Performative Environments

Bo Stjerne Thomsen

For Storm

Maybe some day this work can inspire you,
in the same way as your enthusiastic and energetic approach to life
inspire every new day.

For Merethe

Thank you for your patience, support and constant belief
in my long winding roads.

Performative Environments
by Bo Stjerne Thomsen

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ABSTRACT

In recent years the influence of pervasive computing, advanced sensor technologies and mobile networks have become increasingly noticeable in the urban environment, at the same time as the fields of architecture and design are exploring new design methods and tools to comprehend an increasingly complex and interdisciplinary field.

This thesis explores performativity as a useful notion for the understanding of increasingly complex interactions happening between objects and subjects, both as part of re-conceptualized externalized design processes as well as an increasingly interactive architecture moving towards underspecified and open designs.

From the basis of cybernetics and the recent influence of actor-networks, these mediated interactions are understood as essentially part of a social practice, and through a series of recent examples within architecture and urbanism, the thesis discusses the theoretical foundation and presents a revised framework describing the interdependent relationships between objects and subjects as well as humans and non-humans within the design profession.

This new framework, taking into consideration how performativity redefines the role of representation, relationships and technology, is exemplified and tested out by designing a series of very different case projects. Here design is approached as an increasingly interdisciplinary dynamic process involving multiple actors through different levels of performative technologies, leading to a revised vocabulary tying together the different design relationships.

The implementation of this framework provides a working model for how architecture enhanced with interactive technologies and network relationships can be illustrated through the notion of ´quasi-objects´. These performative objects retain both variation and recognisability in changing design constellations and are working as channels of knowledge during the design process, as well as specifies how performative environments provides the basis for collective interactions and place-making.

READERS INTRO

The thesis is introduced through a series of themes related to the field of performativity and interaction influenced by new types of technologies in architecture and urban space. This introduction is followed by the specific theoretical chapters forming the background for the framework used to design and evaluate six case projects.

The layout is organized for a continuous reading of the PhD work from beginning to end, however for the main chapters are additionally included a small summary. Figures related to the written content are placed on the same page as the content and referenced at the end of the thesis.
A series of reference projects exemplifying the integration of performative technologies in different variations and spaces are included at a central location towards the middle of the layout and throughout the theoretical chapters. This is meant to continuously exemplify how the theory relates to contemporary performative projects, and they are organized to reflect the stated theme of the chapter.
There are no footnotes or endnotes but everything is contained within the content. References are following the Harvard Style and are listed at the end of the PhD.
The appendix refers to the publications and material produced as part of the PhD, and additionally it lists the acts, which relate to the design of the case projects.

The PhD is only produced in a limited amount of copies for the internal purpose of the dissertation work and is not meant for further distribution, as not all examples projects are cleared as regards to copyright.

1 The **first** chapter introduces performativity from its origin in linguistics and performance theory.

2 The **second** chapter describes the relationships of performativity to the fields of architecture and urbanism.

3 The **third** chapter illustrates the importance of understanding emergence as part of performativity.

4 Chapter **four** introduces the background for performative technologies and describes the historical background with its impact on architecture and urbanism.

5 Chapter **five** discusses the influence of computational technologies and networks towards a new understanding of the affect on bodies, place and social relationships.

6 Chapter **six** presents actor-network theory as an approach to describe the effect of social technologies as non-human actors and the relationship to design and interaction.

7 Chapter **seven** re-introduces and extends the term, quasi-object, which combines the essential elements of performative technologies with the understanding of ANT as a new language of describing interactive objects and their affects.

8 Chapter **eight** develops a performative framework, which integrates the understanding of technology, representation and relationship into one tool to both analyse and design for mediated design processes and interactive environments.

9 Chapter **nine** analyses the case projects through the performative framework to evaluate the emergent effects of computational technologies and its significance for the design process and place.

10 Chapter **ten** concludes the research by responding to the research questions as well as discuss the future perspectives of performative environments with some final critical reflections.

CONTENT

INTRODUCTION

In recent years the influence of pervasive computing, mobile communication and digital networks have become increasingly noticeable in the urban environment, at the same time as the fields of architecture and design are exploring new design methods and tools to articulate an increasingly complex and interdisciplinary field. The influence of these technologies are no-longer considered as only temporary facilitators for a media-culture, but are becoming essential tools for both the design of spaces and the feeling of place in changing environments. Recently the notion of information technologies have largely maintained a focus on digital tools and data moving in networks between spaces to facilitate communication and exchange of services, goods, people etc. This project looks at the tendencies that treat the computational technologies as integrated environments, where any material potentially processes information including elements containing feedback mechanisms, thus considering how information is part of a material practice.

With the integration of computational technologies, the research project, Performative Environments, focuses on the emergent effects of crossing social and technological networks as a basis for an architecture that stands out as dynamic and open, facilitating self-organizing communicative environments for an organized complexity between flows of local interactions and network behaviour. This is not however for the sake of technology and increasingly more sophisticated experiments, but it evolves around the central issue of how architecture and urban spaces can merge with the current potentials of new technologies inspired from other fields, to stimulate the design and interaction with material settings. In general new digital technologies are introduced with faster pace for every aspect of life, but they are still far from integrating fluently into the everyday, and from time to time they are in risk of becoming even greater barriers for a vibrant urban life and social qualities. This project focuses on the potential outcomes of pervasive technologies integrated in architecture and urbanism in the light of changing public arenas, multi-functional and shared spaces, mobility and globalization and the arrival of a new generation of both more advanced non-human actors and more technologically accustomed human actors.

Looking at a culture of mobility with increased transportation and communication patterns from a more global perspective, we can additionally reflect on the tendencies of this more mobile and dynamic society, which influenced by mobile technologies have made dramatic changes to social and urban behaviour. Thus the starting point for this project is the understanding of the effects of more sophisticated networked sensor technologies and the emergence of cultural affects that radically transforms the way objects with intelligence and subjects interweave in complex relationships. These transformations are changing the design processes and seem to also influence our behaviours in spaces and general feeling of belonging, in times where mobile technologies are increasingly entering the urban domain, while architecture and urbanism largely have remained unchanged as material settings. The research project investigates the potential of these pervasive technologies on the field of architecture and urban design, both as a tool in the design process, a media for personal communication with increased individualized settings and along with the emergence of new cultural artefacts designed for social and collective environments.
The complex notions of how bodies and technologies are increasingly interweaving as part of both design process and the perception of the build environment requires a renewed approach to the understanding of the influence of these technologies. These influences are initially understood as performative, in the sense that human and non-human actors are increasingly collaborating and exchanging information in new interdependent processes.

Research Questions

The research project is guided by this initial research question in order to make an investigation of new designs, technologies and methods that respond to the above mentioned changing conditions of society.

> *How can an understanding of `Performative Environments' treating the emergent effects of interactive technologies explore a new framework for the integration of socio-technical systems in architecture and urbanism?*

The approach to this research question is divided into three more specific questions based on a study of the background of performativity, the technologies applied in relation to architecture and urbanism, and lastly and most importantly, the affect on the design as process with the performed object in mind.
As mentioned the central understanding departs from the notion of performativity.

> *What is the origin of performativity, its essential characteristics and the related influence on architecture and urbanism?*

The transformation currently happening within the design professions is due to several reasons; however in relation to this project there seems to be some specifically new computational technologies and digital networks, which are been initially explored through related fields of interaction design, digital design, computational software for architecture and urbanism as well as currently upcoming fields of urban computing and situated technologies.

> *What is the significance of performative technologies, and how do they relate to interactivity, networks and the experience of architecture and urbanism?*

Finally these understandings and changes in technologies, materials and processes seem to affect the way design is carried out as a profession, as well as how architecture and urban environments are perceived through new notions of computation, networks and media. A new methodology and framework is required for design to cope with these changes, which takes into account both the aspects of theory and practice, interdisciplinary work and the changing role of technology.

> *Can the experimentation with performative technologies through a case-based design methodology propose a new framework, which describes the relationships between human and non-human actors, and inspire a more place-based and social approach to architecture and urbanism?*

The thesis responds to the research questions through five introductory theoretical sections, which defines the background theory and the issues of performativity, technology and the relationships to architecture and urbanism. The research project uses the next two chapters to define the scientific basis and a new vocabulary for how to understand the integration of performative technologies from which a new framework is developed.

This framework introduces six case projects, which are evaluated from the same consistent method leading to the conclusions and future challenges. Thus this thesis is an attempt to provide one overall and continuous description of the PhD work carried out as part of the 'performative environments' and with the stated design challenges. This work has additionally been explored and documented through presentations and peer-reviewed publications during the research period, as referenced in the appendix.

Findings

The response to the research questions is exemplified through both minor conclusions throughout the thesis, a comprehensive review of the case projects as well as a detailed conclusion with perspectives and assessment of the work. However the main findings, which appear through the complete work with the iterations of the research method, can be defined as:

- introducing an interdisciplinary approach to performativity with examples of its application to the fields of architecture and urbanism
- defining a new emerging field of performative technologies based on pervasive computing, advanced sensor technologies and mobile networks with a description of the effects on the design professions
- extending a research-through-design methodology to deal with multiple scales and feedback through active design work and experimentation
- defining how the performative technologies with relationships, affect and embodiment relate to the important issues of place-making and social spaces
- providing a framework for how to deal with integrated responsive systems in architecture and urbanism ranging from passive, reactive, interactive and towards performative feedbacks
- providing an overall framework for how the design professions can inscribe the design process into elements of technology, representation and relationships to allow for higher value of emergence throughout the design process
- designing and exploring case projects with interactive urban artefacts and sites of interaction facilitating place-making and social interactions through new socio-technical systems
- defining the future potentials of performativity through the vocabulary of actor-network relationships to be inscribed in specific designs with the development of quasi-objects
- additionally describing how quasi-objects inscribe human and non-human actors into social networks, and through these become the mediator of the design process and as an extended interactive environment which empower human actors, travels in between spaces, change their appearance, circulate information, facilitate interaction and generally become focal points for a social realm through the relationships that they are enacting
- lastly the project specifies several challenges and objects of concern for the development of interdisciplinary creative design processes relying on the feedback between real-time site-specific information and the future experience of the environment

RESEARCH CONTEXT

Personal Context

I am part of one of the first generations that was seriously affected by the early introduction of the personal computer and digital networks. However, before this influence I wasn't completely in lack of context - on the contrary. Growing up in a forest in a little combined forest and farm-like home implied very specific tangible interactions with everything from forestry to animals and farming. Although this weren't always part of my primary interests, the environment was generally a big playing field for challenging mind and body.

By the middle of the 1980s the first personal computer entered the home office. And even though we were pretty isolated from any fashionable technologies at that time, there were some really ambitious and forward-looking national agencies, who right away distributed powerful IBM PCs to all the main staff, whom previously have been acting very independently and extremely low-tech, including my father. This technology came in as a new central piece on the office desk, next to the telephone and answering machine and with full printing capabilities and network. However besides it being a dramatic change for a working environment, it was a gift for a young child. It provided not only some new ways of doing work, games, graphics etc., but at the same time the network, introduced with the computer, provided access to facilities like BBS (Bulletin Board Services), collaborative environments, sharing of files, games etc. and the soon to come 'internet'.

These two conditions of the 'thick' context and the connected PC however seemed contradicting and have for some reason almost been since then. Although one of the big jumps came with the portable PC around 10 years later and the more powerful mobile phones, they are for most people still acting as media for global connections but still somehow isolated local artefacts, which exists in but only intersects little with the local context. These technologies are acting as personal computation devices with communication technologies, and global information can be accessed through these sources, but only rarely they contribute to the present environment and specifically intersect with the material settings. They do not feed in to place, so to say, and space more seems to be a raw container of input. Although this integration has been announced almost the last 20 years, it is first by now that we begin to see how integrated computation, distributed sensor technologies and mobile networks act as extensions of existing spaces and functions within the everyday life of architecture and urban space; a tendency which still has much to wish for and carry at least as many challenging prospects for the future.

Professional Context

The field of architecture and urbanism as professions are being increasingly challenged these days; mostly due to new parametric software that provide very rational techniques for dealing with materials and structures, at the same time as being presented for more severe financial constraints, challenges on the 'design ownerships' to the process etc. No doubt that technology brings into consideration many interesting collaborative environments not to mention some tough discussions between architects, engineers and clients; however would this be the real important challenge for architecture in the beginning of 21st century? Many of these challenges are being faced by architects by adopting new software tools that take into account for architecture to be experienced before-hand, and at the same time facilitate a model, which can be controlled by the architect. However in this light of more parametric, algorithmic and generally more rational tools, we are still lacking tools and understandings of some of the core fields of architecture and urban studies, which are not yet faced by these technologies.

For sure more efficient tools that take into account more advanced parameters are obvious for especially an architectural profession, but also generally as a new way of working through the whole building industry. However the main important challenge right now seems to be that the revolution of mobile technologies are not at all concerned with architecture. When observing how people move in streets and how architecture is affecting people, it seems obvious that the effect of the new computational technologies are mostly happening at a representational level, where the building industry aims at producing generally more significant icons as well as working to an even more increased level of optimization. However in everyday life the materiel setting framed through architecture and urban design have difficulties in coping with the attention from new mobile technologies.

Architecture and urbanism are getting in the background, although still with an influence, where new technologies might serve to increase relationships between the build environment and people, at the same time as stimulating a broader understanding of relationships across spaces and people.

At the same time the context that feeds the development of parametric design models are still based on extreme simplifications of everyday life, and with the current computational powers and logic of communication and distributed sensor technologies, it seems relevant to discuss if there would be other ways to combine the experiences of sites and environments with more real-time technologies, taking into considerations the complexity of real life interactions within design studies.

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'You should beware of this chapter. I hope that it works and is useful, but it comes from somewhere, rather than everywhere or nowhere' (Law, 2007, p. 2)

The research methods are described with an overall introduction to the approach to knowledge and science followed by the specific fields framed by theory, methods and empirical knowledge and the interaction between them. This is necessary in order to understand the relationships between the theoretical work and the integrated role of real-life case projects and experimentation, and additionally to provide a broader understanding of the effect of performative technologies on architecture and design. As mentioned in the introduction, design professionals within architecture and urban design only rarely reflect critically on the actual affects of the designs at the same time as scientific knowledge with new technologies are primarily integrated to a level where the Clients can easily perceive and pay for the first and obvious benefit. The combination of theoretical work introducing contemporary ideas and technologies tested out through real-life experimentation is thus an attempt to stimulate a more classified and faster level of both innovation in the professional field, understanding of the affects of computational technologies as well as a possible experience and acceptance of these processes in a broader forum of actors and contexts.

The background for this research thus stems from an interest in combining the theoretical investigations and reflections of the doctoral work with practical design explorations with real clients and sites seeking to find a combination aspect of the knowledge sustained through this interaction. This design inquiry is inscribed in learning processes acting in different domains of knowing moving in-between the subject of philosophy and the domain of science. Here knowledge is developed in an iterative process between the interdisciplinary field of socio-technical studies within architecture and design, and the empirical studies setting up, designing and evaluating a set of design experiments with the related empirical methods. The developed knowledge is accumulated in a series of diagrams which aims at making the knowledge more 'socially robust', at the same time as it is exemplified and tested out through the interaction with professional actors.

As part of the subject of performative knowledge, it is thus the aim of the research to combine the theoretical arguments and reflections of the humanistic sciences with the empirical investigations of the natural sciences based on design experimentation. The design experiments are performative in the sense that they set up a complex relationship between actors and environments to study the actual behaviours and interdepen-

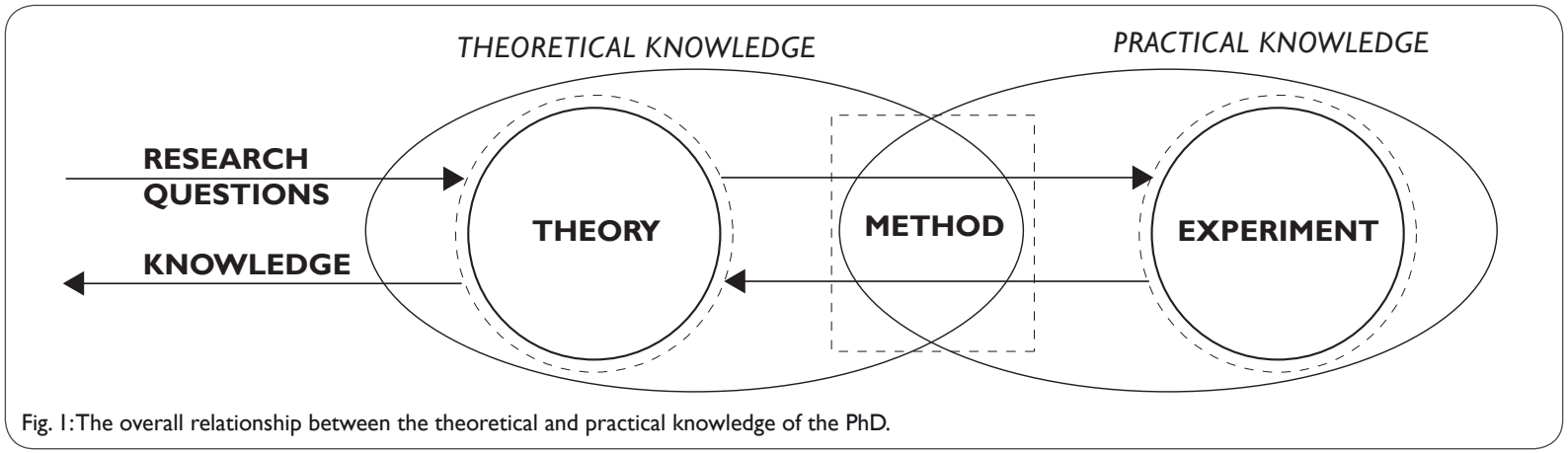

Fig. 1: The overall relationship between the theoretical and practical knowledge of the PhD.

dent relationships, which are impossible to study in closed laboratories; at the same time the researcher is closely involved in both designing and examining the work both affecting the setup of the experiment and the scenario for interactions. Knowledge is evaluated on how well it can both describe the overall relationships in the design experiments as well as the social affect inscribed in a feedback between actor and context.
This overall relationship between the domains of theoretical and practical knowledge and the related scientific method is exemplified in the below diagram. The domains illustrate different ways of perceiving the world of science, however keeping in mind that among the comprehensive scope of potential theoretical and empirical knowledge, every scientific endeavour contains a large degree of reduction and simplification of principles (Hastrup, 1999, p. 154).

The diagram on the previous page serves as an illustration of the relationships between the stated research questions, theory, method and the empirical work. The domains of knowledge are simplified as the theoretical knowledge also implies some empirical work although not necessarily experiments, and where the practical knowledge at the same time lead to theoretical knowledge. The traditional natural and humanistic sciences have worked from each direction respectively starting from either a positivistic approach (logic empiricism) based on factual generalized phenomena from which to create an understanding of the world, or through critical rationalism (hypothetical-deductive) starting from a hypothesis with a reflective starting point to observe the empirical work (Pahuus, 2004, p. 12). However there are multiple considerations with both directions mainly considering the aspect of the natural sciences that scientists shouldn't have any preliminary understanding of the world before starting the empirical studies, as well as the how this knowledge is reflected in the tools and equipment they are using. On the other hand considering a theory as starting point can many times seem to be a very loose ground depending also here on the societal basis and background of the researcher and context. (Hastrup, 1999)

The starting point here however is to provide an introductory research field both through the research questions and the first theoretical investigations. This is mainly required as an aspect of critical rationalism in order to establish an introductory paradigm, which illustrates a shared agreement constituting an area to be explored in more detail through specific artefacts and experiments (Kuhn, 1962). This also implies iteration between the theoretical work and the experiments, where each cycle is critically examined towards an evolutionary approach to knowledge. The introduction of a theoretical approach mainly inspired by both a humanistic and technological framework before the experiments, also acts as a natural background for the design experiment, where it provides a selection argument within performativity, when normative research is not an essential part of this research. However when these feedback loops comes into existence through human action with experiments constraint by elements of the natural sciences, it is additionally moving into more complex fields of hermeneutics; a combination aspect recently presented as 'naturalistic hermeneutics' (Mantzavinos, 2005).

Nevertheless, this is believed to be an unnecessary complication of the more specific field of science within design, but critical rationalism from Kuhn inspired a whole field of scientific studies mainly influenced by a socially constructed scientific knowledge, which is a more essential part of performativity. Here it is especially valuable for the considerations of experiments, as critical rationalism aims at testing out the hypothesis by creating the conditions behind the hypothesis, as well as every observation is affected by certain ways of thinking. The studies that seek to combine the issue of a socially constructed scientific knowledge with the complexities of different influences of experiments and actors can be referred to as being extended by the 'actor-network theory'. This theoretical standpoint was originally based on research in the natural sciences, more specifically showing how scientific facts are an integrated part of processes of negotiations and translation between human and non-human actors (Latour & Woolgar, 1986), but it is also part of the critique of the grand narratives and general objective theory, which also characterizes the critical rationalism. This performative and relative understanding of science as constituted in heterogeneous networks of both concrete and abstract entities is essential for the construction of knowledge and the broader influence of experiments. The specific performative scientific aspects of these more relativistic approaches to knowledge, is exemplified in more detail as part of the discussions of actor-network theory in the later chapters and its specific application in the case projects.

Research through Design

What is exemplified through the research methods is a broader understanding of the design experimentation as an extended version of the laboratory. Here the case studies as practical design experiments carried out with real clients and sites becomes a turning point for a new object of knowledge, however inscribed in more complex relationships. The reason for this discussion of the relationships between theory and practice arise naturally from the design aspects of this research, where one of the main purposes is to illustrate how a feedback between design experimentation and theory can provide a more classified knowledge on the effect of performative technologies, which is also highly relevant for practice to discuss and use.

The issue of experimentation was the obvious condition for the natural sciences, as well as it has existed for a while within human-computer interaction studies evaluating mainly interfaces and semantics of software. However also within the more specific fields of design, there is a beginning tendency to discuss the relationships between for instance 'research through design', 'research-on-design', 'research-in-design', 'research-by-design' or 'research-oriented design', which all aims at making design and research more operational. This is a very difficult task mainly because of the often silent and intuitive processes associated with design, the traditional more master-oriented approached to design practice as well as the specific evaluation of design through studies of human interaction. Additionally it is difficult because the design of objects traditionally haven't been associated with being knowledge or research, but instead an outcome of a specific knowledge or competences. Fallman mainly focusing on HCI design (Human Computer Interaction) is differentiating between design-oriented research and research-oriented design where the main difference is the focus on the final result of the design and the actual involvement of paying clients (Fallman, 2005). In here research-oriented design has a focus on the artefact, where it is not just considered as a sketch or a working prototype, but with the motivation of providing an actual product to a paying client. This aligns well with both the perspective of active learning models where knowledge is a way of acting, as well as how an active improvement of an unsatisfactory, problematic situation is one of the primary motivations for thinking and designing (Dewey, Logic: The Theory of Inquiry, 1986). This design work, with real projects and clients, is also the ambitious focus of this research, however with the intension to work across multiple design scales, where projects often becomes comprehensive, complex and time-consuming. The idea of a more practice-related and 'honest' feedback should be the case of the interaction between the research design and the real sites and actors. Essentially this also creates a beginning complication of the differentiation between the actual research innovation and the design intend, however knowledge becomes apparent through the reflective process as an outcome of the feedback between different case projects. At the same time it is the ambition that the intricate relationships between research and design, theory and practice and the manifold of intensions and negotiations between various actors can be studied through actor-network theory, as a more specific way of tracing differences and translations during the design process.

The Engine driving the Research Methods

The above introduction now allows for a more detailed description of the research methods, as they are performed through this doctoral work. This diagram elaborates the research methods with a greater amount of detail along with very specific directions to how the theory, methods and experiments are interconnected. The diagram on the next page describes the relationships between these elements in the research project.

The research is carried out as an iterative process between explorations of theoretical works with the construction of arguments, together with the design of experiments and the subsequent reflections in a feedback revisiting the theory. The methods of design involved with the critical reflections of thinking develops both the theory and the experiments to gradually new levels, at the same time as material from the experiments are condensed and reflected into definitions for the future explorations.

The main introductory focus, indicated with the inner circle of the diagram, concerns an ambition to explore a body of work which reflects the initial research questions, and which are comprehensive in scope but specific in application to be able to support the first design reflections and experiment. This is the first move which is described by the research question followed by the inner theoretical circle consisting of the foundational theoretical work. These works are based on the groundings of performative theory, its recent application within architectural and urban theory as well as the essentials of emergence as a condition of performativity, along with the basis concerning technologies treating performative questions. Thus the introductory theory is bridging core theoretical work with design considerations and a technological basis, in order to be able to describe the ambitions and concept for the first experiment.

The design of the first experiment, with the first design move and the inner experimental circle, should provide the basis for the overall framework, the methods of evaluation and the experience of contemporary design

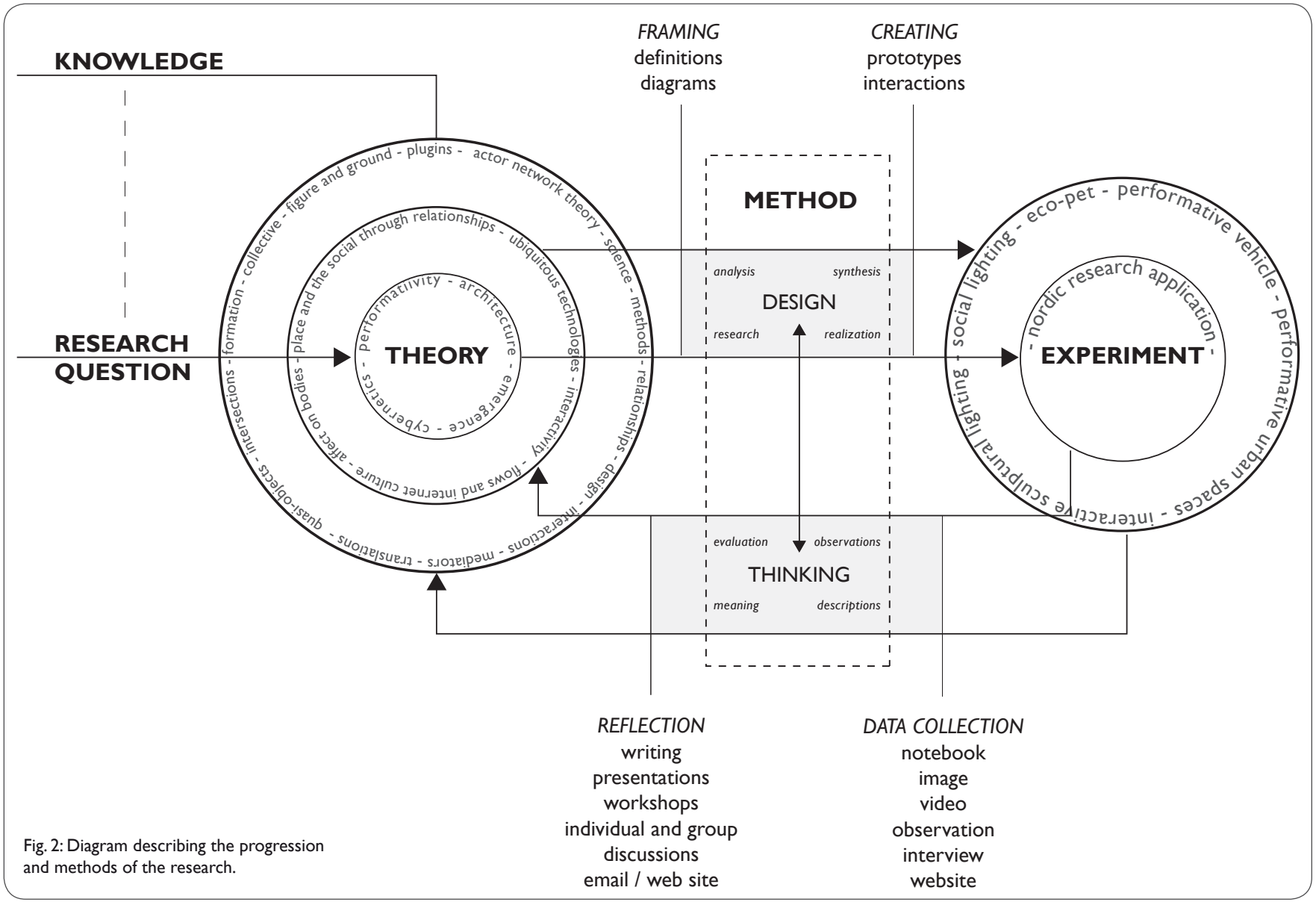

Fig. 2: Diagram describing the progression and methods of the research.

processes with computational technologies. This design work is carried out from the basis of existing design principles describing iterative design processes. Here several different theories and approaches are describing the stages between the initial framework and realization; in the problem-based model explored at Aalborg University, the model is divided up in the specification of the problem, the analysis, solution and conclusions, where the more general design approaches goes through phases of learning with research, analysis, and synthesis towards realization. This resembles some of the stages in the Kolb's four-stage learning cycle concerning concrete experience, reflective observation, abstract conceptualization and active experimentation as an essential basis for working with experimental work (Kolb, 1984). However, like with the reality of experiments and integration of theory and practice, this is not always the case of how practice is approaching design, mostly because they are caught up in a manifold of different forces with loads of coordination issues, deliveries to clients and authorities etc. Therefore the design experiments are an essential part of bridging the theoretical and practical fields of knowledge, as they become the analytical objects both framing and contributing to the theory, at the same time as providing the empirical material for investigating technologies and affect. Ongoing through the research project, a comprehensive list of reference projects are developed to facilitate design discussions, client and user meetings with specific and easy to understand examples of performative works and technologies.

This first project to initiate the perspective of the broader considerations of design experiments is the Northern Research Application (NoRA) to be presented at the Venice Biennale, consisting of a detailed documentation of the design process and interactions on site as well as relationships to clients, contractors and the general feedback from academics. At the same time this experimentation requires critical thinking to extract and evaluate meaningful information from the observations and descriptions; a process based on learning principles going back to the first ideas of Dewey (1933) probably most well-known through the taxonomy of Bloom mainly in the cognitive domain (Bloom, 1956). Here it is important to emphasize how knowledge exists in the fields between theory and practice, and how it is both embodied and social, mediated, influenced by the tools used and created through interaction (Fook & Gardner, 2008, p. 28). The two main elements of the method, design and thinking, supports each other and is an important element of the process of knowledge, acting as a design intelligence combining thinking and doing, and sustained when design integrates a pattern into the world (presentation by Speaks, 2008 based on Hawkins, 2004). Here the experiment is the design, which is compared and tested out in a real-world scenario; thus the first experiment at the same time provides the initial experience with and feedback on the actual applications of performative technologies and the challenges and barriers for the future work.

The second iteration extends the theoretical work in regards to better understand the effects observed through the first experiment, mainly by elaborating the definitions and influence of new technologies as regards to interactivity and networks, as well as the affect on bodies, place-making and social relationships. This theoretical work serves additionally to be condensed into the first initial framework and diagrams, used first of all as a general understanding to discuss the implications as well as used as an input in the subsequent design processes. The additional design processes extends the methods and tools used in the first experiments but divided into several experiments each with a specific focus and direction in relation to the developed framework. Thus the second design iteration is meant to dive deeper into more specialized areas of the first experiment, and then also to extend the critical reflections upon the methods of doing experiments and the associated complex relationships.
After the second phase of experiments and reflections, the theoretical work finalizes the research by specifying the concepts and discussions, which encapsulates the complete body of work into performative knowledge and applications, by assembling and reflecting upon the feedback between theory and practice through the methods of actor-network theory. This final theoretical feedback upon the practical experiments is condensed into the conclusions, final framework for future studies and the associated knowledge obtained through the research.

Theory

The theoretical part of the research project becomes a way to frame the reality as a reduced perspective of the research by introducing a series of recent theoretical directions within performativity. It is initiated by a hypothesis which emphasizes performativity as a useful notion for understanding the influence of computational technologies on contemporary design processes. This notion of performativity is reflected in contemporary theoretical discussions and current works and exhibitions within architecture and urbanism, thus investigating the initial idea that performativity is central for understanding the affect of architecture and design and contemporary design processes.
Performativity is used as an initial umbrella term describing how archi-

tecture and design increasingly participate in complex real-time acts with the surrounding environment through integrated technologies, and thus frames the succeeding studies on technologies and culture. The definitions of performativity also becomes a way to frame the theoretical discussions within the cross-disciplinary design field of architecture and urbanism, which through recent architectural debates, project examples and overall tendencies define the basis for understanding the essential notions of performative environments. The notions of performativity within architecture and urbanism shares some similarities across both design processes and realized projects, and they are described through a common language all referring to a related vocabulary of technologies and the effect on design. This brings in a discussion about technologies and the recent background of computational technologies, and extends the theoretical work into more detailed technological studies and the affect on culture and human behaviour.

The theory presents how elements of contemporary design discussion and technology can constitute an initial reality for the research, and in this way it introduces the first constraints of the first experiment through the conceptual notions of culture, space and interactions and the issues to explore through experiments. Through the feedback between experiments and theory, writings and revisions also becomes a continuous process of developing a framework for the experiments, especially in the second phase of experimental work, where the theory specifies different aspects of technologies, interaction and design relationships to be investigated through the experiments. In the end the theory is a way to round off the research by comparing the initial research questions with the overall process and to compare the different aspects of science with the experience of the case projects thus building up the final theoretical arguments and linkages, which can shape how the knowledge of the research can be made applicable for future work

Experiments

As mentioned above, the experiments are the essential elements which differentiate this research from many other doctoral projects. The research project are specifically integrated in practice but started up through the theoretical framework with the possibility to both participate and realize an experiment applicable to the research. The first experiment aims at being investigated with real clients, a fixed economy and potential sites, as an example project to set out the directions for the future work. Additionally the design studies for the first experiment are grounded in academic work through the active participation of students and teachers at the same time as it contains the regulatory demands for constructing a building for public involvement. Through the first experiment the research is both initiating the initial concepts through the theory, coordinating the project and participating in the design and realization for the specific constructions, however the main design initiatives and loads of work is carried out by students and professional builders. Thus here the research contains both a possibility to reflect and step back to observe the project at the same time as being involved and participate where required. In the end however, when things get tight, the processes gets messed up and everything is set in to aim at providing an experiment, which can fulfil the requirements for the theoretical work and the overall research.

The first experiment shapes the overall understanding of the impact of the reality presented in the initial theoretical framework, at the same time as it dramatically influence the next level of theory based on the experiences and reflections with the initial case project. The second round of experiments contains the possibility to carry out specific aspects of the theoretical framework instead of having one comprehensive build project; the works are split on different types of projects with different levels of realization, clients, economy, sites and scale with the theoretical framework as the common basis. These experiments are becoming more complex, mostly because of the several smaller case project each discussing one aspect of reality, and with a performative framework at times becoming more complex than one big project with a more complex setup. At the same time these experiments are more open and less restricted in time as well as they involve less other actors in the process.

The active participation in the multiple projects also becomes a way to in the end summarize and reflect on the overall patterns in the research, in relation to how the different experiments are approached, designed and partly realized throughout the full research period. In the last part the design thinking consist of extracting both the individual experience from each of the projects as well as trying to condense the overall impression into a joint field of knowledge. The architecture and design experiments become a medium for understanding a science to both test of new and question old paradigms, as well as investigating the emergent cultural phenomena expressed through architecture and design.

Methods

The method deals more specifically with the design thinking tying together the theory and experiments and keeps a pace in the progression of knowledge; besides the general process of design and thinking as described above, the key activities are described as Framing, Creating, Data Collection and Reflection, as elements used throughout out the different phases of the doctoral work.

Framing concerns the essential simplifications of the theoretical work by defining the key terms and characteristics as a language for the design work. At the same time this language is supported by a series of diagrams, which are continuously refined throughout the research. Although this framework changes during the course of the work, the main definitions are faster at becoming essential terms used to describe and communicate the scope of performativity and technology. The diagrams are more loosely tied to an ongoing discussion on how performativity and technologies are influencing both the design process and the interactions in everyday life and are thus slowly detailed and compressed throughout the different iterations.

Creating concerns the ongoing development of models and prototypes. They are also essential parts of the design process but similar to the issue of framing, these prototypes and models gradually become representations of the framing and theoretical work, although they do not exist as the final and realized experiments. In this regards they have a more archetypical character and have the potential of facilitating the design process as ongoing inspirational work. Here more traditional physical prototypes in any available material become the first drafts for form studies and interactions, however quickly these prototypes are transformed into computer models or more detailed parametric models. Sometimes this happen in the other directions especially in projects where clients provide an introductory site model for computational studies of natural phenomena to be additionally explored using fluid dynamic software or similar. The process of creation sometimes emerges as a great surprise considering that models are explored for potentials and when an idea gets to a point where it needs a more refined representation. This feeds back to a mixed feeling of often relief, disappointment or a wealth of new aspects to explore.

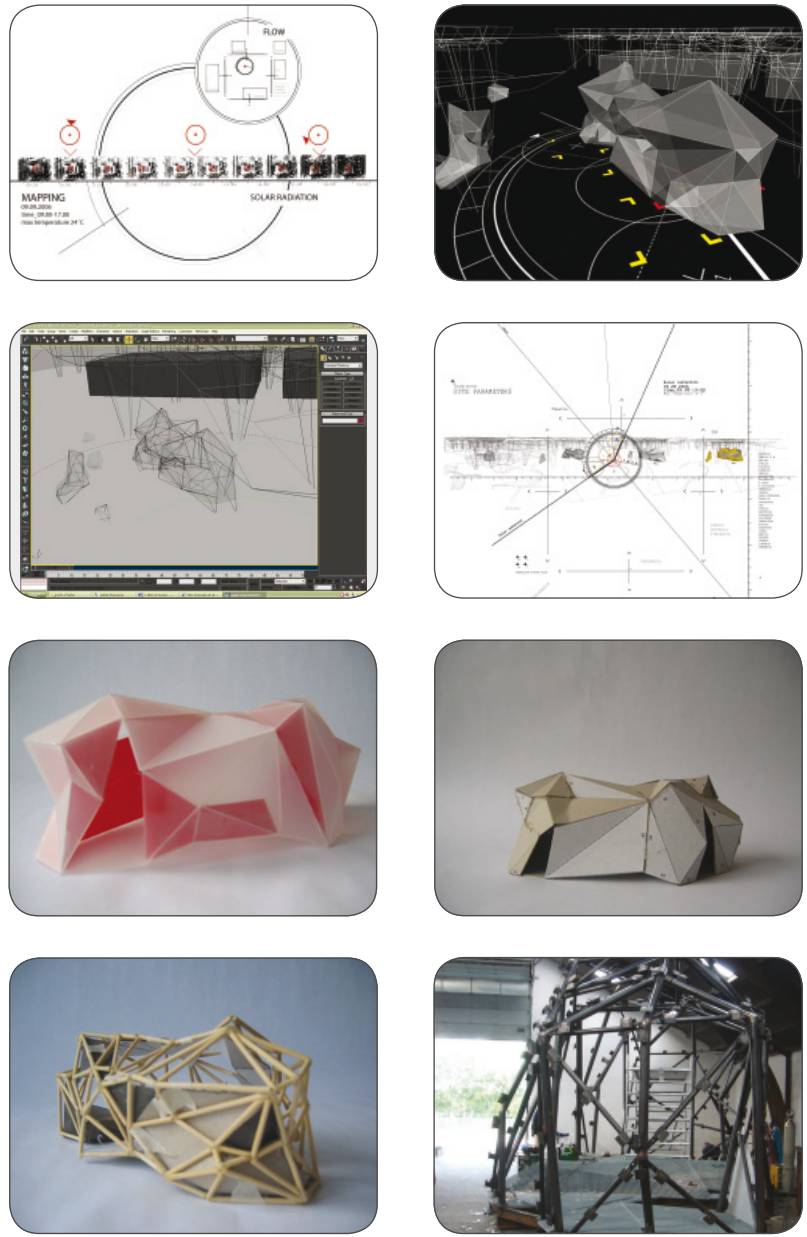

Fig. 3-10: Different models and illustrations used as part of the NoRA development.

Data collection is the essential part of the method to gather material for the reflections. Throughout the research project every face-to-face conversation, presentation, workshop and discussion is documented in a series of notebooks. At times the computer is also used to sustain key conclusions and activities; however even with tablet screens to write on, the notebooks are still considered the most valuable tool. Besides being a traditional diary tracing conversations and observations, the notebooks are an essential tool to right-away extend the ideas of current discussions into being more practically integrated for use in the experiments. Thus they become the design researcher's real-time representation of the obvious potentials of having both experiments and theoretical work running at the same time, as illustrated with the research-through design perspective. When specific discussions and subjects related to the ongoing experiments are initiated, one page of the notebook contains the tracing of the observations at the same time as the other page contains the rewriting, idea generation and sketching for how to integrate and conceptualize the current observations as part of the designed experiments.

Besides the notebooks with sketches, the researcher always brings a high-resolution camera at most time also with video recording; every observation of, and in most cases also meetings and presentations, are documented with an image. If the camera fails to be in the pocket, the Nokia N95 mobile phone is maintained for reference also with high resolution camera, video-recording, gps and sound recording. This device at the same organize all photos in a diary with date and time to be supplemented with comments and potentially related to geo-location and compared to current sms-messages. This is indeed a performative device although customization and manipulation of e.g. images is very awkward, but all material is at hand and can be used to initiate conversation, provide reference examples etc. Video is used mostly to gather data about interactions with performative projects both as observations of everyday examples, but most importantly to gather the experience of interaction from the experiments. Loads of video is recorded, however at most times with many projects, it is the most beneficial to observe the interactions and follow up with short interviews on the affect.

Here interviews are not used as detailed anthropological studies but more as brief discussions on the street level with in depth questions on the reason for the observed activity. Websites will be used both for the gathering of reference examples, which at the same time can be circulated and presented for general discussion as well as websites used for ideas generation and conceptual studies on specific sites.

Fig. 11: Notebooks for the PhD

Fig. 12: Integrated phone, camera, video etc.

Fig. 13: Interviews with high school students.

Reflection condenses the iterative process of combining the theoretical studies with the feedback from the experiments. The research is doing its outermost to present the experiments in broader forums and through these presentations raise relevant questions for discussions and feedback. This is done in a series of conferences, workshops and general discussions with clients, users, colleagues etc. At most times the presentation is changed to reflect the specific audience both where required but also to receive the most beneficial feedback; here it is especially important to keep in mind that presentations very often can become too academic or technical for practice to perceive, or on the other hand too overall and general for academic to provide a proper response. In many cases the agendas are sometimes two-folded as this research is trying to bridge the domains; at these occasions it is sometimes more of a performative challenge to present a brief and all-inclusive material for discussion – as in the end any actor has an agenda.

In workshops, the presentations and material is mostly provided as a brief input for a more general process and overall goal, and here the presentations only reflect a few of the initial problems, definitions and conclusions, especially by using the diagrams and models from the framework. Email might not traditionally be considered as a proper media for reflection and feedback on the material, as often it is very difficult to interpret the specific intension or receive a more elaborate response. However in this case any response can have relevance, whether a short comment in a blog to a presented project, a paper or if being just a paragraph feedback on one phase of the experiment. These small notes whether in emails or other media are often perceived as more spontaneous comments, which however as part of the overall framework provides important feedback on the affect of the material or project. The researcher will be doing a comprehensive scope of writing throughout the research project as a whole, however mostly during the phases of the theoretical work. Academic references, quotes and snapshots from discussions are maintained as well as every relevant publication, paper or illustration has been digitally scanned and mobilized. Thus potentially every space can become a place of reflection and writing through the mobilization of material and correspondence, however in the end this material is condensed into an overall feedback in the publication.

By conclusion it is important to emphasize that this research project concerns the overall impacts of computational technologies when perceived through site-specific experiments as well as the reflective process considering design process and theoretical background. Thus the perpetual feedback between the theoretical studies and the practical cases are often entering into one complex process where the method has the overall aim to try to trace and specify the output from the manifold of intertwined relationships.

Fig. 14: One of many presentations.

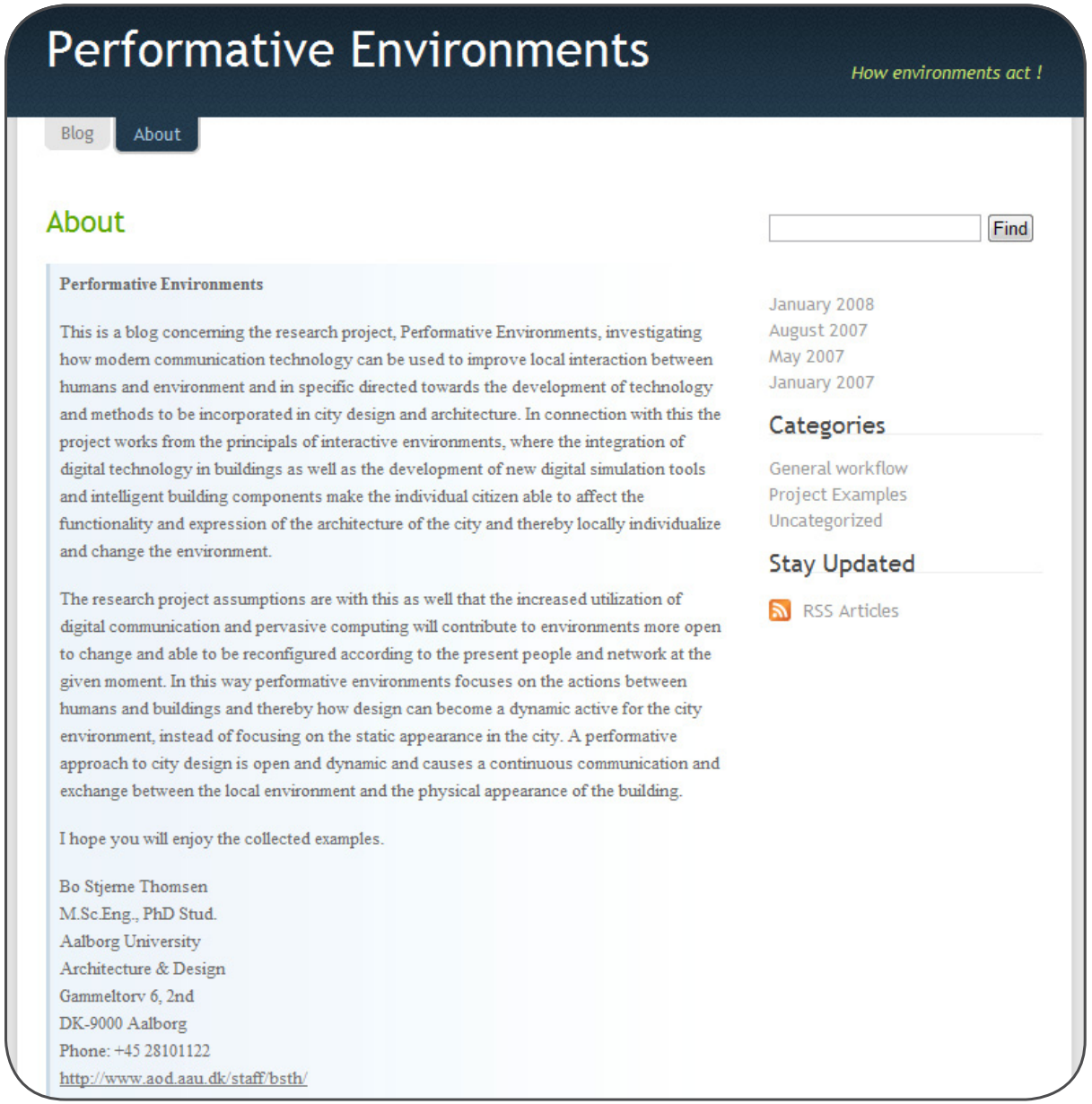

Fig. 15: Blog with reference projects maintained through the PhD.

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The research project adopted the interest in the 'performative' from a series of recent debates within architecture and urbanism, and it rests on a rather comprehensive scope of influences from different disciplines enjoying a widespread popularity. It starts by outlining the preliminary definitions focusing on theories, cases and methods that incorporate actions and effects through multiple feedbacks in complex environments. This field is especially evolving with the recent development of new computational technologies, which requires a revised definition on the affect of technologies and objects, including the widespread integration of the new pervasive, mobile and networked sensor technologies and their impact on architecture and urbanism.
Knowing about these discussions it should be of no surprise that cities and spaces always have had some element of performativity attached to them. When observing and reflecting on the usage of spaces and the complex interactions of people on streets and in spaces, we are looking at phenomena in relation to certain kind of applications, which are getting increasingly mediated through technologies. Essential here is to understand the increasingly complex acts and possible meanings generated from interactions between objects and subjects, seen in the light of new mobile technologies and integrated computation.

The Basis for Performative Theory

> *'Talking to intelligent machines, reconstructing our bodies with the help of prosthetic and genomic technologies, being glued to mobile phones, roving around in cyberspace, indulging in humanoid robotic phantasies, is to mingle our humanity with not-so-mute, active, performative objects in a way which we find equally fascinating as disconcerting.' (Pels, Hetherington, & Vandenberghe, 2002, p. 1)*

> *'Natural systems are now seen not so much as something from which to draw formal order for design as offering a guide to how one can design with the performative qualities of materials, entraining forces and material effects. This marks a significant transformation from the primacy of representations to the use of computation as a simulation and map of performativity.' (Hight, Hensel, & Menges, 2009)*

The starting point for the possible definition of the 'performative' turned out to be quiet complicated. First of all because the singular definition of the adjective 'performative' relate to many interdisciplinary fields of research as well as it is becoming a widely used term to describe both very different and somehow related discourses within both linguistics, philosophy, knowledge, engineering, design, theatre etc. Secondly within the 'performative' itself, which may very well be described with a strong relationship to 'environment', lies the interdependencies on context or a situated condition. Thus it is difficult to define performativity alone but requires to be seen in relation to its actual application. In general it depends on who or what performs and the related acts, however the basic idea treated in this project starts from the focus on performance and action itself, or the process of generating actions that leads to effects and affects in the immediate surrounding environment.
Performatives were from the beginning not introduced to describe the issue of complex interactions, information technology or alternative research methodologies; instead it originated from an interest in linguistics and philosophy. Defining the basic terms of a 'performative' through the Oxford Dictionary provides a brief insight into the variety of meanings:

> *'Performative: Of or relating to performance; (Linguistics and Philos.) designating or relating to an utterance that effects an action by being spoken or by means of which the speaker performs a particular act.' (Oxford University Press, 2008)*

In this way the performative denotes an action within the linguistic definition. At the same time the dictionary emphasize the concepts of J.L. Austin regarding performative utterance as when the 'speech acts'. That is when words 'do' something like from 'perform' where Oxford Dictionary mentions: '*To carry out in action, execute or fulfil, to carry into effect*' (Oxford University Press, 2008). From Austin the 'performative' characterizes the concrete use of language and signifies the realization of expressions in a specific situation by an individual speaker (Austin, 1990). In this way denoting action to language not only giving language a referential function but also a performative one, as when a meaning is constituted through an act or practice. Essentially this seems to involve the issue of communication as the effect of a performative sentence as described by Austin:

> *'I name this ship the Queen Elisabeth', as uttered when smashing the bottle against the stem.' (Austin, 1990, p. 5)*

Then the sentence does not only describe the doing, it is to do it. Butler, whose perspective on performance within cultural performance is additionally described below, further makes an example as an extension to Austin:

> *'According to the biblical rendition of the performative, i.e., 'Let there be light!' it appears that it is by virtue of the power of a subject or its will that a phenomenon is named into being.' (Butler, 1993, p. 13)*

The performative within language was introduced by Austin in opposition to constatives, which usually provided finite statements about the world as either true or false. However also there are utterances, which are more self-reflexive and 'acts' on their own by being part of the reality it describes, moving speech acts from being individual to social and relational. To make an additional simplification regarding the linguistic definitions of the performative, the following two main criteria's were noted by Austin:

> *'The performative should be doing something as opposed to just saying something.*
> *The performative is happy or unhappy as opposed to true or false.'*
> *(Austin, 1990, p. 133)*

A characteristic of the performative thus also imply that it is essentially not a representation of something static, but is reproduced by virtue of the utterance. In relation to the first criteria performatives are doing something in relation to language, and statements are not purely reflective of the current condition, but as well language and speech makes up the world like a theatre performance. In the same way as Wittgenstein described in later works how there are no internal representations, but that it is the use of the word putted into context that provides the meaning (Wittgenstein, 1953), Austin also criticises the idea that the function of language is essentially representative, and statements that are uttered constitute the context in which it functions (Callon, 2007, p. 10). Thus performatives are taking part in the creation of the environments that they exist in, and meaning exists as part of the context that it connects. The second criteria questions normative and relative aspects of performativity. Performative is about doing, and the experience of the acts can be more classified as part of relationships rather than representations of single realities and non-discussable facts.

Fig. 16: Zygote Interactive Ball, which engages the audience at an outdoor concert.

A discussion within language additional indicates that constatives are emerging from performatives effects, thus representations could be said to be in constant transformation and a condition of the state would be impossible (Nealon, 1998, p. 23). The discussion in specific arises from Derrida, who wrote an essay on Austin discussing how performative effects might give rise to constatives like nouns as well as stable identities, knowledge etc.; however which seems to be impossible if they are always performative. Derrida, 1982). At least dealing with performativity and acts imply levels of irreversibility, thus considering an integration of actors and contexts which cannot be undone, but which stimulate processes and potentially emergent behaviours due to the encountering effects.

Theatre and performance studies

Butler (1993) extends these notions as part of performance studies in cultural performance and includes the aspect of norms that are repeated and reinterpreted as part of a performance. From Butler it is clear that the expression 'performance' also comes from the verb 'to perform' like when doing an action or operation, which is similar to an act, being in play or to give a performance as in the Oxford Dictionary and as 'performance' by the Webster Dictionary (Philip M. Parker, INEAD, 2008). The performative understood in this regard do not in specific involve the actual performance, but more understood as when Butler is analyzing how the body materialize, or to say, creates its meaning through performance:

> *'Performativity is not a singular 'act', for it is always a reiteration of a norm or set of norms, and to the extent that it acquires an act-like status in the present, it conceals or dissimulates the conventions of which it is a repetition. Moreover, this act is not primarily theatrical; indeed, its apparent theatricality is produced to the extent that its historicity remains dissimulated.' (Butler, 1993, p. 12)*

In here Butler also emphasizes how repetition in performativity is more of reiterated ritual, which enables the subject as a temporal condition. Butler mostly uses this to describe gender theory but at the same times emphasizes the difficulties in describing certain meanings of words, if they vary with context. Here the subject of context becomes even more interesting, as the norms that are introduced through performatives can only happen if the acts are allowed in the context or society, broader speaking. Or simpler speaking, to be able to work with performatives, the acts need to be allowed or maybe just to be experienced in order for meaning or content to evolve, which is an important aspect to consider later in respect to doing experiments. However a performative succeeds only

> *'because that action echoes prior actions, and accumulates the force of authority through the repetition or citation of a prior and authoritative set of practices.' (Butler, 1997, p. 51)*

This described the necessity for the act to be a ritualized practice, or to start a language used in later chapters, it requires a positive feedback loop. Additionally Butler couple relationships of Derrida and Foucault in describing how identities are performative, and social agency is emergent as a chain of possibilities in a regulated process of repetition (Nealon, 1998, p. 17ff).
This also strongly implies that power relations are governing these formations as from Foucault, but most importantly that the performative statement has to hold in several contexts in order to be meaningful. Butler here brings the issue of performativity into being by inscribing a chain of possibilities (Derrida, 1982) for emergence to happen (Foucault, 1977), keeping in mind that every effect is a response to already given codes. Here repetition as part of performativity seems to be important for the formation of meaning as well as identity, thus transforming things that merely presents themselves as 'possibilities' to more steady 'emergent' conditions, as a definition to be elaborated later on.

