparency and a hands-on approach was important, for instance, knowing what went into the product and in which conditions the product was

manufactured. Another aspect was building relationships with manufacturers that had a similar ethical outlook based on the principles of Fair Trade. For this Company, if the above underpinned the business practice it should resonate with the consumer and thus being honest and truthful with your customer was considered an important aspect (Smal, 2016, p.151, 168), and was corroborated in the product analysis undertaken. It also reflects what the founder and manager of Company A suggests – you can't do it all, but you can be honest.

### 4.3 The journey of Company B

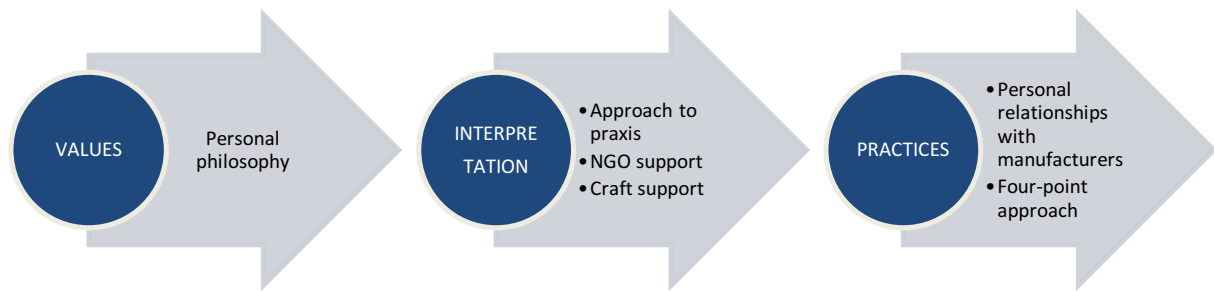


Figure 4. The journey of Company B

For Company B the personal environmentally sustainable consciousness of the founding member underpinned the business strategy. The company started in the mid - 1990's with a focus on natural fabrics and later produced products that consisted of approximately 90% organic fabrics. The company took part in international fashion platforms such as Aesthetica in London. With diminishing availability of organic textiles in South Africa, Company B needed to shift their approach of environmental sustainability (Smal, 2016, p.147).

Participant 5 mentioned:

“ ...someone's got to contribute to saving the planet . . . and clothing is such a huge user of natural resources – of crops, of machinery being used, of people involved. Its mass production, it's a human, mechanisation process . . . .Yes, we're in clothing, so we try to reduce our waste, we are trying to be the least harmful possible. So if everyone tried doing a little bit, it's better than doing nothing.” (Smal, 2016, p.156).

The company, which was very critical about the lack of local organic or environmentally sustainable textiles, was also constantly exploring alternate materials, such as the use of bamboo, milk or soya fibres, and being involved with the development of local hemp fibres (Smal, 2016, p.157).

Company B focussed mainly on natural and organic textiles. Due to the unavailability of local environmentally sustainable textiles, the company decided to change their environmentally sustainable focus to developing products that are least harmful to the environment and thus they came up with the following four-point plan. The plan is, firstly, to use, natural organic fabrics where possible. As most of the natural fabrics that are currently used are imported, this has increased their carbon footprint. However, the increased carbon footprint is mitigated by predominantly making use of local owner-managed Cut, Make and Trim (CMT) manufacturers to supplement their in-house production. In addition to the type of fabric used, the company is also conscious of the type of dye that is used, with regard to the possible harmful side effects on the environment. Secondly, they are

committed to reducing waste in all levels of praxis; for instance, a zero waste approach to pattern making has been adopted. Thirdly, through re-work, re-use or repair, an emphasis has been placed on the durability and ‘longevity’ of their products. Company B also produces wedding garments and the fabric of unsold wedding dresses is often re-used; there is also a clothing repair service. The last aspect of the four-point plan is to recycle where possible (Smal, 2016, p.173-179).

Company B supports local non-profit organisations by supplying them with organic waste fabric for paper making, thereby increasing informal employment opportunities. In their shop, carvings from a local wood crafter and handloom-woven scarfs from a crafter in the Western Cape region are sold. The company often participates in awareness projects such as the *Fur Free* fashion show held a few years ago, and contributes designs for *Miss Earth*, a national beauty pageant that focusses on environmental sustainability.

## 4.4 The journey of Company C

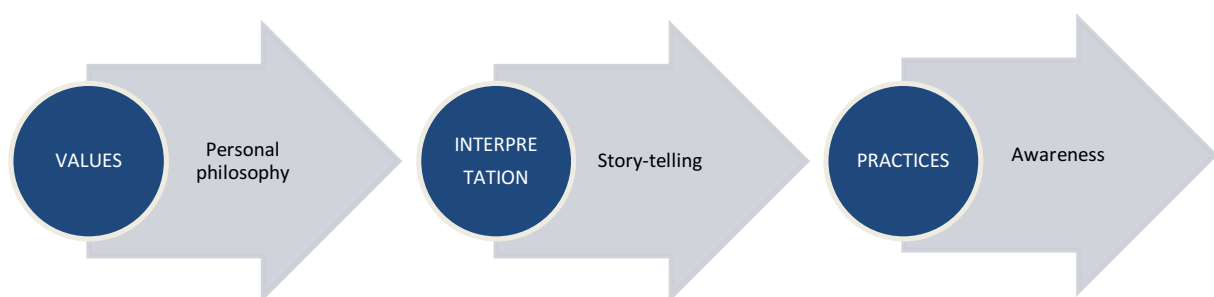


Figure 5. The journey of Company C

Company C, the smallest of the three participants, was started in 2004 with a distinct focus on Africa. This is an owner-/designer-managed design studio that outsources all production. The owner can be considered a fashion entrepreneur who showcases high-end fashion products, which he refers to as ‘eco-luxe’, on all the major fashion platforms in South Africa (Smal, 2016, p.148, 158). The owner and designer of company C mentions that clothing should be a reflection of your conscience, and this underpins the environmentally sustainable approach of the company (Smal, 2016, p.159). The owner, who was most critical on the unavailability of suitable local organic textiles, focusses his environmental sustainability on consumer awareness and through various public platforms regularly addresses environmental sustainability

“...besides spreading the message of living consciously with our environment, and being more ethical in our way of life, I am dedicated to spreading positive messages about African and other indigenous cultures in what I do.” (Participant 7 in Smal, 2016, p.204).

The owner, as in Company B, experiments with various types of environmentally sustainable fabrics that are mostly imported, supplemented by approximately 20% of fabric sourced from the southern region of Africa. The owner of Company C refers to story-telling as a way of spreading information about environmental sustainability. One of these stories is the use of the African ‘boer’ goat, a small, common, indigenous livestock animal found in the whole of South Africa, of which

the shaved hair mimics cashmere. In a South African context, the experiment with 'boer' goat hair can be considered environmentally sustainable as well as being a social development project for rural communities (Smal, 2016, p.148). This telling of stories through products such as the 'boer' goat cashmere supports Fletcher and Grose's (2012) suggestion of transformative fashion design praxis, where fashion design becomes the inflection point where "... larger ecological, socio-cultural and economic forces are causing [a] re-examination of both design's prevalent value systems and the places where design skills are traditionally applied" (Fletcher & Grose, 2012, p.155). Creative recycling of waste fabric is another aspect with which Company C aligns. Although quite critical on the South African consumer's lack of engagement with environmental issues, the owner of Company C is an advocate of a holistic approach to environmental sustainability and uses various fora to address environmental consciousness (Smal, 2016, p.188).

## 4.5 Values and consequences of design

Stuart Walker mentions:

"It seems that fundamental human values, ethics and notions of meaning and meaning-seeking transcend any particular philosophy or religion . . . This foundation of values and routes to personal meaning offers a basis for acting in the world – for human expression and the ways in which our endeavours are constructed and played out." (2014, p.32).

He suggests that such matters are of critical importance in an approach to sustainability and considers a number of questionable and/or unsustainable design practices, such as being enticing, encouraging early obsolescence in product use, and creating products that contribute to over-consumption, all of which help drive fashion consumption. In order to create a culture of sustainable decision-making, aspects such as moderation, everyday objects playing a less dominant role and companies being less-profit driven are suggested as alternate approaches by Walker (2014, p.19-21). There are areas where fashion design praxis can align with his suggestions, by adopting an emphatic approach to praxis that takes people and place into consideration. In a way Thorpe (2010) proposes a similar point of view, although her approach is from the consumer and choice editing perspective; as Thorpe (2010, p.5) indicates, economic growth does not necessarily equate to growth in well-being. She suggests design for behavioural choice and argues for a 'right' decision to be factored into a product (Thorpe, 2010, p. 8) so that impact can be determined at the design stage (Thakara, 2006).

Walker (2014, p.33) advocates that design be seen as a question-raising activity, rather than as a problem-solving one. In so doing, design-solutions do not merely become design-outcomes but also raise questions on appropriateness, which in turn necessitates that one considers what the value or priority of the design is. According to Walker (2014, p.35), conventional approaches demand that design be either function- or technology-led. Yet, could one move past the normative rhetoric of function and aesthetics to create products that are meaningful as well as being functional, and also adhere to the required aesthetic?

## 6. Conclusion

The reflection on one of the key findings that emerged from the case clearly indicates that the approach of reduce-reuse-recycle is not sufficient in driving environmental sustainability in the fashion industry and that a more engaged approach is called for. The first aspect, considering suitable environmentally



sustainable components, was considered to be both an imperative and a major stumbling block by the participants. In the case reviewed, issues such as the high cost of acquiring these components and the frequent unsuitability of environmentally sustainable components for a high fashion brand were forefronted by Company C – a high fashion brand. Lack of expertise in the South African fashion and textile industry was considered a major impediment as reported by Company A. For this reason Company A decided to outsource supply chain and manufacture to Mauritius and Madagascar in order to comply with the company's business strategy – that of using a percentage of certified organic cotton in their predominantly natural fibre products. In addition, the company sought manufacturers whose practice is in harmony with their own approach of ethical manufacturing and socially responsible behaviour. For Company B, unavailability of environmentally sustainable fabric was also one of the major stumbling blocks, as the owner describes: "... [the] challenge is so hard to continue to be eco-friendly when your fabric, the base of your business, is not available" (Participant 5 in Smal, 2016, p.157). Therefore, the participants did not consider environmental sustainability to be an economic advantage, which correlates to the findings of the SASTAC report (Mossgroup, 2014). The second aspect, an eco-aligned mindset, forefronted that all three companies considered environmental sustainability to be the core driver and thus aligned to operating from a holistic vision where environmental stewardship is embedded in the core practice and values of the business (Esty & Winston, 2009, p.282-283). In order to be more successful economically, the companies that formed part of the case could have decided not to focus on environmental sustainability in their praxis, yet they chose to do so. The reason for continuing thus seems to derive from the personal ethical foundation – therefore this must be a driver.

Fletcher and Grose (2012, p.180-181) suggest that an impact-driven approach to fashion design praxis is necessary, encompassing and embodying social, cultural and environmental values, rather than a trend-driven one. This broader, more holistic approach to environmentally sustainable fashion requires a more holistic environmental consciousness in fashion design praxis. One of Fletcher and Grose's (2012) suggestions for environmentally sustainable fashion design is that interested parties become design activists and educators. Black (2010, p.252-253) and Fletcher and Grose (2012) confirm that it has become imperative for the fashion designer to influence decision-making, as the complexity of the fashion industry is evident and therefore the role of design (and thus the designer) to drive or influence environmentally sustainable fashion has become increasingly important. Environmental sustainability in this industry should not be considered the 'poor cousin' as the SASTAC report suggests, but could be one of the drivers for economic reform in the industry.

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# Digital Designers as Democratic Innovators; Using and Designing for one Approach to Challenge Digital Natives

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**Abstract:** Looking into the role of Digital Designers in Participatory Democracy within a city, a second-year students module explored how users outside of digital participation could be supported. Instead of working towards a brief that generalised the 'digital divide', the module utilised a designing-for-one approach, where the abilities, context and wants of one individual took precedence. A neighbourhood with a diverse makeup, students were paired with individuals whose reason for non-participation ranged from health or mobility issues to technology access or language barriers. A challenge for students, they came into contact with design restrictions beyond their own understanding of digital media, requiring a breakdown of 'the digital' into fundamental purposes: communication, social network, etc. As educators this raised questions about design education, the skills taught and the relevance of them. On reflection we suggest that design education actively try new approaches to best educate the responsible and able future designer.

**Keywords:** Digital design, e-government, digital divide, digital inclusion, designing for one

**Film Contribution:**

<https://www.youtube.com/watch?v=F9t857nnC38&t=298s>

# User Evaluation of a Healthcare Product Design in Rural India. When Methods run short

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**Abstract:** User evaluation plays an important role in the early stages of the design process, especially when the products are targeted towards low and medium income countries. However, design research evaluation methods might at times overlook cultural and contextual sensitivities. In this paper we present a case study where a mixed evaluation method was used to test the prototype of a Delivery Stool, a childbirth aide concept. It provides an alternate birthing position and can be used both for normal deliveries in a hospital facility or in accidental deliveries outside the facility. The paper suggest that under current circumstances it might be beneficial to test products as a part of the implementation program and not detached the two., If the global health community would readily embrace and support design work in all its capacity, design initiatives such as the Delivery Stool could make a more valuable contribution to public health programs.

**Keywords:** Product design, healthcare, low and medium income countries, user research, maternal and newborn health

## 1. Introduction

Maternal death, or mortality associated with pregnancy, childbirth and postpartum, is a massive public health challenge, despite the global progress in the last decades. Globally, an estimated 289 000 women died during pregnancy and childbirth in 2013, a steep decline of 45% from levels in 1990. Many, if not most of the deaths, are attributable to a lack of access to skilled routine and emergency care (WHO, 2015a). Innovative products and services designed especially for the maternal and newborn health sector in low and middle income countries could in part contribute to making care more equitably available to all women and newborns.

This paper shares a case study of an evaluation of one product, a new kind of a Delivery Stool concept that was the output of a design project initiated in 2015 with the aim to decrease maternal mortality during childbirth. Lab.our. Ward, the project within which the Delivery Stool was designed, followed a human centered design approach and intended to involve health providers and pregnant women in the design of products and services that could positively influence the childbirth experience.

In this paper we seek to answer the following research question: How can user evaluation work in low and medium income countries, such as India? During the user evaluation of the Delivery Stool's second prototype we repeatedly perceived how methods fell short in this context and through this paper, we wanted to reflect on this.

Salgado et al (2015) discuss instances where methods might fall short when designing with immigrants. In their opinion critical success factors for research projects include the recruitment efforts, group dynamics, facilitators' attitudes, and the choice of venue for the meetings. In fact, many decisions regarding the design of a participatory research evade strict instructions on techniques and implementation. Participatory design defines the research context and therefore, the types of discussions that eventually do or don't take place. In the case of Salgado et al's immigrant research project, participants were asked about their migration stories in settings that were either familiar or neutral to them. The design researchers listened to participants' thoughts, opinions and reflections on their migration experiences. The techniques they used demonstrated that working with people from different cultural backgrounds is not straightforward and that the atmosphere influences results, perhaps even more than the techniques themselves.

In order to contribute to this methodological discussion, we wanted to analyse the planning and implementation of the Delivery Stool's user testing and evaluation in the states of Uttar Pradesh and Bihar in India. In addition, we aimed to unfold how the local practices and cultural sensibilities could possibly influence the design process, especially the evaluation of prototypes.

## 2. The case study

The case study described in this paper is the user testing and evaluation of one of the product concepts, a Delivery Stool, within the Lab.our Ward project. The Lab.our Ward project was a healthcare design project combining several design approaches, including human centered design and evidence based healthcare design, in the context of facilities in resource-poor settings. The Lab.our Ward project mostly took place from December 2015 to December 2016. The project group consisted of product, stage, interaction, service and architectural design experts who worked together with medical advisors and health practitioners to develop many innovative concepts to improve the maternity ward in a low resource context.

The organisation behind the project, M4ID Oy, is a social mission company with an aim of improving development and health outcomes for underserved and vulnerable populations. M4ID provides people-centred design and creative communication solutions for global development and health organisations. The project got funding and expert assistance from the Bill & Melinda Gates Foundation. The authors of this paper were involved in the project and working for this company. The first author was a part of the product think tank, and has



worked as an industrial designer, the second author was involved as a design researcher and the third author was the general producer of the project. The project team visited Nigeria, Kenya and Uganda during the development of the concepts. The team used participatory research methods during the research with healthcare experts to identify the problems in the facilities and further develop concepts and early stage prototypes. Afterwards, the first author visited India for field research from March to April 2016 to gather user insights on the Delivery Stool.

An important milestone to the Lab.our Ward project took place on the last week of May 2016, when the team exhibited various prototypes and design proposals for future and existing maternity wards as a part of the triennial Women Deliver conference and exhibition in Copenhagen, Denmark (Lab.our Ward, 2017). The team showcased around 30 different ideas in the form of work-in-progress concepts and prototypes. This exhibition was done to co-create the concepts further and receive feedback from the visitors who were global health experts from around the world. During the conference many product ideas, such as an Ergonomic Delivery Bed, simple Bed Add-ons to existing delivery and postpartum beds, a Multipurpose trolley to be used by different users in the facility as well as the Delivery Stool (Fig. 1 & 2 ) discussed in more detail in this paper , received extremely positive feedback.

The focus of this paper, the Delivery stool is a low cost, portable piece of furniture made of plastic and rexine that can be used for additional support during childbirth and delivery or as an alternative to a delivery bed. The stool can be used for normal deliveries in the delivery rooms of different maternity facilities and as well during emergency and accidental delivery situations across and outside the facility. The stool concept combines a squatting birth position with low cost furniture to increase capacity and preparedness for ad hoc deliveries.

Except few slight ergonomic suggestions for improvements in the maternal health conference, the overall positive feedback received gave us early indication that the Delivery Stool, could be easily adopted by the MNCH community and it might have the potential of be impactful in low resource settings.

After building the first prototype and testing it in the professional conference with global health experts, we realized we also needed to have user evaluations in real settings. Many characteristics of the Delivery Stool such as transportability needed to be evaluated in situ. The Delivery Stool is easy to carry (it could be moved by a walking person or taken in the ambulance), it saves space when compared to bed based deliveries, which in some overcrowded rural facilities might be an urgent need, and the stool as a product promotes a squatting birthing position which has been associated with less pain and an increased sense of empowerment during birth.



*Figure 1. (Left one) The Delivery Stool 1.0. This first prototype was used as a conversational tool in Women Deliver to gather insights on the concept and for the future development of the product. Source: Amar Nath Shaw*

*Figure 2. (right one) The Delivery Stool 1.0 ready to be carry to the next delivery. Source: Amar Nath Shaw*

James Loren Christian (2014) states that experience from design practice suggests that user feedback should not always be taken to the letter, and that the particular context in which a prototype is presented can greatly influence a user's perception of the concept. This is why, even though we consider valuable the feedback gathered in the Women Deliver event, we still felt the need to test the prototypes in real settings. The conference was an inspirational environment to talk and elicit good conversations with midwives and doctors, but we believe that contextual information coming from health facilities, especially located in rural areas could be crucial in this moment of the design process. In our opinion, it is possible to design concepts for low income settings remotely, but when we want to define the details of the product for final implementation, it is important to consider contextual and cultural differences.

### 3. Evaluation of the Delivery Stool 2.0

We choose to test and evaluate the Delivery Stool prototype in India, in Uttar Pradesh and Bihar, two of India's most populous and poor states. Reasons for this were both practical and driven by opportunities for impact: India is the home country of the industrial designer pursuing this work and who is a native speaker of regional languages such as Hindi, Bhojpuri and Maithili. Another reason for choosing India as a place to conduct this evaluation was that India is estimated to account for 15% (Nearly 45,000) of maternal deaths globally in 2015 (WHO, 2015b). This evaluation of the Delivery Stool 1.0 with end users was not part of the funded project, but was an initiative of the designer and an essential part of his master thesis.

Jasmine Florentine (2015) claims that when designing products for emerging markets, a better understanding of the user can improve the success of the product, however, formal user research approaches designed for conventional markets may not be effective in emerging market scenarios. In line with her we decided to develop a mixed method approach to test the prototype of the Delivery Stool. These specific methods were selected because we considered them a good combination, taking into account ergonomic, functional and esthetical insights. Important is to clarify that testing did not happen during labour, but the designer interviewed people after or before the labour, when there was no rush in the facility.

This included:

- Field observation with ethnographic elements: understanding the context, usage pattern and usability (Observations with midwives and auxiliary nurse midwifery (ANM) and accredited social health activist (ASHA),
- Interviews - with end users (pregnant women) and with local healthcare providers in the facilities,
- A comparison: with other existing forms of birth delivery aides typical in the context, such as such as delivery bed and cot, and
- Ergonomics validation: backrest support, handle, grip, leg support and seating angle. Also, the convenience of carrying, cleaning and storage.

The next step was to make a plan for the field evaluation and design a new prototype version of the Delivery Stool. Though the first prototype (1.0) which was shown in the Women Deliver conference was good enough to be carried and tested in India, the designer improved this prototype and call it Delivery Stool 2.0. One of the important improvement incorporated was to integrate the delivery bowl which measures the loss of blood (Fig. 3). At the same time the amniotic fluids would fall into this bowl making the stool easier to clean after birth. This improvement came after the analysis of the feedback received in the conference.





Figure 3. This is the Delivery Stool 2.0 tested in a primary health center near Agra, Uttar Pradesh, India. Source: Amar Nath Shaw

As part of the plan for the field work in India, we set the objectives:

- Validation of concept in terms of acceptance and motivational factors for usage,
- Evaluation of the aesthetics and functional details of the product,
- Evaluation with different user groups and Maternal and Newborn Child Healthcare (MNCH) experts (midwives, ASHA (community activist working in health in rural India), health providers in different type of facilities (private and public sector), pregnant mothers as well those who have given birth in normal delivery bed (in lying down position),
- Gathering critical insights for prototype development for pilot testing, and
- Gaining a better understanding of contextual requirements and hidden user needs.

The locations for fieldwork were primarily selected because of ease of traveling, logistics, knowledge of local language, and personal contacts. During the planning phase the designer contacted two social impact companies and two Non-Governmental Organisations (NGO) who have worked on several projects in the field of Maternal, Newborn Child Health (MNCH) in order to get some support by providing contacts of health facilities for the evaluation.

The field evaluation was done in roughly three weeks in December 2016, including traveling time, with approximately 5000 km of distance covered using different modes of transportation such as train, buses, auto rickshaw bicycle and walking. In total four different facilities were visited, including a Railways hospital (private center) in Agra Cantt, meant for Indian railways employees, a community health center in Barauli district (20 km from Agra), Shri Jay Prakash Narayan Hospital in Gaya, (public health center) and the All India Institute of Medical Sciences (AIIMS), in Patna, Bihar.

Seven individual interviews were conducted: two with a Health expert and an Auxiliary Nurse Midwifery (ANM) at Agra, one with nursing staff in the operation theatre (delivery room) at Gaya and two interviews with an assistant professor and the head of department from obstetrics and gynaecology at AIIMS Patna, one with a pregnant mother and one with a women that was pregnant before. In addition, a group interview and discussion with a professor from the Department of community and family medicine took place in AIIMS, Patna.

The Delivery Stool is a new product in maternal health care, which entails a description challenge while testing it. In addition, the Delivery Stool requires a behavioural change, as it implies a different birthing position than the conventional one in a facility. This squatting position is part of the recommended positions to childbirth according to Gottvall, et al (2007), who call it the most natural position and suggest that it is used by women if left alone to choose their own position for birth. Further research suggest that the squatting position is helpful in opening the pelvis and allows the baby to find the optimal position for birth. However, according to our experience while interviewing health providers in India, only a few people know about its usefulness and to some extent it was a surprise for them to know that they can perform delivery using a stool.

Since the idea of alternative birthing positions is relatively new in India, carrying and showing the prototype during interview was critical. This was also perceived by Hussain, et al. (2012) that remind us that presenting prototypes makes it easier for participants to be critical and suggest alternatives. During the first interview held at Railways hospital in Agra, with two female health care providers, a brief document (in the form of printed A4 pages) consisting of mainly images and text was first shown and explained to convey the concept of the Delivery Stool, its usage and benefits firstly to the head of the hospital and later to the interviewees. After this, the prototype was shown which made the conversation and explanation more engaging. The feedback and critical comments regarding its acceptance, motivation, usage, ergonomics and scope of improvements were noted in the form of field notes in a diary that was carried by the designer throughout. These field notes were complemented with photographs, audio and videos of important parts of the conversation or the testing (role playing) and audio of the general soundscape of the facilities.

An informal interview and open discussion was done with one expectant mother in Agra at her residence (Fig. 4) and another woman who has been pregnant before. The interview were conducted after they were asked to imagine and demonstrate a scenario through role play. During role play a female companion was also asked to join which could perform the role of a traditional birth attendant or Community health worker (ASHA) or simply as a nursing staff.





Figure 4. Expectant mother performing role play with a companion. Source: Amar Nath Shaw

## 4. Results of the User Evaluation

*In relation to Product positioning:* in principle the Delivery Stool could be used for home deliveries, which is a relatively common phenomenon especially in rural areas of the two states. However, the Indian health system has been consistent in its efforts to eradicate home deliveries as delivering at home without adequate medical access is a significant factor in maternal mortality. Therefore, we did not want to discuss this option.

*In relation to the concept:* the Delivery Stool could be used in different places in the health facility, especially for emergency or rushed delivery situations. The stool could be placed beside the beds in a normal delivery room for promoting alternative birth positions. It could be carried around the facility depending on the willingness of pregnant women to test it. Therefore, the hospital does not need to have one Delivery Stool per room, but pregnant women could be informed about its availability and ask for it if she considers alternative positions. Considering that the Delivery Stool implies new practices such as the squatting position, which is not only a new position for the pregnant women, but also a new working position for the midwife and the doctors, we recommend to include this product as part of the future trainings to midwives. Based on our experience, if an industrial designer goes with the proposal of a new position for delivery, it is not well-received. When, however, a public health expert tells about the advantages of the position in delivery, the Delivery Stool might be more readily accepted as an option. Finally, care provider training is required to create the necessary change to embrace an innovative product such as the Delivery Stool.

*In relation to the acceptance and motivation to use:* using the Delivery Stool for birthing is a new concept therefore in the user testing and evaluation sessions the designer needed to show how it works and explain the benefits. Interviewees gave positive feedback but we understand that this could be biased as the designer was explaining the benefits. Most of them agreed that the full usefulness of the stool could be seen in the public sector hospitals where a huge number of deliveries (more than 300 per month) take place, because the private facilities visited have less deliveries per month and hence e.g. overcrowding situations happen rarely.

*In relation to the functionality:* the Delivery Stool is envisioned to be used when the pregnant women is in a squatting posture with her feet getting support from the ground, which means that the midwife or the nurse would need to bend down or sit in order to perform their tasks. Midwives who were slightly overweight showed concern by saying that “I won’t be able to bend down”. Other concern was the cleaning of the stool and the cover, since they mention that the delivery bed (as it is a flat surface) is easier to clean.

*In relation to the design characteristics:* all of the interviewees thought that the materials, shape and the aesthetics look was good. They even appreciated the fact that it is white in colour and would help them to spot the blood and other stains clearly, however they noticed that this means they would need to more effort to keep it clean.

*Suggestion for improvement:* most of the interviewees thought that having some kind of backrest support as an option would be needed in order to help the pregnant women relax during the labour stages. Placing the delivery stool against a wall was not seen as a comfortable since they pointed that the back support would make them feel more secure.

Most of the discussions ended with the feedback that it needs to be tested further to confirm as the concept is so new and the care providers were giving feedback based on their own experience with other products while not having tried the stool out. The feedback from the health professionals and midwives indicates increased acceptance and motivation towards new ideas and willingness to accept new ways of performing childbirth and delivery in low resource settings, however as mentioned by Hussain, et al (2012) more engaging participation is needed to empower midwives and pregnant women on interactional and behavioural levels.

## 5. Analysis

### 5.1 Planning the user evaluation

The fieldwork proved valuable for gathering relevant feedback, yet we went through several challenges in the planning and execution of the testing.

Connecting to health facilities and providers ended up being challenging. The designer contacted two Non-Governmental Organisations (NGO) and two social impact companies that have been working in India and have done projects in the Maternal, Newborn Child Health (MNCH) sector before. He asked for contacts with local health centres as well as recommendations for how to pursue the testing. However, the initially positive conversations didn’t materialise into direct contacts or ‘opened doors’. Despite this slight disappointment the designer decided to continue to carry on the field evaluation on his own. In one case, the designer met with an NGO director in Patna, Bihar. This person was keen on knowing who is

involved in the project and what is the big picture, but not in supporting the designer's work. It seemed to be challenging to convince higher authorities and to get support in product design testing if the designer does not come with the right credentials or isn't affiliated with a well-known organisational entity. In this case, the designer was not anymore working for the company that did the first version of the prototype, but wanted to move the project forward as part of his thesis work.

Getting permission from the head of the facility was a laborious process. The designer had to first go through process of showing and explaining the prototype two times. This was a time and energy consuming process. He had to first show and explain the prototype to the head of the hospital (not dealing with childbirth) in order to get the permission to conduct an interview with the health providers who work in the same hospital.

Though the designer received a small amount of funding for making the improved prototype and traveling to India, it was not sufficient to pay the participants or interviewees for their time. This could have affected their motivation to participate in the activities proposed by the designer. As a consequence, the designer reached out for some interviewees through personal contacts. Another important constraint was the lack of time to travel, considering the fact that train traveling in India from one state to another, requires advance booking of seat which needs to be done months in advance.

The designer also face problems with false promises. In one case, one of the professors in a health facility in Patna, promises him that she will support the evaluation by doing the actual testing of the Delivery Stool, provided the delivery stool is left with at their facility for few days. Taking this as a great opportunity to get some user insights the designer travelled more than a thousand kilometres in order to drop the delivery stool at the health center. He sent several reminders to the professor in relation to the testing. However, in spite of his effort the testing did not happen. The possible reason in this failure was the lack of interest and motivation from the person, along with not enough support from higher authorities.

## 5.2 Contradictory views

The Delivery Stool was envisioned to be used with a companion and hence the backrest was not added to the current prototype. However, during the field evaluation the designer noticed that *no male companion was allowed* to enter inside the delivery room or operation theatre. Only occasionally a female companion would enter if there is need. The husband and other relatives would wait outside during the delivery. The Delivery Stool, in contrast, was originally designed with a birth companion in mind. Not having a backrest has the advantage of making the product easier to transport, but also, it was a way to align with World Health Organization (WHO) guideline that promotes the presence of the companion during childbirth: "Empathetic support, before and during labour, from caregivers and companions, can reduce the need for pharmacological pain relief and thus improve the childbirth experience" (WHO, 1996: 18).

Faced with this contradiction the designers asked themselves what to do? Should we follow user insights or experts inputs? We wanted to make an innovative product, but if we go too far, stretching the limits of what the user is accustomed to and would actually use, then the product will not be accepted. We might gain recognition in the design community, but it will not have a real impact in low and medium income countries. Our design space is the thin line in which the Delivery



Stool could be socially accepted in context and at the same time be aligned with international global health guidelines. Given these constraints, a sensible designer would probably compromise and add a small backrest that does not disrupt transportability. However, making evident the emptiness, the absence of the companion, might make health providers and pregnant women ask for their presence and in this way we would be promoting WHO's guidelines. Or perhaps the absence of the back rest might make a pregnant woman feel miserable by highlighting her lack of a companion during the stressful and painful process. These type of concessions challenge our values and our ways of thinking in design alternatives. We do not have an answer but many questions. The testing was useful to raise these questions.

## 6. Discussion

Dindler and Iversen (2014) claim that personal and professional relationships are crucial to design outcomes and that designers' responsibilities include awareness of these dynamics. This is referred to as designers' relational expertise. In the context of India we discover that often reaching the right user group is dependent on the rapport with higher authorities (both in a governmental level and in the health facility) and personal recommendations. The relational expertise while doing field work in low and middle income countries can include being agile and smart not only with effective verbal communications but also when reading in between the lines and navigating hierarchical organizations. In addition, the relational expertise includes to be aware and prepared for certain unexpected situations such as false promises.

A huge amount of improvisation was required by the designer to understand and react to the context. This is why, we agree with Light and Akama (2012, 61) when they state that participatory methods cannot be seen in isolation from the person or people engaged in them. They are "[m]ethods and techniques [that] require embodiment". In this case, the male designer was not supposed to enter in delivery room because his presence would be consider as an act of disrespect towards the women giving birth. But the designer needed to contact the female midwives working inside the delivery room and he entered the waiting room trying to be as less disruptive as possible and showing, with his gestures respect for the situation. His cautious presence and respectful manners allow him to be in the waiting room of the delivery room interviewing the midwives.

## 7. Conclusion

As with most global health challenges, improving birthing experience in low resource settings is a complex problem that is interlinked with health provider practices, the presence of companions and change acceptance across different cultural settings. Therefore, product design for better birth experience needs to be considered from a holistic perspective and align with international healthcare guidelines.

We understood that we cannot innovate in design without having the support of the public health expert community, not only for the development of the concepts, but also for the implementation of them. We recommend that in future, user evaluation will be carried on as part of programmatic implementation and capacity building endeavours.

Our conclusion points out to the fact that methods run short. It is not only a question to pay attention to the details of an evaluation protocol but to set up the evaluation in collaboration with other organizations. Otherwise, the risk is that the user evaluation does not give good and rich results, because the participants do not commit to the project. Their insights are dependant of the perception of the project in the future and in this case the fact of not having the right credentials make them perceive as a student's project instead of a real and possible industrial design development.

It was a surprise for us that though the project was targeted toward improving global health, the designer did not get the necessary support from companies and NGOs with a similar mandate. The designer had to struggle with several hierarchical and socio-political issues in quest of evaluating with the end users. For example while approaching some health facilities for getting permission to do the user testing the designer introduced himself by mentioning that he is working in an international NGO even when this was not the case. We might argue that it is ethically questionable, to give the wrong information, however the designer knew that he would be turned away if he does not mention working with an NGO. In countries such as India, designers need to consider several other factors such as hierarchies, social classes, status, casts and gender issues while planning for evaluation. In addition, designers might face ethical dilemmas that are difficult to deal with.

In addition, products alone will not promote behavioural change in health facilities in low medium income countries. They have to be assisted and embraced by health systems and health providers. The Delivery Stool alone is only a drop in an ocean. For making the Delivery Stool an innovation, we need to really understand the health system in the country of implementation, and coordinate a series of interventions such as trainings and campaigns to promote for example the benefits of alternative delivery positions and having a companion present during delivery. There is a need for overall improvement in the Maternal, Newborn Child Health Care sector and it has to done in a logical way, minding cultural backgrounds and practices of the people involved in the process. Design solutions can make a difference only if the global health community (including health providers, companies and NGOs working in the field) embrace practices such as design evaluations and support design work in all its capacity.

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# Facing Major Challenges. Co-designing Radical, Reasonable Innovation

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**Abstract:** Major challenges of our time, such as global warming, increasing migration, or population growth, cannot be resolved within single research fields but through transdisciplinary collaboration aimed at radical, reasonable innovation. Methods that build on design processes are particularly well suited to promote such collaboration, and this paper presents one such method.

**Keywords:** Co-Designing, Radical Innovation, Transdisciplinary, Design Method, Workshop

## 1. Facing major challenges – the need for robust solutions

Large-scale developments such as global warming, ageing populations, increasing migration, and increasing digitalization require novel solutions that deviate from conventional paths of social, economic, and technological advances (Owen et al., 2013; Steward, 2008, 2012). In view of these developments, international innovation policies have designated certain areas, such as mobility, digitalization, healthcare, public safety, and renewable energies, as increasingly pressing issues that necessitate a paradigm shift in these areas extending beyond product improvements and incremental changes within the innovation process (BMBF, 2014; European Commission 2011, 2012).

This shift can best be achieved through radical innovations (Dolata, 2009, 2011). While the primary purpose of disruptive innovations (Overdorf & Christensen, 2000; Dowling & Hüsig, 2004) is to produce technological novelty and thereby economic impact (ibid.), radical innovations (Dolata, 2009, 2011) have the capacity to profoundly influence all major elements of the innovation system: society, industry, science, and policy. At the same time, the effects of proposed innovations and, ultimately, their viability will depend on how well they accord with public needs and values, the market, the legal regime, and the state of technological development. Pressing social issues thus require solutions that are both radical and reasonable – solutions that both deviate from the path and

accord with the needs of those who can affect or be affected by the implementation.

This paper presents one method of producing such solutions, which is based on a structured, transdisciplinary co-ideational process building on the approaches from design and the social sciences. This method was developed within the Radical Innovations project, funded by the German Federal Ministry of Education and Research (BMBF).

## 2. Co-designing radical, reasonable solutions – the actors

According to Luhmann (1990), pressing social problems cannot be resolved within single research fields but only through inter- and transdisciplinary collaboration. The latter includes not only the interaction between different scientific disciplines but between science and society (Bogner et al., 2010; Blackwell et al., 2009; Jaeger & Scheringer, 1998). The transdisciplinary approach to both the idea development and implementation can help increase the likelihood of producing radical, reasonable solutions in two different ways:

- The input of diverse, relevant stakeholders, particularly the public, provides additional sources of inspiration (Smits, 2002; Edler & Georgiou, 2007; Geels & Schot, 2007; Loveridge & Saritas, 2009; Jørgensen et al., 2009; Chesbrough, 2003; von Hippel, 2005; Priem et al., 2012). New approaches to knowledge production such as mode 2 (Gibbons et al., 1994; Nowotny et al., 2001) supplement scientific findings with "socially robust knowledge" (ibid.).
- The viability of proposed innovations will depend on acceptance by potential users and other various stakeholders. The input of relevant stakeholders from the scientific community, industry, government, and the public, gathered early in the innovation process, can help resolve potential implementation issues and ensure that prospective innovations accord with the needs of these stakeholders.

At the same time, accessing the knowledge of these diverse actors and then transforming this knowledge into innovation can pose a particular methodological challenge (e.g., Schütz, 2017; Blackwell et al., 2009; Cuhls, 2008; Boon et al., 2011). One issue is a double-bind problem known as the "Collingridge dilemma" in technology foresight: the full functionality and impact of a new technology cannot easily be predicted until this technology is already thoroughly developed and widely used, after which time it is difficult to make substantial changes (Collingridge, 1982). Furthermore, the needs of different stakeholders, such as decision-makers, developers, and the general public, can substantially vary, which can lead to communication barriers and unbalanced power structures. These issues, in turn, can impede interaction between these stakeholders (Cuhls, 2008; Blackwell et al., 2009). Finally, the use of established, primarily verbal communication methods while trying to picture desirable developments predisposes actors to rely on pre-existing schemas and terminology and thereby limits openness and creativity (Cuhls, 2008; Nooteboom et al., 2007; Peschl, 2007, 2008).

These challenges are addressed particularly well by combining approaches from design and the social sciences, which can help intuitively anticipate or even actively manage a variety of possible futures (Heidingsfelder et al., 2015, 2016; Candy, 2010). Technology foresight has increasingly relied on approaches from

design such as speculative design or experimental scenarios (Candy, 2010; Börjeson et al., 2006). Design imagines the future (Candy, 2010; Grand & Wiedmer, 2010) because it “lends futures solidity, communicative as well as exploratory effectiveness [...] a direct interface to materiality, a place to begin pursuit of preferred futures in the concrete” (Candy, 2010, S. 164). By engaging inherent human senses such as sight and touch (Krippendorff, 2005), design transcends the limitations of verbal expression and provides an ideal basis for transdisciplinary co-ideation. One method building on design to develop radical and reasonable potential solutions to major social issues is presented in the following chapter.

### 3. Co-designing radical, reasonable solutions – the method

The method’s key element is a structured, transdisciplinary co-ideational process employing different approaches from design and the social sciences. This process was tested for the first time in the Fraunhofer workshop “Urban Life Between Security and Freedom” taking place in September 2016 in Berlin.

#### 3.1 Setting

The co-ideational process involves 20 to 30 participants consisting of roughly equal numbers of 1) sociologists, 2) designers, and 3) other experts:

- According to Gustavsen (2006) and Howaldt et al. (2008), sociologists’ expertise allows them to provide social contexts and enable knowledge exchange between different actors.
- Gero (1990) regards designers as “change agents in society.” In this capacity, they help expand outlets for expression (Candy, 2010) and inspire prospective solutions.
- The subject at hand determines the necessary kind(s) of expertise. In our example the group consisted of urban planners, security experts and other urban actors.

Heterogeneous, interdisciplinary teams have been found to outperform more homogenous teams, particularly if their interaction is deliberately managed to synergize perspectives (Williams & O’Reilly, 1998; Page, 2007; Harrison & Klein 2007; Woolley et al., 2008; Bear & Woolley, 2011; Russo, 2012; Nooteboom et al., 2007; Nickerson & Zenger, 2004). Such management can best be achieved through a co-designing process because design mediates between different disciplines (Lindberg et al., 2016; Sanders, 2014) and provides effective tools for interdisciplinary, solution-oriented collaboration.

Studies in the social sciences and innovation research indicate that innovative thinking specially flourishes in environments that promote both personal accountability (Cox & Blake, 1991) and “participative safety” (Somech & Drach-Zahavy, 2013, S. 689), the latter of which is achieved through an atmosphere of openness, recognition, and tolerance of mistakes. Enabling spaces (Peschl, 2007) provide one such environment.

These spaces are “multimedia exhibitions,” designed to inspire co-creation (Peschl, 2007). The “exhibits” consist of images, videos, objects, and texts including interviews and provide a suited basis for the co-ideational process. One type informs participants about relevant scientific findings and inventions and the wider

discussions surrounding them, while the other provides inspiration in the form of “speculative objects” and artistic visions of the future.

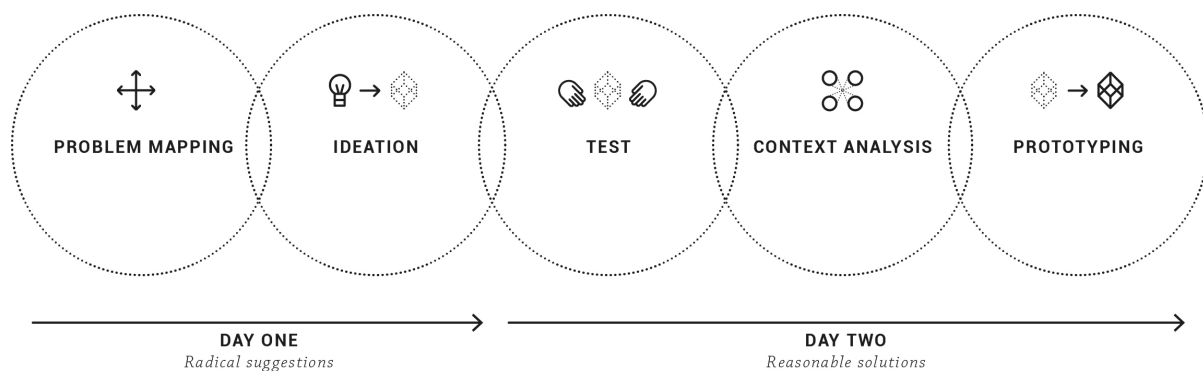


Figure 1. The process

## 3.2 Day one – radical suggestions

The goal is to propose as many radical innovation paths as possible. This process begins by a short “warm-up” in which participants are asked to interpret highly original expressions in as many ways as they can. The purpose is to encourage participants to be creative and think outside the box.

Next, participants are divided into three to four groups (of five to seven) and each group proceeds to its own enabling space, in which it works throughout the entire workshop. Each space is dedicated to a specific socio-technological problem and the first half of the day to the detailed mapping of the problem. To do so, the topic of urban life was divided into separate thought spaces: “outage of critical infrastructure” (e.g. blackouts), “mass events” and “city quarters in change”.

The particular methods employed to support the mapping depend on the problem’s specifics. Participants can, for example, work with the images, such as those of city scenes, provided by workshop organizers or role-play particular situations (Simsarian, 2003). The goal is to identify different aspects of the problem and, during the concluding stage of the session, to pose questions about potential solutions.

Solutions are brainstormed during the second half of the day. This session follows the guidelines developed by Osborn (1957). As recommended for highly diverse groups that have little to no experience with brainstorming (Diehl & Stroebe, 1987, Mullen et al., 1991), the process is two-stage: participants contemplate the problem and write down individual associations during the “quiet” stage and then discuss these associations and develop ideas together during the “interactive” stage (Baruah & Paulus, 2008). These ideas are then assessed as possible, probable, and/or desirable (Amara, 1981). During the concluding stage of the session, participants choose a small number of particularly interesting desirable ideas and determine their specifics with the help of questionnaires provided by workshop organizers.

## 3.3 Day two – reasonable solutions

The goal is to evaluate how reasonable the ideas are and to use this information to enhance the ideas. During the first half of the day, participants test their ideas outside their group in a manner similar to early tests in design thinking (Plattner et al., 2011) or lean design sprints. Depending on the ideas’ specifics, participants



present them to random people and/or different specialists and document their reactions in as much detail as possible. This process may result in “early failures” (Brown, 2009) of some ideas in which they are discarded due to negative feedback. Such feedback is valuable nonetheless and can help participants develop more robust solutions.

During the second half, participants conduct a thorough context analysis in which they identify major actors who should be involved in the implementation process. This analysis is supported particularly well by the Quadruple Helix model. Developed by Carayannis and Campbell (2009), this model comprises four major, mutually interacting elements of the innovation system: science, industry, policy, and society.

In the concluding session, participants use simple materials in unconventional ways to create “narrative objects”, which are tangible, artistic manifestations of their ideas. For each object, participants write a short description or role play a short scene to explain its function. Narrative objects not only document the results (Do, 2005), but encourage participants to contemplate (Visser, 2006) and enhance (Scrivener et al., 2000; Eckert & Boujut, 2003) their own ideas. Most importantly, these objects enable interaction on multiple levels and thereby help transform different individual perspectives into shared visions (Goldschmidt, 2007; Kimbell, 2011; Gero, 1990).

The ideas presented in the workshop “Urban Life Between Security and Freedom” ranged from technological solutions, e.g. the dual use of drones, to new business models for education providers or ideas for social innovations like an emergency currency.

After the workshop, the ideas are processed by the project team and then presented to different specialists, decision-makers, and the general public for evaluation, transformation, and, ultimately, implementation. Which particular actors should participate in this process and which particular forms it should take depend on the ideas’ specifics.

## 4. Conclusion

Major challenges cannot be resolved within single fields but only through transdisciplinary collaboration. The input of diverse, relevant stakeholders, gathered early in the innovation process both provides additional sources of inspiration and ensures that proposed innovations accord with public needs and values, the market, the legal regime, and the state of technological development. Therefore, the roles of these stakeholders in the innovation process need to be redefined and new approaches to transdisciplinary collaboration developed.

By engaging multiple senses, design mediates between different fields and expands outlets for expression. Methods of participatory design can be particularly effective in helping participants co-envision robust – both radical and reasonable – solutions to major social challenges.

This paper presented one such method, which can be easily adapted to the specifics of particular fields, goals, and settings. Its key element is a structured, transdisciplinary co-ideational process in which the transformative nature of design is only indirectly used to inspire or implement solutions but mainly to enable and connect participants.

This method will also be used in a new BMBF-funded project regarding the health care of refugees.

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# Engage: Redoing how we talk about Depression

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**Abstract:** Engage is a workshop tool for facilitating discussions around mental health among adolescents and young adults. Workshops are a common means for mental health practitioners to raise awareness of, and increase self-referral for, depression and anxiety. In its unique approach, Engage uses tangible tokens representing emotions, situations and personae to help participants abstract their experiences into fictitious scenarios.

Engage was designed by four MA/MSc students who have spent 18 months in New York, Tokyo and London exploring cultural differences as opportunities for design innovation, informed by the designers' insights and observations, user tests, and contributions from mental health experts, in all three locations. Responding to cultural issues and differences, it is presented as a case study of culturally-informed design innovation for an important social challenge, with outcomes tailored for differing national cultures.

The project is under further development with UK mental health charity Sane, and with students welfare officers at Keio University, Tokyo.

**Keywords:** Mental health, workshop, cross-cultural, depression

**Film Contribution:** <https://vimeo.com/217978345>

# REDOing Design Education: A Framework Proposal for a new value Creation Process

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**Abstract:** Service design education is still young and it is still interpreted in many different ways, according to the design programs where it usually plays a minor role. Very few education schemes provide a complete curriculum on service design, facing the challenge of equipping a designer who will want to have a dominant role in providing solutions for people, supporting new forms of social innovation that happen through new processes both in public and private services. This paper tries to map the new value-creation process in a three level structure, proposing a framework of new competences and tools that are being developed in design education and research. The value in use, the infrastructuring and the governance levels are explained with the specific tools and approaches required according to the specific aim of the design activity: that is, whether it is about understanding, transforming or communicating a service.

**Keywords:** Service design education, service dominant logic, value creation

## 1. Introduction

Social transformation associated to the rapid evolution of technology and accelerated by the intersection of different social megatrends, from global migration to economic crisis, from population ageing to globalisation, are challenging the education systems, which are supposed to equip the future generation to deal with a context that the educator themselves have never lived.

This situation is challenging every education and research discipline, including the disciplinary area of design. While the existing design programs are facing this challenge by introducing new subjects that focus on the new technologies or new ways of working with users and with the complex system of stakeholders that surrounds the production of new objects, new design programs are emerging, that propose the extension of a design culture and way of thinking to social and

economic aspects that were previously managed by experts from other disciplines.

Service design is one of the new programs. The earliest courses on service design were aiming at addressing the increasing complexity of the corporate offering. Those courses were looking at services as a necessary systemic framework in which products are produced, distributed, sold and consumed. The qualification of services in that context was based on the assumption that services are a complementary offer to products and their function was considered in relation to the competitive advantage service can provide when providing products, the systemic aspects they referred to (the case of Apple being usually mentioned as a relevant example) or for the opportunity to use services as a way to design or control the experience of a product. Consequently, services were identified as “what product is not”, introducing the “IHIP” paradigm, which listed the main characteristics that make services different from products: Intangibility, Heterogeneity, Inseparability and Perishability.

This paradigm is still very useful to characterise services and, above all, to highlight some of the main factors that are emerging when dealing with the design of services, such as time, interaction or ownership. It is a very useful point of view also because it helped to introduce useful service design tools.

This paradigm however, has been challenged from two sides: the increasing awareness of the need for a proper design intervention in services, like those in the public sector, that imply substantial social transformation on one hand, and a new perspective that understand services as a new form of value creation, that challenges the existing link between producer and user – or between a service provider and a service customer – on the other.

The emerging perspective is the ground for a more solid framework for design education, that takes into account the new role of service design and proposes new tools and knowledge for designers.

## 2. Service Design and Social Transformation

Contemporary innovation processes are very often based on the communities' capability to produce spontaneously organised social initiatives that address urgent and crucial problems using new logics and a new approach. Such phenomena have been observed by Manzini (Manzini, 2015), who interpreted them as an expression of the human attitude and capability to solve everyday problems. In other words, they are the expression of what Manzini defines as diffuse design.

Manzini observes that this diffuse capability to produce solutions is something often spontaneous and unplanned, that neither designer nor service providers can control, but that can be somehow supported or stimulated, by creating places for innovation, or tools for conversation that trigger or support the spontaneous innovation process.

A similar approach is proposed by Hilgren et al (Hilgren, Seravalli, & Emilson, 2011) when creating prototypes, or provotypes that trigger social transformation mechanisms.

Although, as mentioned, such phenomena cannot be controlled with the same approach designers had when designing for product manufacturers, they generated a large debate on which tools can be used for triggering social innovation (Kimbell, 2013), on the definition of social innovation (Mulgan, 2006) and on the opportunities and possibility to address such phenomena and include

citizens in a participatory process to co-design innovation processes in the public sector (Bason, 2010).

It is evident that this approach cannot use the same parameters and the same attitude of the existing value creation and consumption processes, in which production and consumption were part of two distinguished spheres. The need to involve citizens and to capture their problem solving capabilities and attitude is calling for a new design approach.

### 3. Service Design and the new value-creation process

Although interaction has always been seen as a crucial characteristic of services, the value creation process based on a clear separation between production and consumption process does not consider the actual user participation to the creation of value. Norman and Ramirez (Normann & Ramirez, 1994; Ramirez, 1999) highlight that contemporary value production processes can no longer be described through a linear model, in which different stakeholders progressively add new value to a product; value that is eventually destroyed, or consumed by a consumer. The best way to represent the way value is produced in the present socio-economic system is to look at the constellation of actors, including the users, that are contributing to qualify the value of a product or service. This constellation is generating highly personalised solutions, that are pushing the limits of mass customisation (Morelli & Nielsen, 2010). This moves the value creation process from the designer's hand to a process of co-creation and from the design studio to the theater of the interaction between the various stakeholders that contribute to the definition of a service. In this context designers do not design services, but rather design for services (Kimbrell, 2011). Likewise, the service provider does not deliver services, but rather supports value creation. The perspective shift has been introduced by Vargo and Lusch's approach, as a new logic to frame production systems: a Service-Dominant Logic (Vargo & Lusch, 2008).

The shift proposed by the new Service-Dominant Logic (SDL) is challenging the role of those who were providing knowledge and controlling the production process. If the production is in the hand of users or those stakeholders interacting in the service *scene* what design competences, knowledge and skills are required (if they are even required) in such a logic?

The structure of the value creation process in the new logic is in fact more complex than just the service scene and goes much beyond this logical level. This structure includes:

- The level in which value is co-produced, or, defined as *value-in-use* by Vargo and Lusch (2008)
- An *infrastructuring* phase, in which service providers (enterprises, designers and/or administrators) organise the resources to activate and support the value co-production process
- A *Governance/transformation* phase, in which service providers address framework instances that would support service scalability, reproducibility and any form of economy of scale that would make the service sustainable in broader contexts.

A different definition of design is possible for each of the levels of this structure: design represents a diffuse problem solving capability at the first level, it

represents a set of professional and expert skills at the second level and a set of strategic visions and knowledge at the level of governance.

This structure is therefore the ground for a revision of any education program in service design.

## 4. The challenge for service design education

Service design education is still young; very few education program are explicitly addressing the demand for specific competences for designing for services. In many cases service design represents a minor part of other design education programs; however, the relevance and extension of services in contemporary economy, in corporate strategies and in the public sector is calling for a better definition of design competences related to services. This justifies the emerging demand for new service design education programs, which fully address the complexity of this area of studies.

In general terms, the tools for designers to work with services are mostly related to the basic design competences, that are:

- The analysis and interpretation of the context for the design action (analytical tools);
- The development of new solutions (design tools);
- The representation and communication of the new solutions among the stakeholders in the value-creation process (representation tools)

Those competences are needed to work at all the three levels of the value creation structure mentioned in the previous section, focusing on different aspects of the design process. The focus in value co-creation process is on the interaction among the stakeholders involved in the services and the experience resulting from such interaction, whereas the infrastructure level will require designers to focus on the organisation of the production system for a service and at the governance level designers will have to focus on replicability and scalability of the solutions (Table 1).



Table 1. Design competences at the three levels of the value co-creation process.

	Understanding	Transforming	Communicating
Interaction/experience	Identify stakeholders, Actors Profiling	Supporting participation Co-designing scenarios Triggering innovation	Inspiring participants
Organisation	Analysing networks Analysing motivations	Proposing service architectures. Creating platforms for interaction	Visualising organizational structures
Replication/Scalability	Understanding ecosystems and power relations	Proposing business models. Defining policies	Communicating visions, Policies and design opportunities

#### 4.1 Design at *the Value in use* level

The value-in-use level is the level in which value is co-created by a constellation of stakeholders. The value designed at this level is the result of the interaction and negotiation between different individual problem solving capabilities. This is therefore the result of diffuse design capability, rather than the outcome of an expert design action. However, several case studies and interesting examples have been presented at this level (Cottam & Dillon, 2014; Murray, Burns, Vanstone, & Winhall, 2006), which suggest a role for designers in supporting value co-creation; in particular the activity of designers can still be relevant:

- designers' analytical competences could be used to highlight the potential of the socio-technical context, identify and profile relevant stakeholders;
- Provocations, scenarios and other forms of visualisation can be used to trigger participation and to support the stakeholders' convergence towards shared value and objectives
- Prototypes and other narrative representation tools can be used to inspire the stakeholders' action and figure out the experiential values to be considered in the new solution.

The tools used at this level have been widely described by several authors, such as Polaine and Løvlie (2013) and Stickdorn and Schneider (2011) and in several online platforms, such as [Servicedesigntools.org](http://Servicedesigntools.org) or [servicedesigntoolkit.org](http://servicedesigntoolkit.org). They include, among other tools (Table 2).

- Personas, customer journey maps and cultural probes, to support the analytical phase
- Scenario building, service journeys, living labs, service jams, to support the design process
- Scenario representations, experience and functional prototypes or provotypes (Blomkvist, 2014) to visualise and inspire interaction.

## 4.2 Design at *the Infrastructuring* level

The level of infrastructuring concerns the designers' specific professional expertise, that can be used to:

- Analyse and map actors' network that can support the value co-creation process, highlighting motivations and incentives that would support participation
- Propose new service architectures, or platform that support interaction by lowering the threshold of competences and skills required for participation and activation
- Represent the service architecture, in order to visualise the systemic aspects and concrete potential of solutions

The concept of service architecture is not new to service design studies, it was introduced with the HiCS project in 2004, (Manzini, Collina, & Evans, 2004) together with a series of tools to support designers in organising resources for new service solutions. The architecture of the solutions of the HiCS project were aimed at organising networks of stakeholders to provide well defined results (that means in a good-dominant logic). More recent projects, such as the *Citadel on the Move* ([citadelonthemove.eu](http://citadelonthemove.eu)) and Open4Citizens ([Open4Citizens.eu](http://Open4Citizens.eu)) explore the possibility to create platforms of tools to code new applications using open data to empower citizens to create new services based on open data. In the service-dominant logic the role of such platforms should be on generating tools, services, channels and filters to support and stimulate the mutual interaction between value producers and users (Choudary, 2015) (Figure 1).

The tools used at this level include (Table 2):

- Actors' network maps (Morelli, 2006) customer value constellation (Patrício, Fisk, Falcão e Cunha, & Constantine, 2011) and service ecology maps (Polaine & Løvlie, 2013) to highlight the relevant systemic components in the analytical phase
- Motivation matrix (Manzini et al., 2004) to highlight incentive to interaction in the design phase; and
- Service blueprint (Polaine & Løvlie, 2013; Stickdorn & Schneider, 2011) and service architecture maps (Manzini et al., 2004) to support the design phase and to visualise the systemic aspects.

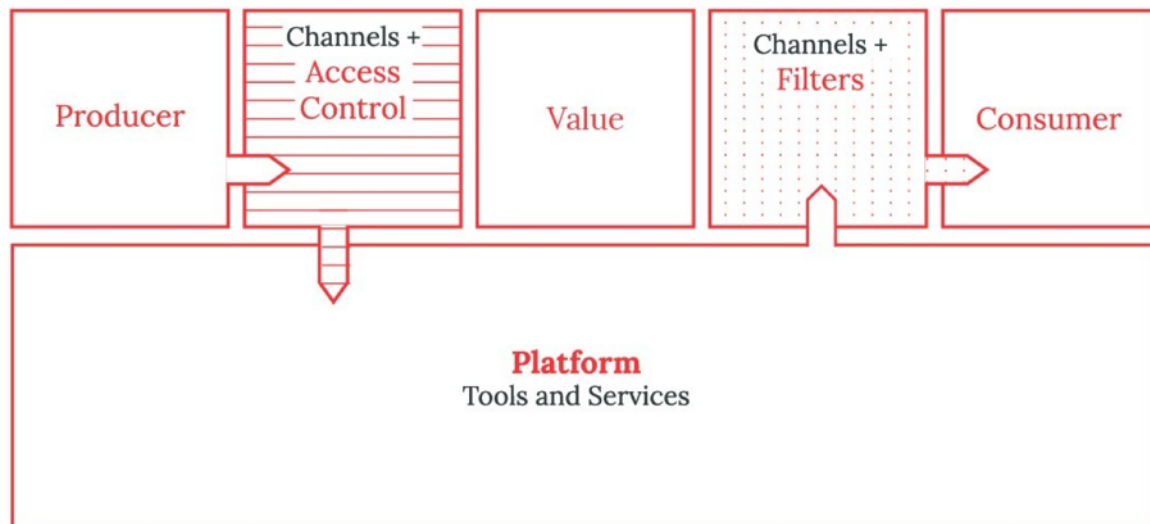


Figure 1. Service platforms and interaction (Choudary, 2015)

### 4.3 Design for scalability and transformation

Although the academic attention of service design is quite recent, service scalability and reproducibility is not a new issue in a good-dominant logic, where franchising and large scale-information-based distribution systems are providing efficient solution. The perspective change to a service dominant logic however, opens new questions. When services are seen as a mean to support value co-creation, collaboration, and stakeholders creativity, their potential to create highly personalised and localised solutions becomes more evident; but consequently the issue of scalability and reproducibility emerges as a need to ensure the economic sustainability of such solutions. New services to address local social problems, such as social integration, active assistance of elderly people, prevention of social diseases, are often designed around specific communities, although their economic sustainability depends on the capability for public administrations to extend them to larger geographical contexts. Furthermore in this context it would be important to take into account not only the shape of the new solutions, but also the tools, skills and organisational capability to ensure ongoing change (Burns, Cottam, Vanstone, & Winhall, 2006). Scalability and transformation of the context however, are not a trivial problem to address. Morelli (Morelli, 2007) was proposing the problem of replicability of highly personalised solutions as a legacy of the industrial logic, which was based on large scale production. Ehn (Björgvinsson, Ehn, & Hillgren, 2010) highlights the link between concrete and local design initiatives to support participation and the democratisation of innovation and Sangiorgi (2011) proposes a consistent framework to unify transformative practices and their stakeholders, from active citizens to platform building. This logical level calls for designer's capability to both understand and address strategic and power relations within local or logical ecosystems and propose models that address the issues of business or social sustainability of the new solutions. Tools to visualise stakeholders' maps, business model canvasses or motivation matrix could prove very useful to address the higher level of abstraction of the issues emerging at this level (Table 2).

Table 2: An overview of design tools to address value creation

	Aims of the design activity	Understanding	Transforming	Communicating
Focus of the design activity	Tools for: Value production	Analysis	Design	Representation
Interaction	Value in use	Service Encounter analysis Customer Journey Map Personas Interviews Cultural probes	Scenario co-design Experience prototypes (Polaine & Løvlie, 2013) Provo-types (Blomkvist, 2014)	
			Service Journey Cards Workshops Hackathons Living Labs	Video Prototypes
Organisation	Infrastructuring	Actors' network map	Service Architectures Blueprints, Service Journeys	
			Motivation Matrix, Use cases.R	
Replication/ Scalability	Governance	Actors' map, Stakeholders' map	Service Architecture	
			Business Model Canvas Motivation Matrix	Socio-Technical ecosystems

## 5. Discussion

The tools proposed in this paper are certainly not new, as they have been developed since the earliest studies in the service design discipline as part of a progressive definition of a toolbox for designers to deal with the most peculiar aspects of service, such as time and interaction. Indeed the focus on those aspects, especially in regard to the interaction, has always been very strong in service design. Norman was pointing out the relevance of the *moment of truth* since the early studies on service management (Normann, 1991), and together with Ramirez was pointing out how the process of value creation in services, build upon constellation of actors, is in fact challenging the most common *value chain* perspective (Normann & Ramirez, 1994). Marketing studies were also suggesting *touchpoints* as the crucial moment in which the interaction produces the service outcome, whereas other previous studies had defined services as a social construction activity (Morelli, 2002). However until the perspective was oriented by a good dominant logic and education on service design was limited to a component of other educations (such as interaction design, experience design or industrial design) a full picture of a professional profile for service designer could not emerge.

The two factors that have probably created the premises for a more complete framework are the emergence of the service dominant logic and the creation of the first specific educational programs on service design.

The service dominant logic suggests a perspective shift to reframe Norman and Ramirez' idea of value constellation. The new perspective is particularly effective in describing processes that imply social innovation in a new generation of services based on peer-to-peer interaction, bottom-up initiatives and participatory processes. It highlights the dominant role of users/citizens/customers in shaping services and clarifies that service designers and service providers are *producing* services, but rather *organising supports for value creation*. This paper aims at casting a new light on this new role, with the aim of contributing to a specific professional profile for service designers.

Such a profile and the related competences need to be properly addressed by design education. The high number of design programs including service design are often limited in time and scope and therefore only focusing on some of those aspects. Service design teaching modules are often focusing on value co-creation and users experience when they are framed in interaction design educations. Other teaching modules are instead emphasising aspects related to the organisation of the service as a production system, thus looking at expert knowledge for the organisation of service architectures or platforms for interaction. The existence of such modules in other educational programs are certainly a good way to introduce relevant aspects of service, according to specific perspectives of each educational program.

The need to focus on a specific service design education is instead calling for a wider and more complete perspective. The three levels of the logical structure proposed in this paper imply three different areas of competence, that service design educations need to address, in order for service designers to *design for services*, which means working in a systemic context, negotiating and communicating with experts from other disciplines, including interaction/experience/industrial designers when working at the value co-creation level, engineers, IT system expert, and even social scientists when working at the infrastructuring level and managers and policy experts, when working at the scalability/governance level.

## 6. Conclusion

Far from being exhausting, the framework proposed in this paper is a first attempt to provide a unifying picture of competences and skills required for designers to play a relevant role in the development of new services. The new service configurations emerging in the last few years, based on new roles and new aggregations of stakeholders are suggesting new forms of aggregations and consequently new ways of dealing with the design of services. The emerging peer-to-peer platforms, for instance, are suggesting new forms of production, challenging the existing criteria, and even changing the exchange currency for evaluating service efficiency, proposing new measurement parameter, such as attention, experience and participation, together with the existing parameters based on economic value. The landscape of competences and skills for service designers to play a role in this context will be shaped according to the ongoing changes in the way services are defined and created. The framework proposed in this paper should therefore be interpreted not as a rigid structure, but rather as a window opened on a changing landscape.



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# Designing Garments to Evolve Over Time

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## Abstract

This paper proposes a REDO of the current fashion paradigm by investigating how garments might be designed to evolve over time. The purpose is to discuss ways of expanding the traditional role of the designer to include temporal dimensions of creating, producing and using clothes and to suggest a range of potential fashion futures that decouple from declining resources. In the first part literature on 'Past and Present' historical and current aspects of sustainability in fashion and textiles are presented. In the second part, three exploratory case studies are described: Two projects by students and one practice-based experiment by the authors. Finally, we reflect on the insights gathered and suggest a REDO of design education to accommodate a wider territory of emergent sustainability thinking. By providing knowledge about teaching sustainability and technical details the paper contributes to a REDO of design education, to further research and the future fashion and textile industry.

**Keywords:** Sustainability, design, education, fashion, textiles.

## 1. Introduction

Traditional design facilitates the movement of natural resources through the fashion system by transforming raw materials into highly desirable products for sale. In the modern fashion industry, the increasing speed and volume of material product throughput is predicated by the industry's utter dependency upon exponential business growth (Grose 2011). With the now ubiquitous presence of fast fashion, the global fashion system is readily accepted as being an unsustainable and heavy burden on the environment (Fletcher & Grose 2012). The fast pace and sheer scale of raw material extraction at the beginning of the supply chain and product disposal at the end outpace nature's capacity to supply natural resources and its ability to process the waste generated.

In design for sustainability, identified burdens indicate points of creative intervention and potential for innovation. Prolonging the active use of garments by improving physical durability is one such intervention proposed by researchers (Allwood et al., 2006; WRAP, 2012) and applied in practice by several brands (Patagonia, Eileen Fisher, Jussara Lee). For example a report from The Waste and Resources Action Programme in UK found that:

“....increasing the active life of all clothing by nine months would reduce the annual carbon, water and waste footprints of UK clothing by 20-30% each, and cut resource costs by £5 billion.”  
(WRAP 2015)

The assumption in this strategy is that better quality fabrics and more robust seaming ensure a garment will last and therefore remain in active use for a longer period of time, thereby reducing the need to extract additional raw materials to produce new items. But focusing entirely on the physical durability of a product in isolation is a flawed concept since studies show that many consumers dispose of garments long before the end of their useful life (Nordic Council of Ministers, 2015). Hence physical durability becomes a liability, not an asset, when garments end up in a landfill or in a natural environment. Moreover, fashion businesses are dependent upon speed of change to ensure new sales and financial growth. Effective fashion sustainability strategies must therefore consider the consumer's use practices and implement new business models that decouple revenue from material throughput in order to achieve any meaningful ecological gains.

## PAST PRACTICE

Textiles enable the physical manifestation of garments and changes in fashion are closely linked to shifts in fabric design expressed through fibre, construction, colour and patterns (Hallet & Johnston 2014). Temporal considerations in textiles and clothing were practiced for centuries across many cultures before the industrial revolution, which began in England around 1830. Prior to this time shifts in fashion were slow, and ordinary people valued clothes because they were time consuming to produce. Most households during this period owned a loom and manufactured hand woven fabrics to meet their own family's needs. Similarly, individuals made their own garments and were habituated to caring for, repairing and 'refreshing' them several times through their lifetime. Techniques for refreshing garments included embroidery, and over-dyeing or printing patterns to hide wear, tear and staining (Lorentzen, 1985; Ploug, 1983). In many villages a local dye/print master provided customized services for the embellishment of these hand made fabrics and garments. At this small scale, these practices were flexible, made optimal use of local resources and produced minimal waste. This prevailing system also allowed for co-creation, providing ample opportunity for the user/wearer to influence the aesthetic expression of the garments, which by necessity and through these treatments, slowly evolved over time. The mechanization of the textile industry and machine-based clothing manufacturing eroded these practices as ever-more efficient mass-production gave rise to changing fashions each season and the current norm of inventing additional seasons to prompt more purchases (Brett, 1992; Forty 1986; Harris, 1993).

## PRESENT TRENDS

Today, with increased awareness of the detrimental effects of the current industry and the rise of digital technologies converging, pre industrial practices may be worth re-visiting and viewed through a fresh 21st century lens. This might provide inspiration for re-setting the rate of material flowing through the fashion system, to be more fitting for our time. Shifts away from ubiquitous styling and fast speeds

are already evidenced in the resurgence of small-scale spinning mills that produce yarns from local fibres, the return of traditional crafts, which are naturally restrained by the pace of hand-work and attention to the 'craft of use' (Fletcher 2010; Fletcher 2016). In parallel, digital technologies in communication, design and textile/garment fabrication are bringing flexibility and customization to the forefront once again reducing surpluses in production and offering completely new user experiences (Riisberg, 2006; 2007). For example the London based company Unmade engages the wearer in the design of knitted sweaters, producing each customized piece on site and on demand, completely eliminating the need for inventory necessary for re-stocking traditional retail stores (Durrani, Ravnløkke, Niinimäki, 2016). This concept simultaneously eliminates waste caused when product sales fall below projections and meets the desires of individual wearers to acquire a unique item.

Concurrent to the above, new concepts and frameworks are emerging in the fashion and textile sectors. One of the most influential is the Cradle-to-Cradle framework that focuses on design with positive impact and on reducing the negative impacts of commerce through efficiency (Braungart & McDonough, 2002). The Ellen MacArthur Foundation points to this school of thought as one out of seven supporting 'Circular Economy'; which is: "... restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times." (<https://www.ellenmacarthurfoundation.org/circular-economy/overview/concept>). This strategy is one of the core touchstones in Patagonia's business; the company recently received the Accenture Strategy Award for Circular Economy Multinational at the World Economic Forum in Davos, Switzerland for their concept (Hoang, 2017). Several other businesses have worked to extend the lifetime of products in various ways. High-end fashion designers like Martin Margiella and Christopher Raeburn, for example, have transformed old garments and textiles into new products of high aesthetic value. Social entrepreneur, Nathalie Chanin of Alabama Chanin creates beautifully handcrafted pieces using skills available locally in rural Alabama and the independent fashion label Good One in UK combines new fabrics with textiles reclaimed from large retail brands inventory waste (Fletcher & Grose 2012). More recently, repair services designed to prolong the physical life of existing garments have gained in popularity e.g. Eileen Fisher's Green Eileen, Toad & Co and Renewed Apparel. Leasing concepts have also been established, as exemplified by MUD JEANS, Filippa K, Rent the Runway and VIGGA.us. All these initiatives aim to address the issue of declining resources by maintaining raw materials and energy embedded in garments, in active use for a longer period of time.

In addition, a number of research projects focusing on sustainability in the fashion industry are in progress one of them is the Trash to Cash project which aims: "...to create new regenerated fibres from pre-consumer and post-consumer waste materials" (<http://trash2cashproject.eu>). Another is The Mistra Future Fashion Project that is a cross-disciplinary research program with the vision: "...to close the loop in fashion and clothing – enabling a systemic change in the Swedish fashion industry, leading to a sustainable development of the industry and society." (<http://mistrafuturefashion.com>) As part of this program Dr. Kate Goldsworthy and Professor Rebecca Early from University of the Arts London carry out practice-based research where they have developed prototypes exploring 'designing for cyclability' (Early & Goldsworthy, 2015).

Over the last decade, a number of books on designing more sustainable fashion and textiles have also been published (Black & Alexander, 2012; Fletcher, 2008; Fletcher & Grose, 2012; Fletcher & Tham, 2015; Gardetti & Torres 2013; Gwilt & Rissanen, 2011; Niinimäki, 2013). Research on teaching sustainable design in this



field has also been brought into the public domain (DeLong et al., 2017; Grose, 2011; 2013; 2015; Hasling, 2015; Leerberg et al., 2010; Riisberg et al. 2015), along with an increasing volume of material for students and educators made readily accessible on-line (Parker & Dickson, 2009; Ted Ten; Youth Fashion Summit, Forum for the Future, Ethical Fashion Forum).

Besides these commercial and literary examples, the Local Wisdom project directed by Dr. Kate Fletcher provides a model for how academic and practice-based research can be conducted in collaboration with students (Fletcher, 2016). In this particular project, seven design schools from around the world came together to further explore Kate Fletcher's ethnographic research with everyday people on the 'craft of use', which is defined as:

"The Craft of Use aims to challenge the dependency of the fashion industry on increasing material throughput and propose solutions through sustained attention to tending and using garments and not just creating them." (<http://www.localwisdom.info/about>)

The authors of this paper were lead investigators for Local Wisdom and brought this ethnographic research into studio classrooms to challenge conventional methods for teaching design.

## 2. Potential Fashion Futures

It is in this social, cultural and technological context of change that business models centred on designing garments that evolve over time can be imagined and explored as potential fashion futures. The aim of the design experiments carried out in the following case studies, is to use design, technology and 'craft of use' to both slow the flow of materials through the fashion system, and to provide new fashion experiences for wearers. In different ways each of the examples provided below investigates how to embed elements of change to satisfy the wearer's desire to 'feel refreshed' as effectively as when they purchase a new item of clothing. A secondary, but no less important purpose is to use these explorations as probes to bring industrial and educational norms to the surface so they can be examined anew in context with the realities of a resource constrained world.

### CASE STUDY 1: DESIGN SCHOOL KOLDING

Being part of the Local Wisdom project inspired Design School Kolding to extend and further develop the 3<sup>rd</sup> year fashion and textile course in sustainable design which build on knowledge and skills previously acquired in 1<sup>st</sup> and 2<sup>nd</sup> year. Currently the 3<sup>rd</sup> year course, entitled *Design for Change - Past, Future and Present*, is a ten weeks full time study divided between teamwork and an individual project. At the beginning of the course we introduce Kate Fletcher's ethnographic research and the methods developed in the Local Wisdom project (Fletcher, 2016). We also present a range of present and future environmental challenges, visionary designers and companies as well as new developments in materials and emergent technologies. The first two weeks of the course are allocated to wide-ranging research starting with a visit to the ethnographic collection at the National Museum. Here the students are asked to document and reflect on sustainable elements in the construction of garments and to identify their specific function. Following this the students conduct a personal and a user centred wardrobe study investigating what elements create emotional value for the wearer (Skjold, 2011, Niinimäki & Koskinen, 2011). Based on the wardrobe studies, the students analyse and reflect on how personal experiences can inform the design process and be integrated into new clothes for constructed personas.

This phase of conceptualising runs parallel to an assignment with 2<sup>nd</sup> hand clothes, which helps students understand how wear affects garments and textiles. In the workshops the students experiment with 3D form experiments and a range of textile techniques, to give the materials a new life. The simultaneous purpose of these exercises is at the same time to develop student's skills for designing new textiles and clothes. Note, using 2<sup>nd</sup> hand clothes in the final project are not mandatory. The groups are free to choose materials and techniques that meet the criteria they set up for a sustainable closed loop design concept. The next four weeks students work in mixed teams to realize their future scenario for a sustainable fashion collection, in which textiles and prototypes for three full-scale styles are completed. The remaining four weeks of this course are allocated to individual work adjusting ideas to a present context. In the following we present a group project from 2015, which is the result of the first six weeks work on Past and Future.

Maria Viftrup Cramer, Liv Marie Rømer (textiles) and Marte Heidirdottir and Ragna Hatlan (fashion) developed a concept they call: The Marks of Use. The group described a closed loop scenario for 2025, where they imagine that efficient campaigning has increased knowledge about the lack of global natural resources. In this scenario, product transformation becomes a key element for the clothing industry, which is now dealing with a disrupted supply of raw materials for new textile production. Garments that enable the user to repair and alter them are now a standard requirement, and companies look to develop and monetize systems that support product adaptations.

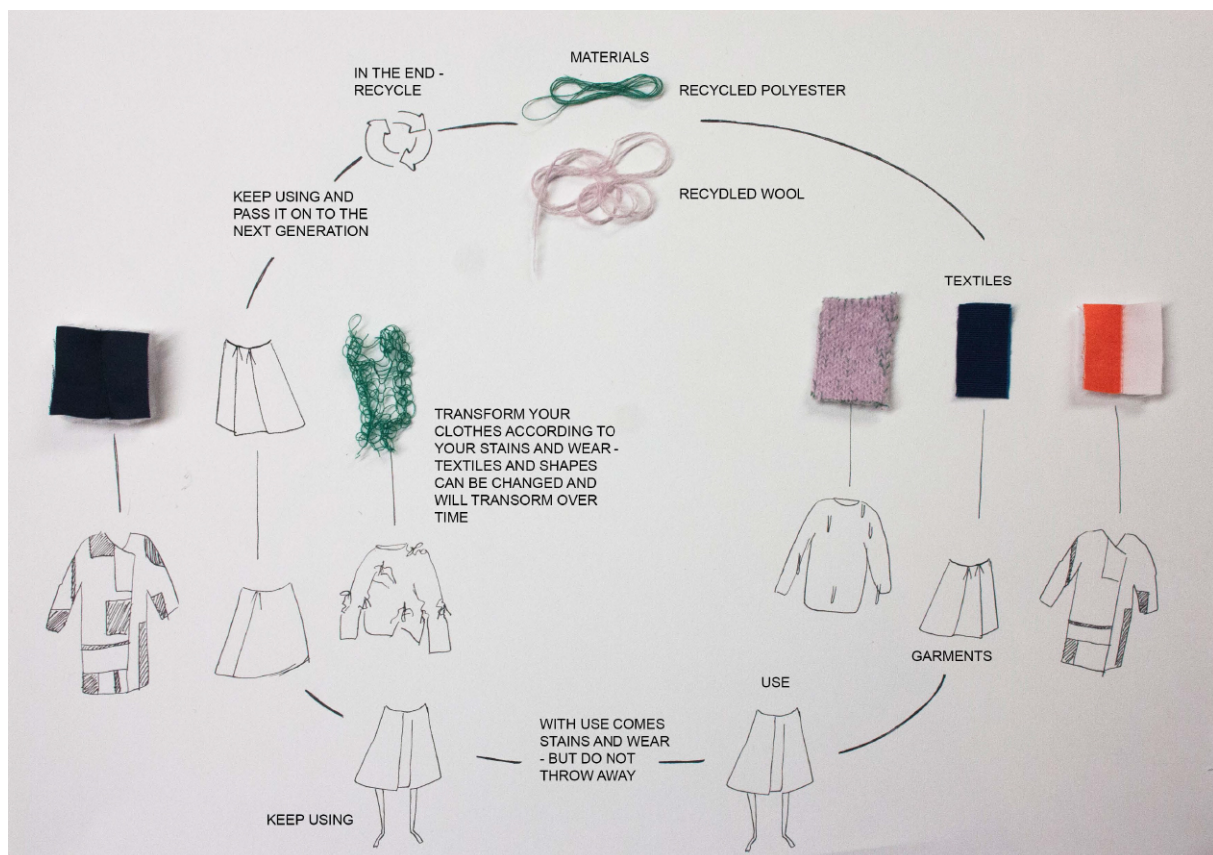


Figure 1. Marks of Use - Closed loop concept developed by Cramer, Rømer, Heidirdottir and Hatlan 2015. Photo by Students

Based on this scenario the students investigated how to create garments that change in form and material, whilst harnessing the skills and interactions of the



user during the products lifetime. During the process decisions were taken collaboratively. Finally the group printed and knitted the textiles and tailored a prototype of one outfit: a skirt, a sweater and a coat, designed for various user interactions.