In theatre this is easier to handle because context in theatre traditionally has been something controlled or narrated, although the stage is increasingly moving to more spontaneous places, as part of more experimental theatre and urban performances. Erika Fischer-Lichte is studying performance and the theatres of the 20th century arguing how the issue of performance in culture denotes the production of meaning, when the performance itself becomes a level of reference (Fischer-Lichte, 2004). She further summarizes the previous mentioned theories as a starting point for an elaborate study of theatres and events:

> *'They all agree that performative acts / performances do not express something that pre-exists, something given, but that they bring forth something that does not yet exist elsewhere but comes into being only by the way of the performative act / the performance that occurs. In this sense, they are self-referential – i.e. they mean what they bring forth – and, in this way, constitute reality.' (Fischer-Lichte, 2005, p. 27)*

Here the social arrives at a level of reference through the performance, and meaning can be achieved through its dependency on change as a result of activities or transformations (Schlieben, 2002). The heterogeneous field of performance studies do not necessarily relate directly to Austin's speech acts but looks more specifically at the performativity of cultural and aesthetic phenomena's as an object of research. This concerns especially how performative acts or specific performances as events, celebrations or market scenes are an essential part of cultural production, and thus important for how society and place is constituted. These studies are more of an approach where everything contributing to the act becomes a matter of the study, but always concerned with the 'real', how reality is negotiated and constructed as a social field (Gade & Jerslev, 2005, p. 10).

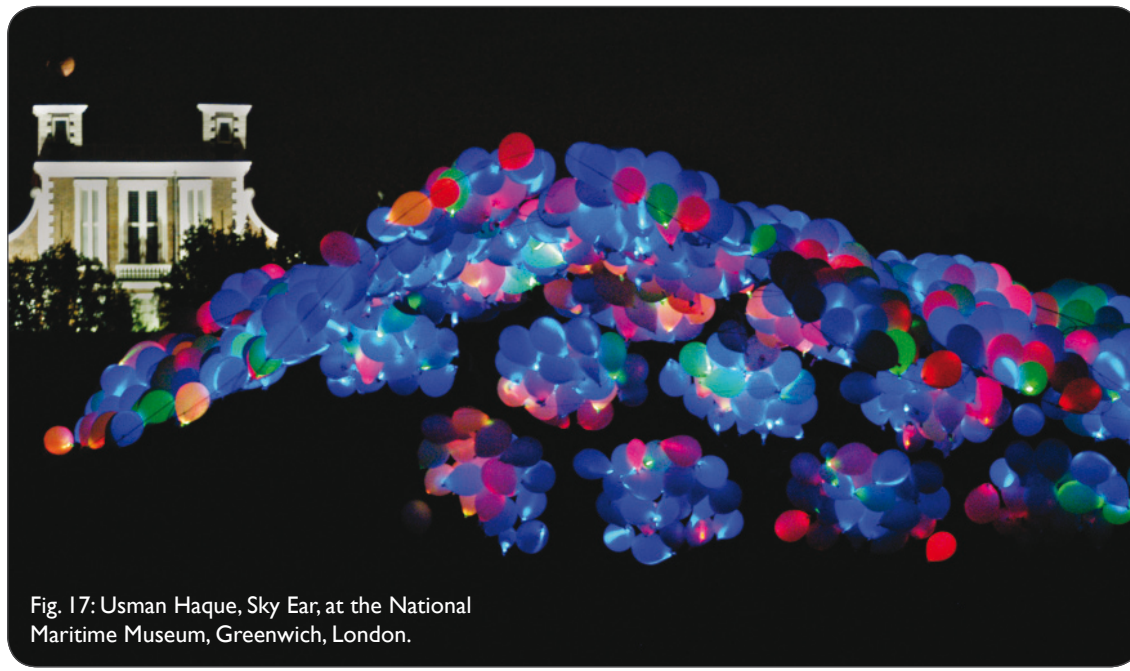

Fig. 17: Usman Haque, Sky Ear, at the National Maritime Museum, Greenwich, London.

Taking the above into consideration, performatives are about actions, sometimes emotional and theatrical but at least coming into play as part on an interaction in an environment. It also implies that the performative takes part in describing the environment in which it exists, and at the same time as in more recent performance studies, it involves the active presence of the actors:

> *A performative space is a space in which the viewer becomes part of the environment, the work, not merely a trigger for the images. The work is designed to incorporate the viewer into the artistic vision. They become performers, if you like. (Rubidge & Macdonald, 2001, p. 2)*

These studies have obviously spread throughout different platforms and into urban performances. Increasingly more culturally rooted performative events involves participants and spectators in complex interactions as part of a more lively and unforeseeable drama. The plot is emerging and the performance (dance, light, music etc.) becomes a constant process of negotiation where each individual contributor tries to find a place in the continuing act. As part of the performance the reality of the setting is created and the performers negotiate their positions and identity. At the same time a wide range of new technologies have extended the notion of performance from the traditional plays and stage settings into more complex interactive, networked and highly media dependant performances.

> *Digital media performances hardly ever refer to one or two particular cultural practices anymore, and laptop performers now use sounds and images; performers from visual backgrounds often employ sounds; installations contain images and sonic materials; architectural sites are designed in ways so as to become performative. (Schroeder, 2006, p. 48)*

These performances involve a variety of settings and media and one of the tendencies following from these new technologies are the crossing and mixing of cultural practices into urban and architectural sites.'
Goffman used the vocabulary from performance and the stage to express how individuals are performing characters, acting if they were on a stage (Goffman, 1973). Even though Goffman in the end (see conclusion in Goffman, 1973) rejects the direct comparison to the stage and the understandings of theatres and performances as comparable to real life settings, it is beginning to get even more relevance with the current mixing of performances and the city. The individual acts differently and will be calculating expression according to each situation and environment, and the interaction between individuals is determined by a feedback between different levels of information and expectations thus considering the communication back and forth. These social interactions are staged through human performance and, according to Goffman, leads to a 'making of worlds' also in urban settings:

> *'What is more distressing than the "vulnerability of public life" in modern society, however, is that we ourselves are actually making the world, in other words, the worlds is an outcome of a "working consensus", which is characterized as a "modus vivendi"' (Goffman quoted in Kim, 2003, p. 61)*

Here reality or social order is maintained by the contributing members. Goffman later develops this into an 'interaction order', which can be understood as a level of performativity, or emergence, as described later on:

> *'It is an order of activity. Whereas in premodern society 'social order' referred to an entirely different order, in modern society the institutional order has lost influence on individuals, and it is the interaction order that remains.' (Kim, 2003, p. 63)*

In the same way as Butler describes how this social order happens through performativity by repetition based on previous codes, this social order occurring through interaction also constructs people's identities and *'do not precede their performances, but are constructed in and through them'* (Callon, 2007, p. 335).
Bringing actors into the discussion also concerns one of the critiques of McKenzie, as the performative 'turn' further stresses the importance for the individual subject to 'perform' in all matters of the everyday and constantly to evaluate identity as part of current actions. The performative identity involves performing for someone – it needs an audience, and '*becoming a subject is thus a relational matter; it takes two or more*' (Gade & Jerslev, 2005, p. 8). Performativity then becomes a matter of inter-subjectivity and involves a constant feedback on efficiency and performance in relation to a variety of relational factors. When described by the words of McKenzie one might acknowledge that the performance concept has widespread impact:

> *'Because performance assembles such a vast network of discourses and practices, because it brings together such diverse forces, anyone trying to map its passages must navigate a long and twisting flight path.' (McKenzie, 2001, p. 4)*

In 'Perform – or else' McKenzie tries to come around a general theory of performance within organization, technology and cultural performance

with inspiration from Foucault and Deleuze. However instead of a focus on discipline, performance will be the primary driving force for power and knowledge in the 21st century through the following main challenges:

> *'Like discipline, performance produces a new subject of knowledge, though one quite different from that produced under the regime of panoptic surveillance. Hyphenated identities, transgenered bodies, digital avatars, the Human Genome Project – these suggest that the performative subject is constructed as fragmented rather than unified, decentered rather than centered, virtual as well as actual. Similarly, performative objects are unstable rather than fixed, simulated rather than real. They do not occupy a single, 'proper' place in knowledge; there is no such thing as the thing-in-itself. Instead, objects are produced and maintained through a variety of sociotechnical systems, overcoded by many discourses, and situated in numerous sites of practice.*
> *(McKenzie, 2001, p. 18)*

One of the aspects of McKenzie is the influence of digital technologies on society, and how it effects traditional industrial institutions and procedures when things become electronically archived, networked and patched together again. McKenzie discusses the implications of performance, and analyzes the debate about performing in relation to Performance Studies, Performance Management and Techno-Performance revealing that each field is structured and guided by different challenges concerning social efficacy, organizational efficiency and technical effectiveness (McKenzie, 2001, p. 130). Here performance is also a normative concern as a mode of measuring knowledge and power within the three research areas of cultural performance, organization performance and technological performance. Cultural performance is evaluated on how effectively it is affecting or working (emotional, symbolic), where organization is about the results and effect of integration, and within technology how effective the systems are running. The three different performance paradigms share some generalizations:

1. *Introducing new objects with e.g. new cultural activities, new organizational practices and new technical phenomena;*
2. *New methods of inquiry with deconstruction, systems theory and computer modelling;*
3. *New metaphors into interdisciplinary analytical tools with extraordinary resiliency of theatre, as well as*
4. *New subjects previously excluded from each of the performance paradigms.*
   (McKenzie, 2001, p. 131)

Although McKenzie do not specifically treats spaces and places and the specific integration of sensor technologies and networks in architecture and urbanism, it works well as an understanding of the influence of performance on environment and design especially along with the metaphors introduced. The one thing to keep in mind however is the rather single-focused aspect of efficiency, or what could be announced as the optimization aspect of technology. It seems to be a general perspective on performance that it becomes a way to measure the fulfilment of certain goals in systems and only rarely as the performative or emergent outcomes in the intersection between systems and humans.
Through analyzing Professor Challenger's appearance in *A Thousand Plateaus* (Deleuze & Guattari, 1987), McKenzie states the age of global performance and the relation between performance and the performative:

> *'Performances are territorializations of flows and unformed matters into sensible bodies, while performatives are encodings of these bodies into articulable subjects and objects.' (McKenzie, 2001, p. 177)*

In relation to the field of architecture and urban design, performances could in this way be understood as a design based on parameters extracted from flows, integrated into interactive artefacts, which generate effects open for new actions. Here bodies refers to a more broad definition of organizations, but also the specific affects that the body perceive during a performance. In general McKenzie is much inspired by Deleuze and Guatarri, where humans are considered to be processual machines, forming assemblages and relations with other 'machines' and evolving to create new forms. Here again representations will end out being mimetic, where performance is evolving; each repetition enacts its own unique event, and the body becomes the site where the event takes place (Rio, 2008). This would be more related to a way of understanding how external relationships are incorporated as part of a feedback process with the design, then constantly evaluating the effects of this integration; a subject further treated in the next chapter.

In this way flows or what I would propose named as ´circulation´ of information, ideas, artefacts etc. are important for the understanding of the performative. Most importantly because circulation produces performative effects as a process of enactment implying circulation as a culture in itself (Lee & LiPuma, 2002; MacKenzie, 2005). In comparison to McKenzie we might be moving towards another kind of performance more related to underspecified or unscripted performances allowing for sociality's (Khan, 2006). To discuss the performative in relation to ´unformed matter

into sensible bodies´ as well as 'articulable subjects' would also imply talking about new kinds of objects moving in and out of places as part of an increased circulation.

Summary

This section introduced how the formal definition of performativity was based on linguistics and speech acts, additionally influencing representation and performative constitution of reality. This inspired the field of performance studies, cultural performance and areas related to theatre with a focus on the relationship between actor and context, the constitution of meaning, content and the social primarily through ongoing negotiation and circulation. The central origin of performative relates to how environments act instead of just being. Through these acts reality or environment is constituted, thus they are not representations of something static, but creates the environments they exist in. This is a condition for language and speech acts, but also concerns how individual identities, knowledge and in general context is part of an irreversibility, where each actor influences the environment and participate in creating the meaning perceived. Within performance this is particular apparent in the way that actors create the narrative as part of the stage setting, but these rituals are also related to more everyday interactions on the street, where individuals exchange different roles based on the norms of both the spatial and social context. Through repetition or positive feedback loops emergent conditions as identities and places are established through performative acts closely tied to the constraints of the environment. At the same time these performative acts are essentially cultural, acting as a level of reference when the social and meaning is achieved through the performative transformations, both as part of more temporary events as well as the situations in everyday life. In essential the acts of the body performing certain actions cause a relationship between the body and the surrounding objects, which emphasizes the 'affects' of technology. Increasingly the relationship between participant and observer becomes more complex and the technologies used are getting more advanced. The environment exists as an emerging space in a constant negotiation through new extended technologies, which bridge traditional roles and spaces. The performative environment is thus based on an ever evolving 'interaction order', which gradually constitutes both subjects and objects.

Fig. 18: Rafael Lozano-Hemmer, Under Scan, at an event in Lincoln, UK, where passers-by are contronted with portraits appearing through their own shadows.

02

'The role of the architect here, I think, is not so much to design a building or city as to catalyse them; to act that they may evolve.' (Gordan Pask in Frazer, 1995, p. 7)

When Vito Acconci in 1981 described his 1979 'The Peoplemobile' as a mobile installation of a vinyl-cladded truck in a steel podium with large speakers mounted on top of it, he named it 'performative architecture':

> *'The viewer activates (operates) an instrument (what the viewer has at hand) that in turn activates (builds) an architecture (what the viewer is in) that in turn activates (carries) a sign (what the viewer shows off): the viewer becomes the victim of a cultural sign which, however, stays in existence only as long as the viewer works to keep the instrument going.' (Acconci, 2001, p. 18)*

The above describes one of Vito Acconci´s acts of architecture. The viewer is part of the architecture through an instrument that constructs the reality of the space and at the same time the representation, however only to fall apart when the observer leaves the setting. There is a radical difference between the technologies available now, and the present days experiments between politics, art and architecture starting from the activities in the 1960´s, but they are still examples of one of essential characteristics of performative architecture; its ability to act with the present local actors and occupying a temporary space for interaction between object and subject. As seen later these experiments grew out of the cybernetics and system theory as it was tested out in architecture in the 50´s and 60´s, but seems to gain a revival as Coop Himmelb(l)au now again 40 years later is exhibiting their 'feed back space' on the 11th International Venice Biennale 2008. The feed back space is brought back to life because the technologies now exist for these installations to be fully constructed and experienced. In this case it is a large transparent plexi-glas installation with media screens and pulse sensors. People entering the space will be sensed for their pulse with fills up the whole ambience of the space – the space as an extension of the body fluids.

However this cross-disciplinary research perspective on performativity within architecture and urbanism requires a more specific elaboration on the perspectives of design, and the performative values attached to these processes. The above example describes the more recent perspective on the integration of real-time sensor input as part of both the perceived object and the design process, but these relationships between the design and multiple effects goes across a wide range of fields. First of all design is a process in which something of value is created. However the difference that needs to be clarified is mainly the aspects of the specific added value, or the conditions which differentiate architecture from building, urbanism from cities and design from being merely an object. There have been several perspectives on how architecture and design differentiates mainly through the more basic ideas about aesthetics, style, art or functional considerations; however performativity involves a broader discussion of design considering the complexity of the possible influences to a design process.

> *'The most common problem with architectural theories is that they have too often been strongly normative and weakly analytic, that is, has been too easy to use them to generate design, but they are too weak in predicting what these designs will be like when built.' (Hillier, 2007, p. 47)*

This is a condition relevant for all design fields where the benefit of having both theoretical and analytical skills involved as part of designing, as well as some knowledge concerning the predicted influence of the designed object. Design is here both a matter of thinking and doing, as a process going across different scales and professions and iteratively combining theory and practice. This essentially involves a level of innovation or a new kind of design intelligence, which no-longer implies fixed knowledge,

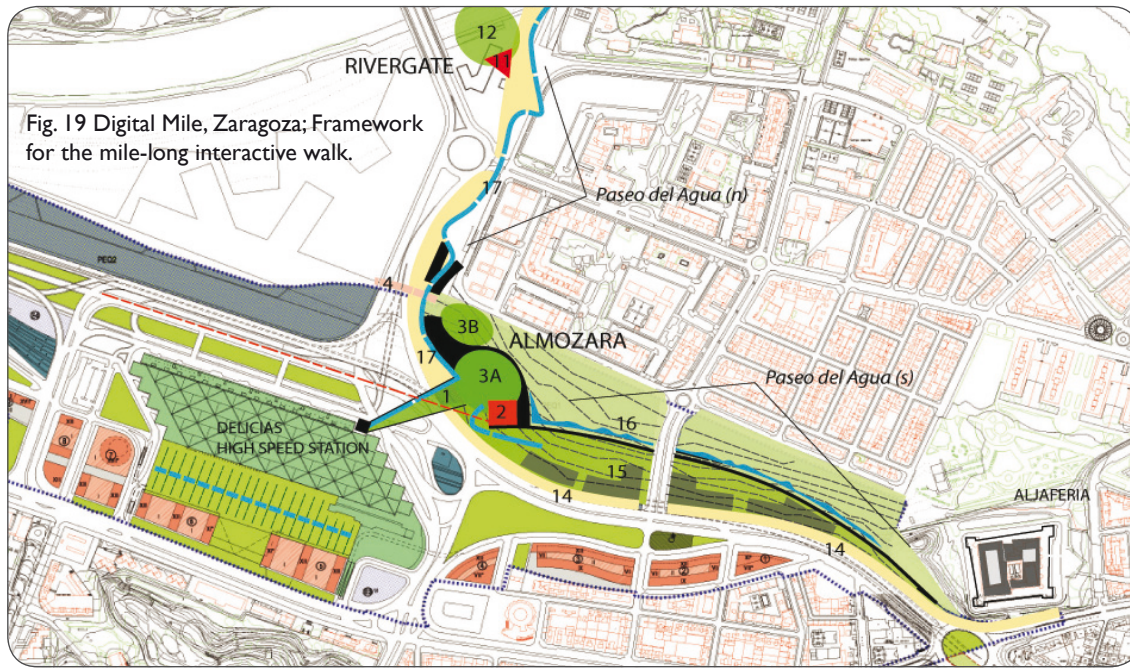

Fig. 19 Digital Mile, Zaragoza; Framework for the mile-long interactive walk.

but knowledge in constant transformation in feedback with the environment. Intelligence here becomes a projection of a pattern on the world and a revision of the knowledge according to the perceived experience (Speaks, 2008 based on Hawkins, 2004), and design is combining thinking and doing, theory and practice. In many respects this seems to be paying a revisit to some of the first academic traditions of architecture through for instance École de Beaux-Arts and especially Bauhaus where the combinations of arts and crafts were specifically focused on cross-disciplinary design competences to be acquired through building and experimentation. The difference now with performativity and new computational technologies is, that these influences are getting more complex, bottom-up and real-time as part of more sophisticated sensor technologies, networks and advanced computational software, where design exists as a combination of theoretical and analytical capacities assisted by computational tools through all levels of design. At the same time the main purpose in regards to design is not another level of efficiency, as was the main purpose of the machine aesthetics of modernism, but how design through technology can affect culture and innovation in a feedback loop to stimulate new uses and behaviours. The result here is open-ended depending on the selected parameters and carry potential relationships to different environments as illustrated through the examples of architecture and urbanism.

Performative Urbanism

One of the early inspirations for Performative Urbanism is Kevin Lynch's 'The City as an Organism', as one of his three city models from 'A Theory of Good City Form' (Lynch, 1981, p. 88ff); it is an urban concept based on information systems and organization derived from multiple feedbacks, moving the definition of the city from being matter of central control to a differentiated self-organized entity (Shane D. G., 2005, p. 55f). Also with some ecological references it has at the same time been associated with the emerging field of landscape urbanism considering the city as a continuous holistic process incorporating multiple infrastructural landscapes as a basis for the organization of the city (Mostafavi & Najle, 2003). Landscape urbanism also originally stemmed from the performative urbanism from Kevin Lynch and Cedric Price, which are treated in more depth later on, and inspired more ecological practices as Field Operations with James Corner. (Shane D. G., 2005, p. 69). Shane describes from James Corner how the performative areas in the city act as *'prepared grounds, flexible and open,*

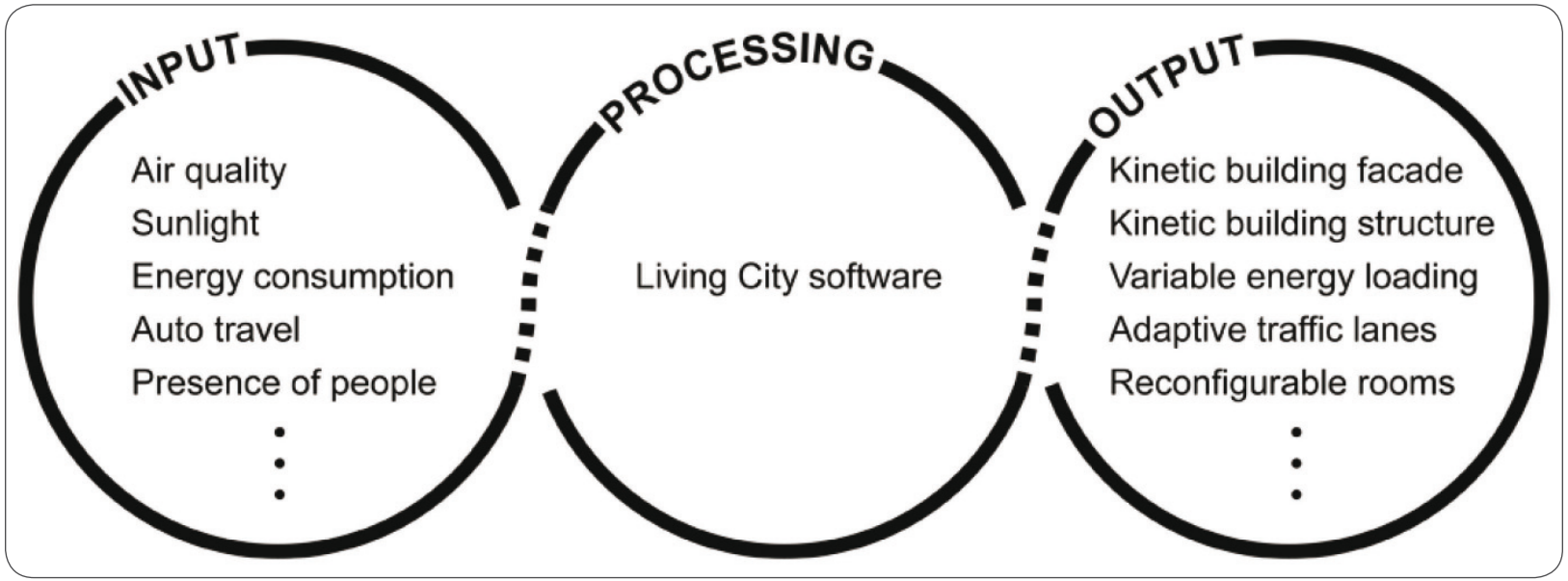

Fig. 20: Living City Software; mediating between input and output processes in the performative city.

like the British commons or Indian maidan, allowing the "adhoc emergence" of "performative social patterns and group alliances that eventually colonize these surfaces in provisional yet deeply significant ways' (Shane G., 2003, p. 3).
This landscape urbanism from Corner, inspired by some of the utopian projects in the 1960s, is based on open common areas in the city to be occupied by programmed and un-programmed activities as from his Stalking Detroit project (Shane G., 2003). Recently performative urbanism has also been defined within the framework of a design method related to the introduction of systems thinking and new software as in the Architecture Biennale project by the architectural office Zebra in Venice 2006. Here Performative Urbanism was presented as a sustainable approach for an urban development project in Beijing, incorporating the recycling of an existing polluted ground as a basis for generating a new urban neighbourhood. In general this illustrates a systems thinking where all parts of the transformation of the urban landscape are related and turned into a local benefit. Thrift has explained why it could be appropriate to apply this performative logic to such landscapes:

> *'I always try to think of cities as performative, as in use, and therefore I see urban landscapes as essentially incomplete and only rarely in the hands of just one network of association' (Smith, 2003, p. 15)*

This kind of urbanism envisions a bottom-up perspective that places itself into an existing ecological setting and self-organizes on the grounds of the open common areas. These areas are still developing as hybrids of festival arenas and landscapes in a mixture of pre-programmed basic activities and open prepared, however often very restricted, grounds. References could be made to the larger festival arenas for instance Roskilde Festival in Denmark, where once a year an empty site is occupied with 60.000 people, however also here under certain restrictions for the massing to organize orderly according to the events (Roskilde Festival, 2008). At the other end are newly developments in RV Communities with for instance the Quartzsite in Arizona, which are almost like 'swarming' sites acting as largely open camping platforms stamped into mostly deserts or rural areas for the elder generation to occupy temporary domains only facilitated by their van, basic supplies on the site and high-speed communication networks (Sumrell & Vernelis, 2007).

Although the mobile technologies are in place for such areas, another direction seems to be heading towards more temporary and limited engagement with the city as part of smaller events and workshops. Increasingly the existing urban fabric is used as a basis for emerging cultural activities considering it as a performative landscape to be extended by mobile technologies, projectors, sound equipment, tents and a variation in themes and scope. Thus performativity is here mostly acting on the premises of open grounds with minimum or no facilities but from the principle of common or lease ownership for mobile actors to settle. The central issue for this urbanism is the new ways to achieve the urban, which could be described as by Ascher as a meta-urbanism:

> *'The modern urbanism defined the means to realize a building project through simple and lasting rules: zoning, density, heights etc. The rules were considered as demands. The meta-urbanism prioritize the goals that need to be achieved and encourage public and private actors to find ways to realize these in the most effective way for the common good and all involved parties….The plans for such a 'qualitative' urbanism enter into this new horizont of rules that weights the results higher than the means, which also implies the architectural or landscape considerations.' (translated from Danish by the author)*
> *(Ascher, 2002, p. 34)*

In the same way as architecture is adopting a wide range of new tools and software to cope with this rising complexity of information and involvement, it also influences the general field of urbanism. Michael Kwartler is trying to extend from the 19th century 'factory system' that has been applied to city design and has created a planning, design and regulatory model to be used for planning purposes. This model basically incorporates different layers of information in a feedback system between planners and citizens based on certain performance indicators. Like in the above 'meta-urbanism' these indicators are set up as imaginary goals to be achieved continuously and are supported by a real-time dynamic model (Kwartler, 2005, p. 88).
These models are no-longer only acting only as digital representations but strongly linked to the actual constraints of behaviours in physical space. The 'space syntax' offers very specific tools to evaluate patterns of human behaviour as part of both architecture and urbanism, and uses these investigations both as part of design and evaluating the dynamic factors of place. (Hillier, 2007)

Now this indicates a growing tradition of event settings with mobile technologies and digital media occupying the urban domain as part of a mobile lifestyle, but also it influences the organizations and administrations as well as the architectural representation and a new approach to urbanism in general. However without these technologies it is of no surprise that cit-

ies have always been performative in the sense that they acted as grounds for complex interactions on the street as well as in organizations through systems and procedures.

> *'Moving through the city, and through public spaces, has always been a performative practice where the citizen is relatively able to use the material world for her own purposes and enjoyment, and engage in critiques of everyday life' (Galloway, 2004, p. 403)*

With this the performative tradition in urbanism is generally considered something happening face-to-face between human actors in the city constantly negotiating their path through the city or in conversations, drama or similar exposed to the general life of the street. However it is dramatically changing with the influence of ubiquitous technologies and more event-based urban activities that increases the impulses for performative street life, as well as it also rests specifically on a development within architecture.

Performative Architecture

> *'Architecture is more than the art of constructing individual buildings. It is also the creation of environment. Buildings do not exist in isolation. They not only impose their character on their surroundings but also have an incalculable effect on the lives of the human beings who inhabit them.' (Conti, 1978, p. 6)*

Conti (1978) describes how the architectural monuments of the ancient have been under constant change influenced by cultural migrations and the general life, wealth and glory of changing civilizations. These monuments ranging from the Bazaar of Damascus to Machu Picchu in Peru all illustrates how different religions and empires left their traces on the build environment through the continuous integration of new crafts and changing traditions.

> *'Such architectural adaptations bring buildings to life, expressing the emotions – the faiths and hopes, the joys and sorrows – of humanity. For not even the most brilliant architects can infuse their creations with life: It requires the mediating forces of cultures and time to do that.' (Conti, 1978, p. 7)*

Fig 21: Christopher Janney, Sonic Forest; interactive plaza at the Expo 2008 in Zaragoza.

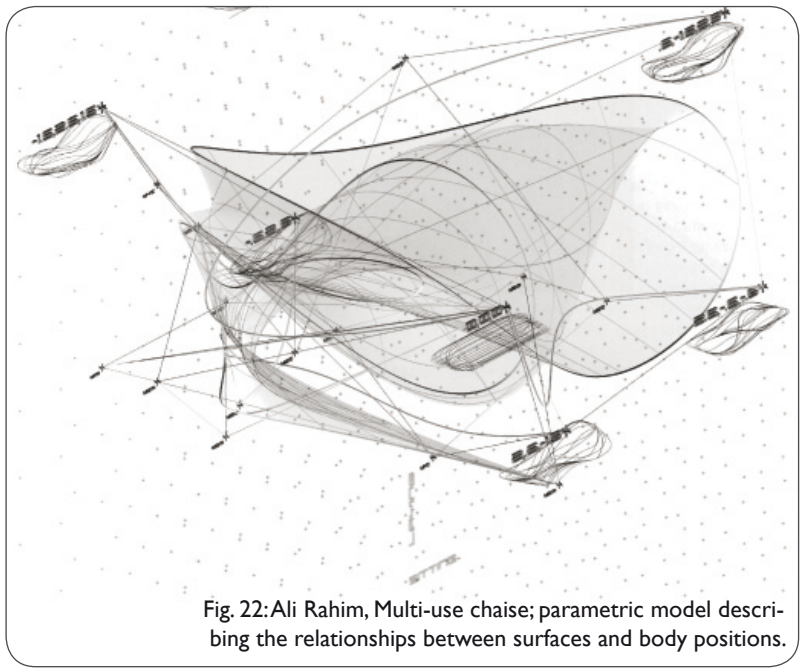

Fig. 22: Ali Rahim, Multi-use chaise; parametric model describing the relationships between surfaces and body positions.

These adaptations were merely based on a change in cultural traditions but also influenced by new technologies and materials allowing for desires to rebuild and change the existing architectural landscape. This adaptation has characterised architecture for centuries however most apparent through the flexible dwellings of nomadic culture as a more temporary and light structure dependant on the surrounding landscape (Kronenburg, 2007, p. 10f). However the architectural response to current technological, social and economic change is essential for the profession, and we are in a radical different time now where the cultural influences are strikingly more dynamic depending on the flow of people and materials.

> *'Architecture is the societal function system that takes responsibility for the continuous, progressive-adaptive development of the built environment of society.' (Schumacher P., 2008, p. 1)*

Here adaptations are still increasingly important, but it is a radical different conception of societal change, than illustrated through for instance the eyes of Le Corbusier, whose belief in a mechanistic vision should rest on a permanence of the architectural object. Here the 'pre-machine civilization' should be destroyed and new cities built based on the passion for technologies (Corbusier, 1935), where *'it is the city's business to make itself permanent'* (Corbusier, 1947, p. 71) .
However similar to how Corbusier considered the integration of the engineer inventions as part of an architectural aesthetic, architecture is in the end not only to be concerned with the finished object. Essentially it is an activity involving a continuous process, which contains at the same time a conscious concern with the effect of the design and a partly unconscious intuitive exploration of new material possibilities.

> *'Architecture is therefore not simply what is done but how it is done.' (Hillier, 2007, p. 35)*

Architecture recognises practice and the material effects as part of the design process along with the integration of a series of complex parameters, which are continuously evaluated and abstracted for integration. Inspirations especially from 'The Thousand Plateaus' (Deleuze & Guattari, 1987), or the multiple positions from which constructions can be created and the non-linear way that they are organized, have led to new positions for avant-garde architects to work with complexity through new digital technologies. These technologies and the complexity of factors involved in decision-making for a design whether a mobile phone, an architectural icon or an urban neighbourhood, are increasingly involving relationships between theory and practice, as well as related scientific methods to iterate design development with affect through socio-technical processes.

The main issue here becomes how this is continuously part of a process of experiment and actualization to test out possible achievements of a stated problem involving the feedback from the possible end-users. With performativity this is thus getting more complex, involving real-time relationships with a range of aesthetic, functional, technical, economic, organizational, cultural and social factors, which are determined through continuous feedback with a computational tools, which can help aggregating and evaluating input with effect. This development has by far had its impact on architecture where all other cultural practices have been through a transformation with electronic media, but where architecture has still maintained largely unchanged, as noted by Peter Eisenman (Lenoir & Alt, 2003).

> *'Computation is primarily conceived as more or less a glorified drafting instrument with little or no effect on our conception of architecture' (Chu, 2004, p. 124)*

The design practices, which have incorporated this kind of idea of technology, are grounded for instance in the experimental practices of Eames and Panton and the more recent of Gehry and Hadid. In these practices

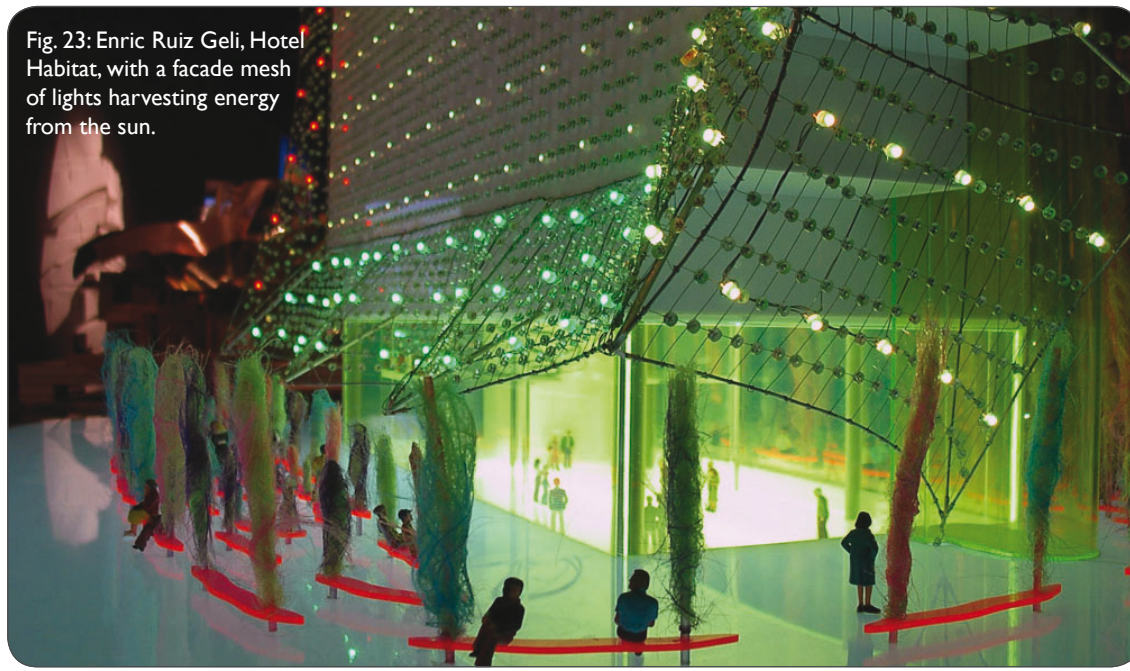

Fig. 23: Enric Ruiz Geli, Hotel Habitat, with a facade mesh of lights harvesting energy from the sun.

there exist an iterative feedback by applying a set of different techniques continuously throughout the design process, at the same time as being inspired by new materials and manufacturing processes, and not limiting their engagement to a specific design scale or context (Rahim, 2005, p. 13). They are practices, which resist on using technology only for efficiency but instead as a tool to inspire innovation incorporating positive feedback with adaptation across disciplines and design knowledge.
Other architectural studios like UN Studio, MVRDV and OMA are beginning to incorporate multiple feedbacks mostly related to organization, economic and urban relationships as part of their 'parametric' processes, maintaining a constant diary of parameters as well as using current projects to evaluate future scenarios. At the other end the studios like Asymptote, Zaha Hadid and C-A-T are more focused on parameters related to the actual perception of form and the affect on body and space, but similar here it also relates to a more sensible notion of 'parametricism' involving total fluidity on all scales (Schumacher P. , 2008). Here no design exists as an isolated object, but is inscribed as part of complex relationships or 'fields', which effect the formation of the design.
Now the current extensions of these concepts of feedback and emergent

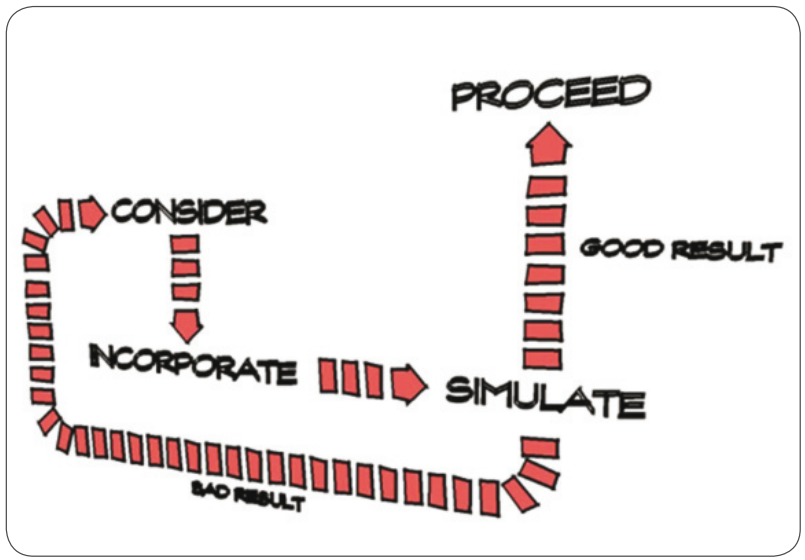

Fig. 24: Performative feedback to optimize design.

processes in design through complex input are reaching another level to be illustrated through the more recent technologies. The main concept as noted in the beginning the chapter is, that change to the design and feedback through technology is no-longer just maintained at the level of the design process, but increasingly considered an open state for the participants to respond. This extends the feedback process of theory and practice, and the design explorations in studios to the real-time meetings at the site and in the hands of users through a responsive architecture.

> *'The agenda of responsive environments opens up a whole new domain of design research. It announces a paradigm shift from the design of inert spatial form to the design of systems of behaviour: the design of spatial systems that are capable of interaction by means of real time reconfiguration in response to users via embedded electronic intelligence.' (Schumacher P. , 2004)*

Again here it is architecture aimed at stimulating behaviours and facilitating new forms of social communication instead of just framing a space of functional requirements. Besides the original idea about architecture being part of continuous cultural and environmental adaptation, Negroponte more specifically treated the issue of a computational responsive architecture through the Architecture Machine Group at the MIT (Negroponte, 1970). The main purpose of architecture becomes mediation, which not necessarily helps the design process but becomes a complete computationally enhanced environment to live in. However at the same time the issue of responsiveness contains the more overall idea about adaptation by incorporating a wide range of different factors including uses and climate. Performative architecture evolves from these traditions of feedback, responsiveness and practice-related designs but the influence is more dramatic and the technologies more advanced as illustrated in the later chapters.
As regards to the specific notions, two important events seem to have made significant contributions to the definition of a Performative Architecture. The first one was a symposium at the University of Pennsylvania in October 2003 leading to the publication 'Performative Architecture – Beyond Instrumentality', and the second one the Performative Architectures Exhibition in March 2004 at TU Delft in Holland presenting a wide range of contemporary practices within architecture and interactive design. Even though the events contain similarities, they set out two related but different paradigms for a performative architecture, which is based on the effect of new digital tools for the architectural profession and the experience of place. The first one in Philadelphia was mainly concerned with the performance aspect of new digital technologies even though the

publication indicated an even broader range of definitions:

> *'This architecture places broadly defined performance above, or on par with, form-making; it utilizes digital technologies of quantitative and qualitative performance-based simulation to offer a comprehensive new approach to the design of the built environment'*
> *(Kolarevic & Malkawi, 2005, p. 3)*

This defines the performative aspect of architecture arising from the development of new both quantitative and qualitative simulation methods based on setting certain performance criteria throughout the design process. Thus the architectural design process is considered performative, as it is being increasingly iterative where each constraint e.g. climate, structural, use, site etc. are fed into the model and by adjusting the parameter architecture appears as an emergent effect of the interactions in the model. This approach is closely related to the process of simulation, which is practiced through many of the new BIM (Building Information Modelling) procedures that are emerging. Here the performative design loop involves a simulation of certain critical design parameters, which is considered and incorporated until a satisfactory result is reached (Thoo, 2008).
The basic condition investigated here is thus more related to the specific performance of the building, instead of the ability to generate more general performative effects. At the same time performativity frames a large variety of new design methods described through algorithmic, morphogenetic, generative, evolutionary architecture etc. all dealing with the integration of more complex parameters to stimulate a computer model.

> *'Architectural concepts are expressed as generative rules so that their evolution and development can be accelerated and tested by the use of computer models. Concepts are described in a genetic language that produces a code script of instructions for form-generation. Computer models are used to simulate the development of prototypical forms that are then evaluated on the basis of their performance in a simulated environment. Very large numbers of evolutionary steps can be generated in a short space of time and the emergent forms are often unexpected.' (Frazer, Frazer, Xiyu, Mingxi, & Janssen, 2002)*

Interests that are similar in scope but appear broader from an earlier definition from Kolarevic:

> *'performative architecture – an architecture in which the emphasis shifts from building's appearances to processes of formation grounded in imagined performances, indeterminate patterns and dynamics of use, and poetics of spatial and temporal change.' (Kolarevic, 2004, p. 26)*

Architecture is here moving its attention away from appearance or to some respect the aspect of representation to the processional act of refining architecture to changing conditions. From many sides this has been criticized as being an extremely instrumental and engineered perspective in its starting point, even many practices are turning away from the one-directional approach that rationally tries to optimize towards a certain goal with the risk of lacking the traditional architectural spontaneity and controlled overview of the project.
The exhibition at TU Delft had a similar ambition to extend from a limited focus on architectural presentation and the new aesthetics of digital media, but it was more ambitious with the selected projects from practices like Marcos Novak, Ali Rahim, NOX, Greg Lynn, Ocean North, Reiser+Umemeto etc., and was considering how this could influence culture:

> *'Performance as a paradigm for architecture moves the attention away from the static object and towards a complex and dynamic plane of relations. It focuses not on architecture as a static art form but on its effects that transform culture: architecture as cultural production. Performative Architectures understand architecture, technology and culture not as separate and isolated elements, but as elements interrelated through complex feedback loops, by which they simultaneously affect each other.' (Stylos, 2004)*

This includes the ability for architecture to have effects that transform a certain culture. Performative architecture is treated as a more complex and out-turned profession that constantly enters into feedback loops that affect each other. Thus this kind of performativity focuses more on the affects of the build projects and not necessarily the parametric software used in the design process. Similar from the two approaches are the emphasis on use of new computational technologies however both as new tools for simulation, optimization and production of architecture in a CAD/CAM/CAC tradition and as the experienced interaction with the build and potentially digitally enhanced architectural space. The optimization performance-based approach can be said to rest in a kind of new-functionalistic idea, which fundamentally treats the new computational technologies as instruments for predicting future building uses and behaviours to optimize and improve building performance. This approach concerns performativity as the understanding of feedback-loops in the design process, circulating an increased amount of building information among different actors to evaluate performance criteria for the design as an end-result. The other approach rests primarily on the theatre-aspect of performance as to understand how digital technologies get integrated within architecture thus enhancing the real-time feedback loops with site-specific

actors. Thus here performativity understood as the actions between an adaptive architecture and the surrounding environment.
Ali Rahim was represented at both events and describe how each performance element exists as part of an evolution as a cultural entity that can be selected and interrelated in an emergent feedback process. The background for Rahim's definitions are inspired by the previous mentioned analogue from McKenzie regarding cultural, organizational and technological performance but with a more specific focus on the animation techniques integrated as part of the design process:

> *'Our design process reacts to external stimuli and transforms a situation through feedback between the subject and the environment and between architecture and its milieu. The material, organizational and cultural change that occurs as a result of perpetual feedback and two-way transfer of information is performativity (italics in original). Here models developed in one research paradigm can be appropriated by another.*
>
> *...Performativity always has the potential to produce an effect at any moment in time. The mechanisms of performativity are nomadic and flexible instead of sedentary and rigid. Its spaces are networked and digital rather than enclosed, and its temporalities are polyrhytmic and non-linear.' (Rahim, 2005, p. 179)*

Fig. 25: MIT Senseable Lab, Digital Water Pavilion at Expo 2008, Zaragoza.

Some of the important aspects mentioned in the above include the feedback processes of information and the importance of an effect in networked and digital spaces. However as Leatherbarrow describes by architectures 'unscripted performance', effects are not something new in itself, as architecture has effects and happen to us even without digital systems:

> *'In truth, we do not so much enter rooms, but rooms (so to speak) happen to us. One way to begin thinking about what may be called the event-character of a setting is to consider its emergence out of causality that no one understands very fully' (Leatherbarrow, 2005, p. 11)*

Thus architecture acts even without these technologies especially based on the tradition of semiotics. Here building elements and spaces carry certain affordances for behaviours and the effects are mainly symbolic as a consequence of typologies and styles. However we can question if an objective description alone is enough for such an event-character of architecture and spaces, as these spaces participate in more ways than through how they are interpreted. Instead what is needed is a more refined approach to the affects of objects, focusing on acts and effects with more non-representational models and interactionism in mind.
The two above approaches have much in common concerning the integration of digital technologies implying stronger interactions with architecture on different levels. However they also share the common feature that it concerns how architecture acts in the sense that it moves it away from the traditional understanding of an object. As from Leatherbarrow spaces can be considered as something donated to us from the past and with which they act upon us. This is first and foremost understood from the experience of the space, thus the affects of the space as an event happening to the participant. When entering the domain of digital architecture that increasingly integrates more complex feedback mechanisms, it adds to the unscripted parameter for both the actualization of the design and the experience of architecture. However at the same time Leatherbarrow reminds us that technique is always anticipatory and that the technologies do not automatically imply a new entity of architecture:
'It is a form of knowledge that leads to preconceived results. Because events arise out of a past that we do not know, they cannot be produced technically. Putting the matter for more forcefully, performative architecture is not the outcome of building or design technology, even up-to-the-minute digital technology.' (Leatherbarrow 2005: 11)
There are other digital technologies to consider including animation tech-

niques, parametric modelling, algorithmic architecture, biotechniques etc. but all is included within the same paradigm concerning increased digital techniques to be integrated in the design process thus enabling the digital architecture to act and evaluate from a set of different complex parameters. However as from the above this design process is still considered a virtual condition for the performative aspect of architecture. It is not yet experienced or realized and the building itself do not yet enter into any feedback loops on the site. One might question if these building technologies still only act as representations for an architecture that is getting increasingly more functional, economical and optimized, and if this should be the purpose of performativity? A few practices are beginning to work with the performativity of the architecture itself, thus considering an architecture and urbanism with dynamic elements that involves real-time actors. In the Post-Agricultural project architect Achim Menges has worked with design processes that uses site-specific parameters for the digital design process and additionally considered it as part of an active system in the structure.

> *'A performative environment necessitates thinking about structure as a condition that generates and differentiates. Rather than a static object, it is helpful to think of structure as a process of structural and material operations.' (Menges, 2004, p. 60)*

Menges uses complex site-specific parameters as for instance specific light and climatic conditions, local agriculture, recreational networks and infrastructure, and uses them as forces to articulate the beginning digital design project. At the same time as these complex parameters are used for the development of the initial project, it further develops into kinetic systems that can change according to new criteria from the original parameters in the model.

> *This indicates that the project follows a twofold strategy: one passive and one active. Firstly, the negotiable field of differentiated micro environments passively provides for anticipated criteria of change. Secondly, active key structural elements provide adaptation for divergent criteria. The consequent mutations of relations between systems will then feed back alterations to the topological organisational model. (Menges, 2004, p. 60)*

This is also reflected in the recent studies by Phil Ayres, who has developed a 'persistent model' allowing for an iterative feedback between a digital model and a responsive architecture. Instead of considering architecture as an end-product delivered to a client, it is a concept that allow for continuous adaptation and control of both the digital and real model, thus emphasizing architecture as a continuous service (Ayres, 2008). This beginning other aspect treats the cultural production of an architecture that becomes increasingly interdisciplinary and complex, moving away from the static object into real-time feedback relationships with a site or environment augmented through a digital model. This would include architecture as a real-time actor to include in the urban game among other participants, and extend architecture from being an entity produced from only one specific culture, but something to emerge as part of the environment. Thus the technologies mainly to be considered later on are taking these developments into account concerning architecture and urban environments as an actor with effects using new real-time digital technologies.

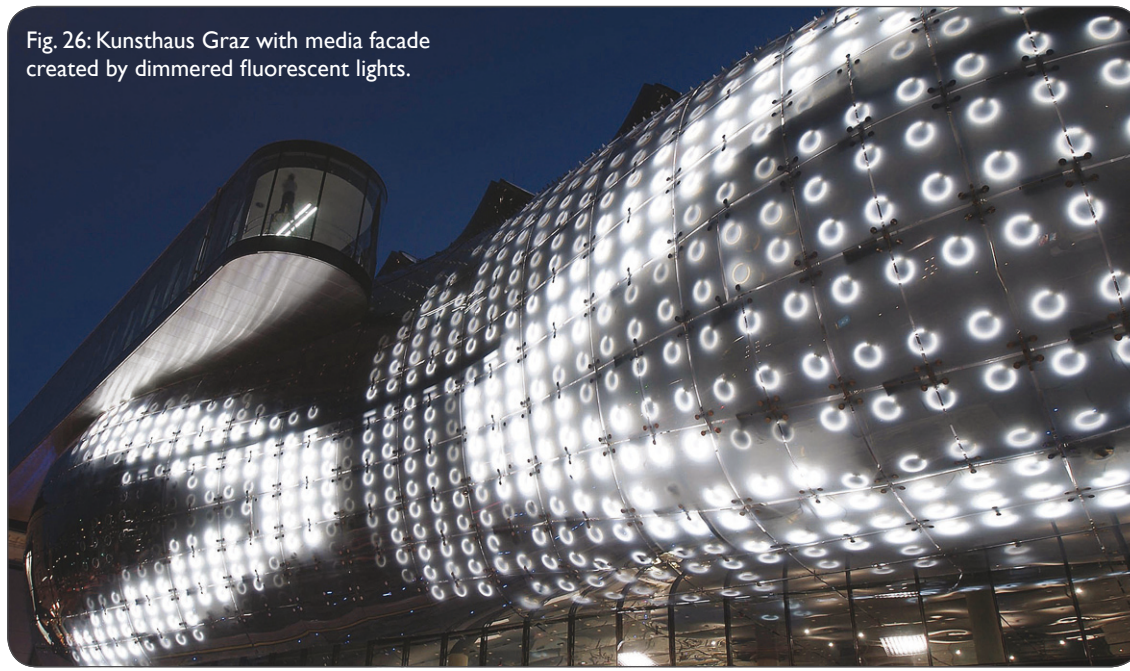

Fig. 26: Kunsthaus Graz with media facade created by dimmered fluorescent lights.

Summary

The observations of affects of performances in spaces are also one of the interests when discussing performativity in architecture. This can be said to rest mostly on the phenomenological tradition with a focus on the subjective experience of spaces that may very well be very different from each of us. In the representational tradition these considerations can be said to be grounded on spaces acting as something devoted to us, from which we can't be sure of its purpose or use, but where the object and spaces act upon us when we enter them. In this sense architecture happens to us, and it will appear with certain affordances based on the design semiotics and the history of the space. These traditions need to be extended into more action-oriented practices treating the embodied experience of interaction.

Within the recent developments in the urban and architectural disciplines, there have also been a widespread focus on the other aspect of 'performance' in the light of new sophisticated simulation tools used mainly for the purpose of optimizing certain factors of building performance. This procedure is at the same time a very conscious procedure allowing architects and engineers to work parametrically and independently with unique factors in the design process, and at the same time a method of continuously being able to see the result of the complex emergent whole. This newer tradition working with parametric software celebrates great interest everywhere in the business, and the tools used to 'produce' architectural and urban space are becoming increasingly sophisticated based on the stated criteria's. Performativity in this sense is approached as a more holistic practice, when incorporating multiple factors as part of the overall design, but the factors are consciously and strategically chosen mostly for the purpose of optimization towards a certain end goal. Besides the more rigid aspects of optimization towards a specific goal, the performative urbanism is also concerned with a more real-time effect through the design of places enabling new behaviours. This kind of urbanism evolves underspecified landscapes acting as prepared grounds, which through a bottom-up approach opens up for the possibility for each actor to engage with the designed landscape.

Across interdisciplinary fields the performative focus on interaction and feedback loops creating emergent effects. Essentially it is thus a time-based process engaging environment and actor, objects and subjects, as a negotiated practice based on interactive encounters, and one of the main issues is how and when to open up the design process for the influence of more complex parameters and influences. This is also relevant because the way knowledge is produced, normative positions maintained and criteria determined is legitimated depending on how well they perform throughout this circulation with exchange of information and materials. At the same time this new widespread focus on the above performative aspects also involve new 'socio-technical systems', where 'objects are produced' with the impact of 'meta-technology' and use of new media. This integration of interactive technologies and the changed perception of place and movement will be further exemplified in the next chapters together with a historical basis from the beginning period of computation and system theory in architecture and urbanism. Besides feedback and interactions as the essential parameters, which will be treated in the coming chapters, one of the common often complicated issues, concerns how the outcome of interaction describes properties, which cannot be traced back specifically to the parts. Here emergence describes one of the most specific terms involving the collective effects of complex interactions.