*Figure 2. Skirt, sweater and coat designed by Cramer, Rømer, Heidirdottir and Hatlan 2015. Photos by Jens Christian Hansen*

The skirt – made of regenerated cellulose – is double-faced, constructed with ties and printed with three large colour blocks in light grey, blue and green. The colours can be arranged differently by using the ties to create a one-colour effect or different combinations of the three colours. The sweater also features easily adjusted ties and is knitted using two different colours and yarns – a light rose wool and a strong green polyester yarn. Over time the sweater will change from rose to green as the 'patina of use' leaves its marks. The quilted coat is 100% polyester with a print design added by heat transfer. A set of coloured heat transfer papers accompanies the product so that the user by ironing can apply surface prints for themselves over time to cover stains or change the appearance. Students also designed a user guide for each garment with instructions on how to use and care for the garments as well as what to do with it at the end of its active life.

This project demonstrates how design students are able to reason through a range of sustainability constraints, whilst meeting wearer's desire for changing the look of an outfit. Through prototyping new garments they also prototype new visions for a 'sustainable' future. In this way, far from narrowing and stifling creativity, these constraints engage the students in highly creative and multi dimensional processes of thinking. Through the concept development, they demonstrate new systems of dressing; systems, which can, in fact, be readily deployed today, as an on-demand, limited editions or even larger scale production. Yet in demonstrating such a strong and practical idea, Marks of Use makes us recognize the current

fashion sector and its utter dependence on the wearer buying and discarding pieces at faster speeds and increasing volumes. Indeed, it also helps us see the same dependencies in all business and in our global economy.

## CASE STUDY 2: CALIFORNIA COLLEGE OF THE ARTS

As an extension of the Local Wisdom research project, undergraduate students at California College of the Arts, San Francisco were asked to take the research on the craft of use as a starting point for their creative process. This marked a departure from the traditional surface/visual research and inspiration typically developed in industry and fashion design education. The studio application of Local Wisdom research engaged students at junior level (third year in the US system), exploring themes of sustainability practice in the studio class: *Fashion Design 4: Ecologies of Desire*. In the US a semester comprises fifteen weeks with each studio class meeting for one six-hour session per week. The *Fashion Design 4: Ecologies of Desire* class is usually arranged around four projects, running from concept to delivered prototype. For this reason, the Local Wisdom research was conducted during the summer break prior to the start of the academic semester to enable additional time for active research and reflection before starting design development. Since students are still building skills in undergraduate fashion design courses, the abstract nature of Craft of Use as a creative starting point was a challenge for many. Nonetheless, several creative strategies emerged from the project, fusing tacit knowledge of garment construction, making methods and wearer use practices. Ultimately, the Craft of Use project broadened the scope and dimension of student thinking and deepened their design thinking and development in other classes.

One resulting concept from the Craft of Use is 'Bespoke for the Masses' (Fletcher, 2016), which features a jacket designed by Jeff Pacis.



Figure 3. Design and photo by Jeff Pacis.  
Agnes Lloyd-Platt



Design by Jeff Pacis photo by

This designer was initially inspired by the complex interfacing used in men's suit jackets to achieve quality fit and was particularly intrigued by horsehair interfacing, which is malleable and readily moulds to the wearer's body. Working with mid-weight cotton canvas and silk lining, the designer deployed horsehair interfacing throughout a simple jacket so that, over time, and through use, the garment shapes a silhouette specific to each wearer.

In this 'fit for all' concept the flat patterning remains simple and constant. There are no additional demands on the patternmaker to develop complicated constructions or expectations on the wearer to change their behaviour or adjust the garment. Customized fit is achieved simply through wear and is facilitated by the users body, through consistent and prolonged use. In this way, the embedded material choices, craft of making, design sensibility and sustainability intent are amplified and intensified over time.

## **REFLECTION ON TEACHING FASHION AND SUSTAINABILITY**

Both projects described above introduce the next generation of designers to a new set of values situating sustainability at the core of creativity. The projects example a REDO of fashion and fashion design education in that they go beyond teaching the skills of practice for the fashion industry as it is today (e.g.: choosing fabric, colour, construction, style). Rather they identify familiar and accepted skills of practice and deploy them to prototype 'new ways' for the fashion sector. Essentially, they 'bend' traditional modes of teaching (studio making) to meet sustainability goals: showing how slowing the flow of natural resources through the fashion system can simultaneously meet the desires of the wearer.

Because these inquiries are explored through their own sphere of knowledge - making and development - students are naturally more readily drawn into larger social and cultural issues; resource depletion, deskilled consumers, human needs, economies of desire and consumption. By asking the wearer to engage differently with their clothing, and by providing a wide range of opportunities to do so, students also probe new fashion systems where both designers and wearers are more actively engaged. In short, they are inspired to imagine what the fashion sector could become in a resource-constrained world.

## **CASE STUDY 3: THE 'REFRESHMENT' EXPERIMENT BY THE AUTHORS**

Inspired by practices of the past, as described previously in this paper, and in order to investigate further the challenges and possibilities of designing for extended lifetimes and use, the authors carried out a 'refreshment' experiment using white cotton shirts and digital printing. Our purpose was to explore design concepts, which de-couple from declining material resources (specifically cotton) and to use the process as a form finding method for an emergent '21st century' sustainability aesthetic. Furthermore we wanted to investigate how digital technology may be merged with 'wisdom' of the past, and hence exemplify emergent ideas as teaching 'tools' for the classroom. To guide the experiment we pursued the following four questions:

1. Can white dress shirts be disassembled and overprinted to create newly desirable products?
2. Can existing digital printing equipment be used to positive effect?
3. What practical challenges emerge to designing shirts for extended and multiple lives?
4. What new technologies might further enable disassembly of garments?



## METHOD AND PROCESS

The methods we employed fall in the category of research by design that:

“...produces forms of output and discourse proper to disciplinary practice, verbal and non-verbal that make it discussable, accessible and useful to peers and others.” (Hauberg, 2011: 51)

White dress shirts purchased at Goodwill were selected for their most common traditional features; details such as stand collars, formal cuffs, plackets and shoulder yokes. Our preferred fabric content was 100% cotton, for two practical reasons:

1. Studies indicate that virgin cotton cultivation is in long-term decline in part due to impacts associated with global warming, as irregular precipitation patterns disrupt crop yields globally. We therefore anticipate that cotton is likely to become a highly coveted fibre and that re-use of cotton is likely to be a future necessity (Grose, 2011).
2. To ensure compatibility of the garments with fibre reactive dyes used in the digital printing process. This print technology was chosen for its production flexibility, artistic freedom and for its low environmental impact.

Each garment was first disassembled into its component parts to allow the separate pattern pieces to be flattened, taped to a worktable and prepared for digital printing. Next all pieces were treated with a compound of alginate thickener and alkaline chemicals to aid fixation of the reactive printing ink to the fabric and to minimize colour losses in washing. Taping the pattern pieces flat was critical to reduce potential for fabric bubbling and buckling during the alginate compound application, which could create surface glitches when printing.



Figure 4. The ‘Refreshment’ experiment by the authors.



Photos by Lynda Grose

Once dry, the prepared pieces were transferred to paper and taped flat a second time to ensure successful passage through the digital printer. The printed motive

was created by manipulating a photographic image in Photoshop and was then communicated to the digital printer<sup>1</sup>. Once activated, the ink jet printer head coursed across the whole width of the machine, distributing ink through tiny nozzles and building the print pattern across the taped garment pieces as well as the paper background. After printing the fabric was steamed,<sup>2</sup> washed, dried and ironed and finally sewn into a new shirt.<sup>3</sup>

## GLITCHES AND INSIGHTS

Deconstructing shirts with robust French seams, proved particularly laborious and time-consuming. Seams stitched by over-locking also proved highly inefficient for disassembly, since they necessitated two passes to rip both the main seam and the over-locked edges. We therefore cut alongside the seams for some of the shirts, which created rough edges on the re-assembled printed garment.

Additionally, sewn-on placket constructions at centre front and cuffs create a 'lip', which trips the printer head midstream, requiring emergency taping of plackets during printing and thus causing white sections within the pattern<sup>4</sup>. In future experiments the reactive dyes could be substituted with pigment inks, which do not require pre treatment and where post treatment is less complicated. Other types of digital printers that might be better suited for the job could also be tested. Similarly, precise engineered prints developed for each garment piece would save ink, which in this experiment was wasted on the paper background.

We expected that traditional garment constructions would be time consuming and ill suited to disassembly, but the experiment served to investigate if the cotton fabric was worthwhile up-cycling and how a fabric laundered many times would react to digital printing. The experiment showed positive results to both of these concerns. One strategy that can be deployed to address some of the obstacles described above is using chain stitched seaming to enable swift garment deconstruction. A second strategy is to use the newly developed technology Wear2; which is a thread designed to be durable in use and to decompose when exposed to microwaves (<http://wear2.com>). Wear2 technology therefore enables the rapid separation of seams and removal of tags, labels, zips and buttons, so garments may be disassembled quickly into separate pieces for 'refreshment' or to enter various recycling processes. This would allow for planning patterns and motives to be layered over time, offering a more complex aesthetic with each additional 'refreshment' without any additional base material through put.

As described above, to design effectively for extended lifetime through digital printing it is key to develop new construction principles so that disassembly is easy or even avoided. However, through our research, we identified that the main requirement of this method of product life extension is to simply enable the garment to lie flat to accommodate digital printing. 'Design to enable flatness' is the key re-entry point for further design intervention. This line of inquiry deviates from traditional western methods of pattern cutting, construction and sewing. We therefore see great potential in Zero - waste pattern construction - a technique

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<sup>1</sup> The image was then exported to the program Ergosoft, which is designed to communicate with digital printers such as the MIMAKI Textile jet TX 2-1600.

<sup>2</sup> The printed pieces were steamed at 0,5 atmosphere pressure and 200 degrees for 10 minutes.

<sup>3</sup> In this experiment we only had access to equipment using reactive inks. The advantages of reactive inks are wash fastness and a large colour palette; the disadvantages are higher consumption of water and energy and time consuming pre- and post treatment.

<sup>4</sup> As a side, conversely, glitches also present an opportunity to expand the designers 'aesthetic latitude' beyond expected norms, by explicitly indicating points for creative responses - decorative counter stitching placed to balance white taped areas, for example, or leaving them alone, to provide points of discussion and sharing ideas with others.

pioneered by Timo Rissanen and Holly McQuillan (Gwilt, & Rissanen 2011), which is more open and flexible to displacing conventional seaming and developing completely new methods of 'assembly-to-enable-flatness for printing'.

The 'refreshment' experiment is an example of research by design and related to, but also distinct from Professor Rebecca Early's pioneering work, which investigates a craft based strategy for extending the lifetime of polyester shirts/blouses using heat transfer printing to create a new look (Clarke & O'Mahony, 2005; <http://www.beckyearley.com>). We share the same intentions as presented by Early & Goldworthy; to reduce environmental impact by up-cycling materials (Early & Goldworthy, 2015). However we focus on cotton garments, for reasons stated earlier, and we prioritize innovation at the beginning of the garments life; design to enable extended lives. Essentially we seek to REDO methods of designing and constructing garments to imagine a potential fashion future, rather than addressing waste in the fashion industry as it is now.

### 3. Concluding remarks

In this paper we have proposed ways for a REDO of the current fashion paradigm by investigating how garments might be designed to evolve over time. The purpose was to discuss ways of expanding the traditional role of the designer to include temporal dimensions of creating, producing and using clothes and to suggest a range of potential fashion futures that decouple from declining resources.. As stated by Hauberg: "...research is systematic inquiry whose goal is communicable knowledge (Hauberg, 2011). In line with this the aim of the paper has been to provide new knowledge to provoke further research and to inspire the fashion industry. We therefore provide technical details for practitioners and researchers to further build upon our work. Our dual aim was to articulate an underpinning philosophy and intent for teaching design for sustainability. The global community of educators teaching this subject is growing rapidly, along with new Internet platforms providing educational material. This interconnected global community of educators and practitioners has great potential and we fully support its growth. Concurrently, as mentioned earlier in this paper, there is a substantial amount of research going on in the field. Yet we see that design for multiple lives and design for easy repair remain in the margins of business and in our experience such aspects are still not sufficiently integrated into design education. Practice-based research is valuable in that it brings theoretical ideas into forms that provide 'proofs of concept' that may stimulate and inspire REDO in design education and business. In a fast paced industry, where fashion practitioners barely have time to design, it is incumbent upon design educators to investigate how we might reference both historical examples and new technologies to re-align the fashion industry's needs more closely with the natural metabolism of earth's systems.

As a bi-product of this research we see that through a practice-based line of inquiry, well-conceived and visually compelling speculative projects become in themselves educational tools. They challenge the tradition of design practice, support and fuel a consumer economy and culture. By doing so such projects start to example as well as prototype new methods for a transitional economy. They also demand and exercise multi-dimensional thinking in the next generation of designers, a skill which is critical to meeting the demands of sustainability. Ultimately for a REDO of fashion, we see design research through practice and design education situated at the centre of sustainability; and sustainability situated at the centre of design and design education.

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# New Visions and the Designer's Role in Strategically tackling Complex Problems and conceptualizing Holistic Sustainability

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**Abstract:** The purpose of this paper is to contribute to the discussion of how to bridge the gap between the design community and industry by exploring the role of design within the fashion industry, its ability to co-create and address complex problems towards sustainability.

How prepared are fashion designers to work with industry beyond aesthetics towards transformative change? What is required of education and industry?

Research indicates a gap remains in the fashion industry Asia with some fundamental challenges to overcome. A combination of lack of skills, knowledge and preparedness on the part of the fashion designers, accompanied by traditional industry siloing reduces the opportunities for design to influence impact.

Guided by systems and design thinking, ethnographies and designerly led transdisciplinary dialogues were conducted among fashion designers and industry.

A multi-pronged approach is suggested, including soft-system practice tools, meta-design education and new industry operational structures to create space for trans-disciplinary co-creation.

**Keywords:** Transdisciplinary-dialogue, design-curricula, complex-problems, holistic-sustainability, design

## 1. Introduction

In this changing time where traditional ways of life are threatened by the continued strive for capital gain with little consideration to the social and environmental collateral damage there are now immediate reasons to change approaches to governance, industry and economic models. With the launch of the UN Sustainability Goals (2016) and the ratification of the Paris agreement (2015), accompanied by although not exclusive to the rise in global social unrest, hazardous pollution levels and its consequences and the reality of the 6<sup>th</sup> Mass

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extinction cycle, together have sharpened the attention of global leaders and policy makers. Policy moves slowly towards governance of more conscious production across industry, albeit still within the boundary of capitalist consumerism: an example of this move is demonstrated by the European union directive (2005), requiring new vehicles to be constructed of 95%, of weight, recyclable materials. Yet to create radical change that can significantly transform the way we do things and address the complex problems we are facing, with people at center supported by technology and systems in the sense of Thackara (2016) requires new visions and ways to reframe the problems within the boundaries of sustainability. Several design theorists, noted by Black (2008), have proposed ways in which we might do this.

Design theorist Manzini (2012), a leading voice in social innovation and sustainability, has proposed the rise of distributed design networks “when everyone designs” creating opportunities to reframe complex problems and design for new ways of doing that moves us beyond consumerism. This approach engages in co-creation and participatory development to tackle complex problems through exploring the merger of tech-socio-enviro-economic solutions. A radical idea that moves the designer into more collaborative and systems thinking environments continually learning, sharing and creating towards social and environmentally conscious and responsible behaviours, that brings together cross disciplines and experts from government to NGO’s and users, stakeholders that are both influential and active in the innovation process.

McDonough and Braungart (2002) proposed the “cradle to cradle” concept implying radical changes to the way a designer considers the product lifecycle. Using this idea the designer is to consider where the resources originate how they flow through the system and what will happen at the end of product life – how can the product remain in the system? This holistic approach to the lifecycle of a product remains a radical idea for many designers and businesses, posing many barriers and challenges given the current supply chains structures and metric systems, yet if we are to address our complex problems then these behaviours are, among others, to be seriously considered.

John Wood (2008) created the Meta design concept as a way for designers to be within the holistic design context and design solutions for change.

So, who will foster the change? There is much evidence to suggest that it is the design discipline that is the “agent of change” Banerjee (2008), Glynn (1985) wrote, “it is the epistemology of design that has inherited the task of developing the logic of creativity, hypothesis innovation, or invention”.

Further, the Design discipline is perceived to have the ability to address complex problems, as described by Rittel and Webber (1973) who characterized design and planning problems as “wicked” problems, with skills that lend themselves to creating new futures, Gregory (1966) wrote that the “design method is a pattern of behavior employed in inventing things”. In addition there is a growing body of evidence to suggest that wicked or complex problems are not something that can be faced by one discipline, but that trans-disciplinary teams are better equipped, with greater success potential to solve these challenges and “catalyse rapid change” (Banerjee, 2008). Thus the designer would be better positioned to catalyse change and transformations as part of a curated transdisciplinary group. Until now while the designer might be equipped with the mind set and approach to look for new ways to do things within the boundaries set and within their specialist area, it has been observed that many designers are not equipped with knowledge to address holistic sustainability. Wood notes:

“designers are still trained to offer relatively narrow, specialist skills, rather than addressing deeper needs.....This has alienated us from our wider economic, social and ecological potential. Many designers feel uncomfortable with ethical aspects of their predicament, but their specialist role makes them too weak to affect positive, radical change.....if designers are to influence design solutions then they must also be able to help everyone else understand problems in a more holistic and relational way.”(Wood, 2008)

Further, while design can contribute Wood argues that

“approaches aim to address complex problems and so resolve in solutions towards sustainability are unlikely to work unless they are integrated within a far more holistic and situated (i.e. less Newtonian) politics of understanding. He further questions how can designers join things together again if they continue to be educated, and employed, as profit enhancing specialists, rather than ecologically and socially-minded generalists?” (Wood, 2008)

With these arguments in mind and the potential for designers to be part of the solution of larger more complex systems driven challenges such as sustainability, in this preliminary study we set out to explore the role of designers, their behaviours and perceptions, their knowledge and understanding on holistic sustainability, as evident in the work that they conduct and in the extent of the change they effect in an Asian fashion industry context.

## 2. Methodology

A developmental process using a systems and design thinking approach was conducted including ethnographies, in-depth interviews and transdisciplinary design dialogue within a workshop environment. A three-step process was applied to enable the research team to first empathize, synthesize then ideate. (Appendix: Figure A.1)

This progressive development enabled the research team through step 1: Empathy stage to understand the category in a way that would enable them to synthesize and reframe the system in step 2, that provided the basis for the designerly led dialogue and sharing in Step 3: the trans-disciplinary dialogue. With these preliminary steps the research team was able to better understand the different perspectives and ways of working among stakeholders. This enabled an informed reframe to share some new and/or different ways of thinking about the future of fashion within the boundaries of sustainability among the supply chain stakeholders to inspire further dialogue and development.

The three-step process:

1. Empathize: Ethnographies and in-depth interviews were conducted among fashion designers both from large industry and independent sources and industry stakeholders who are active in the fashion supply chain, in both Hong Kong and Shanghai. (Appendix: Table A. 2, A. 2.1). These enabled the research team to deep dive into the role of the designer from a designer perspective and from an industry perspective on their involvement, contribution and leadership towards solving complex problems in a move towards sustainability; data gathering for research analysis

2. Synthesize: Re-frame the system towards sustainability: social, environmental and economical. (Appendix: Figure A.3) Set an alternative vision, identify key contributors to the system, areas for discussion on challenges and opportunities
3. Ideate: The trans-disciplinary dialogues provided a framework for design co-creation and participatory development towards practical outcomes for change. Workshop knowledge sharing, designerly led with soft system tools. (Appendix: Figure A.4 - A.7)

In this case, the term transdisciplinarity is according to Stock and Burton (2011).

#### Empathize:

Independent designers tended to cluster in three groups from new graduate/young designers often working in destruction – reconstruction frequently referred to as upcycling, Independent more experienced self-taught sustainability designers, to established albeit small fashion design independents who practice holistic sustainability. Fashion designers in large Industry were interviewed who design on specific brands, types of product or material. Beyond designers the research team ran in-depth interviews among a wide range of supply chain stakeholders, to garner expert knowledge and opinions on the current supply chain status including: design role, operations, new research, challenges and opportunities

#### Synthesize:

All learning was used to reframe the problem in the sense of Manzini (2015) and to project a future scenario vision for the fashion industry. The “future scenario” projected is potentially one of many, it is not known that it is possible or impossible, yet using a similar rhetoric to Wood (2008) if conversation is started what at first seems impossible then with opportunity to address, discuss and develop perhaps it becomes the possible.

#### Ideate:

The range of strategically chosen stakeholders in the transdisciplinary dialogue brought together a group with diversity of expertise to share and create interesting, insightful and open environments that designers can both learn from and help to shape new concepts: stakeholders included government officials, policy makers, circular economy experts, mills, cut and sew factory, global fashion brands, NGO's, start up businesses, strategists, media, academics, innovators (material, industrial), 'eco' fashion designers and consumers.

The vision for the fashion industry supply chain was reframed for the workshop dialogue to optimize holistic sustainability potential, in the sense of McDonough and Braungart (2002), and to provide a space to share knowledge and a catalyst to discuss, why and for what reasons this new system should exist, resting in the field of practice and expert knowledge synthesized by the design research team along with emerging techno-social-environmental trends and a new vision towards sustainability. It was the intension of the research team by defining a vision to provide a point of discussion and debate. The absolute definition of the vision is not the primary importance, its purpose is to create a space whereby knowledge can be shared and built upon within a boundary defined by a move towards sustainability and as such frame the complex problem. To enable this dialogue to happen in an engaged way the research team led the dialogue in a designerly way using soft system design tools as described by Evans & Peirson-Smith (2017)



## 3. Findings

### 3.1 Fashion Designers

Many young new independent fashion designers in Hong Kong and China are unclear on holistic sustainability. Many understand that sustainable fashion is to repurpose used and trashed or waste cut off/redundant clothing or fabric. This concept, of waste to fashion, is used in some Hong Kong higher education fashion schools in raising this specific knowledge point among fashion designers.

Yet these same fashion designers are isolated in this one application towards sustainability, this concept is executed without enquiry into the general understanding or practice of holistic sustainability. Hence the result while in itself positive, executes against a limited reuse waste strategy. Generally these designers were not found to consider the entire eco-system that they work within. Neither, did they display any further knowledge of the basic premise of sustainability with considerations for techno-enviro-socio-economical values or product life cycle. This was found to lead to solutions that are short term: as designers create something from waste with little regard as to its future. The one time intervention will still make its way to "waste and landfill" (McDonough and Braungart 2002) and could potentially complicate further a process of recycling if different fabric types are further bound together. While this bottom-up approach can lead to some heightened creativity working with small run offs or waste clothing plus potentially raising questions on waste, established brands find it complicated to leverage this methodology at scale to create impactful change.

Across the fashion design higher education system the knowledge of how to design towards holistic sustainability is making tiny steps as higher education fashion design educators tussle with how to teach sustainability.

### 3.2 Self-taught sustainability: Independent experienced designers

There is a growing global demand from quality retail for brands to deliver on social and quality compliance certification. Thus creating a pull factor from the retailer for ethically sustainable products. These retailers tend to be located where customers are more demanding of conscious design. The requests are passed onto the designer who (lacking formal understanding or experience of sustainability) is turning to self-taught sustainability. This generally starts and often ends with the materials choice; this is supported by Fletcher & Grose, who state

"the exploration of materials has been the starting point for the lion's share of sustainability innovation in fashion as this is perceived to be the easiest and most obvious place to start." (Fletcher, et al, 2012)

This is also where designers feel they can craft interesting narratives and where big brands are communicating their differences in terms of their materials and processes.

Fletcher continues;

"all materials impact ecological and social systems in some way, but these impacts differ in scale and type between fibers. The result is a complex set of trade-offs between particular material characteristics and specific sustainability issues that have to be negotiated for each fiber type".

The designer is encouraged to work with industry and the supply chain to assess the “appropriateness of a particular fiber for a specific end use and to question whether alternatives exist”. Fletcher further mentions that this latter research on the part of the designer is

“made more powerful if it is accompanied by a willingness to look at and engage with the big picture – the overall garment life cycle and the fashion system of which the garment is a part”. (Fletcher, et al, 2012)

In exploring material alternatives designers were found to limit their efforts with only a few designers who considered overall garment life cycle: these designers are categorized under practicing holistic sustainability.

This specific fashion designer type plays catch-up and operates more in the trenches than at a strategic level within the fashion industry.

### 3.3 Independent Holistic sustainability designers

There are independent start-up fashion design crusaders practicing holistic sustainability. These are the minority and tend to be educated outside of Asia either in USA or Europe. They have harnessed holistic sustainability as they believe that the system will change, that products should be made with consideration for the people involved and their environments, and that new value and business models can be explored to offer do good, feel good, look good fashion.

They leverage the certifications and systems that are available to track and ensure good practices, such as GOTS, soil association etc.

This designer type has defined its own supply chains to create products consideration for the full product life cycle. They carefully chose their users most open to new ways of delivering fashion and willing to pay a premium.

They explore the fusion zones of tech-socio-enviro-economy and are continually monitoring the system and its suppliers to ensure they are leveraging possibilities to advance their product’s sustainability. The latter is time consuming and challenging as yet the fashion supply chain is still evolving slowly towards sustainability and remains erratic and fractionated. These bottom-up change makers are challenged to create full life cycle sustainability offers. Due to the need to leverage outside accreditation, unit costs can dramatically increase by three to five times the cost of regular products.

These Asian based sustainability design experts, if given opportunities, can contribute to tackling visionary fashion sustainability problems: as they are experienced in working closely with transitional users, understand where barriers to progress remain and have ideas to move towards greater sustainability.

### 3.4 Designers in large fashion holdings

Many designers in the fashion chain are expected to execute on fashion concepts within a specific budget and factory choice that have been approved to meet compliance regulation. Budgets are generally set tight which restricts the breadth of fabrics/processes that can be chosen. Often, the attempted move towards sustainability among the industry fashion design community is organic labelled cotton this is in line with Fletcher (2012) who wrote that changes start with “material first”. Although this has been a specific goal, historically organic cotton, has been found to be more costly and therefore outside the scope of most designers given project budgets.

Economic adjustment to accommodate new materials in the design value chain is also a possibility. H&M's top down directive towards Better Cotton and organic cotton for certain lines; targeting customers with heightened sensitivity such as in their baby line: potential price premium is adjusted and absorbed in the value chain and is not detrimental to designer choice.

Experimentation among designers working in holding companies, with multiple brands/product lines, tends to be conducted independently, due to brand competition or different materials. There appeared to be a lack of centralized fabric or other design led experimentation or systematic moves towards sustainability as these seem to be independently organized within brands or fabric specific areas. There are exceptions, although more likely located in Europe or USA, such as Kering's centralized Eco Fabric lab provided to encourage their designers to use eco-fabrics.

We found many designers to be marginalized, lacking knowledge or unable to exercise the key skill sets to enter into change making business discussions towards complex problems such as sustainability.

Further, there is an absence of fashion design soft tools, that could aid informed decision making and map onto the brand/company sustainability goals; such as systematic ways to support science based material or process choices.

Currently, in the fashion industry many sustainability choices and investigations appear to be based more on buzz words than strategic decision-making and are driven by the brand as a way to explore trending sustainability possibilities. Yet, unless there is a top down leadership directive to leverage innovation as driven by a business reframe towards sustainability, these buzz concepts appear to be based on shallow beliefs and lack drive to make change and lasting transformations: as when these possibilities are beyond budget they are quickly withdrawn.

Some designers are experimenting with how to improve the life cycle of specific materials, rarely do these designers have the opportunity to share their learning's across business. This informative, experimentation would be something that all designers could learn from within industry and could further support decision-making.

Fashion industry organisational structure falls short of supporting designers integration and development as core to business operations. As Fischer writes

“the complexity of design problems requires communities rather than individuals to address frame and solve them. These design communities have to cope with the following barriers: (1) spatial (across distance), (2) temporal (across time), (3) conceptual (across different communities of practice, and (4) technological (between persons and artifacts).” (Fischer, 2004)

In this research very little industry organizational infrastructure was identified that might support, conceptual or technological opportunities that could open portals for designers to be influential when tackling complex business problems. Frequently, designers in industry are isolated from business operations and so removed from strategic decision making.

Yet even if designers were given space and access at a strategic level the majority of designers lack the knowledge and design tools to help them contribute their expertise at this level: as designers perceived by some fashion chain stakeholders to be responsible for “making things pretty” rather than credited with “making a difference”.

There is a sense conveyed by some that a waiting game is happening and by others that the waiting game is soon to be over and only those who have taken the time to explore sustainability and change their supply chains will succeed for others its game over as the time to change takes some 5 -10 years.

### 3.5 Designerly led transdisciplinary dialogue

Demonstrated that this type of dialogue with an alternative visionary sustainability framework to the traditional fashion supply chain can place the designer as central to complex problem solving and rapidly impact knowledge, opportunities for innovation and help identify challenges in a co-create environment. (Evans & Peirson-Smith 2017). The authors further indicate that the combination of reframe and designerly led transdisciplinary dialogue provides a space to share knowledge and a catalyst to advance discourse on why, how and for what reasons a new system might exist.

As participants to a designerly led transdisciplinary dialogue, both the independent and industry fashion designer participants were able to exchange knowledge along with other stakeholders and build on their understanding of the fashion supply chain its opportunities and pitfalls and co-create innovations towards new sustainability visions.

Differences between designer types immersed as where the holistic sustainability designers were able to contribute from an experienced and visionary perspective both understanding the current system and its pitfalls they were also alert to new ways of creating visionary systems whereas the young designers who have limited knowledge of the material science, the systemic or systematic approaches of sustainability are less likely to engage in visionary new ways of working.

Indication is that all designers at all levels benefit from these dialogues yet those without personal holistic sustainability knowledge rely further on the contributions of other stakeholders and are therefore less prepared to negotiate alternative directions or outcomes.

As was further reported (Evans & Peirson-Smith 2017) communication and collaboration were found to be lacking across the fashion supply chain.

With this type of curated transdisciplinary dialogue, transparency is improved and opportunities for designers to co-create with industry and towards potential and supported change can be accelerated and magnified.

Beyond participation and In-line with Wood (2008) and Banjeree (2008) for designers to be able to frame and lead this type of visionary transdisciplinary dialogue they require key understanding of systems & design thinking, sustainability & life cycle consideration and meta design tools to fully understand the challenge and create potential visionary frameworks.

*Table 1. Summary of research findings*

- 
- Majority of fashion designers educated in Hong Kong and China, lack knowledge on holistic sustainability and how it relates to the fashion profession
  - Majority of fashion designers rarely consider the eco system, impacts social and environmental, lifecycle analysis and/or end of life
  - Often lack material science knowledge to make informed choices on materials
  - Action taken is often focused on short term benefits and is considered by many to equate to sustainable fashion
  - Tend to follow sustainability brand led trends such as a move to organic cotton, rather than consider full context
  - Asian Higher education fashion design courses tussle with how to educate on fashion sustainability
  - Independent holistic sustainability fashion designers in Asia are generally educated outside of Asia, offer highly targeted product
-

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ranges and are dwarfed by the global fashion brands so their voices remain mostly unheard and their contribution as bottom up change makers is small.

- Lack of designer/business soft system tools to support informed sustainability material life cycle choice that can further map onto brand/company sustainability goals and values.
  - Designers generally, marginalized, from business decision making: lack knowledge and skills to contribute to change making strategic business discussions
  - Fashion Industry lacks organizational structure, temporal, spatial or incentive based infrastructure to support designers as core to strategic decision-making.
  - Transdisciplinary-dialogue
  - Provides an opportunity
  - to place designers as central to strategic development
  - strategically co-create: business and design
  - Designers with knowledge of holistic sustainability, including product life-cycle and eco-system consideration of technology, social, environmental and economical factors found to be better able to contribute to visionary strategic decision making and negotiate alternative outcomes
  - Designers with less sustainability knowledge and expertise in their meta discipline lack an informed voice among other industry and supply chain stakeholders in these dialogues and as a consequence have greater dependency on their working group for decision-making
- 

## 4. Discussion

If designers are to contribute to solving complex problems and create change then they require an understanding of systems and design thinking and fundamentally an understanding of the basis of holistic sustainability and more specifically how it applies to their specialist design field.

Yet in the Asian fashion industry many fashion designers continue “to be almost exclusively harnessed to the needs of business, rather than to the needs of society”, Wood (2008), the majority lack the education, experience and knowledge to address complex problems and co-create towards change. Generally observed that fashion designers are not applying life cycle thinking, the system that garments must go through from resource to end of life, its eco-system or the impacts and processes affected by specific decisions. An indication that many lack the skills and in parallel the opportunities to tackle complex problems or to create change that affects the way business or category operates towards sustainability.

In addition and perhaps as a result of this seeming lack of bigger picture skills, many designers seem to be boxed into a system with a specific function to deliver within specific constraints, that include, specified costs and allocated factories. This is accompanied by organizational structures that tend to lack communications systems across departments, brands or the supply chain, which can further limit the scope of a designer's influence.



Beyond this the technologies and materials that service the fashion designer and supply chain are changing radically. Yet there seems to be a lack of soft system support to keep fashion designers abreast of these rapid developments and enable them to make informed decisions. These tools become ever more essential for decision-making as the user continues to demand more transparency and deliverables from their fashion.

Such tools could help answer questions such as how to choose the best fabric? This question used to be relatively simple, such that the designer asked, what fabric can I use within the budget that will create the best look, feel and style? Now this question has a plethora of values associated beyond look, feel and style the responsible designer would be wise to also delve deeper and ask how can I create the best journey for this product from resource to end of life and then consider what end of life product possibilities i.e. what's next? Can this product be reprocessed back into the fashion chain?

Based on this learning there continue to be opportunities to firstly support the fashion designer in higher education with core skills and within industry to provide the fashion designer with soft system tools to aid decision-making. Secondly there is an opportunity in industry to open up operational systems with designerly led transdisciplinary dialogues that can aid communications, innovations and business development across departments, brands, supply chain, category and help to address complex problems.

## 4.1 Support the fashion designer with soft system tools to aid informed decision-making

As material choice effects the whole life cycle of a garment and is where the majority of designers start the process and change towards sustainability then access to an interactive enquiry based material guide for full life cycle analysis could support design decisions towards solving complex problems and provide information for brand narratives. Industry and design organizations/societies/higher education should consider the speed in which new fabric, new technology, new processes are coming into the field and consider how this information can be organized to optimize usefulness. So to categorize and search on sustainability values and correlate with key company values, these might include but are not exclusive: water, energy, pollution, social wellbeing, average transport miles and ability to recycle.

## 4.2 Open up Industry's operational systems with designerly led transdisciplinary dialogues

Designerly led transdisciplinary dialogue has been found to provide a space to bring diverse experts and users together to discuss new visions. This is a framework to help fashion designers in industry to bridge the gap between design and other stakeholders to tackle complex problems. A similar methodology is used in other industries such as, in Tech at Google. Frequent deep dive dialogues are run across the disciplines, these are called "Sprints": these sessions are led by a specific team of skilled designers. This type of designer has an understanding of Meta skills, able to frame and execute dialogues towards change and new outcomes. Not all designers are equipped to run these sessions.

So, while this designer role, may not be a specific fashion designer role, it can be beneficial for fashion designers to have the knowledge to understand the contributions that such dialogues can make and how to participate to optimize output: as transdisciplinary dialogues provide opportunities for designers to

influence, connect and share across the business and society. Without such dialogues the designer is frequently blocked from decision making and isolated bounded by pre-set requirements that must be met, that forces the designer to perhaps repeat the process with minor changes that are likely to be aesthetic rather than helpful in tackling complex problems. If we are to believe that it is the design discipline that imagines, creates and innovates, in the words of Simon (2000) "our task is to design a future for a sustainable and acceptable world" then designers are key to creating new opportunities and innovations that can become transparent and persuasive when tackling complex problems using techniques such as a designerly led transdisciplinary dialogue.

If the designer in industry has limited access to opportunities for participatory development, the decision making process, the brand communication and deliverables it is difficult for designers to contribute creatively or for industry to innovate.

Siloed designers slow innovation. While framing the future of fashion towards sustainability and creating designerly led transdisciplinary dialogues shows evidence of accelerated innovations and experimentation that stakeholders are ready to collaborate around: a realization of co-creation opportunities, with designers central, that can benefit multiple stakeholder members across the fashion supply chain creating new design networks. Stakeholders learn and accelerate innovations by working in this way and communicating better.

*Table 2. Summary of discussion*

- 
- The Asian fashion design community lacks essential core curriculum and practice to either fully contribute or help tackle complex problems: systems and design thinking, sustainability concepts
  - Enquiry based Soft systems tools to support important fashion design decisions including material choices are absent: life cycle analysis, impacts, optimize sustainability goals
  - Industry operates in silos and can benefit from organizational and physical space to support conceptual and technological (Fischer 2004) opportunities, for designerly led transdisciplinary dialogue to enable designers to co-create and help address complex problems
- 

## 5. Conclusions

This paper concludes that neither the flow of new graduate fashion designers (Asia) into the work place or industry's operational structure are fostering opportunities for designers to work at a strategic level and play an active role in addressing complex industry problems to disrupt the fashion supply chain status quo towards improved fashion systems that deliver on visionary fashion sustainability.

There is much to be improved and delivered from higher education and industry if designers are to play an influential role.

Higher education Asia can assist in preparing designers to bridge the gap with industry by educating them on enquiry led and systems thinking and on the concepts, within their specialist field, of sustainability and product life cycle plus practice based benefits of cross-disciplinary team work and dialogue.

Ideally designers are experts on how to create imaginative and desirable fashion that optimizes the best fusion of tech-socio-enviro-economic models to deliver fashion in a changing world. This asks designers to view complex problems such as sustainability as an opportunity for innovation and desirable creativity by better understanding the context of their design within changing systems. This reaches much further than creatively repurposing waste fabric or implementing trends for short-term gains. Fashion designers would benefit from the knowledge and support tools to compare and choose materials and processes given sustainability objectives and observe the associated social, environmental and economical impacts given these choices.

This implies that integral to optimizing strategic decision making, that can help to strengthen corporate values and vision, are soft system tools to support designers and industry alike to make informed choices on materials and their lifecycle impacts on key resources such as environment and water, and, people and society.

Industry, for its part, if it is to harness innovation, creativity and new business models to address new opportunities that arise from tackling complex problems, such as sustainability, then this research indicates that a business design collaboration can benefit business outcome by changes in operational structure that support both conceptually, physically and incentivised cross business-discipline operational space to support designerly led transdisciplinary dialogues: whereby fashion designers are key participants to the creative innovative input for decision making processes and meta designers are key to frame and lead the dialogue towards actionable outcomes.

If industry can move beyond silos and embrace designerly led transdisciplinary dialogue it can improve business capability to address complex problems in a creative and innovative environment that can lead to visionary solutions. This designerly led approach that leverages across discipline expertise has been shown to accelerate learning, shape new opportunities and enable design to co-create with other stakeholders so as to shape new business that tackles complex problems.

In this way if fashion designers can expand their knowledge and approach beyond the current narrow application and industry can harness design as change agent then there is potential for designers to co-create with industry, across the supply chain of active and influential stakeholders, to address complex problems such as sustainability.

## Appendix

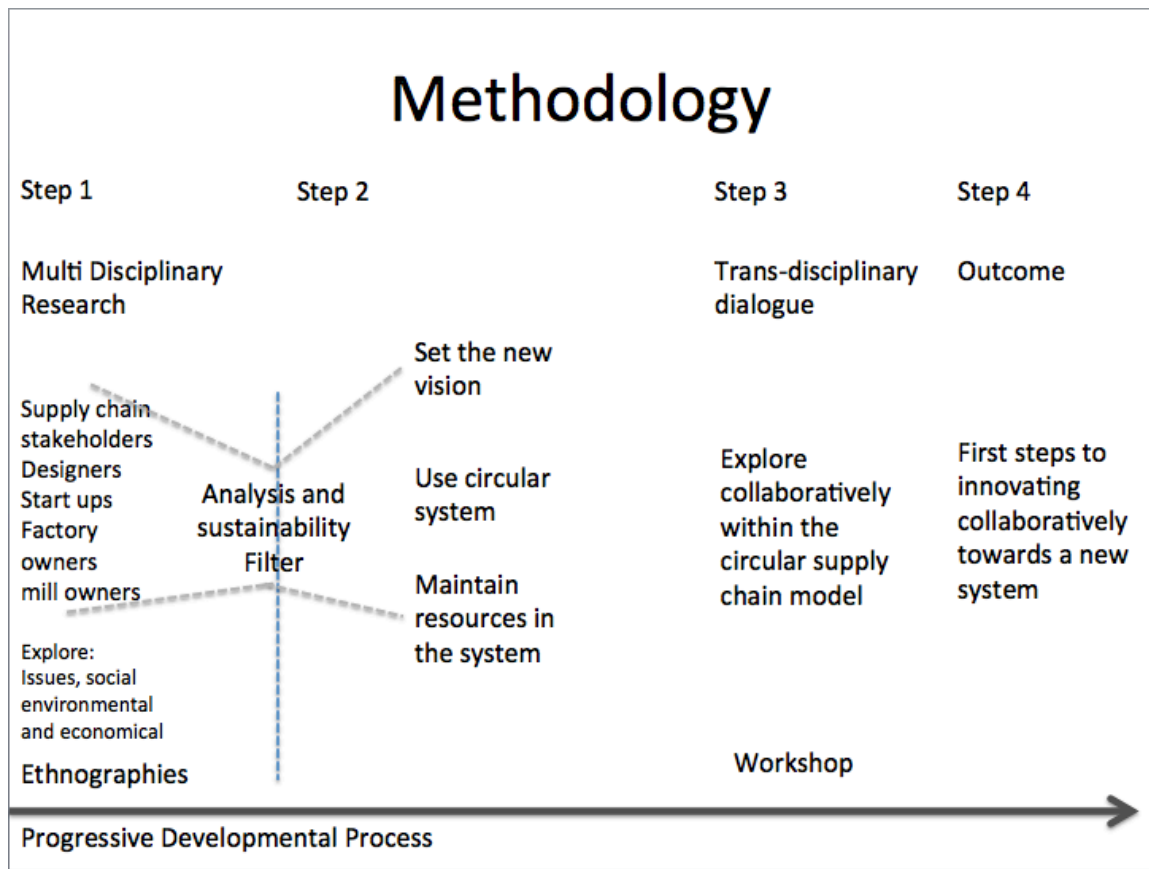


Figure A.1. Illustration of research methodology from step 1 to step 3

Table A.2. Sustainable Fashion Design Project: Objectives and Guideline question areas for qualitative ethnographic research for fashion designers and industry representatives

### Objectives:

- To explore the perceptions and behaviours towards fashion sustainability
- To further explore the perceived challenges and opportunities in this category

### Questions

- How would you define sustainable fashion/ethical fashion?
- Can you explain how you are involved in sustainable fashion initiatives?
- What are the main objectives of your work in sustainable fashion?
- Who is your target audience or which stakeholders are you trying to engage with?
- What are the main issues facing the fashion industry in terms of sustainable practices?
- Whose responsibility is it to activate sustainable /ethical fashion practices?

- 
- Do ethical consumers actually exist?
  - Are you engaged in any new research and/or development that tackle the problems of social or environmental issues in the fashion supply chain?
  - How can the fashion industry manage these issues?
  - How would you describe the role of the designer in addressing these issues?
  - Can you give any examples of best practice in terms of sustainable fashion?
  - Can you give any examples of worst practice in terms of sustainable fashion?
  - Do you think that consumers understand sustainable fashion/ethical fashion? Why/Why not?
  - What is the best way of communicating/explaining the need for sustainable/ethical fashion practices to consumers?
  - What is the best way to change fashion producers/ thoughts, feelings and behaviours regarding ethical fashion?
  - What is the best way to change consumers/ thoughts, feelings and behaviours regarding ethical fashion?
  - What is the future for ethical/sustainable fashion?
  - What are the opportunities and challenges for sustainable fashion?
- 

*Table A.2.1 Research step 1 Empathize: Ethnographies and in-depths by Category and number of participants*

Ethnographies and in-depth interviews	Number
Independent fashion designers	35
Young fashion designers	15
Self taught sustainability	10
Practicing Holistic sustainability	10
Designers in Large fashion groups/brands	10
Business/product development	20



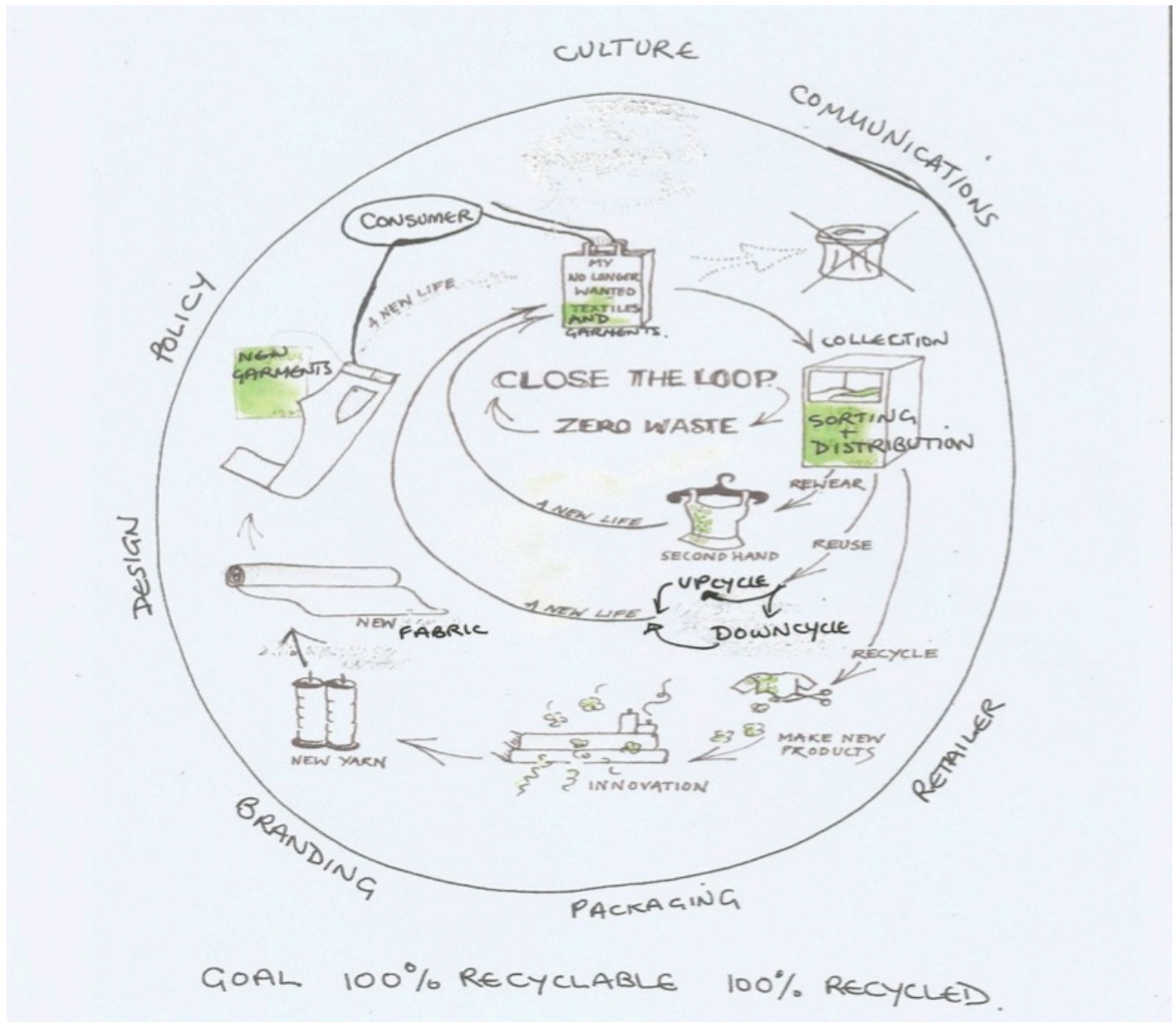


Figure A.3. Reframe initialisation to set an alternative vision: team development with adaptation of H&M's circular fashion illustration and presented with H&M, at transdisciplinary workshops held on the 20<sup>th</sup> April Hong Kong 2016 and 27<sup>th</sup> April Shanghai 2016 as described by Evans and Peirson-Smith (2017)



*Figure A.4. Workshop (50 supply chain stakeholders active and influential including: government officials, policy makers, circular economy experts, mills, cut and sew factory, global fashion brands, NGO's, start up businesses, strategists, media, academics, innovators (material, industrial), 'eco' fashion designers and consumers. Curated small groups to achieve a designerly led transdisciplinary discussion across stakeholder disciplines*

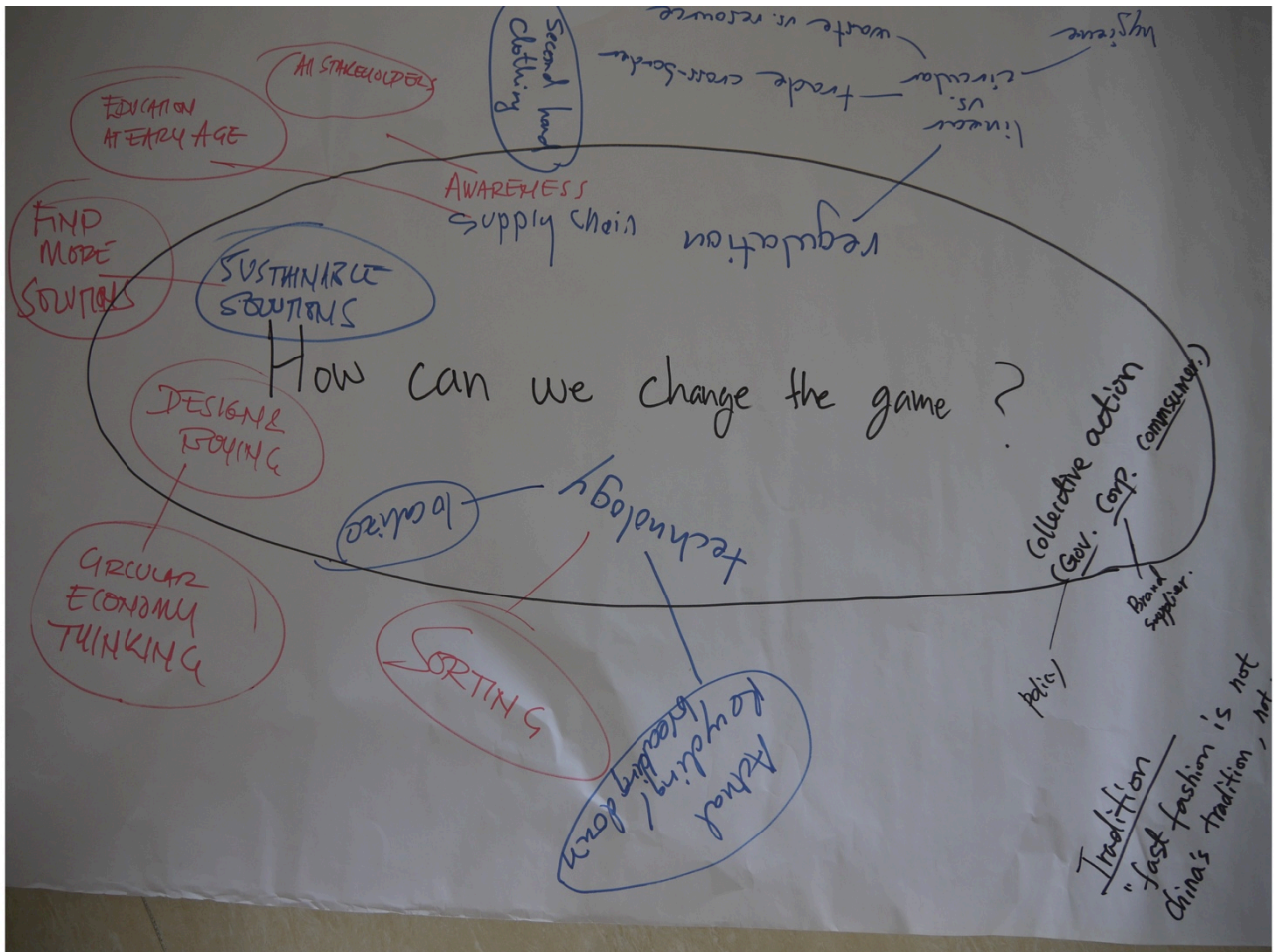


Figure A.5. Example of Soft system tools used for designerly led dialogue: conversation mapping



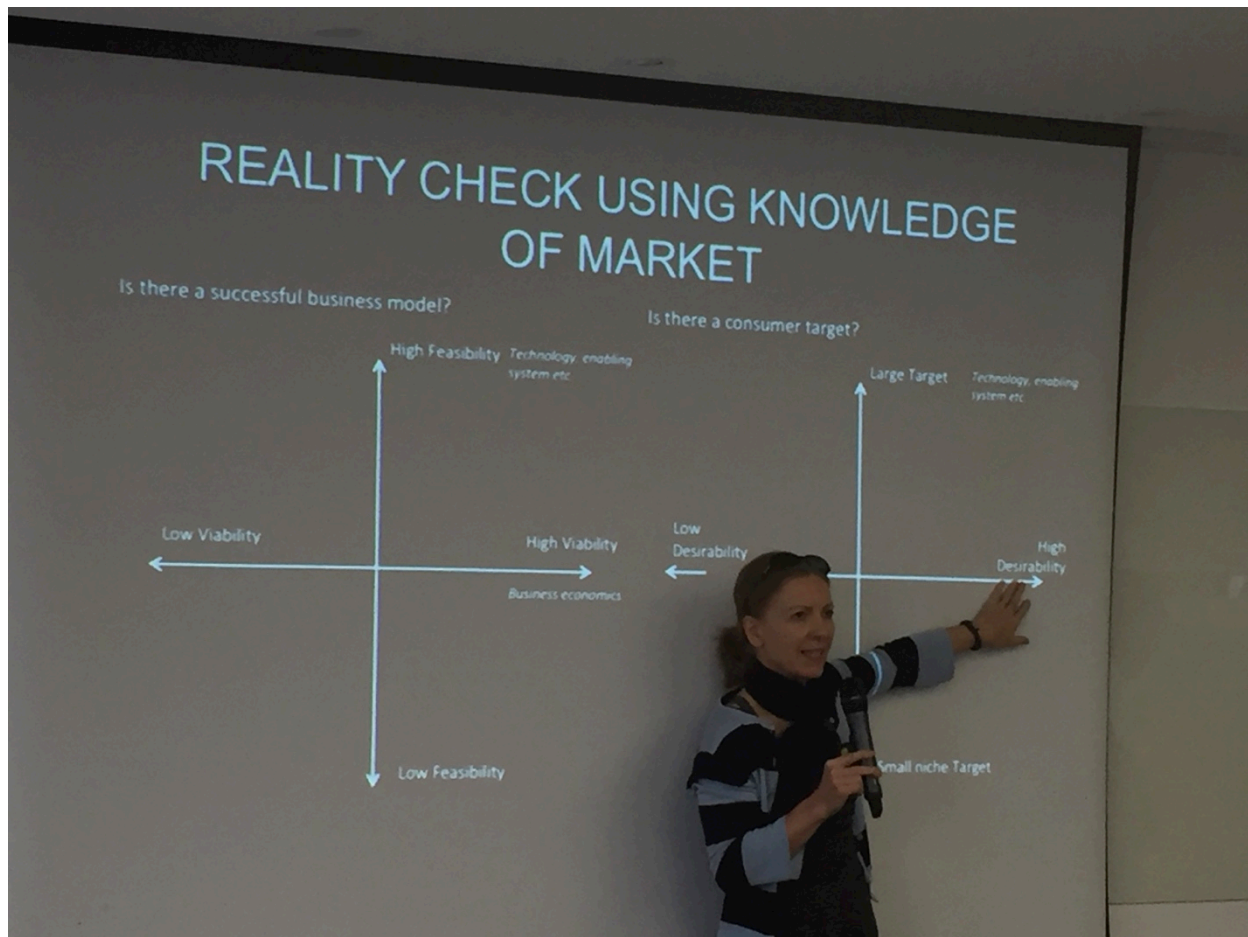


Figure A.6. Example of Soft system tools used for designerly led dialogue: Future scenario planning



Figure A.7. Example of Soft system tools used for designerly led dialogue: Stakeholder roadmap

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# Learning through Disruptive Interactions

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**Abstract:** Fashion education has evolved to meet the changing needs of the industry and train creative individuals to become effective storytellers, image-makers, curators and producers. The role of fashion is becoming an increasingly important medium to communicate unique narratives, develop ways of portraying, reimagine museum and retail spaces, and explore innovative ideas, processes and business solutions. This paper examines the unique positioning of fashion education in Southeast Asia and the significance of redefining the impact of fashion through experiences of disruption, displacement and discomfort. As the field of fashion continues to extend into neighbouring disciplines of design and related industries, the student learning experience needs to respond with rigorous enquiries that confront existing notions of fashion as both a system and means for innovation. The case-studies included in this paper reconcile the challenges of developing an Asian design language in Southeast Asia against a retail landscape dominated by Western fashion.

**Keywords:** Fashion curriculum, future of fashion, disruptive learning, fashion curation

## 1. Introduction

The past decade has witnessed various shifts in fashion from the rise of retail empires such as H&M, ZARA and Uniqlo producing collaborations with designer brands such as Karl Lagerfeld, Balenciaga and Lemaire to fashion exhibitions being shown in museum spaces and the use of social media to communicate fashion and identity in its maximum splendour. In response, the industry is changing and so are its consumers. This material avalanche has over-satisfied consumers' needs to reshape consumer psychology and the relationship to design (Faerm, 2012).

According to Pink (2005):

“Material abundance has made designers realise that the only way to differentiate their products in today’s overstocked marketplace, is to make their offerings aesthetically appealing and emotionally compelling.”

In order to create products that resonate emotionally with their targeted audiences, designers must become empathisers, pattern recognisers and meaning-makers (Pink 2005). While the creative economy demands designers to respond and engage with social, environmental and sustainability issues, educational institutions are desperately attempting to re-invent their fashion programmes by providing students with curricula that allow opportunities to experiment, explore and contemplate the role of design and the positioning of designers as agents of change.

This paper discusses the fashion programmes at LASALLE College of the Arts through a series of strategic projects to break existing pedagogical frameworks of fashion education. The following areas underpin the design of the flexible curriculum: fashion theory leading into practice, multi-disciplinary research and collaborations between students and lecturers, and strong links to the local industry. Through a review of case-studies, this paper will address how fashion education can lead through innovative models for thinking while inherently responding to the changing landscape of design.

Herbert Blumer (1969) studied social interactions formed by the fashion system to conclude that fashion, as a cyclical network, exists because of the actors involved – innovators, leaders, followers and participants. Fashion conceptualises the symbolic values of material culture (Crane & Bovone, 2006) within a circular process of social interaction as an indication for the present (Nedelmann, 1990). However, students in Singapore and the neighbouring region of Southeast Asia readily accept the general perception that fashion is an imported concept that can only be locally interpreted. In response to this misaligned positioning of the role of fashion within the local context, students struggle to identify the relationship between meaning and meaningfulness within the creative process of design. This has produced the following questions, leading to the design of the following case-study examples:

- How can we encourage students to begin imagining the possibilities of what fashion could mean against the Southeast Asian context?
- How do we train them to become “agents of change” (Faern, 2012) who are environmentally responsible, socially conscious, and theoretically and technically knowledgeable?
- How do we teach students to articulate and translate their creative perspectives into a unique design language?

## 2. Background & Context

The fashion programmes at LASALLE College of the Arts position fashion as a “cultural phenomenon in a social and historical context” (Skjold, 2008). Through this approach, students are able to contextualise and translate socio-historical progression and theory into contemporary fashion outcomes. We develop our students’ abilities to observe, analyse and evaluate objects of material culture through different lenses, in order to further interpret these objects within coherent and unique narratives that communicate to wider audiences. Against the fast-changing nature of fashion, the experiential process of design is emphasised to ensure that students learn to slow down and appreciate the local conditions within which they exist. Research and practice converge to give precedence to the value of the design process.

Table 1. Example of Case-Studies

Repositioning the Role of Design within a Local Context			
THEME	PROJECT TITLE	DESCRIPTION	OBJECTIVE
Tracing	<i>Tales from the Wardrobe</i>	Examining the past to understand the present	Developing strong <i>narratives in fashion</i>
Upcycling	<i>UNSEEN: Vintage Redefined</i>	Appreciating the materiality of things	Understanding the <i>ephemeral nature of fashion</i>
Translating	<i>Shanghai 3.0</i>	“Easternising” the West	Building an <i>Asian language of fashion</i>
Reinterpreting	<i>Kimono Intangible</i>	Transferring intangible culture	Extracting the <i>knowledge of fashion</i>

Singapore is a culturally diverse environment that attracts an international, multiethnic student body. Taking into consideration this unique positioning of Singapore, it was imperative that the educational approaches not follow the more established Western examples but cultivate a learning environment beginning with an appreciation for the local history, culture and creative economy. By establishing new narratives and perspectives for communicating the language of fashion, a series of projects and collaborations were designed to foster a multidisciplinary environment. The projects explore themes of Tracing, Upcycling, Translating and Reinterpreting.

#### “Tales from the Wardrobe”

Tracing back into local Singaporean history, students were given the task to create window displays to fulfill the studio and visual merchandising component. The brief consisted of retelling an aspect of Singapore’s history through the visual display of fashion and dress. Students engaged in historical research to accumulate facts, information and memories to imagine and contextualise a Singaporean wardrobe from the past. Each window display acted as a vignette or snapshot into the past, creating strong visual narratives of how objects and the particular grouping of objects communicate meaning and significance.



Figure 1. Tales from the Wardrobe

### *“UNSEEN: Vintage Redefined”*

This project was devised in response to issues of sustainability affecting the system of fashion. Fashion perpetuates a vast amount of wastage, not only in consumption, but throughout all stages of its development. Furthermore, the appreciation for vintage fashion is a Western concept that does not necessarily appeal to Asian consumer culture. This project focused on taking vintage items or articles and redesigning them into new fashion objects in an upcycling exercise. To display the temporality of fashion, the objects were showcased at a pop-up exhibition for a single evening. The ephemeral element was introduced to reinforce the nature of time that governs the immediate and instant gratification of fashion.

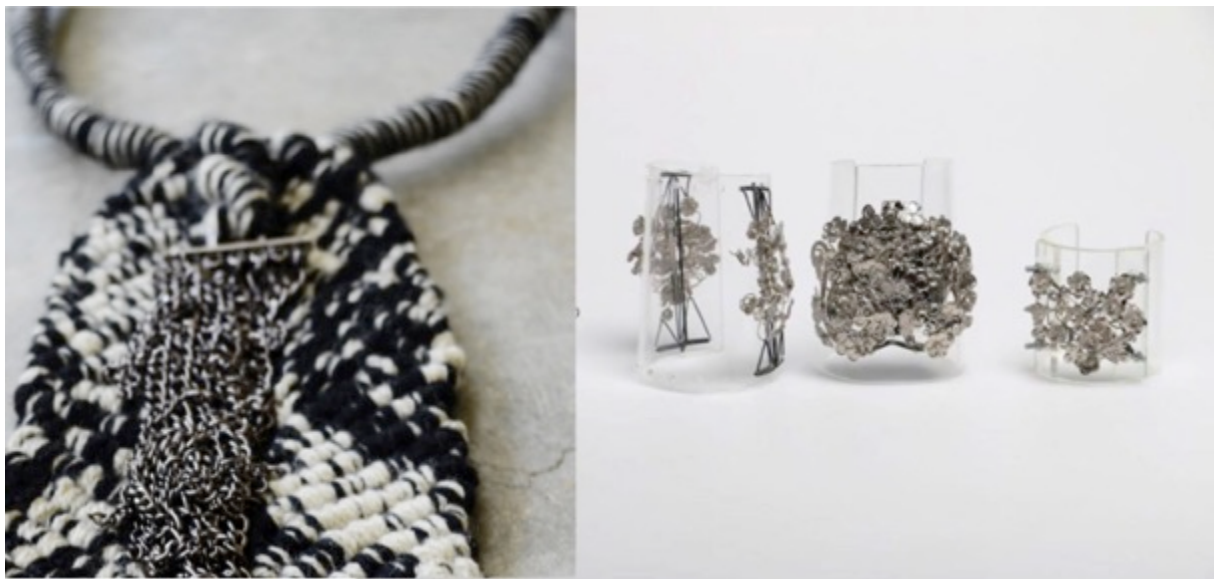


Figure 2. *UNSEEN: Vintage Redefined*

### *“Shanghai 3.0”*

Due to the effects of globalisation, fashion is often equated as being a Western influence to be applied as an inspiration for Asian design. To break this pattern of thinking and producing, this project looked at Asian design elements that could be applied to contemporary fashion norms. 1930s Shanghai was looked at as an historical example of a rich, diverse mixing of cultures. The objectives of the project were to translate traditional to contemporary using an Asian eye for colour, materials, silhouettes, shapes and gestures to develop an Asian language of fashion.





Figure 3. Shanghai 3.0

### *“Kimono intangible”*

This project revisited the notion of vintage but within the specific context of Japanese kimonos. Students examined surviving garments and the values that could be transferred through the materiality of pure form, embodied by the vintage kimonos, to reinterpret traditional knowledge into a contemporary outcome. The project was process-oriented, requiring students to deconstruct the original kimonos in order for them to be reconstructed with new meanings, applications and knowledge. Students were able to undergo the loss of meaning, while physically unpicking the seams of the original kimonos, and reassign new significance when reconstructing and reviving the materials into a new form.



Figure 4. Kimono Intangible

### 3. Introducing Disruptive Learning

The fashion curriculum has always focused on specialist knowledge and skills, yet there is a shift in the current fashion industry requiring a broader and more versatile knowledge base. Each of the former projects was instrumental in breaking down misconceptions and predisposed understandings that fashion must always follow a set of norms set by global industry standards and institutions, innovative leaders and the media. A need was quickly identified to allow students the experience of assuming more control and responsibility over their learning experiences, by breaking with the traditional model of fashion education. Instead, a new framework of research was introduced to disrupt student learning and reinstate the importance of research-led practice.

A new project, 1°17'N – the White Shirt, was established to take students through a journey of discomfort, displacement and disruption. This project focused on the geographical location of Singapore, using the natural climate to set the main parameters of research. Singapore is located 1°17'N from the equator, resulting in a condition of “eternal summer” where seasons are largely absent and daylight patterns are very specific. Within this regional focus, a sustainable design agenda was introduced and students were able to challenge existing fashion norms through collaborative approaches in design. Students from varying disciplines of Fashion (Womenswear, Menswear, Textiles, Creative Pattern Cutting, Media, Industries) explored the possibility of fashion without seasons through their different research interests.

Students were invited to establish and generate different design outcomes, by means of dialogue between disciplines and experiences, through new visual and interdisciplinary approaches. These explorations reviewed the weather conditions of Singapore in relation to relevant issues to produce collective bodies of work. Fashion relies on seasonal shifts, perpetuating the need to continually innovate and drive market competition. However, this project placed students within strict boundaries to design without the conventional understanding of seasons and reimagine how fashion could break away from global trends by cultivating a language unique to the physical constraints set by climate and weather.

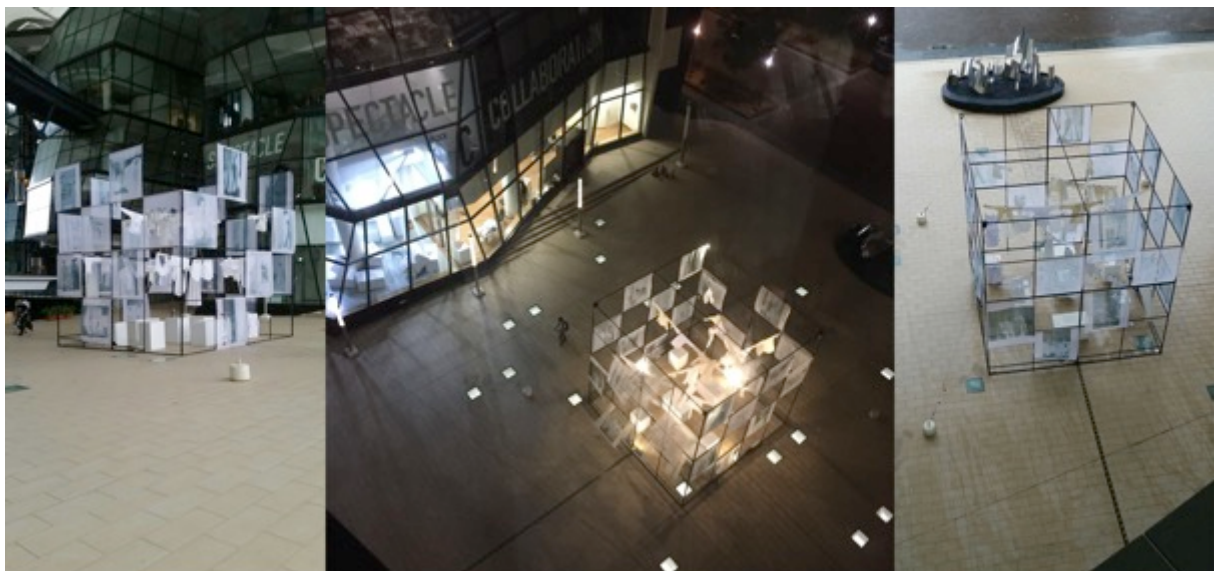


Figure 5. The White Shirt

The project culminated with an exhibition showcasing the research outcomes through either physical and/or virtual spaces. This disruptive approach to interactive learning imposed uncertainty upon the students, as they were confronted by many unknown variables, but the outcomes suggest that they were better equipped to apply theory to practice through an emphasis on research. The open nature of the new curriculum allowed students to develop new ways of thinking and interacting to frame complex design problems into viable solutions.

*Table 2. Pedagogical Approach*

How do we REDO Design?		
RESEARCH	INTO	PRACTICE
<i>Method</i>	<i>Mode</i>	<i>Articulation</i>
Exegesis	Discomfort	Temporality & Ephemera
Hermeneutics	Displacement	Interpretation & Meanings
Knowledge	Disruption	Interventions & Innovations

Table 2. provides a framework for how each of the projects have incrementally introduced students to research-led practice through modes of discomfort, displacement and disruption. As students are presented with new project briefs, they are immediately challenged with the discomfort of exploring the unknown through uncertain methods of enquiry. This is a necessary precondition of the design process, as it reiterates the importance of time within individual experience and the fashion cycle. Exegetic approaches to research provide a foundation and historical understanding of how to situate design practice against present conditions. The hermeneutic approach, requiring a state of displacement in which the researcher is relieved of all fixed truths, allows for new interpretations to be established by forming significant meanings. Finally, the search for knowledge requires a state of disruption through which interventions and innovations are made possible. Disruptive learning is discussed through the 1°17'N project, which reviews how a physical disruption fosters disruptive thinking to produce new knowledge for breaking down existing barriers and imagining future interventions for design.

## 4. Conclusion

This paper has shared how fashion programmes in Singapore and the larger Asia region can remain current and updated through more flexible pedagogical models. As demonstrated through the discussion of the case-studies, providing students with multidisciplinary environments and collaborative research projects produces more independent thinkers and influencers of design. The pedagogical approach provides a framework that can be applied across all disciplines of design, to bring the importance of research to the forefront of design practice as a means for producing new knowledge, interventions and innovations.

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# Design Thinking in Practice – Introducing Design for Renewing Bank Services

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**Abstract:** The growing importance of design in product and service development in recent decades has created a growing interest in design thinking (DT). This paper seeks to complement this discussion, by describing an example of the concept of DT as it is implemented in practice. We examine what happens when a DT project is introduced into an organisation (a bank in Poland). The paper contributes to the existing literature in three ways. Firstly, it provides a case study example on a particular translation of DT into an organisation with no prior experience in DT, describing some of the main challenges and difficulties that occurred. Secondly, it highlights some of the cultural changes in the organisation provided by this new way of thinking. Thirdly, it points towards a discussion on how design methods can be a vehicle and agent for organisational change.

**Keywords:** Design thinking, change management, service innovation, end-user approach

## 1. Introduction

It has been almost forty years since Nobel Laureate Herbert Simon declared the importance of design to managers, stating that, like the engineer and the architect, the manager is a form-giver who shapes social organisations and economic processes in order to create value (Boland, Collopy, Lyytinen, & Yoo, 2008, pp. 11–12). The growing importance of design has historically created a larger interest in the way designers act and work (Cross, 1982, 2011); how they solve wicked problems (Buchanan, 1992) and think differently leading to more innovations (Carlgrén et al, 2014a). In recent years the concept of design thinking has become popular especially in management literature (Brown, 2008; Martin, 2009; Liedtka & Ogilvie, 2011) where it is presented as a remedy for the lack of creativity and innovation in modern organisations. However popular, DT is still a rather loose term with several different meanings (Johansson-Söldberg, Woodilla, & Cetinkaya, 2013). Kimbell (2011) remarks that design thinking, as it is presented

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by its proponents in a majority of popular articles, such as Brown (2008) and Lockwood (2009), do not draw extensively on research in either design studies or management and organisation studies. As a result, DT remains under-theorized and understudied. According to Carlgren, Elmquist, & Rauth (2014a) studies of the potential value of the use of DT are also scarce in the areas of both design and innovation research. Stephens & Boland (2014) point out that scholars and practitioners have given little consideration to how this approach should be incorporated into organisational systems, and Carlgren et al. (2014b) points to that the practical evidence of what happens when DT is introduced in organisational settings is missing.

This paper seeks to complement these few previous studies by describing a practical translation of the concept of design thinking into an organisation. We do so by examining what happened when a DT project was introduced into an organisation with no prior experience in the concept. Our main research question was: What happens when DT is introduced in an organisation for the first time? In particular, our interest is in how DT can become a change agent in an organisation. We were inspired to ask this question after studying the existing literature of DT. The way DT is presented in mainstream management literature suggests that DT is a rather smooth and easy-to-implement process. However previous research on organisational change and innovation, points to many challenges and difficulties when implementing new, more creative ways of working. We find that this critical and reflexive approach to DT is somehow missing in studies of DT. The case study presented in this article is based on a design thinking project implemented in a bank in Poland. The project was implemented in collaboration with a Polish design consultancy specializing in DT. In the first part we present a detailed description of the project, with its different phases and actions that have been taken. That is followed by a discussion about different types of challenges and changes that occurred during and after the project finished. Finally, we conclude on our initial approach and suggest some areas for further study.

## 2. Conceptualising design thinking

In most mainstream (change) management literature it is commonly mentioned that the ongoing market challenges and changes constantly force companies to search for new ways to build competitive advantage, promoting the use of new tools and processes to create distinctive products and services. In this context various definitions of design tools and design process approaches have steadily been gaining popularity - not only in company activities, but also in business research (Martin 2009; Veryzer & de Mozota 2005; Liedtka & Ogilvie, 2011). Rylander (2009) note that design thinking has become a buzz-word among managers. One of the most popular advocates of design thinking, Tim Brown (2008) defines DT as follows: "Design thinking is a discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity". Lockwood (2009) similarly defines DT as "... generally referred to as applying a designer's sensibility and methods to problem solving, no matter what the problem is. It is not a substitute for professional design or the art and craft of designing, but rather a methodology for innovation and enablement".

These rather broad and loose conceptualisations of DT have found critics in the design research community (e.g. Tonkinwise, 2011; Johansson-Sköldberg et al., 2013; Jahnke, 2013). The main critique being that despite their widespread

popularity, they are presenting the concept in too simplistic and too optimistic ways, with vague and general terms providing generalisations such as “the designer’s sensibility” without explaining what it consists of and how well non-designers might develop and make use of it (Stephens & Boland, 2014, pp. 1–2). Carlgren (2013, p. 30) notices that the managerial discourse on DT has been blamed for “presenting the concept as something that will create value in any setting, and is straightforward to implement”. And Stephens & Boland (2014) point out that “it is overly simplistic to import a set of design-thinking practices (e.g., sketching, role-playing, prototyping) and expect their use to automatically resolve “wicked” problems in an organisation”. Presenting various design tools as a toolbox from which one can pick and choose, regardless of skill, leaves out the knowledge needed to use these tools and competencies - which, according to Johansson-Sköldberg et al. (2013), requires years of training and is embodied in designers. Furthermore, as a result of this, some scholars state that the artistic and aesthetic dimensions of design knowledge are often repressed in the DT discourse (Jahnke, 2013; Kimbell, 2012; Tonkinwise, 2011). Kimbell (2011, p. 294) further remarks that design thinking, as it is presented in a majority of popular articles by its proponents (by scholars like Brown, Martin etc), do not draw extensively on research in either design studies or management and organisation studies.

Perhaps as a consequence of this DT appears rather vaguely defined, and many researchers do point to the lack of a common understanding of the concept (Johansson-Sköldberg et al. 2013; Kimbell, 2011). Some authors take a methods-approach in an attempt to define what DT is. According to Seidel & Fixon (2013, p. 20) three methods are commonly cited within a design thinking approach (cf. Brown, 2009; Lockwood, 2010; Martin, 2009): (1) need-finding: encompassing the definition of a problem or opportunity by the use of observation; (2) brainstorming: a formal framework for ideation; and (3) prototyping: building models to facilitate the development and selection of concepts. Carlgren (2013; Carlgren et al., 2014a; 2014b) frame DT as a set of five core principles: focus on the user; challenge the problem; include diverse viewpoints; make tangible; and experiment. Liedtka (2015, p. 927) notices that there are three significant changes and additions worth noting about DT that were not prominent in earlier writings of design theorists: (1) who designs (orientation toward co-creation), (2) the role of empathy and (3) strong emphasis on the concrete and the visual to highlight the key role of visualization and prototyping. With these principles in mind, we will now continue into our case study, studying the implementation of some of them in practice.

### 3. Research methodology

The project which led to the following case description was originally exploratory in nature, designed to gather qualitative open-ended data. Given our exploratory aim an inductive case study approach was considered appropriate (Eisenhardt, 1989; Yin, 2003). In practice the empirical material was collected through in-depth interviews with respondents directly involved in the DT project in the case company. We further decided to conduct qualitative interviews with two groups of experts, and the choice of them was purposeful. The first group consisted of DT consultants from design agencies working with organisations in facilitating DT processes. The second group consisted of representatives from the company, and among these the managers being responsible for the DT project group. In total 10 interviews were conducted in the period from June to December 2014: 5 with consultants, 5 with managers and team members, and all past the event, describing the project in past tense. The interviews lasted from 40 up to 90

minutes, and they were recorded and fully transcribed for later analysis. The details of the respondents are omitted and anonymised due to confidentiality reasons.