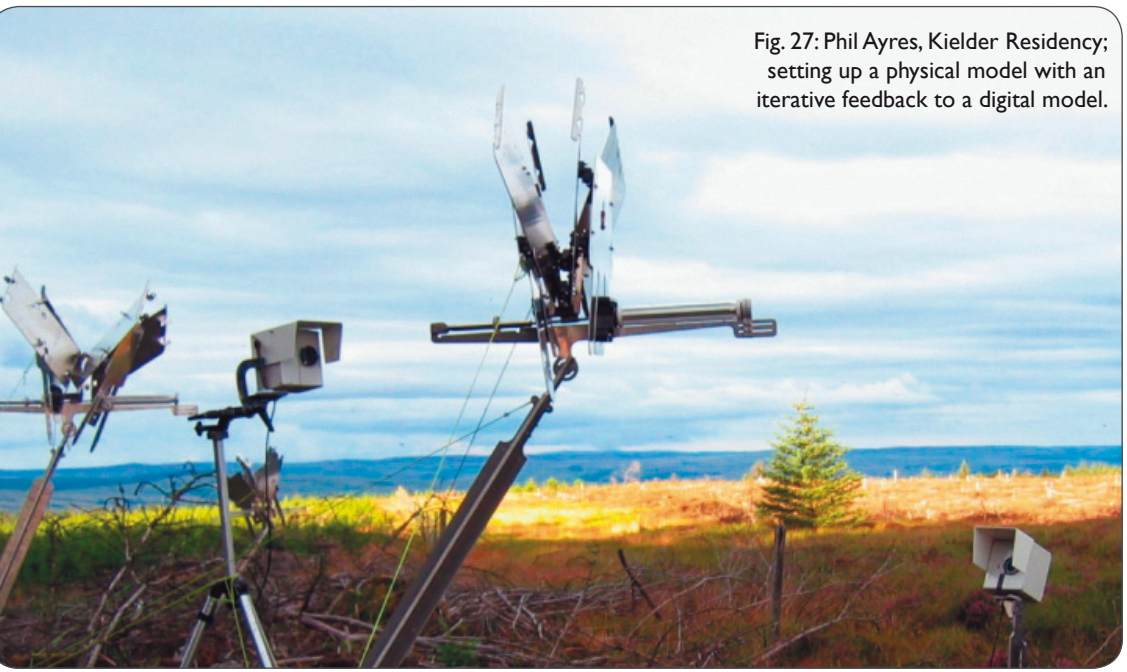

Fig. 27: Phil Ayres, Kielder Residency; setting up a physical model with an iterative feedback to a digital model.

03

Architecture

> *'We should understand all objects as being part of a process of emergence; the made as being part of the making, not the unmade. Our goal must be constructivism, or emergence, and anything that emerges should coemerge; the way we see is emergent, the way we move around, the way we act in relation to each others, to our habits, to our memories, all these emergent patterns should coemerge with its material structure.' (Spuybroek, 2005, p. 74)*

Non-linear dynamics

> *'One of the most striking consequences of nonlinear dynamics is that any population (of atoms, molecules, cells, animals, humans) which is stabilized via attractors, will exhibit "emergent properties", that is, properties of the population as a whole not displayed by its individual members in isolation. The notion of an emergent or synergistic property is a rather old one, but for a long time it was not taken very seriously by scientists, as it was associated with quasi-mystical schools of thought such as "vitalism". Today, emergent properties are perfectly legitimate dynamical outcomes for populations stabilized by attractors.'*
> *(DeLanda, 2006)*

Philosophy

> *'An ontological structure, in the philosophical sense, is an emergent phenomenon. It is something that arises out of participatory practice, not one that springs fully formed from a design process.'*
> *(Dourish, 2004, p. 130)*

From the introductory chapters it should be of no surprise that the research is trying to cope with and accept the extreme complexity of an increasingly interdisciplinary practice. However throughout centuries science has tried to introduce a simplistic view on the world, reducing our vision of a complex world to simple basic objects. No matter that simplicity is a suitable approach for many design approaches, it is also the general tendency that complexity should be coped with, as it has shown successful within for instance information theory and systems theory to be described later on. The understanding of complex systems have led to a wide range of new scientific fields (Prigogine & Allen, 1982, p. 3ff) mostly concerned with the more pure mathematic and engineering sciences but however spreading into the social sciences. These systems occur in everyday life especially as part of larger agglomerations as in the understanding of social phenomena, traffic densities and flow and population dynamics.

> *'The systems which interest us are large, nonlinear systems operating far from thermodynamic equilibrium. It is precisely in such systems that coherent self-organization phenomena can occur, characterized by some macroscopic organization or pattern, on a scale much larger than that of the individual elements in interaction. It is a structure whose characteristics are a property of the collectivity and cannot be inferred from a study of the individual elements in isolation. We may say that reductionism, long a strongly criticized attitude in the social sciences, is found to be inadequate even in the physical sciences. The whole is more than the sum of the parts for such systems.'*
> *(Prigogine & Allen, 1982, p. 7)*

Originally here referenced from thermo dynamics and non-linear systems as in the processes of self-organization, it includes experiments and studies of the complex whole to understand the collective behaviours emerging from the interaction of the individual elements. Methods and mathematics, which have also gained some inspiration for social theories related to the patterns of urban development.

> *'Our point of view is that a complex systems, such as a social system, is characterized by equations expressing the interdependence of the various actors of the system and that these intrinsic nonlinearities, in dialogue with fluctuations, result in the self-organization of the system, so that its structures, articulations, and hierarchies are the result, not of the operation of some "global optimiser", some "collective utility function", but of successive instabilities near bifurcation points. Such a view takes into account the collective dimension of individual actions and emphasizes the possibility that individuals acting according to their own particular criteria may find that the resulting collective vector may sweep them in an entirely unexpected direction, perhaps involving qualitative changes in the state of the system.*
> *(Prigogine & Allen, 1982, p. 37)*

In all aspects of performativity are the puzzling thing about processes, designs and situations that happens through complex interactions – they seem as to 'emerge'. These emergent characteristics are to be found both in the actions and experience of the theatre performance as well as in the design process involving new software and real-time experiences with interactive systems. The central issue, regarding the performative paradigm and the interactions with objects in urban space, is to understand which new types of spaces and designs that emerge, as well as the design processes facilitating and enabling these interactions. Emergence occupies a similar complex and broad field as performativity, but it is central to under-

stand how interactions and circulation of objects can generate meaning in interaction with the environment.

In 1923 Lloyd Morgan described emergence as *'the creation of new properties'* (Morgan, 1923) as part of biological studies, and also here most of the foundations comes from evolution theory. However new properties are essential for any 'emergent process' whether if it would properties in nature, for a digital model or interaction that could not be described from the individual elements. In this regard the scientific background for emergence is based on non-linear dynamics, complexity theory and self-organization and emergence in architecture is also inspired from natural systems and explored from the creation of artificial systems to produce new forms and complexity in behaviour. In its simplest definition emergence *'is said to be the properties of a system that can't be deduced from its components'* (Hensel, Menges, & Weinstock, 2004, p. 11), or related to the science of non-linear dynamics where even small causes can produce large effects. Emergence thus describes the resulting effect of a design intelligence that evaluates and augments the outcome of a series of complex interactions.

Fig. 28: ETH, ADA Intelligent space responding to individual user configurations.

> *'Complexity examines how components of a system through their interaction 'spontaneously' develop collective properties or patterns… that do not seem implicit within, or at least not implicit in the same way, within the individual components.' (Urry, 2003, p. 24f)*

The emerging properties or large-scale patterns are not reducible to its parts as sometimes illustrated through thermo-dynamics, where there is an irreversible flow of time (Urry, 2003, p. 21), which implies that a routing that is initiated for a given process can't necessarily be traced back to the starting point. Many professionals would also recognize this from a traditional way of designing architecture, which involves a series of different ideas and concepts that through sketching and modelling slowly progresses towards a satisfactory design. Here the emergence can be said to be the architectural evaluation of certain criteria along the design process, however sometimes influenced by unconscious personal and environmental factors. Now with the increased knowledge about complexity theory and the interactions between local elements producing large effects, this is getting increasingly relevant as for understanding especially environmental behaviour and the affects of a large amount of unknown factors. In relation to complexity theory there is a similar interest for 'morphogenesis' in architecture, which referring to Turing (with the Turing Machine and artificial intelligence) is *'the capacity of all life-forms to develop ever more baroque bodies out of impossible simple beginnings… and as a mathematical model wherein simple agents following simple rules could generate amazingly complex structures.'* (Johnson, 2001, p. 14) The interesting thing about these investigations is that they are able to generate coherent patterns of emergence through local interactions, like if we would imagine an organized complexity arising from local interactions.
Humans produce such emergent characteristics as part of interactions both individually with objects and collectively, but it becomes more interesting when these feedback mechanisms involve new artificial systems as software or augmented sensor technologies. Thus previously emergent characteristics have been determined from biology or human processes but increasingly computation assist in these emergent principles, and as to be seen later on, enter with a design intelligence that needs to reframe the concept of emergence. Now first of all the sometimes restricted creative processes are increasingly supported by enhanced computation capacity, at the same time as new spontaneous grammars are adding to the complexity of the decisions that can be made. In this regards Kevin Kelly describes the next levels of the cybernetic movement when we are facing the total integration of human and technology or maybe the increasing dependency between the systems.

'Two concrete trends are happening: 1) Human-made things are behaving more lifelike, and 2) life is becoming more engineered.'
(Kelly, 1994, p. 4)

Kelly calls these systems for 'vivisystems', which are exemplified through for instance new computer virus', robot prototypes, games and animations, computer models and artificial ecologies or more recently this 'one machine' (Kelly, 2008). The most specific examples that are related to local interactions is the examples of bee hives, ant colonies, flocks of birds or other 'swarm' systems, which are able to navigate without any hierarchy. It is possible to develop similar artificial and game like systems with the involvement of all participants as well as simulating them through computer modelling (MVRDV/DSD, 2007). The interesting thing, when these systems are being investigated, is that they also represent emergence. For instance the flock of birds reacts faster than the individual bird and acts as a common fluid. When the bats in the Batman movie was being computer modelled or the storming Ork's in the Lord of Rings, it was possible to control the total swarm by a few simple rules; for the bats to fly as a flock it included these rules in a common algorithm:

'Don't bump into another bat, keep up with your neighbors, and don't stray too far away. When the algorithmic bats were run, they flocked like real bats.' (Kelly, 1994, p. 13)

These rather simple rules of interaction made the flock fly like one swarm that constantly changed shape but still maintained together – its new properties of movement was emergent.
Similar to such rules were investigated by Paul Krugman when he described a mathematical model for a city made up by only individual business' each of which to make a decision based on the interaction with its neighbours. (Krugman, 1995). This indicates that laws for the urban flows might as well be generated for polycentric structures by local interactions from the sidewalks, as when interaction designers now are looking back at the theories of Erving Goffman and Jane Jacobs.

'Cities, Jacobs understood, were created not by central planning commissions, but by the low-level actions of borderline strangers going about their business in public life… sidewalks are important… because they are the primary conduit for the flow of information between city residents.' (Johnson, 2001, pp. 92-94)

Jane Jacobs explained such an example of the emergent street life based on the information feedbacks between apparent strangers in the streets; a concept that is also reflected through Goffman and applicable to environments as transit spaces (Jensen, Goffman and Everyday Life Mobility, 2009). These ideas are now additionally supported by more sophisticated technologies that imply that a greater amount of people and more complex phenomena can be gathered from the sidewalks and integrated in collective patterns as part of an information exchange. Emergence is thus a characteristic of the urban and the liveliness of neighbourhoods based on social interactions, and on a more broad scope it can be used to describe an 'emergent urbanism':

'Emergent urbanism refers to an ongoing assemblage flourishing from the dynamic interactions of parts, participant actors and their relations at varied hierarchical levels' (MVRDV/DSD, 2007, p. 91)

At the time of Jacobs, it was a critique towards the contemporary planning principles, but nowadays it might be considered differently with the impact of mobile information technology, where citizen are moving in-between mixed realities and networks. *'Encountering diversity does nothing for the global system of the city unless that encounter has a chance of altering your behaviour. There has to be a feedback between agents, cells that change in response to the changes in other cells.'* (Johnson, 2001, p. 96). This might

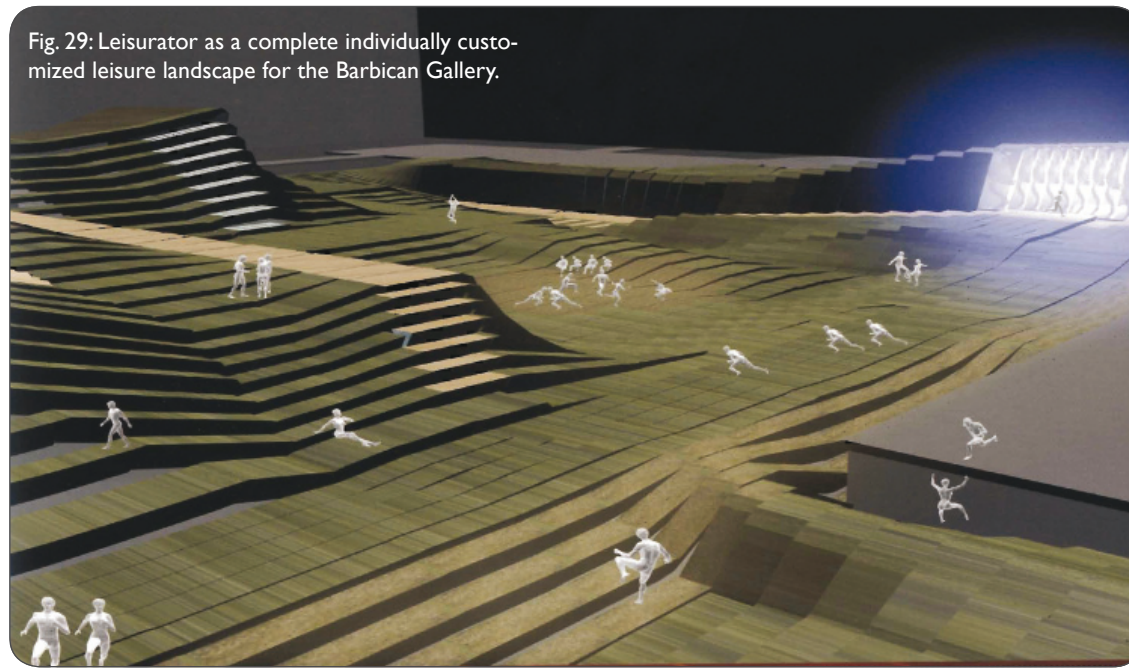

Fig. 29: Leisurator as a complete individually customized leisure landscape for the Barbican Gallery.

give consideration for which kind of interactions to benefit from with e.g. cars in transit spaces and which local interactions that could lead to global properties like aggregations. There is a reason why cities are not self-organized systems, as people are not behaving like ants but with a more complicated logic and own will, at the same time as cities tend to have more long-term consequences. However what is interesting is that these local interactions and feedbacks are able to carry information through the city; information that is a central basis for performativity and thus through open interactions create potentials for emergence.

Cities can in this way be seen as storing information through the flow of its citizens and population, as well as *'without the open, feedback-heavy connections of street culture, cities quickly became dangerous and anarchic places. Building a city without sidewalks, Jacobs argues, was like building a brain without axons or dendrites.'* (Johnson, 2001, p. 146) In a similar way Mumford criticized this, claiming that is was impossible for a 5 million city to keep this organic balance; a logic that can be challenged by the current use of mobile technologies and the databases maintained about these interactions. In the recent study by Senseable Lab at MIT the total amount of incoming and outgoing phone calls and IP transfers from AT&T was illustrated in the New York Talk Exchange project (Ratti, Rojas, Valeri, & Kloeckl, 2008). Even there are no feedbacks associated with the NYTE, it illustrates the emergent characteristics of aggregating large amounts of communication data, and the subsequent conclusions to be made about a city and its neighbourhoods based on this dynamic balance. (Sassen, 2009)

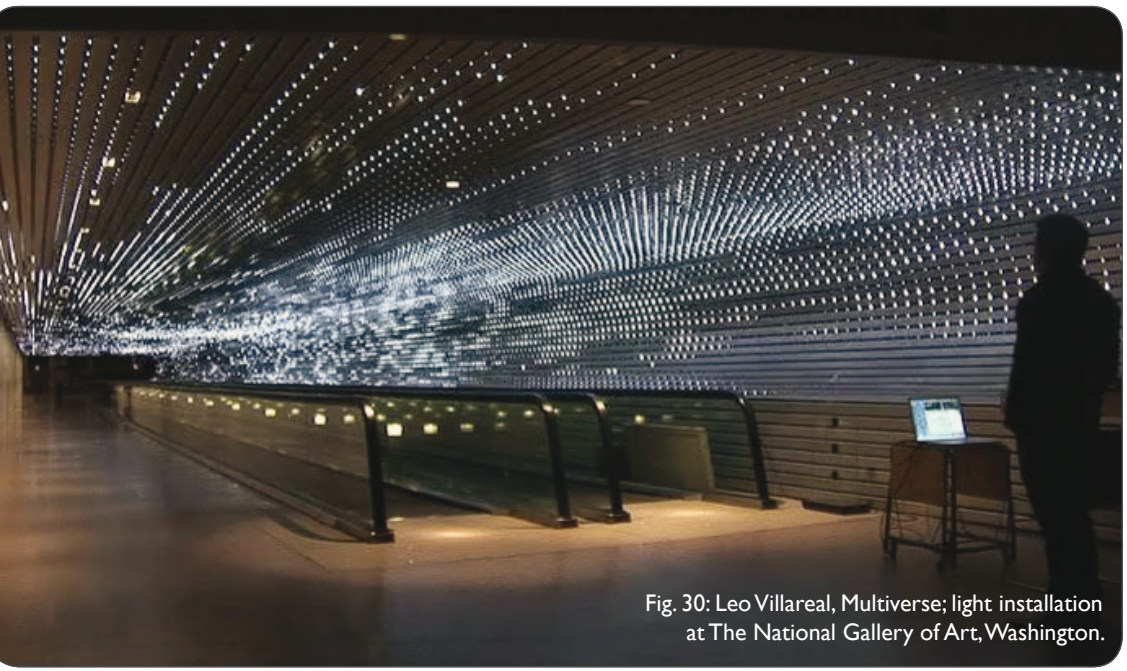

Fig. 30: Leo Villareal, Multiverse; light installation at The National Gallery of Art, Washington.

These thoughts of modelling local interactions as part of city development are richly developed within CA (cellular automata) by e.g. Michael Batty:

> *'The way we simulate such emergence is by representing the basic elements or atoms of the city in two distinct but related ways: through cells, which represent the physical and spatial structure of the city, and through agents, which represents the human and social units that make the city work.' (Batty, 2005, p. 6)*

Christopher Alexander discussed a possible reference related to the emergence of form inspired by nature, and stated such algorithms as formulas where local decisions could create larger unintended structures emerging from the behaviour of local actors, each of who acted in accordance with the neighbour cells according to a set of codes (Alexander, Neis, Anninou, & King, 1987); a logic later specified and refined as part of a 'shape grammar' with computational systems (Mitchell, 1990). Now with the impact of mobile communication proximity is getting more difficult to define as internet traffic and mobile phones poses the possibility for having distant influences and events feeling even closer than the neighbour standing next to you at the bus stop. At the same time the impact of these new 'glocal' interactions can have a more severe impact on your mental state and imagination than the physical appearance and reality in front of you. Here CA and related tendencies are here used for a wide range of purposes as predicting growth of cities and related transportation systems, to the best locations of shopping centres and prediction of crowd patterns at festivals. Currently it is being developed in several directions as part of more focused studies of dynamics.

In continuation of the definition of these systems there is a main interest in understanding how the organization of these systems occurs. What determines the system and how does it evolve in self-organization to new patterns of development? This further implies that there might be local conditions and self-regulation systems as part of the larger network, which Maturana and Varela originally defined as an important characteristic of living systems:

'Autopoietic organization simply means processes interlaced in the specific form of a network of productions of components which realizing the network that produced them constitutes it as a unity.' (Maturana & Varela, 1980, p. 80)

In this way a network reproduce itself (autopoietic as 'self-making') where the function of each component participates in the production or transformation of other components in the network. Thus here the analogy to living systems is that through adaptation, the organization becomes the environment, when evolution accumulates information about it. (Maturana & Varela, 1980, p. 6)

The simple way to describe it is that cells must have some self-making properties to develop; in the same way as actors (human and non-human) have a self-referential state to use as basis when interacting. However this unit is both open and closed as it is open to the flow of energy and matter but still organizational closed. (Capra, 1997, p. 168f). Luhmann took over this definition of autopoiesis and used it to describe social systems as essentially systems of communication (Luhmann N. , 1995, p. xxiii) (Luhmann N. , 1986, p. 174). The identity of the system is defined through meaning as a self-referential system (Luhmann N. , 1995, p. 36) acting emergent almost similar to organization as 'governance without government' (Thrift, 1995, p. 221), thus in this regard as forces that maintain a dynamic balance through interaction.

'The field of emergence is not presocial. It is open-endedly social. It is social in a manner "prior to" the separating out of individuals and the identifiable groupings that they end up boxing themselves into (positions in gridlock). A sociality without determinate borders: "pure" sociality.' (Massumi, 2002, p. 9)

The opposite of these autopoietic autonomous machines are the allopoietic machines, which have as a product of their functioning something different from themselves (Maturana & Varela, 1980, p. 80), and through the coming chapters it is suggested that an alternative definition might be needed for organizations that move between different states of open and closeness, thus also between the individual and collective.
As we in the beginning outlined the issue of the performative it was defined by Fischer-Lichte as the performative act not expressing something that pre-exists, but being brought into being by how the performance occurs and thereby being self-referential, constituting reality. This could be the emergent global effect from the local performative act in the remaking as from feedback with the environment. In addition, it is of no surprise that biological systems *'must continually regenerate themselves to maintain their organization. This, of course, is a well-known characteristic of life.'* (Capra, 1997, p. 168)

'Autopoietic systems are defined as networks of productions of components that recursively, through their interactions, generate and realize the network that produces them and constitute, in the space in which they exist, the boundaries of the network as components that participate in the realization of the network' (Urry, 2003, p. 99).

This indicates that emergent characteristics from interactions are able to evolve in performative systems, which includes the production of the network and boundaries. Emergence thus acts as a next level in an evolution of a process that maintains a temporary state. These states and boundaries could also be social. When Lefebvre described 'space as a social production; place is a personal reading' (Lefebvre, 1974), it also implied the emergence of social spaces, which could be similar to the social order by Luhmann and Goffman as mentioned previously.

Summary

What appears from the above is a renewed inspiration from biology, but with an extension of the aspect of emergence due to the integration of more advanced feedback technologies. These technologies significantly influence how research is done, simulations approached, design investigated and in general act as a new kind of intelligence that extend the perception of complexity into the hands of architects, planners and decision-makers. It is a reliability on new tools that is both interesting and frightening but nevertheless they draw out a new territory, which again inscribes design in a series of conflicting relationships. For Kurzweil this might be described as the ultimate emergence – the rapid evolution of technology to extend beyond any imagination of how and what machines can do (Kurzweil, 2005). These technologies coupled with more advanced empirical knowledge or 'senses' of the real, also makes decision-making a more complex procedure. Instead of a traditionally top-down design and planning vocabolary, ideas and concepts are constantly circulated and the result is a performative outcome based on multiple feedback from different actors. The power lies in posing good problems to be circulated and influenced by the media in which new directions are treated. Knowledge is emergent and being produced through these interactions with technologies. However what is important here is that this design intelligence is no-longer based on only human intelligence extended through sophisticated

computational technologies, but also it is acting as a distributed feedback system through new networks, thus occuring as a collective intelligence. The trick of keeping progress in design is thus not to add more parameters to this 'co-creation' process, which anyway will be added sooner or later, but to constantly reformulate the problem to add value to the project.

> *'Conditions of emergence are one with becoming. Re-conditionings of the emerged define normative or regulatory operations that set the parameters of history (the possible interactions of determinate individuals and groups). History is inseparably, ontogenetically different from becoming. But if feedback from the dimension of the emerged re-conditions the conditions of emergence, then it also has to be recognized that conditions of emergence change. Emergence emerges. Changing changes.' (Massumi, 2002, p. 10)*

Now considering these different aspects where emergence has comparable but different meanings within different professions, then all of them relate to the development of new properties from the whole of interactions, that could not be experienced or foreseen from the individual parts. As from Lloyd Morgan there need to be new properties created as part of this emergence, and outside the circles of biology and physics McCullough even mention the same description in relation to interaction design as *'value emerges from interactions'* (McCullough, 2004, p. 194). These values are very different within the exchange, but it must happen as part of a sense-making of complexity on location apparently together with new cultural properties arising from these interactions. Also emergence is essentially deterministic, which implies that the emergent property or outcome cannot be foreseen but still feeds into the next sequence. For a traditional approach to architecture or design this is a radical different perspective, as it describes a processual approach where each parameter can only be traced partly through process and not back again – emergent properties cannot be remade. In relation to performativity this makes especially sense for human interaction in the same way as from fluid dynamics, that there are no way to redo the experience when already happened. Seldom it is also easy to explain it, as it might happen as an intensive moment as in a blink as a difference to an extensive process. As part of architecture the main traditions are still extending from biological systems in understanding how new kinds of software can have performative properties, but emergence in interactive architecture between both human and non-human actors are not currently well illustrated as in a combination of a socio-technical perspective on performativity and interaction in places. However to do research for emergent processes requires an experimental approach with sometimes great but wasted efforts and sometimes quickly and surprisingly results from spontanous acts.

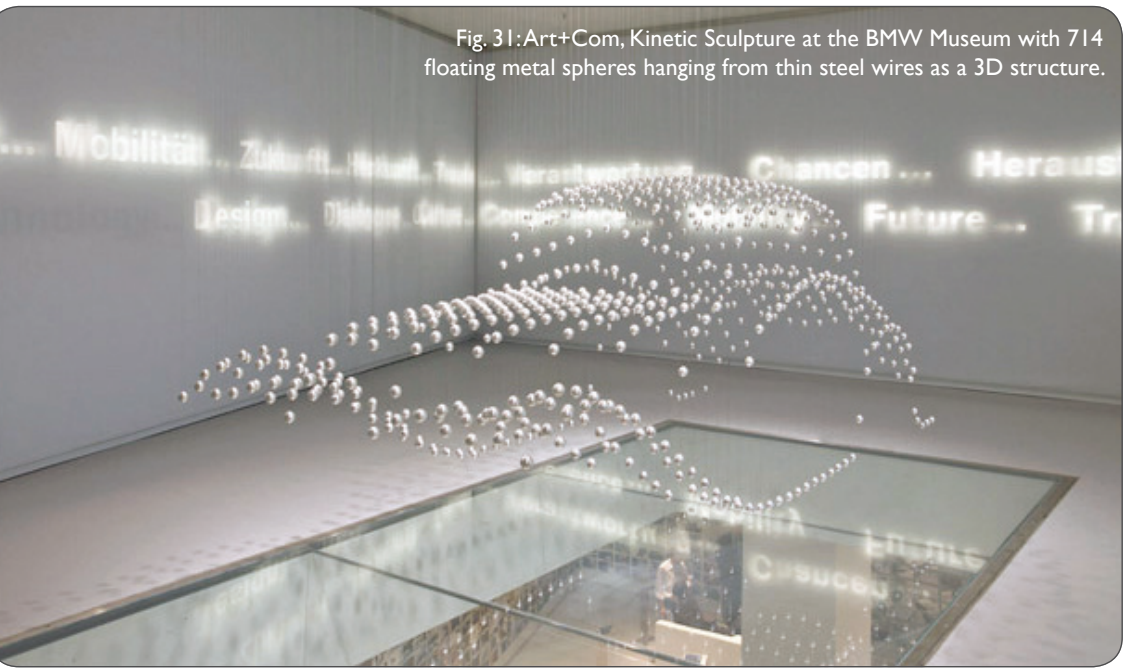

Fig. 31: Art+Com, Kinetic Sculpture at the BMW Museum with 714 floating metal spheres hanging from thin steel wires as a 3D structure.

What is needed, first of all, is to take a glance at the new technologies that are emerging, which based on the coupling of biology and computation, are inspirering new integrated applications for design. This implies a closer look at the origin of feedback and systems in relation to how computation and new technologies in greater extend contribute to acts and effects. Not only does this provide a common vocabolary for understanding the background of computation but also how architecture and urban design was initially affected by these tendencies that now seems more obvious and integrated procedure of the profession.

APPROACHING PERFORMATIVE TECHNOLOGIES

04

'From science and technology studies we take the idea that architectures, machines and texts enable or 'afford' the possibility for certain kinds of mobilities and immobilities. Human, non-human and inhuman agents interact via the affordances of the spaces, infrastructures and technologies in and through which they move, pause, dwell and encounter one another.' (Sheller & Urry, 2006, p. 9)

'The point of departure (of this analysis) is that people, institutions, companies, and society at large, transform technology, any technology, by appropriating it, by modifying it, by experimenting with it.This is the fundamental lesson from the social history of technology, and this is even more so in the case of the Internet, a technology of communication.' (Castells M. , 2001, p. 4f)

'We already have the technological capacity to design and manufacture materials that do not have uniform composition, properties, and appearance.With digital parametric design and production, variation becomes possible not only in spatial layouts and component dimensions, but also in material composition and surface articulation, offering unprecedented freedom from standardization that defined design and production for much of the twentieth century.' (Kolarevic & Klinger, 2008, p. 22)

It would be difficult to name a chapter to deal just with technologies without being typically out-fashioned within a short time. However anyway as 'new technologies' have a widespread impact on this research and as from the previous chapter presents itself at a current shift in integration in everyday life, it needs additional clarifications and historical backgrounds to exemplify the difference from previous periods and the affect on architecture and urbanism. Besides the many aspects and interpretations of technology that deals with the basic concept of 'tools' or 'crafts' from the original meaning of 'techne' and the effect on material objects, one of the more significant aspects is its relational understanding in respect to context and use. One trying to escape the current 'technosphere' of new tools and media may find himself resting in a canoe in a wildlife area realizing that all the stuff in the suitcase are also technologies (Ferré, 1995, p. 1).Thus when technology becomes pervasive it is suddenly not referred to in the same way as 'the new and modern' but merely as a piece of everyday equipment. In the end only few people would look at a chair as a significant piece of 'technology'.

'Technology develops cumulatively, rather than in isolated heroic acts, and it finds most of its uses after it has been invented, rather than being invented to meet a foreseen need.' (Diamond, 1997)

Technologies in this sense are entering the cultural domain on different levels and are being accommodated for through environment, use and behaviour. As Heidegger noted, it is an 'end-seeking human activity' and concerns 'equipment' or 'tools' to achieve these ends (Heidegger, 1996). Essentially technologies are an integrated part of human activity and in his critique of technologies out of context, McCullough exemplify how digital technologies could be situated and environmentally basically because *'often the technologies on which new expectations are based blend into the fabric of everyday existence.'* (McCullough, 2004, p. 10) However maybe technologies are better off to be understood on the basis of location from the very beginning, as when Steven Moore refers to Latour when describing how technology essentially is a spatial concept because its operation depends upon the mobilization of human and nonhuman resources existing in different places, and thus technology would be better understood as human events in space through geography than through history. (Moore, 2001, p. 52f) To make it more simple, technologies exist as part of a feedback loop with culture and stimulate practice during development and new discoveries and with the important issue of providing meaning only through a context.

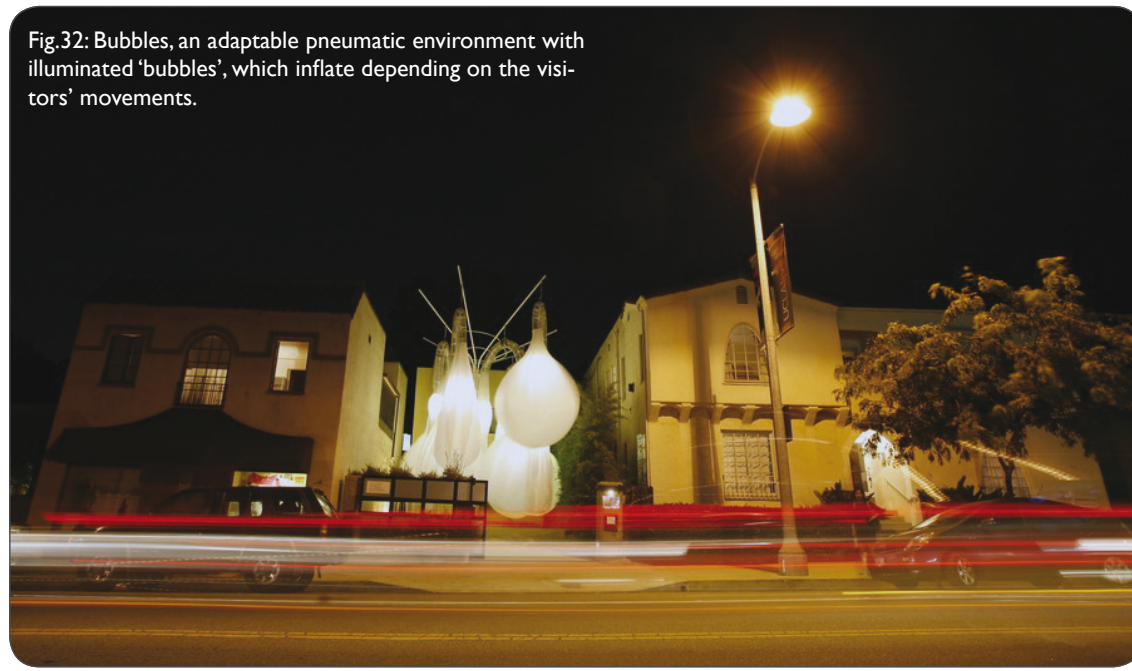

Fig.32: Bubbles, an adaptable pneumatic environment with illuminated 'bubbles', which inflate depending on the visitors' movements.

'Technologies only gain meaning in their application. To be effective, new technologies require the invention of original techniques – methods that allow individuals to use technologies in specific contexts, to accomplish complex or difficult tasks.' (Rahim, 2005, p. 11)

Whether we used to think of the telephone, the fax machine or the personal computer as new technologies, they are slowly getting pervasive moving towards integrated devices as part of daily life. Here technologies are often considered as replacements, maybe because this is how they are perceived when they come into use as part of everyday life, however in general '*new technologies augment and enhance existing tools and practices rather than replace them.*' (Brown & Duguid, 2000)

'From past to present the fire of Prometheus has cooked our food, baked clay, melted metals, powered steam engines, coursed through high-voltage cables, burned in nuclear reactors, and exploded in our bombs and weapons of destruction. Through the architecture that shelters, gathers and inscribes it on Earth; through the wheel and navigation, which have expanded its horizons; through writing, the telephone, and cinema, which infiltrate it with signs; through text and textile, which, as they waver together a variety of materials, colors and meanings, unfurl its undulating surfaces, the luxurious folds of its intrigues, fabrics, and veils – the human world is technological to its core' (Lévy, 2001, p. 3)

The technologies relevant for understanding performativity in relation to architecture and urbanism are connected to the field of interactive technologies. It is technologies that are defined by feedback and their ability to increasingly circulate information among different people and settings joining relationships and shaping the overall network all along. Thus performative technologies are based on actions and progress in the light of new computational powers, and they increase the perpetual feedback between humans and objects, individually or collectively. Even though also here it might serve as a cliché, we have in the recent years witnessed an even greater development in technological devices, computational power and media that are increasingly transforming how we interact, feel at place and in general live our lives. Technologies in this sense go into our domains on a wide range of different levels, and they always seem to be treated as something 'new' or unexpected trying to tear apart our existing rhythms until slowly they are commoditized and indispensable. Anyhow we are still adapting these technologies and getting used to them like any other new tool, home or object. Technologies need time and adaptation and this chapter will try to define the technologies that are now getting into place in the same way as when the railroad spread throughout rural areas, the automobile and the road connected distant communities and when electric power lines and telecommunication cables was distributed to connect people and cities. These technologies are new in many regards but also rest on top of existing ideas about information technologies that basically enhance connections. Now technologies are tools as well as devices. The technologies that are focused on here are explored from the primary conduit of performativity. They are technologies that increase the circulation of information, technologies that make objects and matters 'emerge' in complex networks. Basically it is technologies that now are enhanced in more complex and more intelligent networks and supported by new sensor technologies whether personalized or collective. They tie together people as well as the sometimes create the limits for other ways of being in place, at rest or together.

Cybernetics and the origin of system theory

'Design is a second-order cybernetic system' (Spiller, 2008, p. 366)

When sensor technologies and computational systems were beginning to appear as a more defined research discipline it was introduced around the 2nd world war introducing new computational systems that had much resemblance with natural systems. It began the development towards the understanding of a performative paradigm that involved a socio-technical understanding of the interaction between technology and humans. As well one of the starting points for Lyotard was the crisis introduced by the Cybernetics and computerized society, and especially 'technocratic' aspects of 'systems' and other aspects of the impact of information technology. He described that *'the true goal of the system, the reason it programs itself like a computer, is the optimization of the global relationship between input and output – in other words, performativity'* (Lyotard, 1991, p. 11). These feedbacks with ongoing changes between input and output are essential in the understanding of current developments within computational technologies.

Before 2nd World War there were beginning explorations within building the first computational machines. Here Alan Turing sketched the first concepts for a reprogrammable digital computer that was developed around 2nd World War and giving rise to the Turing Test, which still is considered the method to test computers intelligence. Turing was followed by Von Neumann and his first computers including ideas for self-replicating machines. However the most important common movement happened in the years around 2nd World War with the rise of cybernetics by Norbert

Wiener and others. The Cybernetics Group began investigating communication and control especially in the field between living organisms and technology developing mechanistic models of living systems. Central in cybernetics was the feedback system as the main regulatory principle acting both in humans as well as technical systems. The main feedback system basically related to the issue of feeding back the output of a system to the input described as the feedback loop.

> *A feedback loop is a circular arrangement of causally connected elements, in which an initial cause propagates around the links of the loop, so that each element has an effect on the next, until the last 'feeds back' the effect into the first element of the cycle. (Capra, 1997, p. 56)*

In this way the feedback loop introduces a real time situation of *'the control of a machine on the basis of its actual performance rather than its expected performance'* as described by Norbert Wiener (Capra, 1997, p. 57). In the same way the feedback system is able to introduce a kind of self-regulating system, which also appeared in many previous technological achievements as e.g. the thermostats to regulate the heat in a room or the simple opening device of an electric door tracking the presence of incomers. In many ways feedback systems were considered acting in the same way as the human nervous system is controlling movement, and the way that the body adapts to different situations in a self-regulatory way, as Wiener described with his patients and the monitoring of the body organs (Wiener, 1961, p. 96). Very simple procedures as steering a bicycle, continuous drawing or reaching for an object involves a continuous process of feedbacks, where the hand is constantly corrected to fulfil the task. Procedures that are very simple types of interactions now-a-days introduced in robots with more straight-forward goals.

As with feedback systems and further development of the area it involved detailed elaborations of different kind of systems e.g. negative (self-balancing) and positive (self-reinforcing) feedbacks (Capra, 1997, p. 59). The cybernetic group expanded in the years after the 2nd World War and began to emerge around Wiener and his associates. Cybernetics was further extending into the fields of communication, organization and learning because the basic principles seemed quite familiar in the ways of maintaining a kind of dynamic balance. Within organizational science this control logic has been used as part of these basic principles with four definitions of Cybernetics (Gareth, 2006, p. 82):

1. *Systems must have the capacity to sense, monitor and scan significant aspects of the environment.*
2. *They must be able to relate this information to the operating norms that guide systems behaviour.*
3. *They must be able to detect significant deviations from these norms.*
4. *They must be able to initiate corrective action when discrepancies are detected.*

The interdisciplinary principles of cybernetics introduced the field as part of discussions in broad intellectual debates as e.g. in the Macy conferences where Norbert Wiener joined with e.g. Claude Shannon, Gregory Bateson, W. Ross Ashby and others. This extended the principles of cybernetics in the fields of e.g. communication, social systems and control relations and with the driving force of combining discussion of psychology and mathematics in interdisciplinary settings. The importance here becomes the development from simple one-way control systems to interactive systems that took the output as the input for a revised process.
This is becoming the starting point for second-order cybernetics where learning and participant observers become a key part opposed to the more

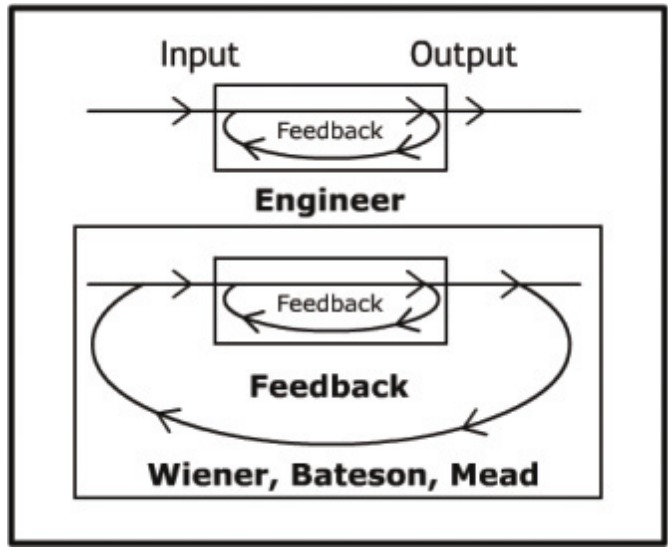

Fig. 33: Diagram of second-order cybernetics.

traditional control systems. Claude Shannon refined the feedback system into a mathematical theory of communication, which further involved into the formal theory of communication describing the relation between the produced message, the channel of distribution and the arrival of the message (Shannon & Weaver, 1971). Gregory Bateson moved in the direction of understanding the mind to extend into ecological systems (as with feedbacks).

> *'A system, after all, is any unit containing feedback structure and therefore competent to process information. There are ecological systems, social systems, and the individual organism plus the environment with which it interacts is itself a system in this technical sense.' (Bateson, 1991, p. 260)*

What is of great interest to Bateson is the three 'large systems'; the individual subject, society, where the subject lives, and the natural biological surroundings (the eco-system), and the three systems as continuously calibrating and sometimes in phases of misunderstanding leading to large crisis and sometimes catastrophes (Ølgaard, 2004, p. 185). In this sense the individual behaviour is regulated by the principles of feedback and calibration

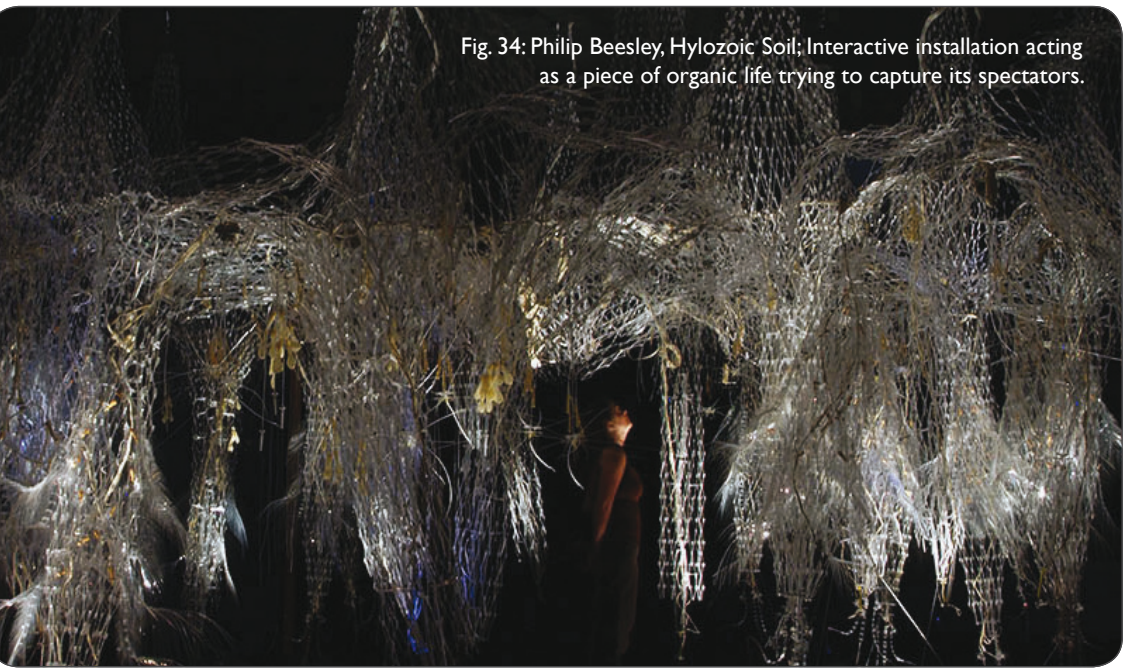

Fig. 34: Philip Beesley, Hylozoic Soil; Interactive installation acting as a piece of organic life trying to capture its spectators.

as well as the learning perspectives drawn from these feedback processes. This contained a holistic view which also incorporates issues as the mind defined through six criteria with one of them as 'an aggregate of interacting parts or components', where interaction is triggered by difference (Bateson, 1979, p. 92). Bateson is using an almost deductive method of observing the processes and find patterns in these processes from where to draw assumptions, which can be compared to the principles of system theory developed parallel by the end of the cybernetics movement. Years before George Herbert Mead used similar principles in social psychology however focusing not as much on the internal mental states but extending the theories of J.B. Watson:

> *'We are not, in social psychology, building up the behavior of the social group in terms of the behavior of the separate individuals composing it; rather, we are starting out with a given social whole of complex group activity, into which we analyze (as elements) the behavior of each of the separate individuals composing it.' (Mead, 1934, p. 7)*

Mead did not see himself as part of the more biologically oriented behaviourism, which most likely is why he is more related to the origins of pragmatism:

> *'It was Mead's emphasis on the social character of the self that separates his thinking from a biologically-based psychology; Mead saw his work as a social behaviorism – it was radically different from associationism, parallelism or behaviorism. For Mead the individual was a self-conscious, reflective, creative, and social being.' (Roberts, 1992, p. 153)*

Erving Goffman brought the theories of Mead further towards a more reflexive practice with the understanding of performance and the interpretation of interactions. Interaction was in this case understood as *'all the interactions which occurs throughout any one occasion when a given set of individuals are in one another's continuous presence.* In the same way *'a performance may be defined as all the activity of a given participant on a given occasion which serves to influence in any way any of the other participants.'* (Goffman, 1973, p. 15) Thus ideas starting with cybernetics based on feedback and systems suddenly had a widespread effect on understanding psychology and human behaviour, and to reach some kind of consensus on the cybernetics Ludwig van Bertalanffy worked on a comparable General Systems Theory (GST). Bertalanffy tried to formulate a formal theory of living systems as open systems that regulate themselves.

'General system theory is a general science of 'wholeness' which up till now was considered a vague, hazy and semi-metaphysical concept. In elaborate form it would be a mathematical discipline, in itself purely formal but applicable to the various empirical sciences. For sciences concerned with 'organized wholes', it would be of similar significance to that which probability has for sciences concerned with 'chance event' (Bertalanffy, 1968, p. 37)

Interesting in this way is that the general system theory tried to define the elements from the whole instead of the traditional Cartesian way of inducting from the specific to the general with the theory of scientific objectivity. Instead it begins a discussion about a network of relationships which are understood by examining the system and leading to contemporary concepts of organized complexities. In here was the idea that all systems share certain common characteristics and to study the phenomena towards general laws could also provide information about specific systems. (Midgley, 2003, p. xxiii)

The cybernetics and origin of system theory lead to a whole range of innovative approaches to science in as diverse areas as information technology, organization, artificial intelligence with robotics, communication and learning environments. The common feature of these approaches rests in the concepts of different feedback and feed-forwards in systems. Especially with the rise of the information society and the globalized technological networks the issue regarding regulation and control in networks becomes a key issue for navigating in the interdisciplinary field of socio-technological systems. One the main interests in the systems theories is also the idea about technology as crossing disciplinary borders and traditional scale limits of design and the efforts to outline general understandings of the feedback systems. In relation to performativity, the elaboration of feedback, or the actions between elements, becomes the main basis for operating with a performative concept with multiple observing actors as central for the second-order cybernetics. Also a few thoughts seem to be headed towards a third order cybernetics involving how actions are made to these systems, but seems to be more beneficial to move to some of the next territories following after the cybernetic thought. In the next step it then reflects in how design is performed through these feedbacks, and how design and urbanism are affected by these system understandings.

Cybernetics and the influence on architecture and urbanism

The system theory and cybernetics movement gave rise to a series of projects within architecture and urbanism, which all encompassed the idea of the city as a system able to respond to changing situations. The architectural projects, which further extended from these ideas in the 60´s and 70´s, could be announced as ´performative´ designs based on the above definitions. Even much of these designs were based on the specific adaptation of feedback mechanisms in constructions and infrastructure as mostly mechanical processes of change, they all more or less encompassed the idea of open designs and systems which individuals could act upon and with potentials of generating new vibrant environments.
Cedric Price well-known for his experimental approach to urbanism and architectural design was one of the key representatives for considering architecture as a feedback process with citizens and space. He seemed to have a strong confidence in the future development and progress together with the ethical dimension of the effects of the architecture on the citizens (occupants and observers) as well as personal freedom with an architecture liberating, enhancing and supportive (Price, 2003b, p. 11). With the

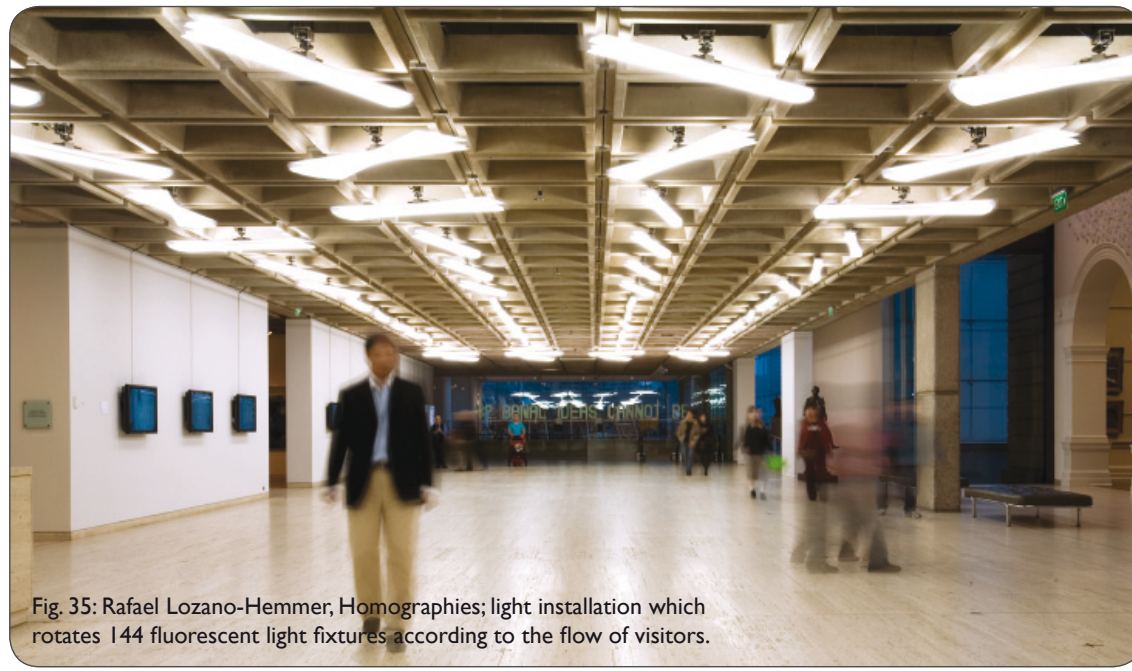

Fig. 35: Rafael Lozano-Hemmer, Homographies; light installation which rotates 144 fluorescent light fixtures according to the flow of visitors.

'Non-Plan' Cedric Price basically suggested the total dissolution of the planning system:

> *'Non-plan in reducing the permanence of the assumed worth of the past uses of space through avoiding their very reinforcement might well give society an opportunity not only to reassess such worth but to establish a new order of priorities of land, sea and air use which would be related more directly to the valid social and economic life-span of such uses.' (Jencks & Kropf, 1997/2004, p. 239)*

Strikingly was the critique from Price regarding planners more willing to discuss conservation rather than innovation and suggested more open and flexible arrangements in the spirit of 60´s movements as e.g. the Pop-Up Parliament. (Price, 2003b, p. 11) For this design process, action and feedback in a time perspective were the key characteristics for developing the proposals and to initiate debates about architecture and society, where architecture only was considered as an appropriate response for a limited time. The Potteries Thinkbelt was a higher educational facility which made a research on simple architectural components put together and reassembled by the introduction of the railway system. The *university* (a phrase which Price did not like) was considered as an exchangeable university

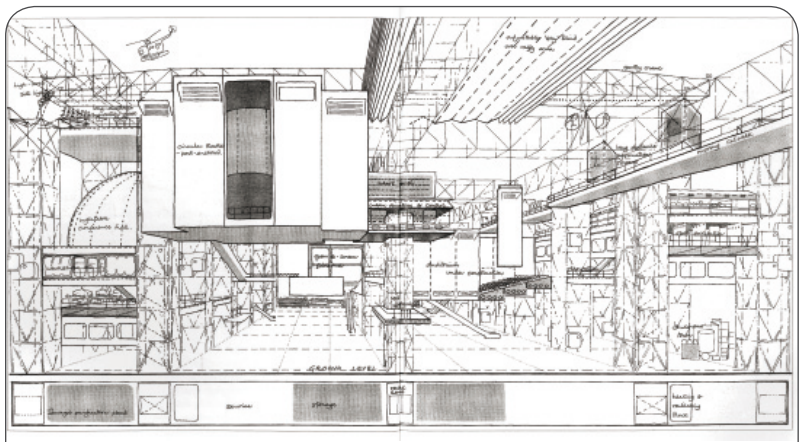

Fig. 36: Cedric Price, Fun Palace, a laboratory of fun and university of the street as a leisure facility to prepare society for the advent of the technological age.

where '*former station train yards would become places of education, where specially designed teaching units could be transported and put together in situ.*' (Price, 2003a, p. 39) This further reflects the beginning concepts for the considerations of networks and decentralization.
In this '*a network would be indeterminate, flexible and extendable, allowing the educational facilities to spread over and integrate into the area of the Potteries.*' (Price, 2003b, p. 13). Price was also considering the impact of information technology similar to Archigram with large-scale displays projected on the sky or on existing city-structures imagined as a kind of Pop-Art. At the same time this introduced the concept of enabling architecture where architecture could start a transformation process through the integration of information technology with some degree of intelligence providing affordances for new uses and behaviours through interactivity.