The analysis is hence built on narratives about the past events. According to Dawson and Buchanan (2005) narratives are widely used as vehicles for reporting organisational life and can be used as valid sources of knowledge. As explained by Putnam et al. (1996, p. 386–387) narratives are: “ubiquitous symbols that are prevalent in all organizations. Also referred to as stories, scripts, myths, legends and sagas, narratives are accounts of events, usually developed chronologically and sequentially to indicate causality. (...) They are the vehicles through which organizational values and beliefs are produced, reproduced, and transformed.”

Czarniawska's (1998, p. 2) states that a narrative requires at least three elements: an original state of affairs, an action or an event, and the consequent state of affairs. She also notes that narrative plots rely on human intentionality and context, and are based on a chronology – this happened first, then that happened next. Narratives, by definition, thus link antecedent (or antecedents) with action (or a sequence of events, or a process), with consequence (or pattern of outcomes) (Dawson & Buchan, 2005). Because we were researching projects that were finished and implemented, our direct access to the happenings as they took place was not possible. What we could (and did) research were stories and narratives about these events, told by some of the leading participants directly involved. We are aware of the limitations that are related to this approach, as well as the fact that we have spoken to consultants and managers only, which is why we have remained critical in our approach, and when possible used data triangulation methods in order to maintain some credibility to the results. The identities of the respondents and the names of companies in the text are coded according to the agreement between the researchers and the organisation under study.

## 4. The case of a DT project implementation

In the following we focus on one case study of an implementation of a particular reading of a DT concept in one of the banks in Poland. We do so in order to look for how the practical implementation of the concept was translated into the organisation, and whether innovation and possible change outcomes was achieved. The case study presented in this article is based on a DT project implemented in a bank in Poland. The project was implemented in collaboration with a Polish design consultancy specialised in DT. The aim of the project was to look for innovation areas and new business opportunities in banking services. In the first part we present a detailed description of the project, describing the different phases and actions that were taken. This is followed by a discussion about different types of changes and challenges that occurred during and after the project finished.

### 4.1. About the project

The beginning of the project took place when one of the directors of the bank took part in a design thinking workshop. He became very interested in the examples presented during the workshop and also in the design thinking concept as a method for implementing innovations in organisations. He started to talk to the design consultancy that he would later collaborate with, and decided to co-develop a project. Because the company had no prior experience in DT, the project was led entirely by the consultancy. The project leader was the owner of

the consultancy – a person with a background in strategic management consultancy, who in recent years had started to develop projects using the DT approach. The project was divided in 4 phases and lasted from November 2010 till the end of October 2011. The phases were as follows:

- Phase 1 – Looking for a value proposition – ethnographic research (5 months)
- Phase 2 – Designing and initial testing of first solutions (4 months)
- Phase 3 – Prototyping and tests of the chosen solution (3 months)
- Phase 4 – Roll out (1 month + continue)

The bank originally approached the DT consultancy with the need to create innovation, which would create a unique value for customers from the mass premium market. They did not know what type of service they wanted to create, but they “knew” that they wanted a new service for an affluent type of customer. The project leader from the design agency reflected upon this:

At the beginning it was not known what this project was supposed to be about (...) The initial brief was very open. They asked us to “look for innovation” ... to surprise them with something new, something that is not yet on the market and something that would grow the overall business. It was supposed to be in the segment of the mass premium consumers. It was a very difficult brief, because it was so very open, so we had to look in different parallel directions.

The team started to look for problem areas, and eventually decided to narrow it down to investment advisory services for customers. In the first inspiration phase the scope of work was divided between the design agency and the bank. The role of the design agency was, in general, the customer area. They were responsible for designing and conducting customer research and, later on, for defining a value proposition. The role of the bank was to look for interesting and potential technologies in the area of customer services. The first step taken by the design consultancy was to conduct a deep ethnographic research study of the profiles of premium consumers. They analysed different segments, and after recognising most of them, they moved on to conduct in-depth interviews with customers from the segments that seemed to be the most interesting to pursue from a business perspective. The interviews were carried out at the premises of the customers, and they were accompanied by observation techniques. The second stage was to explore the offers of the competitors, with the use of mystery shopping and role-playing techniques. The team members were visiting different bank branches and tested offers available in competing banks. As one of the managers reflected, they experienced the same thing in all the banks own affiliations, which actually led to the identification of the problem area:

They were giving us a photocopied sheet of paper with a table of available deposits, completely incomprehensible to us. And that was it. So we thought ok, there is an interesting problem here!

As previously mentioned, the research was performed by the employees of the design consultancy. The employees in the bank were not engaged at this stage. After the phase of ethnographic research, the team decided to converge and work together. After gaining insights into the customers and sharing them within the team, the team started to work on initial concept ideas:

And then we did plenty of workshops, sketching ideas in parallel on four such directions, on how to give people a better access to good investment advisory. (...) Soon after that we had defined our value proposition: “professional investment advice at hand.”

The main insight here was the discovery that when a bank customer have to make important financial decisions such as deciding upon their investment strategy, or use of factoring, they expect to receive individual treatment and expert advice by the bank. In many especially smaller cities the access to highly qualified advisors is limited. The value proposition was hence defined as: "Professional advice within your reach". The team decided to create a video-consultation system, which allows customers in different bank affiliations to access high quality advice services provided by experienced experts from the headquarter, in a convenient way. As the team leader reflected:

We had one major problem - how to provide professional advice on a higher level than the competition, but not more expensive? Well, we came up with this idea that they have tele-conference links in the bank, so you can connect customers from different smaller branches with our experts that are based here in Warsaw.

At this stage, the team used the storyboard technique to better understand and communicate the idea:

Well, so we sketched a storyboard that shows the customer experience with this type of service, where you have to make an appointment for a meeting like this; you walk into a branch, you walk into the videoconferencing room and you connect with a specialist that will help you with, for example, investing in the NY stock market, or with a second mortgage as an investment or anything else.

This stage was finalised with the presentation of the idea at a meeting with the board of directors. The concept was approved, and the next stage was prototyping and testing the idea. The production of the prototype was very important for the whole project. It was the first time the bank was creating a physical prototype of a service they were about to implement. One team member was reflecting on this part of the project in the following way:

Before we came to the final solution we made a very cool prototype of the whole service experience. And we did it in one of the branches here in Warsaw, where we simply arranged a special room and invited 10 clients. We selected those early adopters, and we arranged real conversations about finances with them.

The service was very positively received by the majority of the customers, and all the team members were very actively engaged in the process. One team member was reflecting on how successful this stage of building the prototype was:

And as it turned out they [customers] rated the service above 70 percent in terms of customer satisfaction. Through these tests we validated the whole concept behind this project. We wanted to see how the customer would react (...) and these studies came out so great that those clients not only said yes, that we want it, but the whole material (because we also recorded all the meetings on video) showed that customers felt even much more open and free than at a normal meeting face to face, and it was great!

After the whole concept was tested, the team showed the results to the board and the business side of the idea was also considered. A pilot test was implemented in 2 branches. After a few months of pilot testing the project was positively validated, and the service is now offered to the target customers in several branches in Poland.



## 4.2. DT as a change agent - analysis and discussion

The project developed by the team successfully rolled out throughout the organisation. To some surprise in the opinions of the interviewed respondents, the project turned out to have a much longer and lasting effect on the organisation as a whole, than was initially intended and assumed. As the team managed to implement a brand new service innovation using the DT approach, the whole concept of how the bank was looking for innovation seemed to have changed. In the following section we present some of these consequences, while emphasising on changes in the approach to developing new customer innovations, and in particular on how to approach the customers. Secondly we discuss some of the implications on the collaboration on a team level.

### 4.2.1. Changes in the process of developing innovative bank services

Overall, the most significant and lasting contextual and cultural “side effects” of the project were found at the organisational level. In the following we have divided them into two categories, using the quotes from the interviews to illustrate the change: (1) “It is worth talking with the client” and (2) “The way we do things here”.

#### “It is worth talking with the client”

The first outcome of the DT project was expressed by one employee as “the change of the paradigm of thinking”:

Thanks to this project our whole paradigm of thinking has changed.

This new way of thinking (which was referred to in interviews as “a new mind-set” or “a new attitude”) was in the area of the customer orientation. One employee stated that:

We have now developed the attitude that it is worth listening to the client.

As he expressed it the customer had always been important, but it had never produced any serious results in the bank strategy or actions taken by employees. He said that it was “such a tribal knowledge, which was never really implemented”:

This kind of knowledge was such tribal knowledge before - yes, of course the customer is the boss, and you have to listen to the client. Until now I guess we never really did that.

After some time, an employee reflected back on that the whole company culture was affected by this project:

This project was just the beginning of the creation of a culture based on the design for the client and with the client.

As we observed during the research, by understanding how deep empathy with customers and their engagement in the process (for example, by testing prototypes) can be beneficial for the final output, some of the employees eventually put this declarative knowledge into work.

#### “The way of doing things here”

Connected with the previous point was a second effect at the organisational level, which we have chosen to label as one respondent put it: “the way of doing things here”. The changes in mind-sets/attitudes towards the customers led to a somewhat more “tangible” side effect – a change in the practical product

development process. After the successful implementation of the first DT project, the whole methodology for service and product innovation in the bank changed. As one manager said:

On the canvas of this DT project we are now realizing other initiatives.

This was strongly connected with the change of the mind-sets/attitudes of the employees, described in the previous. The change after the DT project in the product development was mainly in the area of customer involvement. By understanding how fruitful quick verification with customers can be, the whole organisation changed the approach to how to develop innovation, by creating mock-ups, prototypes and testing them very early in the projects (which was never done before). One manager was reflecting on this:

Now we think like “ok, let’s not make a big blast out of something that we invent here, let the clients tell us what he/she thinks”. So now we design the front-ends, prototypes, and interface applications for example, and we give them very early to the clients for test. And only if the whole concept validates only then do we put the whole project forward.

Another manager stated that previously “the customer was the last one to be involved” in order to validate the solutions. All the new project ideas were generated internally, without the customer engagement, which often led to market failures:

Before [this DT project] we were designing the solutions ourselves, internally, here in the bank. And the client was the last link to know about what we did. (...) And that was the reason why many of our solutions failed in the market.

The DT project also affected other employees, not directly involved in the project. One team member highlighted that despite an initial resistance towards “the new way of doing things” the DT methodology successfully rolled out in the organisation and gained popularity among employees not involved in the project in the first place:

Now we have the situation that different people come to us [the DT team] and report issues, and want us to help them with their project to be conducted in accordance with the design thinking methodology.

As a result of the DT project, seven employees were sent on a one-year course in design thinking and service design, which further managed to reinforce the organisational change in the area of product development.

## 4.2.2. Changes at the team level

The second level of change was observed on the team level. The main changes here were connected with the challenges which the DT team had to face during the implementation of the project. The respondents expressed that as a team they were facing many challenges and obstacles on a daily basis. Consequently, they managed to build a very strong team identity in order to sustain and finish the project successfully. One challenge was connected with the DT characteristics; in that the beginning of the project, as well as the outcome (even in the area of innovation) was initially unknown. According to one member this was unusual in comparison to how the bank usually operated, and employees that were outside the DT team were actively trying to sabotage this approach, forcing the team members to defend themselves:

And especially it was such a difficult dialogue with people outside our team, because at the beginning of building the solution, we did not really know which path would be the most optimal. And the absence of such certainty, which could only be validated with the customers during tests, was very strongly challenged by people from business: "You know, or you do not know?" So we were telling them: "We have a right not to know, it is only the client who can tell us!". They could not understand that. This was a big challenge to us all.

An interesting observation is how the team members developed a "them" versus "us" narrative to highlight the uniqueness of the DT team. One respondent even pointed out a particular "BAU – Business as Usual"– tendency for most people to maintain the status quo, and the natural tendency in the organisation to continue with the exploitation process and doing what had always been done:

Always when you try to do something innovative and different, people from the "BAU, the business as usual", they feel that you enter their field of competences. And it was very difficult. So for some people we tried to get them on-board, and make them a part of our project. But it's also a challenge – you cannot have too many people in the team, and some of them just don't fit into such a project.

Dealing with these tensions and challenges on a daily basis, the team developed a strong identity as being "outside the normal business". They called themselves "hackers", working outside procedures, always taking pride in the way they dealt with the challenges:

Here you need to become a hacker, working outside of procedures!

Another team member said that:

Our team was like the internal ambassadors of the project, but the environment around us was very hostile.

An interesting contextual challenge faced by the team had to do with the lack of a creative infrastructure. When the project developed the team lacked the right "creative" infrastructure. To create such a creative space, the director and project leader chose to transform his own office into a team space:

I resigned from my own director office and we arranged it into a team working space. I moved my desk to this open-space in order to work with the team directly.

The move was also interesting in relation to the aspects of the legitimisation of the team in the bank, as the director symbolically became one of the team members, and thereby openly ignored the formal hierarchy in the organisation.

## 5. Summary and discussion

The aim of this paper is to provide a case study example of the introduction of a design thinking project into an organisation with no prior experience in DT, and reflect upon the consequences and outcomes. We initially intended to provide with an example of how the concept of DT was translated into new work practices, as well as into new attitudes/mind-sets in a particular case organisation, in order to contribute to the discussion of the definition of DT. However, as our case study also show, the introduction of DT as a change agent can also have wider, and somewhat unexpected, consequences in the organisation; some of them good, and some more unfortunate.

In this last part of our discussion we would like to return to the role of the design consultancy responsible for the implementation of the DT project, and how the chosen approach affected learning and translation into the organisation. But also on how it created tensions and conflict. Initially the project helped to achieve some lasting organisational changes and learning by disrupting some of the mind-sets, habits and organisational procedures on whether or not to involve the customer at an early stage; as stated by one team member “the way we do things here”. But the changes can only be seen as partially successful. By introducing new working methods, the external design thinking specialists provided new methods of work and new mind-sets on how to approach problem-solving, especially in the area of customer involvement. During the project many tensions and problems occurred, which was later seen as part of the learning process, but which can also be seen as an indication of the trouble lying ahead.

Initially, at the organisational level of the case company, we point to the changes in the attitudes/mind-sets of particularly the team employees towards the clients (“It is worth talking with the client”). The activities, which were introduced by the design consultancy during the brainstorming and prototype test phases, provoked the biggest organisational change in the team were the co-creation and the empathy for the end-user built within the team during the interaction with customers. By being exposed to new working methods (mainly the early prototyping and validation of solutions with customers), the team members changed their statements about the way they perceived the role of the customers in the innovation of new services. As found in the literature, product development might lead to organisational change in an enterprise when the needs and the points of view of external actors, such as customers and suppliers, are brought into the organisation and thus provoke “outside-in” change, as opposed to the normal “inside-out” view of the organisation as a machine (Junginger, 2008). However, since the consultancy chose not to include any of the members of the organisation in the preliminary phases of the project, and mainly not in the part of ethnographically investigating and selecting new business propositions, the internal learning did not begin until the work with the solution spaces and prototype testing took place. This is in line with research performed by Junginger, who noted that design consultancies, when they shift their focus from “working for” an organisation towards “working with” or even “within” an organisation, provides a better opportunity for organisational change (Junginger & Sangiorgi, 2009).

In order to support and reinforce these changes, management sent selected employees to external courses in service design and DT, and created a DT task force in the organisation. This led to another change in the team connected with the process of innovation (“The way we do things here”). Changes in the mind-sets/attitudes led to a change in the formal procedures for how to approach and develop innovations in general, by emphasising a more open and collaborative multidisciplinary approach. At the team level, the main effects were related to a new and shared identity, which the team members developed during the project. This identity was mainly developed as a side effect of tackling different types of challenges that the team members had to face when seeking to collaborate with the remaining staff. One very colourful example of how the team developed this shared identity was the erosion of the formal hierarchy among the team members. But it also created a “them and us” approach to the collaboration with the remaining staff in the organisation, and eventually more or less isolated the team members as “hackers of the established” working outside ordinary procedures. This again could be related to the choices made by the consultancy, in only concentrating on a smaller group of project members, who later turned into the

DT task force. By not adopting a broader organisational approach involving more or perhaps potentially most of the organisational members, at least on a management or decision level, the project effectively created a DT “bubble” in the organisation, which eventually turned into a rogue group of ‘misfits’, who had to fight for their right to exist and perform their work in this manner.

## 6. Conclusion

We believe that our paper contributes to the existing literature in three ways. Firstly, it provides a real case study example on a particular translation of DT into an organisation with no prior experience in DT. As we have shown, popular articles written by proponents of DT often lack examples of the challenges and difficulties that occur when DT enters an organisation for the first time. As some researchers point out, there is still very little consideration to how a DT approach is to be incorporated into organisational work practices (Stephens & Boland, 2014). Furthermore, we show that the concept is presented too simplistically and over optimistically by its proponents (Brown, 2008; Lockwood, 2009). By presenting this case study, we hope to further initiate a discussion leading to a more critical and reflecting approach to DT, presenting it not only in simplistic, idealised ways, but also by pointing to the potential difficulties and challenges that companies can face when starting to work with the concept. Moreover, we point to the difficulties in conceptualising DT, and seek to provide an example of practical outcomes of its implementation.

Secondly, our paper puts the attention towards the more positive and constructive long-lasting effects of DT, which helps to understand the real value and definition of DT, by showing the changes in attitudes/mind-sets of the team members in their approach to innovation and customer involvement. This is in line with research by Carlgren et al. (2014a,b) who also points to some of the long-lasting effects on DT projects.

Thirdly, by linking the process of the introduction of DT into an organisation with the literature of organisational change, we hope to contribute to this, still very narrow discussion on how design methods can be a vehicle and agent for organisational change (Junginger, 2008; Junginger & Sangiorgi, 2009; Deserti & Rizzo, 2014). We believe that especially the last point is an interesting area to pursue in further future studies.

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# Introducing a Designing Attitude in Dementia Care

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**Abstract:** This paper discusses how design can enhance the wellbeing of people living with dementia, their carers and caregivers. It refers to two examples of recent design research that focus on supporting the provision and facilitation of appropriate activities and environments for individuals with advanced dementia in residential care. The projects use interdisciplinary co-design approaches and ethnographic methods to establish new knowledge and develop user-centred design solutions to improve care. Questioning how to REDO design research to create a sustainable impact on the lives of those affected by dementia, the paper concludes that active involvement and continued participation of users, carers and care practitioners in the design process is essential. Training on design skills and making will enable carers to adapt a designing attitude. Exploring how such training can be delivered is a chance for the design community, in collaboration with experts from health care, to take the lead in solving this problem.

**Keywords:** dementia, sensory, co-design, design sustainability, older people

## 1. Introduction

The paper discusses the growing role of design for dementia enhancing the wellbeing of people living with the disease, their carers and caregivers. It refers to examples of recent design research that focus on supporting some of the most important aspects in dementia care - the provision and facilitation of appropriate multi-sensory experiences and activities, including non-pharmacological, person-centred interventions ameliorating behavioural symptoms. The paper raises the question of how to REDO design research and practice for dementia so a long-lasting, widespread and sustainable impact on the quality of care and the lives of those affected by dementia can be created.

## 2. Context

According to the World Alzheimer Report 2016, there are 47 million people living with dementia worldwide today, and it is expected that this number will have risen to more than 131 million by 2050 (Prince et al., 2016). Dementia is a process of cognitive decline that impacts a person's ability to cope with and adjust to their environment, to interact with others and to meet their own needs (Cohen-Mansfield et al., 2015). The term 'dementia' includes several disorders, such as Alzheimer's disease, vascular dementia and dementia with Lewy bodies. Apart from memory loss these conditions present problems with behaviour and the capacity to take part in everyday activities. Behavioural symptoms (i.e. apathy, challenging behaviour, depression) are often an expression of confusion or frustration resulting from limited abilities to communicate and interact, loneliness, need for meaningful activity, too much or too little stimulation, and discomfort (Cohen-Mansfield et al., 2015).

As there is currently no cure for dementia, recent treatment and care methods focus on optimising living conditions for people with dementia fostering a sense of wellbeing. The rapid rise of people affected by dementia as mentioned above has brought an urgent need for effective interventions in supporting dementia care. Particularly in later stages of dementia, care practice needs to support these individuals in maintaining quality of life, dignity and comfort by alleviating behavioural and psychological changes without resorting to antipsychotic medication (Strom et al., 2016).

## 3. Design for dementia

Increasingly, design research and practice has been responding to this need by developing artefacts, environments and initiatives aiming to support individuals living with dementia to re-connect with people and places, maintain their dignity, and re-gain a sense of belonging, purpose and accomplishment - subsequently improving their quality of life and the life of their carers and caregivers. A range of successful products providing meaningful activities for people in early to mid-stage dementia are now commercially available (i.e. [active-minds.org](http://active-minds.org)). Online resources offer information on recent initiatives regarding design interventions for dementia and ageing (i.e. [ageinginnovators.org](http://ageinginnovators.org)). In recent years, numerous projects with high-quality outcomes have emerged from international academic research into the design for dementia, with a focus on improving the provision of personalised stimulation and activities meaningful to the individual as well as improved every-day experiences such as eating and dressing (i.e. [dementialab.com](http://dementialab.com), [designingfordementia.eu](http://designingfordementia.eu)).

Because of the participatory nature of most design interventions and projects in this area, they often generate a high impact already during the project or immediately after. They are very well received and supported by the health care sector, the care-home, the carer and caregiver recognising the beneficial effect. However, after the designer's departure, the impact is not always sustained (the design intervention fails to be embedded in care practice) or the desired ripple effect is not achieved (the design intervention does not spread across the sector / organisation / home).

This observation has now started a debate within the design community as well as interdisciplinary, about how designers can ensure their efforts create a long-lasting, widespread and sustainable impact, improving the lives of as many people affected by dementia as possible.

### 3.1 Sensory enriched environments in dementia care

Within this context, recent interdisciplinary research evolved investigating the quality of multi-sensory experiences currently provided in care-homes in UK (Jakob & Collier, 2017).

People with dementia are often at risk of sensory deprivation as they are limited in their ability to access meaningful and suitable activities. On the other hand, they might be exposed to sensory overstimulation, for example in a care-home environment where common living areas can be very noisy with too many things going on. Both situations present a significant challenge to wellbeing and health potentially aggravating behavioural symptoms. Facilitating appropriate multi-sensory experiences tailored to the needs of the individual (either providing stimulation or helping to relax) is particularly important for people in later stages of dementia as this might be the only activity they can enjoy (rather than occupations requiring a certain level of cognitive abilities, i.e. puzzle). In an attempt to provide a solution, the concept of the Multi-Sensory Environment (MSE) – also referred to as Sensory Room or Snoezelen – was introduced in dementia care. Many MSEs were established in UK care-homes over the last decade as a resource for meaningful engagement reducing agitation and improving functional performance (Maseda et al., 2014; Collier et al., 2010). However, it had been reported that the facilitation of sensory stimulation and the use of such spaces in practice have been inconsistent and limited (Andrews, 2015; Anderson et al., 2011), and anticipated benefits of MSEs for residents has not been achieved. Consequently, staff have become discouraged, perceiving the space of little value, resulting in the rooms themselves becoming abandoned (Dalke & Corso, 2011).

Establishing more evidence, an ethnographic study examining existing facilities and their use was carried out in 16 participating care-homes in London and South England. The results from this critical survey confirmed that most MSEs in care-home settings do not reach their full potential in providing multi-sensory enrichment for their residents (Collier & Jakob, 2016). This was due to the impact of aesthetically and functionally inappropriate design and set-up, the limited range of sensory accessories and equipment available, and a lack of attention to how these spaces are meant to be used, the findings revealed. An important issue was that in the absence of sufficient information and guidance for care practitioners, facilitation of sensory enriched environments and multi-sensory activities for residents with dementia by staff was often very poor.

Following the results from this study, design criteria for creating sensory spaces that maximise the benefit for the users, and that support the daily work of carers and caregivers, needed to be identified and established. The features that emerged from this process as most important were identified as: comfortable and safe; meaningful and familiar; multi-sensory experience; stimulation and relaxation; control and interaction; age-appropriate and usable; flexible and cost-effective (Jakob & Collier, 2017). Based on this design brief, design recommendations for setting up a successful and effective MSE for people with dementia were developed considering aspects such as lighting, accessibility, material, use of technology, climate, and maintenance.

In response to the findings from the study in respect to lack of information and knowledge amongst care practitioners, the research team made these design guidelines and recommendations unlimitedly available through an online hand book, the first of its kind, titled 'How to make a Sensory Room for people living with



dementia' (Jakob & Collier, 2014). The guide book is accessible via [kingston.ac.uk/sensoryroom](http://kingston.ac.uk/sensoryroom). This was also motivated by the gained understanding of the increasing economic challenges care-homes face today. The guide book aims to enable carers and staff in care-homes to set up a multi-sensory space which are tailored towards the specific requirements and preferences of individuals living with dementia without necessarily the need for cost-intensive input from design experts and consultants.



*Figure 1. Examples of sensory enriched environments for people living with dementia. (Photos Anke Jakob)*

### 3.2 Co-designing playful objects and sensory textiles for dementia

Many people living with dementia in residential care have little to do, lack purposeful activity and are often bored (Chenoweth et al., 2009), which can lead to an increase in agitation and perceived challenging behaviours making day-to-day care difficult. By providing multi-sensory experiences through playful objects that can interest, distract, comfort and soothe them, there is a reduced need for the use of medication to alleviate these symptoms (Zeisel, 2011). The result is an increased wellbeing of the person living with dementia and a reduced cost, both economic and emotional, to the care provider (Treadaway et al., 2015). Although some dementia care facilities use playful objects, their use is not accepted wholeheartedly and continues to be considered by some to be stigmatising and infantilising to the person living with dementia (Mitchel & O'Donnell, 2013). Consequently, although playful objects and sensory textiles maybe enjoyed by people living with dementia, unless the family members, carers and medical professionals are supportive, these objects may remain in a cupboard or left in a pile in the corner of a room. Where the management and care professionals are supportive of their use, improved wellbeing and enhanced relationships can be achieved and non-verbal communication for both the carer and recipient of care created (Treadaway & Kenning, 2016).

CARIAD researchers have undertaken a series of projects investigating the benefits to wellbeing of playful objects and textiles ([cariadresearchgroup.cariadinteractive.com](http://cariadresearchgroup.cariadinteractive.com)). The LAUGH project is currently

developing playful hand-held objects for people living with advanced dementia in residential care (Treadaway et al., 2016). This work builds on four previous CARIAD textile design research projects revealing the ways in which people with dementia can benefit from experiencing playful artefacts: *Making a difference*, *Dementia Aprons*, *Hand i Pockets* and *Sensor e-Textiles* (Treadaway et al., 2014). Each of these projects used interdisciplinary participatory co-design approaches to develop bespoke textiles, garments and blankets for people living with advanced dementia (Treadaway & Kenning, 2016). Health professionals, carers, family members and people living with dementia participated in the design process through a series of practical hands-on creative design workshops with materials scientists, computer scientists, artists and designers. Further detail, photographs and descriptions of activities undertaken during these workshops can be found on the project website [laughproject.info](http://laughproject.info). Workshop participants were considered an 'expert group', who were not only able to contribute novel ideas in the design process, but also helped to shape the design requirements; they advised on suitability of their use with vulnerable people and any potential dangers. By adopting this inclusive approach to the design process, the research impact became embedded in the care practice of those professionals and family members involved; changing attitudes and building confidence in the use of playful objects and sensory textiles with people living with advanced dementia.

The attitude of management and ethos of the organisations involved have been found to be key to successful adoption of the designed objects in care. Where the management has been interested and supportive, it has been possible to work closely with family members and professional carers to ensure beneficial use of the artefacts with the people they were designed for.



Figure 2. Sensory textile 'dementia aprons' (Photo Cathy Treadaway)

## 4. Introducing a designing attitude

Two important aspects emerged from both research projects in respect to achieving sustainable impact: 1) the active involvement and continued participation of users, carers and care practitioners in the design process (co-design) is essential, and 2) carers and caregivers need to be provided with skills,

tools and methods that enable them to continue designing after the designer has left.

Co-design / participatory design is not only a valuable method of addressing the complex needs of people with dementia when developing designs to support their wellbeing, but also vital for skill and knowledge transfer and dissemination. As the LAUGH project proves, the inclusive approach causes a change in views and attitudes fostering an appreciation of the potential impact of design on improved care methods. Co-design paves the way for creating an environment where adapting a designing attitude and developing a sensibility for appropriate design solutions becomes possible.

Ensuring long-lasting and widespread impact of design interventions, carers and care professionals need to be actively and continuously involved as creators / co-creators. Evidence-based design guidelines, such as the guide book for setting up MSEs for dementia care, are only a first step to provide the means of enabling carers and care providers to facilitate conditions that promote wellbeing. It is important that people who care for individuals living with dementia are offered training and education on design skills and design making - empowering them by mobilising their creativity and helping to adapt a designing attitude in their care practice. Exploring how such knowledge should be conveyed and training delivered is a chance for the design community, in collaboration with experts from health care, to show ways forward taking the lead in solving this problem.

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# Exploring Situated Making in Media Technology Education

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**Abstract:** Critical making has the potential to foster a practice of connecting critical thinking with physical making through iterative and self-driven learning. This paper explores critical making as a method and a pedagogy in bridging the gap between conceptual thinking and making, encouraging play to cultivate learning and understanding one's relation to the world. *Situated making* is an undergraduate course for second-year students in media technology at department of Technology and Aesthetics, Blekinge Institute of Technology. The key concepts critical making, situated knowledges and interaction were implemented to encourage a learning process aiming at deepening knowledges on critical thinking and hands-on making. We found that augmenting the perception of digital media is necessary moving forward. Acknowledging the hybridity of nature and culture as ever present in critical making practices needs to be taken seriously if we are to create situated educational interventions fostering responsible futures.

**Keywords:** critical making, situated knowledges, media technology

## 1. Introduction

How we interact and engage with materiality is changing; our relations and experiences of the world are becoming increasingly virtual and abstract and our learning environments are becoming more and more digital. How we design digital prototypes, characters, artifacts and infrastructures have consequences independent of any label we assign the world. Learning by interacting with and remaking everyday objects is a stepping stone for using critical making as a method for integrating social, political, ecological and intellectual ideas with embodied knowledges. Linking digital relations with material engagements are vital for social intervention. Schwartz (2016) explores the potential of critical making as a pedagogy among architecture students and suggest that

“[...] instead of creating a virtual model in the computer composed of lines and volumes which are detached from many realities - including gravity, mass, and weight, assembly sequence, texture, and material properties - a student can be asked to generate project ideas by fabricating a series of conceptual constructions out of concrete, wood or steel”. (Schwartz, 2016, p. 230)

In media technologies the political, corporate and social agendas set the standards for how a production should be designed. How do universal standards of game design inflict on the individual experience of learning? What are the conventions of film-making and who do they exclude? What are the underlying political interests of standardization of digital infrastructures? Understanding the consequences of digital activities is crucial for questioning and redefining normative values in media technologies. As Schwartz explains, “the practical knowledge of knowing how to do something is always tied to the individual experience of the person who is learning. This latter form of learning must be attained through embodied interaction with reality” (2016, p. 228).

The ultimate goal of critical making experiences is not the evocative or pedagogical object intended to be experienced by others, but rather the creation of novel understandings by the makers themselves (Ratto, 2011b). Working with critical thinking and critical making, Dunnigan (2013) introduces the term “thingking” as a symbiosis between object and idea and “as situated in contemporary and historical frames of reference” (p. 95). Dunnigan further explains “thingking” as a union of critical thinking and critical making and how the iterative process of critical making encourages a reflection of how and why certain materials are used in the prototyping phase, and how technology, culture and identity are connected.

The immersive practice of thinking and reflecting while making features the intentions and consequences of the work process and a phenomena-in-the-making. Making as a practice of tinkering, messing around, knitting, 3D printing, rapid prototyping and digital fabrication goes beyond the scholar context. The maker movement has gained a lot of momentum where every other major city in several countries provide makerspaces, fabrication labs or technology hubs for the public. The agency behind the maker culture is diverse. In “Conversations in Critical making”, Hertz (2015) interviews academics who raise concern that parts of the maker movement lacks social critique and are confined to a corporate imagination where the makers only use ready-made building blocks such as Lego or Arduino. Jeremijenko (2015) suggests that, “[...] the work needs to be about change, social innovation, and political innovation—just as much as it is about technological innovation. Social change has been excised from the discussion around making due to political views, and it’s a tremendous, tremendous problem” (p. 26). In response to this critique, it is important to note that the collaborative culture, which is seen at makerspaces, are also a flora of creativity, openness and innovation. Nascimento and Pólvora (2016) studied the maker culture in relation to technological action and explain that the relations being formed between maker and technology are more complex than a generic notion of freedom and creativity. The values and practices enacted by the makers are still formed according to social, economic, and cultural conditions, and social change is mostly visible in projects with agendas on gender equality, sustainability or open source.

Lindtner (2014) has studied the maker culture in China where makers believe physical places such as hackerspaces aid technological innovation, social change and individual empowerment. When discussing the relationship between the makers and the state, Lindtner suggests that “maker culture is better understood as a parasitic culture rather than a counterculture, altering the system from within,

contributing to our understanding of the relationship between technology use, production, society, activism and the state” (2014, p. 145).

Working with critical making as part of a curriculum in higher education with pre-determined course goals and learning objectives in the disciplinary context of media technologies is a layered, messy practice. Alongside grand visions of learning diversity, accountability and transparency of motivation, resistance, confusion and serendipity reside (Law, 2004). This paper explores using critical making as a method and a pedagogy in bridging the gap between conceptual thinking and making, encouraging play to cultivate learning and understanding one’s relation to the world.

## 2. Critical and situated making

“So this is the source of the cognitive dissonance that one feels where hearing the phrase “critical making”—critical we see as conceptual, and making is seen as not conceptual—there is a kind of lacuna between those two terms. But that’s obviously quite strange if you’re at all a maker, of course, because making is a deeply conceptual activity, and deeply reflexive . . . though not necessarily in the same way as critical thinking.” (Matt Ratto as cited in Hertz, 2015, p. 37)

Critical making as introduced by Ratto (2011) focuses on making things with the intent of exploring socio-technical relations. The concept “signals a desire to theoretically and pragmatically connect two modes of engagement with the world that are often held separate—critical thinking, typically understood as conceptually and linguistically based, and physical “making,” goal-based material work” (2011, p. 253). There are similarities between critical making and critical design. Critical design, as created by Dunne and Raby (2013), confronts conventions and social norms specifically within industrial design, where product design is almost always optimized and efficient and reinforcing more of the same. Critical design practices question these conventions by creating provoking design prototypes that questions design itself. Still, critical making differs from critical design in a number of ways. Critical making is focused on an iterative making process primarily in an academic context whereas critical design works with critique in the realm of industrial design. Furthermore, the material prototypes made during the creative process are not the topic of discussion – the process is.

Kurti et al (2014) suggest educational makerspaces to build on the philosophy of constructionism as developed by Papert (1998). The aims of this ideology is a focus on self-directed learning where students are required to initiate their own hands-on learning processes by creating and interacting with physical objects. Ratto (2011) explains his intentions with critical making as similar to Papert’s ideas on constructionism, in that it should embody theoretical concepts through making but with the difference of the exercises proposed in critical making to focus more on social sciences and its concepts than the constructivist tradition of mainly residing within the fields of science, technology and mathematics. We chose to introduce situated knowledges as a means of addressing these disciplinary boundaries alongside critical making.

“How to see? Where to see from? What limits to vision? What to see for? Whom to see with? Who gets to have more than one point of view? Who gets blinded? Who wears blinders? Who interprets the visual field?” (Haraway, 1988, p. 587)

Situated knowledges is a concept that challenges traditional views of a value-free, positivist and universally translatable objectivity (Haraway, 1988). The concept redefines objectivity in research as local and partial perspectives where an objective vision in singular is impossible. Situated knowledges together with critical making foregrounds the agency of the students and their ethical responsibility (Corrius, 2016). Thomas and Brown (2011) suggest that changing a knowledge system based on facts, and a continual referral to the question “what is the information”, means a reframing of knowledge where context becomes more important and a question of “where is the information” is foregrounded. This reframing is similar to the concept of situated knowledges and Haraway’s reformation of objectivity. By understanding the context of a physical object, knowing the objects’ historicity and how its meaning has travelled over time through places, cultures, people and other objects we can provide a thicker description of its meaning. Also, as Haraway (1988) proposes, we need to include ourselves in this knowledge production. The traditional fact-based objectivity suggests accruing facts from a place of nowhere, a strong held position in the academia and elsewhere which has created a hierarchy of knowledge systems and an exclusion of the many.

### 3. The course

#### 3.1 A description of the course

Media technology at Blekinge Institute of Technology is the umbrella discipline for four undergraduate programs - digital games, digital visual production, digital audio production and digital infrastructures. The undergraduate program is placed within the department of Technology and Aesthetics at the Faculty of Computing. A conscious effort has been made by the teaching department to include design practices and technoscientific studies for the purposes of strengthening the relations of theory and practice and preparing the students for a paradigm marked by continual change, a wealth of knowledge resources, and new social structures with ubiquitous connectivity.

In 2016 a new course for second-year undergraduate students was developed with the aim of using critical making as a pedagogy. Critical making was introduced in union with situated knowledges and the course name Situated Making was formulated. The course was held during ten weeks between November 2016 and January 2017. During the first five weeks modules with specific assignments were given. The remaining five weeks were used for in-depth prototyping and reflection and creating a video as the final assessment. The number of students attending was 110. The focus of the method is the reflective process of making and construction. The physical prototypes made in the process are of interest specifically for the purpose of visualizing critique and reflection. Ratto (2011a) suggests three different stages for a critical making project involving literature review and creating material prototypes, collaboratively design, building technical prototypes and reconfiguration and reflection. The course content diverged from these stages in that the students worked individually with a physical object of their choice throughout the course. A list of the course modules is presented in table 1 below.

Table 1.

<p>Week 1 – Situating your object. Selecting and situating an object (Situating the object historically and culturally, place of origin, common uses, material, changed over time etc.)</p>
<p>Week 2 – Critical making. What is critical making and how has it been used and how can you use it in your creative process. Daily workshops on microelectronics and Arduino.</p>
<p>Week 3 – Situated knowledges. Interpret, reflect and problematize the concept of situated knowledges. How does critical making relate to situated knowledges? Daily workshops on microelectronics and Arduino.</p>
<p>Week 4 - Prototyping with new materials. How has the object changed in the prototyping process? Do you interpret the object differently and does it have new areas of use?</p>
<p>Week 5 – Interaction. What is interaction? How do you interact with your object? How can you interact with it differently? How can you change the affordance of your object? Create prototypes where you explore where an interaction begins and ends.</p>
<p>Weeks 6-9 - In-depth work with further prototyping.</p>
<p>Week 10 Final assessment film. Compilation of video documentation from course modules.</p>

### 3.2 Analysis of final assessment films

The empirical material consists of 86 student films. The student assignment consisted of compiling a film based on the video documentation they had conducted during the course. This made the chronological structure and content of the films fairly similar. They were asked at the start of the course to document their process and upload the videos to YouTube each Friday. The Friday uploads were not mandatory which led to many students recording their processes at the last few weeks of the course.

A majority of students chose to recreate their objects in different materials, such as plastics, cardboard, paper, fabric, yarn, aluminum foil, wood. Those who worked with microelectronics used it as an extension or as a complement to their objects. Examples are attaching led-lamps on shoes, creating a compass with led-lamps on cardboard with the intention of adding it to a pair of shoes, turning a dish brush into a torch, connecting Arduino and aluminum foil to a belt for the purpose of creating heat, adding a led-lamp inside the cap of a perfume bottle, attaching a led-lamp on jacket, adding a vibrator to a snuffbox. Other examples showcase students altering or damaging the object for the purpose of using the broken pieces in their prototyping, for instance breaking a cup and using the pieces for aesthetic purposes when making a hook. Two students worked with changing the dimensions of their objects. One went from a three-dimensional stuffed animal to creating two-dimensional string art. The other worked with mirrors and created a 3d glass box creating an endless mirroring of led-lamps.



For the module on interaction several tried using their objects for new purposes, changing a plastic cup into speakers and a night lamp, plastic plant turned into a hat hanger, duster and a makeup brush and a glove turned into a holder for candle lights. In the final assessment films a lot of emphasis was placed on explaining key course concepts (critical making, situated knowledges and interaction), presenting their prototypes and how they had worked with different materials. Reflections on their individual making tended to be placed *after* the prototypes were made rather than during the process

### 3.3 A detailed analysis of three student projects

#### *Victoria's mirror*

When situating the mirror historically and materially the student Victoria mentions reflection, movement and notions of self, self-improvement and closeness to truth. Her object is a small, pocket-sized mirror with surrounding soft fabric. She brainstorms on the kaleidoscope and deconstructs the underlying meanings behind the word - Kalos - "beautiful/beauty", eidos - "that which is seen: form, shape" and skope - "to look to, to examine". When she situates her object and her own pre-conditions in the present time and place the following thoughts occur:

- Double standards - cosmetic companies profit on people that are uncomfortable with their appearances.
- Why are women more marketable? - One basic archetype of attractive / men vary wildly. The following questions arise before starting to prototype: as why is this material better? Do I exclude anyone when I design it this way? Who uses this object, and why?

The prototype was created with plaster, mirrors, fabric and glue (figure 1). With the popularity of social media Victoria reflected on the importance of validation and how others perceive you visually and started experimenting with different filters for her prototype (figure 2). She then created a comical commercial presenting the prototype as an essential accessory.



Figure 1.

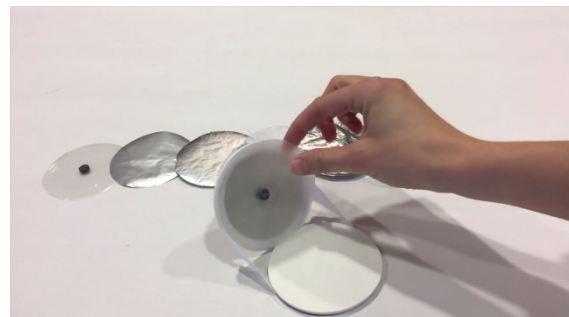


Figure 2.

#### *Juri's attaché case*

Juri's personal views on the case involves notions of a status symbol as it is connected with business and economy, an expensive artifact, male-dominated, cold colors, representing a cold surface, responsibility, company, profit, education, elegant, strict, women and men and bureaucracy (figure 3). He chooses to focus on gender differences in the style of the attaché case and makes a short comparison on how the case is marketed differently between the two target groups' men and women. Cases marketed towards men - material made of leather or fabric, color brown, black, dark blue or beige, exterior - large, heavy. Cases

marketed towards women - Color - beige, black, light brown, white, and silver, patterned. Exterior - small, purse-like, slim, soft edges. Material - fabric or leather.

Recognizing these differences Juri chooses to focus on gender norms for his prototype. He begins working with Adafruit flora but then decides to move away from microelectronics and finds an interest working with wood (figure 4). He makes three conscious choices before starting to work with his prototype:

1. 1) A personal desire to create gender-neutral design
2. 2) Change standards for the business world by creating a case with material that doesn't connote luxury.
3. 3) Ridicule the case as a symbol of stature by creating a case that could be connoted as a cheap one.



Figure 3.



Figure 4.

### *Jonna's keys*

Jonna picks keys because they are one of the objects she uses daily and she wants to explore her relation with them as they take a lot of space and are difficult to keep track on. She continues to situate them historically and materially, introducing different kinds of keys and where they are used. In her mind map on critical making she lists some issues and possible solutions.

- Keys look the same --> difficult to find the right key -- use sound, blinking lights, patterns.
- Easy to lose --> connect to mobile phone or an electronic key finder.
- Take a lot of space ---> alternative keys --> code, alarm, finger print
- Difficult to find keyhole for visually impaired --> add sound to key, cardkey.
- Use mobile as key --> safe

Jonna reflects on the practicality of the key finder product and if you still need to know where the badge is. Would it be better to connect it to the mobile phone? She further reflects on how future keys will be developed and whether lock systems will use codes instead of physical keys and how secure these systems are. As part of the module in creating a prototype in new material students are encouraged to browse through the Swedish magazine Crafts ("Hemslöjd"). Jonna is inspired by a method where you work with imperfection. For instance when knitting you shouldn't stop to correct the pattern if you have made an error, just continue to knit. Jonna wants to use this method in her prototyping by producing an object without reflecting on what it would look like beforehand or look into correct production techniques. She decides to create a key in fabric. The prototype is soft and bendy, difficult to use in any existing keyholes and breaks easily. She experiments with new uses for her prototype and tries it as a door stop, umbrella hanger, window holder and mobile stand (figure 5). Her prototypes with

microelectronics differentiates the keys by changing color depending on which key you press and by creating unique sounds to each key (figure 6).



Figure 5.

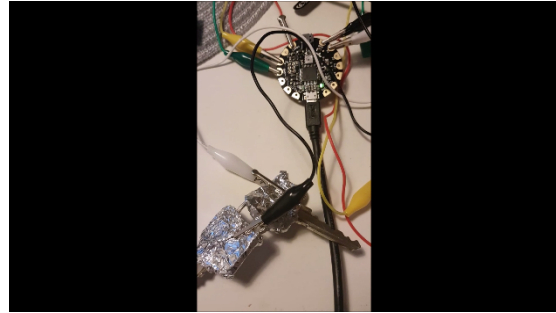


Figure 6.

## 4. Discussion

### 4.1 From “maker” to “critical maker”

“For me through the whole time of the making I was focused on the functionality side, is it going to work? I asked myself, is it safe? I asked myself is it, is it, is it...so many questions were coming to my mind but I was bound by something. I didn't understand what it was ---was it my limits of making or my limits of critical thinking?”  
(Quote from one of the final assessment films)

The student projects shown above present examples of critical makers. They have worked with their everyday objects by asking questions such as: why is this material better than anything else? Do I exclude someone when I design the object in this way? How can I challenge social norms through my design? In all three cases they are working with ideas and prototypes where the critique is visible in their processes and they are positively inclined to playing with different materials and interaction.

The idea of focusing more on the process than a ready-made object was new to many students and it proved difficult to work with prototypes with no pre-determined end-goal. This resulted in several students remaining more in a maker role rather than actively critiquing their own process throughout the course. Several student projects present prototypes of attaching a led-lamp to the chosen object without explaining why this was done. One of the biggest challenges was encouraging students to move from being a “maker” to being a “critical maker”. Embodying critical thinking with their tacit prototyping phase was sometimes lacking in their final exam films, although the concepts of critical making and situated knowledges were presented and discussed among the students during the course. Other forms of examinations with oral and hands-on presentations and critique sessions could overcome this obstacle.

### 4.2. Self-driven learning

Working with a method such as critical making requires a very active role of the student and this approach diverged from many of the other courses in undergraduate programs. The students are accustomed to more of a teacher-driven pedagogy both from previous courses and especially from the school system from younger years. Encouraging the students to use their curiosity and working iteratively with their objects helped them reframe their understanding of knowledge as something more fluid, and understanding the importance of

context. Furthermore, a student group of 110 is far from ideal for creating an atmosphere of collaboration and sharing, which led to an environment of many smaller maker groups and individual work.

### 4.3. Analogue objects and micro electronics

The perception of media technology as being something wholly digital, working with physical, analogue objects and introducing a difficult element such as microelectronics further alienated students from course content. The majority of students were new to microelectronics and learning Arduino became quite time-consuming, which in turn affected their activities with designing prototypes. Still, many students who continued to work with Arduino embodied the analogue and digital relationship between objects, which led to a playful and reflective practice.

## 5. Conclusion and further recommendations

Critical making as a pedagogy has the potential to foster a practice of connecting critical thinking with physical making through iterative and self-driven learning. Considering the educational paradigm where learning is taking place in a world of capabilities such as understanding context, one's relation to the world, sharing imaginations and embodying the co-construction of social life and technology is crucial for creating responsible, innovative design. Using critical making and drawing upon the philosophy of makerspaces in an academic environment with set boundaries of course content and learning outcomes posed several challenges in the course Situated Making.

Critical making as a pedagogy is in a phase of development, and a key issue that needs to be further explored in our learning environment, and which Ratto mentions on the future of critical making, is "the balancing act that must occur between technical and social scholarly expertise" (Ratto, 2011a, p. 258). The students' preconceptions of social scholarly expertise and what this expertise can entail, became somewhat of an obstacle in their course assignments. Although collaborative work was encouraged from start the task of choosing an analogue object and working with it individually discouraged many students from working collaboratively and ultimately created many smaller makerspaces rather than a few larger ones. For future courses with a similar pedagogy we would suggest using production methods the students are familiar with and concentrate on creating smaller communities of collaboration and sharing. Additionally, student to student critiquing sessions would be beneficial for the students in comprehending the 'critical' aspect of critical making. The analysis of the student projects was primarily done on their final assessment films. The discussion of the course therefore lacks an extensive insight into the individual processes of the students throughout the course and it is recommended that further research would include ethnographic and action-oriented research methods to gain a more comprehensive picture of the on-going making practices.

Moving forward we need to work with the perception of digital media and how it can no longer be perceived as something exclusively digital. As Ratto and Ree (2012) explain in their study on 3D printing and social change, digital information (virtual; electronic; 'bits') is becoming increasingly porous with physical representation (material; tactile; 'atoms'). The hybridity of nature and culture is ever present in critical making practices and it needs to be taken seriously if we are to create situated educational interventions that foster responsible futures.

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# Wandering Eyes: Reframing Ethnography and collecting Hints for the Design of Products and Systems for Domestic Environments

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**Abstract:** The role of ethnography in design is amply recognized, especially in the creation of innovative solutions, such as those requiring an active involvement of final users, and in the creation of digital products and services. On the other hand, observation on field is a delicate activity that, to be fertile and inspiring, requires empathic connection with the context, and no anxiety to get to conclusions.

The paper discusses some critical factors of teaching and performing ethnography in design, and proposes an innovative approach suitable in design and education. It also reports the design insights produced by an extensive observation of human behaviours in domestic environments, aimed to investigate daily activities, and based on this approach. The research focuses on functional and emotional/affective factors of experience at home; it also investigates attitudes and values of Italian users with respect to technology based innovation. The results refer to the realm of home automation.

**Keywords:** Design, experience, ethnography, interaction design, home automation

## 1. Introduction

In the design of innovative products and services, the observation of user behaviours in real contexts is recognized as a basilar and an important activity, aimed to investigate user needs and local constraints, and, in the time, the topic has been amply investigated and amply discussed in literature (Rogers, 2011). Authors such as David Benyon (Benyon, 2005) recognized that, in order to orient and inspire the development of innovative products and services, designers can focus on selected typologies of users (i.e. travellers, retailers, scholars, ...), on contexts (working spaces, hospitals, homes, etc.), and also on single activities

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(reading, writing, cooking, driving, and so on). The identification of needs and constraints through research and ethnography in real life, and their representation through design tools such as personas, user journeys and others, has been practiced since decades (Cooper, 1999), but the real effectiveness of this approach should be better discussed and analysed on the basis of experience, so to update and improve design methods and techniques.

Design oriented ethnography is fundamental for design: designers should perform observation on field when they deal with contexts they are not familiar with, so to create solutions that are suitable and meaningful with respect to the constraints, needs and values of the context itself. Ethnography provides evidence based insights about specific contexts, behaviours and cultures, and it is a key research activity that can be used both in preliminary project phases and in subsequent activities so to prove hypothesis and intuitions. From the point of view of education, ethnography supports students in understanding the variability of human attitudes and cultures, so broadening their design perspectives.

The aim of improving the techniques apt to investigate people's needs and attitudes can be very important in the design of technology based products and systems that are intrinsically disruptive, such as those dedicated to home automation. The development of useful and desirable innovative solutions in fact, requires the understanding of the main factors influencing the final experience produced by their use, and the ability to predict the final level of appreciation in terms of practical advantages and overall satisfaction. For this reason, ethnography in the design of interactive and digital products and services should not only be aimed at the detection of needs that could be solved by some technical inventions, but also should focus on the understanding of the tacit and implicit processes that are related to activities and behaviours, also revealing individual (cognitive and emotional) and social dimensions of experience.

Based on several project and education experiences (Pillan 2012, Pillan 2014), I developed the awareness that observation of behaviours in real contexts is indeed a difficult activity, and some recurrent phenomena can severely affect the final results. The critical issues can be resumed in terms of:

- **Correct attitude of the observer toward the context.** In order to collect suitable information about contexts and users, ethnographic observations require the capability of the observer to get free of prejudices and stereotypes, and to develop an open attitude toward the situations “as they are” and not as they can be already framed by previous storytelling or knowledge. As an instance, in the design of solutions dedicated to elderly people, prejudices about lifestyles and attitude of ageing people can severely influence the observation of real behaviours, so producing misleading results, more based on clichés than on real information.
- **Open mindedness with respect to diversity.** Designers carrying on ethnographic research should be aware that observation activities can elicit emotions in the observer, especially when values, culture and strategies of action of the observer are different from those of the subjects under observation. The ability to collect suitable information and design hints and inspiration is directly related to the ability of the observer of suspending evaluation and judgement during observation, as it has been amply investigated by Sclavi (Sclavi, 2003). In order to deal with this unavoidable and intrinsic difficulty, empathy and sense of humour should be part of the observing practice.
- **Ability to deal with complexity and contradictions.** In order to obtain suitable information about people's attitudes, values and habits, the

observation on field should embrace the fact that, very often, there are gaps between intentions and behaviours, and between declared values and factual actions. Indeed, we can learn very much when we can detect contradictions and further investigate them. As an instance, we can learn much if we investigate the reasons why a user neglects to use a product, or uses it in a peculiar way, despite the fact that he or she appreciate its characteristics.

- **Attention to details.** The ability to discern *information* from *noise*, and to distinguish useful data and significant trends from anecdotes and peculiarities, is a very critical and important one. All human being tend to ‘see what they know’ and to pay attention to what they recognize (Ware, 2008); the ability of collecting hints through the observation of subtle and feeble signs is a complex task requiring education and practice. In some cases, extensive observation involving data significant from the statistical point of view can produce suitable results, such as for the unobtrusive remote observation of use for mobile apps. But statistical data are seldom collected in physical environments and usually they focus on pre-defined variables under exams. In physical environments, the attention to details can produce knowledge that cannot be otherwise generated, and that is not included in the expected phenomena.
- **Efficiency of the process.** Observations on field are time consuming, require organization, dedicated facilities and the involvement of skilled experts. Furthermore, very often it is difficult to organize observations in real contexts, such as public spaces (retail stores, stations, hospitals, transport facilities) or private ones (homes) without interfering with activities so not to alter the normal processes. While contextual design research should be carried on with ample resources in terms of time and means dedicated to observation, in my experience, the actual resources dedicated to research on field are very limited both in professional practice and in education experiments. Quite often, information about user behaviours and attitudes are obtained as a “second hand” information, or are simply based on common sense and personal experience. I argue that the lack of first-hand knowledge reduces the creative potentials of a design process and increases the risks of developing a non-adequate solution.

This paper aims to give a knowledge contribution useful in dealing with the criticalities mentioned above or, at least, with some of them, both in teaching and in the design practice.

## 2. Ethnography and digital design

Between other fields of application for the design of digital solutions, the realm of products and services for domestic environments is presently demonstrating an interesting vitality, after several years of false starts: the progresses of AI based solutions, and the development of systems for seamless automation of personalized environments, open new perspectives, while the design of technology-based products and services attracts new interest.

Digital technologies and IoT -Internet of Things facilities can be used to support more sustainable and convenient lifestyles, to allow a more effective control of the use of energy resources and better comfort, to provide solutions for independent living of people with special needs, to produce new forms of aesthetic and functional qualification of the domestic environments, to integrate entertainment

and personal communication and information in responsive spaces, to allow remote interaction with objects, people and spaces. On the other hand, the history of the design for home automation in the last decades demonstrates that it is not trivial to invent technology based desirable and appealing systems for the domestic environments: it is not sufficient to add “smartness” to a refrigerator and connect it to the web to make it better and meaningful; few people really want coercive domestic appliances taking care of our diet or, at least, very few want them in the way we can design them now.

As discusses, between others, by Don Norman in his book *The Design of Future Things* (Norman, 2007), the design of the interactive features of products for daily use and of the automation of the contexts we live in require intense experimentation and critical thinking about the future scenarios. Anyway, technology based products and services appear progressively more capable to respond to both practical and non material requirements of users, and designers need to develop new knowledge and skills so to better exploit the creative potentials of digital systems.

In the present state of the art of interaction design, ethnography provides insights about local and global cultures of living and lifestyles so to produce design principles to orient the design of innovative products and systems; it also provides helpful information to develop and optimize specific solutions in terms of usable and desirable innovation. For these reasons, the issue of upgrading and making more efficient ethnography in design is meaningful for the design education and profession.

In the following of this paper an approach to ethnography at home is presented. The approach is focused on the investigation of the tangle of emotional and cognitive processes that compose user experience and not on user practical needs. In order to fulfil the goals, designers performing observation on field should be trained with respect to the specific competences of design for experience; they should own knowledge about emotional and cognitive dimensions of activities e decision making and they should be aware that ethnography research is a complex activity, also eliciting emotions in the observers and engaging them in terms of performance and more. Furthermore, the approach is based on the assumption that, in order to produce meaningful results, ethnography must be carried on with no explicit finalization and with no anxiety to obtain immediately good solutions for design. In other words, ethnographic observation must be addressed toward an alternative goal, so distracting the designer performing the observation from the temptation to achieve to early conclusions, and to not reduce his/her ability to harvest information on field with an open mind.

The approach was tested in an education experiment involving almost one hundred students in a university course of Interaction Design for the students of the third year of the Bachelor at the School of Design at Politecnico di Milano. This activity produced a large harvest of materials, also including pictures and video, documenting behaviours and habits in domestic environments. The analysis of the so collected documents demonstrated the fertility of the approach and produced several hints inspiring the design of innovative concepts, out of the schemes of the existing solutions. Furthermore, it produced some general insights about lifestyles values that characterize the Italian culture of living at home, so producing knowledge to orient the development of innovative products and services.

### 3. Collecting evidences of experience at home

In the spring semester 2016, I involved the students of my course on Experience and Interaction Design in an experimental activity aimed to verify the assumptions of this approach and to collect information useful in the design of technology based solutions for home.

The key factors of the here reported experience can be expressed in terms of the following goals:

- perform experiments in order to understand how to conduct observation on field with low impact on normal procedures and ways of act;
- collect information on the user experience related to daily in its complexity, i.e. including feelings, attitudes, affections involved in gestures and tasks, and in the interaction with domestic spaces and objects;
- separate the act of observe activities in real contexts from the process of generating new design concepts;

As a preliminary preparation, students received lectures on design for experience (also referred to the framing proposed by Forlizzi, 2004 and Gorp 2012), on interaction design, and on models of emotional and cognitive processes provided by brain scientists such as Kahnemann, and Panksepp (Kahneman, 2012; Panksepp, 2012).

The lectures and discussions evidenced the connection between conscious and non-conscious evaluation processes and emotional arousal (Sclavi). IDEO cards were also presented as a practical tool orienting observations.

In the experiment, the students were asked to form groups of three members and to focus on one single simple activity between those taking place in common domestic environment. The list of proposed activities included tasks such as “getting ready to go to bed”, “preparing the list of goods to buy”, “managing the laundry”, “leaving home”, “entering home”, “making gymnastic” and so on. Each student was asked to perform observation individually in his/her personal home or in a domestic context that was familiar; after the observations, the members of the group met to compare and discuss the different results so obtained and to produce synthesis. Students were free to organize their activity in the way that appeared more convenient for them and less disrupting for the observed subjects, ranging from tacit and non-interfering observation, to video-reporting. The observer could develop a dialogue with the users under observation so to ascertain feelings and attitudes, or could also ask the observed subjects to express their flow of thinking during activities.

As a very important characteristic of the process, students were asked to document and report whatever attracted their attention or produce any emotional effect on them, without any worry to be out of focus in the observation, and, mainly, without any haste of getting any sense out of it.

From the education point of view, the experiment was successful: the students declared that it was useful and that it helped them in understanding the complex tangle of values, emotional reactions, cognitive processes and so on that are involved in the daily activities we perform in an automatic or semi-automatic way.

I argue that revealing the real complexity of experience related to a task or activity is an important step to produce valuable design inventions.



The experiment, as some student declared, was also useful in enhancing their personal sensibility and ability to *listen* and *see* the world, and recognize some little signs as meaningful.

## 4. Formatting rules

The above reported didactical activity produced a great quantity of documents that were successively analysed from different perspectives; the analysis produced results in terms of:

- information useful in a discussion of the approach adopted in ethnography and to improve it;
- hints concerning specific activities, also apt to inspire the creation of innovative products and services;
- knowledge of general interest concerning attitudes and values of inhabitants of domestic environment in our local contexts, useful in the development of products and services for any purpose in domestic environments;
- insights on lifestyles and local culture of living at home, useful in the investigation of motivations and needs that could find suitable response in the development of solutions for home automation.

With respect to what we learned about the approach adopted in the process, an important result of the experiment concerns the role of empathy in the relationship between designer/observer and observed subjects. In the education experiment, we proposed to the student to conduct observation either in their personal home or in the one of somebody they were familiar with mainly for practical reasons. As it possible to observe in the videos documenting the observations, the confidence and familiarity between observer and observed subjects made more natural the process, and most of users shadowed in their activities appeared willing to expose their activities and thinking, and to share habits and feelings.

Ethnography at home is unavoidably intrusive, but, from what we learned, the preliminary construction of an interpersonal relationship between observers and observed subjects, based on trust and empathy, could provide the ground for more effective research.

The collected materials are a rough but fertile source of inspiration and reveal unexpected facets of the experience, even when the observations focused on very simple tasks.

As an instance, I report here the results concerning the observation focused on “making and using the list of goods to buy”. The documents dedicated to this very basic activity, as expected, evidence a variety of different behaviours; some people regularly include in their routine the compilation of a list of goods for domestic consumption, (such as food, detergents and so on); some, instead do it as they notice that stocks are going to deplete; others do it as soon as things come to their mind; others never take note of missing items and simply prefer to remember, only to regret not knowing what to buy when they are at the supermarket. Besides the obvious findings, the observation provided other findings such as that the act of compiling the list of goods to buy, in several families or in some groups of roommates, is an activity that follow rituals and is an opportunity and pretext for social interaction. While making the list, parents talk with children about wishes and expected moments of pleasure, or they discuss with them qualities and criteria of choice for goods. With older sons and

daughters, or in non-parental cohabitant groups, the compilation of the list is intertwined with all the possible dynamic of social interaction and reflects roles and rules of living together. Both, in families and other typologies of cohabitant groups, the conversation about the goods to buy is intertwined with the exchange of news about personal events and programs, and with the playing of social organization within home, revealing a situation much richer than one could think for this practical task.

On the other hand, “compiling and using a list of goods to buy” is an activity involving memory and planning abilities and, therefore, especially for ageing people, it is often accompanied by different concerns about the capability of keeping under control the tasks of daily life as a sign of personal performances. In other words, the simple task of compiling the list of food items that should be bought is often related to some symbolic dimensions of experience, and with the sense of self and of the role played with respect to social relationships.

For some observed people, the mere act of compiling a list is capable to re-frame the shopping as a tedious accomplishment instead than an opportunity of enjoyment.

Despite the triviality of the example, I consider it as relevant and I argue that the development of every innovative product or service to be used at home should be carried on considering the complex tangle of symbolic and social values that are connected to each activity performed at home. In last years, several technology-based solutions that appeared as promising from the point of view of practical functions, instead encountered refusal of users. In my opinion, in several cases, the new solutions, despite their practical convenience, failed to encounter the favour of users because of the implicit consequences of their use on more ephemeral yet important consequences of their adoption with respect to social and emotional dimensions of life. The adoption of some technological solutions has also the power to affect the sense that people have of themselves, and of change the mental strategies of attention and memory. These potential consequences should be investigated and, possibly dealt with, within the design of innovative products and systems.

If we compare these finding with the features of some smart appliances recently presented in interior design fairs, such as refrigerators provided with cameras to be inspected at the distance through a smart phone so to get the information about the needed items, several of these new products seems not convincing and appear as quite far from actual needs and feels, at least in my country. Still, there is much space to develop other, more meaningful inventions, based on the application of digital technologies, more coherent with need of new value in terms of awareness and control on healthy habits and lifestyles, and responding to the desire of playfulness and pleasure in daily life, based on a deeper and more articulated understanding of the relationship that people have with their home and home-mates.

## 5. Lifestyle and local cultures issues in the design of technology based innovation

The collection of documents reporting the observations reveals the different dimensions of experience with respect to some other domestic activities.

As an instance, interesting results pertain a bunch of apparently different activities such as “leaving the house”, “entering the house” and “preparing to go to bed”.

Despite the obvious diversities between the three different situations, each one characterized by different tasks, they all appear to be characterized by intense emotional and cognitive engagement (due to the anxiety of having under control the correct accomplishment of duties and the status of material objects such as the locking of doors and windows). On the other hand, the engagement is due to other factors, less practical and more difficult to frame. Furthermore, despite the variety of attitudes, worries and behaviours exhibited by people with different age and with a different role in the house, most people seem to follow consolidated procedures so to cope with the complexity of “having done everything in the right way”.

Also the act of “entering the house” includes emotions and cognitive efforts: it is not only a list of material tasks, such as “opening and closing the door”, “turning on lights and heating appliances”, “getting free of bags and coats”, and so on.

“Entering the house” can be a most pleasurable instant of delight since it coincides with the end of a working day and to the moment of re-entering the shelter of the personal domestic freedom, but can also be a moment of anxiety, since it is the transition between two different dimensions of life, and with the re-assumption of social and domestic affections and responsibility.

We frame as similar these three activities since, for most people we had the chance to observe, they all correspond to a process of change of context/change of state, i.e. with a situation inducing persons to develop strategies of even rituals to sustain them.

Again, from the non-finalized collection of behaviours, we can be inspired so to produce new paradigms of products and services.

From what we learned, there are ample opportunities to create valuable products and services using technologies and to support the management of the functions connected to “opening and closing the house”, both for leaving and for sleeping, but, at least for the Italian users, the automation should provide awareness of the state of the single parts of the house instead than provide total blind management by the system.

Furthermore, the systems in charge of safety and security at home could be improved from the point of view of the experience if designed so to include personalization with respect to the social organization of the inhabitant groups.

As a last design hint that I report in this paper, it is worthwhile to mention some interesting results concerning habits and lifestyles of ageing people.

About this topic, we collected information on “spend time at home”. The documented activities include knitting, meeting with friends, making gymnastic and so on. As preliminary result, that would need further investigation, several people seemed to share some common factors and, notably:

- the need to have external stimuli to be encouraged, even more time in a day, to be active;
- to have the control on the home environment and daily routine so to have convenient lifestyle from the point of view of wellbeing;
- to have a *steady* domestic environment, where personal memories, preferred objects and overall organization are kept constant.

Again, these non-finalized results appear as fertile with respect to the development of innovative products and system, and to the purpose of understanding how the solutions that are today available on the market should be

personalized and optimized in order to be suitable and desirable for our local users.

The research also produces design knowledge in terms of more general insights that can be used as guidelines for the development of interactive products and services, some of which are here reported.

The approach to ethnography for design at home, based on observation on field not finalized to the development of specific solutions, but focused on single activities is fertile from the point of view of inspiration for innovative concept generation but also from the point of view of critical analysis of the products and system generated for a global market, but that not always are apt to encounter local acceptance.

For all the activities under exam, the research produced information about our local culture of living at home, and revealed the complexity of every single activity performed at home, evidencing that the way we perform activities in domestic environment has implicit yet strong and effective connections with our personal identity and sense of self; with the way we interpret the social interaction with our home-mates, also including affections, roles and practical organization; with emotional and cognitive processes associated to our values, habits and feelings with respect to issues such as privacy, safety, security and lifestyles.

The research also produced the convincement that there are ample opportunities to develop innovative products and system for the Italian users, despite the slow trend in the adoption of digital solutions for home in our local context.

In order to develop suitable products and services for our local culture of living at home, the research point out three different directions for application that seem more promising:

- the remote control of products and spaces;
- the customization of solutions based on progressive implementation of automatic systems, in an approach that consider the constant dynamic evolution of needs and interests that could find a response in digital products and services;
- the development of system that allow the automatic management of functions while supporting a direct control of the state of single elements.

A fourth direction seems to be interesting but, at the same time, appears to need further investigation. It concerns the development of systems to support a better use of energy resources, as an instance of those involved in the management of thermal comfort at home. While the advantages of such systems appear as evident from the point of view of economical convenience and from the point of view of the development of more responsible and sustainable behaviours, it is a difficult design goal to develop control systems and interfaces that could be used to manage this function while ensuring best perceived comfort and acceptable models of interaction.

## 6. Conclusions and final remarks

From the point of view of education, teaching ethnography in design programs and involving students in dedicated exercises is very effective to the purpose of training their ability of embrace the variety and complexity of the world. On the other hand, design oriented ethnography is a complex activity, requiring time and abilities that can only be partly transferred through a didactical process.

In my research, I learned that the final results of ethnography can be negatively affected when the designers performing observations are exceedingly focused on partial elements of the user experience, or, worse, when they are much oriented to find, here and now, a winning idea (a “killer application”) leading and motivating all the following design activities. The haste (or, maybe, the anxiety) of performance distracts the designers involved in research on field from the goal of a neutral observation of people behaviours. In observation on field, we are exposed to a vast amount of information, some of which capture our attention and can be interpreted immediately; some, instead, requires time and thinking before it can be framed and elaborated. The collection of videos and pictures during observation with no finalization, supports the post processing of data and information, and allows the development of non-trivial knowledge and inspiration. The above reported experiments produced useful results and confirmed the suitability of an approach to ethnography for design based on strict separation between the activities dedicated to the observation on field and those aimed to the creation of innovative concepts: “cold” documentation of user experience and research with no finalization can produce specific design hints and general interest insights.

Theoretical knowledge about emotions and cognitive processes is useful in ethnography for two reasons: first: it supports the observation of behaviours and attitudes from a holistic perspective, including functional and emotional dimensions of the experience; second: this knowledge makes designers (and students) aware of their own emotions involved in every phase of the design process, included the research ones. Every design experience is rich of emotions and events for designers, and it requires the ability to confront individual visions and proposals with those of the other actors involved in the project (Trabucco, 2015). This is true both in professional activities and in education project studios. When observation on field is conducted without the haste of producing immediately results in terms of design choices, designers feel free to collect data, information, stories and feelings with an open attitude. They can also focus more on their own feelings and emotions, enacting experiential acquisition about the contexts. The experiments reported above, demonstrated that the materials collected in this way, provide the ground for subsequent design of interactive solutions focused not just on the functional issues, but also on other dimensions of the experience that can determine the desirability of the innovative solutions.

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**REDOING** Creativity, Design Process & Student Learning  
**Room** 1.2 // Friday 2 June // 9.00-11.00

Title	Presentation
Towards a Taxonomy of Design Learning based on Students' Reflective Writings	Koray Gelmez
Student Innovation Labs in Design Education: The Case of the Sustainable Design Lab at the Estonian Academy of Arts	Reet Aus, Harri Moora, Markus Vihma and Nameda Belmane
Design Action & Social Impact	Nova Olson, Pete Fung and Samien Shamsheer

**REDOING** Embodiment, Emotionality & Togetherness  
**Room** 2.15 // Friday 2 June // 9.00-11.00

Title	Presentation
Teaching Healthcare Design. Methods for Empathy	Kathrina Dankl
Sharing Video Datasets in Design Research. The Case of DTRS11	Bo T. Christensen and Silje Julie J. Abildgaard
Co-creating an Accessible, Multi-sensory Exhibition with the National Centre for Craft & Design and Blind and Partially Sighted Participants	Anne Chick

**REDOING** Boundaries, Systems & Frameworks  
**Room** 3.21 // Friday 2 June // 9.00-11.00

Title	Presentation
Extracting User Requirements for Product Design: A Supportive Framework for Designers	Kieu Que Anh and Yukari Nagai
Trail of Evidence	Alissa van Asseldonk, Renate Catherina Scheepers and Bas Raijmakers
Constructing your own Reality prevents others from doing it for you: A Shift towards Culturally Inclusive Design Education	Nan O'Sullivan
REDOing Fashion: The Open Design Object	Kristine Harper and Sofie Edvard

**REDOING** Maker Methodologies, Citizenship & Research Communities  
**Room** 3.6 // Friday 2 June // 9.00-11.00

Title	Presentation
Bridging Social Innovation and Business. A Co-design Experience for a Community Welfare Project	Marta Corubolo and Ilaria Pais
Design as Key to Unlock the Wicked Problem of Sustainability	Else Skjold, Ulla Ræbild and Karen Marie Hasling
A Collaboration between various Education Institutions and Government Departments in order to develop Learning Skills for the 21st Century	Maria Thiel and Des Laubscher



# Towards a Taxonomy of Design learning based on Students' Reflective Writings

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**Abstract:** This study<sup>1</sup> is an attempt to propose a taxonomy of design learning based on students' structured reflective diaries. 50 students enrolling Basic Design I in the Department of Industrial Product Design at Istanbul Technical University (ITU) participated to the empirical part, based on The Revised Taxonomy adapted from Bloom's Taxonomy, which aims to specify cognitive levels in learning. The Revised Taxonomy includes 6 hierarchical levels, which are *Remember, Understand, Apply, Analyze, Evaluate, Create*. Emerging from the researcher's insights on coding process of design students' diaries, there appears four levels in the cognitive process in design learning that we can capture and stimulate via reflective writing, which are *Report, Realize, Analyze, Criticize*.

**Keywords:** Design education, design pedagogy, learning, reflective writing, Bloom's Taxonomy

## 1. Towards a discipline-specific taxonomy

Bloom's Taxonomy emerged from the conference in 1948 in Boston by the educators and scholars suggesting a method to classify objectives in student learning. Three primary domains constituting learning process were specified, which are namely cognitive, affective and psychomotor domains. Following the conference, three books focusing on these domains were separately published with the contribution of the several scholars. The first one was on cognitive domain entitled as *Taxonomy of educational objectives: The classification of educational goals, Handbook I: Cognitive domain*, edited by Bloom et al. (1956). This handbook has been used as a tool to identify student learning outcomes, assessment methods, and instructional objectives (Anderson & Krathwohl, 2001). And thenceforth, it has been used in a wide range from curriculum development to assessment regarding especially cognition and performance (Abe & Starr, 2004),

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<sup>1</sup> This study is based on the researcher's insights of the PhD dissertation titled as "Delving into Curriculum Content and Pedagogy of the First-year Industrial Design Studio through Reflective Writing: A Study on Cognitive and Affective Processes", conducted at Istanbul Technical University, Industrial Product Design Programme in 2016.

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and it has been revisited and revised in several studies (see Grimberg & Hand, 2009; Krathwohl, 2002; Marzano & Kendall, 2007).

Basically, Bloom's Taxonomy categorized students' thinking processes into six complex levels with sub-categories, which were revised later:

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

From knowledge to evaluation the level of cognitive complexity is increasing. While knowledge is at the basic level, evaluation is at the highest level of complexity (Bloom et al., 1956).

Krathwohl (2002) updated the original Bloom's Taxonomy as in the following, which is called as the Revised Taxonomy:

- Remember
- Understand
- Apply
- Analyze
- Evaluate
- Create

There are six levels for the cognitive domain in the Revised Taxonomy (Krathwohl, 2002). The Revised Taxonomy perceives learning as an active process. That's why Krathwohl (2002) changed the noun form of cognitive domain names into verb forms e.g. *Analyze* instead of *Analysis*. Moreover, sub-categories were replaced with the gerund forms of the related verb e.g. *Remembering*, *Organizing*, etc. Cognition in the original taxonomy was named as "cognitive domain". However, the Revised Taxonomy called it as "cognitive process" to refer active nature of learning again (Krathwohl, 2002).

The details of all categories in the Revised Taxonomy will be given in the following (see Krathwohl, 2002):

*Remember* is suggested for the first level of the cognitive process instead of *Knowledge* in the original version of Bloom's Taxonomy. *Remember* may refer to *Recognizing* or *Recalling*. In this level, the objective of education is to keep and declare the related knowledge from long-term memory (Krathwohl, 2002).

*Comprehension* was renamed as *Understand*, which covers *Interpreting*, *Exemplifying*, *Classifying*, *Summarizing*, *Inferring*, *Comparing* or *Explaining*. In this category, students start to make sense of the knowledge (Krathwohl, 2002).

*Application* was retitled as *Apply*. *Executing* and *Implementing* were suggested as the subtitles of *Apply*. In this level, students are performing something that is learned before (Krathwohl, 2002).

*Analyze* was suggested for *Analysis* level. *Differentiating*, *Organizing* or *Attributing* were the actions that students can achieve. This level refers to see the interrelationships of a whole (Krathwohl, 2002).

The verb form of *Evaluation* was recommended as *Evaluate*, which also covers *Checking* and *Critiquing*. This level focuses on making judgments and criticisms (Krathwohl, 2002).

As the last level of the cognitive process, *Create* was used instead of *Synthesis*. *Generating*, *Planning* and *Producing* are subtitles of this level. In this highest level, students start to create novel ideas or products (Krathwohl, 2002).

One of the crucial changes in the Revised Taxonomy was the replacement in the fifth and sixth levels. In the original Bloom's Taxonomy, *Synthesis* is the fifth level whereas *Evaluation* is seen as the last and the most sophisticated level. However, in The Revised Taxonomy, *Create* is proposed as the last level, and hence it is considered as the highest order thinking skill (Krathwohl, 2002).

The Bloom's Taxonomy and The Revised Taxonomy include sub-categories, which is also called illustrative verbs. The Revised Taxonomy and the illustrative verbs can be summarized in the following (Krathwohl, 2002):

1.0 Remember – Retrieving relevant knowledge from long-term memory.

1.1 Recognizing

1.2 Recalling

2.0 Understand – Determining the meaning of instructional messages, including oral, written, and graphic communication.

2.1 Interpreting

2.2 Exemplifying

2.3 Classifying

2.4 Summarizing

2.5 Inferring

2.6 Comparing

2.7 Explaining

3.0 Apply – Carrying out or using a procedure in a given situation.

3.1 Executing

3.2 Implementing

4.0 Analyze – Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.

4.1 Differentiating

4.2 Organizing

4.3 Attributing

5.0 Evaluate – Making judgments based on criteria and standards.

5.1 Checking

5.2 Critiquing

6.0 Create – Putting elements together to form a novel, coherent whole or make an original product.

6.1 Generating

6.2 Planning

6.3 Producing

Bloom's Taxonomy is a crucial contribution since it has shaped cognitive studies in educational research. Whereas cognition is mostly related to remembering and

understanding, metacognition encompasses thinking about and controlling over remembering and understanding (Papaleontiou-Louca, 2008). In brief, cognitive activities enable learner to reach a particular goal such as understanding a phenomenon while metacognitive strategies make learner to check and confirm if the goal has been accomplished (Livingston, 2003). In this respect, starting from analyzing level in the Revised Taxonomy, the learner is accepted as utilizing metacognitive skills. In brief, analyzing, evaluating and creating levels are regarded as metacognitive levels.

Bloom's Taxonomy and the Revised Taxonomy were developed as generic as possible to cover a wide range of disciplines, and supported with illustrative verbs. Regarding this, Benjamin Bloom considers the taxonomy as an initial point by stating that "Ideally each major field should have its own taxonomy of objectives in its own language — more detailed, closer to the special language and thinking of its experts, reflecting its own appropriate sub-divisions and levels of education with possible new categories, combinations of categories and omitting categories as appropriate" (as cited in Anderson & Krathwohl, 2001, p. xxvii). By this means, it is possible to develop a discipline-specific taxonomy. Regarding architecture education, Kurt (2012) examines the Bloom's Taxonomy, and asserts that cognitive skills can be seen as the knowledge of design whereas affective skills signify a continuous attitude of designers. Also, psychomotor skills refer to the ability to draw and to make models. From this point of view, one can claim that the first-year industrial design studio also embraces all these three learning domains of the Bloom's Taxonomy. This study is an attempt to discuss the Revised Taxonomy under industrial design discipline through an empirical study.

## 2. The study

This study is based on the researcher's insights on coding process of design students' structured reflective diaries. 50 students enrolling Basic Design I in the Department of Industrial Product Design at Istanbul Technical University (ITU) in the fall semester of the 2013-2014 participated to empirical part of this study. During the semester, 976 diaries were submitted.

Seven questions were asked to the students as following to make the students reflect on their learning process and experiences cognitively and affectively:

- What are my feelings and thoughts about the today's class?
- What did I learn today?
- How did the today's class contribute to my learning process?
- What couldn't I understand in today's class? Why not?
- How have my ideas changed?
- What is the link between the things that I have learned in today's class and the things that I have learned previously?
- What would I want to change if today's class was repeated? Why?

In this study, content analysis was utilized to make analysis of the raw data by using Atlas.ti qualitative analysis software. In this process, the raw data was converted into the data segments and given codes. Furthermore, the researcher was able to add memos to his/her analysis.

During the coding process the cognitive level in the pilot analysis phase, the researcher endeavored to be loyal to the illustrative verbs derived from the Revised Taxonomy. Yet, it was seen that some of the verbs did not correspond to

the expressions in the diaries. The illustrative verbs that meet the cognitive levels can be seen in Table 1.

Throughout the pilot coding stage, the illustrative verbs were re-adjusted and specified according to the context of this study. And a final coding template was prepared according to this adjustment (Table 1).

*Table 1. The specified and re-adjusted illustrative verbs for cognitive process.*

Cognitive level	Illustrative verbs/phrases
Remember	Remembering Recognizing Recalling a past event without giving any impressions Declaring a fact mentioned in the previous classes
Understand	Understanding/not understanding Realizing Interpreting Inferring Giving examples Summarizing the class Making explanations Comparing without giving a reason Giving impressions or emotions
Apply	Applying Implementing Describing the making process Describing physical qualities of an object
Analyze	Attributing something to something else Supporting something with something else Providing explanations in cause-effect or reason-result relationship
Evaluate	Criticizing herself/himself, the process, the teachers etc. Making comparisons under a set of rules or qualities Establishing connections with prior activities
Create	Forming a hypothesis Planning Generating idea, wish, hope, request

### 3. Concluding remarks

When cognitive score of each class was calculated, the levels of applying and creating seem to be relatively lower than the others. Two reasons were argued for this difference. First of all, the pedagogy and the reflective diaries do not depend on making process. Instead, whereas the pedagogy is based on how the students argue their projects, the reflective diaries are structured to support students' cognitive and metacognitive skills. As a result, the students do not have an inclination to include making processes in their diaries. The other reason was explained with the nature of design process, where the outcomes inherently cover the making process. Figure 1 depicts this adaptation.



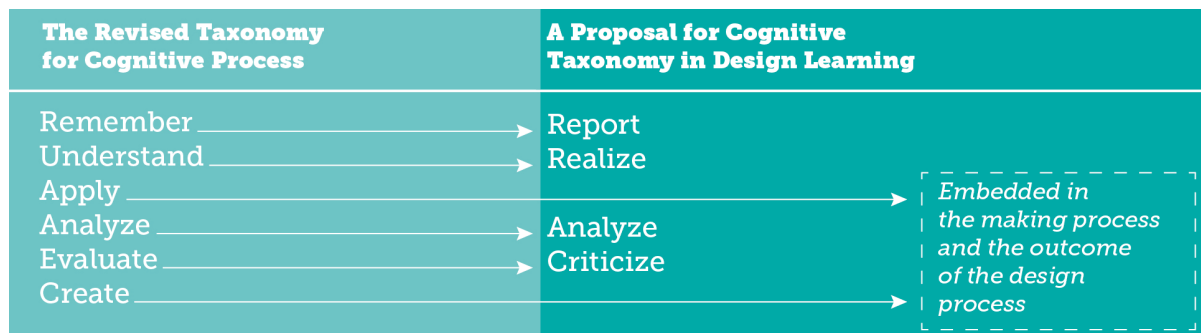


Figure 1. A proposal for cognitive taxonomy in design learning.

Hence, there appears four levels in the cognitive levels in design learning that we can capture and stimulate via reflective writing:

*Report:* This first lowest cognitive level refers to report, remember, recognize, recall a past event without giving any impressions, declare a fact mentioned in the previous classes.

*Realize:* In this level, design students understand/not understand, realize, interpret, infer, give examples, summarize, make explanations, compare without giving a reason, give impressions or emotions. Instead of *Understand* in the Revised Taxonomy, it is renamed as *Realize*, because in the reflective diaries, students frequently used this as a reference to the sparking moment of something.

*Analyze:* This level signifies to attribute something to something else, support something with something else, provide explanations in cause-effect or reason-result relationship.

*Criticize:* In this level, design students criticize herself/himself, the process, the teachers, etc., make comparisons under a set of rules or qualities, establish connections with prior activities. The students mostly made critics on themselves, the process, and the teachers, which can be associated with the collective critique sessions in the classes. As a result, instead of *Evaluate* in the Revised Taxonomy, it is renamed as *Criticize* to underline this domain-specific taxonomy.

Table 2. A proposal for cognitive taxonomy in design learning.

Cognitive level	Illustrative verbs/phrases
Report	Remember
	Recognize
	Recall a past event without giving any impressions
	Declare a fact mentioned in the previous classes
Realize	Understand/not understand
	Realize
	Interpret
	Infer
	Give examples
	Summarize the class
	Make explanations
	Compare without giving a reason
	Give impressions or emotions

Analyze	Attribute something to something else Support something with something else Provide explanations in cause-effect or reason-result relationship
Criticize	Criticize herself/himself, the process, the teachers, etc. Make comparisons under a set of rules or qualities Establish connections with prior activities

As provided in the Revised Taxonomy, illustrative phrases are given in Table 2 to elaborate the levels.

As the Bloom's Taxonomy and the Revised Taxonomy give the opportunity to prepare a discipline-specific taxonomy, the proposal for cognitive taxonomy in design learning was presented in this section. The massive data stemming from the reflective diaries gave motivation and sufficient feedback to generate this as an introductory level model. From this point on, there is a necessity for rigorous empirical studies to check, extend and elaborate it in the context of design education.

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# Student Innovation Labs in Design Education: The Case of the Sustainable Design Lab at the Estonian Academy of Arts

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**Abstract:** Today's design graduates need to possess strong communication and teamwork skills, as well as a broader perspective of the social, environmental and economic issues that concern their profession. This is the reason why many universities have established new learning environments – Innovation Labs, IDEA Labs, MakerLabs, FabLabs, etc. In “new” European Union member states such as Estonia, the universities have also recognised the need for a project- and problem-based instructional approach to educate students in design thinking. The aim of this paper is to present the results of the European Union Erasmus+ Programme project INNOLABS, with the Sustainable Design Lab at the Estonian Academy of Arts as an illustration. The Sustainable Design Lab is the first education platform of its kind in Estonia that promotes a student-centred, design-based approach to teaching along with interdisciplinary collaboration amongst university students, researchers and established companies.

**Keywords:** Design education, innovation labs, student design projects

## 1. Introduction

The pace of change today and the complex challenges faced by businesses and society require an equally complex and dynamic process that accelerates creative solutions. The problems designers face today are different compared to the challenges that were faced in the past decades. New ways of communication and collaboration – the ability to look at problems differently and imagine new business models and thinking – will be key to defining the economy of the future. In a largely globalised world, where the changes in economic and natural

resources can be felt halfway around the globe, our challenges are becoming more intertwined with the systems that connect us all (Brown, 2009).

To meet these new expectations, schools and universities need to depart from the ideas and teaching methodologies of yesterday and start to develop new learning modes (Pearlman, 2009). This applies also to design education. Preparing design students for success in a rapidly changing world requires that we redesign design education. Today's design graduates need to possess strong communication and teamwork skills, as well as a broader perspective of the social, environmental and economic issues that concern their profession. This is the reason why many universities have established new learning environments – Innovation Labs, IDEA Labs, MakerLabs, FabLabs, etc. These types of new structures provide learning environments for students to work collaboratively on design thinking projects. Each of these organisations also provides programs and pedagogy that, together with the new learning environments, develop a culture and space for creative learners. The problem- and project-based learning models that have been used in those student innovation labs have shown that the students are generally more motivated, demonstrate better teamwork and communication skills, and develop a better understanding of the application of their knowledge in practice and the complexity of the issues involved in professional practice (Mills and Treagust, 2003).

In “new” European Union member states such as Estonia, the universities have also recognised the need for a project- and problem-based instructional approach that educates students in design thinking. For example, in Estonia, collaboration, communication and innovative thinking are so far not stressed in traditional design education curriculums. Yet, the universities and industry have recognised that many university graduates, although well-versed in the disciplinary knowledge, do not possess the design thinking and working skills necessary in the complex and multidisciplinary product development environments. Also, the students themselves are calling for more student-centred, hands-on teaching and learning strategies (INNOLABS, 2015).

The aim of this paper is to present the results of the INNOLABS project, using the Sustainable Design Lab (SDL) at the Estonian Academy of Arts (EEA) as an example. The SDL is the first education platform of its kind in Estonia that promotes a student-centred, design-based approach to teaching along with interdisciplinary collaboration amongst university students, researchers and established companies.

## 2. The INNOLABS project

Student innovation labs – a way to sustainable and socially responsible growth (INNOLABS) is a project funded by the EU Erasmus+ Programme and was implemented from 2014–2016. The INNOLABS project aimed to raise the bottom-up innovation capacity for the benefit of sustainable and socially responsible growth in Estonia, Latvia and Cyprus, based on the experience of Denmark and the Netherlands.

One of the main results of the project was to create student innovation laboratories in the project partner universities – the Estonian Academy of Arts in Estonia, Vidzeme University of Applied Sciences in Latvia and Cyprus University of Technology in Cyprus. The project was implemented by the lead partner “Foundation for Society” (Latvia) in cooperation with Stichting NHL (Netherlands),



Aalborg University (Denmark), Interfusion Services (Cyprus) and Stockholm Environmental Institute Tallinn Centre (Estonia).

During the project, the methodological guidelines for student innovation labs were developed based on the long-term experiences of Aalborg University and Stichting NHL (the Frisian Design Factory). Aalborg University was established in 1974, and since then all university programmes have used problem-based learning (PBL). Aalborg University students work in groups, applying problem-oriented methods in preparing projects of high academic standards. The PBL-based pedagogical model of the University has become both nationally and internationally recognised by universities, researchers and students as an advanced and efficient learning model. The Frisian Design Factory belongs to the Design Factory Global Network that was established with the initiative of the first Design Factory at Aalto University in Finland. The Design Factories function as platforms for interdisciplinary product development education, research and industrial collaboration, and, in a wider sense, as a catalyst for a culture of experimental and design-based learning in higher education.

### **3. The case of the Sustainable Design Lab at the Estonian Academy of Arts**

#### **3.1 Design education at the Estonian Academy of Arts**

The Estonian Academy of Arts is the only public university in Estonia that provides higher education in fine arts, design, architecture, media, visual studies, art culture and conservation. Currently there are around 1,100 students enrolled at the Academy, with many participating in exchange programmes at international partner universities. In addition to active study and research activities, the Estonian Academy of Arts also offers lifelong learning opportunities through the Open Academy.

While offering a wide selection of specialities, the Academy also offers unique, individualised study and personal mentorship by members of the faculty. The departments are strong bodies of competence on their own, while at the same time facilitating synergy and interdisciplinary studies. Many faculties have been operating for close to a century. They have lengthy experience and historical continuity, while pioneering change in their field. The Academy welcomes motivated people who are visually and socially sensitive and want to develop their thinking abilities, opportunities and potential as creative people. The goal of the Academy is for graduates to be able to function successfully in society and work as independent creators and thinkers.

The EAA collaborates with universities, cultural institutions, artistic associations, local government bodies and businesses in Estonia and abroad. The partners vary depending on the area of specialisation, and the Academy is able to offer a range of services from research and analysis to creating prototypes. The present EAA Faculty of Design comprises seven specialities: graphic design, jewellery and blacksmithing, ceramics, glass art, fashion design, leather design, textile design and product design. More than 600 people have received higher education in design in the academy during the past decade.

There are also other universities in Estonia providing design education, however it is in the Estonian Academy of Arts where the top-level design education has been mainly concentrated. On the other hand, the EAA has been criticised for keeping

its designer education somewhat isolated and there have been calls for moving the teaching and education towards greater cooperation with companies and other research/education institutions, both on the international and local level. The Department of Development interacts with businesses based on separate projects, and the education programmes are often not integrated into this cooperation. The need for more problem-based education as well as more internationalisation is evident (INNOLABS, 2015).

Several studies (TNS Emor, 2013; Expert Group Report, 2012) have underlined the largely underdeveloped state of demand for design in Estonia and the scarcity of integrated sustainable design solutions. The EAA has recognised that a desirable change would be based on viewing design as a vehicle of user-centred innovation. Therefore, there was an acknowledged need to change the designers' education and relevant curriculum to more practice-based learning by taking up real-life innovation challenges offered by companies and other organisations. In addition, there was also a clear need for a separate physical and organisational environment (new creative innovation and design platform) within the EAA that can take on the role of developing the university-wide design education and cooperation between research and professional practice.

## 3.2 Sustainable Design Laboratory

### Aim and structure

The Sustainable Design Laboratory was established as a new hub of up-to-date design education and research that focuses on cooperation with companies, public sector organisations and professional designers (see also Figure 1). The objective of the Sustainable Design Lab as a design and sustainable innovation platform is to accelerate and support practical and problem-based design education at EAA. It aims to link the theoretical learning of product development and design with practice by bringing together researchers, students and practitioners. It is a separate unit which acts as an independent research institute and teaching framework that organises courses for all students of Estonian Academy of Arts.

The founding principles were derived from the design and innovation models of more experienced countries and institutions, while adjusting them to be suitable for the Estonian context and the Academy's particularities. Its concept and approach is inspired by the other INNOLABS project partners' design labs and factories (especially the Frisian Design factory at the NHL Hogeschool in the Netherlands and Aalborg University in Denmark) and builds on previous innovation at EAA (Innovation Centre, Department of Research & Development, EAA Foundation, etc). SDL shares the same passion and values of the Design Factory Global Network by inspiring with examples and practical projects, attracting people with helpful and proactive attitudes, providing encouragement and practical support and allowing freedom in work.

SDL's focus is on sustainable design with an emphasis on circular economy. This focus was chosen largely because of the lack of knowledge and education on sustainability issues and a growing desire to develop and implement new circular design approaches. So far the knowledge creation in circular economy and its business and design models has been largely ignored in other universities and in design education. A fresh focus on sustainability facilitates the improvement of skills to tackle environmental and social issues with product and service development. Moreover, it also builds on one of EAA's core strengths - the long tradition of crafts education, ranging from fashion to blacksmithing and ceramics.

The new structure works as an open innovation platform, encourages entrepreneurial culture in the university and accelerates development. SDL is a physical and organisational environment within the EAA where cross-sector innovation and multidisciplinary cooperation between education, research and professional practice takes place. SDL is already linked with the creative industry, building sector and textile and fashion industry.

Sustainable Design Lab as a platform:

- Provides leading-edge sustainable design tools and know-how, as well as support to EAA in teaching interdisciplinary courses.
- Provides holistic learning experiences for students in solving real-life challenges in multidisciplinary teams.
- Provides opportunities to EAA researchers to form and participate in design- and practice-led research initiatives and to study different methods related to sustainable innovation, design and business.
- Provides an innovative environment and assistance to the public sector and private enterprises for finding and realising new ideas.
- Facilitates design and innovation collaboration and knowledge-sharing with other universities and research institutions.

The Sustainable Design Lab is a separate institution at the Estonian Academy of Arts and is working in close cooperation with the faculties of Design and Architecture and the Department of Research and Development and the Research Council. The partners of SDL are cooperating closely in order to be quickly responsive, keeping the interaction informal and non-hierarchical. Its current team consists of the leading senior researcher, a junior researcher and two external partners, all of whom are also lecturing and supervising. Additional experts are invited to supervise professional skill-specific projects that students are involved with.

## Research & Development

SDL brings together researchers from different disciplines to explore product design issues with diverse methodological approaches. Practical design projects play an important role in the research of SDL. Practical projects create the input that is further combined and contextualised into scientific research. The majority of the projects are run as students course projects, but some are separate research projects in which students are included as part of their individual courses or research topics (such as Trash to Trend).

The research concentrates on investigating the processes of sustainable design through the lens of circular economy (circular design). Research is based on practice-led methodologies that are based on the processes of professional design. The research topics of the Sustainable Design Lab combine a practical process-centred approach with the conceptualisation of the design problem, concentrating on two main topics:

- Trash to Trend – upcycling design. It explores the possibilities of the upcycling design model in the fashion and textile industries. The topic is based on Reet Aus's doctoral dissertation "Trash to Trend – Using Upcycling in Fashion Design" (Aus, 2011). The design model of Trash to Trend seeks to find a comprehensive solution for the waste generated during mass production in textile and fashion industry. The research has led to a real life circular business model called UPMAD

(see also <http://www.upmade.org>). As such the Trash to Trend based upcycling design approach has been one of the first and ground-breaking initiatives in the area of upcycled fashion design (Aus, 2011; Cassidy and Han, 2013; Han et.al, 2014).

- Design as a driver in a practical circular economy model. The aim of the research topic is to analyse particular practical solutions to find applications for a circular economy model. Circularity models and important factors are analysed, both at the global and company or design-process level. This research topic allows to seek out working design approaches, assess their viability and business models and generalise the results for the benefit of application of similar endeavours. New projects will be created and existing ones modulated to test the assumptions derived from the research for enhancing the circular economy model.

## Education

The Sustainable Design Lab runs two interconnected courses: Sustainable Design Theory and Practice. The courses use problem-based learning. The students are given the necessary knowledge and practical skills to apply the integrated design thinking processes of product development - from the generation and defining of ideas to prototyping, testing and realising products and services.

Sustainable design courses teach students about the principles of sustainable entrepreneurship, main environmental developments and the approaches and methods of sustainable product development and design. Those include Life Cycle Analysis, circular economy, systems mapping, recycling, upcycling, zero waste, the impact analysis of materials and components, etc.

The aim of the two courses is to prepare students for professional work through realistic and integrated cooperation with partners in different fields. It helps to understand one's own actions and participation in the global economic, production, environmental, legal, community and eco-design contexts. After finishing the courses, the students are capable of participating in the sustainable product and service development process, assessing and analysing environmental and social aspects connected to product development, using various sustainable product development and design methods, including carrying out environmental impact screenings for products and services.

The courses last for two semesters. The first semester has more lectures and seminars to give the necessary background knowledge of product development and design. The students gain an overview of social and environmental problems and existing economic models. They learn to analyse systems and its alternatives, circular economy, principles and methods of environmental impact assessment. The aim is to inspire the students to see design as a tool to solve different societal problems and how a designer is capable of guiding processes by knowingly following the principles of sustainability to prevent economic, social and environmental harm. In parallel with and based on the lectures, group projects take place that are based on real company or organisational challenges that the team starts to investigate, map out and solve.

In the second semester, the students learn within their group projects to independently find and solve problems and to communicate different stakeholders under the guidance of supervisors and mentors. The final results and outcomes of the projects are presented to EAA, the cooperation partners and a wider interested audience.

## **Student projects**

SDL seeks out projects that address real-life problems that companies and organisations have and are willing to pose as a challenge for the student teams. They are negotiated with companies and organisations before the study semester begins. The details of the problem, team, engagement and costs are agreed upon in general terms and are further specified at the end of the first semester with a presentation to the client.

Student projects are conducted using the methodology developed in cooperation with Aalborg University. The projects are carried out in groups of generally 3–5 people, depending on the project. The groups are formed from attendees of the Sustainable Design Practice course on a voluntary basis after all available project ideas are pitched to the students. One lead supervisor is the owner of the projects and invites a second supervisor with a complementary skillset. The work process relies on the classical design thinking approach seamlessly combining research, ideation and prototyping. The teams are formed and work processes are agreed upon to be able to function as independent professional teams, similar to a professional setting. Developing relationships is an essential part of the process. The supervisor guides the work process and reflects on the group dynamics.

## **Examples of student projects**

### **Brand Hula / Trash to Trend platform**

Hula is a real-world framework to help students look into the business side of the circular design process. Students are involved by leading the brand and also developing numerous products. Hula uses the Trash to Trend platform as an incubator and window to meet the customer. TTT is focused on sharing left-over materials among upcycling designers and provides a testing environment for developing and selling products.

HULA is also an umbrella EAA brand fuelled by the wish to promote a sustainable approach and collaboration between all departments of the Estonian Academy of Arts. The products created according to the principle of upcycling and using the help of Trash to Trend platform have included handicraft notebooks created from students' old sketches and paintings, dice-shaped penholders made of clay and porcelain leftovers, cutting boards made of oak wood residue and accessories created from lamp shades.



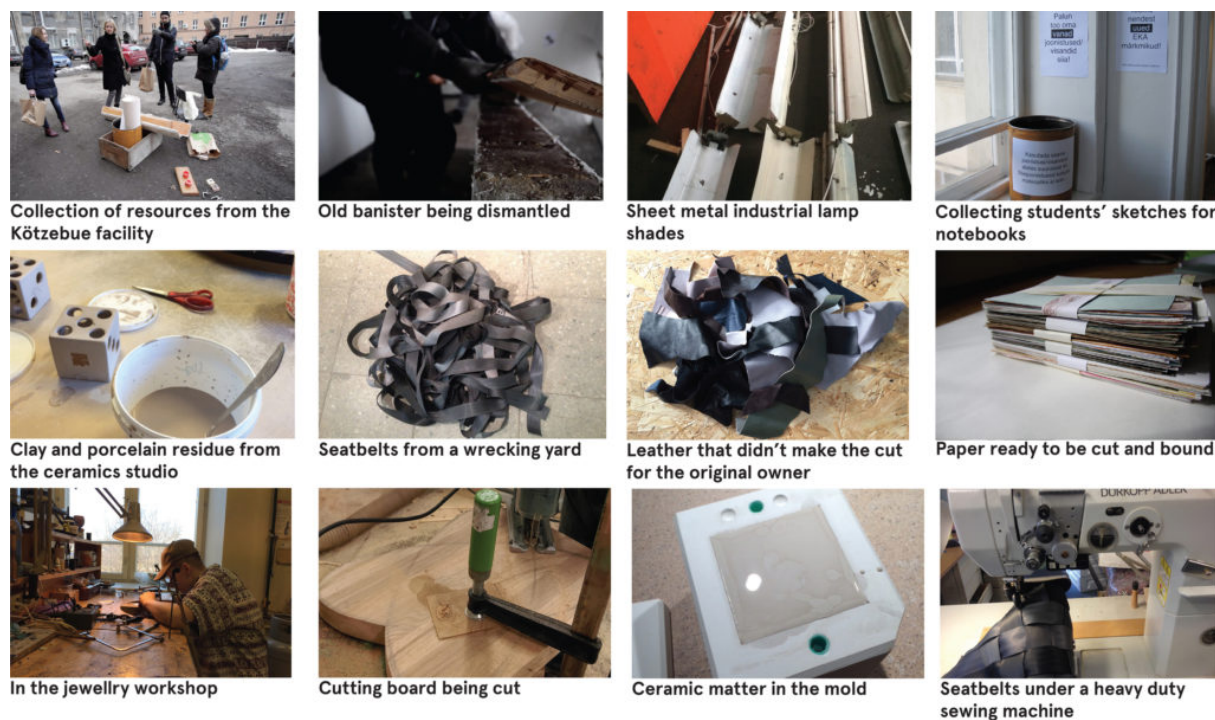


Figure 1. Material recycling operations



Figure 2. Products and experiments for HULA student projects from recycled materials

### Hula lamps from laboratory glassware

An abundance of laboratory glassware was identified that would have otherwise been destroyed and sent to the landfill. Laboratory glassware is now made mainly from plastic, so leftover glassware has no practical use in a modern laboratory. The material looks attractive, but the shape and construction make it difficult to upcycle. The challenge is to figure out how to design it into a new product. Laboratory glassware refers to a variety of equipment, traditionally made of glass, used for scientific experiments and other work in science, especially in chemistry and biology laboratories. As the material is borosilicate glass, made of silica and boron trioxide, it is very resistant to thermal shock. Therefore the idea was to upcycle the glassware into lamps.



Figure 3. Available material

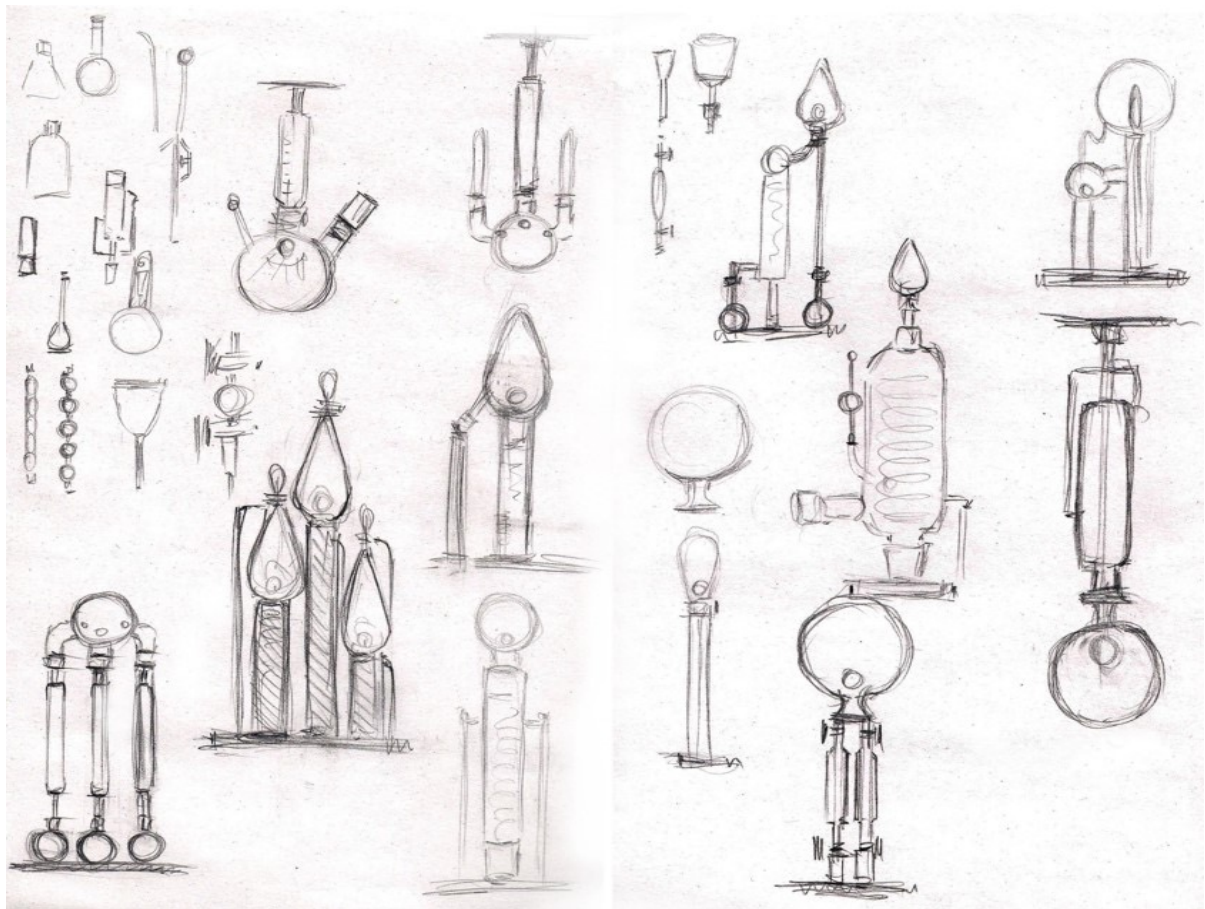


Figure 4. Idea sketches

#### Development of a sustainable food box to replace plastic-based solutions

The restaurant Burger Box wished to be able to use a solution that is sustainable and that people would want to actively use. It must be easy to use and shame-free for the customers. Most food containers are not made from sustainable materials.

Students made a research of different alternative sustainable materials to substitute the current plastic material. They came up with the proposal to use molded fibre for the new food box. Molded fiber is strong and heat resistant, and can handle hot liquids up to 100° Celsius. Utilizing both pre- and post-consumer recycled fibre, it is possible to provide a new package that is both environmentally friendly (made from recycled materials and fully compostable) and functional. Producing it with sugarcane and wheat straw will make it water resistant (without the need for a plastic or wax lining, plus meeting FDA standards for food contact)



The project is in the prototyping phase and the negotiation process with a local manufacturer who is capable of developing the necessary mould and can provide production capacity in mass quantity.

## BOX sizes concept

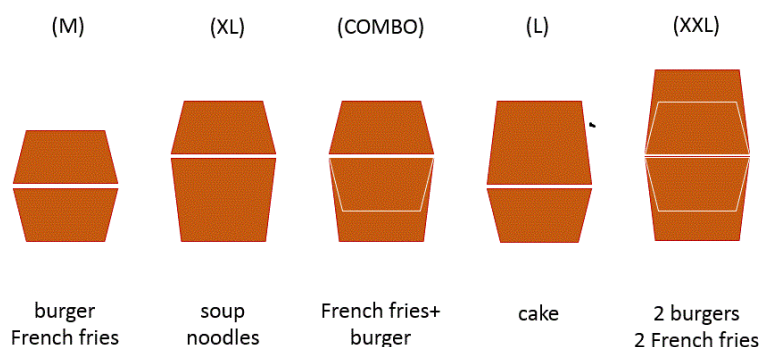


Figure 5. Food box concept

## 4. Conclusion

The Sustainable Design Lab founded as a result of the INNOLABS project has been successful and has helped the Estonian Academy of Arts to diversify its practical education. The Sustainable Design Theory and Practice courses are growing stronger, and SDL has positioned itself as a stand-alone entity within the structure of the academy. It acts as a platform for research and development with companies and organisations, and student-run projects provide valuable input for the two main research topics – upcycling design and circular economy. The first SDL experiments have helped to mature the teaching methodology and strengthened its structural and curricular position.

The biggest issue so far has been the overall curriculum structure of the Academy that does not support a full-year project development when conducting the activities under the SDL as regular courses. Better planning and early involvement motivate students to take ownership of their learning and project results.

The overall feedback from students and the university management has been very favourable, and there is no hesitation within the Estonian Academy of Arts that it is the right way forward. The challenge ahead is to grow and further cooperate. It is important to solidify SDL's position within the academy as an experience and knowledge hub in order to reach more students and get the best supervisors and teachers. But furthermore, cooperation outside the Academy is essential – both national and international. The Sustainable Design Lab needs to build networks to exchange experiences, best practices and also students to expose them to other challenges and other ways of thinking. Strong networks and cooperation foster

synergy to bring SDL to the forefront of innovation and cultivate a forward-looking mindset.

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# Design Action & Social Impact

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**Abstract:** This workshop was a student-led initiative that occurred over one morning at Emily Carr University of Art and Design. It's main purpose was to utilize the framework of a design charrette to investigate ways in which students across all disciplines and years could begin to think about designing differently. The aim was not to generate pragmatic outcomes, as is the expectation of a traditional charrette, but rather to create a generative space to foster critical, and reflective thinking. Social impact was chosen as the theme, as 'the social' functions as a holistic common ground; open to different experiences and knowledge bases, allowing all of the participants, regardless of skill, education and background, to share, explore and respond equally through discernible actions.

**Keywords:** Design, action, social, documentary, charrette

**Film Contribution:** <https://vimeo.com/217802487>



# Teaching Healthcare Design. Methods *for* Empathy

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**Abstract:** Healthcare design requires empathetic understanding among all stakeholders and consequently the development of design *for* empathy. While design anthropological approaches are broadly discussed, spanning from social design to social innovation, analysis methods for human insights are less widely discussed in design. By evidence of a design course focusing on shared decision making (SDM), this paper promotes a blended set of methods, supporting enhanced understanding amongst stakeholders. The empirical data and the comparison with contemporary SDM studies indicate that student designers were able to address some of the most vividly discussed issues in the field: the adaption of SDM to the diversity of patients, the flow of information between the different stakeholders and the general knowledge on SDM by clinicians and the wider public. This paper provides design educators with a series of methods for empathy, encouraging a transformation of design research data into level-headed solutions applicable to healthcare design.

**Keywords:** Design education, healthcare design, SDM, empathy, designerly analysis tools

## 1. Introduction

The ability to understand and share the feelings of another is the general definition of empathy (Oxford Dictionary). Empathy in the context of design has gained momentum in recent scholarly design literature and is discussed in two main ways: empathic design and design *for* empathy. Empathic design can be described as a movement or design direction which is mainly understood as concerned with designing *with* empathy for a certain user group and thereby aiming for enhanced understanding of these users' needs (Koskinen, Battarbee, & Mattelmäki, 2003; Mattelmäki, Vaajakallio, & Koskinen, 2014). Empathy is also discussed as a matter of the methods applied. In order to develop empathy, designers are required to explore people's everyday lives; ethnographic techniques consequently form a practice for developing empathy and a starting point for speculating about alternative futures (Berg, Pink, & Fors, 2015; van Rijn, Sleswijk Visser, Stappers, & Özakar, 2011). Empathy is also described as a decisive factor and key component

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of teaching human-centred design and therefore discussed in the context of the design education (Hess & Fila, 2016; Ho, Ma, & Lee, 2011). Recent design research exploring empathy, is also examining emotionally durable design, arguing for (empathic) design tools and methods that build resilience and sustainability into object-subject relationships, via meaningful attachment (Chapman, 2015). Finally, recent work on empathy in design includes the area of healthcare, discussing empathy as a tool for raising public understanding for diseases such as diabetes (Carmel-Gilfilen & Portillo, 2016; Fouad, 2016).

Design empathy is not only understood as including inspiration and information from users into design processes but beyond that to “observe and feel for the users” ideally leading to a “co-experience between users and designers” (Ho et al., 2011, p. 96). Consequently the term designing *for* empathy is targeted towards designing “in such a way as to afford empathetic feelings and behaviour within a community” (Huck et al., 2015, p. 524). Following this understanding, designing *for* empathy could ideally support sociality through mutual understanding. Huck et al discuss systems designed to facilitate empathy within a church by designing new rituals. This facilitation of empathy, of making community members more aware of each other’s thoughts differs from trying to sensitize design partners for each other in the design process, by shifting the focus beyond the design phase to the actual design concept. This shift of the concept of empathy to the actual design proposal is especially relevant in healthcare where understanding and trust amongst stakeholders determines the quality of care to a large extent.

## 1.1 Analysis Tools in Design

Data analysis in design is carried out with a variety of tools, which are taught as part of design methods. Some of the most well-known include: Clusters are a way to organize larger bulks of information in categories to create clarity and to discover new relations. Visualizing data is a graphic transformation of data sets which helps designers to recognize and communicate important aspects of a problem or situation. Personas transform data about target groups into fictional characters in order to help teams to get a shared feel of what a real person might need. Positioning diagrams help to position different elements in relation to well-defined parameters in a coordinate system. This can help visualize and clarify individual qualities, differences and similarities. On a meta-level, methods such as the log book, are also used as a tool for engaging in dialogue when working on a project, via recording facts, holding on to inspiration and ideas, as well as enabling to look back and evaluate the process (Friis<sup>1</sup> & Gelting, n.d.; Hanington & Martin, 2012).

Each of these methods support the identification of pattern and encourage the identification of connections within design research data. I argue though that these methods tend to facilitate a structuring process rather than funding its analysis. While a fast forward movement in the design process is usually appreciated, a thorough understanding of design partner’s motivations, challenges and needs can be at risk. This is especially factual in human-centred design, with manifold stakeholder viewpoints and (often) ethnographic research data. While publications in qualitative research discuss analysis methods (Marshall & Rossman, 2014; Merriam & Tisdell, 2015; Roulston, 2014; Silverman, 2016), I argue for alternative analysis tools stemming from design research and therefore suggest a closer examination and adaption of the system of pattern languages. Alexander, Ishikawa and Silverstein argue in *A pattern language: towns, buildings, construction* (1977) that a pattern can be defined as a thorough description of a fascinating solution and at the same time implies a careful consideration of the problem connected to it. A pattern language is consequently a network of

patterns that can be used like the vocabulary of a language to create new design solutions. Among others, this problem-solution approach has been discussed previously by design researchers such as Archer (1964) and John Chris Jones (1992)<sup>1</sup>, the essential innovation Alexander et al introduced is their way of describing small sub-solutions in a systematic way. The systematic description includes context, solution, problem, forces, name and illustration as the most important facets. It forces designers to step back for a moment and carefully consider the larger systemic links of a potential solution. Due to its approach of looking at underlying principles of human action, I assert its usability for analysing interview and fieldwork data. In fields such as healthcare and more precisely SDM, understanding the meta-level first, before suggesting design solutions, should be particularly beneficial.

## 1.2 The Systemic Challenge of Shared Medical Decision Making

A course emphasis on SDM has been chosen, due to being an archetypical contemporary design challenge, where systemic, political and local interact in a complex way. Students should train design competencies affording the design of mutual understanding and thus designing *for* empathy, understood as the basis for patients' and relatives' participation in the healthcare system at eyesight. Shared decision making (SDM) aims at a practice where clinicians and patients take medical decisions collectively, shifting the traditional top-down process to a more egalitarian one. Thereby "(...) decision aids should be used in parallel with a communication process, known as shared decision making, where practitioners discuss options and work collaboratively with patients toward preference-consistent decisions" (Joseph-Williams, Edwards, & Elwyn, 2014, p. 699). The design of decision aids within this framework marks one task, however design research shows that co-designing towards an open empathetic healthcare system, is the over-all challenge and shared decision making one element of high quality, people centred care.

In this context, the anthropologist Annemarie Mol contrasts 'choice' with 'care' in her publication *The Logic of Care: Health and the Problem of Patient Choice* (Mol, 2008) arguing that patient choice can lead to poor care, shifting " (...) the weight of everything that goes wrong onto the shoulders of the patient-chooser" (Mol, 2008:xii). Choice in that case would establish a set order, preferred over individual values. While Mol argues that linear patient pathways are no promising way for care trajectories to unfold, and thus questions the overall concept of SDM, also within SDM, the contemporary discourse senses challenges in a variety of areas. Medical areas need to have the right balance of options; tools have to work in the existing workflow of clinicians in order for implementing them successfully; power imbalances between stakeholders prevent SDM; patient characteristics and decision topics need to match (Barry & Edgman-Levitan, 2012; Friedberg, Van Busum, Wexler, Bowen, & Schneider, 2013; Joseph-Williams, Edwards, et al., 2014; Joseph-Williams, Elwyn, & Edwards, 2014). Ideally SDM would be aligned to what health care systems award, however progressive patient democracy and the right for choice often conflicts with national guidelines such as fast track cancer tracks or restricted consultation time and as such SDM tips upon systemic, political decision making rather than challenges prone to be solved by local projects. Creating empathy for the whole variety of stakeholders such as clinicians, patients and relatives has thereby be seen as an essential basis for designers to gain a fuller picture of the barriers and design opportunities in this field.

The themes covered in the introduction lead to the following propositions: At present there is a gap between the literature on empathy design and design *for* empathy. This paper argues that it is not sufficient to support empathy amongst design partners, but makes the case that there is a need for systematic analysis to ensure design *for* empathy. On the basis of this case study I argue that empathetic techniques are a necessary presumption to develop designs *for* empathy; the two approaches do not exclude but require each other in the way of blended analysis methods, the focus of this paper. These methods are essential to prevent a quick proceeding to the solution without understanding design partners' main challenges. Design does offer few 'designerly' tools though to support this analysis. While design based methods such as clustering or visualizing data support the structuring process, Alexander et al's concept of pattern offers a meta-analysis of implicit knowledge and is therefore suggested as a potential designerly analysis tool. SDM is a prototypical, contemporary design task and as such a perfectly suited training ground for design students to work with. SDM as settled within oncological healthcare faces restricted options for students to work directly with patients. New strategies are thus needed to build empathy, meeting the affordances of ethics and confidentiality. Consequently this paper is underpinned by the research question: In the context of the design education, how can teaching formats support healthcare design *for* empathy?

## 2. Method

This study is placed in teaching based research, more precisely in the context of a three-week design methods course at a Danish design school. During this course, master students from cross-discipline and from diverse cultural backgrounds receive an introduction to design methods and shall apply them to shared medical decision making. The project has thereby been carried out with a collaborative hospital partner, setting the briefing: How can design support shared medical decision making? The course has been taught three times in a period of two years, with a total of 56 students and has been leveraged and developed further via the formal feedback from 45 design students. Participating student designers formed cross-disciplinary teams consisting of industrial design, communication design, fashion and textile. One instructor, the author of this paper, guided students through their design process. Students originated from Austria, Canada, the Czech Republic, China, Finland, France, Germany, Hungary, Italy, Japan, Poland, Russia, Spain and The Netherlands amongst other countries, starting their master program in Denmark. Each course started with an introduction to design knowledge on methods and the theme of shared decision making/patient democracy, an excursion to the collaborative hospital partner and ethnographic interviews with stakeholders, empathizing with patients, doctors, nurses and relatives followed. The second phase of the course focused on a search for design pattern and the generation of ideas, the third phase on stakeholder acts, gaining feedback on the generated design proposals (Table 1).

Table 1. Course elements facilitating design for empathy

Methods	Goal
Ethnographic interviews	Cross-cultural stakeholder input on challenges in medical consultations
Analysis of interview data via pattern writing	Examining context, solution, problem and forces to provide a basis for design proposals grounded in human insight
Stakeholder acts	Supporting stakeholder specific feedback on design proposals

### 3. Teaching Formats *for* Empathy

#### 3.1 Ethnographic Interviews

International design students interviewed patients, nurses and doctors in their home countries about their last medical consultation. A questionnaire with five open-format questions has been used to structure the interviews and to allow for comparison, they include: Think about your last medical consultation, please describe the situation. How was information shared? What went well? What could have been done better? Do you have experiences with the concept of Shared Decision Making? The interviews have been transcribed and have been used as a basis for creating empathy for the diverse viewpoints on medical decision making. Due to student designers' easier access to patients and relatives rather than clinicians, doctors' and nurses' voices have not been represented equally to patients and relatives' viewpoints. This marks a limitation to students' insights.

#### 3.2 Pattern Language and Pattern Writing Sheets

In order to make the methods of pattern language (Alexander et al., 1977) as accessible as possible, an adapted version of a pattern writing sheet based on (Iba, n.d.) was used (Figure 1). The pattern writing sheet follows the core steps of Alexander et al's by describing solution, problem, context, forces, name and illustration of the pattern in a systematic way. The method was used as an analysis tool for students' interviews with clinicians, patients and relatives.



**Subject: Best Practices Shared Decision Making**

„In order to discover patterns which are alive we must always start with observation.“  
(Christopher Alexander, 1979:254)

What works when you have to take a medical decision? What works in existing SDM?

**1 Solution** Identify one important thing that you really want to share with colleagues.  
Be concrete (use examples). First think a lot, then choose just one.

**2 Consequences** What is the consequence of the solution?

+

-

**3 Forces** Forces in a pattern are tendencies that we cannot change and which make the problem difficult. What forces are at work? What forces lead to the problem & is addressed by the solution?

- 
- 
- 

**i.2 Context: Healthcare**

**1.1 Problem** What happens if you do not implement the solution?  
SDM without .... would.....

Ideas of Images

**4 Image**

Try to sketch the pattern showing the solution

Ideas of Pattern Name. A good name expresses the essence and is memorable.

**5 Pattern Name**

Figure 1. Pattern Writing Sheet (adaption of Iba n.d.)

### 3.3 Stakeholder Acts

After a one week design phase, teams presented their proposals to a group of information communication technology (ICT) students. Each design team had to prepare a five minute presentation summing up the most essential points of their proposal and was afterwards joined for a *Stakeholder Act*. The feedback team took on the role of either patient, relative, doctor or nurse and gave feedback on the design proposal from that specific point of view (see Figure 2). By taking on a specific position, feedback was supposed to be more directed and empathy for specific roles within medical decision making trained. The design team was asked to document for later discussion and as a basis for refining the design proposal.

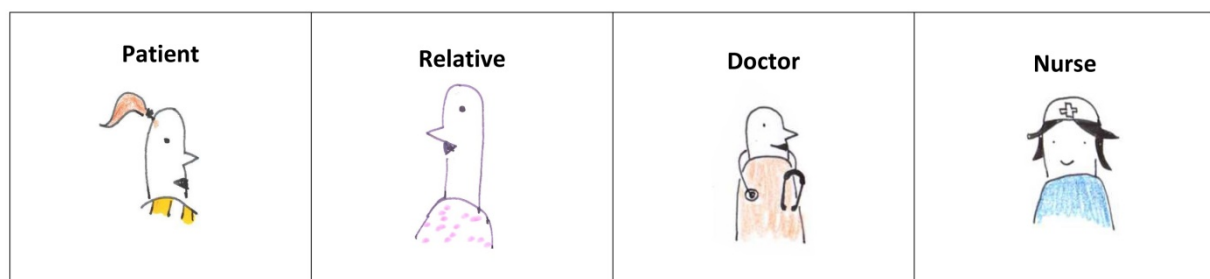


Figure 2. Patches signalling roles for empathetic feedback

## 4. Analysis of Teaching Formats along three Proposals

The following section is organized around three design proposals chosen from a total of 16 that have been developed by student design teams within the three courses. The three student design proposals *Ethical Understanding*, *Logbook* and *SDM Show* have been selected for showing the potential of scaffolding empathy from the interview, to the feedback and detailed design phase. Each section starts with discussing interview elements and a pattern connected to it. It then shows a visualization of the design proposal together with feedback generated in the *Stakeholder Act*.

### 4.1 Proposal 1: Ethical Understanding

Interviews and Pattern: The Diversity of Patients

Both clinician and patient interviewees reflect on the great diversity of people meeting healthcare systems, different in socio-economic background, age, nationality and not last in their approaches to their role as a patient. The diversity of patients has consequently been the dominant subject focus in this design student group and a Spanish radiologist has been singled out by the student design team as informative for this aspect. The physician asserts that the level of receptiveness towards a diagnosis would differ from patient to patient and finding the accurate level of information would be challenging.

“Young people usually want to know all the information, even if the diagnosis is not 100% sure. In radiology you can think that there may be something but it has to be confirmed with further tests. If you tell a suspicion to the patient sometimes they wish you didn’t tell them and if the suspicion is false the patient becomes mad because you made them and their family worry. If you don’t tell them some patients decide to sue and resent that you didn’t tell them earlier.” (Radiologist, 26, Spain)

The radiologist reflects on a wide range of patient groups from receptive to dismissive towards SDM and stresses the need for a possibility for choice: “More information for patients that actually want to investigate is great for both patient and medical doctor” (Radiologist, 26, Spain). This interviewee does not only see a variety of approaches to information in patients but also within the team of clinicians, how and what information is shared differs: “Sometimes several doctors see the same patient and the information shared is not the same, and if a doctor is very straight forward the patient receives different messages from each one” (Radiologist, 26, Spain). To sum up, the key themes in this student design group concerns the diversity of patients and how design solutions could facilitate bespoke SDM approaches. The corresponding pattern and described solution (Figure 3) thus envisions a system that enables the patient to determine the amount of information by taking personality traits, experience and support network into account.

# Subject: Best Practices Shared Decision Making

„In order to discover patterns which are alive we must always start with observation.“  
(Christopher Alexander, 1979:254)  
What works when you have to take a medical decision? What works in existing SDM?

**1 Solution** Identify one important thing that you really want to share with colleagues.  
Be concrete (use examples). First think a lot, then choose just one.

A system in which the patient determines how much he/she wants to know. For example a multiple choice sheet before talking with the oncologist in which it states the amount of fear he/she is feeling towards possible illnesses, how he/she has responded in the past, the amount of people that are around the patient...

**2 Consequences** What is the consequence of the solution?

**+** the doctor, nurse... can know more about how much information should be delivered to the patient

**-** some patients may lie about how they would respond

**3 Forces** Forces in a pattern are tendencies that we cannot change and which make the problem difficult. What forces are at work? What forces lead to the problem & is addressed by the solution?

- does the doctor have enough time to interpret the answers?
- communication skills for doctors or someone trained to mediate
- how to actually express how much information the patient wants

## 1.2 Context: Healthcare

**1.1 Problem** What happens if you do not implement the solution?  
SDM without .... would....

Talking with a patient can be very difficult and the doctor many times does not know how much information the patient wants to know.

Ideas of Images



## 4 Image

Try to sketch the pattern showing the solution



Ideas of Pattern Name. A good name expresses the essence and is memorable.

ethical evaluation  
patient self-responsibility  
patient self-knowledge

## 5 Pattern Name

ethical understanding

Figure 3. Corresponding Pattern

## The Design Proposal

‘Ethical Understanding’ (Figure 4) suggests a method for letting patients determine the clinicians’ communication style and the amount of information transmitted to them. By the help of a scanner, questionnaire or other tool, incoming patients would be clustered into ‘passive’, ‘neutral’ and ‘active’, which specifies the extent of involvement requested. The outcome of this review would result in a tangible object as a signifier, the provision of differently coloured patient bags containing bespoke information material for active, passive or neutral patients. The bag colour would also signal different ways of communication styles to clinicians and consequently a doctor-patient relationship more suited to effective needs.

### 3 CATEGORIES:



Figure 4. Ethical Understanding

In the *Stakeholder Act*, the uniting feedback given from ‘patient’, ‘relative’ and ‘nurse’s’ point of view is around the volatility of a patient’s state of mind towards information. The initial approach might change in the course of the treatment. This is also connected with the question of a valid clustering method itself. The ‘nurse’ asks: How can patients be clustered and who is evaluating this decision? The ‘doctor’ on the other hand hopes that this proposal could open up a more general discussion on sharing medical decisions, signalling that patients are welcome to raise opinions.

## 4.2 Proposal 2: Logbook

### Interviews and Pattern: Integrating his/her Story

The issue of accepting patients as viable experts for their own health and a smooth flow of information amongst all stakeholders has also been subject in this design student group. While medical language is described as hard to grasp for patients, clinician groups such as nurses or medical secretaries are mentioned as mediators, translating doctor’s language or making sure information is comprehended.” I usually try to talk or check frequently between doctor, nurse and patients information. Furthermore, I am trying to check if patients understood medical words or not” (doctor secretary, 30, Japanese). Medical jargon is seen as a barrier, preventing patient inclusion. “Doctor’s technical words are not understood by patients”, “Some patients are afraid of talking in front of a doctor”,

“Doctors talk in team of specialists, that’s that, you don’t get a choice”, are typical quotes pointing to an unhealthy flow of information amongst stakeholders. As a consequence patients do not feel as part of the medical stakeholder team, feel overruled or dismiss treatments in the first place.

“I think the problem in my case was that when I met a new doctor, he did not know my personal history and about the accident that has happened to me. Because of this, he based his conclusion solely on the information at hand (for example the scan with the bone piece) and they might come to a different conclusion.” (Teacher, 52, Dutch)

As a sum up, patients feel that their own story is not heard. As a consequence their perspective is not integrated into considerations about diagnosis and treatment. The corresponding pattern (Figure 5) and described solution thus envisions inclusivity; a system that enables patients regardless of education or physical and mental state to have a say in their treatment.

<b>Subject: Best Practices Shared Decision Making</b> „In order to discover patterns which are alive we must always start with observation.“ (Christopher Alexander, 1979:254) What works when you have to take a medical decision? What works in existing SDM?		<b>1.2 Context: Healthcare</b>	
<b>1 Solution</b> Identify one important thing that you really want to share with colleagues. Be concrete (use examples). First think a lot, then choose just one. Inclusivity means to include patients with many different backgrounds (education, mental and physical state)		<b>1.1 Problem</b> What happens if you do not implement the solution? SDM without .... would.... • exclude many people to have their own decision	
<b>2 Consequences</b> What is the consequence of the solution? <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>+</b></p> <ul style="list-style-type: none"> <li>• everyone can have the same quality of the information and to understand it.</li> <li>• the result is that everybody could be part of the decision making</li> </ul> </div> <div style="width: 45%;"> <p><b>-</b></p> <ul style="list-style-type: none"> <li>• the information could appear too simple for well educated people</li> </ul> </div> </div>		<b>4 Image</b> Try to sketch the pattern showing the solution Ideas of Images 	
<b>3 Forces</b> Forces in a pattern are tendencies that we cannot change and which make the problem difficult. What forces are at work? What forces lead to the problem & is addressed by the solution? <ul style="list-style-type: none"> <li>• it will be still difficult to share the information with some other categories</li> <li>• the educational level (the information should be adjustable)</li> <li>•</li> </ul>		Ideas of Pattern Name. A good name expresses the essence and is memorable. ALL IN!	
		<b>5 Pattern Name</b>	

Figure 5. Corresponding Pattern All in!

### Design Proposal Logbook

Based on the pattern ‘All in!’ this team developed the proposal *Logbook* (Figure 6), an analogue book, providing room for information from doctors, nurses, patient and relatives. It is a means to gather the different levels of information at one place, giving room for a treatment suggestion from doctors, patient’s own



observations and online research, as well as good advice from nurses or information on side effects. In their scenario the *Logbook* is envisioned as a mobile object, connecting home and hospital, clinicians and relatives. A pen with different colours for different users enables to distinguish the source of the input, be it from clinician or patient. The diary-like analogue format was chosen to enable a mainstream, inclusive use.



Figure 6. Logbook

In the *Stakeholder Act*, the analogue version of the book is welcomed for its tactic qualities, but it is also mentioned by all stakeholders that a digital version should be provided as well. This might enable enhanced usability for relatives living far away. The 'doctor' raises doubts if the *Logbook* works within the given time framework of hospitals and thinks that it might be a proposal more suited for patients than for clinicians. The aspect of free white spaces on the one hand side and the strengthening of information transmission of medical terms, on the other hand, were discussed as well.

### 4.3 Proposal 3: The SDM Show

Interview and Pattern: General SDM knowledge

Interviews in this design student group showed a variety of themes around technology, communication as well as shareable patient records but predominantly pointed to a general lack of knowledge about what SDM is and means. Patients remark that they have not been confronted with SDM "in terms of proper tools", however the transparent discussion with the doctor supported her decision making process. This patient story shows uncertainty about what 'real, proper' SDM consists of; as does the following statement: "I believe it's a slippery slope as it might lead to patients looking up treatments and diagnoses online, and cutting their treatments before it is finished because the doctor isn't doing what

they read on Google” (Software Engineer, 26, Turkish). This patient questions health literacy and online access to medical information, a theme connected to SDM but not solely.

Responses reveal that not only patients have a lack of knowledge on SDM but also clinicians as this Danish student shows, recalling a medical appointment diagnosing eye migraine: “Very convinced about the stuff she said, sounded like she knew what she was talking about, knew the symptoms. Quick appointment, friendly, nice. (...) She prescribed medicine which is really expensive, which is, for a student, too much money” (Student, 25, Danish). While the general appointment was perceived as professional by the patient, a SDM approach of integrating the patients’ story and the students’ financial background, could have led to a different treatment solution. To sum up, the key theme that this student design group chose concerned the lack of knowledge on SDM regardless of clinicians or patients. The corresponding pattern (Figure 7) and described solution thus suggests tackling this by offering an introduction to SDM. Their pattern envisions a tool or way that makes patients aware of new opportunities that SDM could offer them.

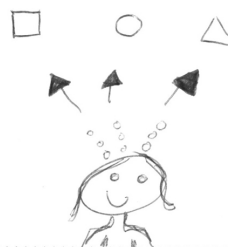
<b>Subject: Best Practices Shared Decision Making</b> „In order to discover patterns which are alive we must always start with observation.“ (Christopher Alexander, 1979:254) What works when you have to take a medical decision? What works in existing SDM?		<b>1.2 Context: Healthcare</b>	
<b>1 Solution</b> Identify one important thing that you really want to share with colleagues. Be concrete (use examples). First think a lot, then choose just one.		<b>1.1 Problem</b> What happens if you do not implement the solution? SDM without .... would....	
making a 'footway' for patients to realise the opportunity to participate in SDM		not enough kno • no participation • mis diagnosis wrong medicin	
<b>2 Consequences</b> What is the consequence of the solution?		<b>4 Image</b> Try to sketch the pattern showing the solution	
+ better communication + understanding situation + see more opportunities - hard to make your own decision		Ideas of Images 	
<b>3 Forces</b> Forces in a pattern are tendencies that we cannot change and which make the problem difficult. What forces are at work? What forces lead to the problem & is addressed by the solution?		<b>5 Pattern Name</b>	
• individualism • stubborn •		Ideas of Pattern Name. A good name expresses the essence and is memorable. introduction to shared decision making	

Figure 7. Corresponding Pattern: Introduction to Shared Decision Making

### Design Proposal: SDM Show

Based on the pattern ‘Introduction to Shared Decision Making’, this team developed the show *What if?* (Figure 8) discussing the potential of SDM in an artsy, playful manner. The show would campaign SDM in a proactive and critical way, making SDM more tangible for all stakeholders. Visitors could for example experience a potential decision between a ‘yes’ or ‘no’ to a treatment via a

pathway. The longer pathway signals a 'yes' with prolonged life expectation including longer hospital stays and side effects. A shorter pathway represents a denial of a treatment potentially resulting in a shorter life expectancy at home and connected to family and kin.

## What If?

An exhibition about  
shared decision making.

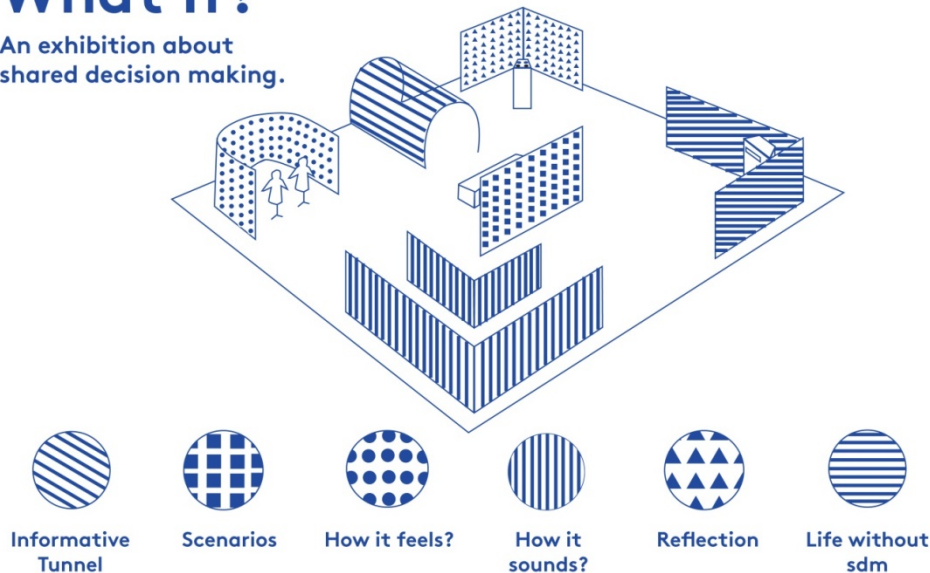


Figure 8. Design Proposal *What if?*

In the Stakeholder Act, the simultaneous approach of sound, feel and look has been welcomed for its multi sensuality, transcending the provision of verbal information on SDM. It is also remarked by all stakeholders that a show presenting SDM would be a good basis for promoting SDM and raising general interest, by providing a platform for critique and discussion. The 'patient' raises the critique that the envisioned scenarios could be too drastic and might have to be toned down. The 'doctor' also points to a thorough crafting of the scenarios making them ethically sound. The 'relative' suggested a further development of the panels and exhibition structure to make it as mobile and versatile as possible. In that case the show could move through the country, taking place in hospitals, museums, town halls, conferences or schools alike.

## 5. Discussion

According to students own written evaluations the course set-up succeeded in supporting their healthcare design approach on several levels. From a teacher perspective, the notion of designing *for* empathy offered grounding techniques but yet met the specific situation of confidentiality and ethics in healthcare. Design students based their design proposals strongly on interviewees' responses, extracting inspiration from specific aspects. Responses and themes seemed to have offered a trigger, an idea, worth to be explored further. The conversion from interview data, to pattern and design concept has been remarkably direct as the three examples show. Between 'All in' and the *Logbook*, a direct connection is visible; the same can be said about *Ethical Understanding* where the name of the pattern has been used for the concept; 'explanation of SDM' is as well a descriptive meta level of the 'what if' questions raised at the *SDM Show*. By way of

analysing the links between interviews, pattern and design proposals, the variety of interview insights enabled students to create empathy and to design *for* empathy. Linking human insight to designerly analysis tools enabled the development of a sound design strategy in line with and beyond contemporary SDM challenges. By continuously drawing parallels between ‘the other’ and students’ own roles as ‘patients’, with the support of the three scaffolding methods, a process of *othering* was questioned and a shift of perspectives obligatory. Ho et al argue in this context that “The identity of a user is a moment; it bears an essential relation to that person, who is a living being with experience, rather than a sum of empty conceptual categories” (Ho et al., 2011, p. 99). In this context, the threefold teaching formats enabled a support of student designers insights and a smooth conversion into design proposals that try to enable empathy at their core. The *SDM show*, as well as the *Logbook* and *Ethical Understanding* facilitate to take different perspectives on medical decision making into account.

The themes covered by the interviews such as patient’s bottom-up strategies of doctor hopping, transparent access to information through technology, restricted time and budget for consultation, focus on doctor’s roles, are implicitly targeted by students. While these are meta-themes, not immediately actionable on a local level, they form part of explicit themes by backing them. All these themes are tightly connected to national health care systems rather than local decision makers. Restricted time and budget for patient consultations for example will not be reformed by local initiatives. In this sense student projects show an implicit understanding of this structural challenge by suggesting design proposals, possibly autonomous from national healthcare guidelines. By evidence of the project samples *Ethical Understanding*, *SDM Show* and *Logbook*, the use of pattern writing to analyse interview data, supported the conversion of this culturally grounded insight into pragmatic, level-headed proposals, by still showing an enhanced level of awareness for context, forces and problem of the suggested solution.

## 6. Conclusion

SDM promotes empathetic understanding among diverse stakeholders in healthcare and consequently the exploration of design *for* empathy. By evidence of this case study based in design education, design *for* empathy shall be embedded in a whole set of methods including means for analysis. The three proposals show that interviews examining success and failure of medical consultations have been a source for initial ideas, pattern writing sheets supported a more thorough analysis, while *Stakeholder Acts* enables a shift of perspectives amongst stakeholders. The blending of design methods enabled concepts grounded in cross-cultural human insight complementing contemporary approaches to SDM more fuelled by medical research. Adopting a mind-set that enables empathy and that is motivated by the will to empathize with people is described as a basis for empathic design (Kouprie & Visser, 2009). In this case study, student designers are users themselves, since everyone is a patient now and then. The applied methods have been targeted to broaden the patient view towards the whole system of stakeholders.

This paper focuses on the materialization of empathy along three design proposals in SDM, generating design proposals enhancing empathy and mutual understanding in medical decision making. The historic role of doctors within a medical system is marked by hierarchy, respect and power, all potential barriers to

a more egalitarian idea of healthcare. By evidence of the empirical data and by comparison with contemporary SDM studies, student designers addressed some of the most vividly discussed issues in the field: the adaption of SDM to the diversity of patients, the integration of his/her story and the general knowledge on SDM by clinicians and the wider public. Underlying to these themes are the power shifts between clinicians and patients in a context of a general movement towards participation, as well as the attributed value reserved for communication within healthcare systems. While SDM serves as specific example within healthcare, empathy is a key concept and approach for creating an impact in any contemporary design challenge, suitable teaching modules focusing on 'designerly' analysis and feedback tools are a way to do so.

## Endnotes

<sup>1</sup> "There can be no solution without a problem; and no problem without constraints; and no constraints without a pressure or need" (Archer, 1964, p. 59). The idea of the pattern language as a re-combination of original solutions to widespread building problems also echo design researcher Jones' call for "breaking problems into pieces" and "putting the pieces together in a new way" (J Christopher Jones, 1970, p. 63).

<sup>2</sup> The International Patient Decision Aid Standards (IPDAS) Collaboration is a group of researchers, practitioners and stakeholders that was established to enhance the quality and effectiveness of patient decision aids. This shared evidence-informed framework contains a set of criteria for improving decision aids content, development, implementation, and evaluation (see <http://www.ipdas.ohri.ca/>).

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# Sharing Video Datasets in Design Research. The Case of DTRS11

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**Abstract:** This paper examines how design researchers, design practitioners and design education can benefit from sharing a dataset. We present the Design Thinking Research Symposium 11 (DTRS11) as an exemplary project that implied sharing video data of design processes and design activity in natural settings with a large group of fellow academics from the international community of Design Thinking Research, for the purpose of facilitating research collaboration and communication within the field of Design and Design Thinking. This approach emphasizes the social and collaborative aspects of design research, where a multitude of appropriate perspectives and methods may be utilized in analyzing and discussing the singular dataset. The shared data is, from this perspective, understood as a design object in itself, which facilitates new ways of working, collaborating, studying, learning and educating within the expanding field of design.

**Keywords:** Design research, video data, shared data, design research methods, design thinking

## 1. Introduction

Using a design object in-the-making as a way to establish a shared focus of attention is one notable designerly way of trying to bridge gaps in understanding, collaborating, and REDO'ing between designers, design researchers, users, organizations and stakeholders. Design objects such as sketches or prototypes are uncertain, ambiguous, re-frameable, contextually shiftable, and open to exploration and interpretation, and basically embody the essential qualities that provide creative potential, as captured by dominant theories of design and creativity (e.g., Dorst & Cross, 2001; Finke, Ward & Smith, 1995; Schön & Wiggins, 1992). For the individual designer, such qualities allow for continual exploration, re-interpretation, framing and object talk-back. In the collaborative setting the qualities also ensure a multitude of potentially distinct perspectives being taken on the same shared object of study. In tracing design objects over time, these qualities ensure both a shared understanding of communicating about the same design, whilst allowing for continual incremental shifts in understanding, as the

object crosses organizational or procedural boundaries, as argued in the literature on boundary objects (e.g., Star, 1989).

Whilst such qualities of design objects are well-known to designers and design researchers, the present paper will illustrate that another type of shared object – video data of design processes – can be utilized with much the same types of benefits for the sharing parties. We will exemplify how the sharing of video data of design processes was utilized in the Design Thinking Research Symposium 11 (DTRS11) for the purpose of exploring multiple perspectives, using a variety of research methods in order to understand a singular design process. At DTRS11, a total of 28 international research teams participated, jointly analyzed, and published on a shared video data set of a design process captured in vivo (Christensen & Ball, 2014) in an organizational setting. The design process being recorded and shared was longitudinal in nature and extended into the research process, in the sense that continued interactions across the practitioner-researcher divide took place during both the research phase and later at the presentation and discussion of the research findings at the symposium. The dataset thus constituted both a shared focal unit of attention for all involved in the symposium, whilst allowing for individual perspective taking in terms of diving into theoretically or empirically derived points of interest for the individual researchers and teams. The dataset, though predominantly stable at the point of sharing, also evolved somewhat over time, as new data and new interviews were added in the process. The shared data facilitated discussions across the application of a variety of research methods and theoretical perspectives among the participating design researchers and the practicing design team, who served as both the object of study and discussion partner later at the symposium. The dataset functioned as a way of bridging gaps in collaboration and understanding amongst researchers and industry participants.

Below the exemplary case of DTRS11 is described, and subsequently we discuss aspects of what was learned about shared data in Design Research.

## 2. Sharing Datasets

DTRS is an interdisciplinary symposium series linking international academics with a shared interest in design thinking and design studies coming from a diversity of disciplines, including psychology, anthropology, linguistics, philosophy, architecture, and design studies. The series provides an international forum for pioneering and state-of-the-art research in design thinking focused on the study of design practice from various perspectives. The 25 year history of the DTRS series is also a story of almost 25 years of shared datasets in Design Thinking research. After the seminal Delft Protocol Workshop, organized by Kees Dorst, Nigel Cross, and Henri Christiaans at Delft University of Technology in 1994 (Cross, Christiaans & Dorst, 1996; Dorst, 1995) around protocol data collected from professional designers in a controlled context, two more DTRS events have involved shared data. DTRS7 involved professional designers (architects and engineers) in their natural habitat (McDonnell & Lloyd 2009a, 2009b; Lloyd & McDonnell, 2009), and DTRS10 involved Design Review Conversations in a design education setting (Adams & Buzzanel, 2016). These shared datasets have had quite a big impact on the Design Research literature. Outside of Design Research however, video-based shared datasets are still extremely rare elsewhere in the humanities, social sciences, and technical sciences. Nonetheless, global trends towards Big Data and Open Science clearly indicate that sharing of video data

holds substantial research potential, as illustrated by the ‘first-mover’ case of the DTRS series.

A shared video based dataset was again central in DTRS11, covering real-life design practices in an organizational setting. We followed a professional Scandinavian design team in a user involvement department solving a design task for a worldwide manufacturer within the automotive industry from October 2015 to January 2016. Designing with co-creation along with user understanding and user experiences were central elements in the observed design processes. The design task was in-between marketing and design. We followed parts of the second phase of the design team’s design project, observing the design team in their process of developing a concept package with both a soft delivery (e.g. strategies, sales channels and marketing), and a more tangible delivery (e.g. mock-ups of accessories to target users). Centrally, the dataset involved cross-cultural co-creation in that the Scandinavian design team and two stakeholders travelled to China to conduct user sessions with Chinese lead users.

Video data was collected with the same design team over a 4 month period, tracing day-to-day the natural course of the design process. All data was collected in situ, in the design team’s natural environments rather than a controlled environment or experimental setup. Once a large corpus of video data (>150 hours) was collected, we evaluated all material, going over field notes and preliminary observations in order to review data, but also going in details with selected fragments, discussing which fields of inquiry might be pursued and which analytical matters that could form focus for further research. We sampled sessions from different stages in the design process and different meeting setups. The DTRS11 dataset was designed to provide multiple entry points of analysis, allowing researchers a wide range of analytical options. The videos included collaborative design activities at various stages of the team’s design process, including planning, ideation, designing and executing two co-creation workshops with lead users. The recorded sessions and meetings included variations in structure and stages in the design process such as stakeholder meetings, meetings with external consultants, core-team meetings, workshops, sprint sessions, brainstorming sessions, spontaneous idea generation, and briefing sessions. The design team employed many different modalities when working; as a minimum, speech, gestures, written comments, post-its, drawings, and pictures are visible in almost any of the recorded sessions. This variety allowed for different analytical focus points for the research teams to assume. The final shared dataset consisted of +15 hours of video and audio recordings, including full transcriptions. In addition, a technical report was distributed (Christensen & Abildgaard, in press), covering details of the project, organisation, the design team’s background, and summaries of video content.

### 3. Timeline

After the dataset was collected, transcribed, and packaged, it was distributed to 60 international design research teams, who had formally signed up for participation through a research brief. Over a 5 month period (see figure 1) the research teams analyzed the data with each their own theoretical lens and utilizing their own research methods. One month into the research process a research proposal with a research plan was required in order to screen the content ensuring all research teams engaged with the dataset. After the final review phase 28 research teams was accepted to participate with a full paper at DTRS11.

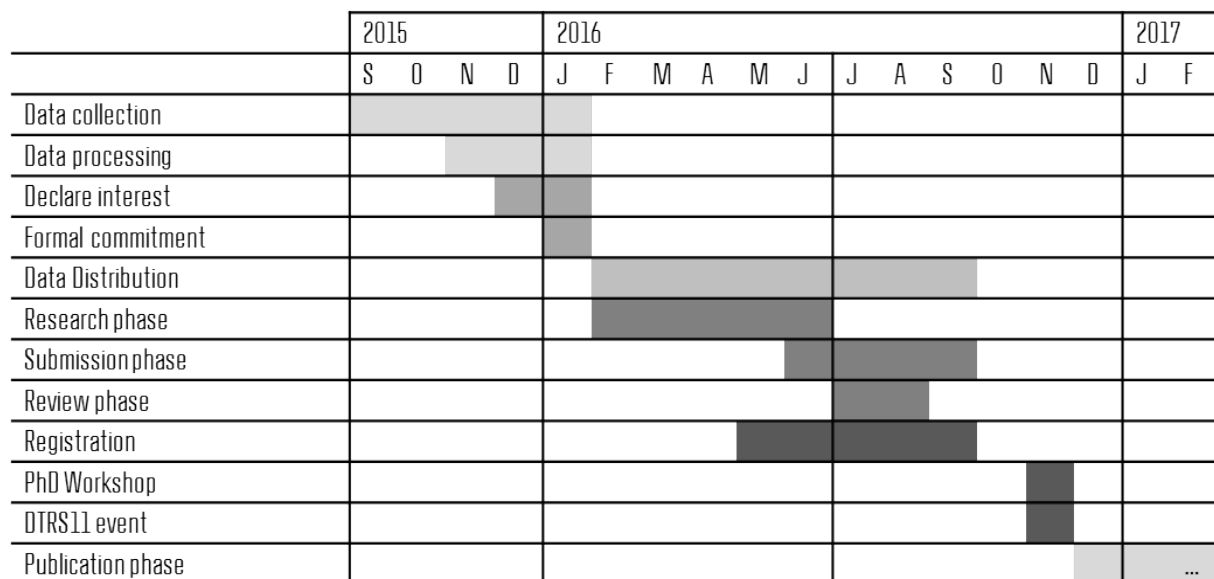


Figure 1. DTRS11 Timeline

During the research process, the organizers encouraged continued interactions with the design team being studied by setting up a ‘shared interview’ with the design team leader, in which the research teams could contribute with questions that they felt could enrich their analyses. The interview was conducted and shared two months into the research process. After submission of all papers and a peer-review round, the selected contributors met at Copenhagen Business School for the symposium event. Continued interaction across the organizational/researcher divide was encouraged by the participation of part of the design team at the symposium, and in a joint panel debate on shared data. All DTRS11 papers will enter into a book publication (Christensen, Ball & Halskov, in press), and select DTRS11 papers will appear in special issues in the journals *Co-Design* and *Design Studies* (to be published in 2018).

## 4. Studies of cross-cultural co-creation

The 28 research teams reported analyses from different methodological vantage points and tapped into different aspects of the design process, collectively contributing toward an integrative and fine-grained understanding of the design activity. The dataset consisted of 22 sessions (20 videos and 2 qualitative interviews). The research teams used 6.6 videos on average, but the use ranged from 1–19 videos across the papers.

The 28 papers covered a multitude of themes, but the following themes recurred across the papers:

1. **Dynamics, Framing and Collaborative Design;** the aspects of collaborative design such as decision making, planning, and framing.
2. **Design Talk;** design conversations and ways of talking about design e.g. using slang or categorizations.
3. **Design Problems, Iterations, and Solutions;** the factors that impact the design process such as time constraints and new information.
4. **Designing with Users and Co-creation;** the user aspect of the design project.
5. **Co-Design and Conflicts;** dynamics in co-design processes such as disagreements and skills among design team members.



6. **Design Team Processes and Roles;** the ways in which roles and relations affect the design process.
7. **Cross-Cultural Design Processes;** the cultural aspects in play.
8. **The Cognitive Aspects of Design Thinking;** design team cognition and metacognitive drivers.

The methodological approaches varied across the themes, and the researchers applied both qualitative and quantitative methods, some using data-driven approaches and others theory-driven. Half of the papers applied quantitative methods such as protocol analysis, latent semantic analysis, and other coding approaches, and the other half applied qualitative methods such as content analysis, conversational analysis, interaction analysis, and ethnographic analysis. 16 research teams used a coding scheme in the analysis of data. Interestingly most research teams applied a mixed method approach to navigate among in-depth findings and general patterns.

## 5. Conclusion

Several important take-home points may be drawn from the exemplary case of data sharing in DTRS11, and below we highlight issues related to analysis, collaboration, and research discussion.

A key observation regards the types of chosen analyses. Upon the sharing of the dataset, the research teams varied in whether they approached the data mainly inductively or deductively. Some of the more deductively oriented researchers experienced difficulties in matching their theoretical interests to the nature of the data, and some teams struggled slightly to find an analysis framework based on the shared data. So, while a shared dataset does allow for a multitude of perspectives being applied, any singular case does not afford examining every aspect of design processes. Any singular case will have an extension, limiting the range of analysis in addition to limiting the generalizability of the drawn conclusions. An important decision to make for future data sharing purposes is how much a priori thought goes into selecting the case and video data. Any type of data selection (whether done with explicit or implicit criteria) both enables and limits the analytical approaches that are possible to apply. The singular object is thus not infinitely flexible in terms of the analytical approaches it affords.

In this case the shared data succeeded in allowing for communication across academic divides, methodological approaches, and researcher-practitioner gaps. The focal data helped facilitate comprehension and discussion of results that were outside the normal theoretical lens of the individual design researcher. The dataset helped maintain empirical grounding in situations when the theoretical abstractions could have been otherwise incomprehensible. That said, the shared data cannot in itself compensate for lack of theoretical background knowledge when discussing across academic divides, and discussions appeared most fruitful when similar theoretical constructs were attacked on the same data using distinct methods.

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# Co-creating an Accessible, Multi-sensory Exhibition with the National Centre for Craft & Design and Blind and Partially Sighted Participants

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**Abstract:** Visually impairment people often visit exhibitions and museums in the UK. Older people are increasingly likely to experience sight loss and they are the fastest growing visitor group to UK museums and galleries. They favour regional and local venues. Museums are beginning to incorporate open-accessible facilities, but multi-sensory approaches tend to be small additions rather than a central feature. More could be achieved if curators built inclusive intellectual access for this visitor group into their exhibitions. This participatory design research project explores how the National Centre for Craft & Design (Sleaford, UK) can cost effectively design and curate non-permanent exhibitions that bring outstanding intellectual access to visitors with sight loss. This involved exploring the following research question: How can co-creation processes that involves blind and partially participants effectively facilitate the cross transfer of experience and skills to generate valid information?

**Keywords:** Co-creation, inclusive exhibition design, blind and partially sighted visitors, participatory design

## 1. Context: Blind and partially sighted people often visit UK exhibitions

People with a visually impairment (VIP) often visit visual art exhibitions (RNIB, 2003) and museums in the UK (Salgado and Kellokoski, 2005; Mesquita and Carneiro, 2016). Academics and arts professionals continue to argue publically funded museums and galleries need to rethink their notions of accessibility for VIP (Cachia, 2013; Candlin, 2008; Walters, 2008, 2009; Hyder and Tissot. 2013; Richards *et al.*, 2010; Small *et al.*, 2012). Sight loss affects people of all ages, but older people are increasingly likely to experience it. Since 2005 this age group has been the fastest growing visitor group (65-74 years) to UK museums and galleries (DCMS, 2016).

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There are approximately two million people in the UK who are registered blind or partially sighted (RNIB, 2016). The majority has partial sight or has lived with vision, so have a visual memory and engage with visual culture (Access Economics, 2009). VIP in the UK favour regional and local venues rather than larger national museums and galleries because they are close to home and less crowded and intimidating (Partington-Sollinger & Morgan, 2011; RNIB, 2003).