> *'An intelligent environment must have the capacity to learn and a memory and an ability to respond. Since the Fun Palace, Price's architecture had possessed a capacity to respond, that is, it could react formally or mechanically to a given stimulus… but an architecture which did not simply react but which learned, remembered, when necessary relearned, and then responded appropriately…'*
> *(Price, 2003b, p. 38)*

As with the Generator project '*Architecture should have little to do with problem solving – rather it should create desirable conditions and opportunities hitherto thought possible.*' (Price, 2003b, p. 92). The Generator project, as an 'intelligent' building, highly encompassed the computer technology and its potential for both responding to user needs and adapt to these as being able to invent its own use, if the users failed to recognize the potential of the system:

> *'We were concerned that the building would not be changed enough by its users because they would not see the full potential to do so. We consequently suggested that a characteristic of intelligence, and therefore of the Generator, was that it would register its own boredom, and make suggestions for its own reorganization.' (Frazer, 1995, p. 41)*

In 1978 this tendency of architecture embedded the ideas of artificial intelligence as part of a responsive environment both feeding back and feeding new potentials into space. The project proposed a grid on a site with a permanent mobile crane to organize moving components and allow for users to be involved in its organization. The embedded processors would know the configuration of the parts and could then learn from alterations and coach itself to its own reorganization. One of the very first proj-

ects of Price, The Fun Palace (in 1961), contributed much to the following concepts although never build. The project was developed together with Joan Littlewood (also as a client), who was a theatre producer, and it was described as '*a laboratory of fun and a university of the streets*' (Price, 2003b, p. 11). The visitor should be stimulated, react and interact, and not just a passive observer as well as the facility was able to move to different settings and locations basically as more thoroughly considered performance facilities:

> *'Price responded with a an architecture which provided an unenclosed steel frame structure, fully serviced by a travelling gantry crane and containing hanging auditoria, moving walls, floors, ceilings and walkways, multi-level ramps and a sophisticated environmental system which included vapour barriers, warm air curtain, fog dispersal plants and horizontal and vertical lightweight blinds.' (Price, 2003b, p. 11)*

This project and the approach to architecture were further referred to as one of the main inspirations for the Pompidou Centre in Paris by Piano and Rogers; first because architecture in the same way should support and enable human activity and secondly with the fascination of new technologies. The Pompidou centre was structurally considered for flexibility in the way all installations, ducts and structures were accommodated on the exterior at the same time as floors could be detached and moved around. The building should not constrain future activities, but the activities should evolve with the building through a framework of space that could be added, opened or divided. In the end however many of the flexible solutions was fixed in place and instead it became a landmark mainly because of its compact structurally expressive appearance. Apart from the design considerations, it was also considered with more comprehensive societal impacts as described here by Richard Rogers:

> *'When buildings contribute to the public realm, they encourage people to meet and converse. They engage the passer-by. They stimulate rather than repress people's natural human potential. They humanise the city.' (Rogers & Gumuchdijan (ed.), 1998, p. 74)*

This responds well to the flexible and enabling element of the cybernetic architecture and it encompasses a strong believe in change; that open systems and buildings as flexible envelopes would generate a potential for more embracing communities and participatory practices that grows with the citizens. Although Pompidou was built almost as a gothic structure with a high-tech expression with open floors that could be disconnected and the beams turned around a pivot on the facade, it was never really used in this flexible character. However the functions inside the 'factory' and concept of having a project injecting activity became a success through open libraries, mediateque and galleries.

> *'Every generation needs to reinvent its public institutions and create new ones. The Pompidou Centre was as much an exploration of the concept of an adaptable, pluralist institution as it was an architectural exploration of flexible space and fragmented architectural form. New ideas require new forms.' (Rogers & Gumuchdijan (ed.), 1998, p. 79)*

Technology for Price was also not only a direct integration of technology for the sake of technology, but he campaigned for '*the architectural profession to be more thoughtful about the way it uses technology, which he feels should provide a non-dictatorial use of space. Price sees buildings as catalysts or ´enabling´ mechanisms, which facilitate and encourage social and spatial interaction.*' (Spiller, 2002, p. 84)

An important aspect which goes through most of the concepts of Price, together with the interactive individual performances and the mobile mechanical concepts, was the idea about learning as integrated in the project. As previously described in the Cybernetics, learning treats the role of

Fig. 37: Pompidou Centre, Paris, as inspired from the Fun Palace.

feeding back the output to the input aware of the systems capabilities to process information, which was much discussed between Price and another of the great speakers for a cybernetic architecture, Gordon Pask.
Gordon Pask however wanted architecture to go even further '*in comprehending itself as one of the fundamental conversational systems in human culture*' (Spiller, 2002, p. 77), and in this way aligning with an evolutionary approach to architecture to gradually evolve, and with the designer as the inventor of control systems. When considering architecture as part of a feedback process with the participants, Gordon Pask introduced how a system could be a town, where '*the observer is trying to make sense of what we call ´traffic flow´* as a perceiver of the activities. However the observers are not only considered as just receiving events generated by an assembly/ town as '*most observers are not content to watch and wait. They act upon the assembly and induce the system to change states in a satisfying manner'*. In this way there is a shift to the *participant observer*, where it is difficult to make any objective measurements of the implications for the participant or objective measurements of the interaction (Pask, 1968, p. 33f). This was also one of the most significant theoretical inputs for understanding of interactions with environments as part of Pask's second-order cybernetics

Fig. 38: MIT, Mobile Experience Lab, The Cloud, interactive furniture.

accounting for the participants in the system. Under-specified goals were introduced to the theory considering that goals can emerge during the interaction in context between the participants in the environments. The second-order cybernetics was further developed into his 'conversation theory' as a theory of interaction between humans and machines (Haque, 2007, p. 54).
Price and Pask were discussing these issues for the Fun Palace project, which was considered one of the first cybernetic buildings involving the participants and architecture into this circular feedback loop. Pask was also involved as a consultant for the Fun Palace (together with Buckminster Fuller as trustee) and they later worked together and developed sketches and ideas for a competition in Japan. The ideas and sketches however seemed to be too complicated with Pask interested mostly in the complex feedback process and Price in the overall system (Price, 2003a, p. 70).
In later writings Price began having thoughts about the mobile design, probably as a continuation of the large mechanical systems that mostly was encompassed in his proposals. He imagined the difference of a circus moving with all its equipment and activities to a new location using wheels and equipment for moving, compared to just sending a message to the location to reassemble the site for its activities (Price, 2003a, p. 74). Thus this message would act as a transformer of a site which could be similar in concept to the recent ideas by Bruno Latour as mentioned later on. Price's reflections on cities indicate the temporary, mobile and adaptable as in permanent mutation not to be stuck in identity overkill (Price, 2003a, p. 54), and aligned well with the performative to develop from the local interactions and not as predetermined fixed meanings.
Another significant influencer from cybernetics was the Archigram group, which was at London´s Architectural Association (AA) around the same time as Price was just beginning to distribute articles. There are obvious relationships between Price and the Archigram group, and although he contributed to the Archigram magazines, he for some reason never joined formally. These magazines could by the main idea of circulating ideas and concepts go well into the definition of a performative movement, but Archigram putted more emphasis on using architectural illustrations to convey the ideology and the technical solutions. In general it was a more pleasurable approach to technology than the modernists have carried into effect, and they focused much more on the unsolved problems than necessarily the solutions. Archigram extended similar concepts of feedback to large and sometimes moveable structures as Plugin-City (Peter Cook), Instant City (Ron Herron), Computer City (Dennis Crompton) and similar concepts as from the group Superstudio.

'A major problem of the organization (and the imagery-control) of large areas of the city is the achievement of a consistency running through parts with widely different sizes and functions. Add to this the problems of absorbing growth and avoiding the piecemeal one-offness of block-to-block relationships, the answer is obviously found in a large-scale structural idea, which is anyhow a necessary of a consistent building…' (Jencks & Kropf, 1997/2004, p. 224)

Through the magazine Archigram, the concepts were published as different fragmented pieces or combinations of ideas. Plug-In City was a metal cabin housing prototype to be placed as a removable housing element in a mega-structure (as in the metabolist movement), with ´cities´ not necessarily understood as replacement of current cities but more understood as a collective. (Cook, 1991, p. 36)

'The Walking City' of Ron Herron expressed the mobile village where large objects were moving instantly around in the city, '*…at once building and vehicle, small and large, tightly-knit and extended. The discussion of house and car as interrelated is a necessary response to the planning problem of what to do with cars, but at the same time it questions the need for fixed places at all.* (Archigram, 2005, p. 33)

Expressed in an immediate restless city always able to adapt to the impulses of the society, Archigram expressed it all through playfulness and with an experimental approach to a discussion on the actual need for cities as large fixed agglomerations. Instead you would be able to be entertained, enjoy food and produce by being on the move and always flexible. Cities would not consist of mass and buildings alone but more about flashing signs and unexpected incidents; the city was here not an artefact but more understood as an environment with the danger of completely losing any signs of form.

'One of the greatest weakness of our immediate urban architecture is the inability to contain the fast – moving object as part of the total aesthetic – but the comic imagery has always been strongest here. The representation of movement-objects and movement-containers is consistent with the rest, and not only because 'speed' is the main gesture' (Archigram, 2005, p. 6)

Yona Friedman very specifically defined a manifesto for L'Architecture Mobile based on a total open design approach where the design activities should be left to the occupants. '*The basic difference between user participation and the concept of L'Architecture Mobile is that in the latter it is the user who makes the project with the designer's participation.*' (Sabine, 1999, p. 21) The 10 items in this manifesto was about opening up structures '*to serve the unpredictable*' as a system to be adjusted based on the input from the occupants, as well as *'the new urban society must not be shaped by the urbanist. Social differences between various districts should evolve spontaneously.'* (Sabine, 1999, p. 21) These space structures could facilitate a city with free connections and manage specialization through participation; however as a pervasive structure it seemed obvious that it would also destruct itself being one overall rigid concept.

The critique to pose at this period of architecture based on systems and cybernetics was quiet easy to foresee. The schism of handing over decision-making on activities and aesthetics to the full capability of the user, pointed towards an, until then, unseen instrumentalism and focus on structural, mechanical and electrical systems with the technology in forefront. Even the strong believe in the individual citizens' freedom to establish city and space through architectural systems, it mostly turned out to be a very rough symbol of pragmatism, which left out basic aesthetic considerations for how the city could appear and organize. The act was in forefront of the poetics of architectural form. What however was very sympathetic was the actors influence on architecture and the city's capability to adapt to the current individual perplexity. Architecture was seen as always capturing

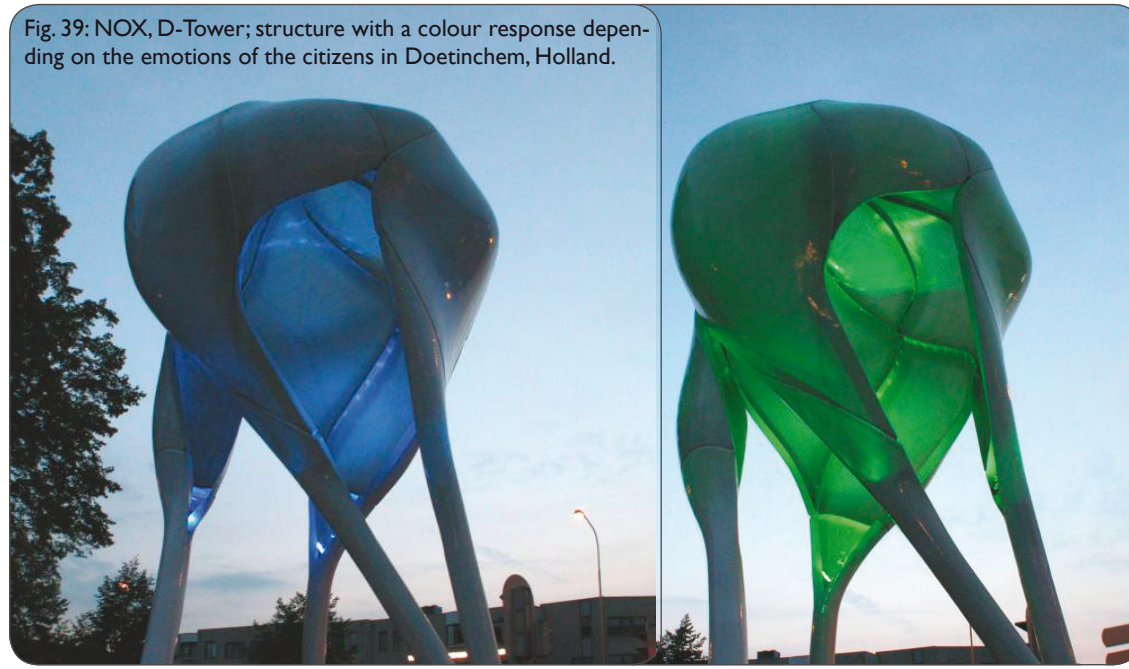

Fig. 39: NOX, D-Tower; structure with a colour response depending on the emotions of the citizens in Doetinchem, Holland.

the moment and intensities of a societal condition with no objective other than absolute freedom and exploration – in fact architecture meant as little as the events of the city, rain, movie screens etc. The groups as Archigram and Cedric Price unfortunately produced more images than objects and only recently we can witness some of it coming alive in e.g. Peter Cooks, Kunsthaus Graz, but previously leaving most of the experiments up to fantasy to imagine how they worked, well-knowing that these architectural instruments and informational systems need to be experienced for the actions that they generate.

It was around the same time as e.g. Jane Jacobs, Kevin Lynch and Aldo Rossi began to question the universality of planning and the shift in focus on both the changing character of architecture and the user involving perspective of urbanism. As previously noted the relationship of emergence was similar to the city diversity appearing from the sidewalks that Jacobs proclaimed and still makes much sense in recent media theory. Aldo Rossi was emphasizing the dynamic character of the city, where uses are changing throughout the life of a building and as well *'destruction and demolition, expropriation and rapid changes in use as a result of speculation and obsolescence, are the most recognizable signs of urban dynamics.'* (Rossi, 1984, p. 22) Kevin Lynch proposed to shift focus from projects and plans as targets to instead discussing the city as involved in constant change by introducing cities as interactions:

> *'A general theory of city form, today nonexistent, would deal with the interaction between city form and human behavior: How a city is shaped by social events and conditions, and how it in turn modifies them in a constant interchange. (Lynch, 1991)*

In continuation of this 'systemic revolution' within urban development, Lynch also defined models similar to the understanding of cities as systems with e.g. 'the City as a Machine' and 'the Ecological City'. The City as a Machine reflected in many ways the principles of Price with the city as *'a system of mechanical parts that interact in a network and are not bound to any particular place.'* (Shane D. G., 2005, p. 46). The City as a Machine however might not only involve moving mechanical parts but could imply an optimization of the communication with the city's media scape accelerating response time between the cells. 'The Ecological City' highly reflects the principles of self-organized 'organisms' with each actor maintaining a dynamic balance able to shift the balance of the urban model according to feedback from the overall environmental behaviour.
In general many of the proposed, mostly utopian urban schemes, evolving from the cybernetic period were either bottom-up initiatives based on local feedback, sensorial installations or more structural large-scale projects that however mostly encompassed ideas of cities as organisms evolving through space-frames or large urban grids. They were difficult to implement or did not have the sufficient technologies to support the interactive developments. Constant's 'New Babylon' developed as part of the situationist movement clearly indicated a convergence of architectural and social considerations in a radical rethinking of the society.

> *'Unitary urbanism would battle against planners and efficiency experts and men in suits who sat in fancy offices high above everyone else; it would work against market-driven cities, too, against cities where spaces became "abstract" commodities, monopolized by the highest bidder. The unitary city would be disruptive and playful, reuniting all that had been physically and socially sundered, emphasizing forgotten and beleaguered places, mysterious corners, quiet squares, teeming neighborhoods, sidewalks filled with strollers, parks with old-timers in berets sitting on the benches.' (Merrifield, 2000/12, p. 3)*

It significantly implemented the concept of the nomadic town based upon

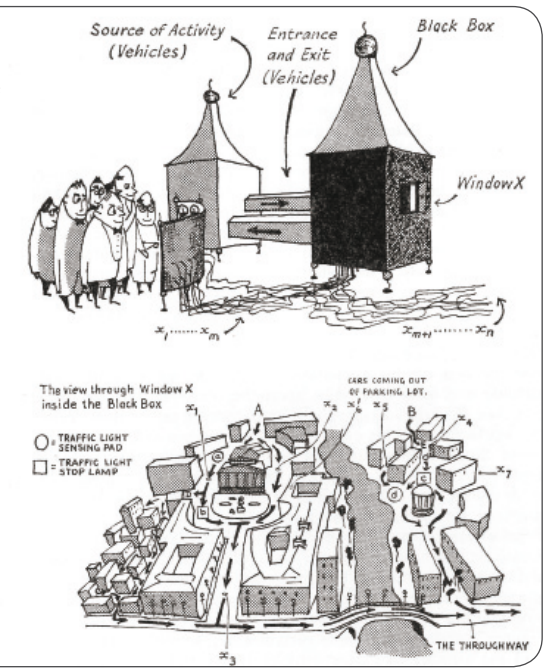

Fig. 40: Gordon Pask and the description of an assembly through the example of a city with participant observers.

a culture of play (Homo Ludens), experiment and enjoyment and as a new ephemeral and social model of the city. Through an era impacted with global communication, a 'unitary urbanism' was similar to other of the post-war schemes proposing an alternative to the modernist city more based on experience in the perpetual state of movement. (Nichols, 2004)
The cybernetics had its impact not only from AA in London but for instant the French architect and cybernetic Nicolas Schoffer built many large utopian structures responding to the environment (Bullivant, 2006, p. 52), however mostly known through his impressive production of cybernetic art. (Malan, 1997)
The thoughts and concepts emerging from the initial understanding of cybernetics significantly influenced a whole generation of concepts that however never really made it beyond the Pompidou Centre as part of the lived urban experience, even though a few more projects are beginning to be realized. Maybe something was missing from this interest in computation since it didn't appear strikingly as part of the build environment and the architectural profession.

> *'What is missed – dooming its brightly colored, hard-edged images of Capsule Homes, Plug-in Cities, Instant Cities, Cushicles, Suitaloons, Manzaks, Rokplugs and Logplugs to seem closer, now, to Jules Verne that to William Gibson or Neal Stephenson – was the emerging role of hyper-miniaturization, wirelessness, digitization , and dematerialization.' (Mitchell, 2003: 24)*

More advanced technologies and new means of hyper-communication might be the answer from William J. Mitchell, well-known for his introduction of shape grammar in architecture (Mitchell, 1990), and one of the most recognized advocates of the introduction of information technologies through his three seminal books on architecture and urbanism.

Continuation of Cybernetics

The concepts related to cybernetic architecture have been continued in different environments but have spread out in a variety of different applications from everything to more engineered intelligent building systems to artistic settings allowing for spontaneous input to changing facades and ambience. Especially John Frazer was influenced working with Gordon Pask and acted as a consultant for Price and was inspired by the new computational tools that extended the possibilities of architectural influences on the environment. In his 'evolutionary architecture', tutored by Gordon Pask just before he passed away, he aimed at developing new tools that materialized the inner processes of the computer to understand it as a physical model. The exploration included 'The Universal Constructor' that followed from the previous mentioned 'Generator Project' and acted as a computational system with physical units slowly self-organizing and communicating with each other when units were changed (Frazer, 1995, p. 44). These first physical prototypes of architectural design systems have again been extended into fields like cellular automata, artificial life and genetic algorithms, but also more clearly participant-focused projects have emerged from Pask's Conversation Theory. As part of many learning theories, Conversation Theory was exemplary for second-order cybernetics in understanding the continuous feedback between input and output. Here learning was adapted through a subject matter represented in structures thus making knowledge explicit and creating a feedback to the person. (Pask, 1975) Here it is the specific type of interaction between humans and machines that constructs knowledge by explicit modelling, and the learner is required to 'teach back' the topic by both a non-verbal demonstration and verbal explanation (Scott, 2001). This is much related to the field of constructivist learning arguing that humans construct knowledge and meaning from their experience. Here Jean Piaget adopts similar ideas of cybernetics with the concept of feedback between the action and the

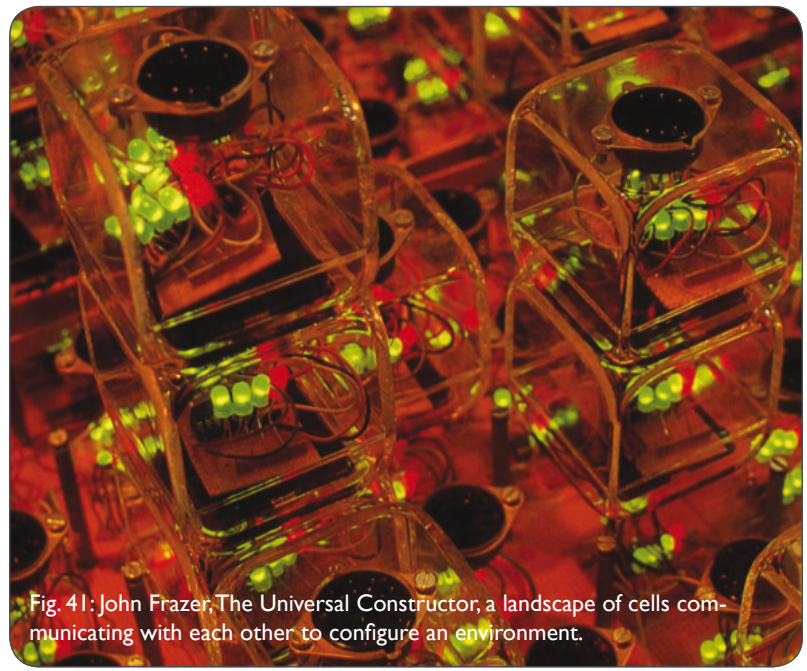

Fig. 41: John Frazer, The Universal Constructor, a landscape of cells communicating with each other to configure an environment.

expectation and learning thus also incorporating a social process (Glasersfeld, 2002) A similar more computational approach is developed by Seymour Papert with constructionism, where he designed the Lego Mindstorm robotics with the same intensions (Papert, 1982).
Usman Haque is one of the more contemporary artists and interaction designers, who have adopted the Gordan Pask concepts as part of new interactive public experiments and extended the second-order cybernetics into more material and urban prototypes. The idea here is essential to the understanding of performative environments and interactivity in general and deals with both the designer's role and the influence of machines in designing environments. The conversation theory implied that context is essential, and developed a unique profile for each individual through underspecified goals, and in a 'conversation' between human and machines the design is developed gradually. (Haque, 2007). This implies that there is a constant negotiation between the machine and the human, each stimulating each other towards a common design. In many of the other related computational projects e.g. as part of the web, it is merely a top-down database of information that the user is browsing through. People are here feeding into the databases, or machines are capturing data from the environment, but the difficult part becomes the shared process between machine and human to develop common criteria's for information.

> *'The reasoning behind Pask's interest in underspecified goals is that if a designer specifies all parts of a design and hence all behaviours that the constituent parts can conceivably have at the beginning, then the eventual identity and functioning of that design will be limited by what the designer can predict.' (Haque, 2007, p. 58)*

Previous examples on the conversational models were studied in e.g. the MusiColour machine (Glanville, 1996) and later the Generator project with Price, and in general these concepts were much more down-to-earth than the more sophisticated theories of artificial intelligence, where intelligence is developed mutually among humans and machines through externalization. Haque has investigated the use of the conversation theory as part of specific performative environments with e.g. the Open Burble and SkyEar (Haque, 2008); here the participants' take part in building an interactive system both affecting a large-scale structure in a park, and the light effects flowing through the structure during a performative event. Pask continued the conversation theory into an 'Interaction of Actor Theory' but the basic principles of second-order cybernetics allowing for participants and observers to join the development of goals are essential in the beginning explorations of interactions between human and non-human agents, especially with the growing amount of one-way informational systems.
Negroponte continued the traditions of cybernetics through his engagement with MIT and the Architecture Machine Group; an engagement which included the integration of computation into architecture not only for the issue of better performance but additionally as part of a computer-aided participatory design. When founding the MIT Media Lab together with Jerome Wiesner, Negroponte additionally extended the explorations of computational designs into a multidisciplinary field consisting of computer programmers, psychologists, anthropologists, designers etc., mainly focused on human-computer interaction and multimedia, but also more specific as part of adaptive structures. The Hyperbody kinetic structure developed by dECOi was one of the more specific actualizations of a more recent idea of an interactive structure and inspired a whole range of initiatives especially within the architectural fields of kinetic structures through for instance the Kinetic Design Group with Michael Fox at MIT. Thus the traditions has carried on and are still growing in the fields of kinetics and interactivity, however first of all there is a need to closer examine this more recent development of interactivity and networks as a basis for performative technologies.

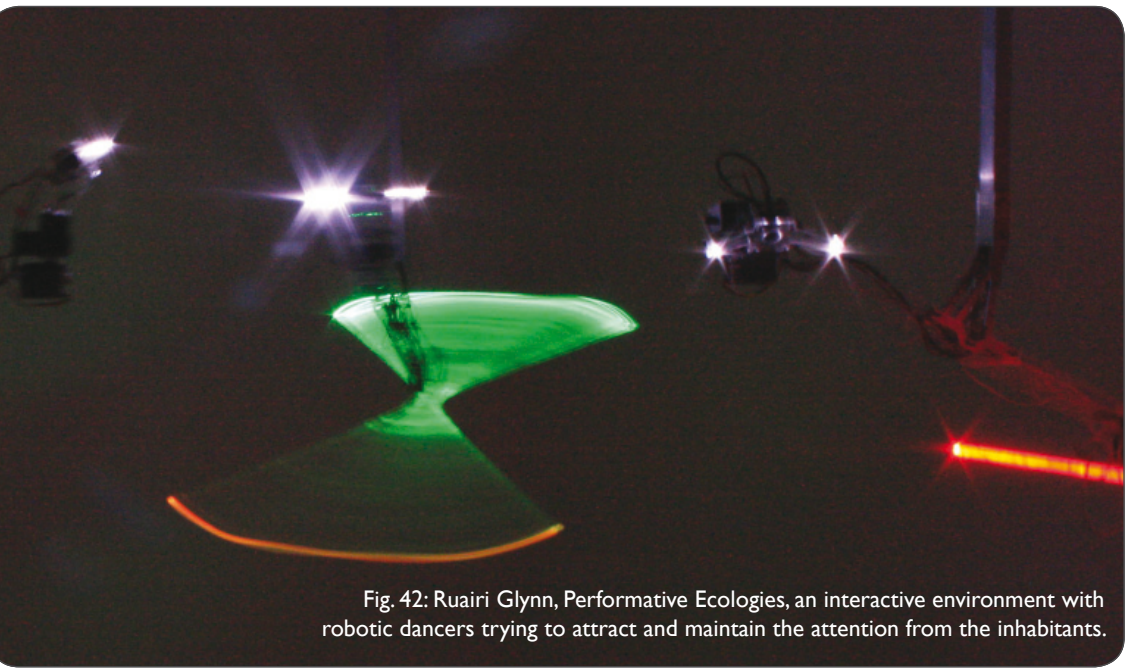

Fig. 42: Ruairi Glynn, Performative Ecologies, an interactive environment with robotic dancers trying to attract and maintain the attention from the inhabitants.

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Some of the issues that have significantly changed how technologies are influencing human behaviour and the built environment are based on a rapid development of multiple fields emerging from cybernetics and control systems. The more recent developments concerns first of all the specific integration of processors within the field of ubiquitous computing, secondly the emphasis on interaction where humans are having a 'dialogue' and thereby a continuous adaptation with computation and sensor technologies, and finally the coupling of these technologies into both global and local networks acting in multiple levels through different protocols.
Performative technologies contain the sum of these developments however now experienced as part of everyday life, as they are increasingly getting essential for everyday interactions with both humans and objects. Through these technologies global culture is interweaved in complex relationships of multiple feedbacks between objects and subjects mostly mediated through new types of distributed and mobile applications. The recent background of these performative technologies and the influence on culture is exemplified throughout the following chapters, indicating a need for new models to understand this influence and the role to play for architecture and urban design.

Ubiquitous computing

The early explorations of computation through the understanding of machines have exploded and become common practice of many of the most advanced research institutions in the world in less than 50 years. However looking at the practice of using computers with people glancing dead into computer screens, fixed to working stations and stereotyped in movement and gesture, it seems like the current tendencies will not last long. New explorations in integrated tangible computing, mobile platforms and collective intelligence are becoming the main drivers of new behaviours and usages of urban space, especially seen in the light of the recent theories and practices within interaction design.
Many of the new aspects of architecture and science are based on a new understanding of electronic media and computational technologies as they are increasingly integrated in our everyday-life. Within architecture, the tools that are created mainly for optimization purposes and virtual domains are now acting as boundary objects connecting our social worlds with physical mobility, when feedback processes between environment and actor are opened up for influence. Alan Kay called this the 'Third Paradigm' of computing when large centralized mainframe computers was followed by personal computers and notebooks to the third era with integrated computing in everyday objects. The idea originally stemmed from Mark Weiser's optimistic description of 'ubiquitous computing' (Weiser, 1991) as a disappearance of computers seamless into everyday objects. Ubiquitous computing thus describes an environment embedded with microprocessors everywhere and increasingly integrated in everyday life as *'hundreds of computers per person'* (McCullough, 2004, p. 5)
From the inspirational book by Greenfield this at the same time implied that:

> *'Ordinary objects, from coffee cups to raincoats to the paint on the walls, would be reconsidered as sites for the sensing and processing of information, and would wind up endowed with surprising new properties. Best of all, people would interact with these systems fluently and naturally, barely noticing the powerful informatics they were engaging.' (Greenfield, 2006, p. 11).*

Even this is a highly optimistic approach towards the integration of computers, it naturally marks the technological aim of computational integration for the common good of places and people. It is basically a tendency within computing that has last for more than 20 years trying to imagine how computers breaks the desktop and fluently merge into everyday life.

Fig. 43: Small Design Firm, Nobel Peace Center, LCDs, LEDs and sound responding to movements.

Truly it takes time for technologies to reappear as new integrated devices, but for systems like this it might also be a relevant question if they will ever stop to break, infect, boot and general jam as part of our physical interactions. At the same time the introduction of ubiquitous computing raises questions on surveillance and our increasingly dependency on microprocessors and technology as facilitators for all our interactions with everyday objects. Most people would be annoyed to constantly reboot their coffee machine as they reboot their computer; however at the same time these systems are being part of medical treatment regulating body organs leading humans to be dependent on this technology on the essential life functions. When ubiquitous computing gets interesting for architecture and design it's usually described as 'pervasive computing' as it both is getting embedded and increasingly invisible.

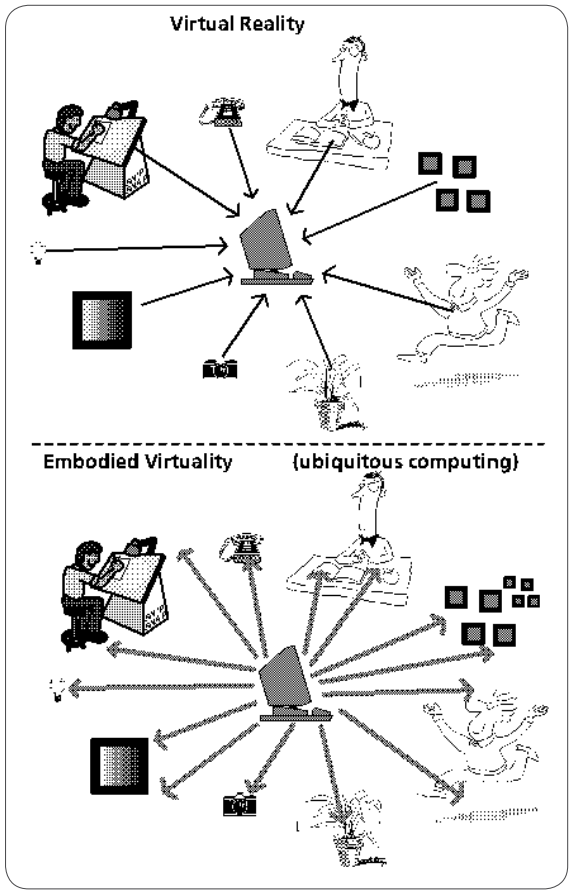


Fig. 44: The difference between virtual reality and ubiquitous computing.

> *'According to a characterization from the year 2000 by the National Institute for Standards and Technology pervasive computing is: 1) numerous, casually accessible, often invisible computing devices, 2) frequently mobile or embedded in the environment, 3) connected to an increasingly ubiquitous network structure.' (McCullough, 2004, p. 7)*

At the same time this can be described as a more naive idea that computational technologies actually will disappear into everyday material objects, where everyone will act fluently with the new artefact. In reality it seems like these technologies will go into a dialogue with existing technologies and be added to the 'accepted' artefacts of our increasingly interactive life, in the same way as mobile phones has extended from traditional stationary communication equipment (Ling, 2008, p. 12f)

As a reference to the industrial revolution all energy was something to be planned centrally and distributed from central power stations transmitted to remote consumers, however increasingly these engines and machines became increasingly decentralized able to be integrated in our everyday devices as smaller engines to facilitate our homes and mobility (Hansmann, Merk, Nicklous, & Stober, 2003). From the industrial revolution, the engine became 'ubiquitous' in the same way the telephone and communication technology starting from centrals to phone booths, personal phones in the office to now mobile and individual communication devices (McCullough, 2004, p. 10). By introducing 'pervasive computing' in relation to 'ubiquitous' the idealistic focus might again be back on architecture and design, as this is mostly understood as technology becoming invisibly part of our everyday objects, and with environments again facilitating the mobile citizen able to feel in place under changing conditions.
The pervasive computing also means the influence of an increasingly amount of 'actors' in the environment all connected to the network of information systems as well as monitoring and interacting with the environment through sensors and feedback. This further denotes the end of what previously was understood as cyberspace or virtual reality opposed to physical reality, as the virtual is integrated and living on different levels and in different devices as increasingly peer-to-peer networks.

> *'Recently we have witnessed a paradigm shift from cyberspace to pervasive computing. Instead of pulling us through the looking glass into some sterile, luminous world, digital technology now pours out beyond the screen, into our messy places, under our laws of physics; it is built into our rooms, embedded in our props and devices – everywhere.' (McCullough, 2004, p. 9)*

For decade's cyberspace and virtual reality was described as the common age of computing where representations of reality were digitized and simulated in virtual software for everyone to access through computer screens. These representations are still continued most well-known through platforms as 'Second Life' but also along with a range of new gaming applications that create simulations of situations and actions. Also new initiatives for instance at the MIT Medialab and other research institutions focus on the connection between real-time sensor technologies with virtual platforms like Second Life. This implies no-longer two distant realities but according to Lifton (2007) it goes beyond the concepts of both mixed and augmented realities into dual realities that exists at the same time influencing each other through sensor/actuator networks. Thus the interaction paradigm seems to be moving from the traditional 'interactive' domains of the web and computer to be integrated and increasingly enhance architecture and urban environments through feedback mechanisms, but also our interaction with computers are increasingly treated in the same way as with humans. The studies from Reeves and Nass (1996) show that interaction with computers and new media can be compared to real social relationships and navigation in real physical spaces, meaning that there are fewer boundaries between the traditional separations between the perception of the virtual and real than previously considered. With the introduction of pervasive computing, it provides even more sense to look at the any comparison studies of interactions across digital and physical domains.

Interactive technologies in environments

Describing the emergence of these technologies and the recent background in computing it suddenly begins to get difficult to summarize such a development. This has a lot to do with the fact that architecture and urbanism as disciplines relies on a series of related professions, and much of the referenced research is composing several research agendas in other fields. However this is also one of the interesting facts of working with both holistic and specific elements at the same time. These technologies are getting increasingly relevant for architecture and urbanist's first of all because they are getting mobile as part of handheld devices and mobile networks, essentially influencing human behaviours in urban space.

> *'Spatially dispersed yet coordinated, fluid collections of wirelessly interconnecting individuals – perhaps assembled, from the beginning, in cyberspace rather than at any physical location – are becoming a crucial fact of urban life.' (Mitchell, 2003, p. 161)*

Many projects are experimenting with the potential of these individual and mobile technologies to interact in mobility creating clouds of information networks and people that move and interweave through sites. The main idea of interaction arises from human-computer interaction, where interactive computing refers to when the *'real-time control over the computing process is placed in the hands of the user, through immediate processing and through the availability of interrupt facilities whereby the user can override and modify the operations in progress.'* (Suchman, 1990, p. 11)
Maybe more apparent, the field of interaction seen in the context of sensor technologies are getting more physical, understandable and easier to perceive, when they are presented through for instance the experiments of Usman Haque. Haque is experimenting with these technologies as part of larger collectively constructed environments where people and objects collaboratively create social domains as in the projects Sky Ear and Open Burble (Haque, 2008). These systems are following from the development of interactive technologies and as a difference to standard reactive systems, input and output are dynamically constructed.

> *'We can consider instead architectural systems in which the occupant takes prime role in configuring the space he/she inhabits, a bottom-up approach which would result in a more productive relationship to our spaces and to each other.' (Haque, 2007, p. 61)*

As mentioned previously Haque bases this conception on cybernetics and the experiments by e.g. Gordon Pask and Cedric Price in the 60's as part of an 'underspecified architecture', as when computer systems begin to evolve on their own. Oosterhuis and the Hyperbody group are working additionally on extending the field of interactive environments not only as part of the realized architecture but focusing on a *process-driven architecture* (Jaskiewicz, 2007) with the development of new interactive software that incorporates the complex socio-technical networks of architecture.

> *'Interactive Architecture (iA) is NOT simply architecture that is responsive or adaptive to changing circumstances. On the contrary, iA is based on the concept of bi-directional communication, which requires two active parties.' (Oosterhuis & Xia, 2007, p. 4)*

This aligns well with the definitions from McCullough that technologies only are interactive when *'technology makes deliberative and variable response to each in a series of exchanges'* (McCullough, 2004, p. 20). Thus when intelligent systems are beginning not only to react to dynamic inputs but goes into feedbacks that dynamically reconstruct itself through for instance databases and learning patterns across multiple networks (Haque, 2007,

p. 61). Interactivity suddenly seems very advanced, but interactive technologies can be simplified as having a dialogue with computation. Media as television are traditionally perceived as one-way action although the nervous system seems to be affected by the various technologies, participants and channels involved, whereas the telephone provides the platform for a dialogue. However also earlier media like video games increases the interactive experience and makes it more apparent because of the integration of more modalities, until we reach the real-time virtual worlds used to share documents, more complex feedback and information exchange with several people. (Lévy, 2001, p. 61ff)

The recent interactive technologies have also existed for a long time as part of sensors, processors and actuators that are binding individual responses to collective outputs, whether in art installations or larger building facades. However at the same time the technologies are getting increasingly individual and location-based with the introduction of more sophisticated mobile technologies, and they are connected to larger more complex networks. These connections appear from concepts as the Soft Urbanism model (Sikiaridi & Vogelaar, 2006) or WikiCity projects (Biderman, Calabrese, Kloeckl, Ratti, & Vaccari, 2007). In these projects the understanding of real-time technologies creates an ability to work with large-scale complex models and to signify individual presence and participation in space, and additionally the potential for the architectural environment to become open for interaction, and not as static pre-determined spaces.

Also these interactive technologies involve closer relationships within the elements of the design process and realization along with the potential for meaningful connections to emerge from real-time access. When accessing architecture through these new technologies it is a way through which we *'create meaning, construct knowledge and make sense of our surroundings'* (Mitchell, 2003, p. 120), and interactive architecture can (also) through these technologies act as a social infrastructure (McCullough, 2002, p. 4). This is where the beginning potential of a networked, interactive architecture begin to make sense as part of urban development and experiments, and the notion to bring into account to understand these emergent effects of multi-interaction real-time urban environments are described as 'performative environments'.

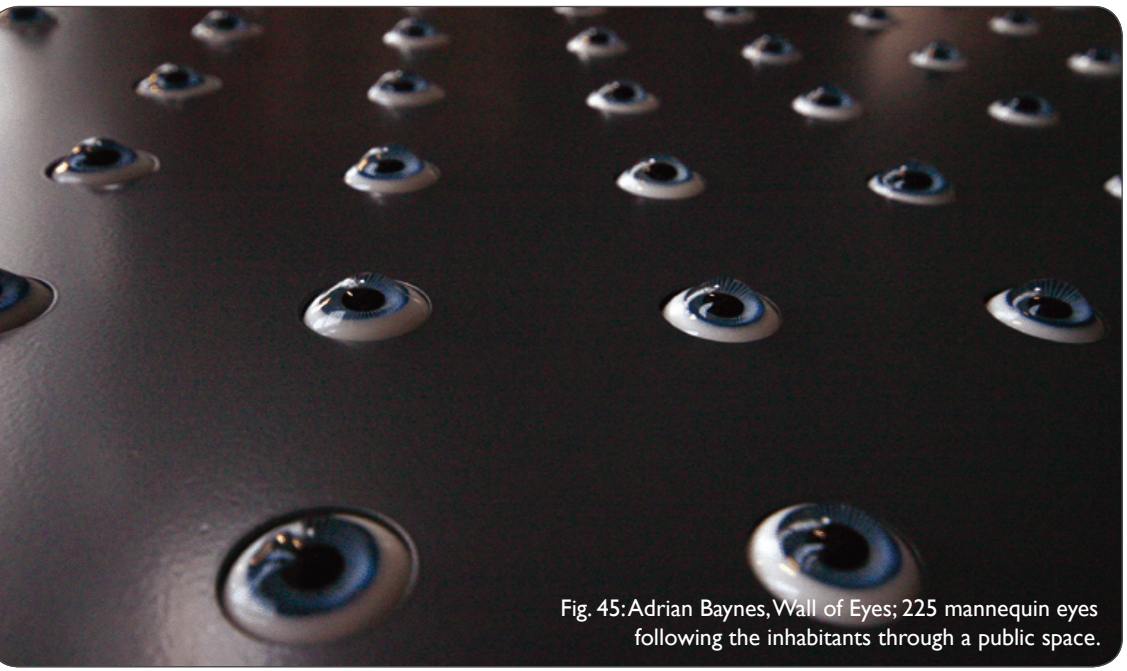


Fig. 45: Adrian Baynes, Wall of Eyes; 225 mannequin eyes following the inhabitants through a public space.

Performative Technologies

The next step from the issue of interactive pervasive technologies is the performative aspect of these interactions, when our urban environments are increasingly getting occupied with feedback processes between various mobile agents and networks – a field recently named as *urban computing* or also sometimes referenced with the more broad issue of urban informatics. This leads to a beginning understanding of the emergent effects of interactions in complex environments when objects and people are naturally communicating and embedded in the same kind of networks.

> *'No longer solely virtual, human interaction with and through computers becomes socially integrated and spatially contingent, as everyday objects and spaces are linked through networked computing.' (Greenfield & Shepard, 2007, p. 4)*

The most significant technologies that are pushing this development is within mobile technologies with gps, gprs, bluetooth , wlan etc., which all are technologies that make the individual mobile object able to exchange information between different levels of local to global networks and still influenced by its owners preferences. The first introduction on mobile telephones was as permanent devices in cars, as in the example of Ericsson in the beginning of the 20th Century, who had a terminal in his car that he could attach to wires and poles when away from his office. Later they were embedded as real cellular based mobile devices in trains before it really integrated as part of the social consciousness and youth culture

in the 1990's (Ling, 2008, p. 12f). These digital networks were traditionally considered as separate infrastructures that did not have any resemblance of the local environment but instead were used for long-range communication. However at the same time as the tracking technologies are getting increasingly more detailed, also at the same time new services are making short-range social networks possible through the introduction of rfid and bluetooth technologies embedded in the urban architecture. This local access creates potentials for meaningful communication with local infrastructures as part of a more situated computing. This issue of being 'situated' while still connected to the network is essential for performative environments. In situated action, actors perform as in a play where *'every course of action depends in essential ways upon its material and social circumstances'* (Suchman, 1990, p. 50).

Here there is an intricate relationship between cognition and the world of artefacts and actions with very specific circumstances. Like with performativity plans become representations through an achievement of situated actions rather than as a pre-given activity, and as Suchman describes with an extension of Mead, it is situated actions that constitute and maintain the shared understandings as part of specific interactions (Suchman, 1990, p. 66). Now performativity and the stated technologies imply that actions are always part of social and physical circumstances, and organizations, or in general constitution of plans, exist as an emergent property of interactions between actors and objects. Thus it is not something predetermined but also it is not random and experiments gradually expose new hypothesis' as an event driven process. It is a condition and an argument which gets even more interesting through the introduction of digital networks, where we keep in mind that *'cities do not disappear in the virtual networks. But they are transformed by the interface between electronic communication and physical interaction, by the combination of networks and places.'* (Castells M. , 2004, p. 85)

The recent upgrade of e.g. the Google services with the Walk-Score where you can make a 'walk-able' profile of your neighbourhood and the Street View with high-resolution images of the streets (Vincent, 2007, p. 118) are now extended into mobile phones which increases the potential perception of the local environments. The mobile phone is no-longer only a generic tool for communication and global gps-positioning but encompasses localized information for a more spontaneous urban navigation including the wide range of new network services to extend the mobile phone as a personalized way-finding tool with guides, social networking, real-time localized information, local remote for bill boarding etc. Actions are now specifically directed to mobile individuals, which are additionally traced by personal ID's and inscribed in semantic networks.

At the same time as the mobile devices are getting upgraded with more situated services and connections, the urban architecture is increasingly being facilitated by a response to the presence of mobile phones thereby emphasizing local feedback loops. Interactive facades as Blinkenlights and Spots on Potsdamer Platz in Berlin as well as the application from GeoVector and Microsoft focuses on the mobile as a new locative 'remote control' to physical environments, facilitating a direct manipulation of the physical environment with emergent collective impacts. The mobile phone and similar distributed and connected objects begins to influence the perception and representation of the urban environment, as we are negotiation the collective presence. In its essence this development of communication technologies acting as an addition to the current sensor technologies and integrated computation creates an intricate web of humans and artefacts (Urry, 2000) and thus directing power to non-human actors (later described with Latour).

Many of the aspects presented here apparently seems like new technologies that first now are fully developed for commercial markets and implemented as part of new devices. This may be one of the points of technological invention but also it is important to point that that these technologies

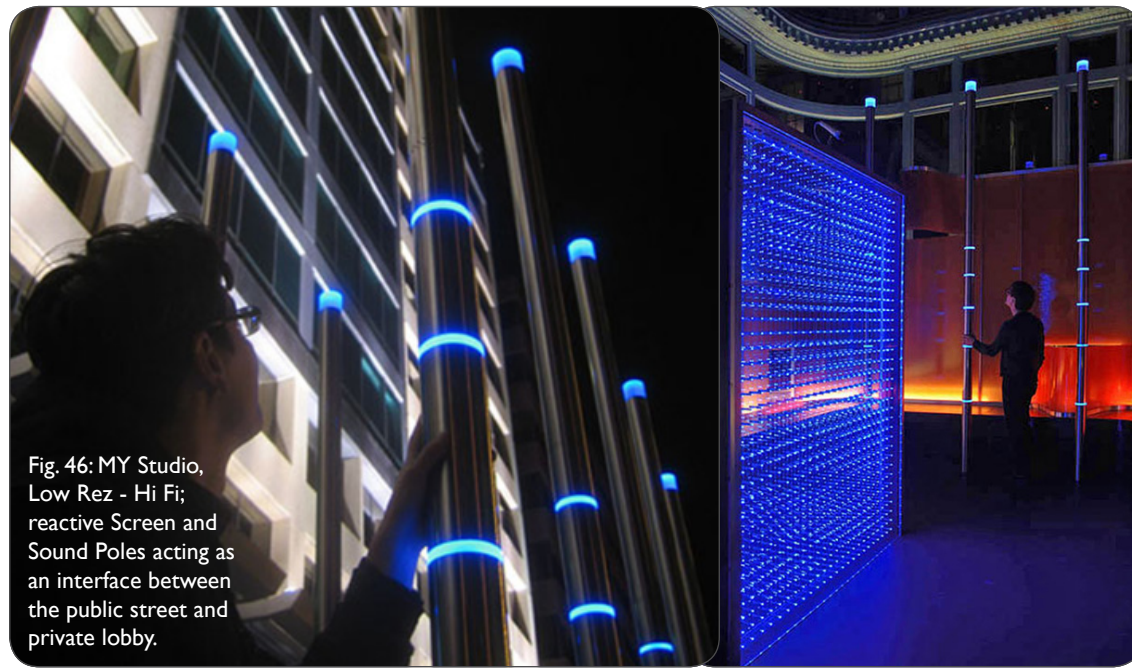


Fig. 46: MY Studio, Low Rez - Hi Fi; reactive Screen and Sound Poles acting as an interface between the public street and private lobby.

are first now beginning to be common for people to own, use and interact with. When technologies are getting that simple that even when parts of the older generation above 70 years old is quickly able to understand and use a mobile phone, it suddenly boost an industry of interaction.
In the present state of the impact of digital information technology now mobilized and individual, we are also introduced to the issues of ubiquitous and pervasive computing, which basically adds the attributes of objects to transform to devices processing information, and in this regard ´subjects´ through the technological integration. This highly affects the flexible potential of both existing and new building types and recognizes the dynamic character of environment.

> *'Architecture that is designed for adaptation recognizes that the future is not finite, that change is inevitable, but that a framework is an important element in allowing that change to happen.'*
> *(Kronenburg, 2007, p. 115)*

This change has been an essential characteristic for architecture in regards to responsive, adaptable, flexible, adjustable and similar designations aiming at creating building types that adjust to a changing context factors with behaviour as well as environments. It is a defining characteristic which has speeded up in response to the flux of new media integrated in architectural element, mobile workplaces and general increase of cultural exchange.

Flows and the rise of internet culture

One of the common themes for all these issues and discussions are the subject of change and feedback among the different acts and performatives. In this regards changing conditions and flows of people, objects, information, ideas etc. are significantly important for any performative whether linguistics, performances, knowledge or architecture, and to make any performative work it requires some effort to facilitate exchange whether among objects or subjects. Through feedback and the effect of a dynamic environment there is a potential for a performative environment to occur and presenting emergent phenomena.
Important for recognizing movement and exchange exists in the light of a post-Cartesian paradigm with central contributions from e.g. Bergson

> *'Bergson's idea is that space as 'extensive', as being measurable, divisible, and composed of points plotting possible positions that objects may occupy, we are stopping the world in thought. We are thinking away its dynamic unity, the continuity of its movements. We are looking at only one dimension of reality. A thing is when it isn't doing.'*
> *(Massumi, 2002, p. 6)*

This perspective is richly explained by Massumi (2002) when describing Bergson's analysis of Zeno's paradox of movement. Basically the flight of an arrow exists in multiple points that are only occupied temporarily, and if staying it would never reach its ends. Thus the arrow is in constant transition and in a passage as part of a trajectory that can only be understood retrospectively moving back from the movements end. Also this implies that '*position no longer comes first, with movement a problematic second. It is secondary to movement and derived from it*' (Massumi, 2002, p. 7), and positionality becomes an emergent quality of movement. This might be considered a relational perspective on society and culture but is beneficial for a creative approach towards understanding how performatives are based in a relational understanding of space – as formation or with a processual perspective - where objects and subjects comes into being by a qualitative transformation.
At the same time it broadens the aspects of place-making. If positionality as part of identity is emergent it could also be served by the feedback processes mediated by technologies. Thus instead of looking at positions it might be beneficial looking at processes prior to groupings or the interactions taking shape before the collective. Similar thoughts appear from Deleuze and Guattari, 'A Thousand Plateaus', when thinking about the world as a set of flows in different speeds and Massumi definitely share some of these inspirations. Here everything flows freely into each other with no distinctions between elements, and the 'Body without Organs' describes the flows without organization, even it in its most extended edition primarily reflects a virtual dimension, or a vast potential of connections (Deleuze & Guattari, 1987, p. 40). As a starting point there has been tendencies towards describing flows of people as the main interest, because of an interest in patterns of movement, points of intersections and aggregations as part of cultural migration, however moving also implies the more specific speed of the body and the perception associated with this as in the time-space demography of Thrift:

> *'The body is in constant motion. Even at rest, the body is never still. As bodies move they trace out a path from one location to another. These paths constantly intersect with those of others in complex web of biographies. These others are not just human bodies but also all other objects that can be described as trajectories in time-space: animals, machines, trees, dwellings, and so on.' (Thrift, 1995, p. 8)*

This extends flows to the movement of objects and a more general logic of flow as a main characteristic of the society, with an increased interest especially through the description of the Network Society; here the 'space of

flows' concerns the understanding of the spatial organization through flows of information, images, technologies, information etc. (Castells M., 2002). This includes the social organization as also described by the Network Society of van Dijk (1999) and the field of sociology seen through the *'mobilities of people, objects, images, information and wastes; and of the complex interdependencies between, and social consequences of, these diverse mobilities.'* (Urry, 2000, p. 1). Flows have also grounded cities and societies for centuries mostly well-known through the understanding of how more traditional physical infrastructures like rivers, roads, lakes, forests a.o. have determined the most optimal locations for cities.

> *'Ground is not a static support any more than air is an empty container. The ground is full of movement, as full as the air is with weather, just a different rhythm from most perceptible movements occurring with it (flight of the arrow). Any geologist will tell you that the ground is anything but stable. It is a dynamic unity of continual folding, uplift, and subsidence.' (Massumi, 2002, p. 10)*

These flow systems acted traditionally as organizational landscapes and performed naturally as the best locations for cities in relation to trade, dwellings, food harvesting, defence etc. Besides this new fluidity and understanding of process, one of most significant flow systems are the technologies that provide digital infrastructures, access to information and resources and in general act as open systems for interaction. Sheller and Urry name these spaces as 'technoscapes':

> *'The concept of technoscape servers to emphasize that contemporary landscapes are shot through with technological elements which enrol people, space, and the elements connecting people and spaces, into socio-technical assemblages – especially the transportation technologies, such as roads, rails, subways and airports, but also the informational technologies, such as signs, schedules, surveillance systems, radio signals and mobile telephony cells.' (Sheller & Urry, 2006, p. 9)*

These technoscapes also produces subjects, and in the same way as traditional physical infrastructures and landscapes were to some respect enabling cities and societies, these new information technologies enable or 'afford' certain kinds of interactions and social exchanges as a basis for a different kind of urbanism. These technologies also imply that the present situation of body and space has changed according to the influence of wireless networks, mobility and pervasive computing. As from Graham and Marvin's (2001) detailed analysis of infrastructures, humans are increasingly living in and out of complex co-evolving networks in close relationship with urban space, and from a sociological standpoint embedded in a liquid modernism more light, fluid and software-based than heavy and solid (Bauman, 2000). These technologies not only affect immediate behaviours and our interactions but are announced as new cultures:

> *'The Internet culture is the culture of the creators of the Internet. By culture I understand a set of values and beliefs informing behavior. Repetitive patterns of behavior generate customs that are enforced by institutions, as well as by informal social organizations. Culture is different from ideology, psychology, or individual representations. While culture is explicit, it is a collective construction that transcends individual preferences, while influencing the practices of people in the culture, in this case the Internet producers/users.' (Castells M., 2001, p. 36)*

To describe an internet culture started from the 'creators' of the internet leaves open many unsolved questions, as basically the Internet was started up as an information resource between universities and later the military to facilitate information exchange. Thus 'creators' can in this case not be described as a traditional hierarchical relationship deciding on an internet culture but more interestingly as an emergent phenomenon. At the same

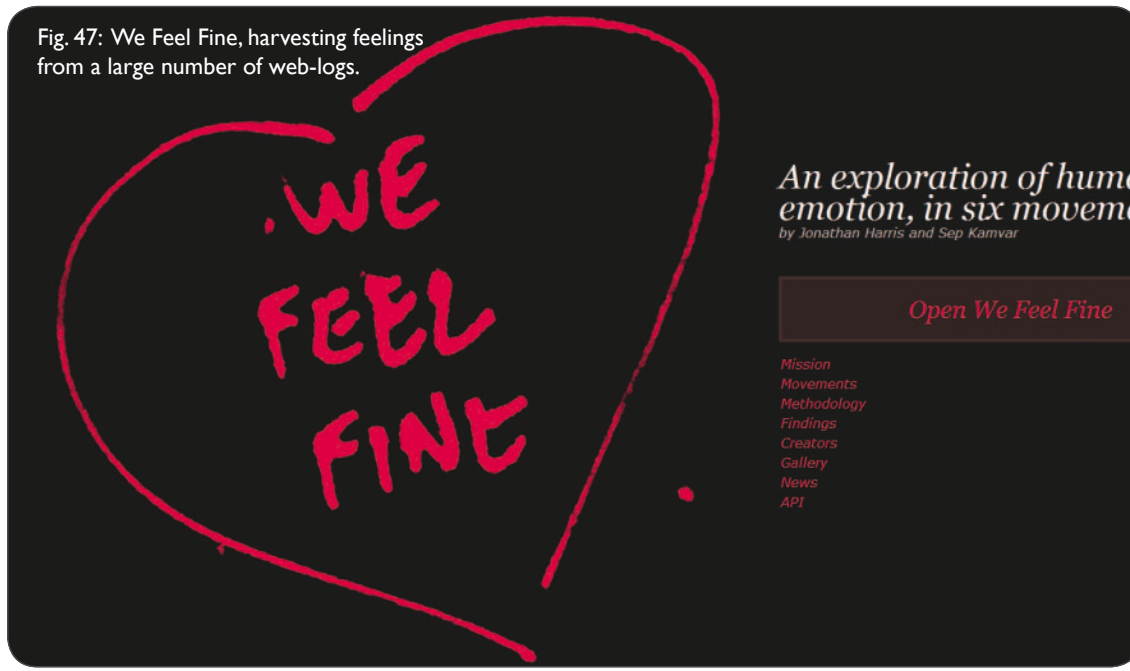


Fig. 47: We Feel Fine, harvesting feelings from a large number of web-logs.

time there is a more general critique of the macro scale perspective from e.g. Castells and Sassen not considering the micro scale and influence of networks on ground level as part of everyday life (Smith, 2003). Varnelis has, as a kind of opposition to Castells, recently described this more as a performative rise of a network culture started from relationships, where there are no divisions between the net and the self:

> *'In contrast to digital culture, under network culture information is less the product of discrete processing units than of the outcome of the networked relations between them, of links between people, between machines, and between machines and people.' (Varnelis, 2008)*

It is a culture that is richly explained through the growing supply of internet blogs and applications as MySpace, YouTube, FaceBook, Twitter, Flickr etc. and the networked relations reinforce the performative aspect of emergent connections between humans and non-humans. Browsing through some of the recent applications it seems quite remarkable how these internet platforms and services have developed within short time. Nevertheless, as Kevin Kelly humourlessly notes, the World Wide Web is only 5,000 days old, and we are not really amazed (Kelly, 2008), even that no-one could have dreamed of how all this information could have come so fast. At the same time these connections seem essential for the creation of new 'performative' identities where especially the youth are constantly reaffirming themselves through networked interactions and constant updates on their real-time 'virtual' status'. It is a culture that has difficulties imagining itself without for instance the internet service Google.

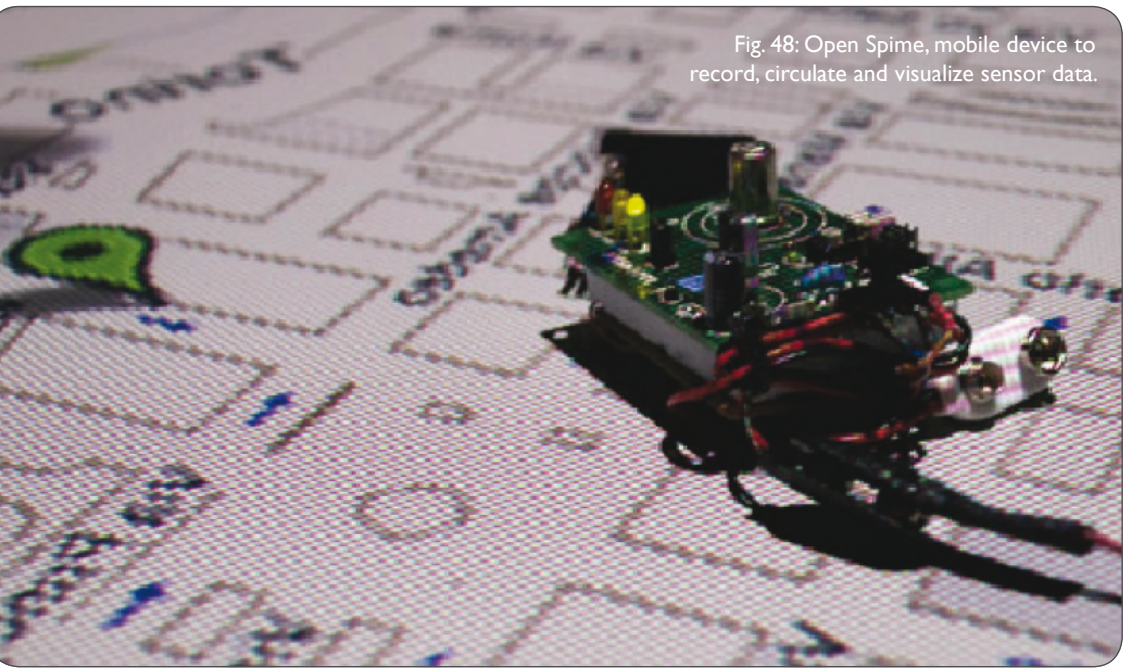


Fig. 48: Open Spime, mobile device to record, circulate and visualize sensor data.

At the same time these interactions are no-longer happening in privatized spaces, but are merging into everyday urban spaces as part of street spaces, cafés, libraries etc. Identities and networked publics are constantly emerging as part of street life and one of the more important subjects of concern are interactivity between places where 'm*oving physically while keeping the networking connection to everything we do is a new realm of the human adventure, on which we know little'* (Castells M. , 2004, p. 87) A condition that is comparable to the thoughts from Mitchell describing the impact of sophisticated wireless sensor networks extending the individual to the Me++:

> *'Now, spatially dispersed yet coordinated, fluid collections of wirelessly interconnecting individuals – perhaps assembled, from the beginning, in cyberspace rather than at any physical location – are becoming a crucial fact of urban life' (Mitchell, 2003, p. 161)*

These matters of the performative are speeding up due to well-known issues of globalization, circulation and exchange of objects and subjects and the integration of information technology everywhere. With the conceptualization of mobility and a greater focus on reflexivity, Thrift suggests *'that we have now reached a point where western cultures have become increasingly self-referential.... As a result, we now live in an almost/not quite world – a world of almost/not quite subjects; almost/not quite selves; almost/not quiet spaces; and almost/not quiet times.'* (Thrift, 1995, p. 257). Thus existing in a kind of constant in-between flux mobility might benefit from these technologies in developing these as part of new potential places, through the understanding of feedback mechanisms and performativity.

> *'In such a conception, the city is made up of potential and actual entities/associations/togetherness which there is no going beyond to find anything 'more real' … In other words, it belongs to the nature of a 'being' that it is a potential for every 'becoming' (Amin & Thrift, 2002, p. 26f)*

Along with the increased mobility of information and circulation of objects, these objects are now at the same time tied to evolving internet-based networks at the same time as existing in local places. This follows from the emergence of the 'internet-0', describing how devices are interlinked (Krikorian & Gershenfeld, 2004) or also described as the internet-of-things

(ETH, 2008). This contains a definition on how devices are becoming online and sometimes even interact with systems that humans are not aware of. Bruce Sterling, also part of defining this 'internet of things' through his authorship, also became initiator of the GPS-enabled sensor networked device 'Open Spime', which aims at collecting, aggregating and visualizing environmental data on-the-run (WideTag, Inc., 2008) resembling an infrastructure for the internet of things.

> *'A technosociety skilled with SPIMES can maintain itself indefinitely through a machine-mediated exploitation of the patterns of movement of people and things through time.' (Sterling, 2005, p. 43)*

Through the eyes of Sterling these objects are part of a development that moves objects from previously being artefacts, machines and products to spimes and potentially biots in a synchronic society where time is the highest value (Sterling, 2005, p. 53) This kind of internet of things leads a development towards intelligent web-based devices including the recent extension with the understanding of the 'semantic webs' (Herman, 2008), which implies intelligence in web applications that autonomously can search and classify information and services across databases to be directed for specific people or machines. The statistics for this internet development is overwhelming and is almost outdated the moment you mention it, however as an indicator of this kind of performative space, Bruce Sterling recently mentioned that Nokia is making 11 cell phones a second and in India 6 million new cell phone accounts a month (Orban, 2008). Kelly states that around 2 million emails are send each second and stored in 255 exabyte's magnetic storage, when he is explaining his ideas comparing the exchanges capacity to the human brain (Kelly, 2008). Statistics that also provides a significant background for Kurzweil's descriptions of 'the six epochs' towards singularity (Kurzweil, 2005, p. 7ff) with the rapid evolution patterns of technology as regards to for instance the speed and performance of processors, digital memory pricing, internet hosts etc. (Kurzweil, 2005, p. 35ff). Also Kelly emphasizes this development that all objects might become part of this web or 'cloud', and what is needed is more like 'portals' to an internet cloud of information. However what might be even more interesting is that through the tracking of these almost personal informational 'evocative' objects (Turkle, 2007), they also tell the story about humans as they will link behaviours to spaces and at the same time begin to know more about ourselves than we do. The tendency here implies that no longer it is only mobile phones that are online, but potentially all things becoming tagged and online, and we might be moving towards a notion as the tectonics of the digital (Orban, 2008).

Affect on Bodies

These flows traditionally considered primarily as movement in infrastructural corridors consisting of people, cars, goods etc. are not new to the field but globalization is increasing this exchange and the speed of the movements, at the same time as information is being exchanged across multiple spaces through the mobile networks. Mobile phones along with increasingly virtual applications indicate the embodiment in space and involve highly sophisticated technical systems towards the post-human (Hayles 1999; Pepperell 1995), as the biological human now is being extended and constructed from systems of boundaries and networks (Mitchell, 2003). This again relates to the increased complexities of the boundaries between body and subject definitions as *'the capacities of bodies have been extended in numerous ways by the new technologies. Equally, they have been intruded into and upon by developments like genetic engineering, new reproductive technologies, prosthetics and plastic surgery.'* (Thrift, 1995, p. 289) To this we today might add the increased influence of mobile technologies as individual devices capable of mediating our environment and relations to others, but nevertheless it further implies post-structural thinkers as Foucault, Deleuze and Guattari where as referred to Deleuze '*the body becomes a*

Fig. 49: Usman Haque, Primal Source; projection on a large water-screen changing in response to the sounds from the crowd.

'complex interplay of highly constructed social and symbolic forces. The body is not an essence, let alone a biological substance. It is a play of forces, a surface of intensities: pure simulacra without originals' (Thrift, 1995, p. 29). Additionally as a trace of relations to the first ideas from Bergson focusing on movement, affect and sensation, and where we can identify ideas about 'the space of flow' in relation to body.

Here the term 'affect' becomes important because it expresses a new configuration of bodies, technology and matter. Affect generally designates the body's capacity to affect and be affected as an augmentation or diminution of the body's ability to act, engage or connect, especially in relation to how technologies are allowing us to experience new affects which are extended from the traditional organic constraints. (Clough & Halley, 2007, p. 2) Within architecture, affect connects the architectural object with uses and context (Rahim, 2005, p. 143); it becomes the feedback manifested through the affordances of the space feeding forward to new broader affects.

> *'Rather than allowing an extensive, outward response to the space, affective space induces an affect within the subject: an intensive, outside-in inflection in response to specific forces inherent in the site. Subjects do not logically adapt to an affective space; rather they are qualitatively changed and adapted by the space.'*
> *(Lenoir & Alt, 2003, p. 340)*

These affects are part of more general flows, which are increasingly occupying a variety of intersecting domains influencing the body between the physical and virtual – not solely represented at the physical space or in the digital network but moving in and out of spaces as described from Graham & Marvin (2001) splintering urbanism of intersecting infrastructures. These influences and increased intersections of places, bodies and networks had led to a description from Roy Ascott as of a syncretic process. Traditional cultures are being increasingly affected by these networks and flows and:

> *'...all of these different tendencies, tastes and persuasions are being re-aligned, interconnected and hybridised by a vast global community of online users, who are transdisciplinary in their approach to knowledge and experience, instinctively interactive with systems and situations, playful, transgressive and enourmously curious. This living culture makes it up as it goes along.' (Ascott, 2007, p. 25)*

Ascott's describes how no institution can deliver a proper all-inclusive response (similar to Lyotard as noted previously) and so can architecture not contain all the etiquettes of such a hyper-culture. The global community is mapping out the world with open-ended networks and a bottom-up culture, and for Ascott it might lead to ideas about a global brain as in a similar explanation from Kelly, describing this feedback community as the 'cloud' (Kelly, 2008). Interesting here is that it is people from somehow different profession who are all riding this integration of information and software with human bodies.

Sterling describes a process towards the synchronic society, where multiple histories are synchronized as informational resources to be manipulated in real-time (Sterling, 2005), and through his research background Ray Kurzweil has been widely discussed when proclaiming the near of singularity; humans are beginning to extend biology through genetic engineering, nanotechnology and robotics, and machines will progress to be like humans or beyond (Kurzweil, 2005). Nevertheless the different theories seem to work towards a convergence of biological, technological and cultural systems in collective beings. This brings the attention to human beings also considered as historical and cultural constructs increasingly influenced by technology and with no clear definitions of a biological entity (Dyens, 2001, p. 52). At an instance it might reflect a nightmare in regards to traditional human integrity on the other hand it might be the next level in the cultural evolution where technology no-longer just acts as extensions (McLuhan, 1964) or integrated devices, but basically shape humans as cultural artefacts.

> *'People re-invent themselves, create new relationships, new orders of time and space. Along the way, they create, as well as accommodate, the future.' (Ascott, 2007, p. 25)*

In its essence this becomes a generative self, acting in self-organizing systems, and the culture described by Ascott is essentially performative in the way it reinvents itself on-the-run affected by complex networks and real-time interactions. *'A digitized body is a cultural body'* (Dyens, 2001, p. 86) and the body acts as a collective and a digital echo. The result of this and the introduction of mobility create these different affects as:

1. *we live in an increasingly artificial, or, more accurately, manufactured, environment;*
2. *a kind of disillusionment with the science, a more general solidarity with other living things and at the same time a renegotiation of the body and the self;*
3. *a review of machines and machinic complexes as troublesome companions as being part of actors in relation to Latour and*
4. *a realignment of politics and the political.*
   (Thrift, 1995, p. 260ff)

There are still differences to how the body and mind act with the environment, and Ascott draw the line pretty straight in relation to the stability of physical and materials settings in contrast to the complexity and uncontrolled thoughts of human minds.

> *'Just as Ecludian space appeals primarily to the physical body so cyberspace appeals primarily to the mind. The body loves edges, surfaces, solidity, resistance, pull. It seeks the heat of the sun, the keenness of the wind. It wants its world to be limitless but safely ordered, open to the clouds but protected from indeterminacy….The mind, by contrast, seeks connectivity and complexity, uncertainty and chaos. It knows reality to be contingent, layered and ambiguous, constantly collapsing and reforming, observer-dependant, endlessly in flux- The attitude of the mind towards the body is post-biological.' (Ascott, 2007, p. 26)*

According to Ascott it becomes a total culture of the mind relying on the most sophisticated sciences of nano-technology, biophysics, cognitive studies and mixed reality technologies. Besides all these fancy technological phrases for new developments, it also emphasizes the core ideas about embodiment. In relation to embodiment from Merleau-Ponty it referred to the actual shape and capacities of the human body as well as the related affordances of the body as a medium to the world (Merleau-Ponty, 1962). Although Ihde has described how everything essentially is embodied in some sense (Ihde, 2002, p. 68), Dourish (2004) considers recent developments within Human Computer Interaction and extends the phenomenology from e.g. Merleau-Ponty, Heidegger, Husserls and Schutz into a new definition of embodiment.

In this regard embodiment is grounded in and emerging out of everyday mundane experience and focuses on practice and everyday tasks as well as practical action as a source of meaning. Bringing the current development in interaction design into consideration '*embodied interaction is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts.*' (Dourish, 2004, p. 126) An embodied condition essentially involves artefacts and objects and the shared understanding of the world through these objects, as described above, and they not only exist in local space but are mostly reaching out to other spaces through networked technologies. In cybernetics and conversation theory, as noted previously in relation to Usman Haque, an embodiment could also be developed with underspecified goals that would enable collaboration and converge towards shared goals between both the human embodiment and the computational response. (Haque, 2007, p. 58)

These descriptions question how to approach the new digital technologies that increasingly appeal to cognitive and playful processes in comparison to a physically constrained reality especially in comparison to McCullough's 'digital ground' that, among other issues, emphasizes how technologies can be situated and bring people into place. For Ascott this might be architecture of the mind that can think for itself, and *'this paradigmatic change in architecture is not registered at the level of form but at the level of behaviour.'* (Ascott, 2007, p. 27) Lefebvre has previously made significant contributions to understand this intersection of mental and real space also implying a connection between the objective, quantifiable, Cartesian space and the qualitative sensory experiences in a 'production of space' (Lefebvre, 1974). In Lefebvre's descriptions any society makes its own space and space becomes a social product, which is fundamental for the reproduction of society (see reference to Venice as a social production in Lefebvre, 1974, p. 73).

Although it is a specific notion referring to how 'space' is produced, Lefebvre also identified three moments of this production having to do with material production, the production of knowledge and meaning, and thus the active processes of production over time (Schmid, 2008, p. 41). With

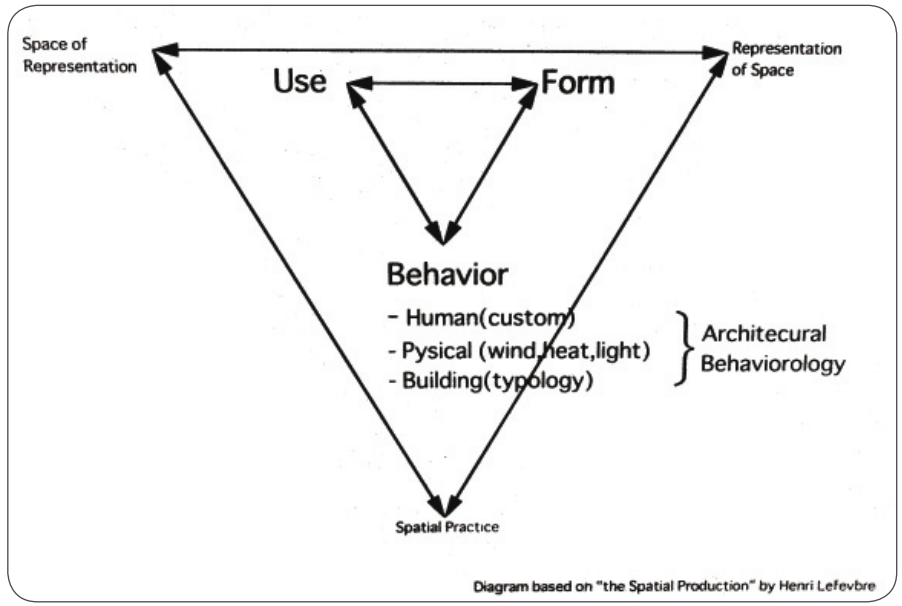


Fig. 50: Atelier Bow-Wow, Spatial Triad.

this Lefebvre has created the 'spatial triad' that spans between representations of space, representational space and spatial practice, which has been reproduced in a variety of different diagrams however all encompassing the continuous production of space over time. The questions to consider here is that with the impact of computational systems, 'social space' can be said to essentially imply that it *'reconciles the physical and mental, concrete and abstract, and if we consider all interactions with computer systems 'social', then these interactions also have the potential to be places where the physical and mental co-mingle.'* (Conrad, 2006, p. 63) Computers are placed on the level of 'social systems' connecting the mental state to objectified space.

The different interpretations of Lefebvres 'spatial triad' are very creative in scope and use but in general this transformation of space can be divided into lived space (representational space), perceived space (spatial practice) and conceived space (representations of space) thus combining the experienced space, the spatial practice based on relationships and the objects representing space (Grönlund, 1999; Grönlund, 1998; Schmid, 2008, p. 29). At the same time the transformation of urban space has brought a renewed attention to the intersections between form and use. The Japanese Atelier Bow-Wow seeks to describe this in a new proposal for a spatial triangular diagram introducing an 'Architectural Behaviorology' between states of use, form and behaviour (Atelier Bow-Wow, 2008, p. 10). Architects have traditionally occupied the domain of representations but Atelier Bow-Wow aims for the role to produce lively space, thus emphasizing behaviours as an issue between the concepts of use and form. Behaviours however do not only indicate human behaviours but also the dynamic factors of physical phenomenon to building typology and effects on nature and is one of the more interesting factors to involve in relation to practice.

Fig. 51: Studio Roosegaarde, Dune; wedding couple at the interactive installation in the Maastunnel, Rotterdam.

Looking at sites as activities with behaviourology doesn't necessarily create places from a mobility point of view. In the sense that everything is in constant movement and undergo change, situations could easily be misplaced as focusing only on adaptation and not on temporary fixation. Here the central issue becomes how fixation and identification can evolve from movement and flow, supported through new spatial paradigms and situated technologies. With reference to the internet as a basis of performative identities lies an important focus on the way movement and constant negotiation becomes the primary reference of a culture. These performative identities, which were introduced mostly with reference to performance and efficiency, are maintained primarily through circulation of information and constant feedback. They exist out of equilibrium and do not necessarily spring from fixed representations. Instead of representation positionality becomes important – the ability to position the body and mind in relationship to other dynamic factors within the same social network.

Place and the social through relationships

The conception of place has changed in the light of mobility and network technologies. Through research and work you are more often finding yourself drifting around searching for wireless networks and a plug for your computer, and many often both noisy, dirty, uncomfortable and crowded spaces can suddenly become meaningful places of both work and rest by opening the laptop and maybe plugging in some earphones. This is no-longer very unusual and the personal computer or even the mobile phone acts as enactments for places, and these ever evolving conditions arise from the use of new technologies whether the body is in high speed on in a relaxed setting. One would argue that these technologies are not places at rest, but on the other hand a matter of restlessness, which makes us constantly anxious to connect to them; however maybe more importantly again these technologies need to be seen in relationship to what they connect. Although you can be passionate about certain work tasks and software, it is more obvious that these technologies quickly satisfy your requirement for relationships acting as a medium for a social network both to humans and non-humans. Place thus here arises from the personal experience of access, whether it is to the computer as a communication technology or as a mediator of other related social tasks.

The previous discussions on performativity, technologies and flows now come together on multiple levels in relationship to the emergence of new extended urban environments. Most importantly there are important connections between the circulation of information, people and objects and the attachment to place. The tendencies here are not considered in relation to the more traditional aspects of representation as in e.g. the 'Pattern Language' of Alexander (1977) or 'Genius Loci' of Norberg-Schulz (1971) (1980), but instead it is proposed that the concept of place is in a rapid change due to the performative technologies.

When Meyrowitz (1985) spoke about 'no sense of place' concerning the impact of electronic media, it was exemplified through television, but still his approach combining aspects of Goffman and McLuhan is highly interesting today. The influence of sensor, mobile and networked technologies on place can still be considered in relation to face-to-face interactions and the multi-staged drama as by Goffman, but needs to be considered in relation to how media extend our senses and generally have a more widescale effect on social roles as per McLuhan (Meyrowitz, 1985, p. 4). The impact of media is like a house where all the walls are suddenly removed and the disappearance of clear spatial segregations of both places and situations, which according to Meyrowitz breaks down the barriers between the front and back stage, public and private, and blurs the differences between different stages of socialization. You are no-longer isolated and always with access to a vast amount of information, and instead information bypasses the isolating characteristics of place and seems to have dissolved the ability to play roles.

> *'Another way to think about a social situation is as an "information-system", that is, as a given pattern of access to social information, a given pattern of access to the behaviour of other people'.*
> *(Meyrowitz, 1985, p. 37)*

Although information is becoming both virtual and pervasive it seems like the today's effect of these even more advanced media are the potential for even more social roles and more rapid changing social groups, which instead of being held together by places alone are held together by more advanced communication systems working in and out of different but connected places. This is a performative situation also including communities bound together by processes of circulating information (Anderson, 1989), changed or unchanged as information moving like Latour's 'immutable mobiles' and 'context' appearing as from the process of 'weaving together'

Fig. 52: Milk and Tales, Play Orchestra; recreates a public orchestra for passers-by to enter and trigger musical instruments.

(Brown & Duguid, 2000, p. 197ff). There is even more performance and roles to be played with the more advanced media, and at the same time there is an even greater potential to make them locational and 'placed' through new types of interaction and information. Information will play a key role here as *'a difference which makes a difference'*, as per the definition from Bateson (1972, p. 459), referring to the things that get onto a map, or how the mind responds to the difference in the environment that it is able to discern.

After all Goffman does not speak much in detail about the effect of context or places in specific (Meyrowitz, 1985, p. 36). Instead more likely we are even moving towards a conceptualization of meaning, identity and place, which are created in the intermediaries and in-between spaces as much as in more sedentary states; an approach that reflects how places also exists as 'moments of encounters', as a relation to other sites and not necessarily with fixed meaning (Jensen, 2009). Places also come into being by the distance and travel in-between, thus indicating that places can be defined by movement.

> *'The consumer seeks the stimulation of difference from goods which are increasingly homogenized. He or she resembles a tourist who travels from one clone city to the next, visiting the same shops, buying the same products each. But he or she has travelled: For the consumer the stimulation lies in the very process of moving on.' (Sennett, 2006, p. 148)*

As per the previous chapter on flow and movement, place is increasingly related to the issue of migration and mobility and new ways to locate ourselves in an increasingly dynamic world of information and movement. As part of this there is a need for new ways to stimulate place as part of temporary dwelling and movement, and as global citizens we might be reaching a focus where we are aiming at 'becoming native to place' (Braungart, 2008), but still this do not replace the intensities of more specific local place-making. McCullough has described the problem of placelessness and disembodiment in relation to new media, and outline a series of theorists considering the difference on space and place for instance:

- *'Space is movement; place is rest' (Yi-Fu Tuan)*
- *'Space is alienation; place is identification' (Norberg-Schultz)*
- *'Space is an ordering of understanding; place is an ordering of experience' (Edward Relph)*
- *'Space is a social production; place is a personal reading' (Henri Lefebvre)*
- *'Spaces are the basic divisions of our surroundings; place is our history and adaptation to them' (J.B. Jackson)*
- *'Space is the scene of being; place is a site where human modes of being are well provided for' (Heidegger)*
  (McCullough, 2004, p. 176)

At the same time McCullough references Casey (1997, p. 286) when describing that *'place itself is not a fixed thing'*, which is interesting in opposition to the many aspects of place-making as part of 'belonging', 'habitation' or 'home'. This is also reflected through the social construction of place, which might happen in a variety of different situations and spaces.
'Instead of thinking of places as areas with boundaries around, they can be imagined as articulated moments in networks of social relations and understandings.' (Massey, 1994, p. 154)
The tendencies put new constraints on the design process and the ability for architecture to maintain its capacity to respond to changing environments, where it is important that we '*recognise space as the product of interrelations; as constituted through interactions, from the immensity of the global to the intimately tiny... ... that we recognise space as always under construction.'* (Massey, 2005, p. 9). Although this is a reference from geography regarding social space in relation to practice and difference, this important link between the social and place also concerns how spaces change with the collective interactions of people (and objects).

> *'The distinction between space and place is, approximately, a distinction between the physical and the social. "Space" is largely concerned with physical properties (or metaphorical physical properties). It concerns how people and artifacts are configured in a setting; how far apart they are, how they interfere with lines of sight, how actions fall out of a distance , and so on...*
> *... So while "space" refers to the physical organization of the environment, "place" refers to the way that social understandings convey an appropriate behavioural framing for an environment. It's not for nothing that we use the term "out of place", but not "out of space"; the idea of "place" often plays a much more central role in determining behaviour.' (Dourish, 2004, p. 89f)*

Dourish not only defines a very clear separation between space and place through the social, but also emphasizes how the world is created through our perception of it and interaction with the objects and subjects on our way. This important aspect was part of Heidegger's phenomenology, who unlike his tutor Husserl rejected the Cartesian dualism between mind and body, and emphasized how the world is revealing itself through practical encounters. Through acts, the world becomes meaningful and objects play a central role as equipment, in the same way as the computer mouse exists only because it acts as an extension or mediated action. (Dourish, 2004, p. 109). For Heidegger being in place is based on experience of being situated in ways of being (Heidegger, 1962), and involves a relation between things (Heidegger, 1971), which opens up a framework for Latour described later. Here importance is also attached to activities and practice in everyday life, where place exists as an emergent characteristic of movement. Thus as with identities, places are also performative in relation to the concept of spaces as frameworks, although architecture still would insist on buildings as important frameworks for these activities, but *'because place is a product of a 'pause' and a chance of attachment it exists at many scales'* (Cresswell, 2004, p. 20). Cresswell has also approached a definition of place from different perspectives, with one of the important observations that place can exist extremely temporarily based on the concept of meaning.

> *'When humans invest meaning in a portion of space and then become attached to it in some way it becomes a place.' (Cresswell, 2004, p. 10).*

This also implies that places are emerging as part of everyday life like driving a car, reading a newspaper etc. and not necessarily as part of particular events or people. Thus there are not necessarily any dualistic distinctions between space and place. Place is also created through movement as described in the body-ballet by David Seamon (Seamon & Buttimer, 1980)

> *'Seamon also looks beyond the individual body movement to group behavior. When many time-space routines are combined within a particular location a 'place-ballet' emerges which generates, in Seamon´s view, a strong sense of place. The mobilities of bodies combine in space and time to produce an existential insideness – a feeling of belonging within the rhythm of life in place.' (Cresswell, 2004, p. 34)*

With the body-ballet the combination of group behaviour and time-space routines evokes a strong sense of place, which resembles some of the previous references to Goffman with the idea of place as a setting for action. From a series of group observations Seamon additionally suggested that these place ballets (Seamon, 1979, p. 56), which can be described as an emergent phenomena of people and space, occurring independent of scale across neighbourhood, street, public space, building interior etc. as an environmental dynamic compared to Jacobs (1961, p. 50). Seamon was also inspired by the phenomenology of Merleau-Ponty regarding learning and experience through the body. Although consciousness and the body are mutually engaged with the world as part of perception, Merleau-Ponty described with the 'body-subject' how the taken-for-granted intelligence of the body acted outside of conscious control (Merleau-Ponty, 1962). Consciousness is thus not only to be conscious about something but also it is mediated through the body and not just a mental construct. Like the 'blind man's cane' (Merleau-Ponty, 1962, p. 152) objects also become extended instruments for perception and to an extent where they even become unnoticed. For Seamon the body-subject is the pre-conscious subject which usually describes the more automatic or mechanical acts of interfering with the world (Seamon & Buttimer, 1980, p. 155), and provided that we consider this body-subject as having a pre-conscious perception of space, it is valuable to evaluate how this is affected by performative technologies.

The difference now with performative technologies is that a range of

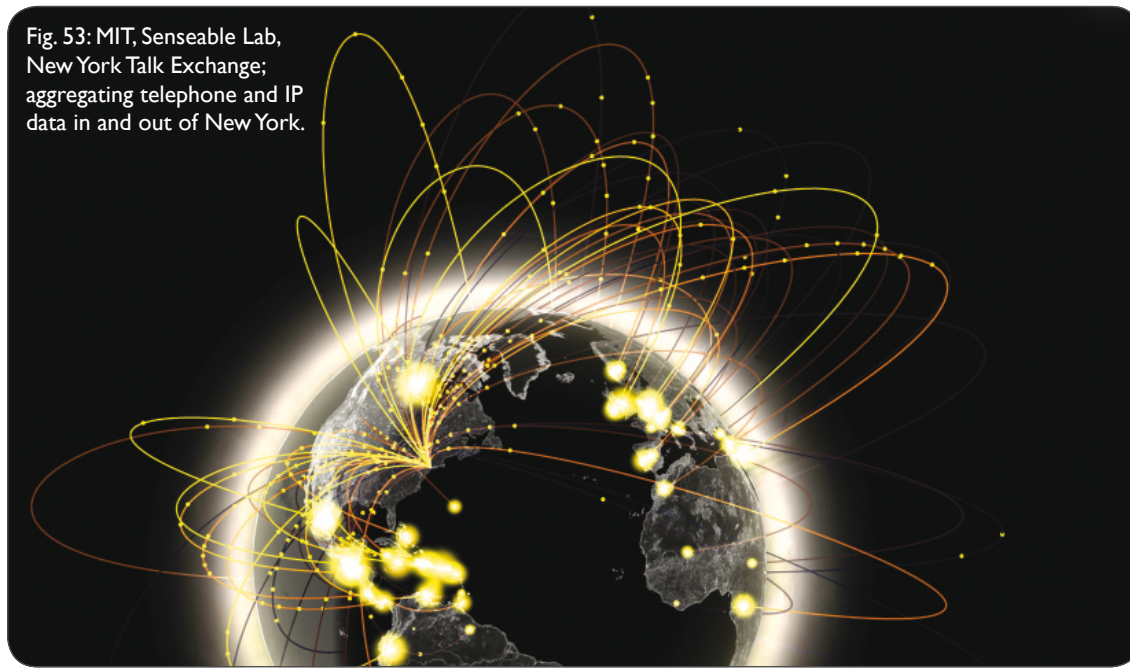


Fig. 53: MIT, Senseable Lab, New York Talk Exchange; aggregating telephone and IP data in and out of New York.

examples are beginning to show how sensor technologies situate experiences and create places and public domains through interaction with these technologies later to be described as non-human actors. One of the most important matters are part of the intersection of the mental and material experience in time and space, and how 'place-ballets' through new media presents themselves as potentials for engaging the body-subject. Here parts of the pre-conscious acts are proposed to be related to the emergence of places, as the performative technologies are able to bypass the preconscious human behaviours with interactive physical objects, thus combining place with new social relationships during shorter time-span.

At first it may sound as an annoying phenomenon to integrate technologies that should disturb the 'body-subject', or simpler speaking, try to incorporate attention from people in everyday situations towards local collective interactive media. Importantly however this should not be treated as the media screens in the movie 'minority report' shouting at your every move, but should be treated as a well-considered design issue in order to reflect current behaviours and potentially interests at the specific locations. There are projects emerging indicating some of these abilities

Fig. 54: Mark Shepard, Tactical Sound Garden; toolkit to plant a public sound garden for participants to explore.

mostly aimed at being playful and event-based, but depending on how open people carry their personal profiles on e.g. mobile applications, the more they could be used to aggregate data for collective use. Another important aspect is treated by Sandy Pentland as part of what he calls 'honest signals' (Pentland, Honest Signals, 2008). Here Pentland emphasizes that human decision-making is largely determined by a 'social sense' (honest signals) evolving from social relations rather than words, which are not part of conscious rational decision-making but rather by unconscious processes. Basically they are 'honest' because as they are unconscious and more difficult to fake and incorporating peoples elements as movements, gestures and voice patterns, they can be used to determine both individual and group behaviour. Mobile phones and conversations are not only directly expressed through the behaviour in urban spaces, but they also distribute important and sensitive information related to both social and local characteristics. For instance the data from Pentlands research regarding social structure identification indicate that by analysing proximity data from cell phones, you can with 95% accuracy identify close friends, with 96% accuracy identify workgroup affiliation and by 98% identity your boss (Pentland, 2007).

At the same time studies as part of the New York Talk Exchange project from the Senseable Lab group analysing mobile phone and IP traffic in and out of New York provided detailed information on the diversity of cultures at the different neighbourhoods of NY (Ratti, Rojas, Valeri, & Kloeckl, 2008). This indicates that the new mobile applications are sensitive technologies in regards to surveillance issues, but also can express more deep founded issues about global relationships and urban neighbourhoods, which can be used on a more general level in relationship with new types of urban interior, facades and general accommodation of street fittings.
As regards to the previous discussions the creation of place is one of the important elements in an increased mobilized and networked culture, and it seems like that performance and new interactive technologies contribute to improving this relationship between places and the social. At the same time a new language is developing to describe how factors of 'placeness' has been dramatically changed in relation to the introduction of mobile phones and sensor technologies in urban space. One of these tendencies has been described as the movement from the flaneur to the phoneur introducing the 'e-urbanite', who is articulated within the mediated space of the mobile phone and the wireless web and stroll around using a digital identity (Luke, 2005). Here Luke describes the 'phoneur' as the post-modern 'flaneur' (Benjamin, 1989; Certeau, 1984; Baudelaire, 1964) moving

about as a real-time commentator of the post-modern world constantly talking or sms'ing. The phone is a personal object and a technology part of a system of ideas in which the user is influenced by a network of communication links (Myerson, 2001) at the same time as commercial advertising is prompting to stimulate behaviour of consumption. Here the 'phoneur' is operating partly as the body-subject however guided mostly by a virtual field of data, and commercial applications are trying to stimulate 'local' behaviours of consumption through digital plugin's. The phoneur shares some characteristics with the more playful urban drifting with the situationist 'derivé' (Knabb, 2006; Debord, 1967), however operating across different networked spaces and in engagement with both digital and physical representations; a subject carefully discussed by Shepard and Greenfield with a reference to a woman drifting with her mobile phone in a shopping centre (Greenfield & Shepard, 2007, p. 33ff). Here the body is operating as through pre-conscious acts, while the mind is kept busy with the content from the mobile phone, therefore successful applications to involve local interactions should involve both situated media that could influence the mobile phone, but also designs that shape the body moves in space e.g. through new types of urban landscapes.

The integration of phenomenology, the body and objects have similarities to the field of tangible interaction considering that these sensor systems are getting increasingly pervasive and merging with new media and material technologies. The technologies are performative and are thus acting as open systems encouraging more people to collaborate on content at specific locations using individual devices, and through these artefacts they occupy both personal and collective domains attached to place through social interactions. In the same way as commercial business' have been anxious to release continuously more advanced personal mobile objects, there is an urgent need for more public digital 'commons' that are not bind to commercial interests, and one of the main agendas should be to ensure new democratized performative media compared to traditional public plazas. The 'Digital Mile' project in Zaragoza designed at the MIT, although not yet realized, has tried to outline some of these aspects by proposing several new public media and designs that encourage sharing of information and increasingly being tactile through new technologies (Frenchman & Rojas, 2006).

> *'The project aims to incorporate digital media into everyday aspects of the public realm, making places that respond to their users, change to accommodate multiple activities, provide stories, information and services, and hopefully, become deeply meaningful to a rich array of people in Zaragoza who will live and learn within them.' (Frenchman & Rojas, 2006, p. 16)*

More projects in the same style have been proposed ranging from the more utopian urban spaces of the 'Leisurator' (Pastore & Sabatelli, 2006) to more sensible and spontaneous installations like the tactical sound garden (Shepard, 2008). Essentially here the social relationships between humans and non-humans support the process of place-making through new types of interactive technologies, even to a level where we can talk about them as being 'public domains' (Hajer & Reijndorp, 2001, p. 11). Here not only social groups emerge as part of these places but also there is an exchange between different social groups, which additionally extend the emergent properties of an interactive architecture as part of more diverse urban settings. (Jensen & Thomsen, 2008)

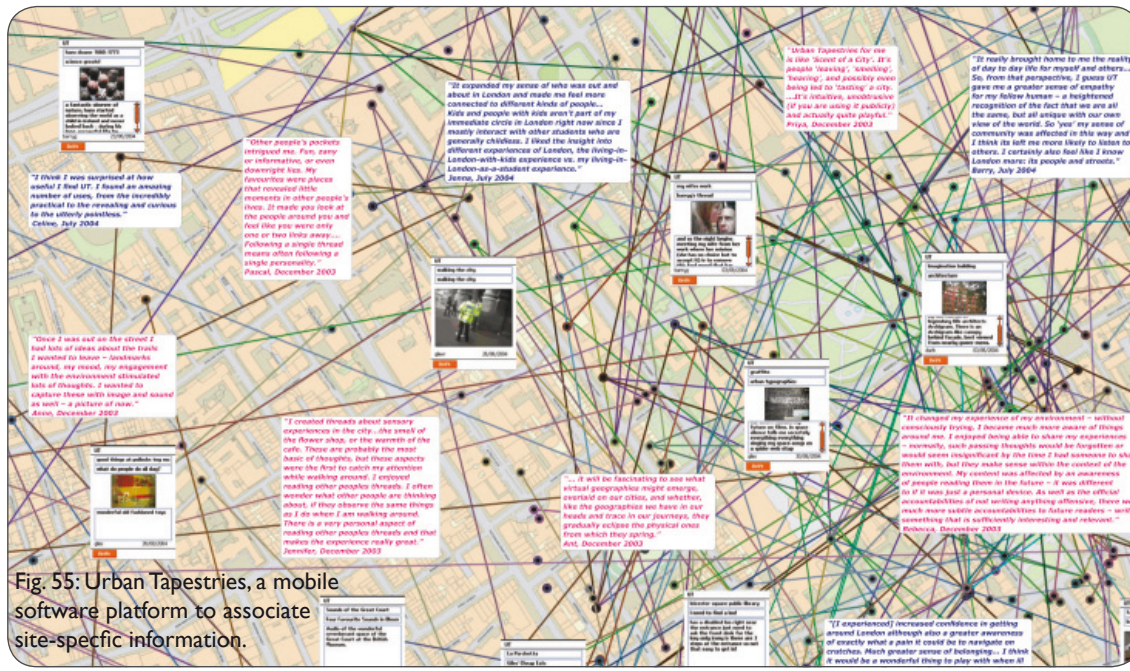


Fig. 55: Urban Tapestries, a mobile software platform to associate site-specfic information.

Summary

The above serves as a background for understanding the technologies that are now being increasingly integrated in the daily urban life and the stated dilemmas in regards to the integration and use. Ubiquitous computing was introduced as the understanding of how computation will be increasingly integrated as part of the everyday objects and environments potentially pervasive and disappearing into material settings. It is combined with aspect of distributed computation, which feeds the idea of virtuality into everyday spaces, and they are increasingly being exemplified as part of a bottom-up approach to interaction where participants can increasingly customize environments. Combining these interactions with multiple actors, both objects and subjects, and the influence of a large variety of new mobile services and peer-to-peer networks, creates a new culture of performativity manifested through different kinds of mediations; a mediation which recognizes most aspects of the environment as a source of information as well as a possibility for personal adaptation. This is a general notion part of a space of flows implying that change is essential to the world, where positionality is only a state of being as part of movement, greatly supported through the recent cultural impact of digital networks. Networks and new upgraded infrastructures that breaks traditional hierarchies at the same time as new complex sub-domains and spaces of limited access are emerging, but nevertheless expands in scope and use with a speed not seen previously. Through these spheres of information and interaction, a new kind of objects also emerge relying on the connections of the internet, customization and intelligence of computational technologies and with potentials of new extensions and attachment through advanced sensor technologies. They are traced through circulation and reshapes the things they interact with including humans weaved into networks of objects and subjects. They mediate every act and extend every sense and thus reconfigure humans as biological entities being part of a constant reinvention of the personal through collective engagements.

It is clear that through our active engagement with these objects or tools we are experiencing the world, and we are getting familiar with pervasive technologies that are increasingly separating place from our physical body. For Ascott it might be a relief to let go of the body and integrate completely with a free mind-set for cyberspace or digital narrative including new artificial technologies, but anyhow if these experiences should be grounded, it would still involve physical objects and engagement with sites. We have traditionally considered the impact of geo-location devices, networks and sensor technologies as facilities to navigate and make sense of the physical world, however this concept might be understood better in reverse; the physical world might serve as background for experiencing the flow of information. Information becomes again tangible and serves embodied interaction through new affects, where tangible and locative interaction of spatial information is essential for creating places and embodying people as part of collective experiences; interactions that are essentially social and accustomed through personal behaviour. Here computation and science might change the paradigm of space and behaviours in physical and mental realities and again bring back attention to the social and the performative character of technologies.

The relationship between place and the social in regards to performative technologies additionally suggest that attachment to place not only seems to exist through traditional dwellings or architectural types, but that a way to ground experience and introduce a personalized adaption as well as a social interaction, can be reached through new types of both situated and mobile technologies. These technologies focus on place through access and relationships between both humans and new technologies acting as ways to access information and to collectively exchange this information. These places increase by levels of interaction, and they exist potentially both in the intermediary spaces as well as in traditionally dwellings and not necessarily through fixed meaning. Here places coexists with levels of social technologies and at the same time relates to how underspecified and empowering these technologies are for the users, provided that they also are able to be easily accessed and understood. At the same time they operate as new tools for accessing customized locative information systems combined with a spontaneous engagement with material settings, thus acting as a way to engage people with place through new extensions. Placing oneself becomes a way to act upon a spatial setting customized through new sensor technologies and networks, which in most cases also are integrated as part of more advanced collective data platforms which increase social relationships. The experience through a combination of mind and body is essential for this understanding of place, which comes into being through everyday activities and practices at the same time as in temporary places through the mediated possibilities for attachment. Thus performative technologies provides one way of situating this experience to bypass preconscious acts through new extensions as mobile phones or embedded computation and sensor technologies.

06

'The sense of belonging has entered a crisis' (Latour B. , 2005, p. 7)

The focus on performativity and emerging technologies seen in the light of the social and place-making requires a new understanding of the effect of new kinds of objects influenced by interactive technologies, networks and increased circulation. As previously considered with reference to Lefebvre (1974) and Massey (1994) relations and the social can emerge out of practice, but these theories do not take into account the relationship to objects and non-human actors. When agency can be considered an effect distributed through a heterogeneous arrangement of materials (Foucault, 1975) and not only human subjects, it begins to get relevance for both the concepts of design and the affect of the material arrangements on human relations. Here Actor Network Theory (ANT) with Bruno Latour (Latour B. , 1987; Latour B. , 1993; Latour B. , 1996), John Law (Law & Hassard, 1999; Law, 1992) and Michael Callon (Callon, 1987) includes objects as important for relationships, especially concerning connections between human and non-human actors.

First of all ANT is a language to describe how and to which extent technology influence human behaviour, and it rejects given categories in favour of performative processes describing a bottom-up mobilisation of heterogeneous things (Monteiro, 2006). It is born out of the tradition of science and technology studies (STS) focusing on how science is actually done and the technologies designed, for instance in an example where Latour (1987) observes scientists in action. In here Latour analysis the process of science and at the same time it is a general indication of Latour's basic assumption that humans and society is defined through action. Order is something performative and an effect of an achievement and not given a priori. These analyses partly stems from Latour's earlier work 'We have never been modern', which tried to break the modernist dichotomy between nature and society claiming that this separation never existed. This separation has also influenced how architecture as a profession has been constantly evaluated between the simplified 'objective' criteria from the natural sciences concerning function, technique, proportion etc. and the strictly cultural criteria in relation to aesthetics, metaphors etc. (Till, 2009, p. 56).

Also in general ANT could be announced as a 'performative' theory as it focuses on how this performing ´order´ is carried out through the establishment of facts, effects or technological means. This is also a link to the concept of emergence, however understood in the sense that this ´order´ is not emerging from only local or global conditions but from the circulation in-between. As when cybernetics originally started up as comparable systems of both biology and technology and the relationship between, there were a beginning need to understand the effects of these integrated devices increasingly dependent on both the virtual and physical, technology and system, humans and non-humans etc., and ANT is a way to emphasize the actors and relationships through networks. It has been used in a wide range of fields from management studies (Callon, 2007), transportation systems (Latour B. , 1996), to 'coins', keys in hotels and a T-bone steak (Latour B. , 2003), but started out from the sociology of science and technology, where especially 'knowledge' was presented in an actor-network relation as a product of hard work through heterogeneous settings embodied in various material forms (Law, 1992). Here ANT follows in the traces from e.g. Lyotard, who claimed the loss of the grand narratives with the introduction of cybernetics. Knowledge is now legitimated in relation to how well it performs or enables a person to perform in particular roles, and performativity becomes the criteria for how effective knowledge is. (Lyotard, 1991). ANT seems to offer a way to trace this performativity and provide new 'meta-narratives' from the thousands of localized roles that people are living. Legitimating knowledge through performativity might also be a way to recreate the collective project, where we can understand how new media can collect and exchange smaller pieces of information from a large amount of participants. In this regard performativity, with ANT, can respond to a previous call from Jameson:

> *'What is wanted is a great collective project in which an active majority of the population participates, as something belonging to it and constructed by its own energies' (Jameson, 1991, p. 278)*

ANT method and science approach

It has been argued that ANT is neither a theory nor a method. In 1999 Latour even rejected both the definition of actor, network, theory and the relations between them: *'I will start by saying that there are four things that do not work with actor-network theory; the word actor, the word network, the word theory and the hyphen!'* (Law & Hassard, 1999, p. 15). Basically Latour does not see it as a complicated theory but more as a way of describing practice or the associations of everyday life. Calling it a theory therefore might be difficult although it states some proposals for certain actions to be taken to head towards an ANT framework. In relation to this Latour at the same time points out that ANT is not a theory of the social, any more than a theory of the subject, God or nature but emphasizes it as a *'space of fluids circulating in a non-modern situation'* (Law & Hassard, 1999, p. 22).

As described later Latour however revisits the social in a more convincing way, which makes it appear as one of the cardinal points of ANT; at least considering the many other naming and headings that has been associated with ANT (e.g. 'sociology of translation', 'actant-rhyzome ontology', 'sociology of innovation'). This however seems to be a general condition for the practice of Latour always shifting focus and playing with definitions, but as

regards to methods in ANT, Law emphasizes that *'…methods, their rules, and even more methods´ practices, not only describe but also help to produce the reality that they understand'* (Law, 2004, p. 5) and *'the argument is no longer that methods discover and depict realities. Instead, it is that they participate in the enactment of those realities.'* (Law, 2004, p. 45). In this way the methods applied to research, affect the production of reality, as in continuation of post-structuralist thinkers as Deleuze, Derrida and Foucault with discourse studies. However it also relates to the important interdependencies between technology studies and the social as mentioned previously, and at the same time it opens up a new way for realities or narratives to emerge in opposition to previous top-down perspectives.

> *'So what of research methods? Our argument is that these are performative. By this we mean that they have effects; they make differences; they enact realities; and they can help to bring into being what they also discover' (Law & Urry, 2004, p. 393).*

ANT is not assuming that there is an internal reality, not even from the science point of view, but it is constructed externally, also through the eyes of the scientists, the laboratory or whatever objects that may be used as a vehicle for the idea. It shares similarities to the research of Peter Galison,

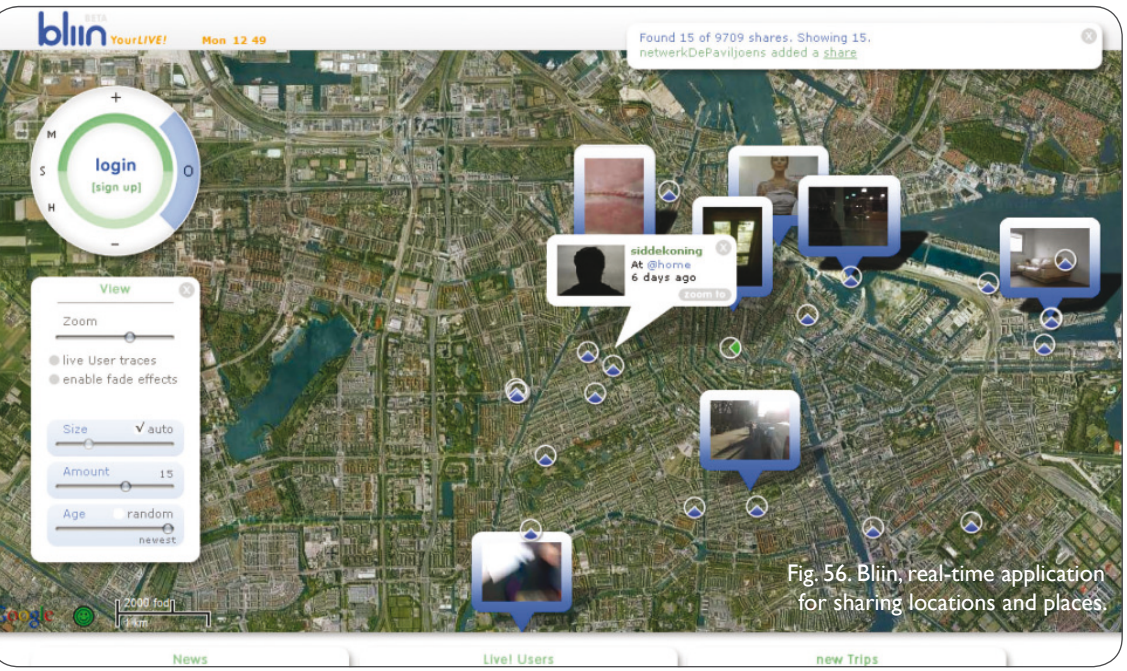


Fig. 56. Bliin, real-time application for sharing locations and places.

who have studied how objectivity in science depends on the subjective construction of visual representations and tools (Galison, 2008) as well as Don Ihde referring to how the constructed images creates a better science (expressed at a presentation by Don Ihde, May 5, 2006). Here science depends largely on culture and interpretation, and reality is shaped by the scientist through a relationship with a large scope of images, experiments, tools etc. Diebner describes the common overlap between performance and performativity as part of research considerations and related to the idea about ANT:

> *'It consists of the focus on "constitution" instead of "ontological given" or "presence" instead of "representation". The moment of action, its continuity, the inherent temporality, and the relationship to the present, for the basis of the concept.' (Diebner, 2006, p. 20)*

Certain moments or actions that take place within knowledge and research are based on actions in a relationship between the object and the participant (e.g. researcher) and cannot be obtained by words only but enters a performative relationship. Thus it touches the relationship *'between the researcher and the observed object'* (Diebner, 2006, p. 21) as between an actor and a network, and as Callon has noted:

> *'Scientific theories, models and statements are not constative; they are performative, that is, actively engaged in the constitution of the reality that it describes.' (Callon, 2007, p. 321)*

With ANT, Callon emphasizes (like Galison above) that scientists are no-longer merely observers but also inscribed in the reality of the research as innovators, and questions what sense it makes to have scientists trying to create representations of reality. Instead by the methods of ANT, it concerns the relations between the performative 'acts' together with all of its influencing factors producing a network. Then ANT is not limiting the field but instructing to map out the set of elements which influence, shape or determine action and in this way opening up the act for a description of possible influences carrying out the network.

> *'Instead of assuming that there is a specific external reality upon which we can ground our efforts to know the world, such writers mobilize metaphors such as flux to index the sense that whatever there is in the world cannot be properly or finally caught in the webs of inquiry found in science and social science. (Law, 2004, p. 8)*

However taking this relational understanding of science into consideration, it is very important to emphasize that science still takes places at very specific locations. Scientific theories and findings emerge from locality; they

are not universal, and facts are localised (Law & Mol, 2003), which bears important remarks to keep in mind also when considering situated technologies and new media.
In the same way Latour is trying to bridge the gap between the ´realities´ of practice and the internal field of ´knowing´, as a way to draw out the *performative* knowledge of the real to make it applicable for the actors; here Law is explaining a methodology called 'method assemblage'.