The education and access officers in large UK publically funded museums and galleries normally attend to accessibility matters (Cachia, 2013; Candlin, 2008). To address the 1995 UK Disability Discrimination Act (DDA) they are trying to increase accessibility in two key areas: the venue and the interpretation of exhibits (Mesquita and Carneiro, 2016). An increasing number of national venues are providing access to exhibits for VIP via pre-booked visits and guided tours including touch tours (Krantz, 2013; Hoyt, 2013). UK regional and national museums are beginning to incorporate open-access tactile and/or auditory facilities within a minor number of their permanent collections (Ginley, 2013; Hirose, 2013; Museums Association, 2017). These types of multisensory exhibits tend to be small additions to the main collections rather than a central feature. VIP and campaigners often comment that this provision is inadequate (RNIB, 2003; Hirose, 2013). Much more could be achieved if curators built intellectual access for blind and partially sighted visitors into the curatorship and design of their permanent and non-permanent exhibitions.

There is acknowledgement that a key barrier to provision of intellectual access for VIP is curators are not sufficiently considering inclusive design and curatorship principles at the start of the exhibition process (Partington-Sollinger & Morgan, 2011; Ginley, 2013; Hirose, 2013). It is even more problematic for local and regional venues due to the lack of resources and awareness of accessibility issues (Partington-Sollinger & Morgan, 2011). The area that museums and galleries could significantly improve upon, especially local and regional venues is intellectual access to exhibits (Cachia, 2013; Candlin, 2008; Partington-Sollinger & Morgan, 2011).

Interest in accessibility for VIP in museums and galleries has increased over the past two decades, but research in this field is still scarce (Mesquita and Carneiro, 2016). Participatory design research into how local and regional museums and galleries can cost effectively design and curate an exhibition that brings outstanding intellectual access to visitors with sight loss is rare (Cachia, 2013; Candlin, 2008; Partington-Sollinger & Morgan, 2011).

## 2. Improving ‘multi-sensorial’ intellectual access for blind and visually impaired visitors at the National Centre for Craft & Design

Following extensive discussions with the National Centre for Craft & Design’s (NCCD) senior management concerning their accessibility provision for visitors with sight loss, the author collaborated with them to firstly investigate how to improve intellectual access to this visitor group in their Main Gallery. This resulted in intellectual access for blind and partially sighted visitors becomes a central feature of exhibition design and curatorship for their Main Gallery. NCCD has approximately 12,500 visitors per exhibition and 63% are over 65 years old (Chick, 2016). They have up to 20 non-permanent exhibitions every year and approximately 150,000 people benefitted from their activities in 2016 (Chick,

2016). The Centre advertises itself as the largest venue in England dedicated to the exhibition of contemporary craft and design (NCCD, 2017).

## 2.1 What useful written guidance is available on accessible exhibition design and curatorship for regional exhibition curators?

It was agreed the author would identify and collect literature that could provide practical insights and guidance into how to design and curate an inclusive exhibition for visually impaired visitors. The literature search followed a stepwise methodology to identify the highest quality research available. Database searches were made for publications in English between 1995 and 2016 using a combination of words: 'accessibility', 'exhibition', 'guidance', 'guidelines', 'inclusive', 'design', 'museum', 'gallery'. The search was undertaken using the University of Lincoln's EBSCO Discovery Service that enabled the search of the institution's databases simultaneously. This incorporates a wide array of academic databases. In addition, a search for good quality grey literature (unpublished and/or non-peer reviewed) and website text via an internet free search using a Google search engine. Individual searches using the combination of terms above were used to recover reports, websites and documents relating to activities in this area. The first four pages of a search were scanned for relevant documents.

Most of the useful publications identified by the author was grey literature written and published by large prestigious museums and museum associations. Following consultation with Bryony Windsor (Head of Exhibitions, NCCD) the author reviewed the following publications for relevant guidance and guidelines on how to design and curator a non-permanent exhibition that aim for outstanding intellectual access to blind and partially sighted visitors:

- National Galleries of Scotland (NMS, 2002);
- Smithsonian Institution, Washington (Smithsonian Institution, 1996, 2001, 2011);
- Tyne & Wear Archives and Museums department, England (Tyne & Wear Archives and Museums, 2010; and Coburn, 2016); and
- Victoria & Albert Museum, London (Ginley, 2013).

A summary live working-document was developed with guidance signposted under key themes. The NCCD exhibitions team were fully consulted to ensure the content was relevant to a regional venue with limited resources. Topics covered in this working document include: exhibition design, interpretative panels and object labels; audio descriptors; touch objects; tactile and large print guides; lighting; magnification of objects; magnified images and staff training. The objective was to use this document as the platform for exploring how to design and curate NCCD's next non-permanent exhibition to have outstanding intellectual access for blind and partially sighted visitors?

## 3. Methodology

Participatory design was selected as the most useful methodology to understand the specific characteristics of the NCCD context, and the NCCD staff and blind and partially sighted visitors' unique requirements and perspectives. A central tenet of this methodology is that the key actors are co-creators with the author (Bødker and Iverson, 2002; Chick, 2012). She worked closely with NCCD staff in order to gain an appreciation of their workplace culture, and a Creative Lab group was



formed with blind and partially sighted citizens and their companions as well as the voluntary sector. The Stage 1 research project consisted of co-creation workshops including prototyping sessions *in situ* with the above participants. The question posed to this Creative Lab group was how to design and curate an outstanding non-permanent exhibition in a regional venue that prioritised intellectual access for blind and partially sighted visitors? The Stage 2 research will evaluate the resulting exhibition.

### 3.1 Capacity building starting with the co-creation of an inclusive exhibition

For the author a core aim of the partnership with NCCD was to capacity build through each stage of this research initiative, to achieve the goal of maximising intellectual access for visually impaired and older visitors. The most effective way to work towards this goal was for the author and NCCD to collaborate with blind and visually impaired regional groups and citizens. Their key role was as ‘users’ of the NCCD exhibition and as part of the design team as ‘experts of their experiences’ (Sleeswijk Visser *et al*, 2005). In order for them to take on this role they must be provided with appropriate opportunities for expressing themselves. Govier (2010, p.4) proposes “co-creation fundamentally means museum and gallery professionals working with their audiences (both existing and potential) to create something new together”.

Before the co-creation of the exhibition with participants could start NCCD staff needed training on how to engage and host VIP at the NCCD venue. If the participatory co-creation process was to be successful NCCD sighted participants needed to be more comfortable, thoughtful and empathetic about the needs of VIP. This training proved invaluable to building trust during the process of co-creating the exhibition. All NCCD staff undertook a training day to understand the attitudes that can be a barrier for VIP engaging with sighted people and accessing a museum and gallery. This training also explained the background of visual impairment, facts and figures and dispelled some of the myths around sight loss. Through the safe guiding of a VIP around the NCCD building it highlighted how difficult it can be when VIP visit an exhibition.

## 4. Stage 1 Creative Lab co-creation sessions

A Creative Lab group was formed containing six volunteers, a Royal British Institute for Blind People (RNIB) representative, NCCD Head of Exhibition, and the author. The volunteers agreed to collaborate on co-creating the next NCCD exhibition in the Main Gallery, and if possible continue to participate. The volunteers consisted of five females of which three were artists (one was blind with visual memory and the others had severe sight loss). The remaining participants were their sighted companions. 50% are already regular visitors to NCCD exhibitions.

Over a five month period four Creative Lab sessions were hosted, with no more than six participants at each workshop, as a small group size allowed for greater participation (Stoecker, 2013). The first session contained training to enable the participants to understand co-creation approaches. The author and Head of Exhibitions were the only participants who attend all sessions, even though every effort was made to accommodate participants. The RNIB and visually impaired participants and their companions were not paid for their involvement, but all

expenses were refunded, transport supplied, and refreshments including lunch. The workshops were all held at the NCCD building to provide continuity.

#### 4.1 How can a co-creation group that has blind and partially participants effectively facilitate the cross transfer of experience and skills to generate valid information?

It transpired there was no guidance and research on how to effectively facilitate a co-creation process with blind and partially sighted participants (Taxén, 2004). An impetus behind the Creative Lab sessions was to bring multi-directional learning and mutual benefit for everyone involved in the co-creation of the exhibition. The author firstly consulted the RNIB and as trust was built with the participants on the issues and techniques to consider when planning and facilitating the co-creation workshops. So the research initiative developed the secondary question above.

Minkler and Wallerstein (2008) state group decision-making processes can be an effective mechanism because:

- Multiple perspectives contribute to a project;
- Group inquiry and interaction leads to debate about change; and
- Dialogue changes the perceptions of participants and their readiness to contemplate actions that are to the benefit of the local setting.

The author therefore planned the co-creation sessions to be an equitable experience for all participants (Senge and Scharmer, 2001; Stoecker, 2003, 2013). This meant all participants should feel they could influence the design decisions and have ongoing meaningful opportunities to contribute to Creative Lab sessions, as well as afterwards via email and telephone conversations.

#### 4.2 Key exhibition components to explore

Following the first session it became very apparent the overall exhibition concept needed to address the bias towards visual culture in experiencing an exhibition. The NCCD exhibition theme of 3D printing provided the participants with opportunities to explore a multi-sensory approach. The group identified the key topics to address during the co-creation sessions for the non-permanent exhibition as:

- Gallery space way-finding solution.
- Achieving an effective multi-sensory exhibition that was inclusive to all visitors.
- Interpretive information in audio and identification of appropriate cost effective audio equipment for the NCCD Main Gallery.
- Inclusively designed interpretative wall panels and object labels.
- Large-print and Braille brochures.
- Visitor assistance and interpretation by NCCD gallery assistants including; guiding a visually impaired person, offering interpretations of exhibits, and answering questions at the NCCD reception desk.

## 4.3 Facilitating the participatory design of the exhibition

Co-creation involving designing is generally based on tools and techniques using visual communications (Sanders and Strappers, 2008). This was still to be the case in the Creative Lab co-creation sessions as only two of the participants were blind, but all visual imagery was larger than common and all text documents adhered to the RNIB accessibility publication guidelines. Visual imagery was also printed or mounted onto thin card to aid with close up consideration. In some instances text and imagery was projected to facilitate collaborative re-designs to occur. As trust was built the sighted participants learnt to verbalise the visual imagery and explain more fully design and curatorial ideas, concepts and solutions for the blind participants. Braille documentation was not used as the blind participants did not read Braille. Lego figures and blocks were used in one workshop to explore the exhibition layout, way-finding and visitor experience. Small-scale card models of the proposed multi-sensory desks were also produced, which could be easily handled. Prototypes of touching objects were also 3D printed for evaluation and discussion.

The rationale behind certain accessibility guidance was more clearly understood by the sighted participants because the visually impaired participants illustrated the consequences to them of ill-considered exhibition designs. So the sighted participants became empathetic to the requirement to ensure visitors could get close to exhibits, graphics and audio to enable touching, handling, looking, reading and listening. The objects were selected based on the 'narrative' of the exhibition, and whether they could be handled or replicated. In addition, it was agreed it was important to demonstrate different materials and textures that are 3D printed, and this provided various materials for the touching objects to be made from. A priority for the author was the development of a design that clearly demonstrated this was a multi-sensory exhibition and the participants agreed. The 'live' working document was continually referred to and iteratively up-dated when time allowed.

Early in the co-creation sessions it became apparent the accessible exhibition guidance could be creatively expanded upon through the co-creation process. An example is a solution was developed to assist visitors with severe sight loss to read the object labels on an exhibition plinth. People with low vision often need to be within 75mm of a label to read it (Smithsonian Institution, 2011, p.25). NCCD visitors would now be encouraged by gallery assistants to pick up an object label from a plinth for close up reading. The object labels would be fixed to plinths with Velcro. This creative solution was not identified in any guidance but is an extremely effective answer for local and regional galleries and museums.

The co-creation activities were most successful because the design objectives were relatively contained in scope, and the participating communities were tightly defined. The author facilitated the co-creation sessions but this leadership was not a heavy-handed, top-down form of direction. In the future, the author will need to develop a tool-kit of different approaches for co-creation sessions with blind and partially sighted participants. There were times during the process when Bryony Windsor and the author strongly offered their experience to ensure the design of the exhibition was aesthetically pleasing. The typeface 'Ariel' was proposed by some of the participants as the most inclusive typeface for the wall panels but because Windsor and the author disliked it, another effective sans serif typeface was chosen. This caused some tensions in the group but it was agreed different wall panel typographic designs would be tested on visitors in the Main Gallery.

Due to time constraints and lateness of funding the participants with a visual impairment were not effectively involved in the testing of the design concepts. This has resulted in the major testing of the exhibition components for effectiveness of intellectual access occurring when the exhibition is open to the public (28<sup>th</sup> January – 23<sup>rd</sup> April 2017).

#### 4.4 Everyday ethics: The challenges of co-creation

Engaging with different participants on a real world participatory design research project raises ethical considerations that go beyond individual-level protections, as the clear distinction between those who were doing the research and those who are researched becomes blurred. The way the author addressed this issue was through exploring and practicing “everyday ethics” which Banks *et al.* describe as “the daily practice of negotiating the ethical issues and challenges that arise” through the life of a research project (2013, p.266).

This approach draws on “virtue ethics”, which places pre-eminence on qualities of character (Banks and Gallagher 2009) and the ethics of care, which focuses on responsibilities attached to particular relationships (Held 2006; Tronto 1993). This led the author to adopt Campbell and Vanderhoven’s stance that “ethics in relation to co-production (and perhaps more generally) should be regarded as less about procedural conformity and more about the demonstration of an ethical state of mind” (2016, p.30). The author found the standard ethical approval procedures did not adequately address the flexibility inherent to co-creation, so the procedures of ethical review were a struggle.

### 5. Evaluating the co-creation approach

It is important for this research to understand the strengths, weaknesses and opportunities of using creative activities as a vehicle to aiding the process of engaging with VIP, including eliciting their views, and encouraging them to participate in NCCD activities. Academics have recently begun to identify these artistic engagement approaches as ‘beyond-text’ (Durose *et al.*, 2011; Beebeejaun *et al.*, 2014) or ‘social design’ tools (Armstrong *et al.*, 2014). These researchers are recognising the symbolic value of these approaches for “challenging the dominant form of expression of existing unequal power relationships and sometimes stimulates a change of ethos” (Beebeejaun *et al.* 2014, p.12).

The evaluation of the Stage 1 research is focused on understanding the value of the participation process and the significance of the co-creation engagement to achieving effective intellectual access for visually impaired visitors to an NCCD exhibition. The author found, as did Rooke (2014, p.6), many traditional evaluation approaches “particularly unhelpful and inappropriate to understanding participative processes in community settings”. This implies the evaluation and understanding of these processes has become more complex than conducting participation surveys.

Triangulation of research data and the use of multiple methods of data collection have been used to evaluate participatory action research projects for over two decades (PolicyLink *et al.*, 2012) and seems an appropriate approach to evaluating the Stage 1 research. Semi-structured interviews with Creative Lab participants and exhibition visitors; visitor observation in the Main Gallery; exhibition visitor survey; and grey document reviews (including coverage by the media) are presently being undertaken. This is in addition to collecting the exhibition visitor figures and socio-economic profiles.

Over time the author will develop a case study of how the NCCD has iteratively improved how it has engaged with VIP and catered for their needs, and the resulting social impacts. The author is extremely aware that this must go beyond the merely anecdotal. As Crossick and Kaszynska (2014, p.126) advice:

“In the arts and cultural worlds, anecdotes about the transformation of individuals or communities have often been a substitute for systematic evidence. Case studies offer a route to a more nuanced understanding of what constitutes value for those involved, and for the wider collective of which the individuals are a part, and of how we might understand the processes that produce it.”

## 6. The resulting co-created exhibition

### 6.1 Exhibition subject

The exhibition was titled ‘3D Printing: The Good, The Bad, and The Beautiful’ and explores how citizens, designers, engineers, scientists, conservators, manufacturing businesses amongst others are adopting 3D printing. How this technology is bringing about social, organisational, and economic shifts was interpreted for visitors through key themes and the selected exhibits, text panels, audio interpretations, public talks, and education programs. The author developed the exhibition contents and co-curated the exhibition with Bryony Windsor (NCCD Head of Exhibitions).

### 6.2 Gallery colours

Black on white and black on yellow were the colours chosen for the exhibition identity because they are generally regarded as the clearest combinations for VIP (NMS, 2002; RNIB, 2003). These colours were used to visually define the walls, floors, and plinths, so the floor is visually separated from the walls and furniture (see Figure 1). This is because people with low vision and visual perceptual difficulties require at least a 70% contrast in colours to negotiate a space (Smithsonian Institution, 1996 & 2011). If the walls, floor, and plinths are all basically the same hue, all components of the room blend together. Matt and non-reflective finishes were also used.

### 6.3 Way-finding path

A textured exhibition way-finding path using two different bright yellow floor tiles (replicating what is found before a road crossing to indicate to VIP to stop or proceed) were used (see Figure 2). This textured path led visitors to each of the multi-sensory desks in the exhibition space. The consistent lighting in the gallery and the contrasting dark grey concrete floor against the bright yellow tiles combined to produce a clearly delineated circulation route.





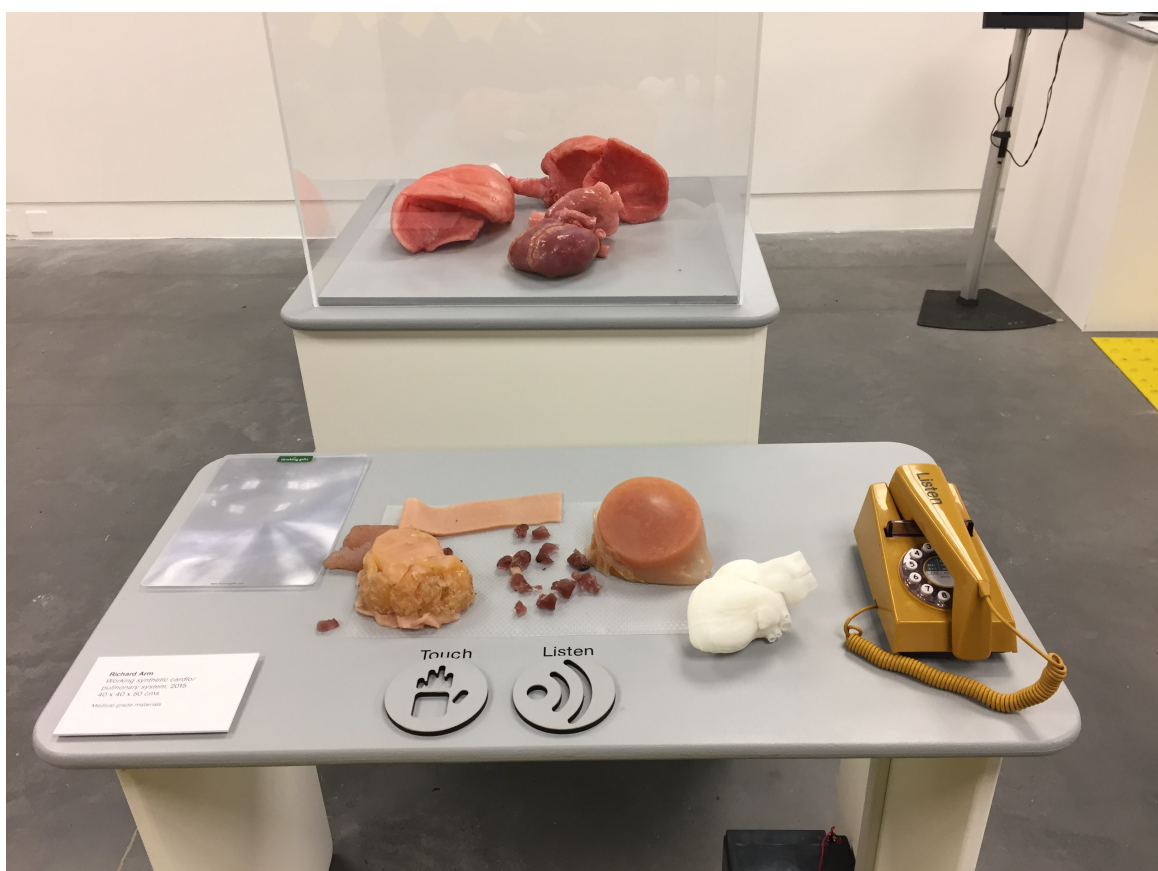
Figure 1. '3D Printing: The Good, The Bad, and The Beautiful' exhibition, The National Centre for Craft & Design, Sleaford.



Figure 2. Textured tiles way-finding path which guided visually impaired visitors to each multi-sensory desk.

## 6.4 Multi-sensory desks

A central feature of the exhibition was a multi-sensory desk containing handling objects; a trim phone (containing the audio descriptors of particular objects and readings of the wall text panels); exhibit labels; and magnifiers. The height of the desks were 700mm because the written guidance consensus was a wide range of visitors can reach over to handle an object when these are approximately 760mm from the floor. This includes visitors in a wheelchair. Three MDF disks were designed by Arnaud Dechelle to indicate to visitors whether they could touch an object; could not touch an object; or there was audio provision on the desk (see Figure 3). A trim phone (of contrasting colour to the light grey desk tops) was used as it allowed the audio to be listened to at adjustable heights, so people in wheelchairs who sit at different heights and people who are tall and cannot bend can use them equally well (see Figure 4).



*Figure 3. Multi-sensory desk with MDF disks, alongside touching objects, audio phone, and a magnifier.*

A demonstration multi-sensory desk and two different way-finder textured floor tiles were placed at the front of the exhibition space, where the gallery assistants were present. The assistant explains to small groups of visitors or individuals the purpose of this desk, including what the different raised disks denote. This desk also contained the large-print and braille publications.

The touching objects on each desk were selected to provide a coherent explanation of the associated exhibit (see Figure 5). Each desk was positioned near the original exhibit (which was displayed on a plinth or freestanding) so the



visitor could relate the contents of the desk to the context of the exhibit. The aim was to provide true access to the exhibition content an exhibit at a time for blind and partially sighted visitors. These desks were meant for all visitors though, not just for VIP. This prevented blind and partially sighted visitors needing to ask for access to handling objects, which can cause embarrassment and makes them feel different to other visitors.



*Figure 4. Multi-sensory desk containing an 'audio descriptor' trim phone, alongside touching objects.*

## 6.5 Exhibits on plinths

The plinths were arranged in the gallery to allow the exhibits to be viewed from at least three sides and exhibits were arranged to avoid visual clutter as some VIP have issues with foreground-background discrimination. Some of the exhibits on the plinths could be touched and handled, but not all objects. MDF disks (with a laser cut out 'X' in the middle) were placed at each corner of the plinth top to indicate objects on that plinth could not be touched.

The colours of the plinths, desks and walls aimed to create colour contrasts between the items and the background, as objects are more easily seen. A 70% contrast between foreground and background is recommended. In addition, objects were not placed against complex backgrounds so the walls were painted white and images of enlarged exhibits were placed near but not behind the exhibits on the walls. Complex backgrounds are difficult to see for people with low vision and for those with figure-ground perceptual problems. The height of the plinth was set at 880mm because exhibits on plinths need to be visually accessible to all as objects placed above 1015mm will be seen only from below by most seated and short viewers (Smithsonian Institution, 1996). The recommended height for viewing objects differs in the identified accessibility guidance publications.



*Figure 5. Multi-sensory desk with objects for handling and close observation.*

## 6.6 Exhibition graphics

Wall panels and object labels need to be legible and readable. Legibility contributes to readability, which is determined by the combined impact of design and layout, type size, kerning, line and word spacing, and line length. For people with poor sight the wall panels and labels have to be simple, have well-spaced paragraphs and layout (NMS, 2002; Smithsonian Institution, 1996, 2011). Clear hierarchy of title and main message, and 36pt body text for the panels and 16pt for the object labels was used throughout the exhibition. Consistent line spacing and a border of at least 10% of the lower case letter height were also used as this increases the effectiveness of the contrast between the text and background (see Figure 6).

Importantly, sans serif fonts are easier to read and fonts such as Arial, Helvetica and Futura are recommended, as well as aligning text to the left margin. Underlining text and all upper case letters is not recommended. As a general rule the space between one line and the next should be at least 1.5 to 2 times the space between the words on a line. Wall mounted panels were placed at a height that is comfortable for both those seated and standing. Panels (including large images of exhibits) were also located in consistent locations throughout the exhibition with no barriers to close inspection and reading (see Figure 7).





Figure 6. Exhibition graphics: Wall panels and labels were simply designed with well-spaced paragraphs and layout.

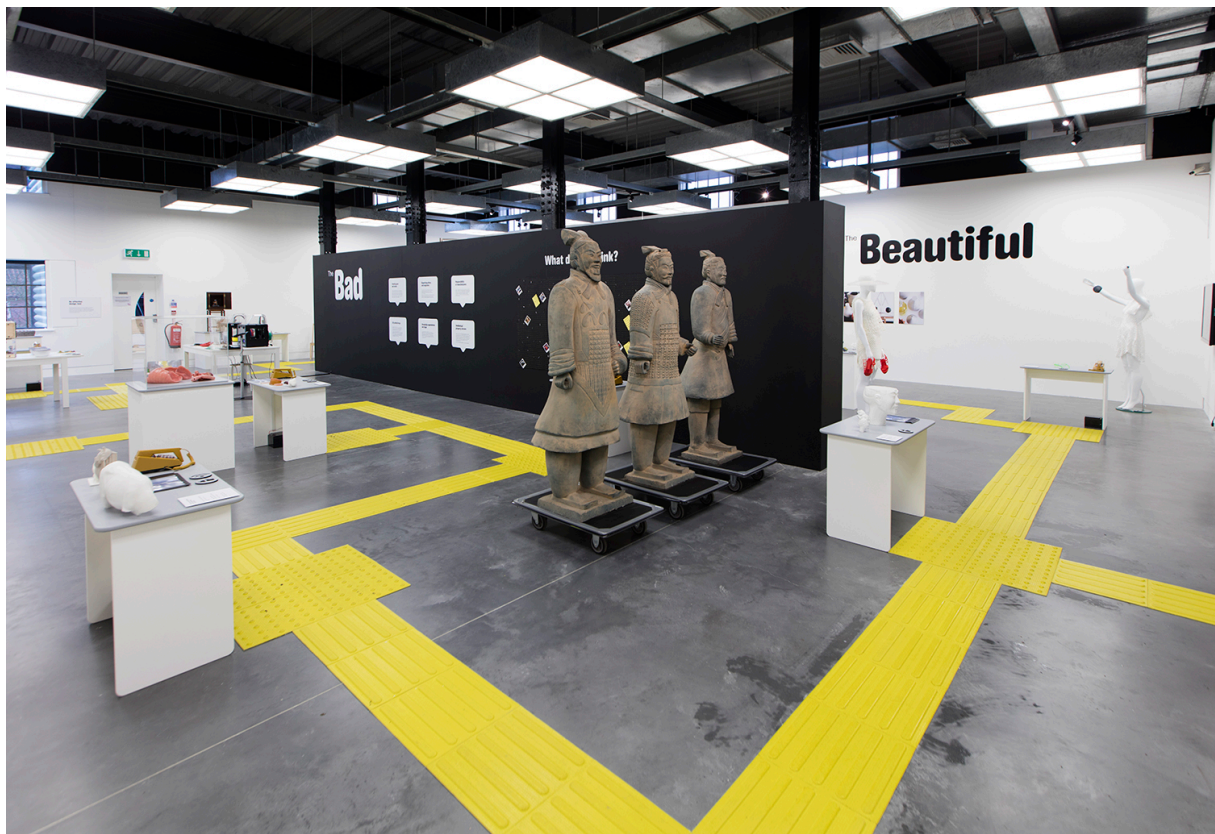


Figure 7. Exhibition graphics, '3D Printing: The Good, The Bad, and The Beautiful' exhibition.



## 6.7 Audio descriptions and audio equipment

The aim of the audio descriptions was to fill in what VIP may not be able to see. A trim phone was selected as the controls for the audio because it allowed a VIP to listen to the audio with one hand free to hold onto a guide dog, or stick, or person. In addition, this approach of having eight trim phones place on desks around the exhibition allowed for visitors who do not use smart phones to access the audio. On a number of the multi-sensory desks there are objects that can be handled after or before listening to the audio description, and this serves as a valuable complement. This audio technological solution was developed because it was cost effective, easy to install, appropriate answer for the gallery space (which did not contain WiFi) , and could be adapted for use in future NCCD exhibitions.

## 6.8 Lighting quality

Good lighting is particularly important for visually impaired and older people who tend to need more illumination to see objects and read labels and graphics. There were no conservation requirements for light-sensitive materials in this exhibition, so low light levels were not required. Light level changes within the gallery were minimal and when this occurred it was gradual. Shadows falling directly on an object was avoided, as placed in shadow an exhibit will be lost for people with low vision. The main aim for the lighting design was there had to be sufficient light on each object and label to make them visible to all visitors.

# 7. Conclusion

Through the NCCD curator collaborating with people with different categories of visual impairment novel and effective multi-sensory accessibility solutions have been created that go beyond the available accessible exhibition guidance. These co-creation activities and evaluating the resulting non-permanent are essential for re-thinking the NCCD as an arbiter of 'multi-sensorial' culture. Blind and partially sighted people largely depend on their ability to explore museums and galleries based on senses other than sight (Figueiredo *et al.*, 2012; Richards *et al.*, 2010). This Stage 1 research has highlighted the complexity of designing and curating a multi-sensory exhibition for a regional and local museum or gallery, and it is therefore advisable for curators to build relevant partnerships to facilitate knowledge exchange, collaborative activities and capacity building.

The effectiveness of the inclusive exhibition designs are presently being researched and data collected through semi-structured interviews with NCCD staff, the Creative Lab group members, visitors to the exhibition, and invited inclusive arts experts. Written and verbal feedback on the exhibition from visitors (sighted and VIP) is also being collected in situ. This Stage 2 research will be based in part on the questions the V&A asked visually impaired visitors on their provision in 2012 (Ginley, 2013):

- Does each element of the interpretation provision significantly aid understanding of the exhibition subject matter and exhibits?
- Does each element of the interpretation provision encourage further exploration of the exhibition from the user?

This Stage 1 research is the first step towards developing an in-depth demonstration case study of a regional 'visual' arts venue using co-creation to address how to develop outstanding intellectual access in their exhibitions for blind and partially sighted participants.

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#### About The Author:

**Professor Anne Chick's** research is focused upon using co-creation methodology to address identified social and environmental issues with the key actors. She is interested in the opportunities of using creative activities as a vehicle to aiding the process of engaging participants to elicit their views, and find solutions.

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# Extracting User Requirements for Product Design: A Supportive Framework for Designers

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**Abstract:** User requirements play an important role in product design. With the development of social networks and online shopping sites such as Amazon.com and Cnet.com, we can easily obtain valuable feedback from users. The crucial question is how to utilize user feedback to support the development of product design in the early phases. This paper presents a framework for assessing user requirements from online websites. With the support of opinion mining techniques, the framework can provide useful user requirements for designers. The evaluation of the framework was conducted in two cases: A Nokia mobile phone and the Apple iPod. Both cases showed that the outputs of the proposed system are useful for designers in improving the product quality.

**Keywords:** User requirements, sentiment classification, product design, knowledge design, design creativity

## 1. Introduction

User requirements play an important role in the early product design process (Ulrich et al., 1995)(Ulrich et al., 2004). The main disadvantages of traditional methods for capturing user requirements are that they are time consuming and expensive. For example, we need to meet users in order to interview them to obtain valuable feedback. Furthermore, it is very difficult to select appropriate customers from whom to obtain requirements. Fortunately, with the development of the World Wide Web, we can easily receive valuable feedback from users across the world, by processing a product's review document through online shopping sites such as Amazon.com, Ebay, and Cnet. The problem, however, is how to extract user requirements from raw text. The initial work on processing a product's reviews is strongly related to sentiment classification. However, the output of this sentiment classification simply provides information about whether the review document is positive or negative, which may not be sufficient for product designers to enrich their development. There have been a number of works on extracting more useful opinion texts to support users. Hu and Liu (2004)



proposed opinion mining to extract product features and indicated the importance of opinion mining for business intelligence (Liu, 2012) (Kumar and Vadlamani, 2015). Zhen et al. (2009) proposed multiple opinion text summarization to obtain useful text segments. The authors experimented on the same corpus as Hu and Liu (2004) and concluded that their approach appears to be more suitable for readers than previous works, in terms of usability. However, this research focuses only on a general summarization system, without taking designer use into account. Yang (2011) proposed a method using online reviews for product selection process in the product design. (Jing et al., 2016) proposed a method that utilizing big consumer opinion data for product design. Lin et al., (2013) indicated the helpful review with the perceptive of designers. Conrad and Kim (2011) presented a robust framework for enriching new product design process by capturing customer preference trends. Along with the successful of this research direction, we propose a novel framework utilizing online reviews for product design with the following motivations.

- Since text obtained from the online source is sometimes noisy, a method for identifying irrelevant reviews is essential to remove the noise and increase the accuracy of user requirement extraction.
- Each extracted sentence will be classified into the category of “advantage” or “disadvantage”. This aims at providing a better vision for designers.
- The proposed system is extended from Zhan et al. (2009) by creating a mechanism that allows system interaction with users through queries, which can result in higher accuracy in the extraction process. In addition, information from “Pros,” “Cons,” and “Top review” is extracted in order to improve the system’s accuracy.
- In addition, we provide a function that can extract aspect features of a review’s documents and reveal its sentiment (that is, positive or negative). This function can easily support designers looking at customers’ needs in review documents.

This paper is organized as follows. In the first section, we introduce our framework, where certain technical methods will be presented. Then, we exploit the proposed system to validate three cases. Experimental results are also discussed in this section. Finally, we provide our conclusion and discuss our future work.

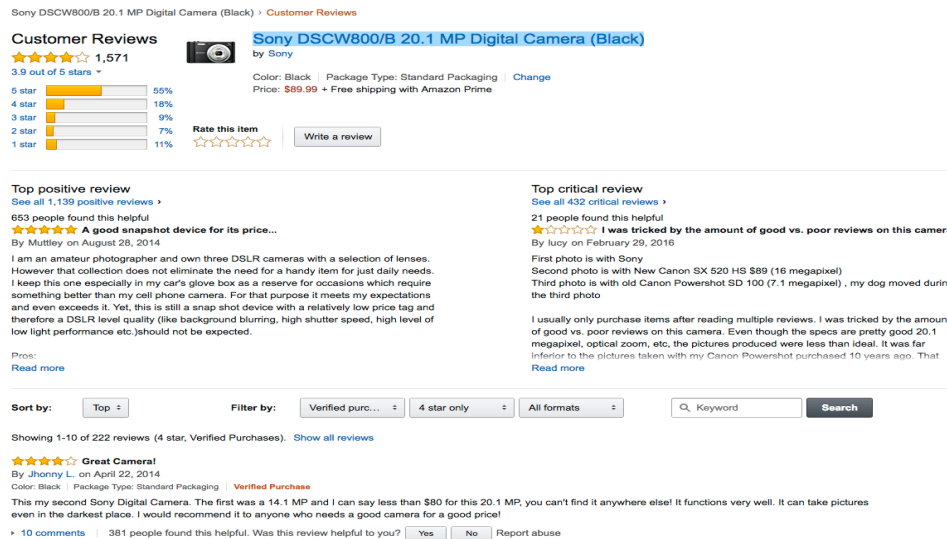


Figure 1. Example of Amazon reviews

Figure 1 shows an example of online reviews for given a product on the Amazon website. We can collect product reviews to extract importance information for product design.

## 2. Proposed Framework for Extracting User Requirements

Figure 2 shows the proposed framework for extracting user requirements. There are three main components in the framework: the first is the model for identifying irrelevant users review documents for given products, the second is the method for identifying high-quality reviews, and the third is the user requirement extraction model, which is used for obtaining users' needs from a large number of review documents. Figure 2 graphically shows the main components of the framework and its work process.

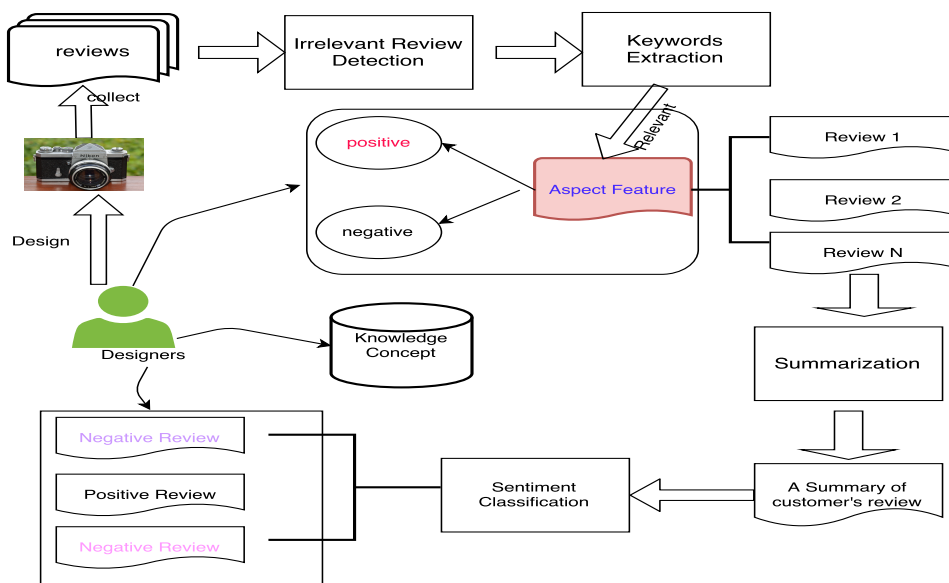


Figure 2. Framework for extracting user requirements

First, we apply preprocessing and irrelevant review detection to obtain useful reviews. After that, a keyword extraction process will be applied to obtain set of aspect features which are relevant to the given product. In the next step, we will find all reviews which are correspondent to the aspect feature and performing a summarization technique to obtain gist sentences for designers. A sentiment classification will be applied to find “positive”, “negative”, and “neutral” review. In addition to that each aspect feature will be scored and estimated to whether it is “positive”, “negative”, and “neutral”. The advantage and dis-advantage of features for the product are based on the “negative”, “positive”, and “neutral” information.

## 2.1 Preprocessing

The user requirement extraction process begins with a set of customer reviews as input. These reviews regarding a particular product are collected from the Internet. Preprocessing steps, including stop word removal and word stemming (Porter, 1980), are first applied to the review documents to reduce the noisy information. Word stemming is the process of reducing inflected or derived words to their stem, base or root form. The most popular stemming algorithm is the suffix-stripping algorithm, since it does not rely on a look-up table consisting of inflected forms and root form relations. In the suffix-stripping algorithm, rules are stored that provide a path for the algorithm to find a word's root form, given an input word form. Examples of rules include:

- If the word ends in ed, remove the ed
- If the word ends in ing, remove the ing
- If the word ends in ly, remove the ly

## 2.2 Learning Model to Classify Irrelevant Reviews

In this section, we present our model for learning to classify irrelevant review documents. Spam reviews waste a lot of readers' time and can reduce the performance of the system. Therefore, the main goal of this component is to detect irrelevant reviews from a set of reviews. In order to achieve this, we used the methods described in Jindal and Liu (2008). This method can be summarized as follows. In this section, we present the method for identifying high-quality user requirements. This method is based on the observation that a reviewer who is a product expert usually provides a quality product review. Top reviewers are identified by extracting the advantages and disadvantages of reviews. This information is confidently believed to be of high quality, and used to determine a top review. In addition, the advantages and disadvantages of reviews are extracted by using the keywords “pros,” “cons,” “advantage,” and “disadvantage.”

## 2.3 User Requirement Extraction

When a document has not come from a “top reviewer”, it is treated as a normal review. This section presents a method for extracting user needs from a collection of normal reviews. We adapt the work of (Zhan et al., 2009) by implementing several additional components. The main concept of this work is to extract information corresponding to people's interests.

### Keywords Extraction

In this section, we describe the component of our system that identifies the product features typically rated by users, which includes finding corresponding sentences mentioning these features. The first component is a string-based dynamic extractor that searches for frequent nouns or noun compounds in

sentiment laden text, which is similar to the models in Hu and Liu (2004). However, while those authors applied associate rule mining to obtain frequent nouns or noun compounds, our method uses a sequence mining technique to find a sub-sequence of words appearing frequently in the set of review documents.

### Aspect Features

An aspect feature is defined as a feature that relies solely on the text of a set of reviews to determine the ratable features of a product. The feature extraction techniques used in this study are particularly useful for identifying the unique features of entities where the feature, entity type, or both are too sparse to include in our static models. For example, dynamic analysis might find that for a given “Nokia phone”, many reviewers are concerned about the “memory card,” and effective analysis of the reviews should identify this as a key feature. Sequence mining is used to generate a list of word sub-sequences of and their frequency. We use prefixspan2 (Peil et al., 2004) to obtain a list of dynamic features. We then apply several filters to this list, which include removing candidates composed of stop words or candidates occurring with a low relative frequency within the set of input reviews. In addition, we use a score (Zhan et al., 2009) to rank the priority of a feature, as follows:

Table 1. Feature extraction

Feature	Frequency	Score
MP3 player	4	35.183
Safari web browser	3	33.487
YouTube application	3	28.84
Album artwork	3	28.84
Battery life	11	61.87
Music video	5	40
Web browser	7	50.18

$$score = f \times \log_2 \frac{N + 1}{n} \times \log_2(l + 2).$$

Here,  $f$  denotes the frequency of the phrase appearing in the review set,  $N$  and  $n$  are the number of review documents and reviews in which the phrase appears, respectively, and  $l$  is the length of the phrase. The score is used to rank features, and the top-ranked features are selected. Static features are defined by the producer and indicate the common attributes of a product. For example, when considering “Nokia mobile phone,” the static features of this product would be “screen,” “sharp,” “colour,” and so on. The static features are used in conjunction with the dynamic features in order to ensure that all aspects of the given product are considered. This enables us to understand the opinions of product reviewers more clearly. In this work, the dynamic and static features are merged in order to obtain a set of features for a given product. The hybrid of dynamic and statistic features is then defined as user requirements for designers. In the following subsection, we present the process of extracting information regarding the advantages and disadvantages corresponding to each feature.

## Multiple Review Summarization

For each topic in a collection, all relevant sentences are extracted and added into a pool of candidate segments for the final summary, until the expected summary length is reached. We used the Lucene search engine toolkit to determine a set of relevant sentences corresponding to a particular feature. Lucene typically considers each feature as a query and finds all sentences that are similar to this query, and the similarity measure for two sentences is conducted using the cosine similarity method.

All relevant sentences are summarized to obtain important information regarding to the features. The method of Maximal Marginal Relevance (MMR) is implemented to reduce the redundancy in the sentence selection process (Carbonell and Goldstein, 1995). In the second component, MMR intends to balance the trade-off between the centrality of a sentence with respect to the topic (the first part in Eq. 2) and its novelty compared to the sentences already selected in the summary (the second part in Eq. 2), i.e. to maximize the marginal relevance in the following formula:

$$\text{MMR}(s_i) = \text{Sim}(s_i, C) - \max_{s_j \in S} \text{Sim}(s_i, s_j)$$

where  $s_i$  is a candidate sentence,  $C$  is the set of relevant sentences to a particular topic,  $S$  is the set of sentences already included in the summary. With regard to  $\text{Sim}$ , a cosine similarity measure between sentence vectors is used, in which each element of a sentence vector represents the weight of a word-stem in a review document after removing stop words. The details of this method are presented in the paper (Zhan et al., 2009).

## Sentiment Classification

In the final step of our system, we develop a sentiment classification which can classify an opinion as positive or negative. We obtained all review sentences which are relevant to the features (for example, all sentences relating to “screen”). Then, we perform sentiment classification to obtain labels corresponding with review sentences. To build our sentiment classification, we obtain the training data from the Amazon website and used it along with the sentiment tree bank of Stanford University (Scher et al., 2013), for the learning process of machine learning model. We used the fasttext tool (Joulin et al., 2016) for learning sentiment classification model. We also develop an aspect sentiment classification model using a deep learning technique which is described in (Manning et al., 2014).

## Examples

Figure 3 shows an example of performing the system to extract user requirement list from given a product review.



<p>can have up to 1750 songs on it .<sup>47</sup></p> <p>[+] 8GB of size is great.<sup>47</sup></p> <p>[+] Video is good - the screen is vibrant enough and for the size of the screen, watching video is quite a pleasing experience.<sup>47</sup></p> <p>[+] iPod is unbelievable I love a touch screen and I love how big the screen is.<sup>47</sup></p> <p>[+] It's the perfect size for most people to hold, and despite being fairly glossy, won't get too dirty.<sup>47</sup></p>	<p>[+] It was slimmer than I had expected it to be and felt like the perfect size and weight in my hand.<sup>47</sup></p> <p>[+] Its size and weight are fair, and its design is sleek.<sup>47</sup></p> <p>[+] not really pocket size<sup>47</sup></p>
<p><b>web browser</b><sup>47</sup></p> <p>[+] The Internet based applications do work very well, however they do tend to run slowly, and the Safari web browser tends to crash often.<sup>47</sup></p> <p>[+] The Internet itself is very fast and uses the Safari web browser.<sup>47</sup></p> <p>[+] Just a simple tap and everything is at your beck and call (who needs a click-wheel anyway?) The latest model boasts such things as safari web browser (Wi-Fi required) or e-mail (must set-up account).<sup>47</sup></p> <p>[+] Its Wi-Fi capabilities allow its users to keep up-to-date with the latest news, music and events by using the built in web browser to search for any categories the users pleases.<sup>47</sup></p> <p>[+] Safari: Excellent, very usable web browser 2.<sup>47</sup></p> <p>[+] Other than that it has a YouTube video player that allows you to stream videos from the internet.<sup>47</sup></p> <p>[+] The built in web browser is a good function of the iPod touch.<sup>47</sup></p>	<p>[+] You can do this when using the Safari web browser too, as some internet pages are easier displayed in the widescreen mode.<sup>47</sup></p> <p>[+] The YouTube application sometimes doesn't allow you to watch videos with the errors "This video could not be played" or "This video does not support iPhone yet"<sup>47</sup></p>
<p><b>battery life</b><sup>47</sup></p> <p>[+] Basic Features - The iPod Touch has a battery life of around 22 hours (Music).<sup>47</sup></p> <p>[+] and the battery life is brilliant it last about 20 hours which is longer than any other mp3/mp4 or ipod ixx ever owned .<sup>47</sup></p> <p>[+] The battery life is good, and it works well in that when you are uploading new music from your computer to your iPod Touch it is charging it at the same time.<sup>47</sup></p> <p>[+] Review of Apple iPod touch 8 GB by rjbriggssy Excellent battery life combined with an interface even a baby could understand makes this easily the best ipod or even portable music/video player on the market.<sup>47</sup></p>	<p>[+] On the downside the battery life is pretty poor, with just 22 hours play for music and 5 hours for movies.<sup>47</sup></p> <p>[+] It does not have a very good battery life of 22 hours music, and 5 hours video or WiFi.<sup>47</sup></p> <p>[+] The battery life for music playback is up to 22 hours and the batter life for video playback is up to 5 hours.<sup>47</sup></p> <p>[+] could have better battery life when watching films.<sup>47</sup></p> <p>[+] Battery life can deplete rather quickly depending on use.<sup>47</sup></p> <p>[+] Shortish battery life and you can only charge it through your com.<sup>47</sup></p> <p>[+] If you are using the backlight, the battery life can go faster than you think!<sup>47</sup></p>
<p><b>Keyboard</b><sup>47</sup></p>	<p>[+] keyboard difficulty if any.<sup>47</sup></p>
<p><b>album artwork</b><sup>47</sup></p> <p>[+] The main music player screen also shows the album artwork of the track and with a touch of a list button on the screen you can view all the tracks on the selected album.<sup>47</sup></p>	<p>[+] The cover flow option is amazing if you have all album artwork as you can scroll through all your albums and see the covers, however does not look so good if album artwork is missing.<sup>47</sup></p> <p>[+] Sometimes, the visuals change when you do this so you can flick through your album artwork instead of going through a list of songs.<sup>47</sup></p>

Figure 3. Examples of extracting user requirements list

Label	Text	Label	Text
[+]	The battery life for this phone is really good as well .	[-]	Keys may be too small for larger fingers
[+]	The battery life on this phone is very substantial.	[-]	bottom small
[-]	Poor battery life and occasionally slow OS	[-]	A bit small keypad
[-]	Short battery life, takes a while to connect to GPS	[-]	hangs when you press keys to fast
[-]	Battery life is rubbish	[-]	Slow messaging, no automatic keypad lock
[-]	Chunky, terrible battery life	[-]	Keyboard is hard to use, no flash player ..
[-]	Battery could be improved		

Figure 4. Shows an example when we perform with aspect "battery life" and "key" for Nokia phone

### 3. Case Studies and Experimental Results

In this section, we present two case studies for evaluating the proposed framework: A Nokia mobile phone and an iPod Touch. We first collect reviews, and then apply our framework to obtain user requirements. Thereafter, the user requirements are sent to designers by means of a questionnaire.

Questionnaire 1

1. Are presented user requirements about Functions of the product informative for design? Yes ☐ No ☐
2. Are presented user requirements about Shape of the product informative for design? Yes ☐ No ☐
3. Are presented user requirements about Content (Software) of the product informative for design? Yes ☐ No ☐
4. Does the features list provide useful information for designers to improve product and develop product? Yes ☐ No ☐
5. Does the methods save time for designers in collecting user requirements for product design? Yes ☐ No ☐
6. Do performed opinion extractions of reviews enrich design knowledge? Yes ☐ No ☐
7. Which components in the method are significant for improving product and developing product?
8. Does "Advantage –Disadvantage" list help designers in designing product? Yes ☐ No ☐
9. How do you evaluate usefulness of the presented information of user requirements for further design?

Figure 5. The questionnaire for designers

## Nokia Mobile Phone Case Study

The purpose of the user requirement extraction tool is to extract user needs from a collection of review documents related to the Nokia mobile phone. As explained in the previous section, a set of appropriate reviews is obtained after identifying irrelevant product reviews, and high-quality reviews are also obtained using this tool. Among 90 review documents, two “top review” documents are obtained. In addition, information reflecting the advantages and disadvantages of the Nokia phone is provided. Following this, a multiple summarization technique is used to extract information from the set of reviews. These outputs are provided to designers for evaluation in terms of improving the product. The user requirement extraction process is capable of extracting a set of features for the Nokia mobile phone; however, the problem is obtaining a set of features that are useful for improving the product. In designing a mobile phone, there are two types of user needs: the first relates to engineering, while the second relates to the shape, color, and structure of the mobile phone. This information focuses on improving the product where the designers could not. In order to validate the output of our framework for designing a product, we used a questionnaire to evaluate the usefulness of the user requirement extraction tool. Three designers were asked to answer the questionnaire, which evaluates the use of automatically extracted user requirements that represent opinions of users of the actual products. The questionnaire is intended to be used by designers for further improvement and development of the product. The two presented cases are followed by extracted information regarding user requirements, listed with an importance score. The questionnaire also includes a list of advantages and disadvantages of the highest-rated requirements from user opinions. It should be noted that this is automatically extracted information, and not all of the requirements are precisely defined. At the end, questions regarding every test case are listed. Figure 5 shows the questionnaires used for designers to evaluate the proposed system’s output. The outputs of the user requirement extraction are obtained to support designers in improving their products. The following outputs are provided to the designers:

- The advantages and disadvantages of the mobile phone
- The user requirement extraction outputs
- Features of the products

The designers are given 30 minutes to read the outputs of the extraction tool to answer questions regarding whether or not the outputs of the user requirements tool are necessary for improving the product. The first question asks designers to evaluate how the list of features obtained by the proposed system can be useful for improving their products. The second question is whether the advantages and disadvantages of the product could be useful for improving the product. Finally, the summary of reviews corresponding to each product feature is evaluated. In order to investigate whether or not the user requirement extractions are useful for improving the Nokia phone, a list of “hard features” is provided, along with those “dynamic features” obtained from the set of review collections. In this case study, a list of design features commonly used in mobile phone design is provided as hard features. The design features are defined as the collection of human interface elements that users see, hear, touch, or operate (Han et al., 2000). Both specific design features and the product as a whole affect user requirements. For example, the colour of a mobile phone may affect perceived luxuriousness, and the arrangement of a display and its relevant buttons may affect perceived harmoniousness. We used the topic identification model of the proposed framework to obtain the table of features, and then considered them as user requirements for the product design. The list of user requirements is shown in the figure below. As shown in Figure 6, a mobile phone consists of both hardware (physical) and software (logical) components. Buttons and display panels are examples of hardware components, while the menu and animation are examples of software components. Each component may have different properties, and the properties are classified into three groups: individual, integration, and interaction. For mobile phones, “size of button,” “clarity of selected menu item,” and “text input mechanism” are examples of individual, integration, and interaction properties, respectively. After obtaining this list of features, the next step is applying the user requirements extraction tool to determine the values for each feature. The tool is applied to a review collection set obtained from the online data. For each feature, the Lucene search is used to obtain a set of document sentences, and the summary tool is used to obtain the outputs. All of the outputs are provided to the designers, in order to evaluate whether or not they are useful for improving the product’s quality. First, the features list generated by the topic identification component of the proposed tool is evaluated to determine how these may be useful for improving the Nokia mobile phone. The results obtained from the evaluation of four designers are shown in the table below. We obtained a user requirements list that is useful according to the evaluation. The user requirements list generated by opinion extraction was evaluated to assert its usefulness for the purpose of designing the Nokia phone. The results (Figure 6) of the designer evaluations show that 41 user requirements among the total 125 extracted requirements were chosen by all the designers, which means that 32% of the user requirements are agreed on by all the designers.

Table 2. User requirements list for Nokia phone

**User requirements for this product**

Please mark the **requirements** you found useful for the design. The following page is a list of **Advantages** and **Disadvantages**, based highest ranked user requirements.

<input type="checkbox"/> memory 100 <sup>+</sup>	<input type="checkbox"/> say phone 29 <sup>+</sup>	<input type="checkbox"/> memory card 63 <sup>+</sup>	<input type="checkbox"/> digital camera 55 <sup>+</sup>
<input type="checkbox"/> key 100 <sup>+</sup>	<input type="checkbox"/> remove battery 29 <sup>+</sup>	<input type="checkbox"/> megapixel camera 66 <sup>+</sup>	<input type="checkbox"/> data cable 46 <sup>+</sup>
<input type="checkbox"/> weigh 100 <sup>+</sup>	<input type="checkbox"/> recommend phone 36 <sup>+</sup>	<input type="checkbox"/> mega pixel camera 42 <sup>+</sup>	<input type="checkbox"/> connect phone 29 <sup>+</sup>
<input type="checkbox"/> display 100 <sup>+</sup>	<input type="checkbox"/> range features 29 <sup>+</sup>	<input type="checkbox"/> many features 46 <sup>+</sup>	<input type="checkbox"/> color display 29 <sup>+</sup>
<input type="checkbox"/> shape 100 <sup>+</sup>	<input type="checkbox"/> quality pictures 41 <sup>+</sup>	<input type="checkbox"/> main menu 36 <sup>+</sup>	<input type="checkbox"/> certainly recommend 29 <sup>+</sup>
<input type="checkbox"/> color 100 <sup>+</sup>	<input type="checkbox"/> quality music 29 <sup>+</sup>	<input type="checkbox"/> looking phone 29 <sup>+</sup>	<input type="checkbox"/> carry around 36 <sup>+</sup>
<input type="checkbox"/> screen 100 <sup>+</sup>	<input type="checkbox"/> quality good 36 <sup>+</sup>	<input type="checkbox"/> look phone 29 <sup>+</sup>	<input type="checkbox"/> camera phone 41 <sup>+</sup>
<input type="checkbox"/> size 100 <sup>+</sup>	<input type="checkbox"/> quality camera 29 <sup>+</sup>	<input type="checkbox"/> long time 29 <sup>+</sup>	<input type="checkbox"/> camera good 46 <sup>+</sup>
<input type="checkbox"/> wide range 29 <sup>+</sup>	<input type="checkbox"/> put back 36 <sup>+</sup>	<input type="checkbox"/> life other 29 <sup>+</sup>	<input type="checkbox"/> buy phone 41 <sup>+</sup>
<input type="checkbox"/> whole phone 29 <sup>+</sup>	<input type="checkbox"/> proper digital 29 <sup>+</sup>	<input type="checkbox"/> last phone 29 <sup>+</sup>	<input type="checkbox"/> black white 29 <sup>+</sup>
<input type="checkbox"/> white balance 29 <sup>+</sup>	<input type="checkbox"/> problem phone 36 <sup>+</sup>	<input type="checkbox"/> large screen 51 <sup>+</sup>	<input type="checkbox"/> best phone 41 <sup>+</sup>
<input type="checkbox"/> video mode 29 <sup>+</sup>	<input type="checkbox"/> pretty good 29 <sup>+</sup>	<input type="checkbox"/> keep phone 29 <sup>+</sup>	<input type="checkbox"/> best Nokia 29 <sup>+</sup>
<input type="checkbox"/> video calling 46 <sup>+</sup>	<input type="checkbox"/> play music 29 <sup>+</sup>	<input type="checkbox"/> internal memory 55 <sup>+</sup>	<input type="checkbox"/> battery life 63 <sup>+</sup>
<input type="checkbox"/> used phone 36 <sup>+</sup>	<input type="checkbox"/> TFT color display 38 <sup>+</sup>	<input type="checkbox"/> highly recommended 29 <sup>+</sup>	<input type="checkbox"/> additional features 29 <sup>+</sup>
<input type="checkbox"/> used Nokia 29 <sup>+</sup>	<input type="checkbox"/> pixel camera 36 <sup>+</sup>	<input type="checkbox"/> great phone 36 <sup>+</sup>	<input type="checkbox"/> Visual Radio 29 <sup>+</sup>
<input type="checkbox"/> turns itself 29 <sup>+</sup>	<input type="checkbox"/> picture quality 55 <sup>+</sup>	<input type="checkbox"/> great features 29 <sup>+</sup>	<input type="checkbox"/> VGA camera 29 <sup>+</sup>
<input type="checkbox"/> turn phone 41 <sup>+</sup>	<input type="checkbox"/> photos videos 29 <sup>+</sup>	<input type="checkbox"/> good quality 36 <sup>+</sup>	<input type="checkbox"/> USB cable 36 <sup>+</sup>
<input type="checkbox"/> true Nokia 29 <sup>+</sup>	<input type="checkbox"/> phones market 36 <sup>+</sup>	<input type="checkbox"/> good phone many 42 <sup>+</sup>	<input type="checkbox"/> TFT colour 29 <sup>+</sup>
<input type="checkbox"/> these phones 29 <sup>+</sup>	<input type="checkbox"/> owning phone 29 <sup>+</sup>	<input type="checkbox"/> front phone 29 <sup>+</sup>	<input type="checkbox"/> Symbian OS 29 <sup>+</sup>
<input type="checkbox"/> text message 36 <sup>+</sup>	<input type="checkbox"/> owned Nokia 41 <sup>+</sup>	<input type="checkbox"/> front camera 29 <sup>+</sup>	<input type="checkbox"/> Sony Ericsson 46 <sup>+</sup>
<input type="checkbox"/> symbian operating system 42 <sup>+</sup>	<input type="checkbox"/> other phones 29 <sup>+</sup>	<input type="checkbox"/> find phone 29 <sup>+</sup>	<input type="checkbox"/> Second VGA 29 <sup>+</sup>
<input type="checkbox"/> switch off 36 <sup>+</sup>	<input type="checkbox"/> operating system 41 <sup>+</sup>	<input type="checkbox"/> feel phone 29 <sup>+</sup>	<input type="checkbox"/> SD card 36 <sup>+</sup>
<input type="checkbox"/> stereo speakers 41 <sup>+</sup>	<input type="checkbox"/> onto phone 29 <sup>+</sup>	<input type="checkbox"/> features phone 29 <sup>+</sup>	<input type="checkbox"/> PC Suite... 41 <sup>+</sup>
<input type="checkbox"/> standby time 29 <sup>+</sup>	<input type="checkbox"/> old phone 29 <sup>+</sup>	<input type="checkbox"/> fantastic phone 29 <sup>+</sup>	<input type="checkbox"/> N series phones 34 <sup>+</sup>
<input type="checkbox"/> sound quality 55 <sup>+</sup>	<input type="checkbox"/> new phone 29 <sup>+</sup>	<input type="checkbox"/> fantastic camera 29 <sup>+</sup>	<input type="checkbox"/> N Series 29 <sup>+</sup>
<input type="checkbox"/> software update 29 <sup>+</sup>	<input type="checkbox"/> music player 66 <sup>+</sup>	<input type="checkbox"/> excellent phone 29 <sup>+</sup>	<input type="checkbox"/> Music Player 36 <sup>+</sup>
<input type="checkbox"/> slow down 36 <sup>+</sup>	<input type="checkbox"/> months now 36 <sup>+</sup>	<input type="checkbox"/> easy navigate 29 <sup>+</sup>	<input type="checkbox"/> Mini SD 29 <sup>+</sup>
<input type="checkbox"/> slide back 46 <sup>+</sup>	<input type="checkbox"/> mobile phones 36 <sup>+</sup>	<input type="checkbox"/> drain battery 29 <sup>+</sup>	<input type="checkbox"/> MP camera 29 <sup>+</sup>
<input type="checkbox"/> side phone 41 <sup>+</sup>	<input type="checkbox"/> mmi SD 29 <sup>+</sup>	<input type="checkbox"/> display screen 29 <sup>+</sup>	<input type="checkbox"/> Large bright 29 <sup>+</sup>
<input type="checkbox"/> series phones 29 <sup>+</sup>	<input type="checkbox"/> Message 100 <sup>+</sup>	<input type="checkbox"/> digital zoom 36 <sup>+</sup>	<input type="checkbox"/> FM radio 41 <sup>+</sup>
<input type="checkbox"/> sending text message 34 <sup>+</sup>		<input type="checkbox"/> Adobe PDF 29 <sup>+</sup>	<input type="checkbox"/> Carl Zeiss 77 <sup>+</sup>
			<input type="checkbox"/> Battery life 36 <sup>+</sup>

The results show that the outputs of the proposed system are highly useful for designers in terms of improving the product. The features list, as well as advantages and disadvantages, are also useful for designers.

Requirement List	Importance	Number of votes
Key	100	3
Weigh	100	3
Display	100	3
Shape	100	3
Color	100	3
Screen	100	3
Stereo speaker	41	1
Picture quality	55	2
Photo video	29	3
Music Player	66	3
megapixel	42	3
Large Screen	51	3
Internal Memory	55	3
Adobe PDF	29	3
Visual Radio	29	3
VGA Camera	29	3
USB cable	36	3
Second VGA	29	3
SD card	36	3
Mini SD	29	3
MP camera	29	3
FM radio	41	3
Carl Zeiss	77	3
Text Message	36	1
Side back	46	1
TFT color display	38	1
Message	100	1
Memory card	63	1
Main Menu	36	1
Drain Battery	29	1
Display Screen	29	1
Digital Room	29	1
Video Calling	29	1
Data cable	46	1
Connect Phone	46	1

Requirements List	Importance	Number of Votes
key	100	3
memory	100	3
weigh	100	3
display	100	3
shape	100	3
color	100	3
screen	100	3
video player	28	3
sound quality	67	3
music video	40	3
music player	28	3
album art work	28	3
weather stocks	28	3
touch interface	40	3
Safari webbrowser	36	3
Yotube application	29	3
Bacteri life	29	3
FM radio	41	3
home screen	77	3
web browser	50	1
SD card	36	3
watch movies	35	2
touch screen	57	1
perfect size	28	1
carry around	28	1
YouTube Video	29	1

Figure 6. The agreement results of designers for Nokia Phone and iPod Touch.



## iPod Case Study (iPod 2009)

Similarly, to the case of the Nokia phone, we distributed the output of the proposed system to designers and asked them to evaluate it using a questionnaire. First, the designers identify which user requirements extracted by the system are useful to them. The obtained results are shown in Table 3.

Table 3. User requirements list for iPod

**User requirements for this product<sup>u</sup>**

Please mark the **requirements** you found useful for the design. The following page is a list of **Advantages** and **Disadvantages**, based highest ranked user requirements.<sup>u</sup>

<input type="checkbox"/> <sup>u</sup> memory 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> music player 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> weigh 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> main menu 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> display 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> love music 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> shape 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> listen music 50 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> color 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> like perfect 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> screen 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> ipod touch 69 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> size 100 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> internet browser 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> worth money 40 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> inch screen 50 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> web browser 50 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> iPod touch GB 80 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> weather stocks 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> home screen 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> watch videos 35 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> highly recommend 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> watch movies 35 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> first iPod 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> video player 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> cover flow 35 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> touch screen 57 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> carry around 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> touch interface 40 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> big screen 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> touch GB 74 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> best ipod 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> sound quality 67 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> battery life 61 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> size weight 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> apple ipod touch 40 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> quality brilliant 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> app store 35 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> put iPod 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> album artwork 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> previous iPods 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> across screen 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> pretty good 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> YouTube video 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> perfect size 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> YouTube application 28 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> other features 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> Safari web browser 33 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> open iPod 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup> iPod Touch 57 <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> new iPod 28 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup>
<input type="checkbox"/> <sup>u</sup> music videos 40 <sup>u</sup>	<input type="checkbox"/> <sup>u</sup>

Figure 6 (left side) shows that 41 of the 52 extracted user requirements were chosen by all the designers, which means that 79% of the user requirements are agreed on by all designers. Table 4 shows the answers in the questionnaire for which all designers selected “Yes” for questions 1 through 7 (except question 2). The proposed bridging method is exploited in the case of the Nokia phone and Apple iPod. After obtaining the user requirement results, we asked designers to answer several questions in the questionnaire.

## Aspect Sentiment Case Study

We also conducted an experiment to verify whether aspect sentiment would be useful for designers. After extracting the aspects mentioned in the previous section, the problem is determining whether it is positive or negative with respect to the review document contents. We implement an aspect sentiment model using advanced machine learning. In order to determine how aspect sentiment classification could be useful for product design, we asked three designers to answer questionnaires similar to those for the Nokia and iPod case studies. The designers agree that the system would save time and help to obtain user requirements, especially when designers do not have the ability to understand English. The sentiment aspect extraction would help designers to identify quickly which components of the product should be improved. As an example, we will focus more on negative and neutral sentiments to evaluate user comments.



## Questionnaire results and Discussion

The results shown in Table 4 provide the following findings:

- According to the designers, the user requirements are useful in terms of shape, function, and contents, while the method for collecting user requirements saves time.
- The output of the system enriches design knowledge and is helpful for designing the product.
- The presented user requirements regarding product functions are informative for design.
- The presented user requirements regarding product shape are informative for design.
- The presented user requirements regarding product content (software) are informative for design.
- The features list provides useful information for designers to improve and develop the product.
- The method saves designers time in collecting user requirements.
- The opinion extractions performed on reviews enriches design knowledge.
- The “shape” components of the method are significant for improving product and developing product.
- The “Advantage - Disadvantage” list helps designers in designing the product.
- The user requirements information presented is evaluated as very useful for future design.

Table 4. Questioner results for Nokia Phone and iPod Touch

Dataset	Designer 1		Designer 2		Designer 3	
	Nokia Phone	iPod	Nokia Phone	iPod	Nokia Phone	iPod
Question 1	Yes	Yes	Yes	Yes	Yes	Yes
Question 2	Yes	Yes	Yes	Yes	Yes	Yes
Question 3	Yes	Yes	Yes	Yes	Yes	Yes
Question 4	Yes	Yes	Yes	Yes	Yes	Yes
Question 5	Yes	Yes	Yes	Yes	Yes	Yes
Question 6	Yes	Yes	Yes	Yes	Yes	Yes
Question 7	Yes	Yes	Yes	Yes	Yes	Yes
Question 8	function	function	function, memory	function, memory	function	function
Question 9	useful	useful	very useful	very useful	useful	useful

According to the designers, the proposed system is useful in terms of shape, function, and content (software). This clearly indicates that many users would like to see improvements in these features of the product. This knowledge is essential for focusing on specific features in designing and developing a product. In addition, the user requirements extraction method saves time, because the proposed system can automatically extract useful requirements from a large collection of product reviews. Without this system, we would need a great deal of time to obtain useful information from these documents, because we would have to read the entire document to identify user requirements. Time is also saved in the sense that we do not need to interact directly with users using traditional methods such as interviews and questionnaire. The designers agree that the outputs of the systems enrich design knowledge and are very helpful in designing the product. The evaluation of the designers shows successful bridging between

user requirements and designing of products. In conclusion, we believe that increased accuracy of user requirements extraction from online reviews would result in the outputs of the proposed system being more appropriate for future product design.

## 4. Conclusion

In this paper, we have presented design cases with user product reviews for supporting the design of products. The evaluation was conducted in two cases: A Nokia mobile phone and the Apple iPod. Both cases showed that the outputs of the proposed system are useful for designers in improving the product quality. This result leads us to believe that as long as we ensure the quality of user requirements extraction, we can present a method for bridging user requirements and the process of designing a product. In addition, we verified the function of feature sentiments, which was also found to support designers. In future, we would like to develop our mechanism in different languages, which will take the cultural aspect of design into account.

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# Trail of Evidence

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**Abstract:** The readership in Strategic Creativity at Design Academy Eindhoven (DAE) explores how design can contribute to address complex problems to bring innovation in society and economy. We develop design research as a collaborative practice, not only with partners in the industry but also by collaborating with students. To do so, the readership developed Design Research Spaces; extra-curricular modules for Bachelor students making them temporarily part of a real design research project, that's how we teach students to REDO.

This paper and film (<https://vimeo.com/213439963>) gives insight into the use of the '*Trail of Evidence*' (ToE) within the Design Research Space of the project 'Stroompunt' (English title: Current Futures), focusing on creating water awareness and behavioural change in one Eindhoven neighbourhood. Working with 'what-if' scenarios, students were taught to ToE method, to work within a framework that facilitated analysis and doing research as a team of individuals.

**Keywords:** Thinking through making, contextualisation, design for behaviour change, social innovation, evidencing

**Film Contribution:** <https://vimeo.com/213439963>

# Constructing your own Reality prevents others from doing it for you: A Shift towards Culturally Inclusive Design Education

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**Abstract:** From the standpoint of a design school, situated in New Zealand, where the proud and visually articulate Māori and Pasifika peoples who exhibit traditional skills of visual communication, storytelling and making are domiciled, one might ask why these skills and this knowledge was overlooked from the aesthetic education we offer. With diversity extolled as highly valuable, it seems incongruent that homogeny and standardization should continue to overshadow design education. Critical of this duplicity, this paper asserts the facilitation of culturally empathetic design curricula in which all students have an equal opportunity to contribute and flourish. Building on the concept of renegade knowledge, this research asserts that to REDO design education indigenous knowledge should be considered as fundamental to design pedagogy as western knowledge currently is. This study draws from the Māori and Pasifika cohorts at the School of Design, to elucidate the benefits brought about by the inclusion of diversity.

**Keywords:** Indigenous design knowledge

## 1. Introduction

Please Paramount to the shift from standardization in design is not the adaption, interpretation or inclusion of indigenous symbols and visual narratives but the presence of, and respect for indigenous students and indigenous knowledge within design education. Guided by the contributions given by my Māori and Pasifika colleagues and students alike, this study recognizes the complexity of this fledgling relationship in design education and acknowledges the need for ongoing negotiations. The contribution I offer in this study is to investigate the use of a reciprocal relationship for those sharing this important space.

Both diversity and inclusivity are now ubiquitous terms in the manifestos of contemporary design institutions. The benefits non-western cultural ideals and

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approaches offer design education, although noted as valuable, are quixotically, still side-lined by a design curricula that continues to be dominated by Eurocentric Modernist ideals (Sohoni 2009:330). But while on the one hand cultural influences are extolled, the homogeny and hegemony established through standardization nearly a century ago, still dominates design. Critical of this duplicity, this paper asserts that to facilitate more culturally diverse and empathetic design education, in which all students have an equal opportunity to flourish, indigenous knowledge should be imbedded into contemporary pedagogies. This paper will utilize the vigor of renegade knowledge to further the call for a shift from the standardization that theorists assert remains extant in design education (Findeli 2001:11). Renegade knowledge is produced by scholars who, dissatisfied by established academic tenets, turn away in order to founder new practices (Engels-Schwarzpaul 2016:11). One such practice this paper offers is The Silent Approach in which teachers step back to enable new knowledge to emerge from the diversity of the student cohorts. Students is expected to become "independent, autonomous and responsible" (Gattegno 1963:80). Drawing evidence from both the staff and student cohorts at Victoria University, School of Design this research elucidates the opportunities brought to design education through diversity and inclusivity. By exploring and exposing the provocations of current design tenets, as still dominated by a western approach this study aims to REDO design education in order to create spaces within which the use of Indigenous ideologies and knowledge will not only be ratified but establish future opportunities for the use and appreciation of it within design thinking, research and practice. Using the Pasifika ideology of Ta-Vā (time and space) developed by Tongan academic Hūfanga 'Okusitino Māhina and the supporting belief, teu la vā (sacred connections), this paper will debunk Loos' claims and in doing so acknowledge the parallels, relevance and opportunities Indigenous culture offers design education.

## 2. Current Paradigm

### 2.1 Leading to the Current Paradigm

From the specific standpoint of New Zealand, design as a discipline developed well after the colonial period in the mid twentieth century; as such, design research and practice has tended to disregard Indigenous culture as having little to offer the disciplines. This has resulted in current design pedagogy being dominated by a working model that privileges western influences. Seemingly forgotten within the current design histories taught, or perhaps conveniently just ignored, is reformist Owen Jones' (1809 -1874) praise of both Māori and Pacific people's use of nature's harmonies, to perceive and depict true balance (Jones, 1856). As a leading nineteenth century educational reformist, Jones, along with John Ruskin (1819-1900), Gottfried Semper (1803-1879) and Henry Cole (1808-1882) was acknowledged for his contribution to modernism (Wick 2000:17). Jones was the first of his alliance to ratify the impact culture, specifically Pacific cultures, could have on the development of a codified visual structure as part of the tenets he pursued (Jones 1856:14). The formal embellishments of Vitruvius (c. 90 - c. 20 BCE) in the first century AD, Leon Battista Alberti (1404 - 1472) in the fifteenth century and the decades that ensued where ornament had flourished in both theory and practice ended in the late nineteenth century. This was due to criticisms over the extravagance of this periods' industrialised production and caused the application of ornamentation, to be considered obsessive and to be scrutinised as such. The resultant manifestos eliminated visual expression generated from cultural, religious and historic references (2000:15) Influenced by

the Reformist's endeavours, early twentieth century designers continued to discard the use of such excess in their work. Austrian architect and follower of the Vienna Secession, Adolf Loos (1870-1933) scorned ornament, labelling it degenerate and no less than a crime (Loos 1908:19). Loos' defamation, cited expressions of indigeneity as counteractive to the evolution of modern culture (1908:20). This was one of the earliest and I would argue most ignorant, outbursts he advocated. As ill-informed as this research suggests his claim was, it did successfully initiate the elimination of ornament from the curricula of art and architecture, which took with it indigenous culture. The absence of applied ornament, patterns, or cultural markings in design embodies the modernist tenet of a simplified universal visual expression. This codified aesthetic still dominates many curricula, but thankfully its use is no longer considered sacrosanct (2009:231).

## 2.2 Beyond the Current Paradigm

Design theorist, Alain Findeli posits that to move beyond the homogeneity current in design, there is an urgent need to broaden the scope of inquiry (2001:230). Fern Lerner further defends this shift and suggests a more inclusive approach would ensure the aesthetic language of the future does not become constricted or impeded (Lerner 2012:143). I argue that to facilitate this shift and enable more culturally expressive design solutions, Indigenous students and Indigenous knowledge should be accommodated into the design space. Central to this paper is the use of Pasifika ideologies. Mahina's Ta-Vā (time and space) and teu la vā (sacred connections) are highlighted to illustrate the relevance and opportunity afforded design education when Indigenous knowledge is seen, heard and celebrated for its diversity, relevance and capacity to innovate within contemporary contexts.

This research focuses on the obstacles indigenous students face within an aesthetic education that has within its history, that proud claim for the removal of cultural, religious and historic references from its visual and ideological vocabularies. I suggest that the absence of indigenous knowledge or visual reference to it, from current curricula is no longer an appropriate pedagogical model. The solution, I posit is not an 'either or' scenario but a recognition that knowledge comes from many cultures and contexts. This paper supports Māhina's suggestion that the integration of reciprocal understandings would greatly benefit the development of a relationship between Indigenous and western design knowledge. I argue that this approach offers a fluidity and mutuality that would invite the inclusion of indigeneity within design pedagogy and in doing so, accommodate the shift away from the standardization that characterizes many of the western design approaches. This includes new approaches that create culturally inclusive spaces that recognise all members, whatever their identity (Baskerville 2010:110). This study explores how culturally empathetic approaches along with the inclusion of indigenous knowledge could improve the success of indigenous design students but as importantly enable these students to make a significant and authentic contribution to the critical shift in design education and practice being called for by theorists, pedagogues alike. In the face of this appeal this research suggests its focus is a timely if not well overdue, contribution towards change in design education.

Samoa academic Albert Wendt celebrating the vastness of offerings embedded in Pasifika cultures, Samoa academic Albert Wendt writes;

“I belong to Oceania – or at least I am rooted in a fertile portion of it ... So vast, so fabulously varied a scatter of islands, nations, cultures, mythologies and myths, so dazzling a creature, Oceania deserves more than an attempt at mundane fact; only the imagination in free flight can hope – if not to contain her – to grasp some of her shape, plumage and pain ” (Wendt 1982:202).

Wendt's words go a long way to elucidate the affluence of visual and ideological material held within Pasifika cultures. Albeit this ostensible wealth, Pasifika students have spoken of, “road blocks in their learning” (Matautia 2017: 20). St Andrew Matautia, a post graduate design student of Pasifika decent, believes there is “a need to find pathways within design education that are culturally inclusive and more amenable to the contributions Indigenous cultures can make as a whole, not just for the Indigenous and, as studies tell us, endangered students” (2017:31). The reciprocity Matautia speaks of is inherent in Mahina's Ta-Vā. In order to ratify these claims this study will illustrate the relevance and impact of Mahina's theory to both creative practice and critical thinking through course work at VUW School of Design.

“Casting an eye over my educational experience, an epiphany had occurred when I was encouraged, although at first it felt like I was permitted, to use aspects of my culture in my design process. There was no doubt that this inclusion allowed me to express myself, explore more confidently and design more intuitively” (2017: 32).

From the standpoint of a design school, situated in New Zealand, where the proud, vocal, visually articulate and prolific Māori peoples are the indigenous, and many more Pasifika peoples equipped with similar skills of visual communication, storytelling and making are domiciled, one might ask why were these skills and this knowledge ever overlooked from the aesthetic education we offer? Equally baffling, is why design institutes who invite diversity and inclusive approaches continue to deliver an aesthetic education that is still dominated by a working model that privileges a western approach. This research seeks to see beyond the global calls for a visual diversity that benefits economic marketplaces and enables countries to grow their identity and market shares in global economies (Levitt 2006:5) Purdue University defined diversity as “characteristics of personality, work style, religion, race, ethnicity, gender and sexual orientation, having a disability, socioeconomic level, educational attainment, and general work experience” (LeadingEdition, 2011). Dr Linda Leach addresses the need to do more than pay lip service to diversity by simply situating it within the group. Leach asserts that as a component of diversity, indigenous peoples are still under-represented in tertiary institutions and discusses the need to continue to move away from methods that still endorse, “assimilation into the dominant culture” (Leach 2011:247). In support of Leach's assertions, I argue there needs to be an acknowledgement within pedagogical practices that personal and individual interaction is required to enhance the positive benefits of inclusiveness. Embedded in this paper is a simple appeal; I ask that we, as design academics, stop talking and listen. In order to move beyond the singular trajectory of design history taught that moves from the classical through the industrial to modernism and beyond I argue it is time to let others be heard. The histories that dominate design pedagogy rarely mention the colonization of indigenous peoples and their assimilation Leach speaks of. I posit it is time to set aside the voices of extolling Western design knowledge and employ the Silent Approach. This approach was

developed by the French mathematician and educator, Caleb Gattegno (1911-1988). The Silent Approach employs indigenous methods of teaching and learning where the silence of the teacher gives the students room to explore and the teacher room to observe (Gattegno 1963:55).

Not to limit one's appreciation of diversity, but to address a specific scenario that informed this research, this paper pays particular attention to the Pasifika students within the SoD to exemplar the benefits of a shared and reciprocal approach to design education. This approach to teaching and learning not only enables these students to situate themselves and their culture within their design work but also enriches the pedagogical experience for all students. In 2016, outlining her aims for the use of Indigenous knowledge VUW Deputy Vice Chancellor (Maori) Rawinia Higgins stated, as part of a larger plan, a hybrid approach. "Mātauranga Māori and Mātauranga Pasifika (Maori and Pasifika knowledge) should not be confined to the pre-colonial era, because its evolution is also about knowledge interaction, production and hybridity" (Higgins, 2016). In support of Higgins' suggestion this paper will exemplar course work from the SoD that evidences a hybrid approach between Mahina's Ta-Vā and tenets of the German Design Academy, the Bauhaus (1919 – 1933) whose tenets still form much of contemporary aesthetic education used today (Francis 1971:843).

### 3. Theory of Reality, Ta-Vā within Design Education

Mahina's ideology of Ta-Vā, The Theory of Reality; is rooted in a holistic view of Pasifika as one, Moana. Ta-Vā, although Tongan its ideology is reflected in other Pasifika cultures. The Samoan belief of *teu le vā*; the nurturing of space relations and *vā tapuia*; sacred connections all add a depth and breadth to the ideology. Wendt's clarification of *vā* goes some way to articulate an understanding of the space created when connections, interactions and relationships occur and where Ta-Vā plays out.

"The space between, the in-betweenness, not empty space, not space that separates but space that relates, that *vā* holds separate entities and things together in the unity-in-all, the space that is context, giving meaning to things" (Wendt. 1999:402).

Important to the notions of shared understandings is the common appreciation of the space and relationships humans, nature and things hold within Ta-Vā and a number of Bauhaus tenets. This correlation offers the first opportunity to establish reciprocity within design education.

#### 3.1 Theory of Reality in First Year Design

In 2016 the first year cohort was representative of thirty-one cultures. The highest number by over three times is the New Zealand Pakeha (a white, as opposed to Māori, New Zealand born student). This number is followed by Asian-Pacific students, Maori and then Pasifika students. More importantly this research gleaned from an online questionnaire undertaken by this cohort that the Māori and Pasifika, who have predominantly been brought up and educated in New Zealand consider Western influences are more relevant to their studies than their cultural ones. (Figure 1)

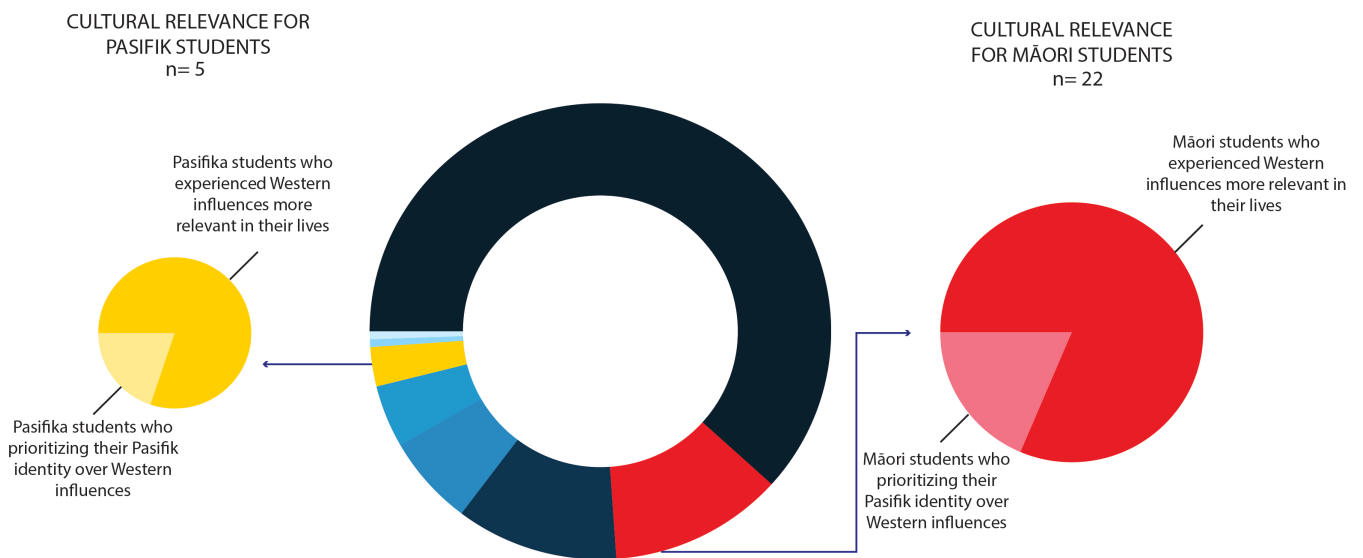


Figure 1. Ethnic Diversity in First Year Cohort Victoria University Wellington New Zealand. The assimilation of Western Culture by Maori and Pasifika design students (Indicative only)

In response to the diversity of Indigenous cultures present in New Zealand design education I have developed project work for both the first and second year students. Following the principles of the Silent Approach, the students are given the opportunity to inform each other by speaking to their own culturally inspired visual spatial languages. To gain an appreciation of the reciprocity imbued in this experience the students are asked to explore the parallels between Ta-Vā and those of Johannes Itten (1888–1967) and László Moholy-Nagy's (1895–1946). Itten and Moholy-Nagy, as two of the most influential Bauhaus masters, shaped the preliminary year (Vorkurs) pedagogy. Much of their teachings continue to be central within the modernist educational approaches still delivered within Western, and many non-Western, aesthetic programmes (McFall 2009:345). These teachings are described as the backbone of Modernist pedagogy and laid a pathway for individual exploration and analysis of one's self within larger collectives, be they family, religious groups, communities or in Itten's case philosophic collectives (Whitford 1984:119). These principles, like Ta-Vā and teu la-vā offered Bauhaus students the ability to see, synthesize emotion and senses, and expressively articulate the essence of form and space. Itten explained,

"Walls with windows and doors form the house, but the emptiness in them establishes the essence of the house. Fundamentally, the material conceals utility; the immaterial establishes essence. The essence of a material is its effect of space, the immaterial. Space is the material of the immaterial (Badura-Triska 1990:278).

Understanding that space exists between entities as a relationship allows students to examine the concepts of their own symmetrical and asymmetrical balances that exist in their own relationship with their specific cultures. Using the Gestalt theory, and teachings of Itten and Moholy-Nagy alongside Māhina's theory of interconnectedness a link becomes evident between individual components and a larger more meaningful whole. In support of these theories Rudolf Arnheim (1954 -



2007) an advocate of Moholy-Nagy, explains, “Any visual quality must be determined by its environment in space and time” (Arnheim 1988:275). Māhina argues that the Western appreciation of space as linear, is unsustainable. Māhina purports Ta -Vā as a more circular methodology that is more holistic and ecologically viable option (Ka’ili 2005:86). I suggest that while the Western appreciation of space as a mechanism of separation remains the dogma in design pedagogy the benefits of the interconnectivity offered within Māhina, Wendt, Itten, Moholy-Nagy’s insights remain limited.

The first year project is designed to elucidate the use of indigenous knowledge and privileges the cultural traditions of visual storytelling cultivated in the absence of the written word. The students are asked to graphically articulate the relationship between themselves and their culture and to reflect on both the tangible and intangible connections the have to their cultural heritages. The students investigate historic or traditional meanings and narratives embedded in the symbolism of the culture/s they identify with in order to find relevant methods of expression in a contemporary context. Using simple elements and forms of the reductive aesthetic codes, common to both Indigenous visual spatial languages and the universal visual language developed within the Bauhaus tenets, the students are asked to apply an understanding of Ta-Vā and teu le vā in order to visually characterise the connection they have to their cultural heritage. Drawing from their genealogy the qualities of each tethers that connects the student to their culture is characterized through the iterative processes inherent in design. Using visual narratives and specific visual strategies taken from indigenous practices students iterate and integrate graphic representations of their cultural heritage and visually express their emotional connection to it. With an appreciation that people and cultures arrange time and space in multiple and diverse ways students are then asked to consider themselves and their personal collectives within a larger group. This group is defined as Moana and represents the larger holistic appreciation of Indigenous peoples of the Pacific. Using a combination of drawing, generic software and more complex custom tessellation and pattern generating software the students continue to grow their understanding of connections through iteration.

To articulate the visual narratives they have used in their designs the students employ strategies of repetition, rotation, symmetry and asymmetry. This selection of visual strategies are fundamental within the pattern making practices in the Pasifika regions and as discovered throughout this process this limited selection is mirrored in the generic coding of the software engaged to manipulate the symbols. The results have been collated in the collective formatting synonymous with Owen Jones’ Grammar of Ornament. The work is catalogued on plates that are representative of both Moana and the specific cultural connection the student has used to develop their visual identity and subsequent pattern iterations. Plates 2, 4 and 6 are part of a series of works that graphically express connections between Moana and the cultural cacophony that makes up the first year intake at The School of Design, Victoria University, New Zealand. (Figure 2)

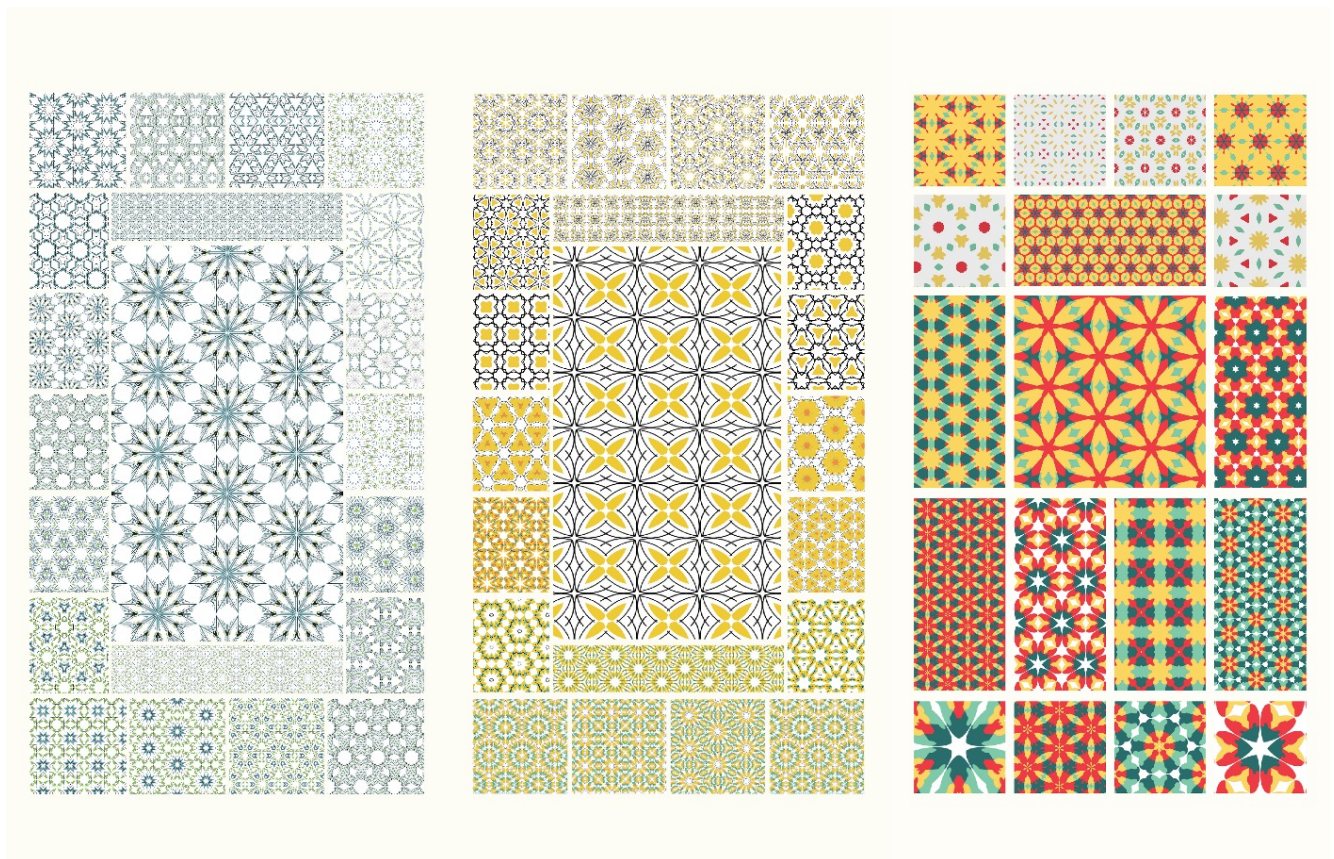


Figure 2. First Year Design works from Modern Tribes Project – reproduced with student's permission  
 Plate 2. Moana/Pasifika                      Plate 4. Moana/Maori                      Plate 6. Moana/Asia

### 3.2 Theory of Reality in the Second Year Design Cohort

Having experienced indigenous knowledge in parallel with Bauhaus tenets students expressed surprise that their cultural heritage could not only be included but enable their creativity. Building on this the students are asked as second years to again look to indigenous knowledge to help frame the development of individual standpoints as designers around wider issues. Using the ideology of Ta-Vā as the counterpoint, the second year students are asked to articulate their concerns for the spaces inhabited between humans and humans, humans and nature and humans and things ideologically.

“Education needs to be at best, both critical and technical, with the critical taking primacy over the technical. A consistent shift of Western from imposition to mediation of tensions at the intersection of Western-Moana cultures has been long overdue. The logical order of precedence in the scheme of things that knowledge production always precedes knowledge application” (Māhina 2010:172)

Vā, Ta-Vā and teu le vā, are further incorporated within the critical theoretical approaches students are encouraged to take to their studies. All second year students are asked to consider the relationship of Mahina's ideologies and those they see as the incumbent within 21st century design. The students are asked to reflect on their first year project in which they had incorporated cultural histories, design vocabularies and Tā-Vā to help identify and visually express both tangible and intangible connections. Building on the visual interpretations students are asked to consider Ta-Vā as a counterpoint to their current appreciation of theoretical approaches to design. Notions of space as containing what could be

described as invisible relationships are introduced through Māhina's ideology of Tā-Vā theory. As a specific feature, and as an expansion on their understanding of the relevance Tā-Vā has in contemporary society, the second year students are introduced to the ideology of teu la vā the recognition of sacred connections. The relationships were explained as existing between people, ideals or nature but importantly they are emotional, binding and eternal. The students used these ideals to discuss how respect, reciprocity, mutuality, symmetry and balanced socio-spatial relationships could be engendered into their design investigations. Mahina advocates, "People are thought to walk forward into the past and walk backward into the future, both taking place in the present, where the past and the future are constantly mediated in the ever-transforming present" (2010;170). Students discussed Tā-Vā and teu le vā as offering them ways to investigate and relate to design issues around sustainability, mass-consumption, customization and inter-personal digital relationships. (Figure 3) The appreciation of connections between humans and humans, humans and nature and humans and things as inter-generational and requiring immediate and ongoing nurturing was apparent in the student work.

Mahina's influence within this discourse is not understated. Whilst arguing that humankind must acknowledge their past and present actions as connected to the future one student argued that Moana peoples view earth and humanity as inseparable entities which need to be explored together in order to gain a deeper understanding. I will show there is value for design thinking and practice in the establishment and acknowledgement of connections to the past and that learning from failure can be key. A second student argues that internet and cyber relationships and forms of connection reduce empathy and threaten meaningful human interactions. The student posits that a society founded on more authentic connections such as those offered by Mahina in his ideology of Ta-Vā is a more sustainable model to build holistic human communication on. (Figure 4)



Figure 3. Abstract from student research essay: *The Use of Ta- Vā to Disrupt Western Frameworks* (left) and *Ta- Vā as a means to Reconnect Online Relationships*

Throughout this paper I have exemplified coursework that uses methods of teaching and learning that attempt to REDO aspects of design education and enable the



inclusion of Indigenous knowledge. Having lessened the status held by the beliefs and understandings of the teacher, or the incumbent knowledge, The Silent Approach offered space for students to position their own understandings within their design practice. This study has endeavoured to highlight the need for pedagogical approaches that enable diversity and inclusion but also methods that showcase the benefits diversity offers design thinking, research and practice. To initiate a shift away from the standardization considered prevalent in design expression, as a teacher I have taken a step back from establishing tenets or advising on responsible or best practices. Following the guidance of Baskerville and Gattegno the course work I have developed asks the students to establish autonomy over their connections and convictions towards the world they are designing for. As part of a large and diverse cohort the students can engage across cultural and ideological borders and begin to appreciate new depths and new ways of seeing. I argue that when a student appreciates who they are as an individual and can articulate the relationships they have to larger diverse communities they are more able to engage with and understand that, “every experience of another culture can offer us an occasion to experiment with our own” (Castro 2104:41). With this appreciation I posit design students will be well equipped to both value other cultures but more appropriately reveal, using an enriched visual-spatial vocabulary, the connectivity held not only in similarity, but most importantly within diversity. As a kindred spirit to Moholy-Nagy, and I would hope Māhina, had they ever met, Buckminster Fuller asserted “Space is irrelevant. There is no space there are only relationships (Fuller 1969:46).

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# REDOing Fashion: The Open Design Object

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**Abstract:** In this research paper an investigation of the open design object raises questions on how to REDO design practices in order to change consumer behaviour and prolong the lifespan of design objects. The focal point is garments, but the theory on the open design object that will be unfolded can be applied to other product categories as well. The theory of the open design object outlines methods to slow down the aesthetic user-experience and charge the design object with durable value based on openness and inclusiveness. Designing an open design object implies focusing on the user phase by considering how interaction, use and wear might become a part of completing an object, or how to add inherent development options to garments. The theory of the open design object is accompanied by a garment collection named *An Archive of Usage*, which exemplifies ways to work openness into design objects.

**Keywords:** Sustainability, Aesthetics, Durability, Post-production, and Changeability

## 1. Introduction

In this research paper an investigation of the open design object is initiated by raising questions on how to REDO design practices in order to change consumer behaviour and prolong the lifespan and durability of design objects. The focal point in this paper is garments, but the theory and the philosophical fundament on the open design object that will be unfolded can be applied to other product categories as well. The reason, however, for emphasising garments is to meet the current need in the fashion industry to rethink the way garments are designed, manufactured, and worn in order to minimise over-production and unnecessary harm of the environment. The theory of the open design object outlines “tools” to slow down the aesthetic user-experience, as well as ways for the designer to *charge* the design object with durable value based on openness and inclusiveness.

The exploration will lead to thoughts on how to rethink and REDO the design object in order to make it open and inclusive. Furthermore, the idea of the open design object will be compiled with the duration of the design object. The open

design object implies concrete, material endurance. The intention is to present various open design objects, the design process behind the objects as well as the theory on the open design object at the Cumulus Conference.



Figure 1. *An Archive of Usage #1*

## 2. Sustainability and Durable Openness

The British Romantic painter John Constable (1776-1837), who is primarily known for his atmospheric landscape paintings, has reportedly stated that "time will finish my paintings" (Saito, 2010, p.176). If we transfer the thought of a piece of art containing an openness to the time that will pass and the traces that it will leave to the design field, this would imply moving away from thinking of a design object as being *finished* or *done* when it leaves the hands of the designer and moving towards focusing on the user phase. If time finishes an (art or design) object, it might be constructive for the designer to dwell on the user phase in the design process, as well as to work an openness into the design object; an openness that would enable the user to "shape" the object with traces of use and wear, in an aesthetic manner. Perhaps one should, in accordance with Constable's statement, even go as far as to think about the design object as being unfinished when being "released", and as establishing its own life or assuming its character in the hands of the user. This would emphasise being inclusive and open to use and the interaction between subject and object in the design process.

Integrating an openness into the design object is a way of making it receptive to the aesthetic value that can potentially be added in the user phase; i.e. it involves viewing changes in the object surface and shape, due to wear or due to integrated variation- or change-possibilities, as aesthetically fulfilling. It also includes assumptions that wear and use as well as personal associations and feelings can add to the completion of the object. And that the object in the dialogue with the

user becomes valuable, unique, treasured and, due to this, durable. The focus on openness and inclusion implies a shift from storytelling focusing on the thoughts and hands behind the design object to the story of the life or the use of the object itself. We will get further into the storytelling-focus in the section “Charging a design object with time” - but first, further thoughts on the durability of openness.

When an object is charged with openness and thereby becomes a carrier of the time that is used on and with it, a tactile and emotional bond is created between the object and the user, which supposedly makes the user less inclined to replace it. Or when an object holds inherent possibilities for variation and change, it becomes a source of continuous aesthetic nourishment, which might prolong its lifespan remarkably. Hence, the hypothesis that we are operating with is that the open design object is more durable and sustainable than a “closed” object, which is done when released and characterised by a short peak-period closely connected to newness. The open design object is not only durable due to a bond that is established between subject and object, which is based on it being an archive of usage. It holds longevity because of its capability to continuously intrigue and aesthetically nurture the user due to its appearance-evolution.

But how can the designer think and work a prolonging of the peak-period into the design object itself?

When a designer creates and releases an object, in a sense, she/he “freezes” time or constructs an end to prior occurrences. A process leads to the object; an inspirational phase, an experimental phase, a prototyping phase and a production phase as well as a communication phase, in which the receiver is informed about the object and concept around it. However, rethinking and REDOing this process might be the key to creating an open design object. What if an object wasn’t thought of or created to be done when released, or to be the conclusion to a design process? What if the developing phase continued, after the object changed hands from the maker to the user? The open design object indicates an opening of the static way, we traditionally think of objects; i.e. that an object has a shape, and that it retains that shape. The open design object, however, doesn’t imply “inviting” the user to be a part of the design-process à la co-creation nor does it necessarily incorporate sharing economy concepts. Rather, the open design object is a concrete, material, substantial, visible opening of the design object; it contains an invitation to the user to utilize, explore and leave traces on/in it.

Besides the sustainability that comes along with openness, due to the presumption that the open design object, literally, changes and develops in the hands of the user and therefore continues to intrigue her/him long after the initial fascination of newness has faded, the open design object should have a broad appeal. Designing with openness and inclusiveness in mind should ideally be a way of aiming for broad applicability and relevance, which means that as many people as possible, regardless of cultural background and capital or habitus, feel intrigued by the object. Now, this goes against most of what we teach students regarding targeting products to a specific group of people in order to insure that they feel an instant connection followed by the need to own. However, opening up the design object is a way of letting go of that part of the design process; loosening up by generalising and allowing whoever buys the object and uses it to shape it and influence it, is a necessary part of working with material openness. Relevance still remains crucial. If the user doesn’t experience an object as relevant, she/he will hardly consider purchasing or sustaining it. But working with relevance in relation to the open design object does not mean moulding it and closing it in order to ensure relevance for a narrow, well known target group; it implies daring to incorporate universal themes that have a broad appeal and relevance as well as

leaving the conclusion to the design narrative open and mouldable. Therefore, the next section will explore how to simultaneously open up and generalise as well as ensure that the receiver experiences subjective applicability.

### 3. Generalisation and Relevance

In order to create a design object with openness and broad appeal, the designer's personal starting point must be generalised. As mentioned, this process implies the creation of an opening that offers the recipient applicability and relevance. Working with generalisation as a part of the design process can elevate the object from closing in on itself to being inclusive and open. The personal element of inspirational source must be transformed into something general in order for it to be experienced as relevant and applicable by others than oneself - and in order for it not to close in on itself and thus shut others out by being too narrow. So, rather than integrating a personal experience or memory in a design product, which could for example concern the designer's grandmother and her beautiful, warm home, her care, thoroughly made dinners and slowly knitted sweaters, the tale should be "lifted" onto a meta level and thereby transformed into something more general, something that the recipient can relate to by connoting e.g. "homeliness" and "slow clothing". To be able to appeal generally and aesthetically, and thus rise from merely adding personal taste and memories to one's design product, the designer must transform her/his subjective beauty experiences or sources of inspirations into more general themes or concepts. When one accordingly manages to convert sensory and mentally strong memories or influences into something more universal or something thematic, it becomes a possibility to communicate these to the receiver and thus potentially launch similar experiences in the recipient - broadly. The individual element must, as a part of the design process, be generalised and aestheticized in order for it to contain both a sufficient degree of relevance and an openness that makes it possible for the recipient to embrace and integrate it into her/his personal reality and history.

Correspondingly, Aristotle points out in *Poetics*, in relation to the Catharsis experience (Aristotle, 1996), that a performing artist should focus on universal human themes in order to "move" or "touch" the receiver. This thought could make sense to transfer to the design process in order to change closed subjectivity to inclusive openness. Pursuant to Catharsis, which is attached to the theatre experience and more specifically to the tragedy-genre rather than the comedy-genre, this will typically result in themes such as "segregation", "unrequited love" or "death". The Catharsis experience implies namely that the viewer, from a safe place (the theatre seat) is overwhelmed by the feelings associated with loss-experiences, and thus lives through such without really being endangered. One can, however, only feel touched or affected, if the play (or accordingly the design product) is perceived as relevant and applicable. And the experience of relevance and applicability will only occur if the author of the tragedy (or the designer) manages to generalise and aestheticize the story (or the product) to such an extent that it has a broad appeal. In order for the recipient to get touched or feel affected, the author (or the designer) must make use of universal human themes that can synthesise the diverse sources of inspiration as well as generalise and aestheticize individual taste preferences and memories. In this sense, generalisation causes openness: due to the stylisation of the form the story/product may accommodate or contain the recipient's needs and feelings and thus is experienced as inclusive.

“The experience of beauty cannot be as subjective as it first appears to the person affected by it. If the productive effort to create beauty is to have any meaning at all, then it must be supposed that our experiences of beauty are, at least to a certain extent, shared” (Böhme, 2010, p.23).

This quote by German philosopher Böhme indicates that beauty experiences are similar despite their initial subjective nature, and that they are therefore characterised by certain universality or by being common to all (or most) human beings. The common, universal elements of the beauty-experience are worth striving to identify in order to create an open, durable design object with a broad appeal. Assumingly, the durable design object is aesthetically pleasing; it invites the user to repetitive use and provides her/him with continuous aesthetic nourishment.

But are the universal elements of the beauty-experience related to the open design object linked to “neutrality” or “noise”?

The 20th century’s design history provides several examples of the search for a universal style or idiom: functionalism, the international style, and minimalism. This search is characterised by pursuing a mode of expression that is experienced by the recipient as relevant, useful and recognisable, cross culturally.

The Bauhaus designers approached the universal design language by removing ornaments and symbolism in order to minimize “misunderstandings” in the decoding of objects. Moreover, the idea was that a minimalist and “neutral” design object more easily would fit into a number of contexts, or that it would be highly adaptable to its surroundings. This adaptability, and durability, stemmed from the fact that it didn’t create any *visual noise*. The quest for a durable design expression was immanent to the Bauhaus mission, which was focused on creating time- and placeless expressions. The universality of Bauhaus was thus linked to a direct disassociation from time and place (Harper, 2015). In this sense, universalism can be described as a mode of expression that affirms common aesthetic ground rules and that neutralizes local and contemporary parameters of understanding, and in doing so, might produce aesthetic pleasure for people regardless of time and place.

The theory of the open design object, however, indicates a different approach to a universal design language as well as universal aesthetics. Working on the creation of the open design object is a way aiming for an expression that is broadly experienced as relevant without being uniform and anonymized. It is an expression that is sufficiently unanimous to be long lasting, applicable and recognizable to a manifold of people, and that can simultaneously hold diversity and accommodate a need for variety and change.

The questions that the theory on the open design object contains are: Is the experience of relevance, durability and applicability solely connected to the uniform and the “neutral”? Or is universal aesthetics related to the open design object, rather than neutral and smooth, diverse and “noisy”? The answers to these questions have already been indicated: Openness to diversity, “noise” or complexity, fleeting changes and personalisation can constitute an object designed to have a broad, cross-habitual, cross-cultural appeal. However, in the section “The components of the open design object” we will elaborate on this point and concretise not only why, but also how this can be done.

The narrative of the open design object is created through usage. It arises from the post-creation phase. It contains a great deal of *time*; the time spend moulding,



wearing, changing or experiencing inherent changes unfold, which leads to the next section.



Figure 2. *An Archive of Usage #2*

## 4. Charging an Object with Time

As discussed, designing an open design object includes focusing on the post creation phase by aiming for slowing down the aesthetic experience, stretching and prolonging the peak-period of the object and continuously intriguing the user. This implies storytelling; immanent, material storytelling characterised by a dynamic narrative that offers an antithesis to stagnated branding.

Danish philosopher and artist Ørskov describes objects as congealed or fixated occurrences (Ørskov, 1999). By this he indicates that an object is *charged* with the time that was put into it (and to an extent also with the time-period or the *Zeitgeist* in which it was created); the creation time and the way that the creator/designer has interacted with the material leaves traces in the object, and those traces form a narrative of the time and the hands behind the object. The story of the creation time is a very current way of composing storytelling about design objects that fall into the category of slow design. As mentioned in the introduction to the paper, the theory of the open design object arises from the slow design movement in the sense that it concerns prolonging the lifespan of design objects by encouraging the user to preserve and sustain them. The captivating, convincing slowness of an object is partly connected to the story

behind it, i.e. the story of the time and the hands behind the object as well as the visions and thoughts it is *charged* with, i.e. the story of the creation time. The trend within storytelling is, accordingly, tales of hands-on processes, designer-cooperatives and the nourishing tactility and sensuous pleasure that follows thoroughly made products.<sup>1</sup> Luxury of a time period is often, simply put, constituted by being the answer to what people are trying to escape. And in a time period, like the current, characterised by a lack of presence, tactile stimuli and human interaction due to the abundance of smartphones, tablets and (a)social media, not to mention *time*; no one has enough time, it is not a big mystery that tales of contemplation, reflection and community-feeling are experienced as convincing and relevant by a broad audience.

However, as mentioned, the open design object implies a shift from a focus on the creation time to the post-creation time or the user phase. Ørskov operates with two other time categories in his writings; the time of existence and the time of being (Ørskov, 1999, p.85). Both of these time categories concern the post-creation phase and specifically the interaction between the object and the user. The time of existence is the time-course of an object; it is constituted by the traces of use, the repairs, the wear and tear and weathering that mould and transform an object that has existed for a while and has been frequently used (because someone has treasured it and considered it useful and/or aesthetically pleasing). An object characterised by the time of existence holds a story of the user and her/his habits and preferences. This story establishes an immanent, dynamic, ever-evolving storytelling that adds value to the object and shapes it. Charging an object with the time of existence implies creating space for development. The open design object that holds openness due to “the time of existence” is not *done* when released; it contains an immanent openness to the user shaping it, affecting its functionality by wearing it and leaving her/his unique physical traces on it. Working with the time of existence means embracing the beauty of the unpolished, the imperfect, the beauty of time passing by and leaving its inevitable traces, and the beauty of changeability. When the designer works openness into the design object by emphasising the time of existence the value and beauty of usage is underlined. Slowing down fashion by involving the time of existence involves creating garments that *can* in fact be repaired or upgraded and that age with grace.

The time of being is the time it takes to “be together” with the object in order to detect it or understand it (Ørskov, 1999, p.85). Opening up the design object involves a prolonging of the time of being. Prolonging the time of being implies stretching the peak-period and postponing the interest-decrease that is typically, simply put, connected to “closed” objects. But how? As described, the open design object is not done or “rounded off” when released by the designer, hence it holds an enclosed invitation to the user to touch, engage, interact, use, shape, transform and leave traces of wear on it. This invitation might be shaped by its idiom or by its surface. It might lie in its colours or its print. Or it might unfold itself as an inherent metamorphosis led by the time going by, the body that wears it, and the hands that touch it. The time of being is a Ping-Pong or a wordless dialogue between the experiencing subject and the design object.

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<sup>1</sup> Examples of such stories: <http://www.voicesofindustry.com/> <http://craftandlore.com/>, <http://www.amyrevier.com/work/>

## 5. The Subject-Object Dialogue

*"The passionate early stages of a subject-object relationship could be described as a honeymoon period, a period of intense synergy within which everything is new, interesting and the consumption of one another is feverish. Honeymoon periods are by their very nature short lived and must, ultimately, give way to the inevitable onset of normalcy"* (Chapman, 2011, p.63) The durable subject-object bond or "relationship" between a person and a thing is characterised by what Chapman, Professor of Sustainable Design, calls normalcy; i.e. by everyday life and by repetition and routines. Normalcy is the antithesis to the glittery newness of "the honeymoon period". Continuing on the relationship metaphor, normalcy ought to be the natural "next step" after the initial seduction and the honeymoon period, but in most subject-object relationships it fails to appear. Perhaps because consumers have gotten used to *consuming* objects, i.e. devouring or *going through* objects by using them for a short period of time, getting done with them, and finally getting ready to buy and consume new ones. Or perhaps most design objects need REDOing. Perhaps a lot of objects are not made to be used for a long time or to be sustained, due to poor quality, the incorporation of fleeting trends, or due to an inherent *closedness* that makes them unchangeable, inflexible or unable to follow along the natural changes and rhythms of human life. Even though the word normalcy might connote triviality and the boring repetitions and chores of daily life, normalcy is in opposition to the trivial. Normalcy holds, rather than triviality, the nurturing repetition that follows the perfect mix of the *well known and intriguing*.

In order for the design object to contain the possibility to establish a bond based on normalcy, it must be inclusive and flexible. The open design object is exactly that. It holds an inclusiveness that is based on concrete, material flexibility and changeability and/or on aesthetic and narrative openness due to the generalisation of the designer's initial subjective inspirational source, as previously described. Furthermore, it invites to continuous usage and *dialogue* due to its ability to be both flexible and static (this will be elaborated in the last section of the paper "components of the open design object").

As described, in order to create openness the designer must focus on the post-creation phase as a part of the design process. In other words, a thorough investigation of durable subject-object bonds and continuous use could be a beneficial way to explore ways to open up the design object. Another possibility is applying secondary data on durability. A good example of such data is the Local Wisdom Project<sup>2</sup>, which is a thoroughly conducted ethnographic investigation of the characteristics of garments that are kept and worn for many, many years, and even passed on through generations. Professor of Sustainability Kate Fletcher introduces the term *user-ship* as a part of the project. User-ship is a process in which the users in *dialogue* with the piece of clothing mends and takes care of, and thereby makes the piece truly their own. Perhaps they add colourful embroidery or change the buttons or add a patch of patterned fabric; all of which gives the garment its own unique and rustic beauty as well as turns it into a tale of use.

The dynamic narrative that constitutes the repetitively nurturing subject-object dialogue is the essence of the durability of the open design object.

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<sup>2</sup> [www.localwisdom.info](http://www.localwisdom.info)

In the essay *The Work of Art in the Age of Mechanical Reproduction* German philosopher Benjamin introduces the term aura, and discusses an aura-loss linked to modern reproduction techniques (Benjamin, 1969). The aura-loss associated with reproducibility is a loss of what Benjamin calls *cultic* aura. This type of aura is connected and subject to the authenticity and uniqueness of an artwork. A reproduced artwork can never be authentic, since it isn't *original*. However, Benjamin does not view the loss of aura negatively. The loss of cultic aura doesn't mean that auratic experiences are not possible in relation to modern artwork, not at all. In relation to reproducibility, we are just dealing with a different type of aura; a profane aura (Jørgensen, 2001, pp.368-69). Profane aura is not dependent on authenticity. The opening of the artwork can due to reproducibility techniques and the enclosed profane aura-experience be described as inclusive; it releases the artwork from traditions and brings it into the distinct life-situation of the viewer or recipient.

The thought of the profane aura can advantageously be transferred to the design object. As described, an important part of REDOing the design object by *opening* it up, is aiming for broadness and universality. The open design object is not a "niche", unique product that is auratic due to its singularity. The open design object is meant to be experienced as inclusive by a broad audience, and it shouldn't require any pre-understandings for the recipient to capture it and make it a part of her/his life. It holds an anti-elitist beauty-experience or profane aura.

Professor of Philosophy Saito operates in her book *Everyday Aesthetics* with the term *the familiar strange*. The familiar strange can be described as gem-like aesthetic potential hidden behind the trivial and mundane facade of familiar objects. But even though there can be a lot of reasons to *charge* a design object with *strangeness* and thereby momentarily "force" the recipient out of the comfort of familiarity (Harper, 2013), perhaps some objects should also emphasise and celebrate the rewarding, non-trivial rhythms that our human lives are build up around (Saito, 2010, pp.49-50). Saito argues that by seeking the familiar strange or pursuing to embed ordinary, everyday things with gem-like aesthetic qualities, and thereby attempting to overcome the triviality of monotonous daily life, "... we also pay the price of compromising the very everydayness of everyday" (Saito, 2010, p.50). By this, Saito emphasises the quality and beauty of *everydayness*. Everydayness can, just like the term normalcy, connote triviality and insignificance. But in Saito's use of the term, everydayness implies the on-going satisfaction of a rewarding everyday life - and the pleasure of being accompanied by everyday objects that support everyday rhythms and habits. The majority of our lives consist of the rhythms of everyday life. And most of the objects we surround ourselves with should support those exact rhythms and perhaps even improve them, emphasise them and bring beauty or aesthetic nourishment to them by being embedded with changeability and inclusiveness.

## 6. Components of The Open Design Object

Designing an open design object - exemplified here by open garments - implies focusing on the post-production phase and the user phase by considering how interaction, use and wear might become a part of completing an object, or how to *charged* garments with inherent development options.

To specify some of the components that might play an important role in the process of creating an openness in a design object/garment a selection of the below elements can be taken into consideration:



- Open surfaces: Designing an open design object can imply including inherent options for the surface to change its appearance. Perhaps the structure of the garment is affected by usage or by the movements of the wearer's body. Or perhaps the garment surface will change appearance over time. Opening the surface of the design object can also mean incorporating textural variability. The designer can expand the receiver's tactile sensibility and cultivate her tactile literacy by consciously letting the creation time as well as various textures characterise the design-expression, as well as by opening the object-surface to use and time or allowing decay to shape the look of the object.



*Figure 3. An Archive of Usage #2*

Inviting the user to mend and sustain the design object can be another way of opening up for surface changeability. Mending can add aesthetic value to a garment. Not in a flashy, shiny-new kind of way, but in a sensual and tactile way. Patches and stitches and rough parts hold a rustic beauty that cannot be machine-produced; it is a beauty characterised by the storytelling of usage and by the meaningful subject-object dialogue.



- Open patterns: Perhaps making use of prints or patterns that hold an inherent ability to develop or change appearance when being used can create an opening of a garment. This could imply including wear and stains in the completion of the pattern. Or it could involve the development of an open print that is sensitive to heat, moisture or light or atmospheric changes, and hence holds the ability of alteration



Figure 4. *An Archive of Usage #3*

- Open shapes: The open garment can also be a garment with a manipulable shape, or clothing that plays with flexible silhouettes. Open shapes concern aesthetic flexibility and thereby an inherent changeability in the aesthetics or the expression of the object. This could result in modular thinking; i.e. considering the garment a whole consisting of elements that can be combined or replaced. Or in an inherent option of changing the overall lines or look of the garment.

Incorporating open, changeable shapes into the design object is a way of inviting the user to engage in sensuous explorations.



Figure 5. *An Archive of Usage #4*

- Open usage: Working with open usage means opening up the design object in order to accommodate the user's changing needs. In this category of the open design object, the focus lies on functionality; e.g. how can a garment adapt to the user's functional needs in order to improve or support her daily life routines. Creating garments that can be used for different seasons, for a range of occasions, or that can be adjusted in order to follow the life-situations of the user are other examples of concretising the theory of the open design object.



Figure 6. *An Archive of Usage #1*

Working openness and inclusive durability into the design object is a way of REDOing design practises. Despite the above listed ways to ensure changeability and avoid closedness and stagnation, and thereby activate the continuous subject-object dialogue, the inclusive and open design object embraces normalcy and everydayness. As mentioned, the open design object invites to continuous usage and dialogue due to its ability to be, simultaneously, flexible and static. This means that, just as human life; the open design object is built up around a constant, static core that ensures its quality and comforting familiarity. But simultaneously it is changeable and dynamic.

The pre-Socratic Philosopher Heraclitus is known for having said that no man ever steps into the same river twice, for it is not the same river and he is not the same man. The open design object is, just as life and our natural environment, always evolving, but at the same time it is experienced as familiar and well known.

At the Cumulus Conference the photographed examples from the collection *An Archive of Usage*, which exemplify ways to work openness into design objects, will be presented. Our Instagram account<sup>3</sup> will document the on-going process of the research and development phase.

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<sup>3</sup> <https://www.instagram.com/edvardharper/>



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# Bridging Social Innovation and Business. A Co-design Experience for a Community Welfare Project

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**Abstract:** The objective of this paper is to investigate the competences and methodologies that can support the construction of a codesign process. This is intended to be a continuous and strategic dialogue between organizations from different sectors – business and not for profit – and communities in developing socially innovative services related to welfare.

Complex social needs, as the ones tackled by social innovation, require integrated and innovative approaches able to combine and manage the contributions of different actors. In particular, private sector is called upon to acquire an active role through a stronger recognition of its potential and by sharing all its resources – not only economic ones. By presenting an on-going Italian project on communitarian and cross-sectorial welfare, the paper reflects on how the design approach could play a crucial role especially in structuring such multi-stakeholder processes.

**Keywords:** Strategic design, codesign, social innovation, community welfare

## 1. Introduction

Building on the debate on social innovation and on its related phenomena (Meroni, 2015) and for the purpose of this paper, two dimensions create the background for discussion. The first one is related to the scale of the problems or challenges that social innovation aims to address: indeed, usually bottom-up initiatives start locally in response to needs expressed by groups of citizens who try to solve specific problems. Besides their local dimension, however, such mobilizations are often symptoms of broader challenges that imply a wider cross-sectorial action that involve a larger number of players to produce a real and long-term change. Moreover, looking at the areas in which social innovation operates (education, health, housing, migration, nutrition, etc.), it appears clear that to face such complex and broad challenges we need a common and coordinated intervention.



The second dimension we need to address refers to the hybrid nature of social innovation, which is explicit in both the solutions it provides and in the process generating them. The contamination between different sectors and organizations appears to be both the innovative way to respond to a societal challenge as well as the enzyme for starting the (scaling of a) project.

According to Mulgan (2007), “social innovations are usually new combinations or hybrids of existing elements that cross different organizational, sectorial or disciplinary boundaries”. This implies the need for a more systemic approach to design relationships between the various stakeholders involved in a solution, especially if we consider the economic and social growth of a context produced by the scaling up of local initiatives. As stated by Jenson (2013) and Murray et al. (2010), social innovation can be considered as a device for changing and improving relationships and blurring boundaries between the state, the market, family and community in response to welfare challenges. Moreover, as stated by Caulier-Grice et al. (2012), apart from improving the existing relations, social innovation also fosters the creation of new relationships between different stakeholders.

Within this complex framework, the role of business is indeed attracting more and more attention: companies are being increasingly called upon to provide a contribution towards the co-creation of innovative sustainable solutions, providing and mobilizing their material and immaterial resources for the common good (Council of Europe, 2014).

Given all that, a new systemic approach is needed to allow every actor/stakeholder to gain a common perspective on strategies, methods and tools to tackle shared societal issues, and to be empowered towards a more collaborative and structured way of operating. Thus restoring the awareness of the benefits of working together.

This paper proposes a new framework of design processes that involve different sectors of society, including the private sector (paragraph 2). As explained in paragraph 3, design tools can help in managing this complex system of stakeholders and building different and innovative models of collaborations towards common social challenges. In paragraph 4, an Italian project will be presented in order to describe how design methodologies can be used to solve communitarian needs, in particular those related to work-life balance, and how innovative welfare services can be developed through cross-sector collaborations.

## 2. Integrating social innovation and the for-profit sector

In 2015 the UN Agenda 2030 for Sustainable Development proclaimed the importance to call on all businesses to apply their creativity and innovation to solving sustainable development challenges (UN, 2015). The private sector has been recognized as a vital partner to turn the commitments into long-term concrete practices and to respond in a new and effective way to local and global problems. However, it needs to be engaged in collaborative processes alongside all the social actors in order to share its resources and to fully express its transformative capacity. An inclusive growth is indeed subject to the ability to build shared strategies that promote the action of several actors and the efficient interconnection of resources. For this reason companies, alongside non-profit and civil society, are encouraged to seek for collaborative processes towards common sustainable goals.

For several years companies have been called upon to adopt a “responsible approach” to give a stronger contribution to local development. Greater attention has been placed on “the responsibility of enterprises for their impacts on society” and on the positive relationship that the company can (and must) build with the whole system of stakeholders (EU Green Paper, 2001). Thus companies have started to acknowledge the importance of dealing with their stakeholders adopting practices that would meet their expectations (Freeman, 2010), and to create new channels of communication with them in order to give information about economic, environmental, social and governance performance.

This attitude has enabled companies to move from “doing less harm”, according to a defensive strategy, to “doing more good”. Long-term social progress indeed does not depend on philanthropy or occasional supports to communities, rather on integrated business strategies that incorporate competitive advantage with social value (Porter, Kramer, 2011). A deep reconciliation between business success and social progress is required: creating economic value in a way that also generates value for society by addressing its needs and challenges (Ibidem).

This view reconfigures the role of business, defining a new paradigm in which private companies can contribute to both community and firm’s prosperity enabling social changes through innovating their actions for sustainability (Caroli, 2017).

Such approach, belonging to those companies that “view community needs as opportunities to develop ideas and demonstrate business technologies, to find and serve new markets, and to solve long-standing business problems”, has been summarized by Kanter (1988) under the term “Corporate Social Innovation” (CSI). Over the years a stronger connection between corporate social innovations and core businesses has been recognized, describing CSI as “a strategy that combines the unique set of corporate assets (entrepreneurial skills, innovation capacities, managerial acumen, ability to scale, etc.) in collaboration with the assets of other sectors to co-create breakthrough solutions to complex social, economic, and environmental issues that impact the sustainability of both business and society” (Mirvis and Googins, 2012).

This radical change of perspective assumes therefore the company as one of the subjects operating within an ecosystem, able to produce value but also to benefit from the relations established. Moreover, it implies the opportunity to transform CSR into a catalyst for innovation, creating competitive advantage by institutionalizing corporate social innovation (Herrera, 2015), starting from developing new relational capacities through the innovation of “stakeholder engagement” mechanisms.

Social innovation is about changes in the relationships between different actors, and concerns therefore primarily the modalities of action, and not necessarily only the actions themselves. This approach can be applied also to the relations between stakeholders and firms in the context of sustainable development. In particular, here innovation refers to the improvement and effectiveness of the inclusion of stakeholders in the firms’ strategies for sustainable development (Caroli, 2017).

As stated by Kozati (2016) Gebaner (2013) and Ayuso (2011) it is possible and desirable that firms co-create innovations that benefit both themselves and the external subjects involved. To this end however, the firm must be able to:

- Assimilate the insights, ideas and indications coming from stakeholders, overcoming the classical perspective of unidirectional communication;

- Work in a peer to peer logic, providing its assets and resources to stakeholders and defining with them the problems and the possible solutions (Caroli, 2016).

There are four fields within which we can distinguish the degree of innovation of stakeholder engagement: i) modality, which should provide a full strategic involvement of the parts to share the modalities of sustainable development; ii) tools, which should include an interactive communication finalized at co-design and co-development; iii) focus areas, which should contain those relevant to the firms' competitiveness and its impact on sustainable development; and iv) subjects, which should include the totality of stakeholders, included those more peripheral within the firm's network (ibidem).

The adoption of the approach delineated above allows companies to identify social innovation opportunities while enhancing their competitive advantage, representing an essential step to foster an organizational culture devoted to innovation and sustainability. As stated by Mirvis (2016), the main challenges faced by companies in dealing with social innovation relate to both the context in which social innovation occurs as well as to the nature of such kind of innovations. The "unfamiliar culture and context" as well as the weak legitimacy to operate within local communities and "non-traditional customers" demand for new processes of collaboration between business and non-business partners as well as for new capabilities and tools to manage such processes (Ibidem).

In this sense, co-creation processes, supported by design methodologies, become essential means to foster business-non business collaborations towards common goals.

### 3. The transformative role of design

The design discipline contributes to shaping collaborative paths between business and non-business by leveraging on 3 peculiar capacities related to: "systemic thinking, sense making and capacity building". As stated by Cautela et al. (2015) designers embody a "transformational role", in the way they "empower people to invent solutions together" (European Commission, 2013).

In particular these 3 capacities are crucial when applied on social innovation processes that aim at 1) intentionally involving a multiple group of stakeholders from the early stages, often with conflicting interests and motivations, and 2) let the areas of intervention emerge from within the design conversation, i.e.: through the emersion of local needs, the identification of common and promising fields of work, the synergies between resources, assets and competences, and the creation of shared action plans.

The Systemic Thinking skill "incorporates strategic thinking and the capacity to work with communities representing diverse interests and positions, to make them align and eventually converge into a joint initiative" (Cautela, et al. 2015). The present paper aims at building on the Community Centered Design (Meroni, 2014) concept, which implies the presence of designers within a community and their active immersion in the context in order to gain a deep body of knowledge. It aims to understand if and how to adapt it to the peculiar kind of Community in which social enterprises and private companies work in contact with citizens and in which the cooperatives and third sector operate as touchpoints between citizens and companies.

The Sense Making capacity is here adopted in the designerly way of building objects of conversation, that represent and describe new ways of organizing relations and services. Designers here assume the role of “intermediaries” between companies, organization and citizens, as described by Zurlo and Bohemia (2014). Through their capacity to envision opportunities and shape initial rough service solutions, designers here contribute also to activate the interest of stakeholders. As regards specifically the business sector, the capacity of Sense Making may result in highlighting new opportunities for innovation as well as of new field of future corporate research and development.

Capacity Building. The nature of social innovation in the form here presented, forces any stakeholder to leave her comfort zone and to start adopting new languages, new competencies, new tools that support collaboration. More specifically, it asks for a new set of specific capabilities, strongly related to the:

- identification of social needs and priorities;
- collaboration and negotiation with unconventional stakeholders;
- coordination of immersive and participative processes;
- management of long return horizon goals;
- multi-business unit involvement.

The codesign and design thinking approaches facilitate the contribution of different stakeholder and empower them to take action and participate in the process of social innovation. At the same time, service design competencies contribute in shaping innovative social forms and value creation systems, contributing to support social innovations in the peculiar forms services (Corubolo, Meroni, 2015).

The case study here presented aims at applying design skills as well as strategic and service design disciplines to a community welfare project in Milan, exploring both the challenges of structuring a multi-stakeholder project, as well as the creation of collaborative services.

## 4. Case study discussion: a “community welfare” project

Milano Sei l'Altro is a community welfare project that has been launched in 2016 in the Italian city of Milan. Winner of the call “Welfare in Action” promoted and funded by Fondazione Cariplo and led by Consorzio SIS and a network of partners including social enterprises, associations, a research foundation, the municipality of Milan and companies, the project aims at experimenting new community welfare services by engaging local actors - institutions, third sector, social enterprises, communities and businesses - into a collaborative process of design and implementation. In particular, Milano Sei l'Altro addresses the issue of work-life balance in environments with scarce socio-economic resources.

In recent years, especially in the Italian context, we could observe the rise of new and articulate social needs, which cannot find concrete answers in the current public welfare system. The socio-economic crisis has caused an increased fragility of family-based systems: by provoking a material impoverishment and reducing the perspectives of larger sectors of the population, especially women and unemployed people, it contributed to make social ties and relationships increasingly fragile. This scenario highlights a new concept of “vulnerability” that refers to categories of people who “slide silently downward from a life of economic dignity to a state of poverty as a result of biographical events that until

recently were considered natural occurrences in a person's life, and yet today often severely disrupt the lives of these people, not only because welfare support is insufficient, but mostly because social ties are weak" (Mazzoli, 2012).

In this context, Milano Sei l'Altro aims to provide original solutions to the new welfare and occupational needs, such as innovative forms of work-life-family balance and social services to favour the integration of unemployed and non-employed people into the labour market. Considering the structural fragmentation of the territorial resources and the specificities of the Milanese context, the project intends to reach an effective engagement and empowerment of those vulnerable groups, especially women, who suffer from a lack of balance between work and private life caused by difficulties in the management of their care loads (elderly and/or disabled relatives and children).

The project consists of 3 main actions:

- the involvement, since the early stages, of all the local actors (institutions, non-profit organizations, civil society and also companies), especially those who are not traditionally considered responsible for the provision of welfare services, whether they are profit, non-profit, public or private entities (citizens, workers, young start-ups) to ensure a more integrated and structured system;
- the ideation and experimentation of innovative design methodologies to foster the co-creation of new solutions, encouraging the different social actors, and especially firms, to adopt the new model of stakeholders' interaction, communication and effective collaboration which is the milestone of (corporate) social innovation;
- the creation of tools supporting the connection and aggregation of actors and resources, such as: "community hubs" where citizens, associations, not for profit organizations and businesses may also find a physical space to gather and co-produce services; and the new professional position of the "community manager", who plays a crucial role in mediating and facilitating dialogue between the actors, creating relationships, aggregating the social needs of community and promoting the transformation of the welfare offer.

The project scenario is built onto two main pillars-issues:

- Aggregating existing resources - goods, services, competences - in order to systematize and direct them towards an offer of high-quality and effective welfare services based on a logic of re-distribution of value;
- Improving and innovating the offer system through personalized and collaborative services by matching supply and demand and by introducing innovative forms of design and management of services.

For the purpose of this paper, we focus our discussion on the design process developed by the project to effectively engage the local actors, and in particular the private sector, since its early stages. Milano Sei l'Altro is indeed an innovative project in the Italian context, especially since it considers business as one of the several subjects that participate to the discussion and definition of solutions within a rigid and traditional field of work (work-life balance). It challenges the private sector to evolve from a logic of "employee welfare", in which the goal is limited to support and facilitate the life of the workers and, at its best, to make these services available to a small percentage of the local community: on the contrary, it invites companies to adopt a more open and collaborative approach and to fulfil their responsibility in joining a broader and multifaceted "design team", addressing



the needs of society, and therefore also those of companies' employees. At the same time, Milano Sei l'Altro encourages social enterprises, cooperatives and the third sector to perceive themselves as co-designers of such solutions, and not as mere "suppliers of social services" for the public or private sector (Borzaga, 2004).

In particular, the design contribution provided by the POLIMI DESIS Lab aims to support for-profit companies in:

- Fully recognize the elements with greatest potential within their own business in order to respond to social needs (resources, experiences, know-how, tools), not only through activities of mere philanthropy, yet in a logic of authentic integration;
- Rethink their relationship with local stakeholders in a more strategic and structured way, making sense of their needs and linking them with existing corporate solutions, or getting involved in the co-design and co-creation of new ones;
- Contribute to structure and support fragile and often fragmented multi-stakeholder collaborative processes, which still represent useful sources of external knowledge that may be integrated within the internal structure and thus become a trigger for innovation (Mirvis, 2016).

## 5. The 'Milano Sei l'Altro' process

The process is still ongoing, as more and more companies and organizations are joining the project. This means that continuous improvements and adaptations are still being done to better refine the model.

We will here introduce the main phases that compose the process (Figure 1) by presenting: the main objectives as well as the challenges we faced, the competencies we introduced and the different combination of stakeholders involved in each phase.

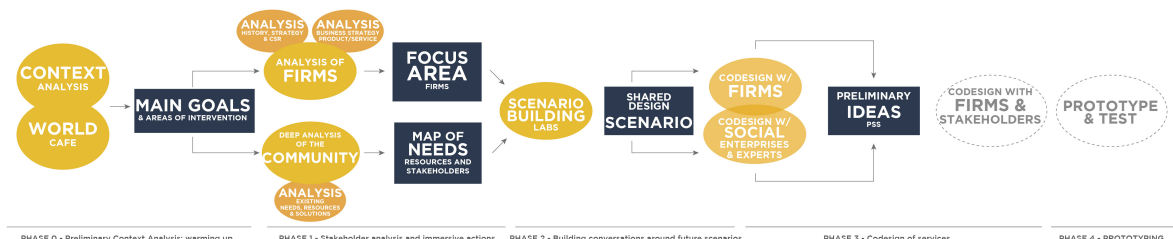


Figure 1. The process developed within the Milano Sei l'Altro project.

### 5.1 Phase 0. Preliminary Context Analysis: warming up

The preliminary context research had the main purposes of connecting theoretical and practical knowledge related to welfare sector and of involving stakeholders in a first open discussion.

Being among the main players providing services of care and home assistance, the core partners of Milano Sei l'Altro are, indeed, involved in both basic and applied research projects that explore the evolution of such services. A desk analysis of literature data and of the results of previous and on-going projects contributed to creating a baseline knowledge, which was shared among the group. In addition to this analysis, we mapped local social innovative practices, experimenting with

work-life balance solutions, such as bottom-up initiatives, neighbourhood projects, informal groups and more.

By leveraging on this existing wide knowledge, a World Cafe (Figure 2) was organized in order to start engaging relevant actors. At this point, private companies were invited together with representatives from the municipality, social innovators, start-ups, cooperatives and social enterprises. Organized around 3 topics (resources, networks and innovation for collaborative processes), the World Cafe gave us insights on the barriers and drivers in establishing cross-sector collaborations as well as connections to existing good practices and projects. This helped us also to better identify the targets and their needs and to reframe the macro areas of intervention.



*Figure 2. The World Cafe organized to collect insights on the barriers and drivers in establishing cross-sector collaborations.*

## 5.2 Phase 1. Stakeholder analysis and immersive actions

In order to detail and integrate the data collected in Phase 0, the first steps into the Milano Sei l'Altro project were dedicated to gain a deeper and more structured knowledge of the specificities of the Milanese areas involved in the project and to identify the most promising areas of work.

Public, profit and not for profit organizations were interviewed with the aim to explore both needs and resources related to the work-life balance issue. This phase consisted of two parallel processes:

- **Immersion in the communities.** 8 Community Manager immersed themselves in the communities and conducted more than 100 interviews, addressed at 70 different social actors, i.e. social cooperatives, associations, public services, informal movements, private citizens. The interviews investigated: specific needs expressed by the targets, existing or missing solutions, and potentially available resources. As result, a **Map of Needs** (Figure 3) has been realized with the aim to represent the main work-life balance related necessities and problems expressed by the communities.
- **Analysis of the private companies.** Businesses have been analysed through 2 actions: a desk analysis of companies' key documents (Sustainability Report and Annual Report) to deeply investigate their approach towards sustainability and welfare; a design conversation to managers and/or key functions, with the aim to deepen the understanding of the competencies in the sustainability and social innovation sectors as well as their will to collaborate in the project. Meetings with the companies can be considered a form of light co-design sessions, as we invite them to rethink their projects through

the principles of Milano Sei l'Altro and to evaluate promising areas of work. The outcome was a report called "Focus Areas".

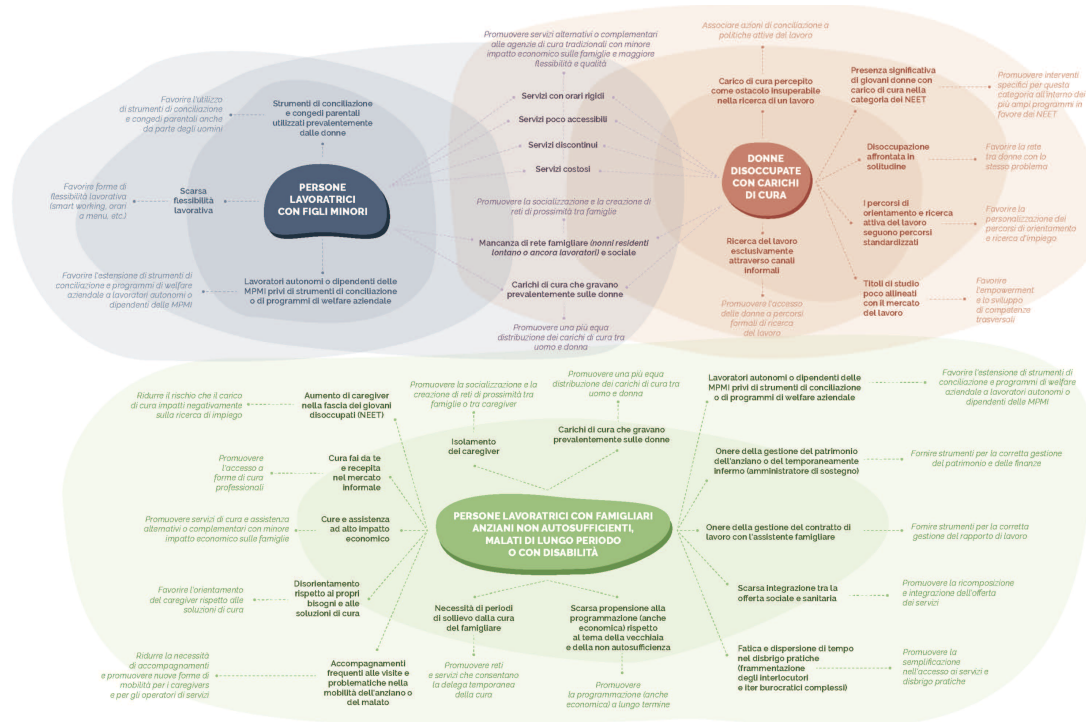


Figure 3. Maps of Needs representing the main necessities and problems expressed by the communities.

This double level of investigation gave us the opportunity to evaluate potential synergies among the stakeholders and related to the project. This was indeed a crucial phase in which designers, by systematizing the data and interpreting them, contributed to highlight common objectives between company and communities.

Figure 4 illustrates the process of intersection between the level of business and the level of the communities: the nodes emerging by overlapping the two dimensions highlight the Opportunity Areas, represented then in a map.

This process has been repeated for all the companies and stakeholders involved into the process, thus identifying those opportunities where multiple actors expressed interest, knowledge or expertise.

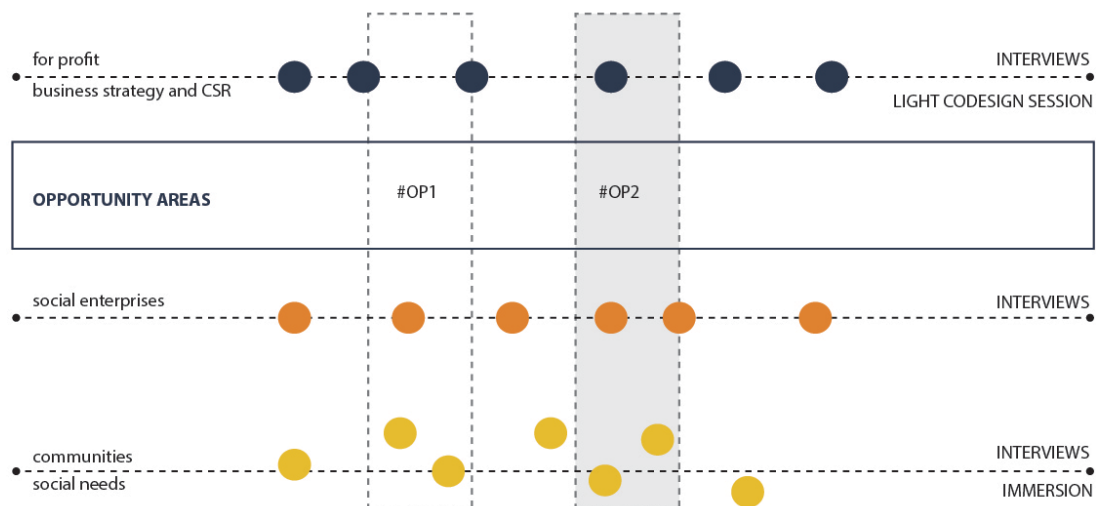


Figure 4. The intersections between the business and the community levels reveal the Opportunity Areas.

### 5.3 Phase 2. Building conversations around future scenarios

As anticipated, the second phase was dedicated to overlapping the level of business analysis to the territorial one. From this “integrated map”, we could make visible (and sharable) the specific areas of intervention within the biggest Map of Needs.

The focus of the design work was here the interpretation and transformation of “opportunities”, expressed through needs, into “objects of conversation” (Zurlo, 2012, Jegou and Manzini, 2008) able to describe future situations and trigger the collaboration.

In order to move from the present situation to the future, we organized a series of mini-workshops, inviting the core partners of Milano Sei l'Altro to explore their strategic visions within each opportunity area. This internal knowledge was transformed into a series of stories describing future scenarios and in a map of stakeholders to be involved in the process.

This material, together with a set of existing inspirational practices, nourished the “Milano Sei l'Altro Labs” (Figure 5 and 6), a series of workshops that involved the core partners, the community managers and the private companies but that were also opened to the contribution of local stakeholders, public servants and domain experts.





Figure 5. The Milano Sei l'Altro Labs exploring and discussing the scenarios.

During the labs, participants were guided to discuss, modify, reinforce, and transform the initial scenarios and to give their interpretation of them, negotiating roles, exploring conflicts, and sharing resources. The results of the Labs were actually a series of strategic design actions, where the object was not creating a solution for a client (the invited company or the local cooperative), rather a common vision on how to tackle a need expressed by the communities; for example, the planning for the elderly, in terms of financial, housing and social programming.

This is indeed a radical change of perspective for the actors involved: from designing a strategy responding to the mission of one leading stakeholder, to a co-interpretation of local needs developed in a shared strategy.



Figure 6. The Milano Sei l'Altro Labs exploring and discussing the scenarios.

## 5.4 Phase 3. Codesign of services.

Building on the outcomes of Phase 3, we entered the phase of co-designing services. From the scenarios, populated with a series of micro-actions, we created again 2 parallel paths. On the one side we supported the private sector to interpreting the results in terms of integration or connection to existing corporate solutions, resources or assets, encouraging the collaboration even between



different business units and functions; on the other side the results entered a series of meetings held in the community hubs and engaging local cooperatives and citizens in order to promote bottom-up interventions in the areas.

Following the first path, the team that participated in the “Milano Sei L’altro Labs” was reconfigured again around the specific scenarios, in order to build a “design team”, in which non-expert designers from the core partners and private companies collaborate with expert designers in the codesign of integrated solutions (Manzini, 2015). Differently from the “community level” path, the design action was more focused on developing complex solutions, which require the contribution of experts and organization, more than the activation of the communities (e.g.: the creation of funding schemes or the development of new professional roles).

The upcoming phase of the process, which is still on going, relates to the prototyping and testing of the solutions. This part aims to transform initial ideas of services from the stage of concepts to the level of local experimentations.

## 6. Conclusions

This still experimental phase of Milano Sei l’Altro aimed at identifying a set of processes and tools to build collaborations between conventional (non profit organizations) and unconventional (businesses) actors, involved in local welfare projects. Looking at the overall route, we can notice how the main path follows 2 different but parallel directions: one more related to the community and third sector level, therefore more strongly attached to the context, the other one more connected to the private sector. By mirroring the main activities, the 2 paths re-join at specific moments in the process, in order to then converge as long as we proceed with the project.

In the first part of the process, this iterative process of divergence and convergence is conceived to assure:

- A deep understanding of the needs and opportunities expressed by the various stakeholders;
- The progressive engagement of specific actors and functions both on communities and organizations levels;
- The emergence of overlapping areas on which to focus the design action.

In the second part of the process, divergence moments were designed, firstly, to validate the service ideas and, secondly, to reinforce and modify them according to the motivations, competences, resources and skills of the different actors.

Two main groups of service ideas clearly emerge:

- Solutions that directly connect to on going activities of one of the partners (or a small group of them), and therefore work as extension, integration or innovation of a existing experience (i.e. building on previous knowledge);
- Solutions still without any (or with a low) degree of ownership and that need to be amplified (Corubolo, Meroni, 2015) in the sense of finding an opportunity of development in the creation of new partnerships. This closely relates to the trajectories of scaling undertaken by social innovation (Westley & Andaze, 2013).

We can see how the overall design process involves a wider or narrower design community at different stages of service concept, development and prototyping. This iterative and creative process sets the conditions to constantly test and reformulate the emerging solutions, thus aligning them to the contexts, the available resources, the actors and the actual demand for innovation (Drayton, 2010).

Moreover the collaborative and cross-sectorial process, established among the partners, raised the following preliminary reflections on how collaboration may impact and generate innovation:

- Inside the organizations: the approach adopted fostered greater collaboration between the business units and functions within the single organizations, leading them to a convergence of objectives and a sharing of expertise;
- Across the organizations: the processes allowed to trigger “mutual learning processes” that innovates the ability of companies to relate to the territory and vice versa. Profit and non-profit organizations had therefore the opportunity to experiment new mechanisms of dialogue and exchange that allowed them to reach reciprocal advantages. On the one hand, companies obtained a deeper knowledge of local needs through a direct co-operation with social actors operating within the communities, thus establishing new partnership models. On the other hand, *not for profit organizations* acquired skills to relate to major economic actors and to manage complex processes, thus increasing the opportunities to achieve changes and innovations on a larger scale.

Future investigations may focus on the specific actors which enable such ecosystems of social innovation, deepening the understanding on which entity can play the role of promoter or catalyser of the process, and which are the main competencies, that complement the design skills here presented, finding connections with the research on the role of intermediaries and umbrella organisations in the spread and growth of social innovations (Davies & Simon 2013).

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# Design as Key to Unlock the Wicked Problem of Sustainability. Multiple Perspectives Research in a Design Perspective; A Case Study

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**Abstract:** How might we as researchers within the design community reach out and create new knowledge and value in close collaboration with a company, and at the same time contribute to a sustainable development? In this paper, we address the question of *How and with whom do we re-do*, by proposing *multiple perspectives* research as a way to unlock the potential of design thinking as a fundamentally *integrative discipline*. Hence, the aim of the paper is to show and discuss the ways in which a research design constructed by several perspectives can enable an actual impact. We will present the company collaboration case on which the paper builds and account for the applied multiple perspectives research design. Lastly, we discuss how the construct has supported a less compartmentalised understanding of sustainability within the company, and furthered insights on how design can be a driver for sustainability throughout the value chain.

**Keywords:** Multiple perspectives research, design thinking, sustainability

## 1. Introduction

In this paper, we wish to showcase an example for the particular theme of this Cumulus conference that focuses on the question of *How and with whom do we re-do*?

What we would like to share is the research design of a project we took part of during the period of August 2014 – March 2016, with departure in the raw fur supplier and auction house Copenhagen Fur (DK). As such, the central issue in this paper will evolve around the question of *how* we re-do; how we as researchers within the design community can reach out and create new knowledge and value in close collaboration with a company, and at the same time contribute to a sustainable development. What we will present is the way in which the structure



of our research project address these issues and challenges. Firstly, we will describe how the multiple perspectives research approach of the project conjoint well with principles for design thinking. Secondly, we present the departure and content of the project in relation to the product life cycle of fur. Thirdly, we will elaborate what this approach brought about which could not have been reached in a more 'narrow' research structure. Finally, we will conclude how this project can be viewed as a possible showcase for how design can bring value to companies and organisations with a departure in the sustainable agenda.

## 2. Multiple Perspectives Research in a Design Perspective

It has been stated that 'All fieldwork done by a single field-worker invites the question; *Why should we believe it?*' (Bosk, in: Maxwell, 2005: 106). Thus, this paper showcases an example of a research design constructed as a qualitative multiple perspectives study, in that it brings together four researchers with backgrounds in cultural history, material engineering, fashion design methodology and user practice. What we wish to show and discuss is how a research design, involving multiple researchers investigating a shared problem from each their perspective, can enhance validity of outcome through cross case analysis (Eisenhardt, 1989: 533). According to Eisenhardt, such multiple lens research design strengthens the build-up of evidence, as researchers can build a synergetic view of evidence; foster divergent perspectives and grounding, adjust and share data-collection and be forced to look beyond initial impressions (ibid.). What it also does is to echo well the idea of design thinking as an *integrative discipline*, within which lies:

"...a concern to connect and integrate useful knowledge from the arts and sciences alike, but in ways that are suited to the problems and purposes of the present" (Buchanan, 1992: 6).

As we will show, the multi-disciplinary and multiple perspective approach of the project also echo well Buchanan's *four orders of design*, as it concerns design as, respectively, *symbolic and visual communication*, *material objects*, *activities and organized services* and, design as *complex systems or environments for living, working, playing, and learning* (ibid, pp. 9-10). In the following, we will elaborate how this perspective helped bridge together the sub-projects of our research design, and also how it helped frame and synthesize our analysis and output.

## 3. Departure, content and main findings of project

It is common knowledge that sustainability is a highly complex area, as it covers the whole product life cycle; from raw material production to processing, from shipping to design and retail, and finally from first purchase of consumers to end life of product. One might even state that sustainability is for our time what Rittel first formulated as a *wicked problem*. It is indeed "*ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing*" (Rittel in: Buchanan 1992: 15). Living up to the ideals of the Brundtland report of 1987 (United Nations, 1987), which dictates how each product must serve both *people, planet and profit* can be highly difficult, particularly for companies

that were founded in the heyday of industrialism; as stated by Gardien et al. (2014), some of these companies might be 'stuck' in previous socio-economic paradigms. This means that in spite of ambitions, they might find it hard to fully deliver when it comes to sustainability, as they focus solely on the production phase, and not what happens with their product once it gets out on the market. Also, this focus often underestimates the potential role design can play, seeing it as a singled-out phase of the product life cycle that is detached from e.g. raw materials production, supply chain or manufacturing rather than an integrated part of all these activities (see e.g. Kozlowski et al., 2012).

With a departure in such reflections, the four sub-projects in case investigated in parallel a main research question:

How might a strategic design perspective point towards best practices in the fur sector that align with challenges within the garment sector at large?

The initial process was to establish a common ground with regard to how the idea of sustainability was understood and approached in the company, as well as within the research team. This was done through conducting on-site observations, informal conversations and formal semi-structured interviews with relevant stakeholders and key employees. Also, the research team coordinated literature studies on fur and on sustainability, and combined this with desk top research of company activities and engagements on the area. This process led to the insight that the concept of sustainability was primarily understood by the employees as something related to the farm level (e.g. living conditions and use of carcass wastage) and the material production level (e.g. tanning and dying). Thus, an understanding of sustainability secluded to the earlier stages in the product lifecycle of fur, whereas sustainable approaches to design processes and user practices were largely ignored (Skjold et al., 2016).

Based on this, the four sub-projects had the following objectives, approaches and main findings:

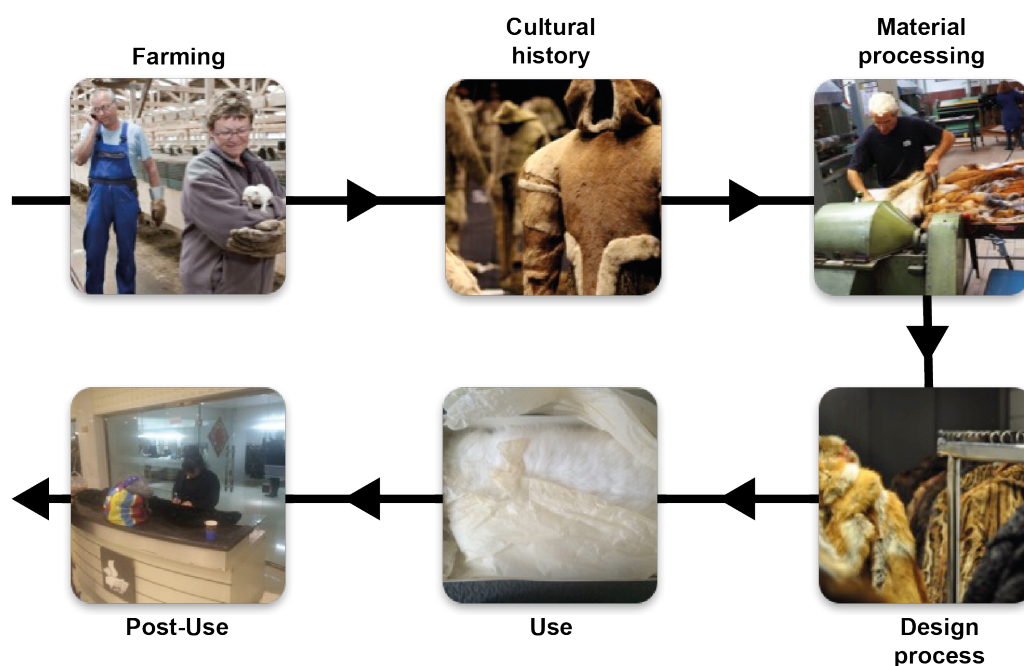
Through qualitative interviews with farmers and employees in the company, combined with studies of fur history, the cultural history perspective explored how shared memory of fur might promote sustainability at both product- and strategic level (Skjold et al., 2016, pp. 12-17). Contributions were new insights on how the cultural and personal memory of fur might be embraced and activated as an inspiration for sustainable development, by leaning on memories and stories of fur beyond recent fashion and celebrity culture – and yet at the same time include not only the story of the farmers and the co-operative model of the company, but also memories (and practices) of man and nature.

Through a mapping of existing and potential practices around the material processing of fur, the material processes perspective explored how it might be possible to support best practice examples within the fur sector (ibid, pp. 18-25). Contribution were new insights into why life-cycle assessment of fur presently pose a challenge, due to the complexity and number of stakeholders involved in the production process. Hence, transparency of environmental impact is difficult to achieve. Still, sustainable practices can be supported by the company defining and communicating clearly the areas they take responsibility for. Furthermore, they can promote transparency overall, by identifying and communicating general challenges within the entire life-cycle.

Through qualitative interviews with designers and furriers internal and external to the company, combined with observations of design processes in relation to fur, the design process perspective explored how general design and sustainability

practices in the area of garment design might inform and support the development of sustainable strategies in fur design (ibid, pp. 26-31). Contributions were new insights into how the fur material's potential durability can act as a driver for product longevity if approached in the design process, through enhancing existing practices such as craftsmanship and zero-waste. And furthermore, by cultivating design approaches such as design for circularity, secondary use, modularity, product diversity and user-inclusion.

Through qualitative interviews with stakeholders, employees and exemplary users of inherited fur, the use perspective explored how understandings of user experiences of fur might inspire more sustainable practices within the fur industry (ibid, pp. 32-39). Contributions were new insights into how craftsmanship and material quality provides fur garments with a high status that might be used as a platform for creating awareness around animal welfare, material processes and manufacture. Furthermore, existing business models sustaining product longevity could be implemented such a repair or re-design. Lastly, by shifting away from fast and trend-based values, and instead cultivate 'slower' values, fur might become more attractive to types of consumers not currently addressed in the company's design strategic focus. Altogether, the activities of the company and of the research team were mapped in relation to the entire life cycle of fur (see Figure 1).



*Figure 1. Except for the farm level, the four sub-projects covered the life cycle of fur, which made it possible to form a cross-level analysis that mapped barriers and potentials for sustainability across the entire life cycle.*

During the project period, individual analysis and findings were accumulated and shared amongst the four project researchers through monthly meetings and a joint online filing system. Furthermore, shared office space during the project period enabled a continued exchange of experiences, reflections and problems in relation to the study. Lastly, knowledge was shared as well as built with company employees through four comprehensive and consecutive workshops that focused on different aspects of the research project.

## 4. Building up new narratives

As it has already been highlighted, when discussing fur and sustainability, it often ends up with focusing on issues concerning animal ethics and environmental downsides of the material production itself. As raw material suppliers, Copenhagen Fur have only engaged sporadically with the entire product life cycle of fur. They are producing raw skin and when these have been sold on one of their auctions, they know very little about and have little to do with what happens in the material's future life. In the project, it was proposed to provide a qualitative life cycle overview that communicates the process as a whole in combination with information and method cards on applied or future technologies and processes. This overview can be used internally in the organization to discuss present and prospect initiatives that benefits sustainability with a particular concern for the pre-consumer phases of the product life cycle. However, such initiative does not capture user experiences or secondary use phases and the potential this gives for storytelling and market positioning.