> *'We will need to think of our methods as tools for discovering a reality, or aspects of a reality, that is out there in a fairly definite form but is more or less hidden to us' (Law, 2004, p. 38) and 'We need a way of talking that helps us to recognize and treat with the fluidities, leakages and entanglements that make up the hinterland of research.' (Law, 2004, p. 41).*

In continuation of the previous considerations regarding performativity, emergence and complexity science, ANT is trying not to label aspects of reality but to perceive and experience complexities and map out the relationships by 'following the actors'.

ANT as relationships

The process of exchange between human and non-human actors is a process happening in networks of heterogeneous materials, in the sense that almost all interactions are mediated through objects of one kind or the other.

> *'People are who they are because they are a patterned network of heterogeneous materials. If you took away my computer, my colleagues, my office, my books, my desk, my telephone I wouldn't be a sociologist writing papers, delivering lectures, and producing 'knowledge'. I'd be something quite other – and the same is true for all of us.' (Law, 1992, p. 4)*

This focus on position through relationships almost reminds one about Einstein and the special theory of relativism. Here we are only able to position ourselves according to the relations to other, similar to how John Law tells *'that entities take their form and acquire their attributes as a result of their relations with other entities'* (Law & Hassard, 1999, p. 3). As when entities can be anything from humans to non-humans through everyday objects, it is a kind of relational understanding that nevertheless has much to do with how identities also can emerge *'as an ensemble of relations between different places'* (Abbas, 2005, p. 93). In connection with the previous chapter concerning flows, it is important for ANT that changes and circulation are a fundamental character of everything from identity and the social to knowledge. It is a performative explanation, and part of a fluid ontology, to how things emerge through interaction as part of circulation.

> *'Actor-networks are associations of actors and resources which are put into circulation in a continual effort to construct and maintain power relations. They are performative definitions of what society is about.' (Thrift, 1995, p. 221).*

Associations is one of the distinct characteristics of ANT and in the recent publication 'Reassembling the Social', Latour (2005) describes it as one of the main differences to previous sociologies. ANT is 'sociology of associations' (Latour B. , 2005, p. 9) and confronts traditional sociological 'structures' by emphasizing that they are always in formation and never fixed. The social needs to be constituted and investigated as regards to which associations and actors that make it exist.

> *'One way to mark this difference is to say that social aggregates are not the object of an ostensive definition – like mugs and cats and chairs that can be pointed at by the index finger – but only of a performative definition. They are made by the various ways and manners in which they are said to exist.' (Latour B. , 2005, p. 34)*

Fig. 57: Paul Notzold, TXTual Healing; text messages projected in public space to encourage sharing of thoughts, experiences and ideas.

It is important that the social is something that needs to be assembled, and this includes not only how it is 'said to exist' but also to which extend there are connections between different material settings described like a network. It has resemblances to the broader concept of 'society' that Urry has introduced seen in the light of mobility (Urry, 2000).
Also in here objects and subjects are entering a more intimate relationship through inhuman objects that constitute social relations (Urry, 2000, p. 14) thus with a more intertwined relationship between the human and the physical world. Essential for this concept is that '*if you stop making and remaking groups, you stop having groups*' (Latour B. , 2005, p. 35), and in this way '*the object of a performative definition vanishes when it is no longer performed – or if it stays, then it means that other actors have taken over the relay*'. Although this is not specifically treated in this project, it is worth mentioning that identity is involved with this socially performative process rather than a definitive product. '*Identity is not a given, but an activity, the result of which is always only a local stability*' (Miedema & Wardekker, 1999, p. 79). Looking at the performative and circulation implies pointing to the importance of actions and emergent affects while constantly reformulating the relevance of the object on the social, identity, place etc.

This is what ANT seems to have been focusing on continuously through its many detours, or as John Law describes *'to have transformed the social from what was a surface, a territory, a province of reality, into a circulation, is what I think has been the most useful contribution of ANT'* (Law & Hassard, 1999, p. 19). Hence, the actor-network is those elements in a context that shape action as *'the argument is that these various networks (not only) participate in the social. They shape it.'* (Law, 1992, p. 382).
Actor-Network Theory has also been considered as part of spatial and urban studies by e.g. John Urry and Nigel Thrift, where also the performative aspect and definition of networks occur: '*Actors come to define themselves and others through interactions…. – in the intermediaries that they put into circulation*' (Thrift, 1995, p. 24). In continuation of this '*a network is, therefore, defined by the actors and by the circulation of intermediaries in interaction.*' (Thrift, 1995, p. 24) like previously mentioned with references to Bergsonism. Society is not what holds together but what is held together through a waste amount of both human and non-human (or inhuman) actors in the sense of media, state actions, changing technologies, advertisement, corporations etc. (Urry, 2000). Thrift makes an example of how ANT can be described as four different 'ordering principles' as the nation state, the media, the organization of money capitalists and machine intelligence, when considering how an international financial system is mediated, networked and circulating 24 hours day (Thrift, 1995, p. 221ff). Although ANT was beginning its popularity before the internet dominance and emergence of the digital network, it is still among the many electronic metaphors that it is most easily paralleled and understood in regards to the overwhelming availability of connections and effects. A development which also severely changes how interactions are carried out through new kinds of software agencies where an '*electronic world, with its emphasis on meaning and increased social connectness, forces an even greater reflexivity into the conduct of many meeting places.*' (Thrift, 1995, p. 231)

Smith adds to the influence of ANT on defining networks in regards to cities. The global, national and local are no longer a matter of scales but a matter of how long and connected these networks are, in the same way as it is not a matter of a difference between something more concrete or abstract. Instead it is world city networks emphasizing the flows (referring to Murdoch):

> *'ANT requires us to look closely at the traffic, the immutable mobiles that travel through and in so doing make networks. Indeed, the interesting idea that can be researched by world city scholars is that the nodes and the links are made by that which passes through them. In other words, nodes and links (world city networks) are not viewed by ANT as empty infrastructures that are subsequently filled by immutable mobiles.' (Smith, 2003, p. 14)*

In here the immutable mobiles are introduced by Latour as what can be transported and mobilised without changing their form. This additional emphasizes the practice aspects in a non-representational thinking, thus looking at the performative elements, or elements that do something instead of the fixed geography.
It is especially an idea posed by Thrift, defining ANT with the following elements (Thrift, 1995, p. 23):

1. *It provides a means of understanding how everyday practices are transmitted into wider processes of social formation.*
2. *It points to the way in which social agency is constructed in these social processes.*
3. *It identifies the process of construction as one that requires constant effort, and is always halting (need to maintain networks…)*
4. *It problematises subject-object relations because of its catholic view of what can count as actors.*
5. *It demonstrates how reality is constructed through processes of translation, association and alliance which strengthen particular positions/accounts of practices at the expense of others.*

ANT definitions

Actors are the first important definition, and in the early literature they are basically described as 'entities that *do* things' (Latour B. , 1992, p. 241). Reminding ourselves that this project deals with the effect of advanced sensor technologies, it seems obvious that things are beginning to act, however in the original meaning this is also in the figurative or semiotic sense. Objects do things by merely representations when they carry associations; however later Latour has reiterated the definition describing that actors are things (human or non-human) what is *made* to act. Thus even if actors are doing something themselves, it might not necessarily define it, as an actor *'is not the source of an action but the moving target of a vast array of entities swarming toward it.'* (Latour B. , 2005, p. 46). In this sense action is like in a performance dislocated always uncertain or on the edge of the real, and the actor changes the performance or action – how simple it may sound.

Translation follows from the definition of the actor, and has been very detailed described by Latour through an example of a hole in a wall replaced by a hinge.

> *Walls are a nice invention, but if there were no holes in them there would be no way to get in or out—they would be mausoleums or tombs. The problem is that if you make holes in the walls, anything and anyone can get in and out... So architects invented this hybrid: a wall hole, often called a door, which although common enough has always struck me as a miracle of technology. The cleverness of the invention hinges upon the hingepin: instead of driving a hole through walls with a sledgehammer or a pick, you simply gently push the door...; furthermore—and here is the real trick—once you have passed through the door, you do not have to find trowel and cement to rebuild the wall you have just destroyed: you simply push the door gently back. (Latour B. , 1992, pp. 227-228)*

Here the hinge has taken over the efforts of constantly building and rebuilding the wall to get in and out, but with much less effort, describing it as a non-human actor. This includes all objects which participate in acting and affecting behaviour both as tools but also more generally how architecture and design affect how we perceive and act with our surroundings. Translations originally came as a description from Serres as part of a boundary condition, and in general the process of translation implies making two objects equivalent, where they take over each other's performance.
The more broader definition of actors thus implies '*any thing that does modify a state of affairs by making a difference is an actor – or, if it has no figuration yet, an actant*' (Latour B. , 2005, p. 71) Here it becomes apparent that many objects make such a difference as part of our everyday life, but nevertheless it is valuable to begin considering how these objects participate in shaping our surroundings and the social, especially as many objects afford certain fixed behaviours. Some great deal of efforts are also usually put into discussing the figurative part mostly in extension of symbolic interactionism from e.g. Mead, which previously has discussed how the meaning of things and environments is derived in large part from social interaction (Seamon & Buttimer, 1980, p. 139). However this project emphasizes the physical transformations with effects and affects in favour of a general semiotic discussion, although much architecture and design operate from the basis of the same stereotyped actant's or typologies.

At the same time it is also the transformation of the major effect to the minor effect that is named 'translation', as the effort has been translated or displaced to the non-human actor. This also widens the subject of the social from traditional sociology, as the 'translator' plays a key role between mediators (described later) in the original meaning of *socius* 'as someone following someone else' or as a connection or associations (Latour B. , 2005, p. 108). There are important choices involved by delegating efforts to non-human actors or even machines like in all aspects of design or technology, but anyhow it happens all the time as part of our everyday objects. The point however being that what is traced by those translations, done by actors, will carry out the network (Latour B. , 2005, p. 108) or as Thrift describes it:

> *'When there is a perfect translation, or redefinition, of actors' identities and behaviours, then these are stabilized within the network.' (Thrift, 1995, p. 24)*

> *'In turn, this process of translation demands the utilization of materials of association which are able to act at a distance, thus constructing time and space within these networks. (Thrift, 1995, p. 221)*

Therefore in this sense networks are not only the links between elements or sophisticated infrastructures but a way to associate agency. A network becomes an assemblage of components (almost as described by Bergson) that designate the flow of translations, or as Latour describes it with the following features:

1. *A point-to-point connection is being established which is physically traceable and thus can be recorded empirically*
2. *Such a connection leave empty most of what is not connected, as any fisherman knows when throwing his net in the sea*
3. *This connection is not made for free, it requires effort as any fisherman knows when repairing it on the deck*
4. *It has to be renewed by the passage of another vehicle, another circulating entity*
   Latour B., 2005, p. 132)

Other more exciting namings for this network could be mentioned, for instance the even more fluid, de-territorialized or mobilized 'rhizome' (Deleuze & Guattari, 1987, p. 21), but anyhow to be able to trace such a network requires a large amount of data maintaining a log of actions and input, and Latour describes the vast amount of notebooks for this purpose or other alternative sources of data management. Tracing the social seems even more complicated as it depends on this network of translations making a difference for the social actors as part of the performance; however the important point being that it starts from the opposite direction of traditional sociology and objects. The ANT ends with society, or potentially participates in creating society, by seeing the collective build from networks of associations that only can be traced if they are dynamic or undergoing change. From this perspective ANT is a bottom-up local creation that is shaped through associations.

Fig. 58: Electroland, Target Breezeway; tracing of position and paths of participants in the Target store at the Rockefeller Center.

A few more clarifications need to be settled before heading on, especially concerning the important element 'mediators' and 'intermediators', which will be used to describe the effect of new interactive technologies.

> *'An intermediary... is what transports meaning or force without transformation: defining its inputs is enough to define its outputs.' And 'mediators... cannot be counted as just one... their input is never a good predictor of their output.... Mediators transform, translate, distort, and modify the meaning of the elements they are supposed to carry.'*
> *(Latour B., 2005, p. 39)*

The difference between these two is important as if there are no mediators (and only intermediators) the social will not be rendered visible. In some environments it might be beneficial to consider intermediaries instead of mediators in order to optimize flows or for merely functional considerations, however in respect of the social or relationships between places, people and objects, mediators are the central elements to create attachments and stimulate innovation.

Callon and Latour additionally operate with the issue of a 'black box' as derived from cybernetics as a stable and regular piece like machinery. Latour has used the black box to speak about scientific and technical work that was made invisible by its own success, as an unquestioned matter of fact. '*A black box contains that which no longer needs to be considered, those things whose contents have become a matter of indifference'* or simply *'a black box contains a sealed network of people and things.'* (Stalder, 1997, p. 5). Like much of the vocabulary of ANT it is a term from cybernetics, where it described machinery which was stable (although complex). It is most commonly used as a metaphor for all the facts that are not questioned and therefore maintained as static premises, for instance as part of grounded scientific knowledge.

> *'So an actor-network is what is made to act by a large star-shaped web of mediators flowing in and out of it. It is made to exist by its many ties: attachments are first, actors are second.'*
> *(Latour B., 2005, p. 217)*

ANT and design

The studies of ANT are mostly carried out on already existing technologies and objects, but besides the general ideas concerning actors, translation and mediators there are a few exceptions dealing more specifically with design. Inscription specifically *'refers to the embodied patterns of use... suggesting that action is inscribed, grafted or hard-wired into an artefact.'* (Monteiro, 2006, p. 5) Thus it is a way of predetermining the use of an object, and it share many resemblances with the concept of affordances from James J. Gibson (1979; 1977) primarily used in interaction design. Here objects are perceived not only in terms of object shapes and spatial relationships but also with the object possibilities for action, which is defined as the affordance. It has been extended as part of the 'actual' and 'perceived affordance' by Donald Norman more specifically indicating how an object should be used and thus related to the more functional requirements of an object:

> *'... the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.' (Norman, 1990, p. 9)*

For Norman affordances concerns the basic feedback between the design and the user as an important element in order to ensure proper handling of both existing and future things (Norman, 2007), however it is by far treated with the same ambiguity and complexity as in ANT or other science and technology studies considering non-human or even in-human agents (Sheller & Urry, 2006, p. 9). For instance Norman makes the example of the 'shared space' paradigm that considers designing environments that seems more dangerous than they are, thus making drivers drive slower or more carefully (Norman, 2007, p. 79). This aspect however only seems to involve the user aspect of safety and not the more general aspect of how these environments are designed and the behavioural impacts. Additionally the question for affordances in relation to use, is to involve considerations as regards to how objects in general affect our understanding of the world.

> *'It absolutely requires recognising that the artefacts people interact with have enormous impact on how we think... ...artefacts do not merely occupy a slot in that process, they fundamentally shape the dynamic itself' (Robinson, 1994, p. 78)*

If affordances for objects are generally designed only for clear usage patterns, then humans are being influenced and increasingly affected to be machines of linear usage scenarios, and issues like ambiguity and more inspirational collective acts might be lost in 'no translation'. Here cognitive clarity might not be a way forward of how objects can stimulate interactions and the social, but instead treated as a subject to be critically examined as part of the understanding of the broader affect of objects. As per the previous example of the door hinge, translations are an essential part of the design, as it traditionally acts as an intentional placement of a specific function. If it would be a more specific design scenario, a designer would translate the role of the users or systems into assumptions before posing a design proposal (Monteiro, 2006, p. 6). However it is important that the inscriptions can be weak or strong depending on the level of ambiguity as referenced for instance by the descriptions of Umberto Eco:

> *'Ambiguity is the product of the contravention of established conventions of expression: the less conventional forms of expression are, the more scope they allow for interpretation and therefore the more ambiguous they can be said to be. The modern open work may be seen as conveying an exceptionally high degree of information, because of the radical contraventions of established conventions that characterize it.' (Eco, 1989, p. xi)*

Architects like Greg Lynn, Frank Gehry, Coop Himmelblau, Zaha Hadid are specifically aiming at maintaining an ambiguity in the design and through

Fig. 59: Michael Cross, Bridge; rising steps appear when participants pass through water.

these affordances rendering visible a variety of 'action possibilities' with the space, which enable and encourage people to form new connections with space (Rahim, 2005, p. 139). This is further elaborated as part of the case studies, as it concerns a discussion of how restricted designs should be in regards to performativity, especially considering that the idea related to co-creation and empowerment; *'the task of defining and ordering the social should be left to the actors themselves rather than try to decide how to settle any given controversy.'* (Latour B. , 2005, p. 23). If (all) objects are designed for clear uses based on simplified scenarios of human behaviour, we are also heading towards the simplification of humans because of more simple (and stupid) objects. It might be more valuable to consider how objects not only shape humans, but the constant interdependency between how objects are shaped and reshape humans through interaction.

> *'People use artefacts to create meanings in their lives, to give form to their experience. If you think about an object as something to be mastered, about a message as something to be decoded, or an environment as something to be navigated through, all of these artefacts are dead' (Robinson, 1992, p. 5)*

The same apply to the aspects of reality or the attachment of design to place and experience. Designing through ANT need to happen outside enclosed laboratories and brought into real settings as an assemblage (Shane D. G., 2005, p. 147), but it requires new kinds of technologies and objects to mediate these relationships as part of design. Here technologies are inspired and more easily innovated because design becomes embodied and sensed in a feedback loop with site and experience.

> *'The birth of a new technical object is never a linear progress. It is knotty, a mangle-prone emergence across a threshold of surprise... The life of a technical object must always pass through the stages of ultimate fact of experience and merely-talked-about factoid before finally baring itself through experimentation.'*
> *(Massumi, 2002, p. 215)*

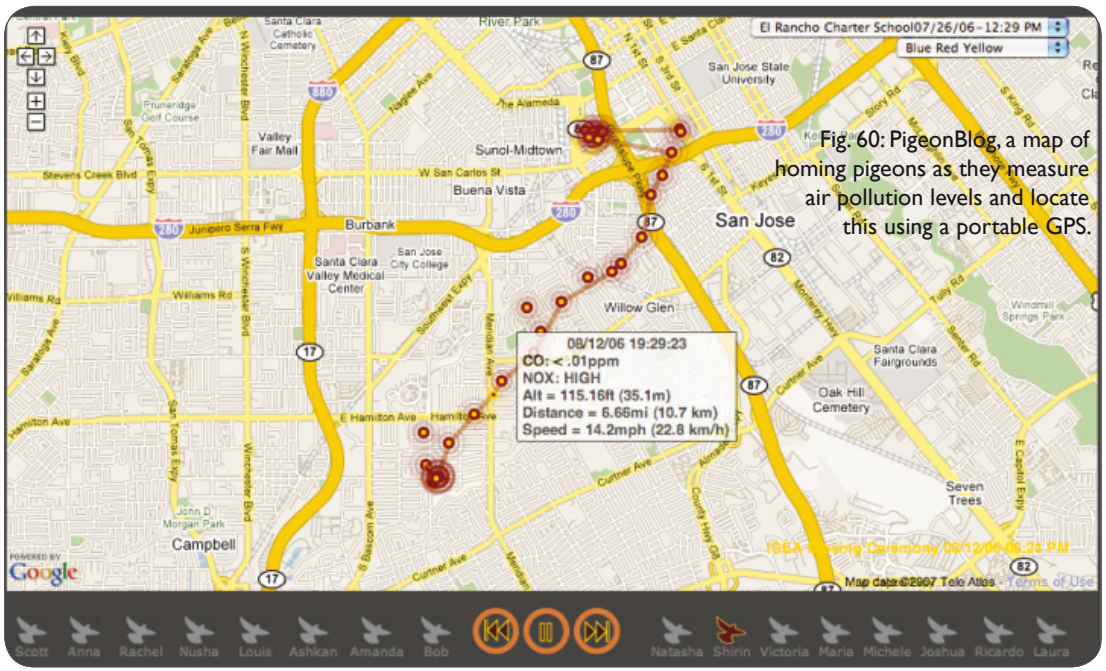


Fig. 60: PigeonBlog, a map of homing pigeons as they measure air pollution levels and locate this using a portable GPS.

Fig. 61: Nicola Basic, Sea Organ; plaza changing the sound in relation to the ocean waves and additionally equipped with a solar driven media surface.

ANT and interactions

After these designations and definitions, we are again back at considering places, interactions and performativity. For Latour, ANT is essential in regards to localisation, or how everything starts from local traceable actions through which a local site is made to do something (Latour B. , 2005, p. 173ff). Here the general phrasing of 'context' is kind of meaningless or blurring the image of relationships, unless it appears as the actor-network itself, which is the most meaningful way of describing it. Actors as both humans and non-humans inscribed through relationships can be considered as the perceived environment, as if there were no mediators it might not be perceived, or described as a background condition. Essentially everything is produced somewhere. Secondly the local needs to be distributed mainly through an extended view of interactions. Here we can add to the previous indicated definitions of interactions:

1. *No interaction is isotopic meaning that each actor comes from many other places, materials and actors*
2. *No interaction is synchronic meaning that the time origin of the present actors is very different*
3. *Interactions are not synoptic meaning that the given influences are never simultaneously visible and thus different each time.*
4. *Interactions are not homogenous meaning that material qualities do not sustain but change all along.*
5. *Interactions are not isobaric meaning that things pressure differently.*
   (Latour B. , 2005, p. 201f)

This indicate some obvious kind of relativity as *'in most situations actions will already be interfered with by heterogeneous entities that don't have the same local presence, don't come from the same time, are not visible at once and don't press upon them with the same weight.'* (Latour B. , 2005, p. 201) For sure this mark out the scope of performativity when interactions are no-longer only local, one-to-one and face-to-face but instead networked, mediated and disturbed by a large variety of new complex objects and time-dependant events. Also linking to the spatial *'no place dominates enough to be global and no place is self-contained enough to be local'* (Latour B. , 2005, p. 204), and the spatial becomes even more complex and shifting our realities for both perceiving and acting in place.

Considering these impacts on interactions it might seem like a miracle how people can actually go through a life and feel at place in many of these complex and sometimes chaotic environments (provided that they do). One of the important connections to follow here and keep in mind, especially when designing for these new technologies, are that maybe there are more human and non-human actors in places like busy cities and airports that helps designate you as being someone, than in your traditional workplace. Maybe it is because new personal mobile communication technologies designate 'you' in a different way than previous technologies, which primarily were meant as tools serving something else. This is very different from for instance a traditional space that is *´tailored´ for you 15 years ago'* (Latour B. , 2005, p. 194) and *'most of what you need to act is already in place'* (Latour B. , 2005, p. 195). Here however there are also increasingly new media to compensate for the architectural framing of space, where the space steps into the background in respect to the actions carried out, as with many new integrated architectural media.

Increasingly there are continuously new and even more convincing services and subscriptions to people who can pay, to become more 'you', or to connect to situations and networks. This is related to the access principle emphasizing that access is what counts (Rifkin, 2001), because it helps the associations, when interactions becomes more complex. In an airport you become the centre of attention no-matter where you move, and the general environment is designed not to disturb this impression (although many people are disturbed by the 'undisturbed'). Or moving to the next level with today's many customized technologies, there are endless new ways for the individual to be aligned with his or hers current expectations or goals.

These 'vehicles' could be called *'subjectifiers, personnalizers, or individualisers, but I prefer the more neutral term of plug-ins'* (Latour B. , 2005, p. 207), which are all of these objects, which designate 'you' as being someone. Through this concept there is a vehicle for localization to be prepared for any physical or mental state, provided that we are able to be allowed to get access to the background for these needs. However, although we are social through objects there is still much to wish for in regards to the collective. The basic starting point for interactivity has been optimization and personalization, but the social interaction with people through common objects as part of the collective, is what really would count both as part of place-making and personality. One option could be to connect the sites of local interactions thus transforming individual actions into actor-networks. This is one of the interesting points, but also to at least offer mediators that accounts for several local interactions as a basis for collective assemblies, could provide new systems for collective places.

Summary

ANT is shifting the focus from the ontological given to the performative, as how things are constituted through interactions between heterogeneous materials. The social is described as a broader spectrum of associations defined by actors (or actant's), when they connect through mediators. This implies that the social by definition is performative, as this is a condition for maintaining and constantly renewing groups. The material and objects participate in this process with no distinction between humans or non-humans as both are potentially actors and associated in networks. The relationship with the performative is very clear not only in the description of the technological mediated interaction but also in the way that both humans and non-humans play certain 'roles' like in a performance. Much of the theory thus has resemblances of a description of a narrative, where each element is an actor and the course of the play is happening through translation. Translation is the process performed between two actors and describes the development by a change in effect thus binding the actors together; here design is a process of translation regarding how actors are modified or replaced. Essentially technology and objects are mediators (or an intermediary) for action on the same level as humans, connecting actors to the network.

Fig. 62: Milk and Tales, Gamelan Playtime; a tactile surface on the London South Bank, releases recordings from the Royal Festival Hall.

The focus on interactivity in ANT does not limit itself to the more specific field of interaction design or ways of accessing information through interfaces. Instead interactions are much more complex, although emphasis is on the origin of the local relationships that make a difference for each interaction. Apparently one of the more obvious methods to keep in mind here, are the focus on experimentation and carefully observing the changes in effect when different actors influences the course of the object. Thus some processes inject new inspiration to the development of the object acting as a performative feedback loop, while others will stall the development or in the end fix the object at a certain level, mainly because all actors left the stage. Here the social relationships are considered important, both when it is the intension to make a progress on a development of a design, and also when it would be time to narrow the possibilities by attaching actors to place. Here ANT needs inspiration from another related theory, which more specifically describes the influence of an object constant in change both communicating and circulating between different actors.

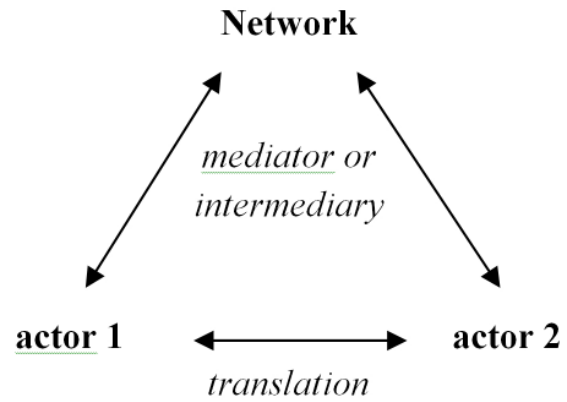


Fig. 63: The relationships between actors, network and mediators.

07

OBJECTS ARE back in strength in contemporary social theory. Whether in the shape of commodities, machines, communication technologies, foodstuffs, artworks, urban spaces, or risk phenomena in a thoroughly socialized nature, a new world of materialities and objectivities has emerged with an urgency which has turned them into new sites of perplexity and controversy. After poststructuralism and constructivism had melted everything that was solid into air, it was perhaps time that we noticed once again the sensuous immediacy of the objects we live, work and converse with, in which we routinely place our trust, which we love and hate, which bind us as much as we bind them. High time perhaps also, after this panegyric of textuality and discursivity, to catch our theoretical sensibilities on the hard edges of our social world again, to feel the sheer force of things which strike back at us with unexpected violence, in the form of traffic jams, rail accidents, information overload, environmental pollution, or new technologies of terrorism. Perhaps the most intriguing feature of this new constellation is our (re)discovery of the multiple new ways in which social and material relations are entangled together, blurring conventional distinctions between the software and hardware of our social lives.

...

Material objects are enactments of strategies, and actively participate in the making and holding together of social relations. In addition, these material enactments inevitably have a spatial dimension; they simultaneously establish spatial conditions for objectual identity, continuity, and difference. Space must not be reified as a natural, pre-existing container of the social and the material, but is itself a performance.
(Pels, Hetherington, & Vandenberghe, 2002, p. 1)

After reviewing the methods of ANT on how to follow the actors and trace the social in understanding complex associations between human and non-human actors, it is time to look more carefully at objects. Even though ANT has resemblances to a theory, it mostly present it itself as a proposal for a method to follow relationships as part of practice. It does not tell anything specifically about how to design for associations regarding special objects or sites that can optimize mediation where required. Instead one step backward is needed to revisit the idea about the objects, which suddenly through ANT are presented as very important for the understanding of the social and local sites. Although the objects according to ANT carry some kind of agency, this is mostly in regards to their semiotic or functional aspect in relation to how they create associations and affect the behaviour in spaces. From a more technological point of view agency would only be taking into consideration if the object or system had some kind of autonomous behaviour, thus it would require some level of intelligence in order for this object to design on its own. However the broader definition of ANT implies a concept that seems relevant to understand not only technological systems, but also technology in general as with elements of design and architecture, which carry affects no-matter the degree of computation. It carries threads back to the background of performative architecture in the introductory chapter, where the work of for instance Acconci, Rahim and Leatherbarrow was visited. These might be the original representational affects, but with the technologies mentioned in the following chapters, now objects are constantly changing character, expression and performance based on fluid parameters. Also these objects (ref. to ANT) will carry agency not only as when they are designed and implemented but are already part of associations from the first conceptual ideas, the software used, the material relations, designers involved and so forth. The objects are constantly translated all along the design process and reiterated according to different pressures of actor-networks. This is valuable to consider, not only from the basis of contemporary design processes of e.g. Greg Lynn, Ali Rahim, Zaha Hadid, Coop Himmelb(l)au and similar, who are working based on the constant forces of influence that

Fig. 64: Jason Bruges Studio, Memory Wall; changing lights depending on movements and picks up the colors of the inhabitant.

effects the design, but also from the point of view of the interactions on site, with users and clients for the benefit of new mediations and affects in more complex urban environments.
These objects that constantly are influenced and modified by the collective exchange between heterogeneous elements need another vocabulary. Currently it is difficult to even just speak about the influence of performative technologies, if the effect and integration of new sensor technologies, networks and computation only is referenced from a representational point of view. From the very beginning they could have been characterized differently according to their different acts and affordances, but objects seemed to have been fixed in the classic modern opposition to humans and subjects. Also with the impact of the 'internet of things' or information technology, objects are not only represented but communicates differently in different situations. Not only do these new technologies change how objects act, but else the general value and affect of objects (as per the introductory quote in this chapter) are beginning to retain more importance. In continuation of performative environments, technologies, ANT and increased flow in society, one of the most promising areas for new kind of objects, and related to the subject of mediators, are within the creation of places and shared collective urban environments. These objects require not only mediation but also circulation and a change in effect depending on feedback and actor.

Quasi-object introduced

In here the 'quasi-object' will be treated as an umbrella notion for objects that take over characteristics of the information society. This is also partly how this definition was introduced, when the philosopher and multi-scientist Michel Serres described it with a reference to Hermes, the Greek God of communication (Serres, 1991). Serres has been a pioneer in describing how communication changes the relationships of the collective through information technologies. It is not directly apparent in all of his writing, but anyhow much of the work resembles a reference to information technology and networks looking for the intersections between networks and objects:

> *'For Serres these two forms or metaphors for the real – the solid and the fluid – endlessly intersect- So the real is flux, fluxity, and also their intersection… we need a third object, a way of knowing that intersection.' (Law, 2004, p. 117)*

As a reference to urbanism, Serres describes that the quasi-object made the founding moment of Rome possible as Romulus was torn apart by the city fathers (Serres, 1991), who carried away the body parts under their robes. The Fathers became bound together by their crime and the multiple parts of the body acted as a quasi-object whose circulation defined the social bond. The origin of Rome is in this way described as a making of the collective through the mobilization of the quasi-object. The quasi-object marks relationships, which would be floating without a point of reference, and thus it is said to 'stabilize time' maintaining a fairly stable network as long as it is moving. (Serres, 1991, p. 106). Serres originally described the quasi-objects in Parasites (Serres, 1982), a phrase that he is sticking to in relation to a criticism of the 'empty balance' of current economics (Wiek, 2007). Similarly in Parasites, Serres describes the quasi-object as part of a soccer game. As the ball is passed from player to player it becomes an actor (to use the ANT expression) that can change the course of play, and the roles of the players. The players become a subject in the game by the circulation ball, and focus is turned towards the affects of the ball, and what it enacts, rather than the qualities or representation of the ball itself.

> *'This quasi-object that is a marker of the subject is an astonishing constructor of intersubjectivity. We know, through it, how and when we are subjects and when and how we are no longer subjects. 'We'; what does that mean? We are precisely the fluctuating moving back and forth of the 'I', The 'I' in the game is a token exchanged and this passing, this network of passes, these vicariances of subjects weave the collection.' (Serres, 1982, p. 21)*

The circulation is necessary in order for the distributed multiple to make itself a collective, and without the object there would be no collective or Rome in this case. At the same time the acts of the quasi-object have many resemblances to the mediation in ANT in the sense that meaning is transformed by translation or exchange of the object. As part of these flows, the objects exists and provides its meaning through exchange.

> *'Quasi-object: a token, a thing that circulates, an exchanged gift, the peace pipe, the team ball. As the mediating object, it fixes relations on itself and around itself. Such an object became the focal point for the foundation of Rome, becomes the point round which the collective takes hold and around which a relation to the world is constituted, including the world as object of knowledge.' (Abbas, 2005, p. 177)*

Latour (1993) used the quasi-object in continuation of his hybrids as a reference object criticizing the dualism between nature and society. No-matter how many interdependencies or feedback loops that are drawn between society and nature, they do not come to terms, and Latour

instead describes the quasi-object (or quasi-subject) as a place between the two poles.

> *'Quasi-objects are much more social, much more fabricated, much more collective than the 'hard' parts of nature... on the other hand they are much more real, nonhuman and objective than those shapeless screens on which society – for unknown reasons – needed to be 'projected'... Science studies have forced everyone to rethink anew the role of objects in the construction of collectives, thus challenging philosophy.'*
> *(Latour B. , 1993, p. 55)*

Latour additionally uses it as an argument for the history of natural things, as there has been a long tradition of writing the history of people. Instead of starting from the 'fake' oppositions of nature and society, the explanation starts from the quasi-objects, or the mediators, as a new ontological relativism (Latour B. , 1993, p. 85ff). This emergence of society starts from the stabilization of objects, and is thus more valuable for stabilizing social relationships than previous fixed assumptions about the social; the quasi-object thus designates a source of agency that passes through the traditional dualisms.

> *'The quasi-object can help inform an account of technology that would embrace both its social and discursive constitution and its anchoring in the real.' (Hansen, 2000, p. 34)*

Through Serres and Foerster, Niklas Luhmann has even adopted the notion of quasi-objects to exemplify these social systems, which are sustained through the ability of recognition in changing different situations, changing social constellation and while still maintaining their concreteness as objects – here art is acting as a quasi-object like the example of the soccer game (Luhmann N. , 2000, p. 47). With the same reference Lévy is going even further not only to describe how this object constitutes the subjects and the game, but more as a catalyzing object for a collective intelligence (Lévy, 1998, p. 151).
At the same time as the quasi-object might not exist as an object, but it is one nevertheless, since it is not a subject, it can also be described as a quasi-subject, since it marks or designates a subject who, without it, would not be a subject (Serres, 1982). From this is sounds like there are no difference between these two although in the later work of 'Angels' (Serres, 1994), Serres unfolds the quasi through the illustration of 'angles' in an airport space. It is a very evocative description of the influence of high-tech communication on interpersonal relations combining the scientific with the artistic. Here quasi-subject and quasi-objects are illustrated as constantly moving in the transit space, and how the new networks of digital communication and physical movement causes new spaces to emerge out of the flow as referring back to Bergson's 'continuity of movement'.

> *'Millions of human beings – here are your angels, Pia – inhabit the upper reaches of this city, which remain absolutely stable albeit moving at subsonic speeds….Los Angeles… An upper zone which is reproduced at an even higher level by rings of orbiting and stationary satellites, launched from the equatorial suburbs of Kourou, Baikonur and Cape Canaveral, and by hundred networks for the communication of electromagnetic messages' (Serres, 1994, p. 64)*

The two people in the book 'Angels' both acts as quasi-elements. Pia is a doctor at the airport, she stays in place, acting as an 'interchanger' between passengers continually arriving and departing. She is a described as a quasi-subject. Pantope travels the world as an airline representative, mediating between destinations. He is described as a quasi-object. The two people weave together relations on a global scale and the world is in this way defined by intertwining networks submerged by the passage of ambiguous objects circulating between them. In general humans as knowing subjects are considered the quasi-subjects and nonhumans the quasi-objects as the available objects, illustrating that the mediation determines the definition.

> *'In different situations, subjects become objects, or conversely, objects become subjects.' (Moore, 2001, p. 90)*

Again it is a narrative concerning the circulation of the quasi-element, which weaves the relationship between players, and at the heart of the collective there is an object, but an object which is relatively ambiguous, since its properties are given according to the way it passes through the collective. In a discussion between the two main characters, Serres refers back to a concept of the performative with '*The performative act… (as)…. the formation of a collective network out of the most intense solitudes.*' (Serres, 1994, p. 96). In this case it is a bit complicated that a human seems to be presented as both a quasi-object and a quasi-subject, with the mediation determining the state; however the more interesting aspect in this project is a focus on the quasi-object as the extended object that mediates places and people through information technology.

> *'This quasi-object that is a marker of the subject is an astonishing constructor of inter-subjectivity… the object stabilizes our relationships, it slows down the time of our revolutions. The object makes our history slow.' (Abbas, 2005, p. 2)*

The quasi-subject can thus be compared to an extended state of humans through technology and knowledge bringing thoughts back to Hayles (1999) and Pepperell (1995).
Now getting a little closer to the discussion about the technologies we need to revisit what these new technologies are actually doing to objects. In extension of Serres and the discussion of information technology and networks as an increasingly distributed local and pervasive condition for objects, also the 'internet' itself has been considered part of this quasi-spectrum. Here mostly because the internet traditionally has been defined as something virtual, and therefore neither is considered an object or a subject, however this might not be so valuable in discussing design. Instead the integration of internet as part of objects along with sensor technologies and with a potential change in appearance requires involving the understanding of the 'virtual'. According to Pierre Levy (1998) (from Gilles Deleuze) the virtual is traditionally compared to the digital or the absent, as opposed to reality as a material embodiment, but also the 'possible' needs to be introduced along with the 'actual'. The possible is the 'real' (as a static representation) just without existence implying the logic reasoning of making it real; thus something possible is not enough to make something

Fig. 65: Greyworld, Bins and Benches; robotic benches and bins move around at the plaza in Cambridge, UK.

happen. Actualization implies *'the production of new qualities, a transformation of ideas, a true becoming that feeds the virtual in turn'* (Lévy, 1998, p. 25). Thus realization comes from a predetermined possible where the actual is a solution to a problematic complex. Virtualization is de-territorialized and prepositional associated with imagination and knowledge on the way to be placed (Serres, 1994). It comes originally from 'virtue' or as 'a capacity to act', and thus a potential reality that isn't unreal but just hasn't gone into effect yet. (Picon, 2003, p. 295)

> *'The difference is that in the translation from the possible to the real, nothing emerges that was already known, whereas the transition from the virtual to the actual always involves the emergence of something previously unanticipated.' (Rahim, 2005, p. 77).*

Now the point being that the quasi-object sustains the de-territorialized virtual as an agent of the transition between the virtual and the actual, and as an emergence of the real between the individual and collective, private and public, and the local and the global. However it needs some kind of prescribed actions embedded in the design in order to augment the in-between states, but they can exist both as part of a design process or as virtualizations embedded in a realized design. Delanda has a related reference to the quasi-object, describing it as a quasi-cause where the quasi-causal operator acts as an information channel linking multiplicities together (Delanda, 2002, p. 84), thus again here between the virtual and the actual. This quasi-cause *'is nothing outside of its effect…'*, but *'…it maintains with the effect an immanent relation which turns the product, the moment that it is produced, into something productive'* (Deleuze, 1990, p. 95).
Thus the quasi-causal operator is able to affect multiplicities by revealing inherent properties of an entity through translation or transformation. The logic from Delanda and Deleuze can sometimes be quiet confusing to relate to an architectural practice, however considering the influence of interactive technologies and the information embedded within these objects, it becomes clear that the quasi-object is able to distort an environment in a way that it reveals previous information and effect in a time-based manner, thus providing an 'open work' for which other actors can take hold. The quasi-object is thus acting as the mediator, which reveals the information about the material thus providing the possibility for collectives to be affected, to access and circulate additional information through it.
Additionally the quasi-cause can also be used to describe the emergent effect of knowing the multiplicities in a design process, by comparing it to how Zizek interprets Deleuze (Zizek, 2008). Thus coming to a certain point in a design process and reflecting back at the multiplicities that

created the current object, creates a quasi-object, because the design is not only the object performed from the historical elements creating the object, but also the knowledge or 'aggregation' of all the part of the process. Compared to a traditional design method, the designer is sometimes only deciding based on the current stage of the process, thus the current prototype, design or objects in front him, but provided that the historical process or multiplicities are externalized partly through new technologies, it is affected by quasi-causes thus adding possibilities for emergence. Quasi can here be said to be a meta-object, or the aggregated information about the design, which causes emergence. One could question why it is still an object, but here it is important that this quasi-object is something that can be sensed or traced through its associations.

Going back to the game, referencing the quasi-object in Serres' soccer game, rules are needed for the collective formation to exist. Massumi takes us to an even greater detail of the soccer arena and the perpetual feedbacks that exists (Massumi, 2002, p. 71ff). The formal rules of the game capture and contain the variation; however the basic condition of the game consists of a field with two goals, two attractors. The two goals polarize the space between them, no matter if the goals are created from two stones on a bare plane of gravel or at a high-tech soccer arena with coloured commercial nets. The goals induce the play and every player is charged by the movement towards a goal, and the ball and player correlate according to position and state. Kicking the ball, the player is the subject of the movement, and the ball is the object, however the ball is the subject of the play, as it is the object-marker of the subject. At the same time the ball moves the players, and *'the players are thus the object of the ball'* (Massumi, 2002, p. 73). The ball can here be considered an autonomous actor because it is the only centre of the game, and when the ball moves, the whole game moves as a global event. The game is emergent and every movement becomes a modification of space and as such an event which makes local effects create global effects. There is much more to this game of the ball and the players on the field but the simple point is made. The ball as a quasi-object is acting within some formal rules in a restricted space and constantly mediating between the individual and the collective. It becomes a relation between the actor and the network, or even more important; the ball becomes the important actor coexisting with the players to create an actor-network within the framework of the polarized field.
These are in essence performative environments even though the technologies are not yet specified, but what is actually the environment? An old reference to McLuhan used to analyse media helps. McLuhan described a 'perceptual organization', which was organized in a figure/ground relationship. Here the form emerges out of the interaction in the process of perception.

> *'The consciously noted elements are figure and everything else is ground.' (McLuhan, 1977, p. 9)*

> *'The figure is what appeared structured, as the foreground and whereas ground appears as unstructured and background. The boundary between the two appears to belong to the figure, that is why the figure has a shape, whereas the ground appears to be shapeless. The figure is specific, the ground is generic.' (Stalder, 1998)*

Figure and ground constitute what is perceivable in total, and the ground, described as the environment, is not a passive container but an active process influencing all the elements around it – it's heterogeneous. This is also the background for his famous quote 'the medium is the message' (McLuhan, 1964), because communication technologies operate through its context affecting the environment, in the same way as for instance housing is a medium of communication shaping human association and community

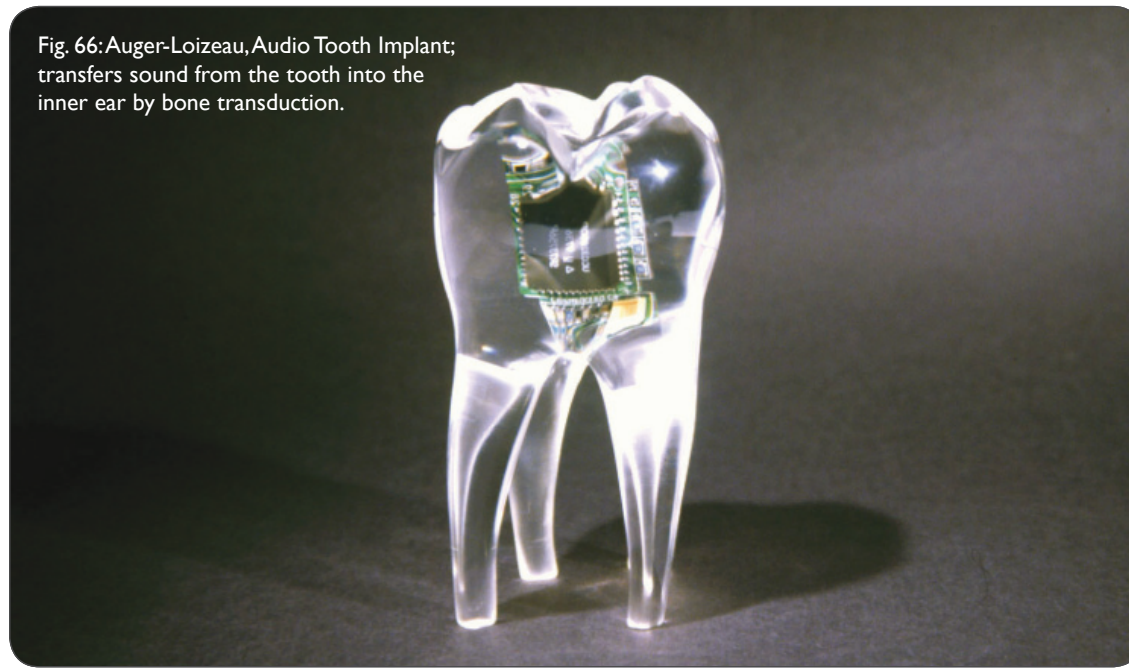


Fig. 66: Auger-Loizeau, Audio Tooth Implant; transfers sound from the tooth into the inner ear by bone transduction.

(McLuhan, 1964, p. 121). Technologies in this sense have local effects and carry own assumptions of time and space given rise to new technologies which further affects society. Referencing McLuhan and Serres, the ball is mediating between the figure and ground or between the individual and the collective through new kinds of interactive media. It connects to an environment and a figure similar to the player and the field, and then disconnects again. At some point the ball is close to the individual, and in the next moment part of the collective. The interactive part makes it always moving and changing as nothing is seen as before. Here again it involves the body. It comes closer, it turns away, and it becomes distant. It might be a simple effect of distance always shifting between being within reach physically or digitally or out of reach at a collective platform. Looking at a piece of interactive architecture is often perceived as a constant change in affect. Suddenly you realize an individual change in the setting, before it is gone in the next moment.

As described the figure-ground relationship is a way to describe the environment as part of perception; however there is also some new research to include as part of these considerations. Traditionally it has been believed that descriptions as part of representations and the ability to assign specific properties to moving object e.g. in the ball game of Serres, would be the main procedure to keep track of individual objects, when there are more than one; basically by adding information to the object it makes it possible to track it. However recent research within psychology and cognitive sciences emphasizes that it actually isn't the properties or locations, which makes it possible to identify the object, but it is the object or thing itself (Pylyshyn, 2007, p. 17). The essential concept here is that a process of individuation makes it possible for the perceptual system to keep track of things and objects, even when they change properties; actually in many cases the human motor system can pick out objects without descriptions or assigning specific properties, which means that the cognitive system contains more than descriptive or pictorial information. This happens based on a 'visual index' assigned to moving or changing objects, and for instance allows professional game players to keep track of multiple moving objects in a ball game (Pylyshyn, 2007, p. 21). This is essential for the understanding of the quasi-object and its relations to places, as here the quasi-object through its information and change of properties is able to index fixed places, which can be maintained by cognition even if they later change properties. The quasi-object contains the ability for the cognitive system to assign an 'object file' for each object through the change in properties, however at the same time a change in location makes the same trick possible, which means that a change in information and description of properties is not needed as part of moving objects (Pylyshyn, 2007, p. 40). This is interesting for both the concept of architecture and places, as an interactive architecture do not need to change properties all the time to be indexed in the cognitive system, and at the same time, things that move can be indexed without a change in properties even the more modalities involved seems better, unless it reaches the level of chaos.
The quasi-object as part of interactive architecture is a process of constant mediation, which continuously shifts between the object and place, and being individual and collective as an integrated part of the environment. In the same way the 'internet of things' potentially realizes a 'parliament of things' (Latour & Weibel, 2005) with information technologies as part of quasi-objects staged through a public voice (Bratton & Jeremijenko, 2008, p. 16) This is essentially also the case with a performative architecture; it contains the ability to behave as a quasi-object describing the complex relationships between humans and non-humans, and emphasizes how objects create subjects through new types of computational technologies (Thomsen, 2008).

Quasi-objects upgraded

The performative technologies create a renewed attention to the quasi-object. Here mainly because embedded computation connected to networks together with advanced sensor technologies and memory, increase the ability for these objects to create a feedback between the actor and the environment. Different levels of information and at different stages in the design process makes them ever evolving, not only because of an increased awareness towards environmental factors and diverse modes of exchange, re- and upcycling trends, but primarily because designs through sensor technologies also adapts to places, which feed back into design software as a basis for additional reiterations. The illustrations as part of ANT and semiotics indicate that objects are actors and also have subjective relationships as part of their influence in networks. However adding the ability for objects to specifically distribute information and change characteristic e.g. shape, colour, tactility, illumination etc. as part of interaction, not only stimulate the perception of subjective relationships with objects but also stimulate individuation and personalization, and most importantly this facilitate the aggregations of these interactions into collective systems.
This new terminology of objects in regards to interactive design, buildings, cities and environments are not at all clear. Much of them seem to lack the evocative character of objects that e.g. Turkle has argued for (Turkle, 2007), but also they mostly lack the situational aspects of change with local

environments and particular actors and situations. These objects are getting increasingly important, maybe foremost because of the performative characteristics of these objects couple the cognitive stimuli that humans always search for with the specifics of materiality and places. These specifics however, we remember, are also evolving over time as building context is relational although the perception of change in material is dependent on the social context.

> *'Reality is a relational effect. It is produced and stabilized in interaction that is simultaneously material and social.' (Law & Urry, 2004, p. 395)*

When looking for objects within design and architecture we can begin to look at the continuation of cybernetics and its influences. When studying design and architecture that responds to the electromagnetic spectrum, Anthony Dunne begins using definitions of what could be quasi-objects or mediators. Through his 'hertzian tales' Dunne turns towards designing the aesthetics of behaviour with products, instead of the more traditional technical and semiotic functionality (Dunne, 2005). Here it is important to allow the interactivity of objects to be more poetic maybe acting as 'dreamy objects', which act as connected objects as a basis for actor-networks.

> *'Dreamy object offers one possible interpretation of the electrosphere. It helps us think of electronic objects in 'Hertzian' terms, as interconnected fields rather than discrete things. It acknowledges the problematic conceptual status of electronic objects, arising from their ambiguous identity as hybrids of matter and radiation, functioning at all scales and speeds as well as going beyond the range of human perception.' (Spiller, 2002, p. 297)*

In this way the status of the 'object' is extended and added quality in relation to its ability to relate or connect; here it deals with another type of aesthetic experience. At the same time one of the important challenges for new objects is not necessarily the user-friendliness but instead to consider a 'post-optimal object' (Dunne, 2005, p. 20), which focus on being provocative and narrative in order to transform spaces, as when they leak radiation into spaces and objects around them. *'Many devices designed to transform private situations into public ones depend on the 'leakiness' of electronic objects.'* (Spiller, 2002, p. 297)
When Dunne speaks about the integration of these new 'dreamy devices' it is not to talk only about pervasive technology and the integration of 'smart' devices, which usually are considered as elements with some kind of intelligence. Instead it's about electronic objects and there relation to space affecting the relationship between body and spaces. These extended objects which mediate social relationships are also finding their way into architecture. The 'braincoats' in Diller & Scofidio's 'Blur' building acts as extension of the human profile in order to stimulate relationships in a foggy environments. These tendencies go across both more artistic objects and into the fields of experience architecture. The Alliance arena in Munich by Herzog de Meuron can change its appearance of the EFTE facade into three different colours depending on which team is playing. However not only is this a representation of a changing envelope of a stadium, which communicates and affects the driving experience on the highway, but also the whole stadium changes function and 'style' with a replacement of the whole interior, advertisement, brand products, soccer nets, stadium seats etc. according to the represented teams. Although not specifically underspecified the building becomes a stage for a new set each day. In the D-tower, NOX has designed a landmark which through a questionary on a web page indicates the emotions of the citizens in the neighbourhood of Doetinchem. These 'emotional' guidelines become externalized and the public is able to feed back information from the tower itself. Here the tower is not only a representation of four different emotions but it is changing according to the nature of the local city as well as opens for input from the street level itself.

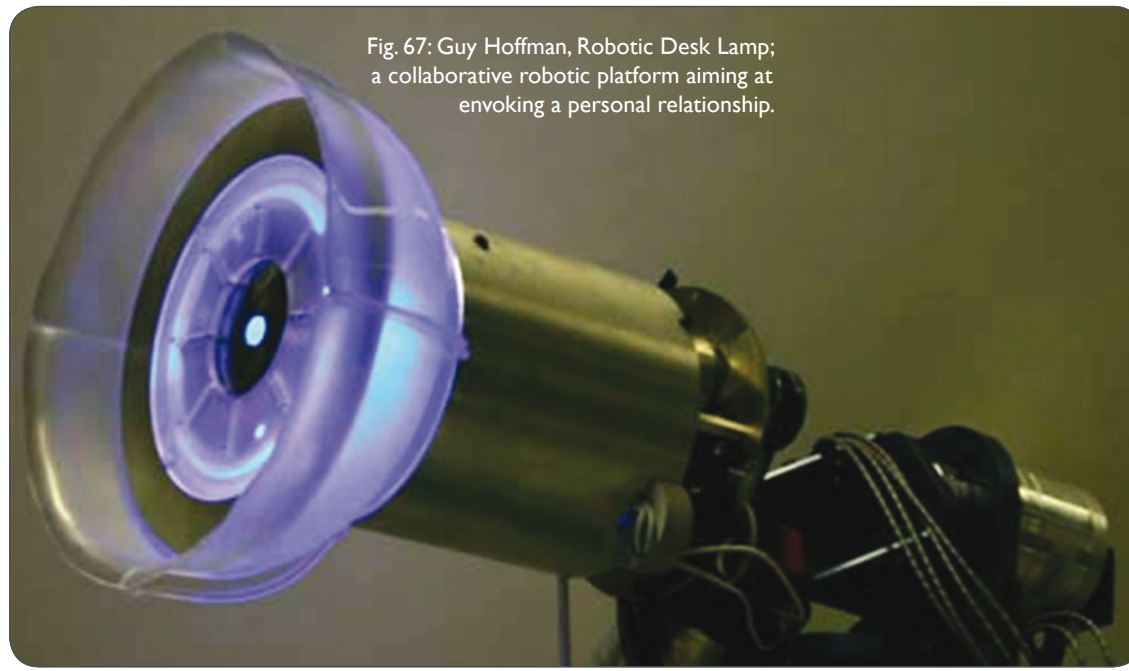


Fig. 67: Guy Hoffman, Robotic Desk Lamp; a collaborative robotic platform aiming at envoking a personal relationship.

To shift to another status of these objects or devices, Winy Maas from MVRDV is talking about them in another way:

> *'Today Architecture is moving toward the development of 'devices' that can combine large-scale issues with individualized input, and analysis with proposals. Architecture in the future will be consumer oriented, connecting bottom-up with top-down. It will come to be seen as an instrument for general observation, as a messenger for urban transactions and as a communicator of wider processes.... Maybe then we can become more active, assertive, communicative, and in the end, productive, in shaping the future city. (Maas, 2004, p. 14)*

These devices are from the background of MVRDV not only physical devices but as well software being able to connect actor and network relations by adding constrains in the design process. In this way, the device is an instrument for the design process but might as well be extended into the built environment. As previously mentioned these objects are also becoming more emotional like the architect and designer Kas Oosterhuis, who is developing increasingly 'machinic' bodies of architecture, which are capable of responding to environment and human as the integration of building and body. *'Once we are able to establish a connection between emotion and construction, human bodies will naturally communicate in real time with other dataprocessing devices like instruments and buildings.'* (Oosterhuis, 2002, p. 93)

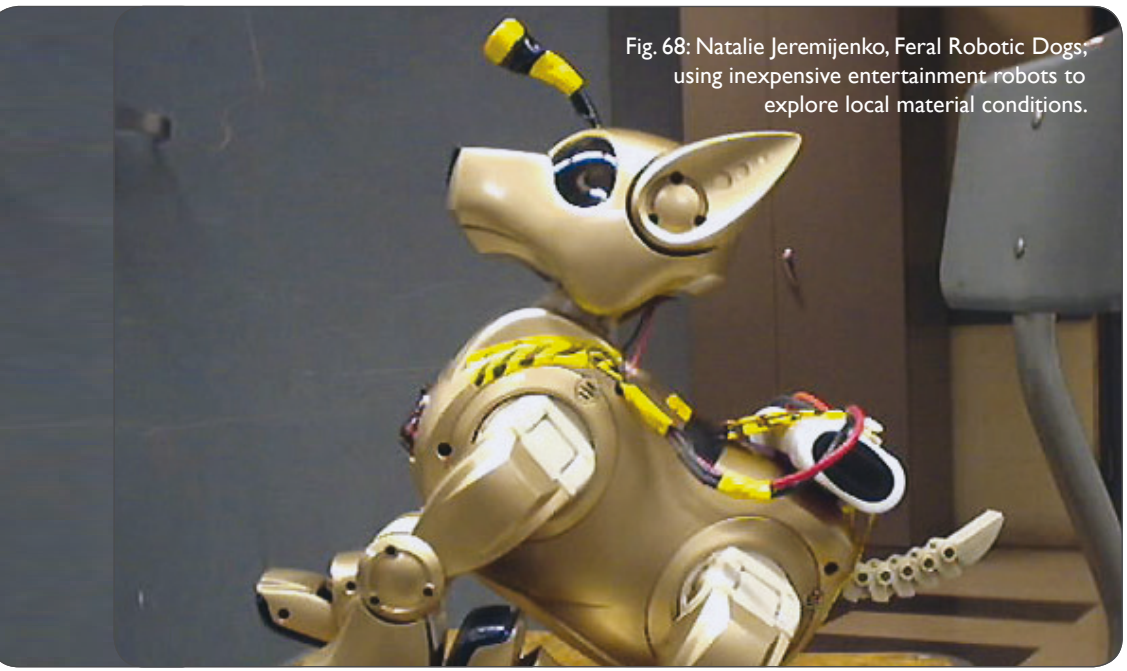


Fig. 68: Natalie Jeremijenko, Feral Robotic Dogs; using inexpensive entertainment robots to explore local material conditions.

Neil Spiller has emphasized research related to the previous notions of cyberspace to begin understand the blurring boundaries between the virtual and the actual. The quasi of objects are in this case highly dependent on the relation to the virtual and the actual, or as he describe it as 'vacillating objects':

> *'An object will have many selves, many simultaneous forms. Technology is forcing the object to become a subject, partial and anamorphic. The anamorphic object changes form when viewed from certain viewpoints, in different fields or in distorted mirrors. The new objects will have formal qualities that are determined by the virtual or physical terrain in which they are viewed or manipulated.' (Spiller, 2002, p. 306)*

Additionally these objects affect the way sites as local environments are perceived in different ways at different times and with changing actors. Underspecified spaces open for interaction and multiple input are here described as a relation between 'vacillating objects' and what Spiller calls 'active sites' from molecular biology. *'Active sites, as well as being a way to link objects together, could be the ports that one tickles to cause formal distortion or to coerce information from objects, or they could be a door to another spatial terrain. An object that has representations in more than one set of spatial conditions may well have differing numbers and configurations of active sites.'* (Spiller, 2002, p. 308)

In this case Spiller could talk both about physical representations of objects but as well about the information technology that binds it to something pronounced as virtual. Active sites could in this case be the quasi-objects', which links to the local sites leaving traces to build environments as part of changing flows. Although this aspect of the virtual still have references to a cyberspace it more or less indicates how objects facilitate exchange between different flows and domains, which offer the potential for local sites acting as both input and output for new kinds of boundary objects.

> *'Cyberspace provides objects that move from group to group, shared memories, and hypertext for constructing intelligent communities' (Lévy, 1998, p. 160)*

These layers of information which causes objects to be dependent on an increased amount of networked sensor data influence the way objects are perceived and shared, at the same time as they are increasingly moved between different spaces. This basically implies that although RFID inte-

grates a specific ID for each object, they are no-longer acting as constant or a fixed representation as a physical entity, but instead the performative aspects imply that they act according to the coordination of the different inputs that they are influenced by in real-time.

> *'Whereas time was once considered to be the fourth dimension, it is now the first. In understanding our place in this world, it has become increasingly important to answer the question of 'when' rather than the question of 'where'…. It is not enough for architecture to think about the temporalisation of space; it must face the spatialisation of time…' as well as 'through connectivity people synchronize, level and reassert their social relations.' (Bouman, 2005, p. 14f)*

Essentially here because the link between the actual and the virtual not only consists of information and circulation but essentially goes across time to sense and aggregate a large amount of information, which can be attached directly for the intended purpose. Currently they primarily exists digitally but will gradually find their way into practice as part of experiments with extended sensor technologies coupled to networks and continuously upgradable digital models, before realized as part of elegantly changing forms. Everything in the design process will be correlated both regarding the multiple parameters maintained through complex spreadsheets and evaluated in parametric software, but at the same time maintained with real-time affect on preliminary site.

> *'The new digital tools might in fact be best described as quasi-physical form-finding processes.' (Schumacher P., 2008)*

These quasi-objects are generally moving towards being more organic as introduced previously by the idea of singularity (Kurzweil) and vivisystems (Kelly). They will use new computational systems possibly extended into bio-webs, which make them handle complex tasks through more autonomous behaviours serving multiple functions and changing into different types of actors. This can be seen from for instance in the current development as part of biotech research or the beginning gene manipulation of objects, which causes them to grow on their own and fit the characteristics of bones and tissue. Here growth patterns are completely performative only to be influenced by the changing stimuli set by the specific environment, but they are not uncontrollable as the characteristics are determined through the provided stimuli. This would also finally determine how the definition of these different objects will be decided mainly based on their abilities to transform environments or situations, instead of how they appear or fixed to a certain function.

Summary

At first there seems to be a rather long way from the simple circulating ball in the game, as illustrated by Serres, to the more advanced notion of computational technologies. However the main elements, considering the interactions that bind places and interactions together are valuable as a metaphor in regards to more advanced technologies and new behaviours. As per the above these technologies reintroduce the circulating object as a valuable item both for the constitution of place and the social, and the foremost interesting questions that these objects raises are concerned with how they constantly constitute meaning as part of processes and within the locations.

In short, the actual makes the possible real through virtualization. Here the actual provides the transformation to the real because it attaches meaning to the possible through the knowledge associated with the virtual. The quasi-cause is the operator which acts as an information channel between the actual and the virtual, thus being the mediator which distributes knowledge from the virtual to the actual, making the possible emerge into the real. The quasi-object, with the multiple causes, act as the bonding between the virtual and the actual, providing the location-specific informa-

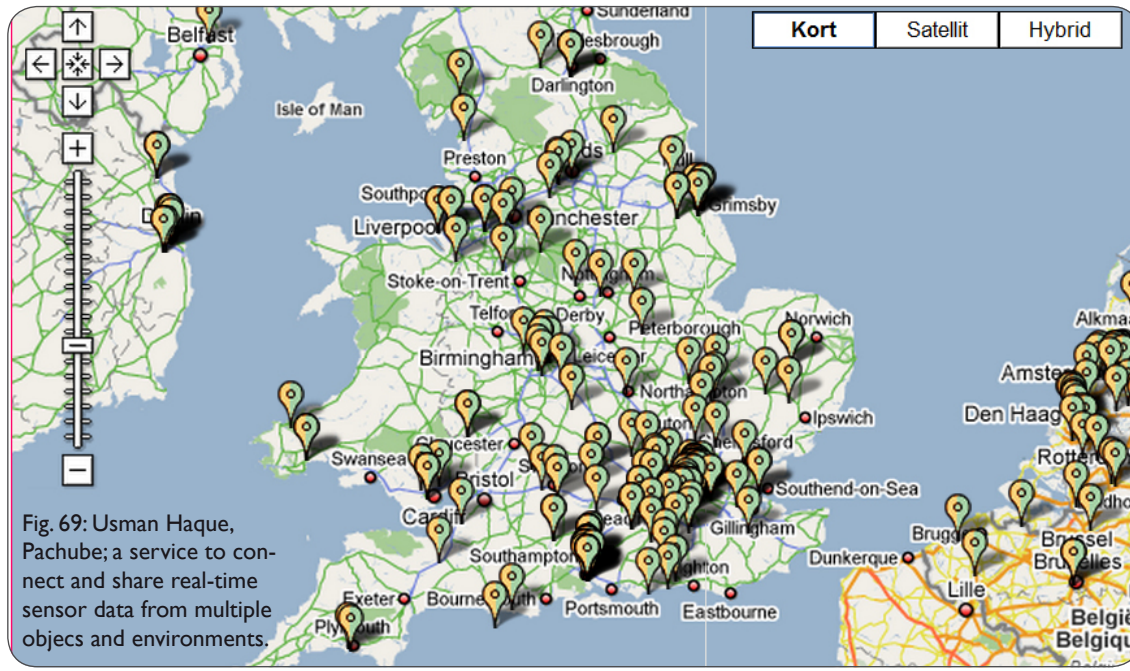


Fig. 69: Usman Haque, Pachube; a service to connect and share real-time sensor data from multiple objecs and environments.

tion as well as the aggregation and historical context to translate how a new object or design can emerge and fit in as a solution to a presented problem.

The main characteristics of the quasi-object are its ability to mediate between actors by providing the necessary knowledge through circulation and effects like sensing, transformation, networking etc. The collective can thus take hold in the quasi-object as a platform for interaction, and use it to distribute information, or as an extended object acting as an actant providing many possible figurations, thus appearing as several different actors. Naturally the quasi-object needs a medium to operate through, and to serve embodiment and places it would be most efficient through some level of materialization. This would both provide the possibility to access information through bodily acts but also to exchange information, transform physically or in general in various ways that it can provide a platform for collaboration across time and space.
Through the case-projects the quasi-object will be used in different ways. First it will serve as a way of describing the different changes happening through a process of actualization and in the end realization. Here the quasi-object comes into use through mediation, and when a process needs to be reflected across its complete actor-network of heterogonous objects and affects. The quasi-object thus here simply acts as a way to aggregate and exchange information making it the object that creates the performative. Secondly through the development of pervasive computing and networks this object is no-longer merely a medium for a performative design process but also acts as a way of describing a real-time manipulation of a design. Thus the informational and knowledge-based character of the quasi-object can come into complete materialization through some of the recent technological developments. Here the quasi-object can move between different spaces, attach and mediate places through interaction by virtue of its underspecified status, change its representation and use through transformation, accumulate and aggregate of multiple data inputs and outputs through networks and essentially act as a focal point for the social arrangement of humans and non-humans.

Fig. 70: Herzog and De Meuron, Allianz Arena; stadium changing exterior colour and complete interior depending on the home team.

PROJECT FRAMEWORK

08

The current tendency towards the integration of performative technologies in architecture and urban space needs a new framework. This is required both for the understanding of the revised configuration of architecture and urban spaces based on the integrated technologies, but also to be able to re-introduce design as a profession being aware of these effects. The overall integration of pervasive computing, sensor technologies and mobile networks is illustrated through the diagram on the opposite page.

The beginning ideas from cybernetics involved control systems, reactive systems and later increasingly interactive systems; however these systems were in the beginning considered mostly for a functional optimization of spaces and not for the spontaneous engagement or dialogue with technologies for social purposes. As with second-order cybernetics and later extensions, performative technologies extend the concepts of interactivity into networks through the involvement of multiple actors as part of everyday both fixed and mobile spaces. Thus interactive technologies with embedded sensors, computation, memory and effect, acting as pervasive technologies integrated in architectural components and the general urban fabric, are now extended across networks and brought into play through location-specific actors.

The point being, that performativity essentially is part of defining the social through interaction with artefacts, at the same time as the actors (human and non-human) gets increasingly location-specific through more precise tracking mechanisms and situated technologies. The sense of place at the same time involves the collective interaction with artefacts creating the actor-network through very specific situations. This is a new situation, mostly because humans at the same time are getting increasingly used to both the experience of interaction as well as mobile extensions, and through web platforms they are introduced to services, where they can share and create own content as part of everyday life situations.

Fig. 71a: Finalizing the programming of the street light experiment.

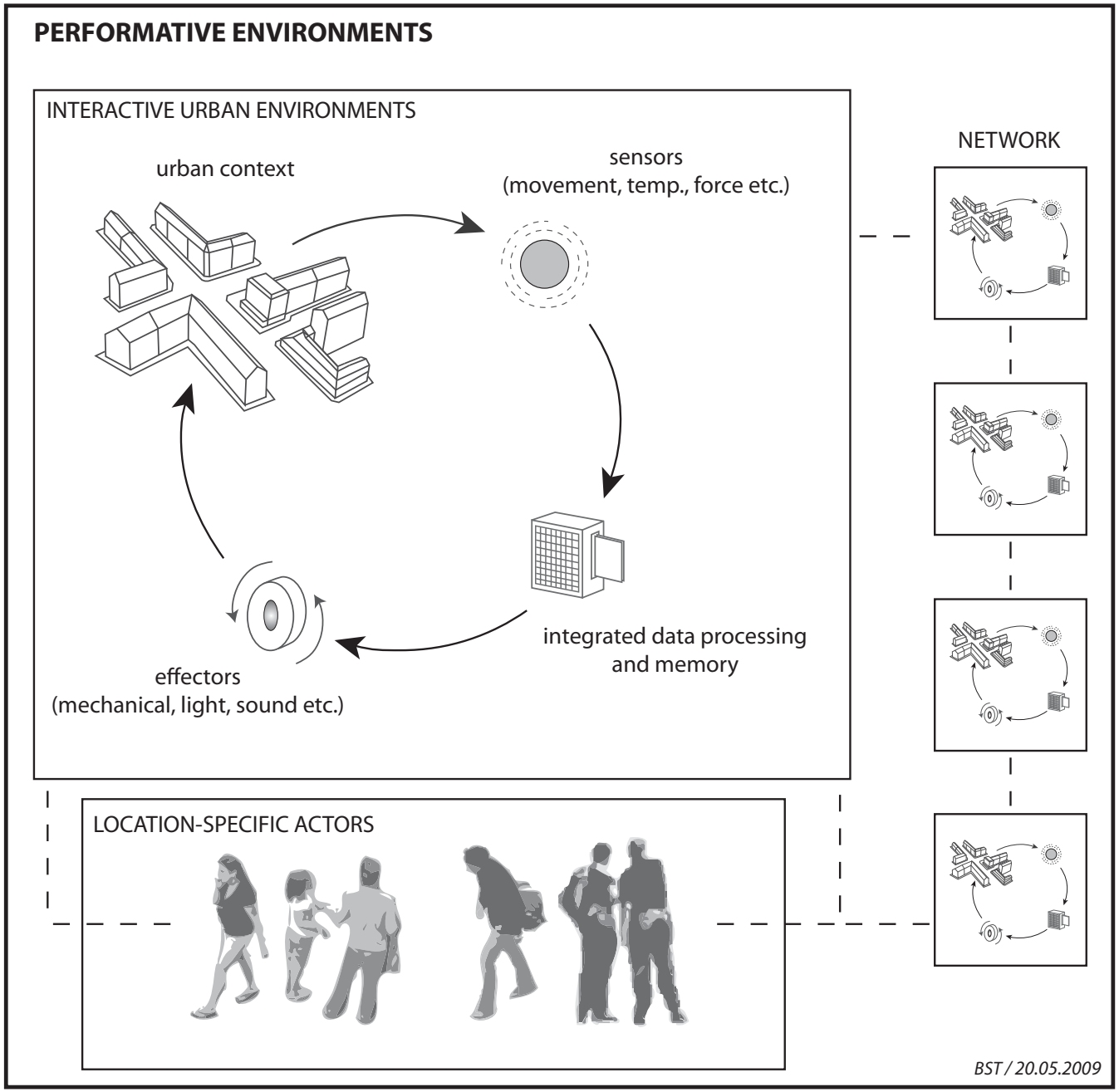


Fig. 71b:
Performative Environments and the social relationship between interactive environments and location-specific actors.

Overall performative framework

In order to provide an operational scheme for discussing the different impacts of performativity and technologies as part of a design process, a new performative framework has been developed. This framework serves both as a way to understand the relationships between the different levels of responsiveness to an environment, places and mobility but at the same time also as a platform for discussing how contemporary design processes emphasize different aspects of performativity and environment. At the center of the design discussion rests the concept of the quasi-object, and the framework is specified in order to sufficiently inscribe the quasi-object as part of technological, relational and representational thinking. The foundational work for this framework comes from the introductory theory, which describes the relationships between technologies and environments, the relationships to design and networks and the affect with embodiment. In more specific it is inspired by the previous mentioned 'spatial triad' (Lefebvre), which has undergone several interpretations both through urban and architectural perspectives. Essentially here the much referenced 'production of space' with the socially produced perspective on space and the intersections of theory and practice, mental and social, provides an introductory model for setting up the relationships of the quasi-object developed through ANT; a model which also contributes to the focus on the practiced and lived experience of the experiments. This framework for performativity and the quasi-object, exemplified through the aspects of ANT, should thus provide a way of describing the quasi-object when being under constant circulation and development.

As mentioned the quasi-object is considered a circulating informational object, which comes into being throughout the design process by the many ways it mediates the design process, at the same time as it is used to describe the extended architectural elements through pervasive computing and networks. The framework is then a diagram, which describes the ways the quasi-object is made to act, through the integrated technologies, the relationships they connects and the representational level of its expression. Although Lefebvre specifically criticised the focus on 'things in space' rather than the broader understanding (Milgram, 2008, p. 273), the argument through ANT is that objects and spatial practices are highly interrelated though the social. However the triad of Lefebvre is also valuable to escape the traditional dichotomies through a three-folded analysis (Schmid, 2008, p. 34), which together potentially forms a shared understanding of knowledge, meaning and objects. Similarly this framework of multiple dimensions spanning a three-dimensional space, describes the activities of the quasi-object in space; or how the object is made to act through the social relationships.

A framework based on performativity and the influence of new technologies will however look different than the traditional triad, but the main ideas from Lefebvre are used as a starting point, along with the influence of embodied interaction considering the intersection of physical, mental and social space (Conrad, 2006). At the same time each of the dimensions is mobilized by a different level of intensity, thus providing another level of detail within each of the dimensions.

Representation of space is involved with the bodily condition of the conception, and how it is mentally represented. As part of an architecture and design practice this is part of more specific states in the design process, where the design is represented through diagrams, texts, drawings, pictures, signs, models etc. The conceptions of these representations are changing between the levels of very specific interpretations and highly open and ambiguous forms of design. Here the levels of symbolic relationships are partly integrated as part of these different levels of representations, however conceived at the level of the individual.

first dimension	second dimension	third dimension	
representations of space	spatial practice	space of representations	
conceived	perceived	lived	
mental	physical	social	
representation	technology	relationship	extensions
level of association	level of feedback	level of attachment	

Fig. 72: Definitions extended from Conrad, Schmid and Grönlund (2006; 2008; 1998)

The spatial practice with the bodily condition of the perception of objects is involving the engagement with technologies. This is mostly due to the theory emphasizing how practice involves the influence of interactions with networks of communications as part of both everyday life and production processes. As additionally described, these technologies are the tools or equipment, through we are engaged with the world by its actual application, but they are now gradually changing from being not only passive objects, but gradually being mediated as reactive, interactive and performative technologies

Space of representation concerns the lived social life and is thus concerned with behaviours taking into account how objects and subjects are caught in a manifold of relationships. As part of the more relational approaches this emphasize how the social is engaged with fixed and fluid conditions and essentially describing behaviours and levels of attachment.

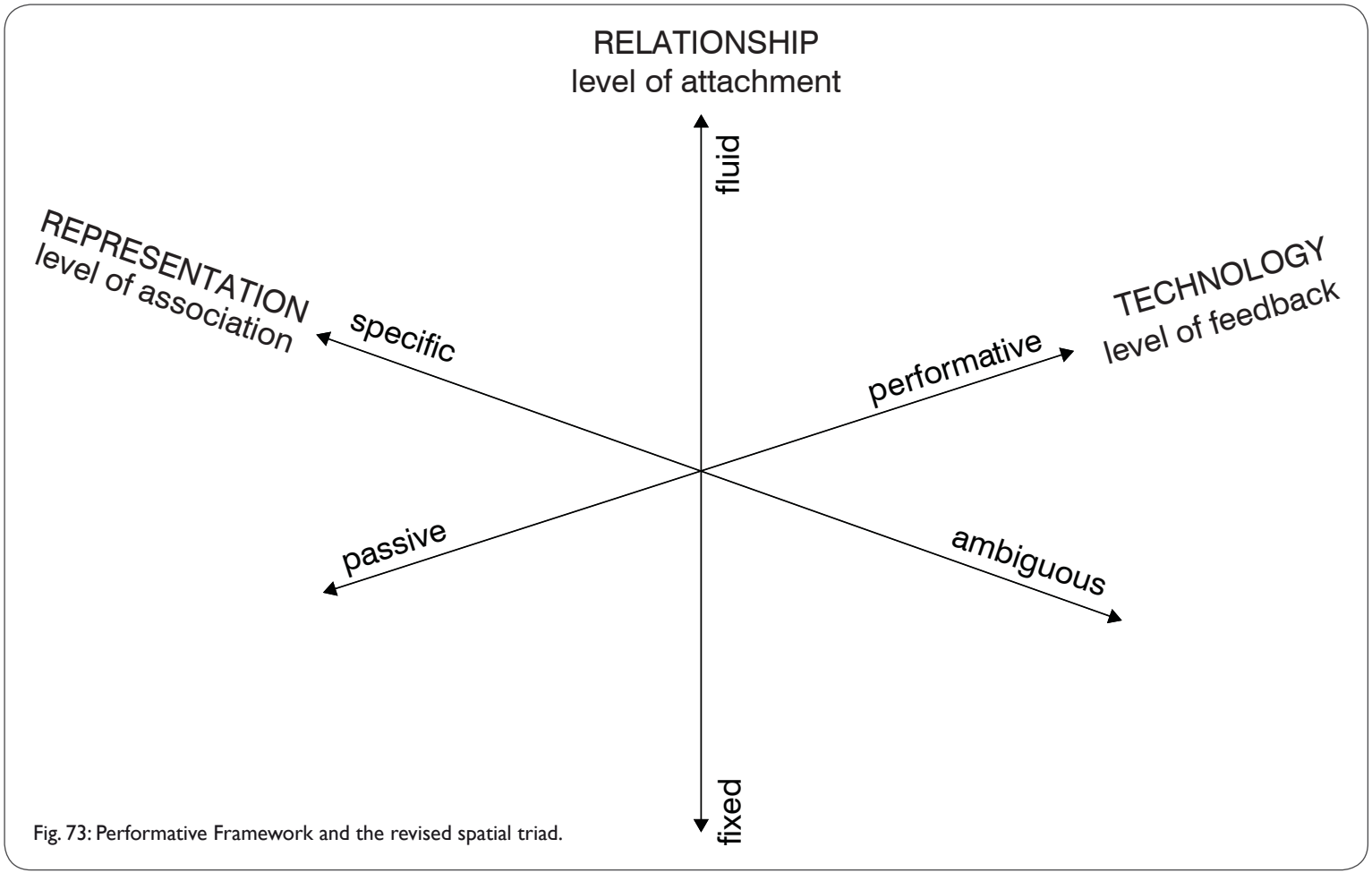


Fig. 73: Performative Framework and the revised spatial triad.

The three levels of the performative framework

While the quasi-object is circulating inscribed in time and space, it is now engaged with these three dimensions spanning different levels of intensity. There are many other relevant theories which potentially could make the object more specific, for instance by describing it through the original three principles from Vitruvius regarding the firmitatis (durability), utilitatis (utility) and venustatis (beauty). However it is obvious that this framework concerns a more mobilized view on design, where e.g. beauty is depending on a mental condition, utility expressed through the engagement with technologies and durability with a more general focus on relationships describing the general state of the object. The quasi-object gets specific through its actual application and engagement throughout the process, when it is maintained in temporary states of time and space. The way the quasi-object appears as part of the process and inserted in the project framework, is through different quasi-causal operators as described earlier with a reference to Delanda and Deleuze. These operators act as quasi-causes or information channels linking the multiplicities of the quasi-object together. During the ongoing design process, it is very difficult to trace the specific relationships between cause and effect, basically because the results do not appear linear or directly, but are performative and emergent as part of multiple interactions. The quasi-cause is thus each of the influencing factors which appear throughout the process and reveal themselves through the quasi-object; each of them are the differences making a difference when looking at the overall map, and in the end forming the overall emergent process.

The three main factors that are contained in the project framework are thus technology (level of feedback), relationship (level of attachment) and representation (level of association) each providing one coordinate in a three-dimensional space spanning the main influencing factors of the quasi-object.

Technology – level of feedback

The first coordinate describes the level of feedback introduced by the integrated technology, where the most performative response would include multiple feedbacks through pervasive computing with integrated sensor technologies across networks – thus an increase in the scope and speed of feedbacks. The definition is based on the conclusions of performativity and performative technologies and thus takes into consideration interactivity through networks with the involvement of multiple actors (human and nonhuman). This however does not define the specific level of intelligence but implies that the system is able to learn and act differently according to repeating patterns of interaction, and increasingly the more performative these feedbacks are the more complex and 'autonomous' they appear.
It is important to emphasize, that the definition of technologies in this respect concerns the specific perception of the technology, although the response initiated or afforded through the interaction can lead to other patterns of mental response. Defining these responses based on the technological basis of pervasive computing and feedback, also emphasizes that most environments are currently contained within the passive response, as most environment are not mediated through computational technologies. Passive environments can therefore be underspecified in the sense that they can provide for instance moveable furniture for people to organize themselves, which however wouldn't necessarily make it an interactive setting. In the next level a reactive environment is based on a one-way reaction where people can act with the environment and receive a response as a change in the physical setting, receive information and similar. Interactivity involves, as previously noted, a bi-directional feedback with the environment involving a 'dialogue' with the environment or building. Here the building is increasingly becoming an autonomous entity able to act spontaneously and independently on information obtained from the site, moving towards performativity with networked and underspecified interaction providing a platform for interaction across multiple actors and locations. All these factors of feedback are effects influencing perception and the spatial practice in terms of the degrees of mediated physical interaction.

Representation – level of association

The level of representation is based on the discussions of flow and levels of ambiguity, where the difference between a specific or closed association to an object and an ambiguous more underspecified engagement with an object will determine the position in the framework. Thus the coordinate can also be said to indicate a level of a broader 'positioning', or the integrated capabilities for an object to enable conditions, or alternatively

being conceived as a closed entity. As part of the design process, this is specifically expressed through the many entities conceived throughout the development of the design, where the representational level is evaluated based on the actual produced objects of the profession. This comes into practice through texts, sketches, pictures, diagrams, physical and virtual models, presentations and a wide variety of different media and materials, and is thus a dimension which describes how specific this element appear as part of the process.
Here the design professions are part of a production of circulated elements between different actors, and in general the mental conception also changes in relation to a physical positioning of the shaped object. This also implies that being specific also refers to an actual 'positioning' of the specific 'thing' in opposition to having the object circulating in a state of transition. In a design process there are ongoing pieces of representation, which are intended for specifying certain concepts or decisions, or there are models and sketches intended to keep the things flowing as part of more creative or unsettled processes.

Relationship - level of attachment
From the previous chapter regarding place and the social, this is potentially one of the most interesting coordinates, as the levels of attachments, both physically and digitally through space and place as well as individual and social, are highly influenced by these new integrated technologies, along with the objects that we carry with us, no-matter if we are fixed or mobile. These levels of attachment basically express how the more lived relationships are between the actors, and thus how the quasi-object is currently inscribed to the material through its behaviours. It can be fixed and locked in certain processes, or it can appear in a fluid condition, where it is constantly attached to different relationships under continuous influence from many complex factors. A fixed relationship implies a current status of almost isolation or un-sociality, as potentially from ANT it will not exist for long unless it is maintained.
At the same time the focus on relationships and fluid conditions of behaviours, exists more or less as an alternative to the traditional focus on place, where the level of attachment also indicates its access conditions and relationships to the actor-network. The behaviours of the quasi-object can thus be active and stimulating for the overall process, or they can be more fixed and static with a limited exchange.

Describing the quasi-object

Through the project framework the quasi-object and its influence can be analyzed based on two different but much related impacts, focusing on how design evolves during the process as well as the specifically intended end-product on location and in interaction. This can be said to involve respectively a diachronic and a synchronic perspective on the quasi-object as part of the design process. Both approaches are based on ANT and the notion of the quasi-object in relation to design, and its abilities to stabilise social processes by enacting relationships similar to a mediator in a game-like setting.

The quasi-object as mediator
The first approach uses the framework to describe the quasi-object as essentially an interactive object, which allow for the exchange of information with an immediate relationship to the aggregated and historical layers of the design process. The quasi-object comes into being here mainly as part of texts, objects, digital and physical models etc. exchanged as part of the process and essentially materialized as part of an extended medium. It is traced by keeping track of all discussions, decisions, materials produced and communication throughout the process. The first approach thus concerns the influence of individual attractors in relation to the more holistic influence of performativity on the design process as a whole; how technologies and representation co-evolve through engagement with social practice and places. Here the quasi-object is exemplified through ANT thinking, showing how design is inscribed in complex processes and participates in the social production of place and space, through the different ways it is augmented among various actors and networks.
The quasi-object is here mainly a meta-object acting as an agent of the transition between the virtual and actual and in the end the emergence of the real. The quasi-object can be traced throughout the design process by following the quasi-causes, and comes into being as an informational object describing current states, and potentially materialized as temporary physical objects. These quasi-objects are constantly translated during the process, because the main purpose of them is to allow for transformation and thus development incorporating possible synergies. As per the background theory, the quasi-object thus provides emergent effects by sensing and exchanging the multiplicities as part of the design process. Additionally it acts as a reflective object enacting relationships between the interdependent entities of a design process as a mediator translating the content formed by other actors. In the end of the design process, the quasi-object contributes to the product as it constitute the performing order, which

sustains the possibility for a product to emerge; essentially the product thus contains the characteristics of the quasi-object but where most elements are traditionally fixed.
As part of the analysis of the case studies, each of the quasi-causes have been traced and described in relation to the difference they created for the design process. Each of these causes will be dedicated a coordinate based on the project framework and is thus in total creating an assemblage with the quasi-object describing the complete trajectory throughout the design process. When these causes are mapped, they are exemplified according to the levels of intensions to each of the coordinates. Thus they are each given a code between -10 and 10 depending if they are related respectively passive or performative, fixed or fluid, specific or ambiguous. This method is used as part of other more quantitative studies to indicate a level of interest, however it is not a method which would provide very specific results for each of the causes, but indicate the larger scope of influence, or emergence, on the complete process.

The quasi-object as experience

The second approach emphasizes the specific interactions with a quasi-object as part of everyday interactions, when performative technologies are integrated in architectural or urban elements, thus allowing for additional feedback and circulation of information and material. The second approach thus concerns the more specific affect of the integration of performative technologies as part of realized projects; thus here considered as the experience of a performative design intended to stimulate a more collective and creative use of the city through computational technologies. This combines aspects of the first approach mainly through an evaluation of how the current result of the performative process is materialized into an experienced practice, but also seeks to acknowledge how performativity emerge through interaction at the final impact with uninformed users. These 'touch-points' or the synchronic perspective as an intersection through time-space is a way to evaluate the influence of performative technologies more specifically; especially in regards to potentially find elements of sociality and place-making. These impacts or touch-points are expressed several places, however here the model is based on an evaluation of the design intend on the actual space, thus understood as how these technologies comes into being or is intended as being part of a material world with an un-informed audience.

The performative technologies increase the possibilities for empowerment and co-creation through new location-based media, at the same time as urban reality is constituted through an active engagement of the user through interaction between space and body. Additionally it brings the often blurry definitions of 'information making a difference' into practice by emphasizing how information also is a material dependant element, which increase understanding and collective engagement with both city and design. This however, provided that these designs are based on 'open works', which stimulate creative uses instead of having a fixed purpose and behaviour through single-functioned design intends.
This emphasizes the specificity of the quasi-object as a new conceptual object with extended properties. It becomes a material setting that changes depending on interaction and perception along with an embedded virtuality kept constantly alive and only fixed through relationships. Here the representation of a quasi-object happens at the level of the body. Based on the background theory some of the central characteristics of this object concerns how it:

- acts as an extension of the senses (McLuhan) and an instrument for perception (Merleau-Ponty)
- as an information system providing access to social information and behaviours of other people (Meyrowitz)
- makes apparent and embodies the 'difference that makes a difference' by locating it in context (Bateson)
- establishes meaning and construct knowledge based on associations (Mitchell)
- mediates encounters between actors in architecture and urban space (Jensen and Thomsen)
- reflects and aggregates levels of unconscious data about behaviour and cities (Pentland)
- interrupt pre-conscious behaviour by intersecting mental and bodily experiences (Seamon)
- stimulates local and more playful situations as part of more spontaneous acts (Luke, Debord)
- stimulates interaction between different social groups as a basis for public domains (Hajer & Reijndorp)

In addition, the more specific effect of these technologies not only involves the quasi-object as mediator of exchange transforming space into a performed place, but at the same time it essentially creates the collective experience of place and attachment by constantly mediating between figure and ground or actor and network. The small changes in properties is a way for the perceptual system to create an index of object and place, thus emphasizing how objects are used to keep track of time and space even without an unnecessary extra degree of information. The process in place creating the environments is an ongoing process, where the environment is constituted through the actor-network afforded by the circulating quasi-object. The quasi-object constitutes the public, which in the next level becomes architecture and culture and is thus involved in translating place into the overall context of society.

The below diagram describes this influence of performative technologies and the integration with place, from the passive to the performative. As the interaction with architecture and urbanism increases, it also transforms place into collective settings, implying that people actually take part, and thus space becomes the environment itself. Figure and ground, actor and network gradually reconstitute themselves when the body becomes the environment and vice versa, and increasingly a feedback loop is performed between people and objects in place and across space through digital networks. The sensor technologies thus stimulate interaction at the same time as architecture and citizens 'leak' information into each other.

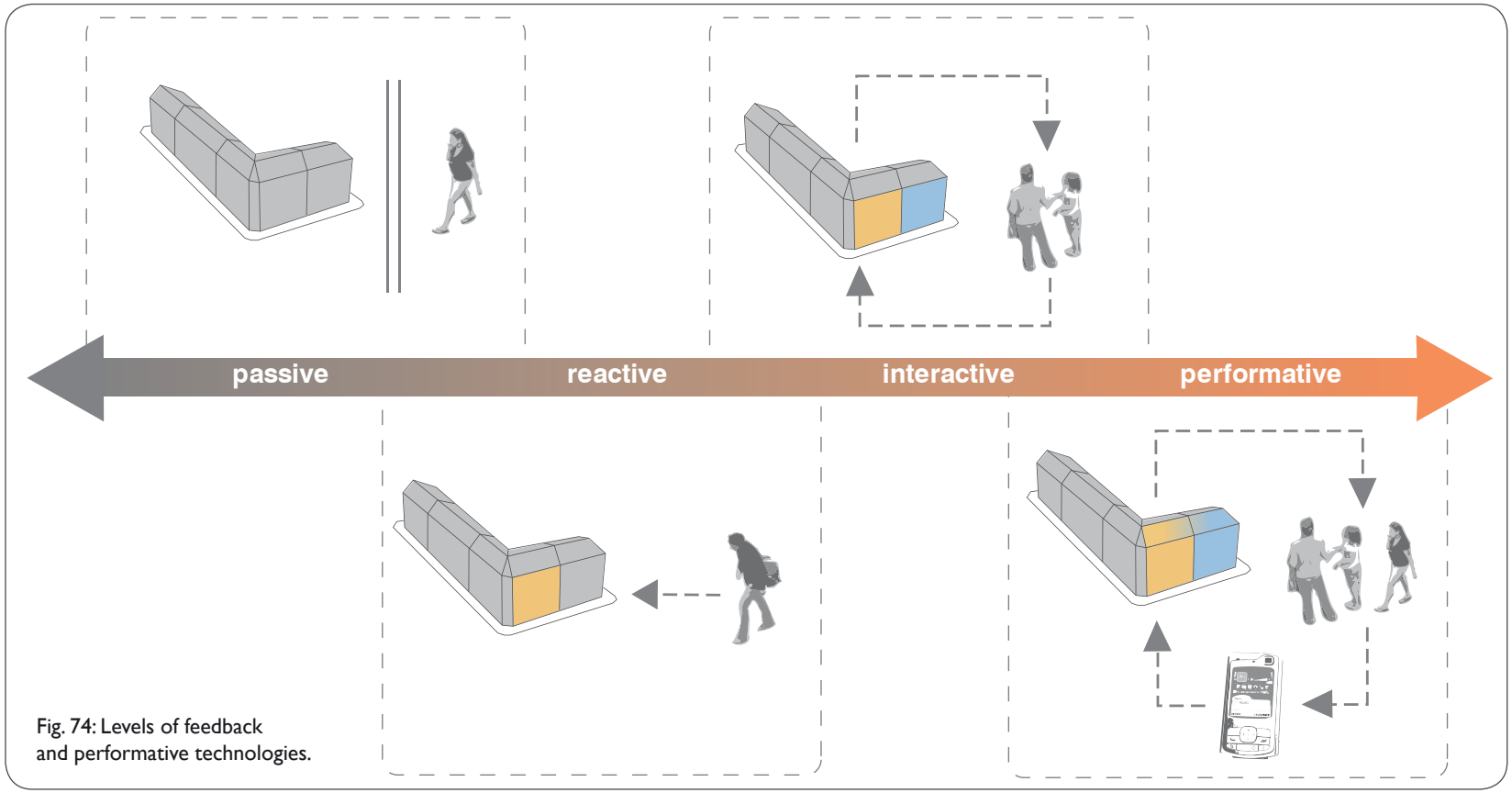


Fig. 74: Levels of feedback and performative technologies.

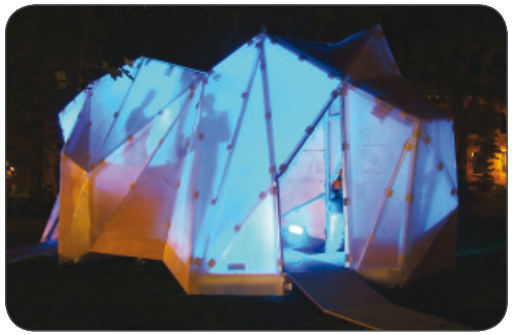
CASE PROJECTS

09

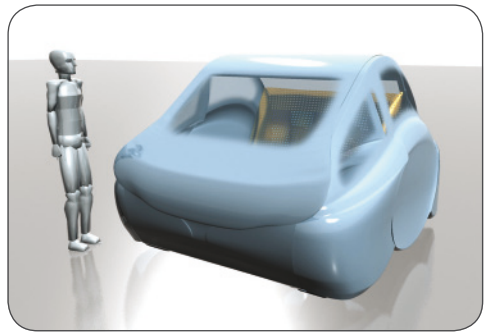
The selection of case projects for the PhD is initiated by the design of the NoRA pavilion for the 10th International Architecture Biennale in Venice. This project gave birth to a series of research questions considering the impact of computational technologies on the design process as well as pervasive computing and sensor technologies as part of realized building projects. At the same time it started up the considerations behind the project framework describing the different types of environmental responses in different contexts and the affect on respectively individual and social behaviour, space and place. A more elaborate and illustrated description of the design work, construction process etc. can be reviewed from this website: *http://www.aod.aau.dk/staff/bsth/nora/*.

NoRA was designed using different types of technologies and techniques involving both old and new design traditions, which was again challenged through variations of computational technologies integrated in the finished and exhibited piece at the Venice Biennale. These technologies were part of a reflexive process evaluating the design, and thus used as a reference for the remaining case projects, which are selected from a series of experiments and ideas developed during the course of the PhD. The other case projects are in specific locating themselves across different design scales, implementation levels and technologies, and as it is most often in projects now-a-days, they are mostly developed in partnership with other highly enthusiastic practitioners and academics.

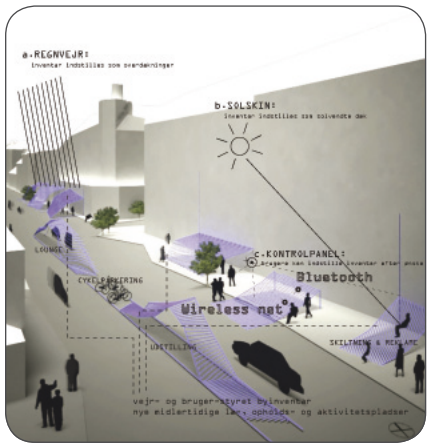
Due to the exemplary character of the NoRA project, in relation to the scope of complexity and fittings as well as the time spend both designing and realizing this project, it will be used as the main study in relation to the empirical work. The same framework will be used for the remaining projects but described with less level of detail as regards to realization. The relevant knowledge to extract from these projects have been specifically focused on the overall aspects of performativity in relation to how new computational technologies affect the relationship with design and place and the impact observed during the design process. The projects will be introduced briefly, followed by a tracing of the quasi-object, which translates the design during the project development. Thus there are many influencing actors translating the design, but especially the quasi-object plays the important role as it is keeping pace in innovation and creates attachments. Here the quasi-object acts as an assemblage of 'differences that makes a difference' when examining the process and experiencing how the object develops.



A: NoRA – Nordic Research Application
Interactive pavilion for the 10th Interactive Architecture Biennale in Venice 2006 as well as ongoing temporary locations.

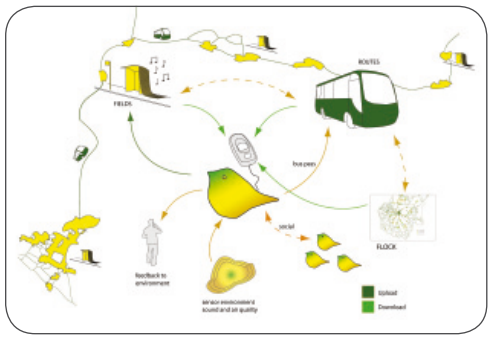


B: Performative Vehicle
Studies for a City Car project based on a collaboration between the MIT, Smart Cities Group, and General Motors.



C: Performative Urban Spaces
Urban project dealing with the transformation of the street of Amagerbrogade in Copenhagen into multi-functional purposes.

D: Interactive Sculptural Lighting
An interactive kinetic street lighting project developed primarily for a plaza in Aalborg, Denmark.



E: Eco-Pet
Portable and personal location-aware sound recording device developed for the youth in Brescia, Italy.

F: Social Lighting
Integration of sensor technologies for adaptable and social lighting schemes developed in different levels of complexities and forums as part of events and exhibitions and finally as part of a Copenhagen street lighting.

Fig. 75-80: Case project

A: NoRA – Nordic Research Application

The design of the NoRA pavilion for the 10th International Architecture Biennale in Venice is the first and most important case study in the research project. The project was carried out in collaboration between Food College Denmark and Architecture & Design at Aalborg University based on initial financial support from the European Union and local sponsors.
The project has been presented at different occasions, events and conferences and carries both theoretical and practical considerations through a series of papers and articles, which can be further reviewed from the supplementary material in the appendix. The main concepts and conclusions from these writings have been including in the below summary.

Background

The NoRA pavilion for the 10th International Architecture Biennale in Venice was designed as a combination of an exhibition and performance venue, maintaining ambiguity in expression and with interactive technologies that enabled possibilities for continuously changing the architectural expression according to the current cultural flows. The NoRA pavilion is, in this respect, a performative architecture, which emphasises interactions in socio-technical networks and involves the effect of non-human actors in establishing social relations.

On the Biennale in Venice an area of about 35 m2 was occupied mainly as an exhibition space and with the integrated technologies activated for the purpose of being both an attractor and a local generator of urban life. On special occasions NoRA was occupied with events from the National Culinary Team of Denmark and the University institutions, which utilized the kitchen, lounge and media functions for the main purpose of communicating culinary experiences and establishing an intensive social forum through the local site and present actors.
The conceptual approach to the Architecture Biennale was to understand architecture as evolving from the interactions between site and actors in the generated field of dynamics between local site constraints and global networked input. From the first discussions on the Biennale theme and the conceptual approach, a group of students of Architecture & Design at Aalborg University explored fluid dynamic software as a tool for generating form from site relations; a method involving the notion of site dynamics and flow parameters that are constantly interweaving and co-evolving as site infrastructures.

Fig. 81: NoRA in the evening at the Venice Biennale.

Fig. 82: NoRA in daytime at the Venice Biennale.

This design approach thus relates to the understanding of flows and relational geography, however mediated through fluid dynamic software simulated the site dynamics and complex relations of forces and flows on the site. This extends both from the notions of Bergsonism and Deleuze as well as paralleled by earlier architectural studies by e.g. Lynn, Rahim, Ocean North etc. The immediate result of such an exercise is an 'open work' carrying ambiguity for additional interpretations and new uses, and not architecture as a sole object meant to fix representation and meaning.

Although this ambiguity was maintained as a discussion subject through the initial studies, the next level in the design process was the introduction of the next generation of computational technologies integrating pervasive computing and sensor technologies to enact human experience. Here a coupling happened between the different types of computational technologies, and the physical artefact relates to the field of situated computing and potentially a social infrastructure where architecture stimulates social encounters. These technologies worked on multiple levels combining technologies as a tool for the National Culinary Team of Denmark and acting as an extension of their current facilities and instrument to express the sensual aspects of culinary activities, at the same time as being a tool to enact the spatial experience of visitors passing by the pavilion. These interactive technologies combined audio fragments and visuals that merged and developed through the interaction with people. At the same time there were settings allowed for networked applications including logging of activities through a web diary and camera, remote controlling and network setups with other buildings, which however weren't implemented in full scope.

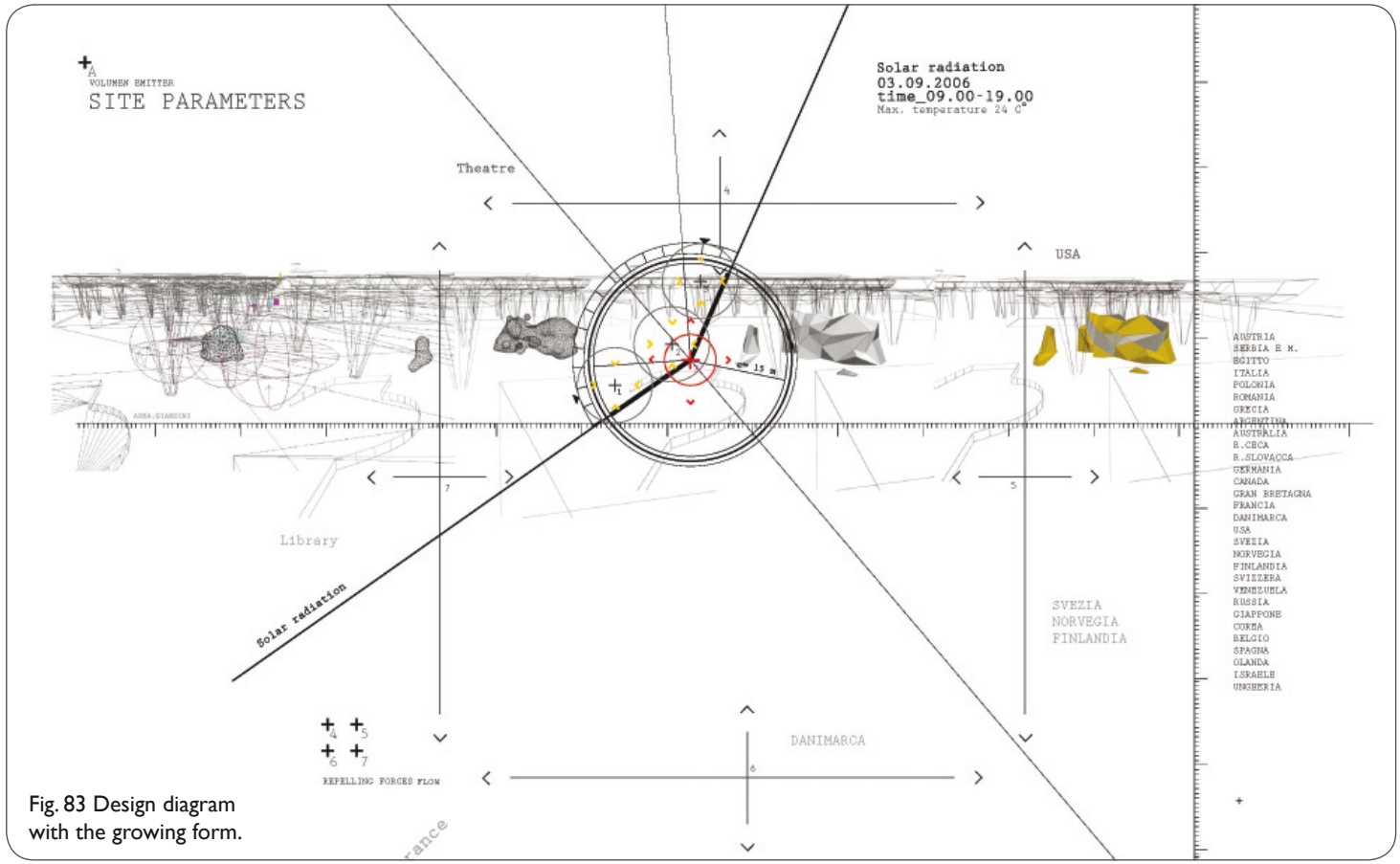


Fig. 83 Design diagram with the growing form.

Performativity

NoRA treated some of the very essential complexities to be considered as part of designing and working with a performative environment. Most importantly it concerns the relationship of a quasi-object that exists as an outcome of a network of interactive relationships and is continuously being affected and further enhanced throughout the lifetime of the building. Here NoRA is inscribed in a performative relationship enacting latent realities as an underspecified architecture that invites attachment, instead of being a static product that attempts to determine a fixed identity. Through its integration on a site, it acts as a mediator integrating individual interactions for collective experiences and potentially public domains, and at the same time it is continuously on the move to a new place and being up- or downgraded throughout its lifetime.

Another important aspect in the project is the idea of the experiment. As part of the design team there was only rarely a feeling of working with something finished or determined as both revealing and frustrating this can be. Always there were new trajectories to follow and new relations to test out, and the outcome of NoRA is to certain degree a performative example of a collective decision-making; the project emerged on the run based on individual initiative as well as consideration and studies for the most functionally, economically and perceivable. The sensor technologies act as technologies constantly measuring changes in the internal activities or external site; in this sense it acts as an extension of the laboratory to the street, however without including the formal statistical evaluation principles. Instead it constantly circulates information between site, spectator and performers in a situated and tangible relationship realized through effects in the architectural enclosure and general ambience.

Overall relationships

As mentioned, the interesting part concerning NoRA in respect to the design process and more broad issues of performativity, relates to the externalization of the quasi-object; thus how knowledge is performed partly social, technological and representational as part of the evolution of the architectural entity. Here NoRA was the initial experiment starting up the framework and settled between traditional systems of feedback and as a pavilion (although very untraditional) spanning both fixed and mobile environments.

Fig. 84: Satelites and relationships around NoRA.

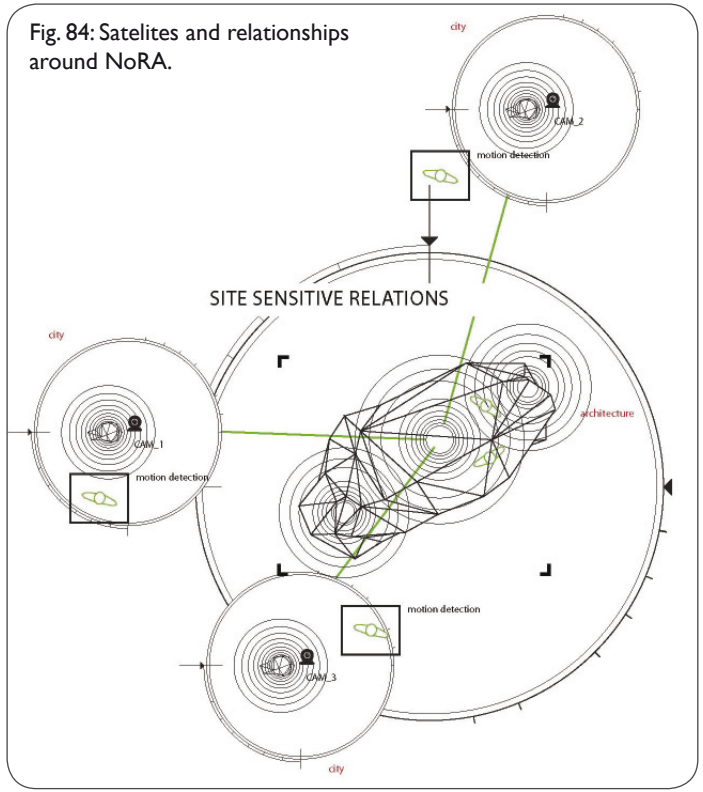


Fig. 85: Satelites at night time.