If we look at potential present and future applications from this perspective, we need to learn from the past and we need to move from objective to subjective value creation. Fur is a technically and functionally durable material, but the company can gain value by increasingly appreciating the material's emotional values. By looking at existing practices of designing and using fur and relating it to storytelling, attention moves from the material itself and the products that are made of it, to the user and ways in which the user installs meaning and value. In other words, the way in which fur as material works as mediator for a given set of values, norms and ideals.

Relating to this, it is evident that the role of fur in society has changed throughout history; from being a material used for wild life and survival by indigenous people living in cold climate areas, and to the '*conspicuous consumption*' of ruling classes in Western society and emerging new power economies. Bridging findings from the four research perspectives together made it possible to identify new possibilities for re-framing the storytelling about fur as material, so that it matches better the demands for ethical and environmental positioning of brands in the 21<sup>st</sup> Century. Hence, values such as resource efficiency, passing-down between generations, user-centred design processes or business models for services and maintenance were propelled as possible new departures for storytelling through design.

## 5. Conclusion and perspectives

The multiple perspectives research structure made it possible to place design centrally as key to re-frame the positioning of the company, as design has the power and potential to propel semiotic shifts between material product and aspirations of consumers.

The multi-layered analysis that was coordinated between four researchers and their individual findings promoted perspectives on sustainability that address a full product life cycle perspective in line with design thinking logics, embracing this way both existing initiatives of the company as well as future scenarios.

As a result, the company made substantial use of the recommendations of the research project as they decided in late 2016 to base their future strategy entirely on sustainability. As this is written, they are starting to implement elements of the project together with the research team across the entire company structure.

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# A Collaboration between various Education Institutions and Government Departments in order to develop Learning Skills for the 21<sup>st</sup> Century

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**Abstract:** In order for us to produce education relevant for the 21<sup>st</sup> Century in the conceptual age, we need to produce innovative, entrepreneurial learners. Furthermore, we need to have a holistic learning experience that produces learners with emotional intelligence, enhanced self-awareness as well as curriculum that is value driven. There is much to be said about the relevance of abstract concepts across various subjects (skills transfer) and learners need to embrace active learning. In this way we will produce decision makers, researchers, discovery based learners and holistic thinkers, all key to be successful in the 21<sup>st</sup> Century. The video clip explains the progress being made by the innovative Design Educator's Africa Collective, IDEA, which is made up of Brideway High School, Greenside Design Center and relevant government departments in South Africa.

**Keywords:** Entrepreneurial, conceptual age, emotional intelligence, holistic learning, design thinking

**Film Contribution**



Title	Author
Bridging the Divide Between Problem and Solution: A Design Approach to Housing Production in Nairobi	Collins Makunda
Developing a Research Co-design Toolkit: A Citizen Science Case Study	Enric Senabre Hidalgo
Design Competences to Support Participatory Public Services	Fanny Giordano
Designing the Social	Frederiek Bennema
How do we Redo Design for Play? - With a Child-Centred Mind-set	Karen Feder
REDOing the Museum Exhibition Design	Kristina Maria Madsen
HealthBand: Campaigning For An Open and Ethical Internet of Things Through An Applied Process of Design Fiction	Michael Stead and and Paul Coulton
Understandings of the Concept of Iteration in Design-based Research	Peter Gundersen
Aesthetics of the Invisible. Sonic Value in the Field of Fashion Design	Vidmina Stasiulyte
Design for Supporting Sustainable Behaviour Retention through Context Change	Wanjun Chu and Renee Weaver

# Bridging the Divide Between Problem and Solution: A Design Approach to Housing Production in Nairobi

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**Abstract:** With the understanding of design as a well-suited approach to dealing with intractable problems, this paper seeks to appraise the phenomenon of housing transformation in Nairobi, Kenya, as the most dominant form of housing production in the city. It reflects on possible ways in which design can bridge the gap between problem and solution; both in terms of defining and understanding the problem and shaping a solution that takes into consideration a multitude of perspectives. Through interview findings and field observations, the paper discusses the actors involved in the rapid transformation of formal housing, in the city, from low-rise bungalows to high-rise apartments, showing how their actions are a manifestation of silo thinking leading to negative externalities. It concludes with reflections on how design can act as a bridge between competing interests through clearer understanding of complex problems and the generation of appropriate solutions that are informed by multiple perspectives.

**Keywords:** design approach, design thinking, housing production, housing transformation

## 1. Introduction

Tim Brown describes design thinking: “as a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Creativity at work, 2017). A more comprehensive definition of design thinking is given thus:

“a methodology used by designers to solve complex problems, and find desirable solutions for clients. A design mind-set is not problem focused, it’s solution focused and action oriented towards creating a preferred future. Design Thinking draws upon logic, imagination, intuition, and systemic reasoning, to explore possibilities of what

could be – and to create desired outcomes that benefit the end user (the customer).” (Creativity at work, 2017)

William Pena and Steven Parshall weighing in on how design could be approached, state that: “...problem solving is a valid approach to design; therefore, problem definition should be the first step in the design process” (Pena & Pershall, 2001, p.52). In a nutshell, then, design is articulated as the most appropriate means by which to successfully tackle a variety of problems.

In the urban context of Nairobi, housing is a challenge and has been a growing challenge since Kenya gained independence in 1963. One of the big challenges of housing in the city is that it is inadequate: its production and supply has failed to match the demand and need for it by urban residents, with a housing shortfall estimated at 150,000 units per year. (Wangalwa, 2014). This has resulted in a proliferation of slums in the city, well-documented by various scholars (Ese, 2014; Mukeku, 2014; Rakodi, 1997). However, in the new millennium, a new phenomenon has emerged. Residential areas that were historically low-density with bungalow type housing are rapidly undergoing transformation into high-density residential areas dominated by high-rise apartment type housing (See figure 1). This phenomenon has spawned myriad problems that are threatening the sustainability of the urban residential habitat. The most glaring problem being the trend towards exceeding the carrying capacity of the urban habitat through inadequate basic infrastructure such as roads, water, electricity, drainage, and sewerage systems.



*Figure 1. Transformation of low-rise housing to high-rise apartments in Kileleshwa. (Source: Author, 26 February, 2017)*

This emergent situation can be attributed to the preponderance of silo or specialist thinking that permeates the production of housing in the city. Various



actors are involved in the production of housing. They range from architects, developers, financiers and investors to the regulatory authorities and residents – both renters and purchasers. Each of the actors has particular vested interests that they seem to be pursuing fully to the detriment of the urban context in which the outcomes of their interactions are manifested.

## 2. Methods

A qualitative approach was employed in this study due to its propensity to facilitate the acquisition of in-depth understanding of a phenomenon. This entailed interviewing key actors and informants for their perspectives on and their roles in the process of housing production. The actors and informants included the county government and other regulatory agencies, developers, architects, contractors, investors, and residents. The data generated was augmented by a review of relevant literature, and published reports on the housing dynamics of the city of Nairobi. Additionally, several site visits were made to the case study neighbourhood, *Kileleshwa*, in which field observation of the emergent apartment blocks were made and documented through photographs, notes and conversations with apartment managers on site.

## 3. Discussion

### 3.1 What's Lacking

The various interested parties are acting at cross-purposes to each other. They do not have a shared vision despite the presence of a document (GOK, 2008) articulating a vision for the city in 2030 as a world class sustainable metropolitan city, which, essentially, is only paid lip service to. Instead, in an apparent reflection of a market-driven, primarily capitalist-oriented economy, the economic profit motive appears to be highly predominant at the visible expense of other needs such as the environmental and the social (WCED, 1987), as well as the cultural (UNESCO, 2016). As it stands, all interested parties appear singularly focussed on the extent to which they can benefit out of their involvement monetarily: The architects are focussed on maximizing their fees or commissions by undertaking larger projects; developers are keen on the high profit margins made possible by developing a large number of units for sale; investors are driven by the high return on investment; the regulatory authorities are keen on increasing their revenue collection through the various fees charged for the approval of the development of apartments; the national revenue authority, Kenya Revenue Authority (KRA) is keen on expanding its tax base by widening its net to capture levies on rental income and apartment sales; and the National Environmental Management Authority (NEMA) is keen to levy more fees, through approvals, on apartment projects, seen as attractive avenues for large volumes of revenue. Arguably, then, an integrated approach to tackling the problem of housing production is sorely lacking.

### 3.2 Towards a Solution

While from an economic perspective, the different stakeholders or actors are benefiting immensely, it is not without consequences; some, more immediate than others. The renters and purchasers and especially the former are net losers rather than gainers due to high rents and inflated housing prices that do not seem to

reflect nor align with the regular incomes of the would-be target market. The regulatory authorities need to play their role of managing the process to ensure that its outcomes lead to the achievement of a shared vision that mitigates to the largest extent possible the negative externalities that arise as a consequence of the entirety of the process and outcomes. The issue of adequate infrastructure ought to be a primary concern, for all the actors, and more so for the regulators upon whom the major responsibility lies to control and manage development in a manner that ensures the sustainability hence the viability of the urban context. Adopting a design approach to tackling the problem opens up alternative avenues for not only appraising the problem in totality, considering multiple conflicting facets; but, also, generating dynamic solutions that go beyond merely addressing present concerns to contemplating the unpredictable ambivalent future scenarios, which design, with its creative thrust, tends to embrace comfortably.

The vision of the city needs to be brought front and centre as the guiding playbook from which all stakeholders' or actors' or interested parties' actions are evaluated and modulated. The design thinking approach, with its comprehensive consideration of people's needs as well as the viability of any given undertaking, offers the bridge for doing so. A design approach with, at its heart, the need to fully understand a problem, no matter how complex, and its tendency thereafter towards problem solving offers a way of grappling with competing interests yet resulting in solutions that address major concerns of the various stakeholders or actors.

## 4. Conclusion

While the development of apartment type housing goes a long way in helping to plug the city's massive housing need, this needs to be undertaken sustainably if it is to endure. Otherwise, the deterioration of the environment will undermine any useful gain from the development of the housing units. Adopting design, in its various guises, whether as design thinking, design process, or simply as a design approach, introduces creativity on to the stage of problem solving. Suddenly, rather than an inundation of problems, an avalanche of solutions, made possible by the open way of thinking wrought by design, gains visibility making apparent hitherto hidden choices in possibilities for addressing seemingly intractable challenges. Design thus becomes the much-needed bridge between problem and solution; the path towards a viable solution in ensuring that the need for urban housing is met in a manner that is bound to endure for a long time afterwards. Through design, the various stakeholders; the actors, can be brought together to agree on a common ground that is mutually beneficial not only for them but also for the urban context in which the consequences of their actions are made evident. This is only possible because design provides the platform upon which divergent opinions and a multitude of perspectives can be considered, critiqued, accommodated, and effectual compromises made.

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# Developing a Research Co-design Toolkit: A Citizen Science Case Study

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**Abstract:** This paper describes the adoption of design thinking for the co-creation of citizen science experiments. The project, which is currently gathering additional data from surveys and interviews after a period of participant observation, is based on the collaboration of a scientific team and the researcher (as a co-creation facilitator) with different groups of secondary students, from three schools in different socio-demographic contexts around Barcelona. Based on the first version of a 'Collaborative Research Toolkit', participants developed through a series of sessions and iterations preliminary designs of experiments about human behaviour, moving from the initial identification of shared concerns to several prototype versions of research sequences and methods. Specific steps of the co-creation process involved discussions about social impact, feasibility and motivation around local issues, collaboratively defined research questions, and logistics needed for the management and production tasks behind each experiment realization.

**Keywords:** citizen science, co-design, toolkit, facilitation, experiments

## 1. Introduction

Citizen science involves the public or “amateurs” (Gura, 2013) in distributed and usually empiric scientific projects, to address real-world problems with the primary task, usually, of collecting scientific data (Cohn, 2008). A majority of citizen science projects consist of digital ICT infrastructures (Prestopnik & Crowston, 2012), where geographically dispersed participants can coordinate and centralise tasks of data harvesting (Wiggins, 2010). Although as a collaborative type of organizational and work design, based on volunteering rather than science as a profession, is not new to science (Silvertown, 2009), the concept of citizen science in recent times has grown in academic literature (Dobrevá & Azzopardi, 2014). There is a growing number of cases where a more participative type of collaboration in research activities leads to common knowledge and community awareness (Cooper et al, 2007), or where non-expert participants develop new

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questions aided by data visualization and this way scientists identify non expected challenges (Goodchild, 2007). However, still the most habitual forms of citizen science are considered only “contribution systems” (Wiggins & Crowston, 2014).

Different literature about this issue point to the need to generate citizen science projects according to deliberate and co-created research designs, that pay attention to diverse interests in order to achieve both social and scientific objectives (Bonney et al, 2014). For example when defining search questions, these can be formed in a top-down approach (scientific-driven) but also in a more bottom-up way, as a community-driven process (Newman et al, 2012). In this respect, in order to advance to more collaborative modalities of citizen science, authors like Bonney et al (2009) suggest the importance of involving participants in the research design process in more deliberative and facilitated ways. Something that relates to the experience described in this paper and the relevance of determining collaboratively clear and project-specific goals, identifying through iterative periods of design different outcomes, tools and features of the research (Dickinson et al, 2012).

Evolved in its latter practices to different sub-fields, which denote design thinking as a “transitive paradigm” that differs depending on the context where it is applied (Di Russo, 2016), during the last decade there has been an increase of approaches and practices where co-design methods have been adopted by the academia and and the industry (Sanders & Stappers, 2014). Authors like Manzini and Coad (2015) consider design thinking an open-ended culture and a practice or path of co-creation, with the main characteristic of involving all actors in the process, but with the key role of the design expert as facilitator. For Kimbell (2011) design in this context is seen as an exploratory cycle for new kinds of value creation between diverse participants, a process of “constructivist enquiry”. The evolution of design thinking disciplines tends to be usually more prolific in researchers and designers producing facilitation materials and receipts, guiding participants through a collaborative creativity process of different scales (Sanders, 2006).

## 2. Description of the co-design process

Under the umbrella of a European project for engaging teenagers with science and technology<sup>1</sup>, as one specific action program related to citizen science, the researcher and a scientific team at the University of Barcelona<sup>2</sup> organised a series or co-design sessions with three diverse groups of students from different Secondary Schools (totalling more than 100 participants). One of the basic premises of the process was to start in the same way in all cases: rather than only involving students in the data gathering process of an experiment about human behaviour (like in previous editions), to work with them in the earlier phase of defining together the goals, issues and methods related to the experiment, following the “co-created” approach (Bonney et al, 2009).

In the early times of participatory design, the researcher served as a translator between the users and the designer (Sanders & Stappers, 2008). In co-design, as the most participative approach derived from design thinking, the designer (who may be a researcher, or a professional of design) takes on the role of a facilitator. The project followed the same approach, structuring the process with a

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1 More information: <http://www.stem4youth.eu/the-project/>

2 More information: <http://www.ub.edu/opensystems/>



predefined sequence or logic, creating the first version of a Collaborative Research Toolkit (figure 1) and a series of steps for each session, where the researcher as a facilitator (with help from a representative from the scientific team, explaining concepts and theoretical aspects when needed) could guide participants through all the co-design process. This way, via four specific workshops with each of the groups, the dynamics moved from (1) shared issues of concern, then (2) derived research questions, followed by (3) prototyping the experiment process in a visual way, and finally (4) eliciting and reflecting the type of tasks and logistics associated to it.

ColMeth: KIT CO-DISENY DE RECERCA COL·LABORATIVA v0.2 – Làmina 1: Problemes i hipòtesis Data \_\_/\_\_/\_\_ Projecte \_\_\_\_\_

**1** Pluja indiscriminada de problemes a comparar: "Ens preocupa que..."
**2** Preguntes de l'experiment
**3** I c

IMPACTE AL BARRI	IMPACTE SOCIAL	ES POT RESOLDRE	ENS MOTIVA	
<div style="color: blue; font-weight: bold;">ALT</div> <div style="color: blue; font-weight: bold;">BAIX</div>	<div style="color: blue; font-weight: bold;">ALT</div> <div style="color: blue; font-weight: bold;">BAIX</div>	<div style="color: blue; font-weight: bold;">ALT</div> <div style="color: blue; font-weight: bold;">BAIX</div>	<div style="color: blue; font-weight: bold;">ALT</div> <div style="color: blue; font-weight: bold;">BAIX</div>	<div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div> <div style="border-bottom: 1px solid gray; padding-bottom: 5px;">[comentaris?]</div>

Material en desenvolupament, llicència Creative Commons

Figure 1. First page of the Collaborative Research Toolkit (in Catalan).

At each of the four stages of the co-design process for the experiments there was a divergence and convergence phase (Brown & Katz, 2011) for generating ideas collaboratively and then selecting together the best options. During all the process, facilitators served as connectors of concepts and active listeners, trying to operate “in the subtle link existing between action research and collaborative design” (Swann, 2002) and adopting informal ways of eliciting and presenting visual information (Kensing & Blomberg, 1998), in this case for starting with the students choosing whatever concern or problem they wanted to address with an experiment about human behaviour. This formed the first phase of the process, where there was a session when they could brainstorm about the types of issues at the local level where an experiment about human behaviour could help to generate evidence, taking into account indicators like “feasibility”, “social impact” or “motivation”, which were reflected on specific thermometers on a wall (figure 2).



Figure 2. Discussion based on indicators for each research issue identified.

Although that first phase needed only as artifacts different figures of thermometers and proper postits, for the next sequences we developed and tested a specific “Collaborative Research toolkit” as a structured and visual canvas (Nagle & Sammon, 2016), having also in mind the parallel component of learning as an important part of the co-design (Dubberly & Evenson, 2011), in this case in relation to the scientific method and notions about “doing an experiment”. In front of the challenge of “leading, guiding, and providing scaffolds, as well as clean slates to encourage people at all levels of creativity” (Sanders & Stappers, 2008), the conceptual validation of a toolkit was also a specific co-creation experience and dialogue between the scientific team and the co-design facilitator.

That key material went under a series of preliminary versions and discussions, trying to find a balance between usability and rigour, in order to create a co-design toolkit useful for a research purpose. In those preliminary discussions, before the sessions with students (although refining the toolkit took place later on in other different key moments of the process, adapting to the evolution of each group and session goals), the main aim was to reach a real level of deep collaboration and mutual influence between research “experts” and research “amateurs”, and not only some sort of excuse for light levels of participation. Quoting Swann (2002) about the practice of design in collaborative research: “authentic collaboration in research is more than just a multi-disciplinary design team approach. The users of design should be genuine ‘collaborators’, and not merely co-opted for token comments in an illusion of collaboration”. For this, in all moments the facilitation team stressed the importance and relevance of each decision or discussion generated by students, on the toolkit or outside it, during debates.

For the second stage of co-creating specific research questions, each sub-group used a canvas where to place postits, in order to cooperatively articulate at least three sentences following the same structure (as seen in the example of figure 3 and 4). Starting with predefined syntagms (“What if...”; “What is the relation between...”; “How...”), these empty structures contained in a modular way different options for a quantitative research question: descriptive, comparative and relationship (Onwuegbuzie & Leech, 2006). Again, a selection and assessment moment based on discussion and visually selecting the best options, allowed for filtering the more relevant research questions for the whole group (connected to the topic or issue already selected in the previous session).

Canvas for generating research questions (in Catalan)

1 El tema o inquietud triada és: \_\_\_\_\_

2 Feu conjuntament 3 tipus diferents de preguntes sobre el tema (cadascú un postit mínim!)

3 Valoreu la pregunta triada

Tipus de pregunta	2ª part de la pregunta	[+ detalls de la pregunta?]	[+ detalls de la pregunta?]
<b>PREGUNTA DESCRIPTIVA</b> (Trieu un començament) <input type="checkbox"/> Qui... <input type="checkbox"/> Com.... <input type="checkbox"/> Amb quina freqüència... <input type="checkbox"/> Quin percentatge... <input type="checkbox"/> Quina proporció... <input type="checkbox"/> Fins a quin punt... <input type="checkbox"/> Quin valor...	[2ª part de la pregunta]	[+ detalls de la pregunta?]	[+ detalls de la pregunta?]
<b>PREGUNTA RELACIONAL</b> (Trieu un començament) <input type="checkbox"/> Quina és la relació entre... <input type="checkbox"/> Com afecta...	[Element a relacionar #1]	[Element a relacionar #2]	[+ detalls de la pregunta?]
<b>PREGUNTA OBERTA</b> (Trieu entre les opcions anteriors un model) <input type="checkbox"/> ...	[2ª part de la pregunta]	[3ª part de la pregunta]	[+ detalls de la pregunta?]

Figure 3. Canvas for generating the research questions (in Catalan).





*Figure 4. A sub-group of participants using the toolkit canvas for generating “modular” research questions.*

The third phase of co-design of citizen science experiments allowed to connect the selected research questions from each group to a more explorative and creative moment, prototyping the sequence of the experiment itself. This was done considering the “big picture” of the research project as a flow of actions over a timeline, following the principle that research design usually should be detailed collectively early on in a project, in order to ensure the commitment and alignment of all partners (Barnes et al, 2006). For this, participants selected a series of icons from a large set of images that reflected key aspects around a possible experiment: research methods (surveys, observation, simulations, etc); experiment logistics (experiment protocols, dissemination, space needs, etc); previously mentioned key concepts or variables (trust, value, solidarity, among others); key people or participants (representing options of age, gender, profession, etc) and additional elements to visualize (depending on the theme and issues for the experiment, ranging from public space icons to other social or context related ones). These dense diagrams (see figure 5, 6, and 7) enabled once more to activate discussions and conversations about feasibility and motivation, in order to select one co-design for each of the three schools, among 4 or 5 “finalist” prototypes after the overall refinement.

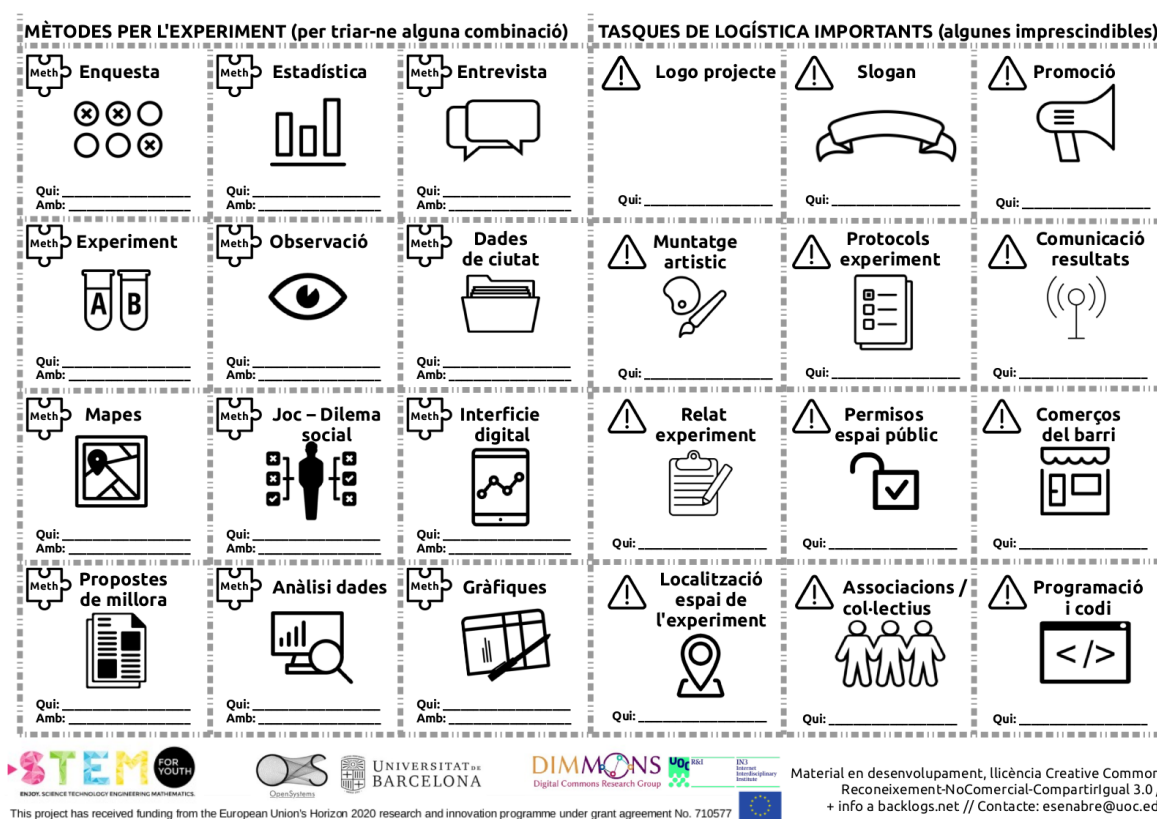


Figure 5. Some of the icons for creating the experiment prototype: research methods and research logistics (in Catalan).



Figure 6. Participants "collaging" the different icons for creating the prototype.



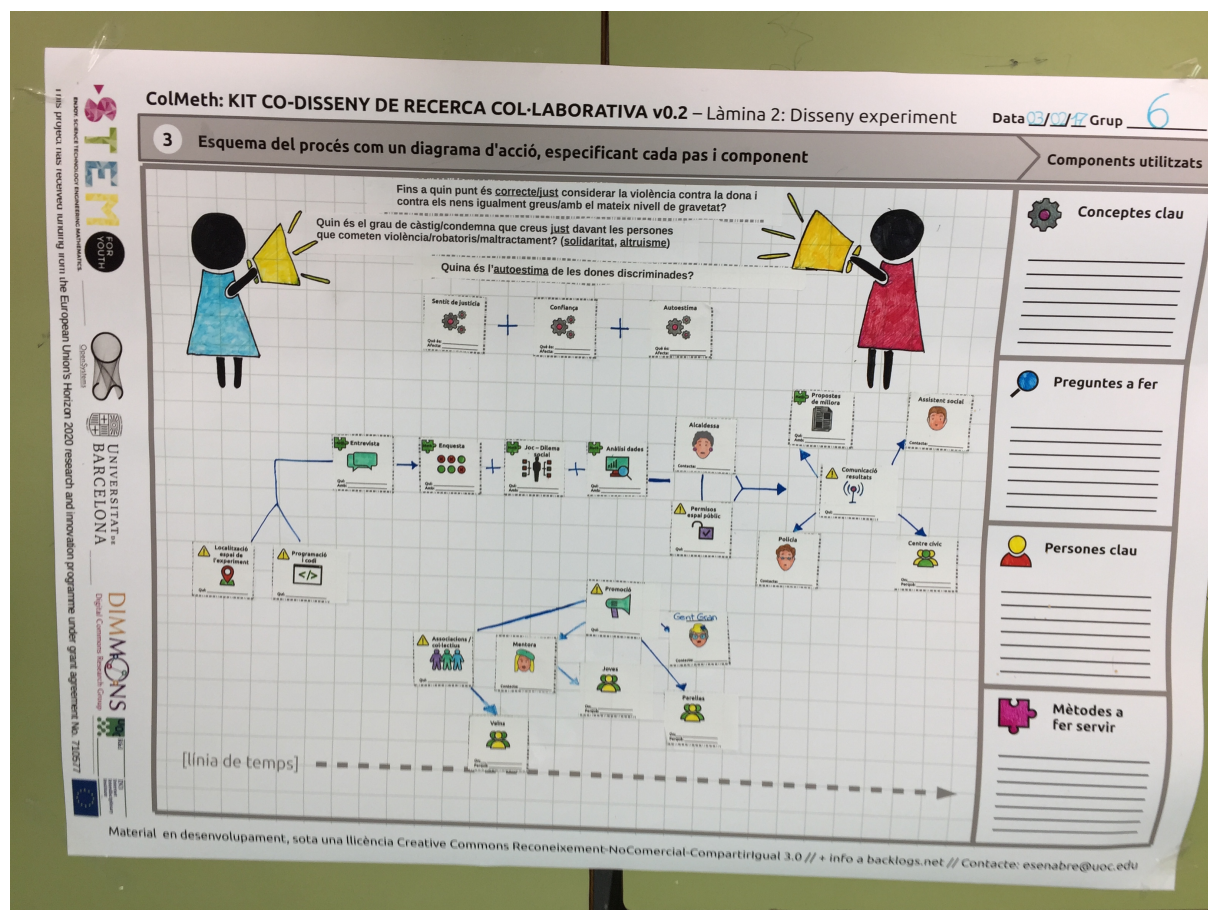


Figure 7. One of the resulting co-designs for an experiment.

For eliciting and discussing the main logistics and needed tasks to deploy each experiment, the fourth and final session of the co-design process involved again to create smaller sub-groups in each of the three classes, which at that stage had already very different approaches to the goals and sequence of the finally selected experiments (one related to perceptions about public space and infrastructures in the city, another one related to gender and violence in a specific neighbourhood and, finally, the third experiment concept focusing on equality and racial prejudices when enrolling kids at local schools). In each case, the session tried to move from the co-design paradigm to one of preliminary planning, based on the selected prototypes and the principles of agile management (Abbas et al, 2008). For this, the toolkit provided a surface divided in different columns, as a sort of basic “kanban board”, making explicit tasks that otherwise would be ignored (Hines et al, 2004). Each column represented a category of tasks derived from the icons used in the selected prototype (figure 8 and 9): experiment logistics; communication and engagement; socio-demographic information; design of the experiment interface; data analysis; and dissemination of results. Participants, as a final stage of their research co-design, had to brainstorm and share with the rest of the group what they thought was needed at different levels in order to make the experiment possible.

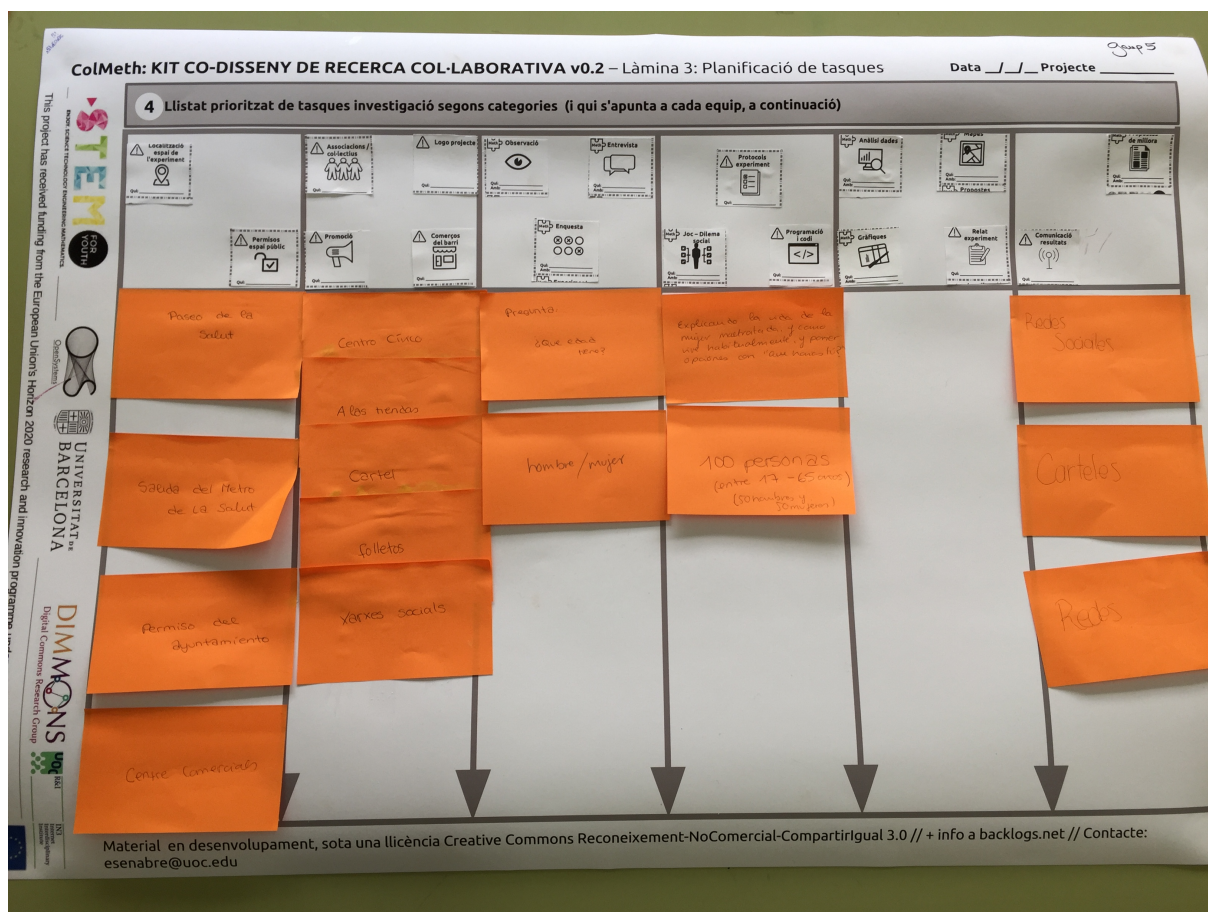


Figure 8. One of the toolkit canvas for brainstorming tasks and logistic needs behind the experiment production.





Figure 9. Discussing possible logistics of the selected experiment.

### 3. Preliminary conclusions

As a process that started with the “designerly” definition of problems, exploring with this citizen science experience how co-design and collaborative research can have a clear interconnection, it connects to further and broader considerations related to the co-design of research processes in other domains. Vom Brocke and Lippe (2015) point to an unconcluded paradox of managing collaborative research projects, in times when the vast majority of research is based on some degree and type of collaboration, which reflect clearly the opportunity and potential implementation of similar co-design approaches in other research contexts:

“On the one hand, collaborative research fosters the integration of the research perceptions, ideas, and views that are needed in order to solve problems comprehensively. On the other hand, the resulting heterogeneity of partners leads to problems with respect to inter-cultural, inter-organisational, and inter-disciplinary management” (Vom Brocke & Lippe, 2015).

In relation to such paradox, the main question of this experience aligns with the hypotheses that design thinking (and more specifically co-design) can lead to fruitful combination of ideas and points of view from diverse participants in the design of a research (in this case a scientific experiment), setting the path for coordinated action afterwards.

In the moment of writing this, results are still partial and unconcluded, waiting for the different surveys and interviews to take place and being analysed, while the production phase and execution of the different experiments are just starting to take place. However, qualitative feedback and notes from participant observation so far, as well as evaluation meetings with the respective teams of teachers and scientific researchers in charge of the experiment, point to a high level of satisfaction with the predefined goals from different perspectives. Some of them can be summarised as:

- The scientific team engaged regularly in the elaboration and different versions of the toolkit, as well as in the co-facilitation, and based on their feedback all results from each session helped them to figure out the type of experiment and needs related to it.
- The scientific team also have an overall positive opinion about the level of engagement and insights from participants in defining progressively the issues, questions and methods to connect to each experiment.
- Teachers from each group observed a progressive implication and quality of results defined by their respective groups of students, and compared to the previous edition of the citizen science project (with other groups) more diverse types of learning implications (related to skills, cognitive tasks, self-assessment, meaningful participation, etc).
- Both teams have a high level of motivation to continue with the rest of the experiment phases, and also confidence in the practical and specific use of the outputs of this co-design phase.

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# Design Competences to Support Participatory Public Services

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**Abstract:** This paper is an early investigation of a PhD-study that started in February 2017. The paper identifies challenges emerging from a gap between citizens' needs and public offering to address such needs. Citizens often organize themselves when public administrations are unable to provide valid answers to unsolved and shared everyday problems. In this context designers should support and facilitate bottom up approaches that could address these challenges by the creation of new public services that are informed by the real needs of their users (the citizens). How can designers support the spontaneous creations of services by citizens? How might designers build platforms that could support interactions between citizens and public organizations on a large scale? In this paper I will refer to the Open4Citizens (O4C) research project as an exemplary playground to build co-design tools that supports the designer activity to empower the citizens to build meaningful services.

**Keywords:** Public services, participation, diffuse design, service design.

## 1. Introduction

### 1.1 Gap between offer and demand

Public administrations are often looking at public service innovation by proposing technological accelerations. The initiatives coming from this approach often increase the technological divide among citizens and often increase the gap between the service offering in the public sector and the real demand for public services. For instance in Denmark, since 2015 all the official documents from public administration can only be retrieved online: the paper versions do not exist anymore (Digst.dk, 2017). This has caused big troubles for the categories of citizens that were not familiar with IT (elderly people for example) and needed special training to access to simple functions, such as their tax return or their bank account.

## 1.2 Citizens willing to act

Since very often citizens' expectations are not met by the public authorities, it is possible to observe a lot of bottom up initiatives, aimed at solving urgent issues. People are organizing themselves, often finding innovative solutions. This happens through cooperative initiatives, peer-to-peer network, solidarity groups, which are self organized and use their own problem solving capabilities. For example, while the Danish government imposes border controls, the voluntary association Venligboerne is already proposing several hospitality initiatives to tackle in a completely different way the migration issue. The informal groups have spread in over hundred cities in Denmark (Venligboerne, 2017). The citizens attitude to find autonomous forms of organization requires what Ezio Manzini calls "diffuse design", i.e. a form of design that happens by itself, without the need for designers, generated by somebody who spontaneously create something that was not expected (local discontinuity) for the sake of tackling the everyday problems that they face. These bottom-up initiatives propose new ways of living that are more sustainable far from the mainstream ones (Manzini, 2015).

## 2. The challenges

When discussing the relevance of design contribution to social innovation, Nicola Morelli and Amalia de Götzen propose that the design actions are structured on three different levels (see fig. 1). Value in use, Infrastructure and Governance (Morelli and de Götzen, 2016).

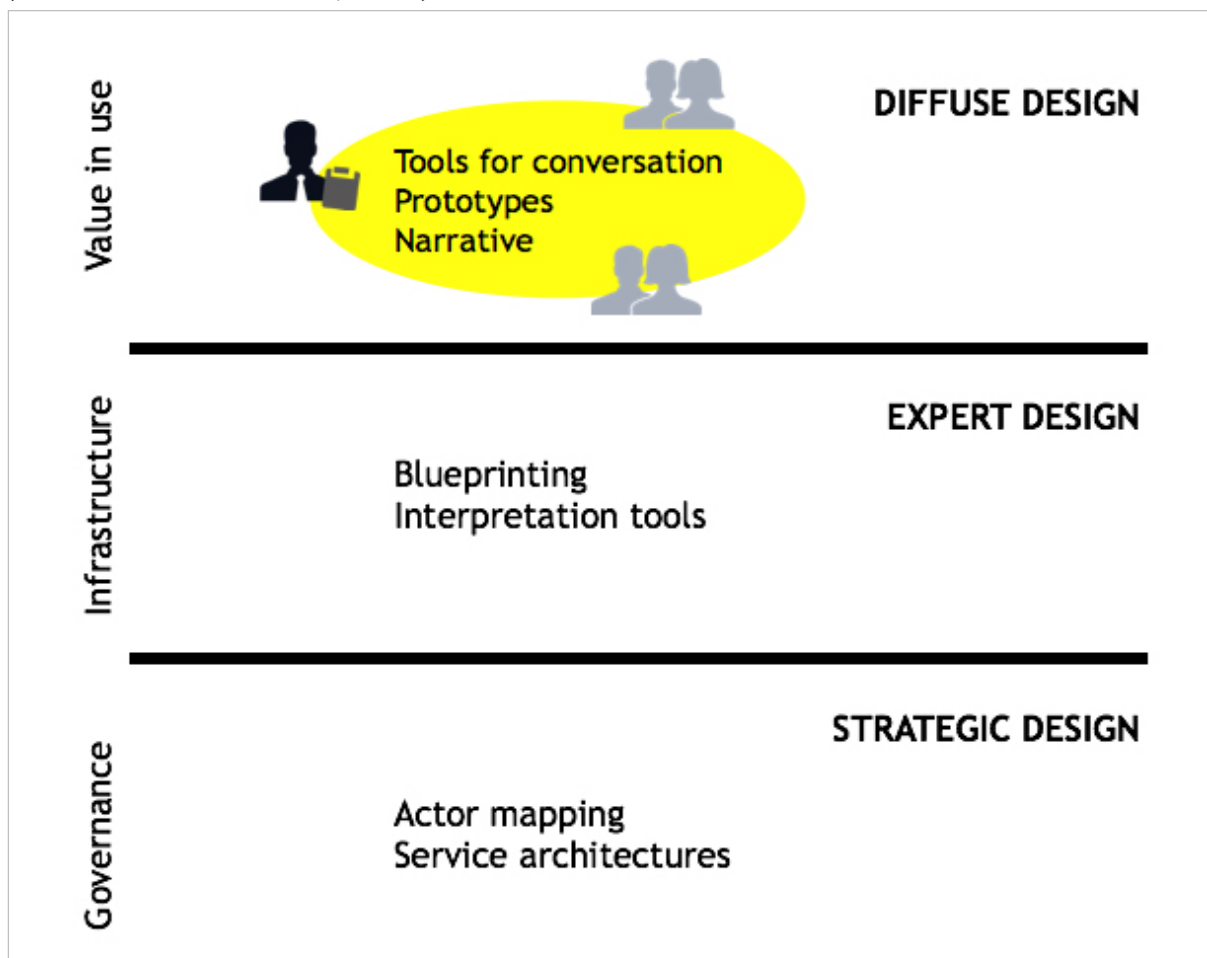


Figure 1. Level of design actions. Source (Morelli, De Götzen, 2016).

The challenge for trained designers in the first level *Value in use* is to verify the relevance of their role even in the context of diffuse design, where they are not supposed to control the design process. Are “expert designers” competence needed at this level? What co-design tools could be built to support these processes?

On the *Infrastructure* level, there is no doubt that professional skills of designers are still relevant when designing the infrastructures, i.e. services to support social changes. This is the opportunity for designers to contribute to a new generation of public services, that incorporates and support social change. How might we design these platforms that could support interactions between citizens and other relevant stakeholders?

Finally, in relation to the Governance level, it is extremely important, in this moment of change, that designers build professional capabilities and skills to create or influence an innovation framework that facilitates innovation in public administration. This means that designers should be able to work at the governance/policy level, creating aggregation opportunities for ecosystems of relevant stakeholders for public innovation (e.g. technical experts, political experts, relevant social groups, citizens, etc). How might designers build innovation/design/creative capacity into public organizations?

### 3. The case: The Open4Citizens project

The Open4Citizens project (O4C) is an European project under the Horizon 2020 Program running from 2015 to 2017 driven by five city pilots in Denmark, Italy, Sweden, The Netherlands and Spain (Morelli et al., 2017). The teams behind the pilots are constituted of design researchers, designers, anthropologists, data specialists, etc.

An increasing amount of data is being produced as a result of the advancement of technology (such as sensors and social media). A large part of such data are publicly available and are now representing a new resource. The potential of this resource has been sized by few companies, whereas open data could be the ground for a new generation of public services. One of the condition for this to happen is that citizens become aware of this potential and learn how to use it.

The project aims at empowering citizens to make meaningful use of open data through the creation of co-design tools and the design and facilitation of hackathons. The goal of the hackathon is to support citizens’ problem solving capabilities (referring to the level of diffuse design) in a dialogue with IT experts and public authorities that own different knowledge. The hackathon is therefore a common playground to experiment and co-create with open data.

#### 3.1 Co-design tool

One of the tools developed is the “starter kit”; a collection of methods that help participants to make sense of data in a creative way. From inspiration to implementation, the “starter kit” is one of the possible tools designers are introducing to give a structure to the co-creation process (Open4citizens.eu, 2017), thus supporting citizens’ design and problem solving capabilities.



Figure 2. Participants using the “inspiration cards” as well as the “thought cards” at the first cycle hackathon in Copenhagen (Hack integration, 7th to 9th of October 2016). Source (open4citizens.eu).

## 3.2 Infrastructuring

The O4C project is aiming at generating to consolidate a structure for citizens participation and co-creation. To this purpose, the design team is promoting a series of hackathon events that are not only open to IT experts (as for the most common hackathon) but also to citizens. Moreover the project is planning the development of physical places (OpenDataLabs) and a virtual platform (opendatalab.eu) that will support citizens involvement even after the end of the research project. The competences involved in the creation of such infrastructure are the typical service design competences. Designers are working with scenarios, journeys, blueprinting and use cases to elicit the requirements of the new services.

## 3.3 Strategy

What is happening before the hackathon is also important to define the relevance of design action. The designers define a theme for the challenge and choose the relevant stakeholders who could take part in the event. By that they define a framework for innovation. This is where the strategic function of the designer lies (the level of governance). The first cycle of hackathons showed that the success of the hackathon highly depends on the capability of the designer to aggregate the right ecosystem of stakeholders and relevant open data around common challenges.

## 4. Conclusion

This paper has described a number of challenges that will be explored in this PhD-study. From building co-design tools and set-ups that support citizens participation into the design of public services to building infrastructures and defining an ecosystem that can support the scalability of services informed by the citizens needs.

The Open4Citizens case has its own limits, the aggregation of citizens did not happen spontaneously but was provoked by the O4C team. However this project is suggesting an approach for designers to provide relevant contribution at different levels from supporting citizens spontaneous initiatives to the definition of broader frameworks.

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# Designing the Social

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**Abstract:** As a PhD researcher at Minerva Art Academy, Groningen, I conduct research into how artists and designers, based on their potential, can contribute to a social context. In my role as a teacher at Minerva Art Academy I intend to gain insights into the processes and possible new practices of social designers in social contexts, by designing a didactic setting in which students can work and learn, in collaboration with an environment outside the academy.

**Keywords:** Social design, learning environment, didactic setting as a research method

As a PhD researcher at Minerva Art Academy, Groningen, I conduct research into how artists and designers, based on their potential, can contribute to a social context. Especially in a society as a global world in which social and physical boundaries are disappearing, as described by Polish sociologist Zygmunt Bauman. As a result of this, according to Bauman, we are currently living in a liquid phase of modernity, a situation in which lives have a fragmentary nature: “both political history and individual lives are split up into a series of short term projects.” (Bauman, 2012, p.15-17) In various places in this liquid society, in which social structures have become fragmented, governments withdraw from social institutions and free market systems have resulted in little or no supervision over private initiatives, grey areas came into existent. These grey areas make clear how fixed roles are no longer tenable, because the underlying social structure no longer exists. Tasks such as healthcare, which used to be the responsibility of governments, are now in the hands of private initiatives in non-coherent communities.

The grey areas are the result of wicked problems, such as demographic shrinkage and individualization, where there is not a single person who can be held responsible for solving the problem. From their autonomous position as outsiders, artists and designers are ideally placed to offer new perspectives on social problems through their artistic practices, and by doing so they can make communities more meaningful. Social designers cannot offer solutions to problems such as loneliness, but by shining a different light on it and by initiating different kinds of conversations, they can actuate the problem and change attitudes, and so contribute to a larger process of change. Stakeholders are participants in this process, and they play an active role in how people view and think about their own social actions. This makes the work of artists and designers both process-based and participative.

In my role as a teacher at Minerva Art Academy I intend to gain insights into the processes and possible new practices of social designers in social grey areas, by designing a didactic setting in which students can work and learn, in collaboration with an environment outside the academy. This will also allow me to research how we can prepare students for a world in transition, so they can have a meaningful role in the liquid society in which they live, not only after they graduate, but also while they are still studying within the walls of the academy. But how do you train people to be social designers in a conservative institution such as an art academy which has not changed as quickly as the world in which it operates? As Roel Klaassen wrote in *'Pleidooi voor Polyphony'*, what often happens is that students are educated in ways which hark back to times in which 'the teachers of the teachers were trained'. (Klaassen, 2012, p29)

It may not be easy for the academy as an institution to adapt to a modern society in transition, but by allowing students to learn and work outside the academy, they can be trained according to a model which complies with how the practice is currently developing.

What is happening very slowly at Minerva Art Academy now is that individual students from various courses are working on discovering their added value in a social environment. At the same time elective courses are being developed in which groups of students can work in social environments for a certain period of time.

In the modules I set up for the course of my research, I have created learning environments, in which students develop their artistic practice in interaction with those involved in the social context. The first case with which I started my PhD research was based on the outcomes of two courses I gave in the academic year of 2015-2016. One took place in a traditional care home in Zuidhorn (Zonnehuis Oostergast), the other in a care home in Kloosterburen, a village in the northern part of Groningen, where inhabitants were on the verge of buying the local care home. The aim of both courses was that students would find their role in the environment they were situated in and to create a dialogue with the given social context. There were interesting encounters between the students, villagers, nursing staff, and inhabitants of the care homes. Students developed inspiring concepts, but lacked the independence to build their own networks, start up a design process, and make the project their own and learn from it as a group. This made me wonder how I could turn the students' passive attitude into a more active attitude in which they would take responsibility for the actions they take within the social environment they are temporarily working in. How much freedom, or how many tools do the students need in order to become proactive and still function as a group? How much information and what kind of information is needed for the students to allow them to function in a situation that is unfamiliar to them as designers? Would it more be useful, for example, to provide individual methodologies to individual students, or to offer the group a variety of methodologies so they can choose themselves?

These were the questions I used in the first case of my PhD research, which took place in a small village (approx. 70 inhabitants) in Groningen nearby the Dutch-German border: Hongerige Wolf, the first semester of the academic year 2016-2017. Here we started to work with a project of artist/social designer Peik Suyling: a bakery. Figure 1. It's a bakery on wheels, a road-building shack with a real wood-fired clay oven in it, maintained and run by the villagers of Hongerige Wolf and residents from the surrounding villages. A core group of locals and initiators/artists Peik Suyling and psychologist Sander van der Ham pull the bakery

from village to village with a tractor, bake bread, and in doing so create a dialogue with its surroundings. They invited us, Minerva students, to step into this process.

The goal and assignment of this course was to create a dialogue with the social context of Hongerige Wolf. With the bakery as the point of departure and functioning as a catalyst, the creative practices of the students had to function as the main tool in establishing relationships with locals, based on equality. While knitting, photographing, building or drawing (anything was possible), students had to find a way to contribute to the programming of the “Bakkerij de Eenvoud Hongerige Wolf e.o.”. Students could instigate (inter)actions, organize events, develop a product etc.

In order to make this happen, the whole course took place in and around the bakery in Hongerige Wolf. We went there on Fridays, about twice each month, from September till February. On the days we visited Hongerige Wolf we tried to immerse ourselves in the village. Peik baked bread in the bakery and through the network he already built up, the students got to know the villagers who were involved with the bakery very quickly. The meetings they had in the bakery led to many encounters in the village and homes of residents. This approach in creating the didactic setting, but also the role I take on as a researcher, resembles the term *dwelling perspective* that anthropologist Tim Ingold refers to in his book ‘the perception of the environment, essays on livelihood, dwelling and skill’. He explains it as:

“a perspective that treats the immersion of the organism-person in an environment or lifeworld as an inescapable condition of existence. From this perspective, the world continually comes into being around the inhabitant, and its manifold constituents take on significance through their incorporation into a regular pattern of life activity.” (Ingold, 2002, p. 153)

As a teacher and a researcher I used the dwelling perspective to create a setting that enabled the students to dwell in the community of Hongerige Wolf. This didactic setting had a few important characteristics: it was informal, open, with a lot of freedom for the students to pick any angle they wished to work from, there wasn’t a strict methodological framework the students had to use, and the small interdisciplinary group of students that enrolled in the course were unprepared in almost every aspect and had very little knowledge of social design and art. Considering the heterogeneity of the group of students, the open assignment and the open character of the context in which the course took place, it might seem obvious to give the students guidance by creating for instance a day to day program, or to start with a workshop on how to analyse the social context. Partly because of the experience I gained with the course in Zuidhorn I decided to start completely open, without a planned and recognizable didactic method, and to find out during or after the course what kind of structure is needed. With this approach I wanted the students to take responsibility for their own actions and the things they put into operation, instead of trying to meet my expectations. They shouldn’t be able to hide behind the role they play as a student (hunting for credits), but instead become intrinsically motivated to act as a human being, a citizen like the inhabitants of Hongerige Wolf, to find the questions and issues to work with in this community. The dwelling perspective helped the students discover meaningful patterns within the social context, incorporate them into their artistic practice and by doing so create more meaningful connections and new perspectives on the roles people have in Hongerige Wolf.

Although I didn’t use a well-structured methodological program, structure or didactic guidance weren’t completely absent either. The guidance I offered was

subtle and most of the time invisible to the students. The custom-made, informal and very personal approach matched the dwelling perspective; to immerse myself in the didactic setting as well as the social context, I saw the same things the students did, took part in the same conversations and had partly the same observations. However, because of my different position, role, and knowledge, I could make the students aware of the opportunities that appeared and help them to connect their artistic practice to the meaningful patterns they discovered. By avoiding a hierarchical structure, and instead coaching the students and working together with them, I created an atmosphere in which a positive group dynamic resulted in commitment to the aim of the course. Not only the students were committed to the course, but also the residents became actively involved with the actions the students initiated. For instance two students developed a dialogic card game, with information they gathered in Hongerige Wolf, and played it with some involved residents. Playing the game opened up new ways of discussing the role and position the villagers have in their community. The participants felt ownership over the game, and continued playing it after the students ended the course, even with people from surrounding villages. This way the dwelling perspective led to acting and acting led to participation.

In order to understand more of what exactly happened during this course and why it was largely a success, I'm looking further into the different layers of participation, the role of the bakery as a catalyst for conversations and the students' interventions, the links with artistic research, in my PhD research as well as the research of the students and the course as a project. I will investigate these elements further in the coming years of my PhD research.



Figure 1. The bakery: Bakkerij de Eenvoud Hongerige Wolf en Omstreken.



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# How do We Redo Design for Play? – With a Child-Centred Mind-Set

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## **Abstract:**

Designers in play designing companies do not involve children as much as they would like to, and most of the time it happens only in the test phase. They don't know how to involve children and they don't know where to find the knowledge, tools or methods to do it. This paper introduces a PhD project that is planning to redo the way we design for play, with a more child-centred mind-set. It shows how we can combine a tool kit of co-creation methods with a more child-centred 'Be In It Together' approach, while specifically targeting play designers in the front-end process in practice. The aim of redo design for play with a more child-centred mind-set is to be able to take on the child's perspective and learn when and how to involve children as a way to design better play experiences for children in the future.

**Keywords:** Design for play, child-centred, co-creation, mind-set, toolkit

## 1. Why – do we need to redo design for play?

A survey of a number of Danish play companies has shown that most of them want to involve children in their development processes, but very few of them actually do it (HUB for Design & Play, 2013). The most common approach is that children are helping to test the product when it has reached the prototype stage, or that the children are only invited in when pictures are going to be taken for the product catalogue. The study and subsequent initiatives have revealed that there are several reasons why children do not get more involved or why it does not happen earlier in the process (Play User Lab, 2016).

Many of the companies would really like to prioritise the involvement of children but are not sure how to do it. In many cases their experience with using common research tools such as questionnaires and user surveys has not worked with children and the expected outcome never materialised. They therefore demand practical approaches which may help them in their efforts to involve children in the development process. Previously there was no opportunity to take courses or otherwise be educated or trained in this field. At present, there are no trained designers specialising in children and play that can be employed to solve such

problems. Hence companies have had to fend for themselves in order to figure out how to involve the children – and in most cases the result has been that no initiatives have been taken whatsoever (HUB for Design & Play, 2013; Play User Lab, 2016).

Those of the companies that manage to involve children tend to do it late in the design process, where there is a more or less finished product they can test. They justify that by claiming that their product / idea should be finished to an extent that children can actually try it out and provide concrete and useful feedback to the designers. The challenge is, however, that if at some point, it turns out that the product is not working properly, that children are not interested in it as expected or that the product somehow does not live up to expectations, this realisation comes very late in the development process. It may mean that the designers have to go back and spend time changing the design, or, in a worst-case scenario, the product will have to be discarded altogether and the design has to start all over. It is costly for businesses and wastes time that could have been better spent. Early involvement of children could have helped to identify challenges earlier in the process, or perhaps resulted in the development of a completely different and more relevant design idea (Druin, 1998).

In this context one can also question whether it is possible to create innovative and relevant products without any contemporary inspiration from and updated knowledge about the target group and its life (Sanders, 2014). This also raises the question of how early in the process the children should be involved; or rather how early the designer should be involved in the children's lives – and how.

## 2. How – do we redo design for play?

The objective of the PhD project 'Child-Centred Design for Play' is to develop, test and evaluate how tools and methods for co-creation with children can introduce businesses to a more child-centred approach. The project will create a framework where designers can spend time with children and thus have the opportunity to experience what the children have to offer at the beginning of the process; that children are experts when it comes to their own lives and play, and that they possess something valuable that we adults do not possess and will never possess (again) – a natural child's perspective. The hypothesis is that designers will develop a more child-centred mind-set and that will enable them to adopt a child's perspective when designing for play.

The development of a specific tool-kit, grounded in research-based methods, will enhance the designers' ability to engage in the life and play of children. Furthermore, it will include the development of a workshop format and a related manual with directions and guidelines to implement the described activities. An evaluation procedure before and after the workshops, will make it possible to study the similarities and the differences, strengths and weaknesses, as well as challenges and opportunities regarding the use of the tools and methods in the workshop format. The mentioned elements will be elaborated further on in the next paragraphs.



*Figure 1. Co-creation between designer and children in Play User Lab, Capital of Children A/S, by Maria Tuxen Hedegaard*

### 3. What - do we need to redo design for the play?

The tool-kit will consist of hands-on tools with simple, practical instructions and visual guidelines. A tool will be a concrete approach to gathering knowledge and inspiration and will identify needs and/or provide direction, which will be part of the foundation that is needed in order to get started creating and designing a good play experience for children. The tools will provide the companies with what they lack and demand: a process they can use that works with children.

The tools will be presented with an easy to understand introduction to the method and the reasons behind it, as well as the potential value and expected outcome. The actual method will be rooted in research-based knowledge, and it will be possible to dive deeper, if it makes sense to elaborate on this part of the understanding. The description of the method will also provide greater coherence with the process and what is required before and after the use of the tool in order to achieve its full potential and value (Bekker, 2014).

The introduction of the tools and the methods will be integrated into a 2-4-day intensive workshop where designers/employees from play design companies immerse themselves in child involvement - in a closely integrated combination of theory and practice. Since the corporations' challenge involving children is most evident at the beginning of the development process, the tools will primarily apply to pre-project activities. This phase is also called the Fuzzy Front End (Koen, 2016) or front end innovation, where opportunities to create new products are explored via for example investigation and identification of existing products (Liedtka, 2011).

In the 'Be In It Together'-approach (BIIT) by Edith Ackermann (2013), it is about "getting at the essence of things, revealing the 'true' nature of the self, of an object or an event" (Ackermann, *Cultures of Creativity and Modes of Appropriation*, p. 4). The transition from the companies' existing 'do-it-yourself' (DIY) approach to a more 'do-it-together' (DIT) approach will in the workshop be facilitated through a 'try-it-yourself' (TIY) and the 'be-in-it-together' (BIIT) approach. In the classic DIY approach, it is the designer who, with his knowledge, background and experience, develops the product; in the DIT approach on the other hand it is something you do together, and in this context, together with the children. In the TIY approach it is not sufficient to read about something, observe others or describe what you see – you have to try it yourself. For example, it may be to play with the products you have helped to design, test other people's products by playing on a playground, playing computer games or building with LEGO blocks. The essence is to allow yourself to experience the feeling of exuberance you can get when playing. One question may be whether it is even possible to design play, if you do not know how to play?

Through the BIIT approach by Ackermann designers are playing with the children, on the children's terms. Here the kids are the experts at being children and at playing, and the goal is for the designer to indulge in the play by being part of it. At the same time the designers will try to understand what is happening, why it is happening and how it is happening. They involve themselves in the children's lives and thereby experience why play is so important for children, for that is this specific experience they have to design for. It is also that insight that enables the designers to argue how valuable it is to include the children's perspective. And it is necessary in order to be able to apply a DIT approach, where 'do-it-together' – or maybe 'design-it-together' (DIT) – makes children co-designers in a co-creation process.

## 4. With a child-centred mind-set

This paper describes how the PhD project 'Child-Centred Design for Play' will try to address the companies' lack of knowledge, tools, methods and approaches for involving children more and at an earlier stage in the development process of the design of play. The emphasis will not only be on the involvement of children, but also on the involvement of the designers in the children's lives and play. It will examine whether this BIIT experience helps the designer acquire an understanding of what is at stake for the children and how important play is for children, and furthermore whether that insight facilitates the development of a child-centred mind-set, where the child's perspective becomes an integral part of the design thinking, irrespective of whether the development process is in its initial stages or close to completion.

The next three years of research will demonstrate whether it is possible, through the activities described above, to develop a child-centred mind-set and redo design for play.

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# REDOing the Museum Exhibition Design

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**Abstract:** This short paper is a research note on a PhD project about *Design and evaluation of experiences as a means of learning in a museum context*. The purpose of the project is to explore and test how we can REDO the museum exhibition design through experience design. The museum's classic role as an information and knowledge institution is being challenged by the experience economy. The methodological construction of the PhD project is based on research through design, which sets the scene for three main experiments in *the lab, the field and the showroom*.

**Keywords:** Museum, exhibition design, experience design, learning, research through design (RtD)

## 1. Outline of Research

Danish museums are being challenged by the experience economy, which puts them in competition with attractions e.g. amusement parks and zoos that use experiences as a strategic tool. Users are looking for experiences that are interactive and engaging in comparison to passive experiences such as looking at objects in exhibition cases. This development strains the museums between their obligations as cultural institution and being an experience attraction (Skot-Hansen, 2008). This means that the museum needs to re-evaluate their classic role as an information and knowledge institution and find ways to enhance their experience potential, but still maintain their authenticity and credibility (Skot-Hansen, 2008).

This change in focus is visible in newer museum exhibitions like at Moesgaard Museum. The exhibitions at Moesgaard Museum is an example of a holistic exhibition design, which integrates both design, architecture, digital technologies and game-elements to enhance the user and learning experience (Madsen & Laursen, 2015). What makes Moesgaard Museum different from other museums in Denmark is that their exhibitions are designed by an in-house exhibition design studio. This design studio is a collaboration between set designers, user experience designers, archaeologist, photographers and game designers (Madsen & Laursen, 2015). But there is still some research on the effect and potential of

these types of exhibitions and the effect of combining the different design skills in developing exhibition design.

The outlook to the user's higher demands for experiences in museums and the still missing research of the effect of newer design based exhibitions, has created the foundation for the national research and development project called *Our Museum* (Vores Museum, 2017; 2014). This project is a collaboration between five universities (AAU, SDU, AU, RUC and KU) and eight museums. The goal of *Our Museum* is to contribute to the theoretical, empirical and practical development of museums' communication and design. This goal is achieved by analysing four different historical areas of Danish museum communication and by designing and evaluating seven communication design projects. This research note represents one of the seven design and evaluation PhD projects and is a collaboration between *Aalborg University* and *Limfjordsmuseum*. The goal of this PhD thesis is to explore and test how we can REDO the museum exhibition design through experience design; to enhance the future museum experience and communication but still maintaining the learning potential.

## 2. Theoretical Foundation

To explore and test how we can REDO the museum exhibition design through experience design I will work in iterative processes between literature studies, practical design interventions at the museum and evaluation of user experience with a *research through design* approach. The expected outcome of this PhD project's research is a tested theoretical design guideline for redesigning the museum experience and an exhibition design concept for the Limfjordsmuseum. The research in the thesis is focused on the intersection of the theoretical tradition of experience design, the 'participatory museum' and learning from which the theoretical design guideline will be defined.

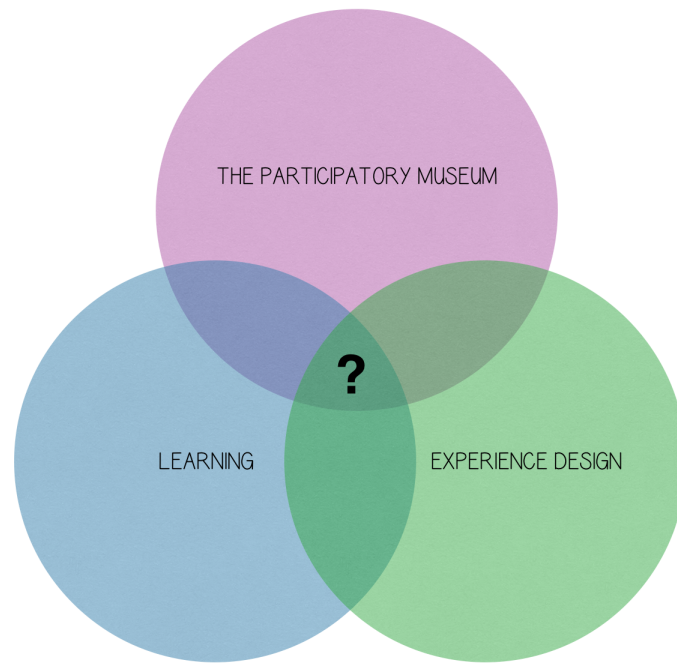


Figure 1. This Venn Diagram (Veen, 1880) illustrates the three main theoretical traditions of the PhD project. The pink bobble represents “The Participatory Museum”, the blue bobble represents “Learning” and the green bobble represents “Experience Design”. In the middle where all three traditions intersect, there is a question mark, which indicates the area where the academic contribution of this research project will be placed.

The main purpose of the PhD project is to look at how we can REDO the museum exhibition design. There is a lot of different literature about museums and museum experiences (Falk, & Dierking, 2013), but one area that is of particular relevance is the participatory museum. As mentioned in *Outline of the Project* the users are demanding more interactive experiences. The museum literature represented in the design guideline will focus on the participatory museum (Simon, 2010). This literature describes how to increase the user’s interaction through participation in the museum and thereby increase the experience. This theoretical tradition is relevant to figure out what works and what does not work in the museum context.

In continuation of the participatory museum, the PhD project seeks to explore how we can REDO the museum experience through *experience design*. Therefore, the second theoretical tradition that I will look into is *experience design*. Experience design as a design tradition is user-centred and seeks to enhance the user experience and optimize the experience potential in a context (Jensen, 2013). Experience design is a multidisciplinary design tradition that combines design elements from different traditions such as aesthetics, flow, user experience etc. Moreover, experience design has a broad application possibility, which makes it relevant for creating the theoretical design guideline for REDOing the museum experience.

Lastly, the PhD project looks at the theoretical tradition around learning to explore how we can maintain or create a learning potential in recreating the museum experience. Because of the broad theoretical tradition within learning (Illeris, 2000), the research will look to theory on informal learning experiences in museums (Hein, 2002), especially focusing on aesthetic learning and the potential of learning through serendipity (Dirksen, 2015) in the exhibition design. So looking back at figure 1, the learning bobble’s intersection with experience design and the participatory museums, is where we find the aspects of the museums experience

that is connected to learning; and thereby defines which types of learning that actually occur in the user's interaction with a museum exhibition. By adding learning theory as a central part of recreating the museum experience we can optimize the learning potential in the future museum experience. Thereby we also preserve one of the museum's utmost central objectives, which is to inform the public (Retsinformation, 2016).

As earlier stated the theoretical design guideline will be created based on these three traditions and if we once again take a look at figure 1, the design guideline will be placed within the intersection of all three theoretical traditions where the question mark is placed. This design guideline will create the guideline for developing museum exhibition design that optimises the user experience and learning potential in museums. But since it is at its first iteration, it is purely theoretical. Therefore, I will be testing its functionality and validity through further iterations with different design experiments at the Limfjordsmuseum. To create the optimal research design for this type of research I will, as previously stated, be using *research through design*.

### 3. Research Design

The PhD project research is based in the field of experience design, where it has been a tradition to work with design research (Collins, Joseph & Bielaczyc, 2004). By applying *research through design* as the foundation for this research design, I meet the methodology traditions of the research field. To frame the research design of the PhD project I use Koskinen, Zimmerman, Binder, Redström and Wensveen's (2011) approach to RtD, because they focus on the creation of understanding and knowledge through the construction of design. Koskinen et al. (2011) argue that we can create knowledge by planning the design process, by producing the theoretical argumentation for the design and through the use of the design.

Koskinen et al.'s (2011) approach to *research through design* creates the optimal conditions for working in an iterative process because it shifts between the theoretical development of the design guideline, creation of prototypes in the "Lab" (Koskinen et al., 2011), practical design interventions as well as experiments at the museum and the evaluation of user experience and the functionality of the design guideline.

### 4. The Experiment in the Project

On the basis of Koskinen et al.'s (2011) approach to *research through design*, the experiments in the project can be divided into three major experiments: *The Lab*, *The Field* and *The Showroom*. *The Lab* experiment will revolve around the theoretical creation of the design guideline, thereby the production of the theoretical argumentation for the designs. But also the design and prototype development for *the field* experiment. Furthermore, in an iterative process, *the lab* is a part of the design process that will be re-visited after *the field* and *the showroom* experiments to evaluate the design concepts and data collected by using and testing both the design guideline and the prototypes. The iterative process is applied to improve both the theoretical based design guideline and design concepts to become the best possible within the frame of the research project.

*The Field* experiment will test the prototypes created on the basis of the design guideline in their appropriate context at the Limfjordsmuseum. The purpose of *the field* experiment is to test how the design concepts created in the lab actually function in their proper setting, how the users interact with them and whether they are fulfilling their purpose as intended. In the field experiment, I will conduct different types of qualitative test with the museum's users to evaluate the design concepts. For example, I will use focus groups to test the design concepts before conducting workshops or interviews with the focus groups to hear about their experiences with the designs in the museum context. As mentioned in regards to *the lab*, the outcome of the field experiment will contribute to the re-evaluation of the design guideline and the design concept before the final experiment, *the showroom*.

*The Showroom* experiment will be conducted as the field experiment. But the difference of the showroom experiment is that instead of testing prototypes I will be testing a new exhibition design at the Limfjordsmuseum, that will be designed on the basis of the design guideline and the tests conducted in *the lab* and *the field* experiments. The purpose of *the showroom* experiment is to test the overall user experience of the exhibition design especially focusing on the aesthetic experience. As with *the field* experiment, I will conduct different types of qualitative test with the museum users, such as focus group workshops and interviews and observations, to evaluate the final design concept. Furthermore, as mentioned in *the lab* and *the field* the outcome of the showroom experiment will contribute to the final re-evaluating of the design guideline and the design concept.

## 5. Conclusion

This research note has presented the outline of the PhD project that explores how we can REDO the museum experience design to enhance the museum's experience and learning potential. This is achieved by creating a theoretical design guideline based on theory within experience design, participatory museum and learning. The guideline will be tested through design development and intervention experiments at the Limfjordsmuseum. Furthermore, the PhD project contributes to *Our Museum's* vision for improving the public's well-being by redesigning and rethinking the museum experience through experience design.

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# HealthBand: Campaigning for an Open and Ethical Internet of Things through an Applied Process of Design Fiction

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**Abstract:** This paper discusses the creation of a design fiction that seeks to embody a *spime* – a near future, Internet-connected and ‘open’ manufactured object. *HealthBand* is a fictional open-source wearable device born in a future where public healthcare has become increasingly privatised. Social equity and citizen empowerment sit at the forefront of its design – the product is the culmination of crowd-sourced expertise and production capital. We contextualise the fictional device in relation to current proprietary Internet of Things products, democratised and open technological practices like the *Maker Movement*, and two previously identified design criteria for spimes – *synchronicity* and *wrangling*. We assert that the fiction can help to further establish spimes as a useful rhetorical lens through which product designers can speculate upon more socially responsible and ethical technological product futures that offer plausible alternatives to the homogenised, unsustainable and profit driven product design cultures of today.

**Keywords:** Spimes, social innovation, internet of things, design fiction, research through design

## 1. Introduction

The past decade has witnessed a growing interest in a corollary of ubiquitous computing, the so-called *Internet of Things* (IoT). Coined in 2004 by Gershenfeld et al, the term is increasingly being used to denote a class of everyday objects (Figure 1) whose material elements are augmented by digital capabilities such as embedded software and connectivity through wireless Internet, global positioning (GPS) and radio-frequency identification (RFID) (Coulton et al, 2014). One product sector to experience much IoT development is wearable devices such as fitness trackers and health monitors (Figure 2). ‘Always on’ and able to monitor the user’s current context, such products can be attached to clothing or worn in direct

contact with parts of the body. Wearables display real-time data whilst sharing information with other connected devices (Rhodes, 1997; Mann, 1997).



Figure 1. Clockwise from top left to bottom left – The Pebble Watch (2013), iRobot Roomba Vacuum Cleaner (2002), Nazbazztag Rabbit toy (2006) and Nest Smart Thermostat (2011) are often cited as some of the first IoT products to find mainstream popularity amongst consumers.

Most current wearable devices are proprietary in nature, that is, they are designed and manufactured en masse by centralised, corporate brands. Moreover, they are ‘closed’ in that they offer no scope for user augmentation such as customization, maintenance or the capacity for upgrades. This paper discusses the creation of a design fiction prototype called *HealthBand* that seeks to embody a *spime* – a near future, connected and ‘open’ manufactured object. In contrast to today’s proprietary wearables, a spime-based paradigm would be built on more distributed and socially equitable design-innovation activities. Accordingly, *HealthBand* is presented as an open-source wearable health device – the culmination of crowd-sourced expertise and crowd-funded production capital. By extrapolating the present trend for *quantified self* wearable devices alongside the nascent field of *digital health*, the fiction seeks to both highlight and question the role that emerging social innovation practices and technologies could potentially play in the creation of more open and ethical connected products.

## 2. Opening Up The IoT

The increasing accessibility of digital technology is beginning to afford individuals and communities the freedom to innovate new products without intervention from conventional corporate stakeholders or industrial scale processes. From physical products created using rapid fabrication tools like CAD and 3D printing, to digital

internet based apps and services, this 'open sector' is said to be challenging the established norms of centralised, profit driven design culture (Green, 2007, Anderson, 2012).



Figure 2. Examples of popular fitness and activity trackers. Clockwise top left to bottom left - the Jawbone UP wristband (2011), Fitbit Zip wearable clip (2012), Microsoft Band (2014) and Garmin 35 running monitor (2016).

The term democratised innovation (DI) (von Hippel, 2005) is being used to denote the practice of products and services being developed by the same people who ultimately use them. DI cultures like the Maker Movement, 'hacking', Fab labs and open hardware and software development, see people share knowledge and expertise to design and build bespoke Internet-connected objects (McEwen and Cassimally, 2013). Von Hippel calls people who personally innovate lead users. He posits that enjoyment gained from the creative process itself – learning and problem solving – is a prime motivator for lead users.

Within traditional proprietary innovation models, designers and manufacturers exploit internal assets and intelligence to develop standardised, 'closed' products. In DI's case, knowledge, resources and technologies are diffused quickly, efficiently and, more often than not, freely through networks of online and offline communities. This collaborative activity results in products which directly benefit those who created them and frequently society at large (von Hippel, 2005).

DI differs from Chesbrough's (2003) open innovation concept as the latter places emphasis on the manufacturer. It sees producers collaborating with outside partners to share the costs and risks of product innovation. Yet the impetus for such design activity is not ethically or socially motivated, rather, it is concerned with profits, patents and intellectual property, which remain primarily with the corporate stakeholders.



## 3. Spimes

### 3.1 What Are Spimes?

Coining the term in 2004, the futurist Bruce Sterling initially envisioned *spimes* to be:

“material instantiations of an immaterial system... they are designed on screens, fabricated by digital means and precisely tracked through space and time throughout their earthly sojourn.” (Sterling, 2005, p.11).

Stead (2016) argues that the origins of spimes are *in the present* as they are likely to develop out of today’s product culture. As a result, spimes’ earliest ‘material instantiations’ would share some technological attributes with present day IoT devices. Such commonalities have led some to use *spimes* and the *IoT* interchangeably to denote an Internet-connected object. We contend that this is a fundamental misappropriation of Sterling’s term. In contrast to today’s ‘closed’ IoT products, a spime object’s design would be distinctly protean in character. Rather than “forever remaining the same... spimes would have the innate ability to transform and reflect changes in technology, cultural trends and peoples’ needs” (Stead, 2017, p.17).

Sterling (2005) also notes that prior to World War II, people had simpler, more linear relationships with their material things and they were more aware of the provenance of their objects. Such transparency became extremely muddled in the transition to our current technoculture where there is an overreliance on increasingly complex material extraction, manufacturing, supply chain and consumption infrastructures. In a spime-based future, people would have a direct hand in designing and manufacturing their objects and artefacts. To use Toffler’s (1980) term, they would be *prosumers* – both producers *and* consumers.

### 3.2 Spimes: A Design Fiction

Spimes are, in essence, “rhetorically futuristic... a category of imaginary object that is also an intervention in the present and... are ‘forward looking’ akin to the actually futuristic objects they create” (Hales, 2013, p.6). Whilst early spimes may come about through extrapolations and convergences of today’s technologies and creative practices, it is yet not possible to ‘actually’ design and manufacture a ‘spime’. Resultantly, Stead (2016, p.3) calls for the use of the speculative design methodology *design fiction* to help “envision potential near future worlds in which spime objects might exist as well as to explore the types of people-product relationships spimes may possibly facilitate.”

Like spimes, Sterling (2005) originated the term design fiction and has since defined this method as “the deliberate use of diegetic prototypes to suspend disbelief about change” (cited in Bosch, 2012, para.3). Here he is appropriating Kirby’s (2010) notion of ‘diegetic prototyping’ which denotes how a futuristic object or product might be rendered ‘material’ and fully functional in ‘diegesis’, in other words, as a ‘prop’ embedded in a fictional narrative environment or ‘storyworld’. As Tanenbaum (2011, para.5) states, the positioning of the designed object within a fictional frame is central to the method as it enables designers to “make an argument about a potential future by demonstrating that future in a context that a large public audience can understand.”

“Design fictions should therefore not be seen as an attempt to predict the future or design a specific product solution,” stresses Stead (2016, p.3), but more so as “a strategy for opening up inclusive debate about *how* and *why* futures are designed



and what they might mean.” Similarly, for Bleecker (2009) the aim of a design fiction is to create a discursive space in which the prototype is free of the constraints of normative commercial design practice and can challenge peoples’ insular and habituated perceptions and expectations of the role products and services play in their everyday life.

### 3.3 A Toaster For Life: A Spime Prototype

To help distinguish the spimes concept from today’s IoT products and reclaim the term from continued misappropriation, Stead (2017) puts forward several design criteria for near future spime objects. With the *Toaster For Life*, Stead sought to create a ‘diegetic prototype’ which embodies three of the criteria – ‘technology’, ‘sustainability’ and ‘temporality.’ The design (Figure 3) aims to represent an early material manifestation of a spime object; an Internet-connected physical product which possesses five innate sustainable attributes – the ability to be repaired, upgraded, customised, recycled and tracked throughout its lifecycle. In order to present the *Toaster For Life* as ‘actually futuristic,’ that is, materialised within a potential world in which it could plausibly exist, a realistic product launch catalogue was produced for the design.



Figure 3. The *Toaster For Life* is a diegetic prototype of a near future sustainable spime object. As with design fiction, the fictional product is presented to audiences within a plausible ‘context of use’ – in this case a product launch catalogue.

## 4. HealthBand

### 4.1 Exploring Two Design Criteria for Spimes

*HealthBand* is a design fiction prototype that explores another two of Stead's spine design criteria – *synchronicity* and *wrangling*. These criteria help to frame the spimes concept in relation to social innovation and ethically responsible design practices. Accordingly, we see the *HealthBand* diegetic prototype (Figure 4 and 5) as a means for creating debate regards the ways in which open and DI cultures might continue to disseminate, giving more people the opportunity to innovate and create their own personalized Internet-connected objects.

Stead (2017) maintains that presently, social innovation design practices and technologies like the Maker Movement, 'hacking' and open source hardware are niche activities and cannot be considered 'mainstream' approaches to the design and production of products. However, a broader dissemination of spine design activities might come about through *synchronicity*, that is, collective creativity and expertise. The notion of *synchronicity* is in many ways analogous to Rodgers' *diffusion of innovations* (1962) theory which, in simple terms, is the process by which an innovative idea or technology is communicated through different channels among society over time.

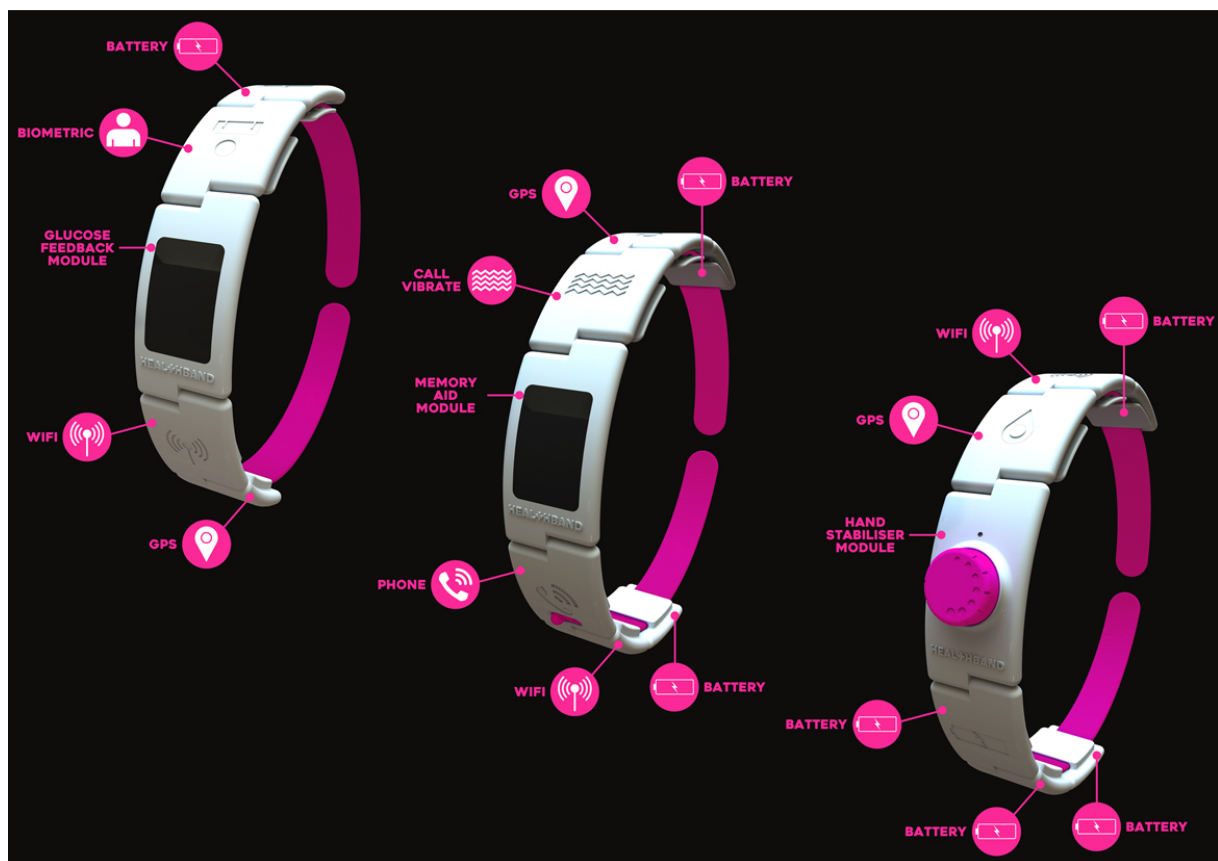


Figure 4. Within the *HealthBand* fiction, three designs for the wearable prototype already exist – a diabetes monitor, a dementia memory aid and a Parkinson's hand stabiliser.

Sterling (2005, p.22) stresses that “in a spine world, designers must design, not just for objects or for people, but for the techno-social interactions that unite people and objects.” He categorises those who design spimes and their interactions as *spime wranglers*. However, while Sterling places trained ‘designers’ at the centre of a spine-based paradigm, Stead (2017, p.19) contends that, “in a

synchronic society, the acts of creation and consumption would no longer be mutually exclusive [and] multitudes of people would be consuming the products that they themselves have had a hand in creating.” More open and distributed design-innovation practices and tools would no doubt enable people like Toffler’s *prosumers* (1980) and Von Hippel’s *lead users* (2005) to become fully-fledged *spime wranglers*.

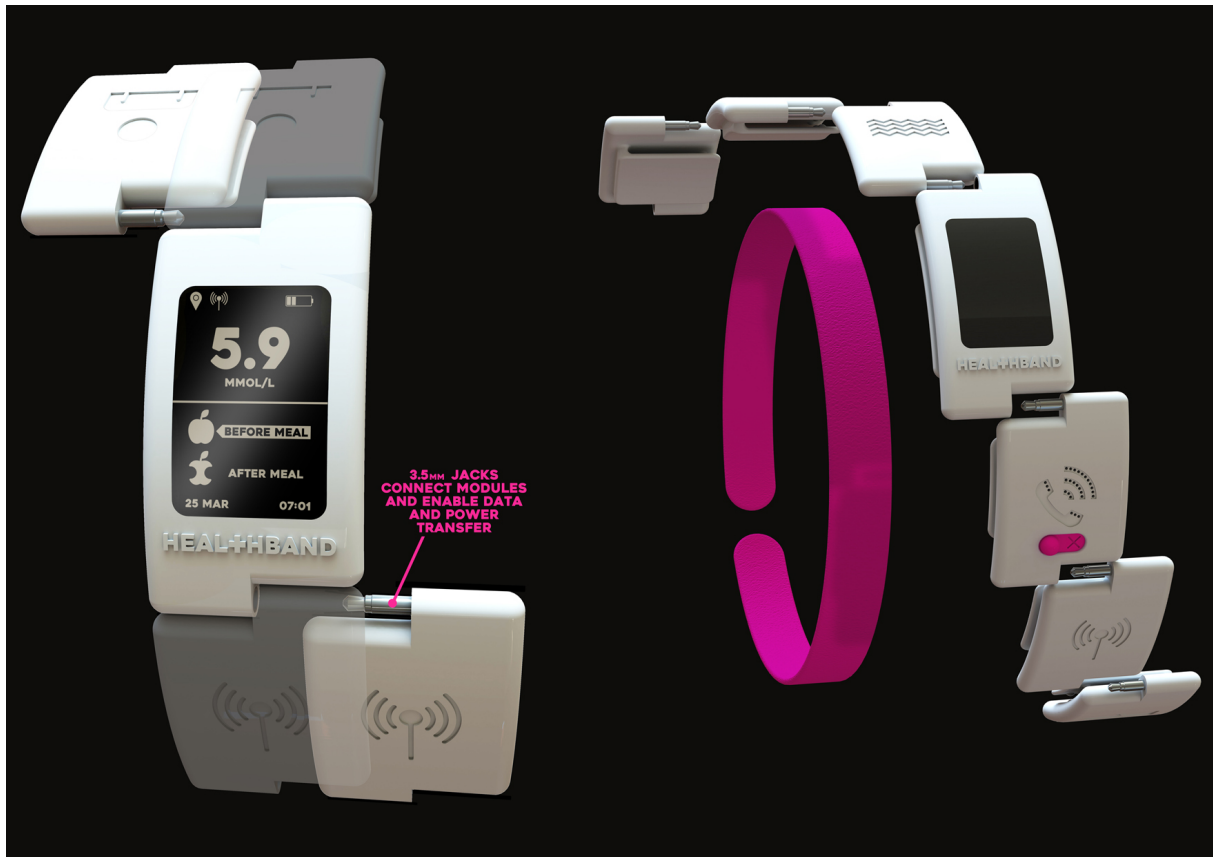


Figure 5. The HealthBand wearable's design is modular and open source enabling different parties to improve existing modules and/or develop new ones with alternate functionality.

## 4.2 The Campaign As A Fictional Frame

Figures 6 and 7 depict pages from the fictional digital campaign document for the *HealthBand* device. We assert that the campaign document acts as a 'situating device', rendering the *HealthBand* prototype as 'within diegesis' and begins to concretise a fictional world in which such a product could plausibly exist. The document explains the origins of and motivations behind the product and discusses the success of a crowd-funding campaign which funded the production of the first three bands – a diabetes monitor, a dementia memory aid and a hand stabiliser for Parkinson's disease. Each of the three models is presented in detail with the backstory of how and why each design was created. The document also details how people can become actively involved in developing the project further – by donating funds, creating new modules based on an open design template, or simply purchasing the device.

In essence, the *HealthBand* fiction offers a vision for a wholly democratized wearable health device. Born in a near future where public health services have become increasingly privatised, the product is an open source, Internet-connected wearable health product. Social equity and citizen empowerment sit at the forefront of its design as it can be regarded as a bottom up, 'do it yourself' netizen

led response to real-world health issues funded and manufactured through the 'wisdom of the crowd'. In our view, the *HealthBand* fiction helps to further establish spimes as not merely an extrapolation of current technologies but more so as a lens for envisioning how nascent democratised design-innovation practices might grow and potentially reshape industrial product design cultures over the coming years.



Figure 6. The campaign document explains the origins of and motivations behind the HealthBand device and discusses the success of a crowd-funding campaign which funded the production of the first three bands.



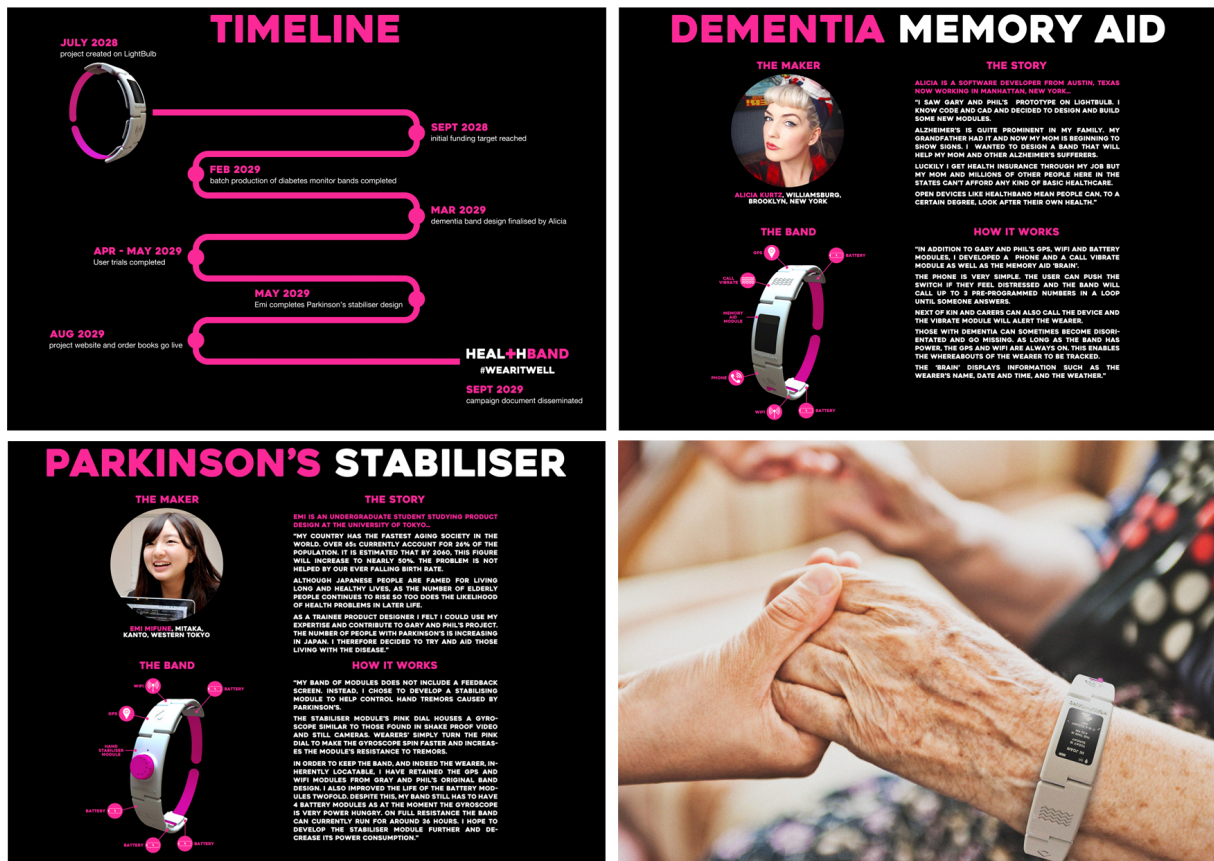


Figure 7. Several more pages from the campaign document.

## 5. Initial Conclusions

With this paper we have sought to help position spimes as a useful rhetorical lens through which industrial product designers can speculate upon more socially responsible and ethical technological product futures. Although fictional, we argue that the *HealthBand* prototype offers a plausible alternative to the homogenised, profit driven and unsustainable IoT products of today. Ultimately, the aim of our design fiction is to open up a 'discursive space' in which broad audiences can easily engage with the *HealthBand* concept and question the desirability, meanings, values and implications of the future world that it helps create. In doing so, the fiction seeks to subvert the envisioning practices undertaken by the commercial design field, whose primary aim is to sell products and not to question the societal impacts of such devices.

## 6. Future Work

Elaborating upon Frayling's (1993) *Research Through Design* methodology, Gaver describes manifestos as such:

"Typically, such manifestos will describe design practice to illustrate their approach, and borrow theories to justify it, but their primary function is to build an account of a practice to be pursued in the future." (Gaver, 2012, p.938).



We see the *HealthBand* prototype as one of a number design fiction projects that will culminate in a *Design Manifesto for a Sustainable, Ethical and Open Internet of Things*.

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# Understandings of the Concept of Iteration in Design-based Research

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## Abstract:

The paper is the first in a series of papers addressing design in Design-based research. The series looks into the question of how this research approach is connected to design. What happens when educational researchers adopt designerly ways of working? This paper provides an overview of design-based research and from there on discuss one key characteristic, namely iterations, which are fundamental to educational design research in relation to how designers operate and why. The paper concludes that in general iteration is not a particularly well-described aspect in the reporting of DBR-projects. Half of the articles are not directly concerned with this aspect and a forth barely mention it. When dealt with, iterations are most frequently understood as cycles of analysis in relation to testing out prototypes in longer periods of time. Refinements are applied retrospectively after thorough data analysis and usually after long periods of testing design solutions in practice.

**Keywords:** Design-based research, iteration, methodology, design theory

## 1. Introduction

Design is no longer limited to traditional areas of design but is finding its way into a whole array of disciplines as a stimulant or a strategy. This paper addresses the growing trend of trying to implement design methods in other disciplines by focusing on the field of educational research. Burdick points out a striking fact with regards to the expansion of design and its seemingly many purposes by arguing that design “is variably a value-add, an everyday event, a working method, a byproduct, a literacy, and a complete abstraction. And frequently designers are nowhere to be found” (Burdick 2009, p.1).

Not wanting to bemoan the situation, Burdick seeks to explore what consequences this growing interest in design without designers has for design and design education. In her review, she examines a particular branch of educational research labelled design-based research (DBR). According to Burdick, DBR is particularly occupied with the methodological aspects of design (ibid). Researchers within the field abandon the laboratory and develop educational interventions in joint collaboration with educational practitioners in the messy

settings of everyday educational institutions. Collecting data from real life situations, and iteratively pursuing to improve them, is part of the legacy that makes a research approach worthy of being labelled design-based.

The paper is the first in a series of papers addressing design in DBR. The series looks into the question of how this research approach is connected to design. What is designerly about it? What happens when educational researchers adopt designerly ways of working?

In order to answer this, the paper revisits the literature review carried out by Shattuck and Anderson (2012) and the close to fifty articles covered by their review. Whereas the aim of the original review was to highlight the basic features of DBR and describe the trends towards the increased use of DBR, the errand of this paper is to get a more nuanced view of how design is conceived within this particular field. The contribution of this short paper is to provide a quick overview of DBR and from there on discuss one key characteristic, namely iterations, which are fundamental to educational design research in relation to how designers operate and why.

The findings of this review can hopefully not only benefit researchers working with DBR but also give valuable insight into what happens when attempts are made to integrate design and design methods in a new discipline.

## 2. Design-based research

Design-based research is a fairly new approach to educational research often credited to the works of Anne Brown (1992) and Alan Collins (1993). The initial focus was on conducting so-called design experiments in order to engineer innovative educational environments and simultaneously conduct experimental studies of those innovations (Brown 1992, DBR collective 2003). The approach has seen a steady rise in interest since the beginning of the millennium, from merely a handful of seminal articles to almost 400 in 2011 (Anderson & Shattuck 2012). Additionally, the approach has evolved from being primarily an American phenomenon to being picked up by educational researchers in Germany, Singapore and the Nordic countries to name a few.

According to Shattuck and Anderson (2012) the approach is characterised by a focus on designing and testing a significant intervention. Ideally, the creation begins with an assessment of the local context and is informed by relevant literature, theory and practice from other contexts. On the basis of this, the intervention is designed to overcome a given problem or to create and improve the current practice. The authors list a few examples of interventions ranging from a learning activity, a type of assessment, the introduction of an administrative activity (such as a change in holidays), or a technological intervention, to provide an insight into the scope of creations possible within the field of design-based research (Anderson & Shattuck 2012). In the development of the interventions, the researchers claim to implement methods or working routines known from traditional areas of design: the researchers work closely with practitioners and the intervention undergo multiple iterations in search of a more effective solution. The present analysis will focus specifically on what is meant by working iteratively by looking closer into how they are reported in DBR-literature.

### 3. Method

The findings presented in this paper are based on a new take on an already published literature review: Design-based research: A decade of progress in education research? In this review, Shattuck and Andersson (2012) aim at assessing this new approach to research and the trends within this particular field. Using the open-source tool Publish or Perish, the authors performed a Google Scholar search in the relevant academic areas for articles containing 'design-based research' and 'education'. From this pool of a little less than two thousand articles, they picked out five articles from each year in the period 2002-2011 with the highest number of citation quotes. The focus was on articles that explicitly use DBR or in some way discuss DBR methodology. Articles that merely cite a DBR research study were not included and only for the year of 2002 were the authors unable to find five articles living up to their criteria, hence only 2 articles were selected.

It seems fair to conclude that the review and its 47 articles are at the very least a systematic attempt to point to a canonic body of DBR literature from which it is feasible to conclude that a representative understanding of a given phenomenon, in this case the meaning of working iteratively within the field of DBR, can be analysed.

For this review the same 47 articles have been analysed using the data analysis software programme NVivo11. Nvivo has been used to code the different articles, run statistical queries (such as word counts) and enable targeted searches and comparisons across the large body of texts.

Whereas the original review was conducted using only the abstracts, the full papers have been coded and analysed to generate material for the analysis presented here.

The analysis is based on an a priori generated theoretical framework. The review draws on the difference between explorative iterations and refining iterations as highlighted by Buxton (2007) as described in the following.

### 4. Theoretical framework

Working iteratively within design disciplines can refer to several aspects of design practice. Two common practices are the production of sketches and prototypes. Buxton (2007) refers to sketching as the archetypical activity of designers. It is what designers across all fields tend to do: they sketch. The purpose of sketching has been thoroughly analysed most famously by Schön (1983) in his observations of the works of architects, where the activity in the early stages of a design process helps designers explore a problem field and discover new ways to set a problem. Schön refers to this as the dialectic of problem setting and problem solving. Exploratory sketching (Olofsson & Sjöln 2007) is fundamental in iteratively pursuing the range of the problem space that a group of designers can work with and differs from the iterative refinements of prototyping. Where the ambiguity of sketches opens up for many interpretations and new proposals, prototypes, on the other hand, specifically try to test and answer these proposals. Prototyping is about refining solutions and narrowing down the efficiency or applicability of different solutions (Buxton 2007). Both sketching and prototyping involve multiple iterations and are pivotal in the process of designing anything.



## 5. Understandings of iterations in design-based research

Having defined iteration as either exploratory sketching activities or as activities tied to refinement purposes through prototyping, it is now possible to analyse the ways in which iteration is understood in DBR.

28 of the 47 articles have at least one mentioning of a form of iteration (iterati\*). Exactly half of the articles have 2 or less, and four have more than 5. Most commonly, the term appears once or twice in the methodological section of the papers as a part of introducing the basics of the DBR approach.

As an example of this Dede, Ketelhut, Whitehouse, Breit & McCloskey (2009) state that “DBR requires iterative cycles of analysis and revision” (Dede et al 2009, p. 14), and they go on to claim that in trying to answer “what works”, DBR is in contrast to other forms of research. Continuous analysis of a repeated design intervention is one of the most common understandings of the term. Stevens, Delgado & Krajcik (2009) state for instance in relation to their Hypothetical Learning Progression design that “The development and refinement of an HLP is an iterative process that is informed by empirical testing of specific instructional experiences designed to help students...” (Stevens et al 2009, p. 708). Even though the authors state that the intervention equally needs developing and refining, the focus (in their reporting at least) is clearly on the latter. The iterations occur as the design is empirically tested. In a similar way both Mohan, Chen and Anderson (2009) and Zhang, Scardamalia, Reeve & Messina (2009) understand iterations as assessment cycles drawing on experiences of a full year of testing an intervention before redesigning it. The examples provided illustrate the general perception that iterative work in DBR literature is characterised by refinements of a given intervention based on analysis of longer periods of gathering and processing data.

There are, however, exceptions to this. Ruthven, Laborde, Leach and Tiberghien (2009) point out the fact that even though analysis of a design implementation is undoubtedly important, the quality of the original design influence the cogency and efficiency of the later revisions. Effective design begins, according to their understanding, in an unconstrained stage where efforts are directed at setting the problem, brainstorming solutions and studying prior attempts. They warn against rushing too quickly to embrace a design or to attempt to “fix” a similar design as opposed to solving the problem identified. Here, an iterative process takes place between the original design and its realisation in the classroom. Although many questions arise as a result of this statement, it is one of the few examples of an emphasis on explorative design iterations found in the pool of reviewed papers. Unfortunately, for the purpose of this review, no materials are provided in the articles to support this understanding of working iteratively. Questions in relation to what educational researchers are to sketch during problem setting and brainstorming are either unanswered or not reported. In a similar fashion, the benefits of exploring a problem space through the use of sketching is undocumented.

## 6. Conclusion

Working iteratively is a key characteristic of conducting DBR. In this review of how iteration is perceived in DBR, two understandings from design theory have been put forward in order to perform the text analysis. One stresses the purpose of

exploring a problem space through multiple disposable sketches and the other underlines the purpose of rapidly testing design solutions through prototyping.

In general, iteration is not a particularly well-described aspect in the reporting of DBR-projects. Half of the articles included in this review are not directly concerned with this aspect and 25% barely mention it. When dealt with, iterations are most frequently understood as cycles of analysis in relation to testing out prototypes in longer periods of time. Refinements are, in most cases, applied retrospectively after thorough data analysis and usually after long periods of testing design solutions in practice.

Only scarcely are explorative iterations such as brainstorming solutions treated, and no evidence in terms of materials are presented in the literature reviewed.

The review highlights the need for further research into the impact of adopting iterative working routines in DBR, and it also points to a lack of transparency of the ways in which educational researchers explore, set and solve design challenges.

## Appendix

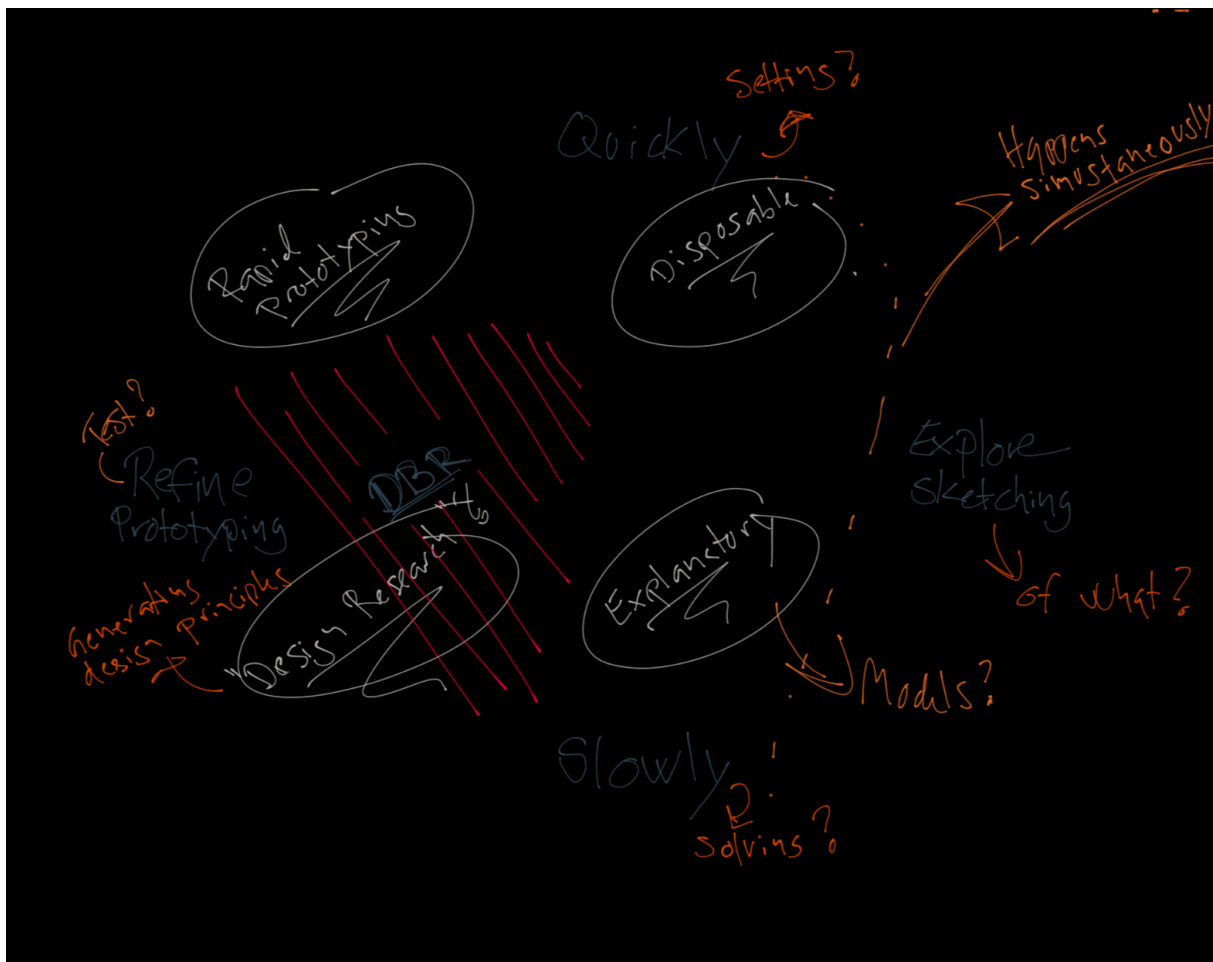


Figure 1. Early draft of how to map understandings of working iteratively in design in relation to design-based research

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# Aesthetics of the Invisible. Sonic Value in the Field of Fashion Design

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**Abstract:** Design education is mostly based on the visual values and expressions. How do we REDO design education? This paper is questioning the predominance of visual culture and investigating the new non-visual perspectives on fashion design aesthetics. The main discussion of this paper is on sound as a design-thinking material. This paper is focused on the exploration of sonic expressions and sonic identities as the possibility for a new method of teaching on the discourse of non-visual aesthetics. The *Sonic Images* – a fashion exercise is presented as an example of design-thinking with a sound that could lead to a new approach to teaching on non-visual values of design objects.

**Keywords:** Non-visual aesthetics, sonic value, sonic identity, design-thinking

## 1. Introduction

The investigation on the Sonic Images as an example of design-thinking method is made. The relationship between the (human) body and object (clothing) is explored and analysed using discourse on the sonic identity and auditory imagination. The topic is explored during the experiments called Sonic Images.

## 2. Identity

The understanding of the Self is a binary system constructed of personal reflection and opinion of others. Clothing as a form of visual communication is a powerful means of making statements. Everyday we make decisions about the social status and role of people we meet based on what they are wearing: we treat their clothes as 'social hieroglyphics' (Crane 2000).

### 2.1 Visual Identity

Clothing, as one of the most visible forms of consumption, performs a major role in the construction of identity. Dress is a part of defining identity and a part of interactions with others. Dress is an embodied practice, a situated bodily practice that is embedded within the social world and fundamental to micro social

order. One's identity is established when others place him as a social object by assigning him the same words of identity that he appropriates for himself or announces (Entwistle 2015).

## 2.2 Dominance of Visual Culture

Although sound, touch, and smell are elements of clothing, the visual culture is predominant in the fashion as a material culture and fashion is understood as a system of visuals. If the hierarchy of senses would change? If the visual value would change to the sonic perception? If we could not see, but only percept the world and self by hearing?

## 2.3 Sonic Identity

Unlike the sense of self-received through ocular reflection, the sonic self is always already mobile, ephemeral, and spreading outward whilst incessantly referring back. It is an echoing 'image' felt throughout the body rather than one perceived externally as visual mimesis. How do we construct the *sonic identity*? Can we recognize the identical sounds of particular objects?

# 3. Sonic Object

## 3.1 Concept of an Object

Art installation by Kosuth ("Joseph Kosuth. One and Three Chairs. 1965" 2017) consists of wood folding chair, mounted photograph of a chair, and photographic enlargement of the dictionary definition of "chair". He is showing three concepts of the same chair: language, real object, and representation. The forth form of possible concept (sound) is missing. There could be added a mode of interaction – sound of folding / sitting on the chair. That is why I started to think about sound as a construct of identity, additional concept to an object. We can apply the same concept for fashion design that is very based on visual appearance: real object (clothing) and representation (photo / video), and text, describing particular clothing. Language could be visual (written text) and sonic (spoken text). Sound of clothing (wearing, moving, touching) is a sonic identity of a garment / accessory / shoes or any object we wear.

## 3.2 Sonic Object

The notion of sonic object was the focus of the first theoretical concerns of concrete music (Kane 2007). Pierre Schaeffer is the first to have conceptualized the sound object as a purely intentional object as opposed to the physical object, the emitter-object. Michael Chion defines this Schaefferian sound object as any sound phenomenon or event perceived as a whole, a coherent entity, and heard by means of a reduced listening which targets it for itself, independently of its origin meaning (Chion 2009).

The notion of sonic object implies not only an awareness of the perceived object, but also of the perceptual process, which gives this object to perception. Schaeffer starts by remarking that the object usually appears in language, classical or colloquial, as vis-à-vis of the subject: the object of one's concerns, hatred, or studied; an object is any point in the world to which an activity of consciousness is applied. It may be an ideal object, existing in consciousness only, such as a logical



proposition, an abstract category, language, or even music when considered independently of its concrete realization (Schaeffer 1966).

For Schaeffer's sonic object to exist, there has to be phenomenological reduction; he agrees to Husserl's statement: "I must exclude all that is transcendently posited" (Husserl and Strasser 1950). A sonic object exists only within the context of a particular listening. The sonic object is at the meeting point of an acoustic action and an intension of listening (Schaeffer 1966).

### 3.3 Becoming State

Clothing is generally considered to be soundless. They don't make sounds when they are without a body that is interacting with them (e.g., hanging garment in the closet, folding pants, etc). Clothing starts to make sounds by interacting with a human body, when we wear them, scrunch or undress them, and etc. The interaction is based on touch and movement. This kind of state could be called as a *becoming-state*. A becoming-state of an audible object: to be determined how it becomes an object from inaudible to an object that produces sound. The haptic and kinetic interactions of human body empower the clothing to become a sonic object.

### 3.4 Identical Sounds

Many items of clothing are in fact associated with characteristic (identical) sounds. For instance, the sound of a zipper is associated with the action of opening and closing a fashion item (such as a bag), the rustle of a raincoat or the opening of umbrella heralds the rush into rainy weather or the hurried escape from it, and of course the sound of a high heeled shoe is a characteristic warning of the approach of a taller-than-normal person (Eicher, Evenson, and Lutz 2008).

## 4. Study of Imagined Sound

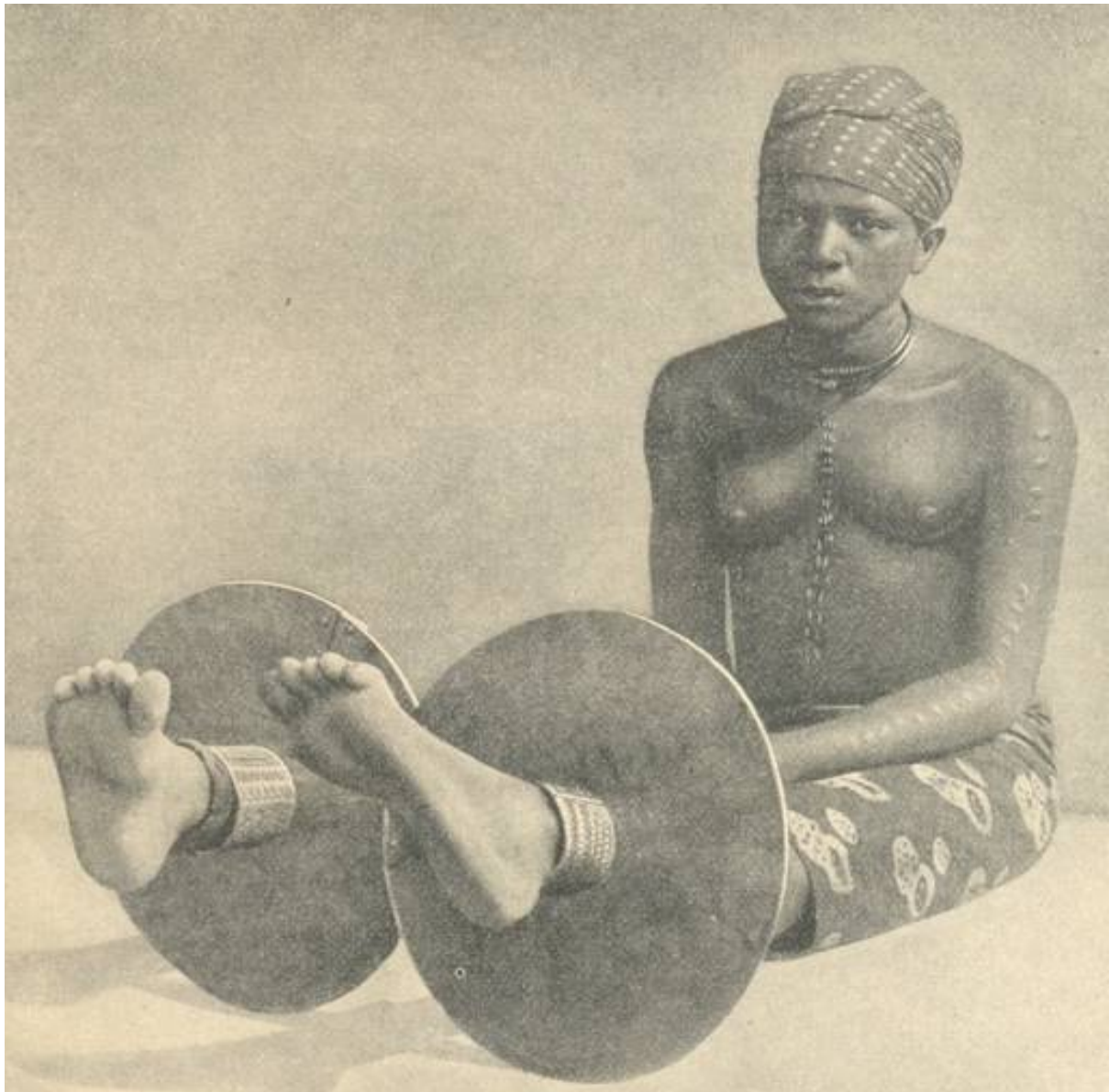
### 4.1 Historical and Cultural Sounds

At the very beginning of my research I started the ethnographical study (Sonic Diary): I was collecting historical and cultural fashion illustrations and tried to imagine the sound. While writing this Sonic Diary, I noticed that it should have been difficult to listen to surrounding in XV-XVII centuries because of accessories, veils, and hats that were worn on the ears. Women were wearing head accessories or massive high ruff collars. There should have been a noise of skin touching with from big, curly wig that were worn during XVII-XVIII centuries as well. It was like a specific sound for a particular century, which becomes as a sonic filter. A wig was also isolating or reducing the volume of sounds, because it was very thick.

### 4.2 Sound of Reform

In one of photos from my Sonic Diary there is a French woman with her bicyclist outfit, including a knee-length divided skirt, a straw boater, and a blouse with fashionably wide sleeves in 1895. The sound of woman wearing trousers and riding a bicycle could be a specific sound of XIX century. Some sounds in women outfit appear (e.g., sound mix of loose trousers and bicycle) and some disappear (e.g., sounds of crinolines and corsets).

## 4.2 Sounds from the Past



*Figure 1. Igbo woman wearing anklet plates, Nigeria, 1922, photo by Northcote W. Thomas*

During the experimental study on imagined sounds, I found a very inspiring photo from the 1922 (see: the Figure 1). Huge anklets that were worn by Igbo women impressed me very much. I tried to imagine the sound that I never heard before. The immense ankle plates were a main part of female in the Igbo country. Many of them were made in Birmingham and afterwards decorated with incised design by native smiths. The women were wearing them permanently, stuffing rags between the skin and the metal to prevent chafing, and walking with a curious swing of the leg to avoid rubbing the plates together.

I made a prototype of these anklet plates (see: Figure 2) and tried to wear it in different motions and body rhythms. I recorded the sound while I was moving in the space with this never worn accessory. I was impressed how my body suddenly became a sonic event: a music instrument.

That experiment led me to develop the exercise Sonic Images and use during my workshops with students, because the auditory imagination brings a very inspiring and original insight for fashion. By shifting focus from visual to sonic perception one can find new (or forgotten) aspects of fashion.

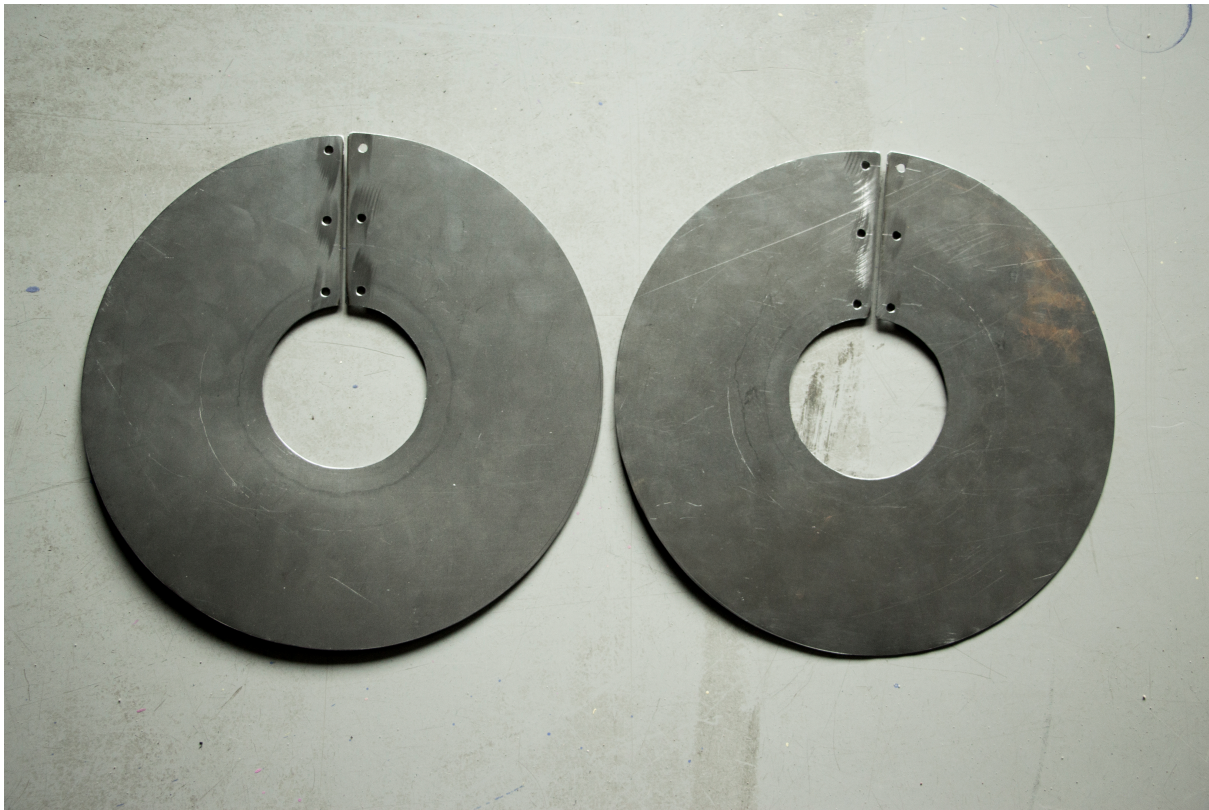


Figure 2. A replica of metal anklets, photo by Vidmina Stasiulyte

### 4.3 Sonic Images

I gave a workshop at Vilnius Academy of Arts for fashion design (BA and MA) students on the sonic aspects of fashion. The main question for my research was: “How to define a sonic property of clothing?” As well I wanted to test the exercise Sonic Images with students. I was showing pictures with clothing and students needed to write down the sounds they are imagining by looking at this picture. The sonic image n. 6 (see: Figure 3) inspired students to imagine the sound of this particular garment. Students gave some descriptions:

- rustle
- squeak
- creak
- cellophane crunch
- paper sound
- trees rustling
- sound of rain
- plastic sounds
- noise

Although it was very inspiring exercise for students, it was challenging to shift focus from visual to sonic, because fashion is so much based on visual culture. It seems that we need to train our ear and mind. Sonic Images is one of various exercises that I created and developing for the Sonic Fashion program that is the



main outcome of my research. I am making the ground theory for Sonic Fashion Design Education: suggesting new definitions and categories, adding new design-thinking methods.

## 5. Conclusions

During the exercise Sonic Images I got an interesting sonic aspect of garments and started to create a dictionary for the Sonic Fashion. As more I investigate and go deeper to the non-visual aesthetics of fashion, I see the huge potential to be explored.



*Figure 3. A Sonic Image n. 6, an example of Sonic Images' collection, photo by Vidmina Stasiulyte*

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### About the Author:

**Vidmina Stasiulyte** is doing a practice-based research in the field of fashion design that is based on sonic value and sonic identity. This new field of investigation in the non-visual aesthetics of fashion is unique and has a big potential for establishing a program on Sonic Fashion.

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# Design for Supporting Sustainable Behaviour Retention through Context Change

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**Abstract:** The socio-economic transitions in developing countries and emerging economics have led to consumption behaviour changes in almost every aspect of individuals' life, resulting in consumerist lifestyles and growing numbers of social and environmental problems. It is of crucial urgency to retain the existing sustainable lifestyle before unsustainable behaviour become embodied in people's daily life. Approaching this challenge from a design perspective, the overall goal of this study is to explore how design can support sustainable behaviour retention through context change. The study aims to understand and identify the individual and contextual factors that influence behaviour retention, then translate these insights into design interventions. The study is expected to inform design opportunities and tools to support people who are undergoing through context change to retain their sustainable consumption behaviour.

**Keywords:** design for sustainable behaviour, user-centred design, behaviour retention, design research, sustainable consumption

## 1. Research Background

People in developing countries and emerging economics are experiencing huge socio-economic transitions towards growing prosperities and higher level of living comforts, resulting in an individual lifestyle change from subsistence to consumption. The emerging consumerist lifestyle has led to undesired consumption behaviour changes in an individual level such as shifts from public transportation to private automobile, from household energy and food conservation to waste, which has caused an increasing social and environmental impact in a macro level (Jackson, 2005). Therefore, guiding and retaining people's existing sustainable behaviour and habits into the new emerging lifestyle through the transition process is of crucial urgency for a sustainable future (de Koning et al., 2015; 2016).

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## 2. Context Change and Behaviour Disruption

According to existing studies, when people are undergoing life event transitions such as residential relocation or having a baby, the changing contexts could lead to the disruption of their existing behaviour and habits (Wood et al., 2005; Verplanken and Wood, 2006; Thompson et al., 2011; Schäfer et al., 2012). Based on these findings, habit discontinuity hypothesis is proposed which points towards context change as a window of opportunity for individuals to form new habits and behaviour (Verplanken et al., 2008). Similar hypothesis is referred as moments of change hypothesis, which argues people's existing habits and behavioural patterns can be disrupted not only by significant individual life events, but also by macro-economic events, for example credit crunch that took place in 2008 (Thompson et al., 2011). The reasoning behind those two hypotheses is that people tend to perform most of their habitual behaviour automatically under a stable interaction with its surrounding contexts, when a certain contextual cue is disrupted, the corresponding habitual behavior that used to be triggered by this cue can be disturbed. Thus, under this circumstance, people become more likely to consider and unfreeze their behaviour and habits with consciousness (Thompson et al., 2011).

Therefore, context change can be seen as a potential opportunity for guiding people's lifestyles towards a more sustainable direction. The notion has been proposed by Verplanken et al in the study about understanding people's travel mode choices after residential relocation, in which he argued that "context change can activate important values that guide the process of negotiating sustainable behaviors" (Verplanken et al., 2008). And it has been further tested in larger scale field experiments by Schäfer (et al., 2012) and Verplanken (et al., 2016), in which effective interventions were implemented for changing people's unsustainable behaviour through context change. However, a successful guidance of sustainable lifestyles entails both the change of undesired behaviour and the retention of desired behaviour. As context change can open up a window for people to consider their behaviour, the existing desired sustainable behaviour also can be unfreeze and disrupted, and its retention may be supported through interventions as well. While most of the existing studies set focuses on changing people's undesired behaviour in life events transition process, the discussion of how to retain the existing sustainable behavior patterns through context change before unsustainable ones become embedded in people's daily life is remained relatively untouched.

## 3. Research Motivation and What Do We Wish to REDO

In line with the research background, the project is closely linked to REDO from both academic and social perspective.

From an academic perspective, the project aims to REDO the design research for sustainable behaviour. In contrast to the existing projects in this field, which set focuses on studying sustainable behaviour change in given stable contexts, this PhD project will look into a relatively unexplored area: how design can support sustainable behaviour retention for people who are undergoing context change. From a social perspective, as most of the existing design for sustainable behaviour studies have been conducted in the context of developed countries, how to implement sustainable behaviour design for people in developing countries emerging markets has seldom been discussed before. The project expects to

contribute with insights to localizing sustainable behaviour design knowledge, and further explore the design opportunities to support people to REDO their consumption behaviour towards a sustainable lifestyle.

## 4. Research Aim, Objectives and Questions

The study aims to explore how design can support sustainable behaviour retention through context change. To achieve the research aim, the study is comprised of two research stages with their own objective and research questions:

Objective 1: To understand why people retain some behaviours and change others through context change.

- RQ1. What are the relevant theoretical perspectives to understand behaviour retention through context change?
- RQ2. What are the individual and contextual factors that affect behaviour retention? And how can those factors inform the design for sustainable behaviour retention?

Objective 2: To explore how to design products and services to support users in retaining sustainable behaviour and outcomes through context change.

- RQ3. What are the design interventions and where to introduce those interventions to support sustainable behaviour retention? How to incorporate them into product and service design process?

## 5. Research Design

This section clarifies the theoretical background, research methods and structure, and research scope.

### 5.1 Theoretical Background

Design for Sustainable Behaviour is a relatively new field of inquiry aiming to reduce negative environmental and social impacts of products and services by influencing user behaviour towards a sustainable way (Lilley, 2007; Elias, 2011; Wever et al., 2008; Wever & Vogtländer, 2015). Built on Wever's review (2012), two research clusters in this field can be identified. The first cluster aims at understanding and translating factors that influence sustainable consumption behaviour into design interventions (e.g. Tang, 2010; Tromp, 2013). The second research cluster deals with informing design practitioners with approaches and tools to support the design process of products and services that affect users' behaviour and practices (e.g. Elias, 2011; Pettersen, 2013; Lockton, 2013; Daee, 2014; Kuijer, 2014). Two dominant theories can be identified in each cluster: behaviour models from social-psychology perspective and practice theory from social-practice perspective.

A comprehensive comparison of the strengths and limitations between these two theories regarding the application in Design for Sustainable Behaviour studies is presented by Pettersen (et al., 2013) and Piscicelli (2016). In summary, behaviour models can provide frameworks for analyzing how individual factors can affect consumption behaviour (Jackson, 2005), but the impact caused by the contextual factors such as social, institutional and cultural factors have seldom been discussed. In contrast to that, social-practice theory takes practices as the unity of analysis and investigate how people perform their routinized behaviour and why

they perform it (Reckwitz, 2002; Warde, 2005), whereas it fails to provide detailed frameworks for analyzing factors that affect behaviour.

Regarding the application of these two theories into the design process for sustainable behaviour, the psychological behaviour models have informed interaction-oriented design approach (Kuijer, 2014), while based on social-practice theory, Shove et al. (2007) introduced practice-oriented design. According to Kuijer (2014), with the aim of motivating the desired sustainable behaviour, interaction-oriented design focuses on studying interaction between user and product. While the practice-oriented design takes practices as unit of design and aims to influence the practices that people perform towards a less resource intensive way.

In line with Kuijer's arguments, by investigating the implicit influence of design on user behaviour, Tromp (2013) also indicated two approaches, analytic approach and synthetic approach, for understanding product influence and designing it. Similar to the concept of interaction-oriented design, in the analytic approach, the interaction between users and products is the central focus, user behaviour is viewed as the result of product-user interaction. While the synthetic approach takes a holistic view and regards user behaviour as a part of dynamic context which comprises cultural, contextual and social factors.

What both of the theoretical perspectives and design approaches have in common, is that when applied within the field of Design for Sustainable Behaviour, they have so far focused on the potential for sustainable consumption behaviour change in given stable contexts, but not for sustainable behaviour retention through context change, which is the main topic of this PhD study. Furthermore, seldom design studies have tried to take insights from both perspectives to solve the sustainability problems. Although social-psychology and social-practice perspectives derive from different disciplines and present different philosophical worldviews, attempts can be made to explore how to apply them in different design research stages for answering different questions (Daae, 2014). To answer the research questions and achieve the research aim in this study, I plan to identify the contextual factors that influence behaviour retention by drawing on social-practice perspective, and apply synthetic design approach to explore where and when to introduce behaviour interventions. Individual factors will be identified by taking insights from social-psychological perspective, the question regarding how to introduce design interventions for sustainable behaviour retention will be explored by applying analytic design approach. The theoretical perspective of the research is illustrated below.

## 5.2 Research Methods and Structure

For the first research stage, a theoretical framework will be developed by reviewing literatures related to behaviour transition through context change. In order to identify the factors that affect behaviour retention and generate insights for design, I intend to collect qualitative data by applying ethnographic informed design method (see Blomberg & Burrell, 2009). A pilot study concerning eating habits and food consumption behaviour when international students move to Sweden for exchange study will be conducted to test and improve the data collection methods. After that, case studies concerning consumption behaviour patterns of Swedish household before and after moving into new accommodation will be conducted to identify and understand contextual and individual factors that affect behaviour retention through context change.

For the second research stage, as the goal is to introduce, evaluate and reflect on the potential design interventions, the research through design method (see

Zimmerman et al., 2007) will be applied. I intend to integrate design insights from previous case studies with reviews from relevant sustainable design literatures. Built on that, I plan on focusing the domain of household energy consumption with a specific interest in studying behaviour of urban middle class households in China, since their emerging consumerist lifestyles has led to a dramatically household energy consumption increase (Liu et al., 2011), it left potential opportunities for design to address the problem. An initial idea is to design, develop and evaluate an interactive service application prototype in participants' mobile devices, which aims to support users' sustainable energy consumption behaviour retention regarding the use of household appliances. For the design, development and evaluation process, user case study and design prototyping methods will be employed. The prototype is expected to be implemented and evaluated over medium-term (approximately over 3 months). An overall view of the research plan is illustrated in the figure below.

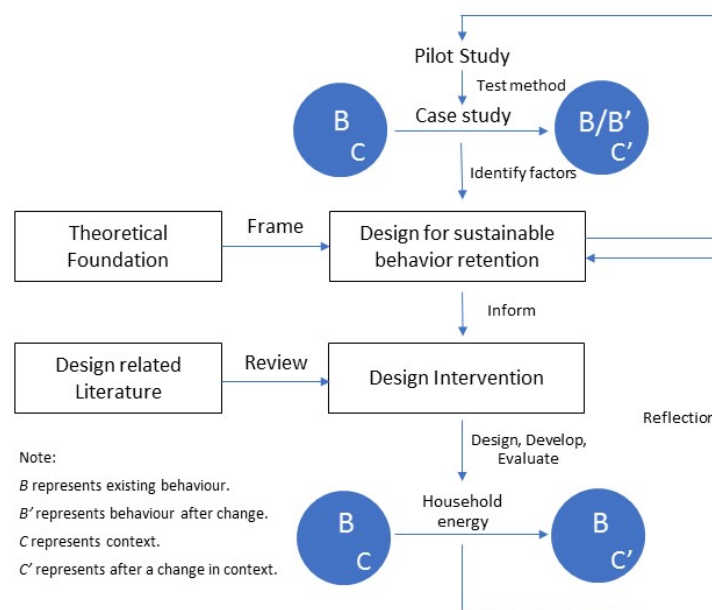


Figure 1. An overall view of the research plan.

### 5.3 Research Scope

In this study, context change refers to both socio-economic changes in a macro level (e.g. social mobility) as well as changes that are induced by individuals' life events in a micro level (e.g. relocation, graduation, pregnancy). The behaviour interventions that this research aims to target are the ones that people perform in daily life, such as food consumption, energy and water usage, waste management, and so on. Since these behaviours are habitual and repeatable, they are more traceable and accessible for analysis. The geographic region of the research is limited to Sweden and China, the socio-economic contexts would enable the study to develop comprehensive understandings of how different contextual factors can affect behaviour retention.



## 6. Expected Contributions and Current Research Step

From a theoretical perspective, by REDOing the existing Design for Sustainable Behaviour researches, this study is expected to provide design knowledge and practices for supporting sustainable behaviour retention through context change. Furthermore, with a focus in implementing design interventions in the context of developing country, the study would contribute to the transition and localization of design knowledge between different socio-economic contexts.

Currently, I am in the first year of my PhD study. By the time of the REDO conference, I expect to have the results of the pilot case study ready. By participating the conference workshop, I would like to further discuss and receive feedbacks about the method and methodology part regarding the pilot study and the general study plan.

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# REDO: Remake, Relocate, Rethink, Refresh, Recreate: REDO

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**Abstract:** The nature of an iterative creative process is physically manifested through this connected series of duplications and relocations of art objects. While these hand-cast sculptures are invested with new identities, they remain informed by their original parts and materiality. Starting with Macrocarpa timber beams, the existing crevices and knot holes were filled with different materials (glass, concrete, plaster, lead), transforming negative spaces into positive, reversed forms, mostly relocated from the original. The time taken to cast multiple duplications and negative/positive inversions, instigates opportunistic perceptual shifts. As connections are sought, identifying similarities and differences between the objects, new and alternative design directions are identified. These investigations parallel architecture design processes. The thinking is more rhizomatous than linear. Elements are explored individually, combined in numerous different ways. These connections create serendipitous, unforeseen possibilities. The hand making and associated contemplation time is key to the best functional, contextual and visually meaningful design outcomes.

**Keywords:** Art, duplicate-relocate, design process, hand-cast, architecture

# Using Interdisciplinarity as Catalyst for Reflexivity

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**Abstract:** This poster discusses how interdisciplinarity can enable new perspectives within individual research projects by allowing new levels of reflexivity to emerge. Based on a writing session the authors held, this poster demonstrates how the presentations and following discussions of individual projects enabled new understandings towards one's own situatedness within the individual project. Taking a theoretical starting point in Donna Haraway's concept of *situated knowledges* it is argued that the interdisciplinary setup triggered a new reflexive level of understanding, which might not have been the case otherwise. Using their writing session as a reflexive tool to understand how interdisciplinarity has enabled them to better understand their *situated knowledges*, the authors introduce the concept of the *apparatus of interdisciplinary reflexivity*. Understood as a matrix of the different elements that define interdisciplinarity as well as reflexivity in a given context the *apparatus of interdisciplinary reflexivity* can help researchers to better understand their own situatedness within their research fields.

**Keywords:** Interdisciplinarity, Situated knowledge, Reflexivity, Apparatus of interdisciplinary reflexivity

# RE-DO-KOLDING. Co-learning Kolding with Students and the Community. Digital Beats: An Open-ended Storytelling

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**Abstract:** This paper is based on a design led ongoing experiment across design, creative process and education. Based on the workshop we're doing at Cumulus 2017 Redo Conference in Kolding, we will use mobile phones as artefacts to create relationship between people attending the Cumulus Conference, the students and the public space of the city. The mobile platform is an enabler to co-design also with neighbors, volunteers and professionals, practitioners involved in the event and living in the everyday in Kolding eco-system. During the workshop the attendees co-design to facilitate and improve human life conditions in the public spaces of the Kolding communities, together with the students and the young people, via their mobile skills, as catalyzer of a new open-ended participatory m-storytelling.

Students work together starting with an online applied project-based experimental methodology, we named "co-learning/co-create & share" to build more human and supportive neighborhood with design-based and innovation-oriented open-ended process acting on the field. The workshop consists of different phases (ideate, observe, test, prototype, iterate, do, re-do) which result in a performance co-created by the whole community in the public space of Kolding, researching through design as a poetic narrative of equality of relationship.

**Keywords:** Research through design, design experiment, public space, co-creation, co-learning, collaboration

# Teaching with Design in Grade 4-7 Classrooms

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**Abstract:** The value of design as a pedagogic approach within general education is gaining recognition in North America as a way to foster 21<sup>st</sup> century competencies. However, there is a need for effective resources and training for K-12 teachers to support the integration of design. This poster shares the results of a partnership, which saw the introduction of a Designer in Residence into a K-12 school. The Designer in Residence was a Master of Design Candidate at Emily Carr University who led a two-year exploration into design-based learning with over 100 students in eleven grade 4-7 classrooms. Benefits to this approach for students with learning differences were identified, and resources were designed to support adoption by teachers. This project highlights an opportunity for designers and Design Universities to engage with K-12 learning contexts through partnerships, which can foster new understandings of design, and news modes of teaching and learning.

**Keywords:** Design-based learning, education, creativity, design thinking, pedagogy



# How might the Future of Design in General Education deliver the UK's Industrial Strategy

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**Abstract:** 2017 marks the first time the creative industries have been formally recognized in a British Industrial Strategy. Concurrently, reductions in applied learning, EBacc, Academisation and general disregard for the value of creativity and creative industries currently promoted within education in Britain present an ambiguous blueprint. This research aims to look through a lens of recasting design as a special branch of the sciences whilst preserving the imperative that the visual and aesthetic “making and doing” of craft does not become obsolete. Methods of intent include empirical evidence, grounded theory, interviewing design education policy stakeholders, and revisiting the recommendations from the RCA’s Department of Design Research to the government (submitted 1978). Design is an activity driven by science and invention. What is needed is an education system fit for the 21st century. Instead of marginalising creative subjects, young people should be provided with the mix of creative and technical skills required for success. The research will be published in September.

**Keywords:** Design education, design policy, brexit, making and doing

# Women Self-Actualization: A Narrative of a Performative Gender Constitution

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**Abstract:** In a traditional Middle Eastern society, men and women have been confined within gender definitions. Those imposed social constructs condition men differently from women by dictating behaviors and establishing a hierarchy of gender positioning that limits women's abilities and potential. Based on postmodernist philosopher, feminist and social theorist, Simone de Beauvoir and postmodernist philosopher and gender theorist Judith Butler, gender is not an inborn role, but rather created through stylized repetition of acts informed by society, named performative acts. For de Beauvoir and Butler, gender can never be a stable identity. Informed by Butler's phenomenological nature of gender constitution, this research explores Arab women self-actualization in the workplace. Via an online platform, called KOONI, the design aims to help women rethink the nature of gender and gender roles in the workplace and introduces the concept of performative acts as a role-playing mechanism to induce change.

**Keywords:** Gender, gender roles, Arab women, workplace, identity

# Putting your *Self* on the Line, an Alternative Critique on Digitalization

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**Abstract:** *Utopia* and *Dystopia* constitute the biggest possible contrast for us to picture the future with. As a complementary diptych, it is a permanent feature of Hollywood's repertoire. We are constantly served up the same stories but with different actors. As such, these two future perspectives seem to form a modern version of the medieval altarpiece, a triptych in which 'The Last Judgement' is flanked by heaven and hell. In this modern version, we embody the middle panel ourselves. The two flanking panels, Utopia and Dystopia, represent both a theoretical model and a concrete reality, and we judge our current time in lieu of this contrast. Contemporary commercial technology giants, such as Facebook, promise us that Utopia already lies within our reach today. Utopia as a model has thus been taken hostage by commerce and all that remains for politics is Dystopia. Whereby the different political parties claim that as soon as the other party comes into power a sovereignty is constituted and Dystopia awaits us. In other words, neoliberalism (commerce) and neoconservatism (politics) cannot be viewed independently from one another, and form Siamese twins who are performing a parody of the tango for us. What it leads to is that if we want to explain the world to our children, we can only distinguish between three categories: *the Refugee, the Terrorist, and the Tourist*.

**Keywords:** Digitalization, critique, technology, visual essay

**Film Contribution:** <https://vimeo.com/218121483>

# Re-shaping the Master Curriculum in Design

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**Abstract:** While re-designing our MA curriculum in design, we set out to re-think the required set of skills that our graduates need to successfully embed into a globalising creative economy in Switzerland. Current developments in the Swiss creative economy show that more and more designers extend their activities into markets and businesses other than design. To meet this shift in the creative economy and support the employability of our graduates, we propose a re-visited model of T-shaped skills by proposing the “Y-shaped Designer”, who embeds more easily into collaborations across disciplines thanks to a disciplinary root, a clearly perceived role and multimodal literacy. We also argue for a more disciplinary BA curriculum in Design providing the “disciplinary root” for a project- and issue-based MA curriculum that fosters transformative thinking, collaborative acting and transmedia outputs.

**Keywords:** Design education, undisciplinarity, multimodal literacy, Y-shaped skills

# Art School Virtual Diary Project: REDO, redesign and re-evaluate an Induction Programme for the Acculturation of International Students in a British Higher Education Art School

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**Abstract:** This action research paper examines a project to REDO, redesign and re-evaluate an induction programme to assist new postgraduate international students to acculturate to a British higher education art school. The project took place in the week before course related induction sessions within the students' specialist areas of study. A virtual diary was used to capture and share the international student voice. Focus groups, Mentimeter surveys (an interactive mobile and online presentation software) and blogs informed the research. This induction programme assisted international students to gain a clearer understanding of expectations from the start of the course. Additionally, it identified the benefits of sharing acculturation information between staff and students. Five themes emerged from this research: Connections/Disconnections, Belonging, Expectations/Reality, Past Experience and Educational Challenges. The anticipated educational and language issues feature less prominently in the outcomes than cultural issues related to leaving home and settling in a new country in the first weeks of courses. Information gathered from this project will be used to redesign future induction programmes and inform the way international postgraduate art and design students are supported in their studies.

**Keywords:** Induction, acculturate, virtual diary, student voice, student experience



# *Impact* through Innovative Approaches to start-up Education combining Creativity, Technology and Entrepreneurship

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**Abstract:** Entrepreneurship is being recognised as an important driver of economic growth, as well as contributor to innovation. Specifically, entrepreneurs and start-ups from cultural and creative industries contribute to innovation in other sectors and impact in societal and cultural domains. This poster presents three student start-up teams created during the CREA Summer Academy, a European Horizon2020 project, that show potential impact on aspects of People, Planet and Profit. In the Summer Academy programme, the CREA Educational Model and Didactic Framework form the core of the programme, in which design thinking, business modelling and innovative educational tools contribute to teaching students *How to REDO* by developing a real start-up. In a first assessment, the CREA educational and interdisciplinary approach combining Creativity, Technology and Entrepreneurship with offering concrete steps towards design thinking and business modelling together with networking, team building and coaching, is found to contribute to the potential impact of start-ups created.

**Keywords:** Creativity, technology, entrepreneurship, start-ups, education

# Leveraging Design Activism to guide Public Projects towards Citizen Inclusion: A case study of Copenhagen Street Lab

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**Abstract:** This paper explores a case wherein design activism was leveraged to guide the governance of a public project towards greater citizen inclusion. This exploration, part of a master's thesis in Service Design at Aalborg university, centres on Copenhagen's Street Lab - a living lab where technological smart city solutions are developed and tested. Though an interesting and innovative public project, at the time of this work Street Lab's citizen inclusion strategy was minimal. This was perceived as a problem, as smart city development without citizen inclusion introduces risks, and can neglect the needs of real users. In this case study, Street Lab's governing actors were slowly pushed towards a more citizen-centred mindset with the introduction of a series of gradually more disruptive designed artifacts. This process produced some positive outcomes, and we therefore argue that design activism is a method worth further exploration for guiding public projects towards participatory design.

**Keywords:** Smart city, inclusion, design activism, living lab, participatory design

# From Critical Regionalism to Sustainable Fashion Design

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**Abstract:** This research project explores on the premises of the architectural theory of Critical Regionalism addressing globalisation and social change into sustainable contemporary fashion design practices in Southeast Asia.

This project aims to influence student's creative processes towards an articulated design knowledge underpinned by the regional cultural specificities, addressing living conditions and the use of local materials.

The environment reflects the way someone dresses, however contemporary society generates social and cultural discourses which have pushed fashion practices into an area of non-place and non-identity.

Identifying the worldwide uniformisation as a problem affecting the fashion practices, we are utilising the Critical Regionalism theory as an opportunity to solve some of these crucial issues.

This research will generate a broader understanding on how fashion, shaped within a geographical, cultural and social environment is contributing to the perpetuation of one's regional identity in a sustainable manner.

**Keywords:** Fashion design, critical regionalism, sustainability, identity, displacement

# Deadline: Exploring Fiction Short Film to Communicate Design Knowledge

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**Abstract:** This case study explores fiction film and storytelling as a means to communicate and learn design knowledge. The project builds on current approaches to applying storytelling in collaborative design, but extends this line of research by examining what can fiction film bring to the mix. Although storytelling is an ancient form of human communication, moving image is a modern version of the camp fire that people gather around to listen and share their experiences. Due to their captivating and immersive qualities, stories and film empower and inspire viewers to create empathy and understanding beyond purely entertainment purposes. And advances in technology, such as virtual reality and 360-degree videos, create new possibilities that change the viewer experience and the way stories can be told. Fiction films can provide an engaging channel to communicate design concepts and to create empathy between multidisciplinary audiences and therefore are a worthwhile area to research further.

**Keywords:** Fiction short film, storytelling, design knowledge

**Film Contribution:** <https://vimeo.com/200369454>

# WE CARE. WE DREAM. WE MAKE REAL. A Proposed Transdisciplinary Master of Design

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**Abstract:** At the OTH Regensburg (Regensburg University of Applied Sciences), we are preparing a new Master of Design program which is positioned in relation to the most recent and dramatic change in design education, namely the worldwide introduction of doctoral study and research. We are admittedly latecomers but hope to leapfrog by drawing on Wolfgang Jonas' model of Research Through Design and John Dewey's epistemology to ground the program. It is transdisciplinary, aiming to integrate scientific inquiry with intensifying artistic competences, and advancing theoretical and practical design know-how. The program is also international and student driven. The basic modules are meant to be flexibly arranged by students and faculty through the codesign process. We are at the early stage of planning and have not done thorough studies on existing MA programs. However, the presentation of the theoretical bases is meant to facilitate discussion and obtain feedback from colleagues around the world.

**Keywords:** Transdisciplinary, design education, master of design, student driven, codesign



# Tangible Information: An Exploration on Visualization Techniques to keep a Steady Focus on Research Findings throughout a Design Project Development Process

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**Abstract:** Qualitative research produces huge amounts of data. Implementing and keeping the findings of an end-user study vividly alive during a project development process often fails and leads to the loss of real end-user needs within the course of the project. Neuroscience indicates that data gets an easier access to long term memory if its perception is connected to emotional as well as tangible aspects. In order to create a lasting impact of research findings on the following design development process two different approaches have been developed within an AAL research project. The aim was to translate the gathered data into tangible and visualized experiences through the creation of a foldable personas card and a three-dimensional cube of requirements. Both approaches pursue the goal to enable a hands-on engagement and an agile discussion about the implementation of the findings of the study with the whole development team.

**Keywords:** User-centred design, product development process, research findings, visualization techniques, tangible information

# The Waste-Off Challenge – Reinvent to Redo

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**Abstract:** Waste-Off was a dynamic, practiced-based, research project that pitted four Colleges against one another in a challenge to give waste new value. It championed the belief that “Understanding circular economics is essential in student education and the importance of a creative (as well as scientific) approach to waste as a resource is vital for innovation.” Cyndi Rhoades. It tasked students, academics, technical and facility staff, with coming together to discover untapped waste streams (such as fabric off-cuts, canteen waste, packaging, clay trimmings, make-ready press-sheets and canal flotsam). Then, through a series of workshops to develop, craft and share their inventions. The project mobilised participants from across design, communication, fashion, performance and fine art disciplines with the intention of: instigating discussion, transforming student and staff (teaching, technical and operations) understanding of sustainable practices; informing pedagogy, inspiring cultural change and the development of a sustainable curriculum, nurturing stakeholder’s relationships and community partnerships.

**Keywords:** Reinvention, collaboration, craft, material responsibility

**Film Contribution:** <https://vimeo.com/127729940>

<http://www.arts.ac.uk/research/researching-at-ual/research-infrastructure/research-groups-networks-and-collaborations/conscientious-communicators/>

# Advancing User-centered Design. Integrating Cultural and Situated Environment across the Design Process

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**Abstract:** This poster showcases the proposal of a pedagogical design method that furthers the scope of research inside the user-centered design process by integrating context research from the immediate environment to reach a broader outlook for product design. This approach aims to shift general notions of the role of the environment inside the design process by classifying it into two domains: cultural and situated environment. This direction comprehends the user within, as users actively interact inside their environments. The method follows steps to widen the discovery and integration of insight generated from the proposed classification of environment. A method that supports the user-centered design process to address insights by analyzing and interpreting the cultural and situated environment where a design is used. An inquiry that considers the characteristics of the environment and its impact to the user(s) and to the product they are in contact with.

**Keywords:** Culture, insight generation, situated environment, user-centered design

# Visual Design and Teacher Research: A Case Study

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**Abstract:** This project presents two aspects of a teacher research inquiry in the field of visual communication design; the visual nature of the inquiry and the resulting insights. In this case study, the visual form of the inquiry shaped insight-generation and communicated these insights effectively. Teachers working in fields related to visual art and design are equipped with high visual literacy. It can be effective for teacher-researchers to adopt a visual approach, which aligns with their learned way of thinking and working. The analysis of the data led to insights in project planning, setting expectations, pedagogy, documentation, survey design and administration, seminar & evaluation, class dynamics and student performance. The inquiry identified tools and methodologies that enabled students to become independent learners. Two of these tools were developed by the project facilitators. This inquiry offers a visual path to REDO design

**Keywords:** Visual communication design, teacher research, pedagogy, pedagogy through teacher research

# Rethinking Design Education for the Multicultural Generation

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**Abstract:** The paper presents a collaborative design workshop of American and Chinese students and faculty conducted in December 2016 in Guangzhou, China. Through the planning, execution, and reflection of the workshop, the authors discuss their success and failure in helping students from different cultural background to collaborate in a theme-based short-term studio. Inspired by this experience, the authors address the challenge and opportunity of globalization and decolonization to design education and stress the importance of establishing strong collaborations with other countries and cultures for a truly multicultural experience in the increasing globalized market of education.

**Keywords:** Higher education, design, multicultural education, multidisciplinary, global collaboration.



# Preparing to Co-design new Design Education for Tasmania, 'Design Island'

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**Abstract:** Centred on a new design degree program under development for the island state of Tasmania, Australia, we outline the early phase of a curriculum co-design process between two schools spanning art, music, theatre, architecture and design, and the state's small but vibrant design community. Through applying design thinking, critical issues associated with our present dispersed design offerings are identified via four problem frames – a mismatch between graduates and future practice, limited exchange with our design community, dated conceptions of design, and geographic dislocation. These are explored in relation to emergent design practices and discourse, notable design curricula elsewhere, and some strengths of our current design courses and pedagogies. Through articulating our working positions on graduate and practice futures – especially in relation to sustainability and critical making – we venture strategies for progressing the next phase of course and curriculum design for the Bachelor of Design (Hons) to launch in 2019.

**Keywords:** Design curricula, co-design, design community, critical making, Tasmania

# Embrace the Transition by Tradition: REDO the Course of Introduction to Animation based on Transformation of Chinese Animation Education and Industry

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**Abstract:** From 1950s until now, the development of Chinese animation brings out a certain amount of pressure on Chinese animation education. With the big rising of animation educating universities, we are facing many problems, such as the overwhelming number of animation graduates to industry, non-ideal student-faculty ratio, disappointing social appraisalment etc. But the most urgent thing is to improve the confidence of animation students in university education, as they will be the main force of animation industry and move it forward in the near future. The video presents a student-centered teaching reform, which is a flipbook project in the course of Introduction to Animation, to showing the idea that how to encourage students' curiosity and confidence about animation by a simple and traditional method. Instead of only dissertation and presentation in such theory-based course, students using their familiar elements and common sense to create their animation work through flipbooks.

**Keywords:** Teaching reform, flipbook, Chinese animation education, introduction to animation

**Film Contribution:**

[http://v.youku.com/v\\_show/id\\_XMjc3MjUwNjE1Ng==.html?spm=a2hzp.8244740.userfeed.5!4~5~5~5!3~5~A](http://v.youku.com/v_show/id_XMjc3MjUwNjE1Ng==.html?spm=a2hzp.8244740.userfeed.5!4~5~5~5!3~5~A)



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Alison Mears  
Allah Dad  
Amalia de Götzen  
Amanda Briggs-Goode  
Ana Souto  
Anders Haug  
Andrew Morrison  
Angus Donald Campbell  
Anke Coumans  
Anna Lottersberger  
Anna-Sara Fagerholm  
Annabel Pretty  
Anne Boddington  
Anne Chick  
Anne Katrine Gøtzsche Gelting  
Anne Peirson-Smith  
Arianna Mazzeo  
Astrid Skjerven  
Avsar Gurbinar  
Bang Jeon Lee  
Barnabas Wetton  
Bente Irminger  
Birgitte Geert Jensen  
Bo Christensen  
Canan Akoglu  
Carolin Ermer  
Caroline Davey  
Caroline Loss  
Caroline McCaw  
Carsten Friberg

Céline Mougenot  
Charlotte Sörensen  
Chris Heape  
Christoph Schindler  
Circe Henestrosa  
Claire Pajackowska  
Claudia Rébola  
Dagmar Steffen  
Daichi Iwase  
Danielle Arets  
Danielle Wilde  
Darryl Clifton  
Delia Dumitrescu  
Desmond Laubscher  
Diana Nicholas  
Elisabet Nilsson  
Elisabetta Lazzaro  
Elzabé Meiring  
Eran Lederman  
Eugenia Chiara  
Faith Kane  
Faseeh Saleem  
Florian Sametinger  
Frederik Larsen  
Graham Newman  
Hala Gabr  
Hanna Landin  
Harah Chon  
Hiro Sasaki  
Idil Gaziulusoy  
James Self  
Jan Eckert  
Jason Wiggin  
Jenny Pinski  
Johan Verbeke  
Johannes Wagner  
John Stevens

Joon Sang Baek  
Judith Mottram  
Karen Hofmann  
Karen Marie Hasling  
Karla Paniagua  
Katherine Townsend  
Kathleen Mahoney  
Kathrina Dankl  
Kirsi Niinimäki  
Kirsti Raitan Andersen  
Lara Salinas  
Lars Hallnäs  
Laurene Vaughan  
Linda Herfindet Lien  
Lisa Grocott  
Louise St Pierre  
Lubomir Popov  
Luisa Chimez  
Luna Rodriguez Sofia  
Maarit Mäkelä  
Mang Jamal  
Mang Jamaludin  
Marc Boumeester  
Margherita Pillan  
Marie Riegels Melchior  
Markus Vihma  
Marte Sørebo Gulliksen  
Martina Rossi  
Mehmet Ali Altın  
Mette Gislev Kjærsgaard  
Michail Galanakis  
Mo-Ling Chui  
Nan O'Sullivan  
Niberca Polo  
Nithikul Nimkulrat  
Ozge Merzali Celikoglu  
Ozlem Er

Paulina Contreras Correa  
Pia Pedersen  
Ramia Mazé  
Ray Witcher  
Reet Aus  
Renee Wever  
Ricardo Sosa  
Richard Herriott  
Rita Salvado  
Robin Turner  
Roderick Adams  
Rosan Chow  
Sally Stone  
Seçil Ugur Yavez  
Shao Dan  
Sissel Olander  
Stephen Awoniyi  
Sukyong Kim  
Sune Gudiksen  
Susan Kozel  
Suzanne Erasmus  
Takanako Yakubu  
Tao Huang  
Tau Ulv Lenskjold  
Thera Jonker  
Tiiu Poldma  
Toke Riis Ebbesen  
Tomoyuki Sowa  
Tore Kristensen  
Turkka Keinonen  
Umber Zahid  
Valentina Rognoli  
Vibeke Riisberg  
Wendy Fountain  
Yao Lu  
Åsa Harvard Maare  
Åse Huus





# Conference Credits

## Design School Kolding Conference People:

Design School Kolding counts around 100 staff members and 350 students. Every single one of them have contributed to the REDO Cumulus Conference. This includes looking for funding, reviewing, graphic design, set design, food design, redecorating the building, picking up phones, answering emails, coordinating space and place etc. In other words: the REDO Cumulus Conference is a joint effort by the Kolding crew with great support from international friends around the world.

### The Organising committee:

Conference Responsible: Elsebeth Gerner Nielsen, Rector

Conference Chair: Mette Mikkelsen

Research Chair: Anne Louise Bang

Conference Coordinator: Anette Flinck

Research Committee: Else Skjold & Ulla Ræbild

PhD Consortium: Anne Corlin

Creative Direction: Barnabas Wetton

Communications and Web: Marianne Baggesen Hilger

Press: Charlotte Melin

Catering & Location: Mette Thrane Frandsen

Photo: Katrine Worsøe, Diana Lovring, Monika Bartosova,

Palle Skov, Trine Søndergaard and Terhi Kohonen

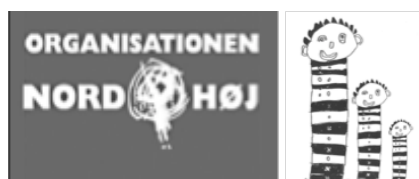
Logo: Leon Kranenburg

### Cumulus Secretariat:

Eija Salmi and Justyna Molik



## Partners



TUESDAY 30 MAY		WEDNESDAY 31 MAY		THURSDAY 1 JUNE		FRIDAY 2 JUNE	
08:00 30	Hello Coffee	Hello Coffee		Hello Coffee		Hello Coffee	
09:00 30	WELCOME Keynote Speeches	Keynote Speeches		Keynote Speeches		Parallel Sessions CUMULUS General Assembly	
10:00 30							
11:00 30	PHD Consortium	Parallel Sessions		Parallel Sessions		Keynote Speech	
12:00 30						Redo Impact Revisited	
13:00 30	Lunch	New Members Fair		Lunch Packets		News from Cumulus Board	
14:00 30	PHD Consortium	Lunch		Keynote Speeches		Lunch	
15:00 30	Field trips - LEGO - Kolding Municipality - Design School Guided Tour	Working Groups					
16:00 30		Coffee		Design Conversations			
17:00 30		Working Groups					
18:00 30		X-Files					
19:00 30	Danish Kitchen	Dinner on your own Danish Design Award		Opening of Exhibition at Koldinghus Castle			
20:00 30		DESIS		Dinner at Godset			
21:00 30							
22:00							