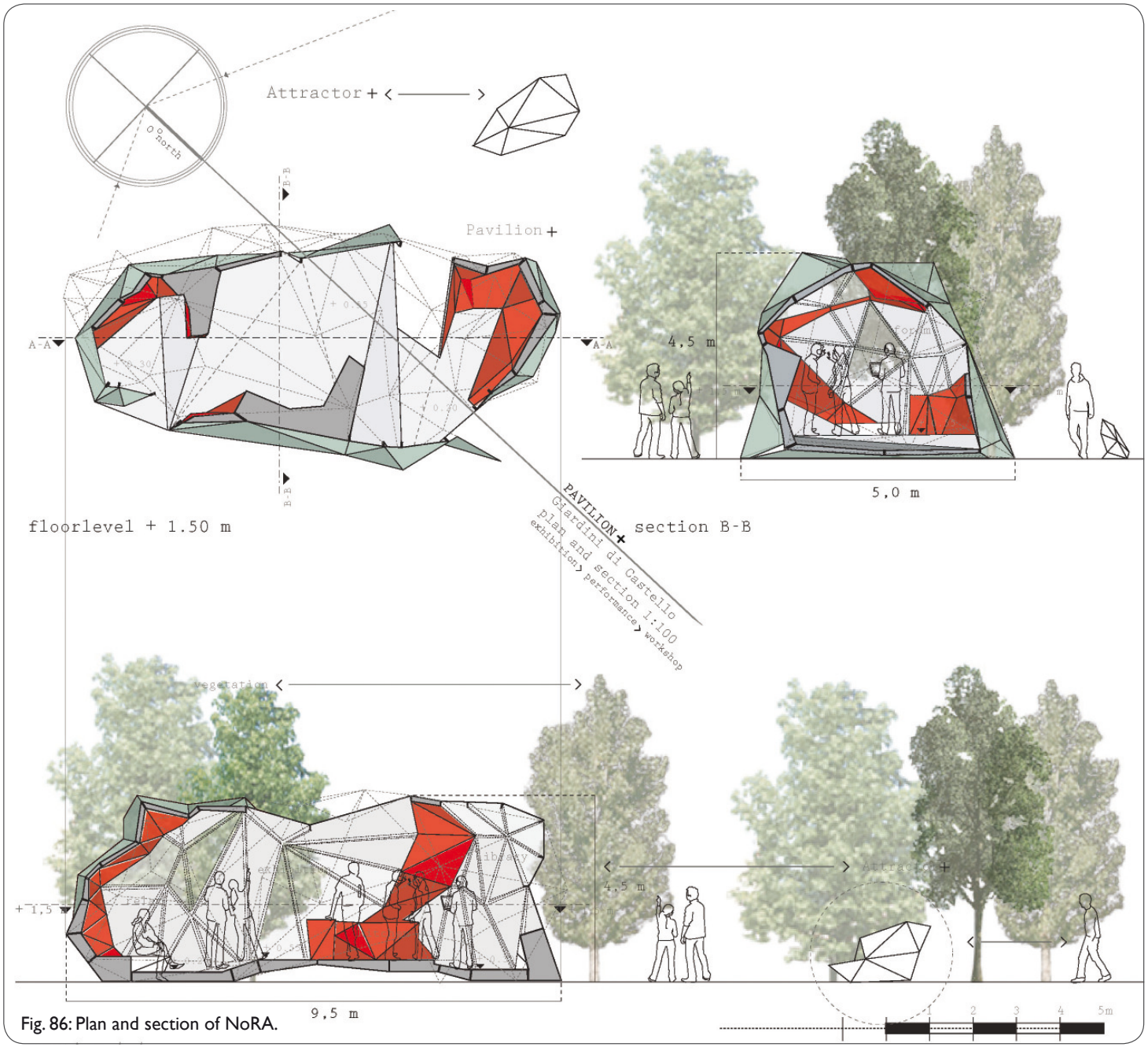


Fig. 86: Plan and section of NoRA.

Technology – level of feedback
In the beginning of the design process the project was mainly approached as a fixed piece of architecture that was created through a fluid dynamic simulation. The response was mainly cognitive through the ambiguity expressed as part of the envelope and furniture. However increasingly investigations were initiated on how the design could respond more specifically to environmental conditions and traces were followed through architectural, structural and ambient systems of feedback. In the end the project was mainly equipped with reactive settings for instance through the technologies that could be adjusted for the National Culinary Team of Denmark as well as the sound and light that emerged through the architectural facade. However in addition to the reactivity of the sound and light patterns from the cooks, a level of boredom was introduced which was triggered by too much activity as well as different layers of sound depending on the time of day and local site. This potentially brings in some levels of emergence to the pavilion when increasingly equipped with a large sound database and levels of interaction depending on activity. Additionally the sensor technologies were investigated for performativity through the complexity of camera input and outputs through storage on a web page and online streaming, thus maintaining a database of activities both for external visitors as well as for the culinary team to revisit previous performances. In this way the main systems were not in itself optimized for interactivity but acted with some interactive parameters through the complex feedback with multiple actors.

Representation – level of ambiguity
The starting point for the pavilion arose very specifically from one site in Venice. The analysis creating the basis for the fluid dynamic simulations and 'organic' growth was specified according to time and place to be aligned with very specific parameters at the center of the Biennale area in Venice; a place which through the coming half year constantly shifted through a correspondence with the Biennale planners. However, the initial studies acted mainly as the first fragment of a place to be further explored as part of a temporary pavilion, later to be moved to new locations as for inspiration and affect. In the next stage, the pavilion was structurally and architecturally defined, with a focus on optimizations and to maintain the overall expression through both a definition of the architectural envelope as well as how to embed the dynamic parameters of people, nature, sound and light. Although the pavilion in the end does seem extremely robust as for a structural design, it is still intended for being mobile with a detailed scheme for how to assemble and package all the parts. Thus the pavilion acts both as a fixed piece of architecture expressed through specific site characteristics emphasized by audio and light patterns triggered by local input, and at the same time it moves and stays only temporarily at new locations.

Relationship - level of attachment
Following from this the pavilion also operates between place and space characteristics defined through the way it can both integrate with place and define place through an enabling of people passing by. The culinary team is individually able to exploit the facilities of the pavilion and control the envelope and satellites according to the food expressions that they intend to present. This align the pavilion with highly customized and individual technologies, however at the same time the envelope can act as a collective entity through exterior input, and thus struggle between being a highly optimized instrument and an emergent more sensible piece with relationships to the environment. The collective interactions emerging through NoRA as a mediating object treat the central idea of architecture as a new social infrastructure, and thereby acting as active participant in shaping place.

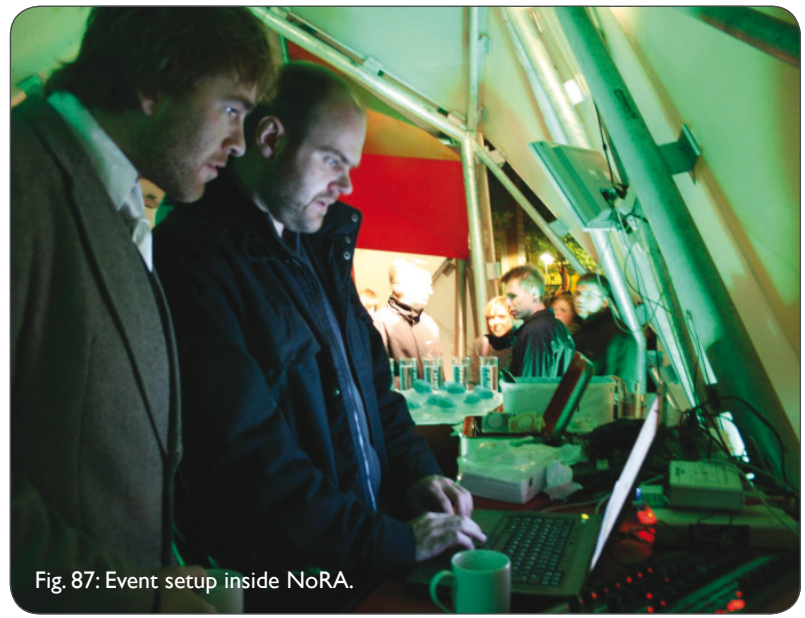


Fig. 87: Event setup inside NoRA.

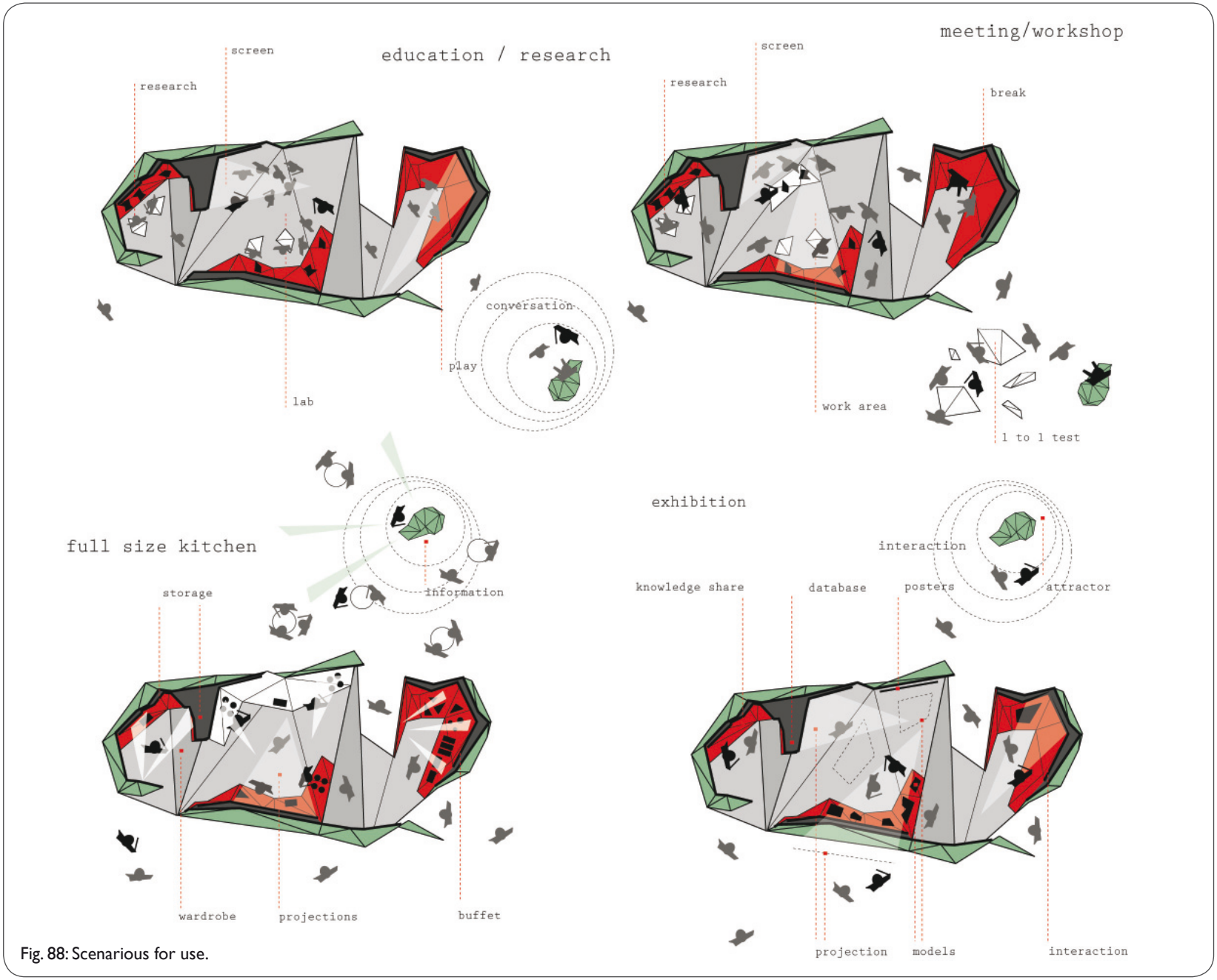


Fig. 88: Scenarious for use.

NoRA on site

Experiencing NoRA as a quasi-object on a site would involve being part of one of the events where it was fully operational, equipped and tuned. This happened at different degrees with different levels of functionality but with the most technologies assigned at the first weeks at the Biennale in Venice. Here the sensor technologies in the satellites around NoRA, the sound track and lighting design embedded within NoRA changing during the course of the day as well as the equipment to be controlled from the inside affecting the body of NoRA as a whole are the main elements.

Firstly, the pavilion is tracked by five cameras: two located inside the pavilion and three located in satellites placed around the pavilion. The remote sensors located in the satellites invites user-involvement from people passing by using NoRA as a media for a bottom up approach to urbanism involving the onsite inhabitants in a direct interaction with the building. When approaching the pavilion, an effect is visualized as part of the NoRA skin at the same time as a sound track specific for the user location and time of day starts as an overlay on the existing sound track. Here users affect the pavilion using their bodies as a collective instruments and navigate through the embedded information patterns. These interactions interrupt the preconscious behaviours when passing by the pavilion, and using NoRA as a quasi-object it at the same time couples the digital and the material representations through the onsite installation. During the setup people were observed moving around the building to trace their impact on the building. However the most success seems to happen from young kids, who in more detail tried to figure out the functionality of the sensors and effects. Additionally the ambiguity expressed in form and behaviours caused people to reflect on its use and explored alternative uses as drawing on the facade, leaning and sitting inside at the furniture, kissing and hugging behind the pavilion etc. Uses and behaviours which were developing as people were inspired by observing each other testing out the designs.

Secondly, during performances inside NoRA, the users were able to manually control the light and sound through an AMX system with a wireless touch panel. The panel is programmed for the different culinary activities that the users intend to communicate. The activities inside the pavilion are tracked by a top-mounted camera monitoring the central stage area of the pavilion as well as a 360 degree camera, which can be controlled manually to communicate, record and archive activities and details. During performances the pavilion becomes an instrument for the performers as an extension of their body; where the technologies are used to enhance

Fig. 89: Inside NoRA in Aalborg, Denmark, at the culture night

Fig. 90: NoRA on the plaza at the culture night.

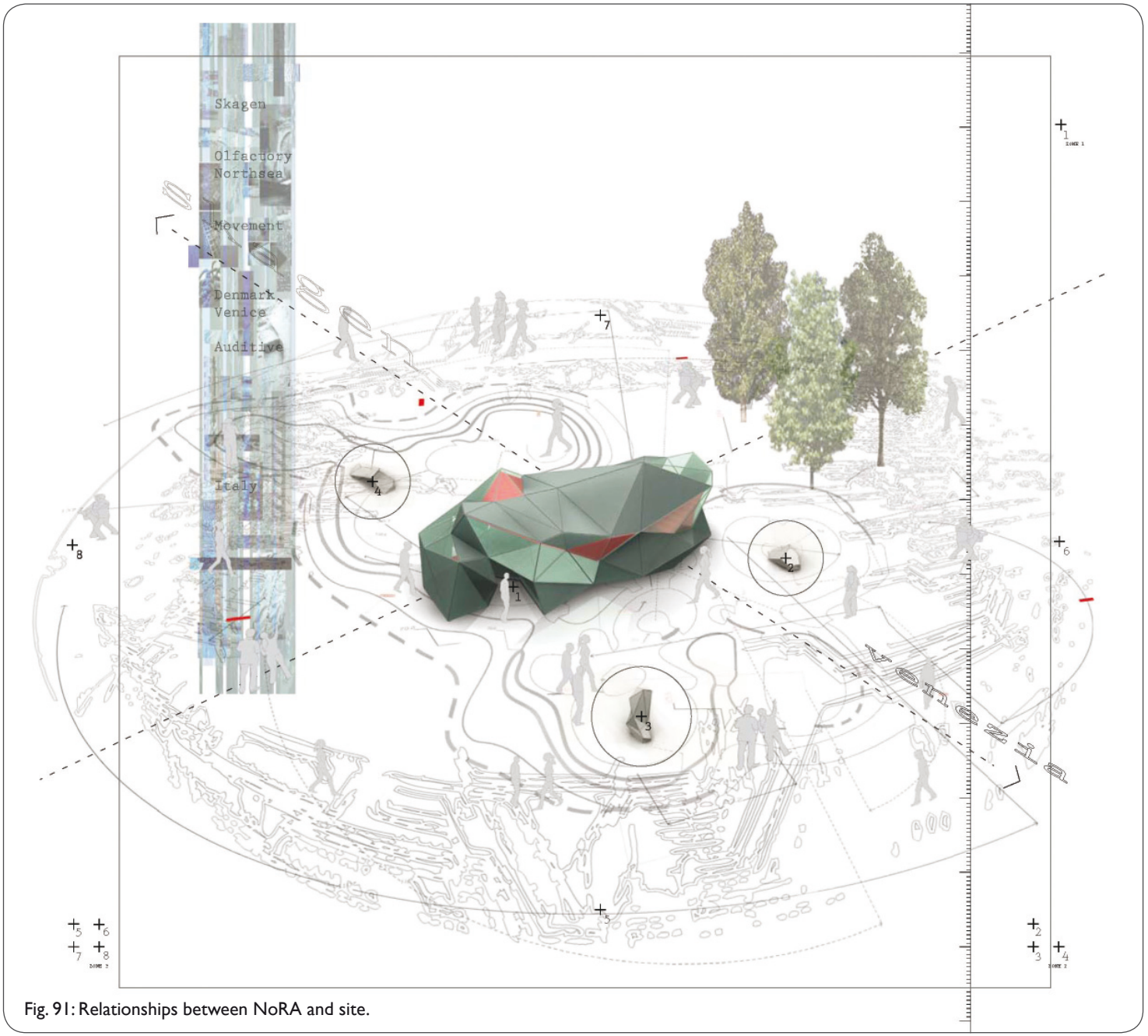


Fig. 91: Relationships between NoRA and site.

the performance experience as a piece of interactive architecture involving visitors' perception of the events. From a webpage visitors are able to visually observe the present activities through the interior top-mounted camera as well as scrolling through previously recorded activities along with a schedule for future events. These uses were mostly observed as part of concert events where music was the phenomena to be experienced and channelled through the visuals of NoRA.

When NoRA as a quasi-object is approached by other actors, it changes its appearance according to level of engagement and gradually transforms individual input into collective experiences. Here the quasi-object mediates between figure and ground, actor and network and tie together the surrounding activities into one evolving assemblage combining architecture, urban space and moving bodies; or as one of the visitors declared as part of one of the opening arrangements: *"It's like entering the pavilion space already when passing by the pavilion. It's almost like it is talking to me, although I don't know the language; I feel special"*. The underspecified nature of the building and site maintains the place as an attachment as long as people move around and through the pavilion having a dialogue with the building and other visitors. These relationships are not initially affected by an information-rich content to be understood, but merely operate through associations between pavilion, site and bodies. However through a more active engagement or creation of new activities, the pavilion gradually emerge as a forum for longer lasting dialogues, where the pavilion becomes a place for temporary settlement to observe the events, culinary activities as well as later engage with the archive and online activities.

Tracing the quasi-object

The diagrams on the next page marks the quasi-causes and thus trace the quasi-object through this process. The causes are mapped according to the Performative Framework as described previously, and illustrated through timelines, sections and aggregated visualizations comparing the different aspects of performativity. The full list of causes is available from the appendix.

The following diagrams illustrate the relative positioning of the different influences in a 3D diagram showing the interdependencies between each of the related factors. From this diagram, the coordinates can be compared to find the emergent relationships during the design process and realization of the building.

Fig. 92:
Inside NoRA in Skagen, Denmark,

Fig. 93: NoRA in Skagen, Denmark, with the Prince of Denmark.

Fig. 94: NoRA opening in Venice 2006.

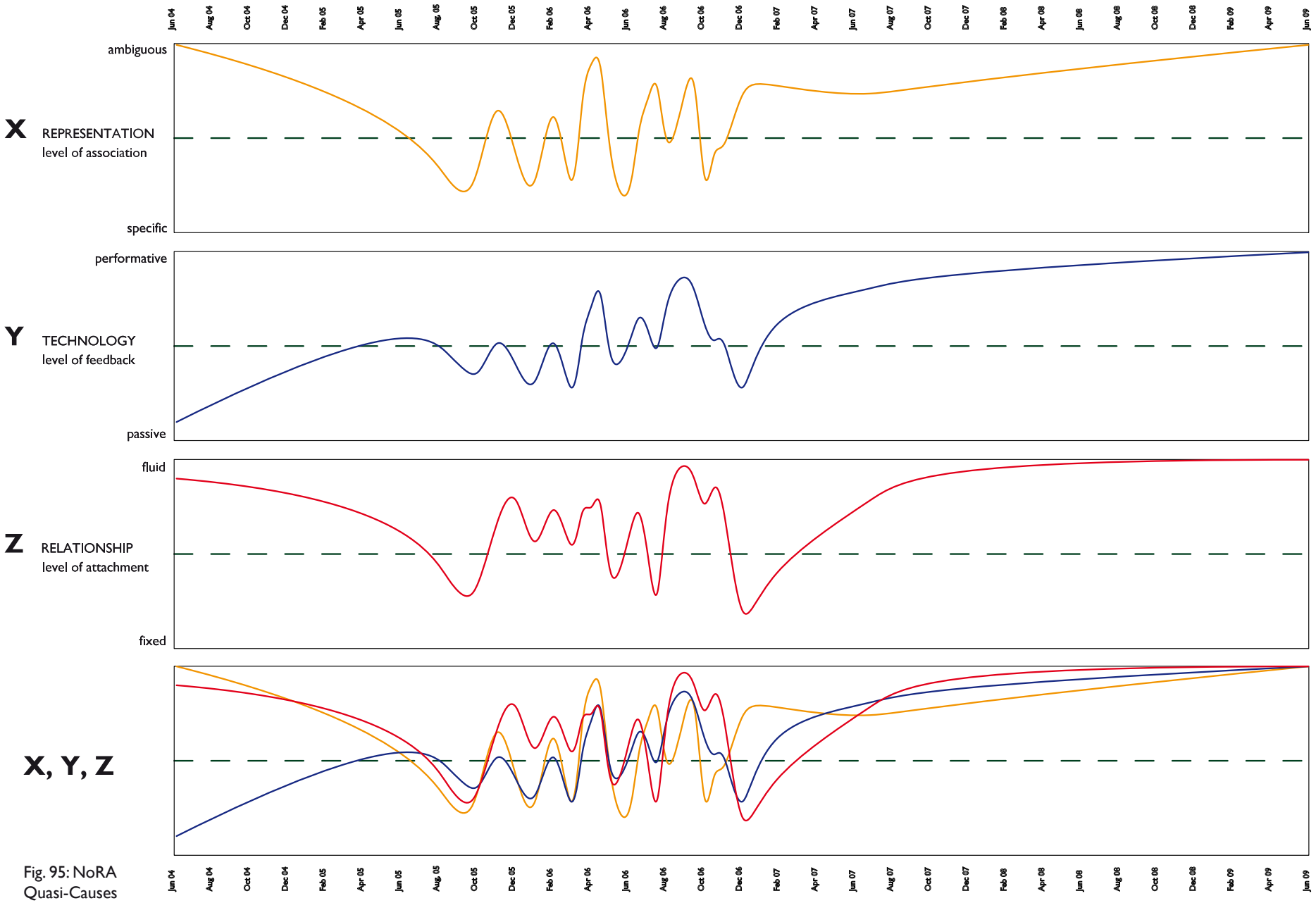
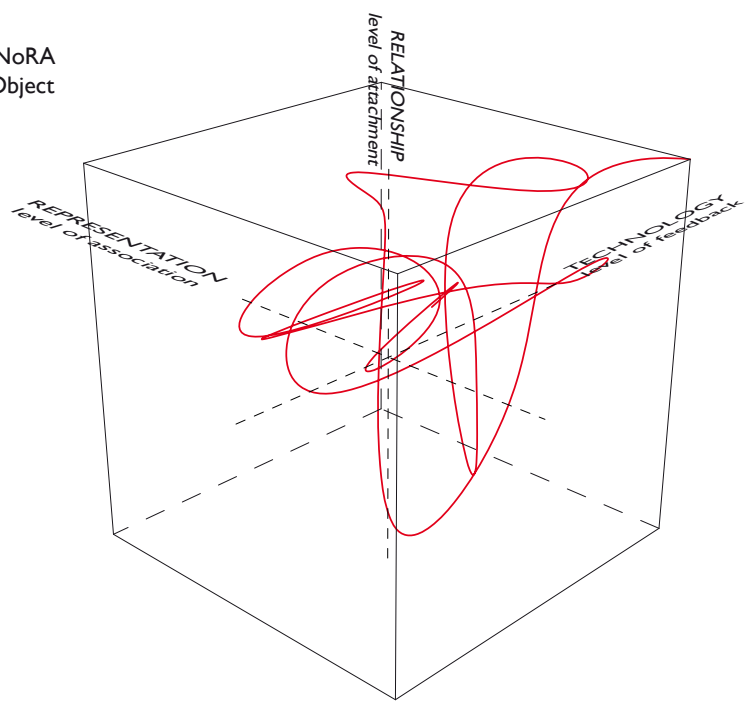
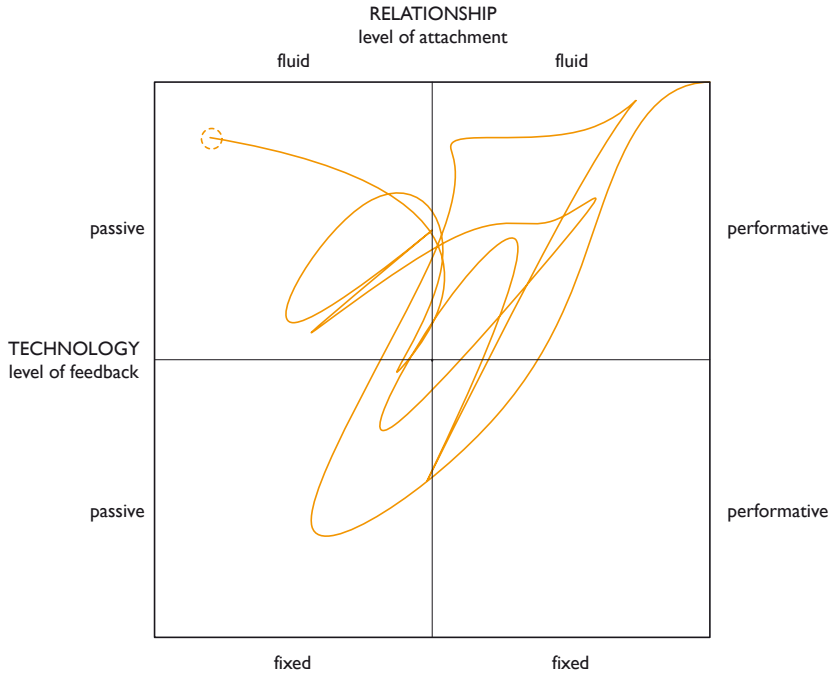
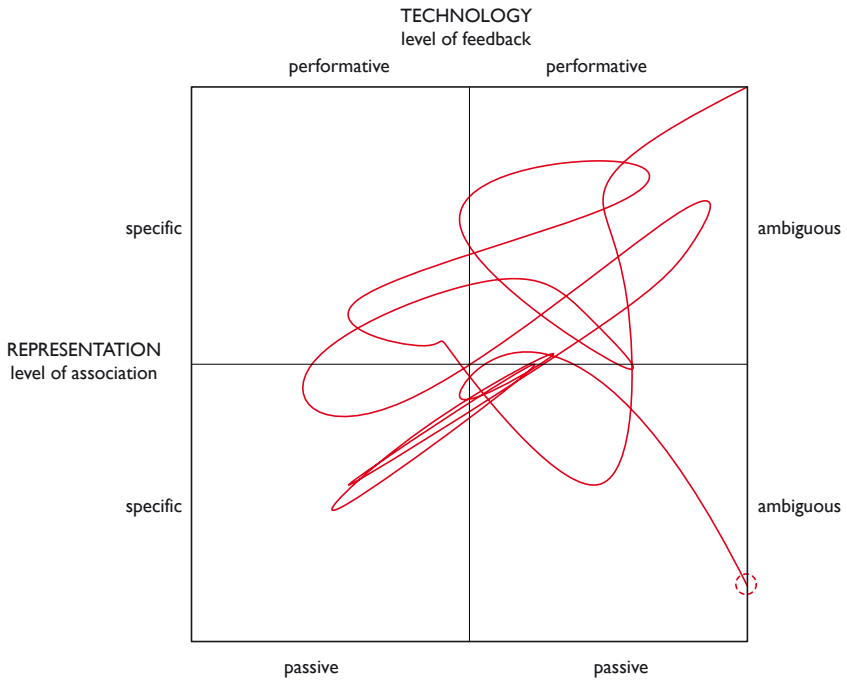


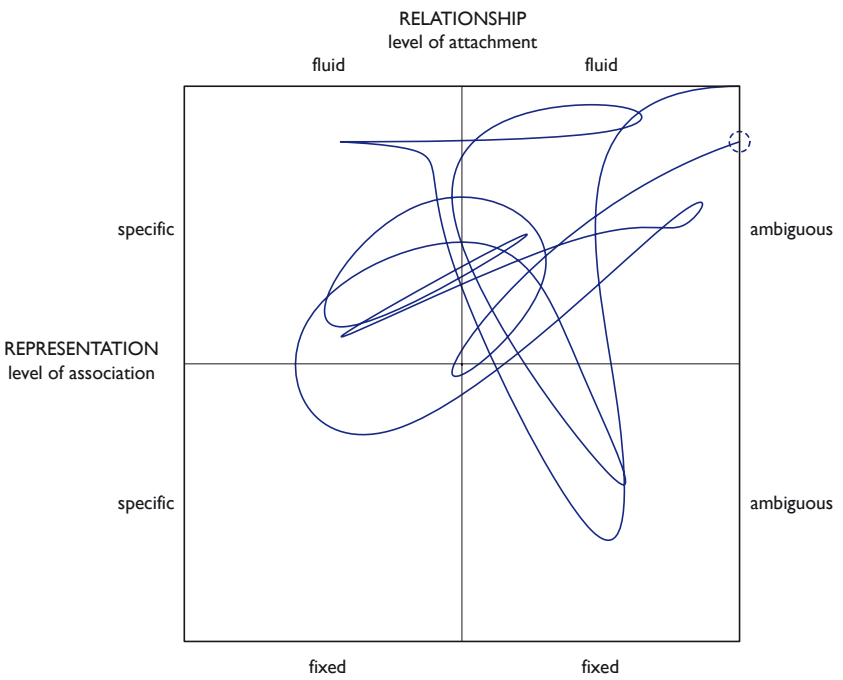
Fig. 95: NoRA
Quasi-Causes

Fig. 96: NoRA
Quasi-Object









B: Performative Vehicle

The performative vehicle project examines new types of vehicles, which uses the current integrated car technologies to its full extent, at the same time as allowing them to further develop for collective urban purposes. The project was carried out based on the framework from the Smart Cities Group under supervision of Professor Bill Mitchell at the MIT Medialab and has been presented at different urban and mobility forums. The project was not implemented but acted as inspiration for the general work in the group as well as inspired for the collective use of other similar technologies.

Background

The case project is thus based upon an ongoing research at the Smart Cities Group exploring new smart vehicles for primary use in dense urban areas. The current City Car has been developed throughout the recent years in collaboration with General Motors and now stands out as an electric vehicle with engine, break and suspension integrated in so-called 'robot-wheels'. At the same time allowing for a smaller electric and foldable vehicle that can be used as a mobile agent with its intelligent control system negotiating services as parking space, energy usage and communication with other mobile agents. The car has received a widespread interest based on the flexibility of the vehicle now having a car with a tiny footprint, being lightweight, all electric, digitally controlled, silent and based on a shared use principle that potentially could transform the car-industry from being a supplier of automobiles to a general more customized mobility service. The project has many offspring technologies, which are being investigated in new intelligent infrastructures, other kinds of vehicles and as part of integrated urban environments.

As part of the visit at the Media Lab, a research was carried out on 'performative vehicles' thus applying the principles of performative technologies, interactivity and open designs to the automobile industry. This research had two main perspectives, which firstly concerned the overall concept of mobility and secondly to implement a performative approach to car design which previously has been a matter of mostly representation and performance.

First of all the growing interest in these new optimized vehicles with a smaller footprint and better utilization of resources are still mainly focusing on the idea of moving as a problem of optimization to circulate people and objects in the most delicate way. Looking back through the eyes of Kevin Lynch, the overall ideas of optimizing urban mobility infrastructures through more advanced industrial technologies resembles 'the city as a machine'.

> *'The whole machine can change, although it does so in some clearly predictable way, as by moving steadily along some predetermined track. The stability is inherent in the parts, and not in the whole.*
>
> *The parts are small, definite, often similar to each other, and they are mechanically linked. The whole grows by addition. It has no wider meaning; it is simply the sum of its parts. It can be taken apart, put together, reversed, its pieces replaced, and it will run again. It is factual, functional, "cool", not magical at all. The parts are autonomous except for their prescribed linkages. It does what it does no more.'*
> *(Lynch, 1985, p. 81)*

This kind of mobility idea is much different from for instance what the American architect Frank Lloyd Wright imagined, when he in the 1930's presented his 'Broadacre City' imagining 'spacious landscaped highways' (Wright, 1932, s. 44) as the great city of tomorrow. Driving through much of the American mobility landscape is like feeling stuck in a vending machine sliding in an awkward rhythm through different kind of checking mechanisms. There are also 'spacious landscapes' but then often strangely

Fig. 97: The vehicle as representation. The Bridge of Sighs in Venice wrapped in car commercials.

perceived at 70 mph mostly focusing out of the front window not recognizing neither the landscape or the nearby driver.
Secondly many cars are still mostly conceived of as driving machines or designed towards the idea of high-level designs to maximize the added value of representation and performance for the buyer. From this whole spectrum of advertising and the commercialization of the personal object, it also includes the branding that comes with this industry. The object is thus in focus as an optimized object for movement and a designed driving container.

However bringing in some of the perspectives of performativity introduced a beginning understanding of the vehicle itself as a potential for the urban environment, and as a quasi-vehicle which also in place could provide meaning to location. The vehicle should fulfil the main purpose of driving, but also keeping in mind that people in USA only spend 542 hours per year in their vehicle (autobeat, 2000). Europeans spend an average of 275 hours per year in their vehicle, and keeping in mind all the resources that are put into this object which mainly fix the body while moving, it appears as a strange way of using such an expensive and rather sophisticated technology. At the same time USA has 26.896 km2 road and parking areas only dedicated for cars even they are mainly occupied doing peak periods (U.S. Department of Transportation, 2007). Now this study is not only meant as an interesting statistic on the usage of cars, in times where many organizations are trying to lower this level in respect to the energy resources used for driving. However in the overall picture it seems like a waste of resources not to investigate how vehicles in general could be used for more and new purposes, especially when they at most time are left at parking spaces instead of being located at 'active' highways out of peak hours.

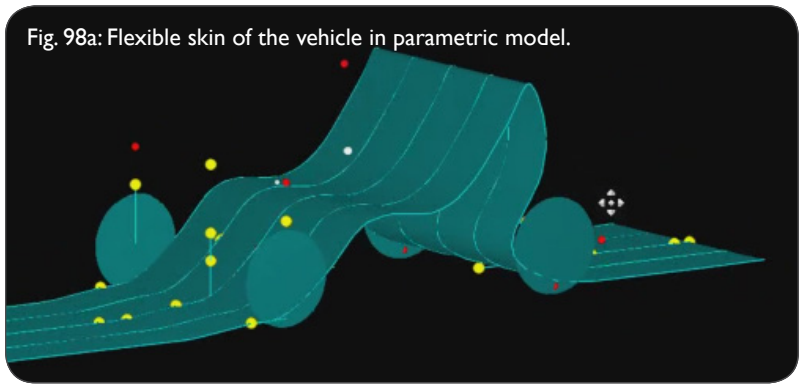


Fig. 98a: Flexible skin of the vehicle in parametric model.

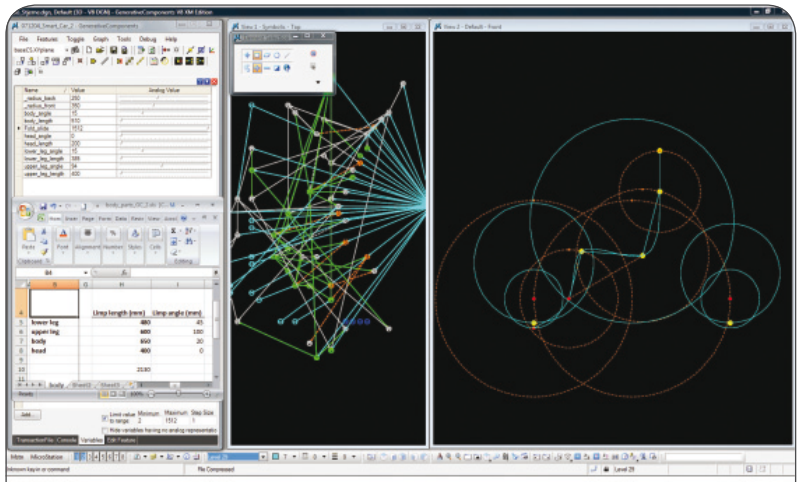


Fig. 98b: Parametric software and internal relationships to the human body.

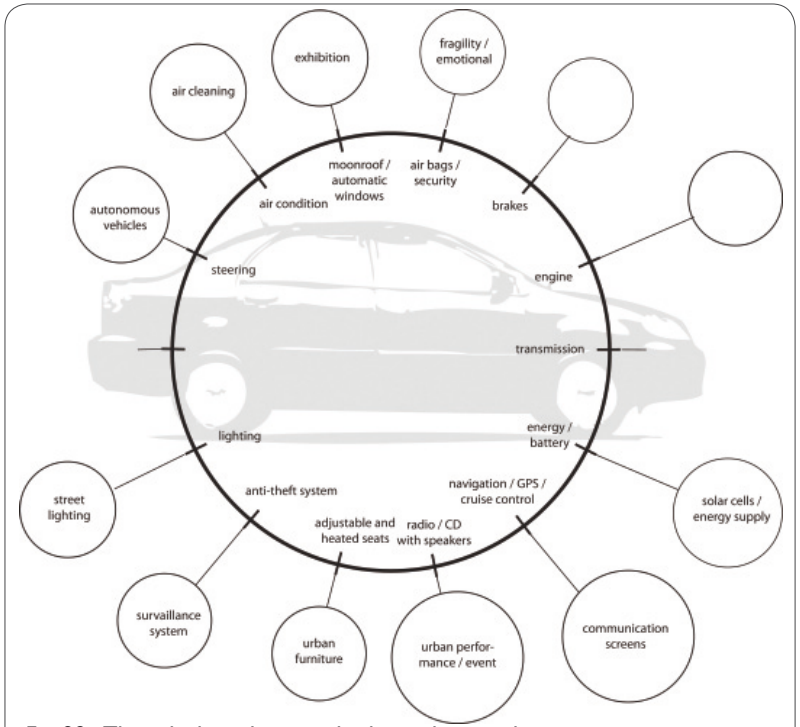


Fig. 98c: The vehicle and external relationships to the city.

Performativity

Here this vehicle was designed as part of the visit at the Smart Cities Group and developed through discussion with the group members, Professor Bill Mitchell and representatives from General Motors. The design method implied an investigation of the potentials of the car technologies to become performative infrastructure for shared urban use. The systems developed for the individual automobiles allows for the integration of interactive technologies that incorporates feedback between the vehicle and the local environment as well as coupling more devices and systems together. Most noticeable is the concepts of incorporating both internal and external communication systems into the design of vehicles allowing them as instruments for an urban dialogue. Secondly the spatial constraints of the existing automobiles mainly focuses on the feeling of movement along with safety issues, and by opening up these facilities for temporary use in parked conditions, they potentially occupy a more meaningful and collective use in the city.

Despite the fact that people are carrying out a variety of other activities while driving, it is of no surprise that the automobile is mainly used for moving, as the car is designed as a 'driving-system'. Dant describes these 'motor car affordances' as generally fixing the human into the mobile and merely as a progression from previous modes of transport (Dant, 2004). However extending the notion of the automobile as a means of transportation into place-based mobile objects, the performative approach to technologies transformed the vehicle by introducing a design that allowed for both energy production with solar cells and energy distribution with batteries but also to drive a communication system with internal and external screens and local protocols integrated in the car design. Secondly the interior of the car is designed as a comfortable seat for movement and can rotated as a shared urban lounge acting both as a workable platform with mobile technologies and as a coupling device with other cars.

The new mobile technologies provide an immediate potential of situating the experience of mobility, when bringing along the most valuable personal items through technological extensions. These technologies however are only rarely place-based as they mostly refer to global networks and not peer-to-peer systems allowing for local social relationships to occur. By providing new mobile object-based platforms with specifically relate to our physical bodies, a performative urbanism is introduced that allows for social relationships and changing use of transit spaces.

This vehicle will be able to work in parallel with local information and situations, and individuals can customize and communicate through it to radically reconfigure the concept of moving from being a static procedure from one point to another, to a more progressive aspect of negotiating, sharing and creating through mobile object-based technologies. It could act much alike the 'tuneable cities' with the car as an interface between the hertzian and physical space (Dunne, 2005, s. 137). These new vehicles are part of complex new systems of infrastructures with beginning understandings of this quasi-car as a 'post-car' (Urry, 2004) that constantly is in a performative dialogue with temporary places and other means of both digital and physical mobility.

In the sense that the previous automobile technologies was closely bound to the industrial age, the coming perspectives of these quasi-vehicles as performative objects introduce a new perspective on culture in relation to an augmented space through interactive mobile objects. In the same way as the 20th century vehicle shaped the industrial division of the city into specialized zones, the emergence of new types of quasi-vehicles could radically transform how spaces are shared, developed and socially constructed through performative objects, provided that new sites are designed for these temporary attachments.

The design investigations were based on a series of studies based on the car as a shared object with new affordances for the experience of urban space. Here initial constraints of parking spaces, standard car sizes, technologies and functionality as well as essential mobility usages performed the background for an adjustable seat to which the rest of the car case was costumed. Design development was done through parametric software based on the adaptable car seat and a series of interdependencies between the cars elements, which performed the basis for the transformable car. However the parametric approach does not replace sketching and other more abstract tools and here also fluid dynamic simulations and system dynamics was used as inspiration for more complex contextual relationships.

Fig. 99: Folding mechanism, sliding control board, media screens and solar cells.

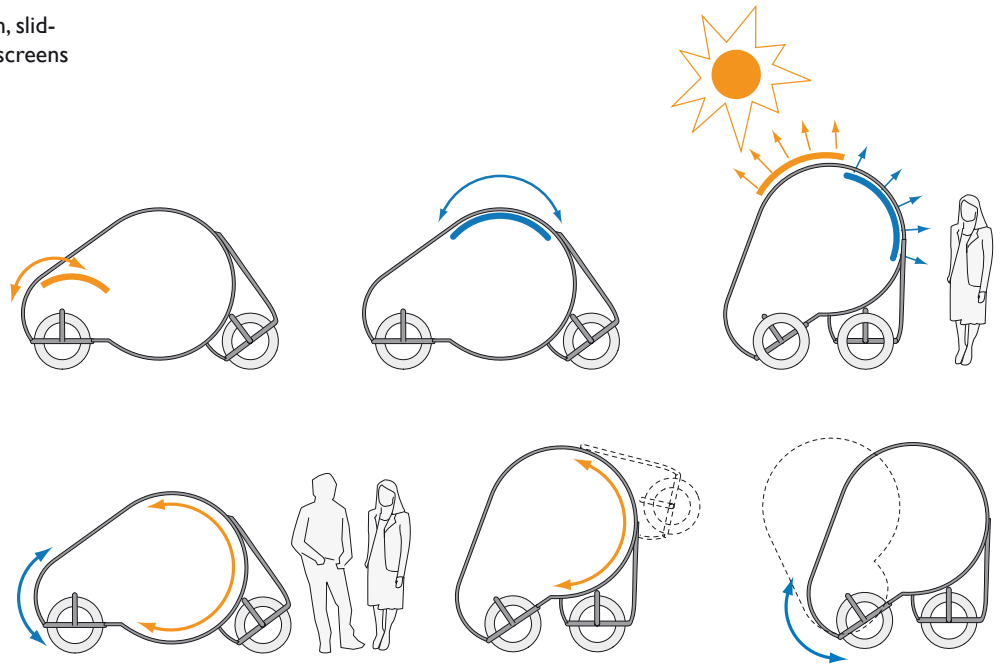
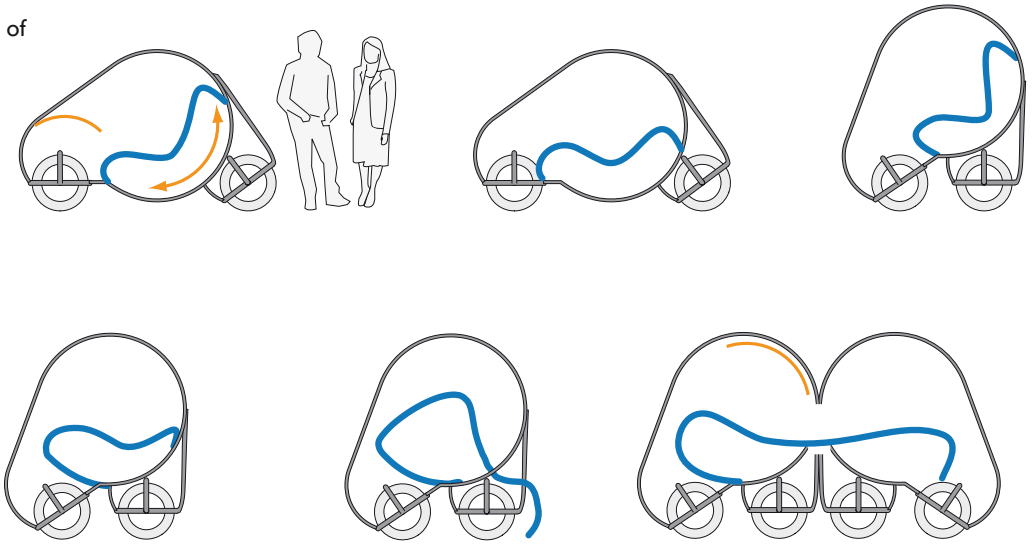


Fig. 100: The configurations of the internal seat.



Overall relationships

Technology – level of feedback

The basic technologies integrated in the performative vehicle were not presented as something dramatically new. Instead the existing technologies in the average car already contain a significant level of performance and the main idea was how these technologies could be partly public and situated, thus increase the feedback with the current space. The main technologies that were selected as the most potential ones, included first of all the basic equipment as lighting, anti-theft system, audio equipment and adjustable seats and extended into more advanced navigation systems and media screens as well as battery packs and solar cells for electric vehicles. The level of feedback thus included the vehicle as a communication device and local media, an energy resource and an urban lounge for alternative activities than driving.

The car is designed around a series of circular structural components with the possibility of sliding and extending different parts of the car. As part of these transformations the major components were how:

- The vehicle can fold up and occupy a minimum space depending on speed, where all functionalities are maintained during folding.
- The driver seat is approached as a large dynamic cushion, which can rotate and transform according to activities of driving, working, lounging, sleeping etc. as well as spill into a coupling car for meetings or social gatherings.
- The control screen used for navigating the car can slide away into the front of the car leaving an open space, as well as containing the additional information features for the future of mobility.
- The media screen used as the top-mounted interface is acting both as a digital window and a ceiling and can be extended as a locative exterior communication screen during folding.
- Solar cells on roof of the vehicle combined with the autonomous wheels allow for a car that during parking can circulate depending on the most optimal positioning towards the sun.
- All the basic sheltered technologies like screens, seats, networks, engines etc. are open for wireless access, thus providing the possibility for the owner to lease out services and facilities from the car for instance by offering a full media platform, urban performance equipment, working place and urban lounge.

The later studies introduced a more basic car case structurally optimized around the circular elements made of carbon fibre to expand a textile metal mesh to be deformed according to use as an urban carpet. However in general the performative vehicle was considered a tool for exploiting urban culture, while still maintaining the functions for safe mobility.

Representation – level of association

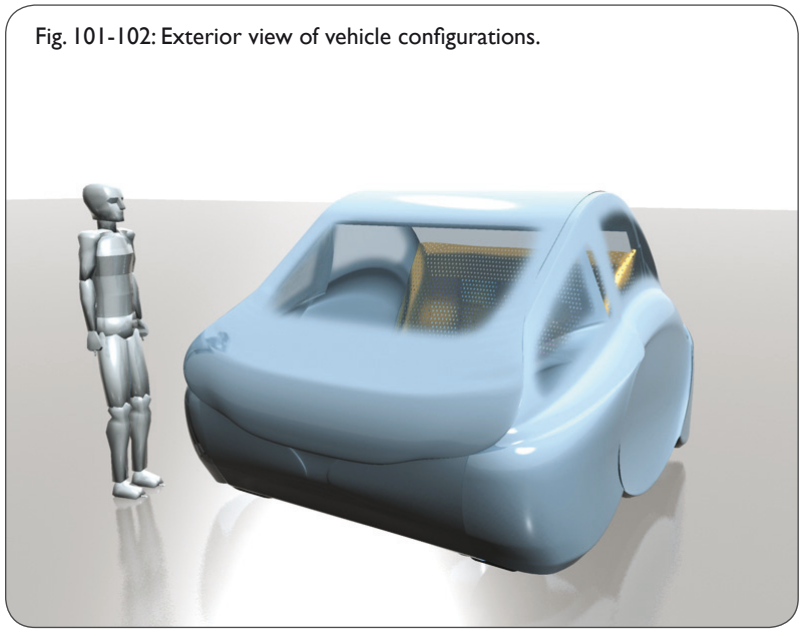
Cars have traditionally been in the centre of representation through an increasingly idolization of the object. Although performance and representation in this case have been strongly influenced by looking at the state of art performance vehicles, this vehicle is not in general meant for ambiguity in expression, but it should appear through use. It should be clear how the vehicle is driving as a secure 'shelter on wheels'.

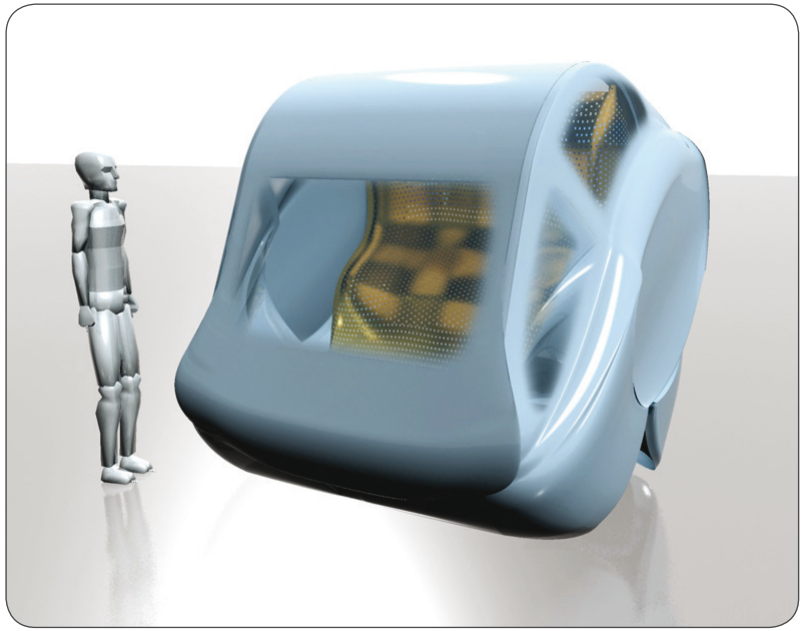
Therefore a crucial moment during the design came with the decision to stick to the more traditional idea of representation of cars, not to deform it completely, mostly because of the relationship to the car manufacture and the concept of investigating how the car could inform a context without taking away the idea about the vehicle. The transformation itself and the open technological platforms imply that it moves from a closed condition of mobility to an open condition of place-making. Representation is in a space of speed and performativity feeds the attachment to place.

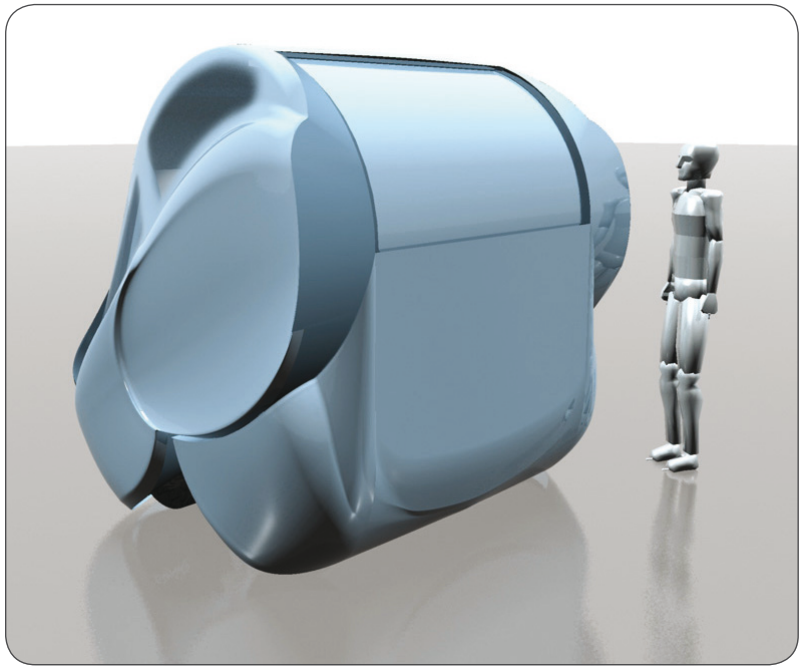
Relationship - level of attachment

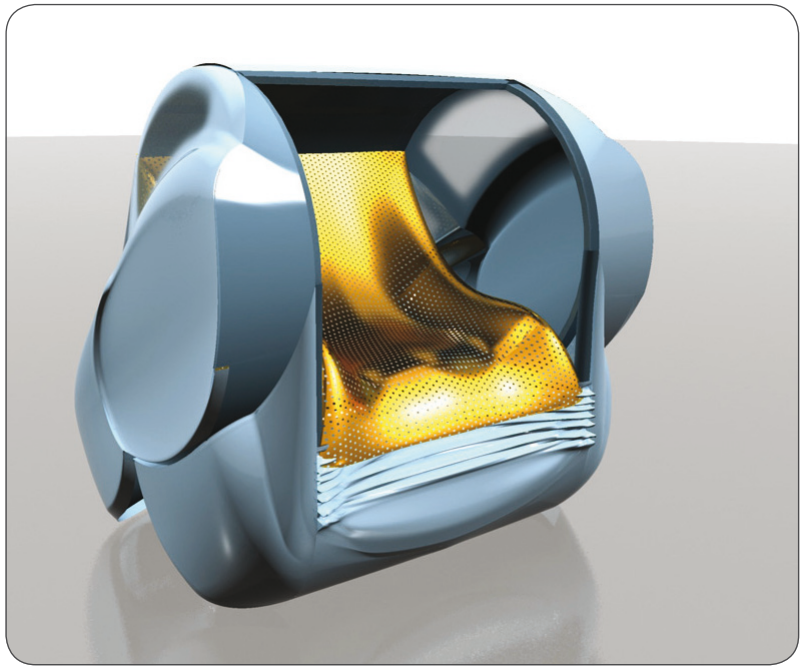
In addition to the above description of the performativity of place, there is also a great deal of attachment inspired from the case of NoRA, however here with the above difference as regards to the speed of movement. To be able to invite for attachment, the design needs to afford for the situations emerging in urban space, and needs to consider how people in general are in flux with laptops and smart phones. This emphasizes the main idea of how parking spaces can turn into places of temporary dwelling, workplaces, lounge areas, performance venues etc., however besides having the design and technological platforms available, they additionally need to be accustomed to a larger organizational framework informing about this availability as well as indicate ways to respectively lease out and use leased objects for collective use. Here the performative vehicle does not need to act merely as an object to satisfy human basic needs, but additionally to consider a vehicle, which resembles the local characteristics of the architecture and environment through a level of mimicry. Attachment is thus inscribed in a whole framework of relationships related to both the networked situated object and the embodied space of movement, which in the same way requires a customized user experience.

Fig. 101-102: Exterior view of vehicle configurations.









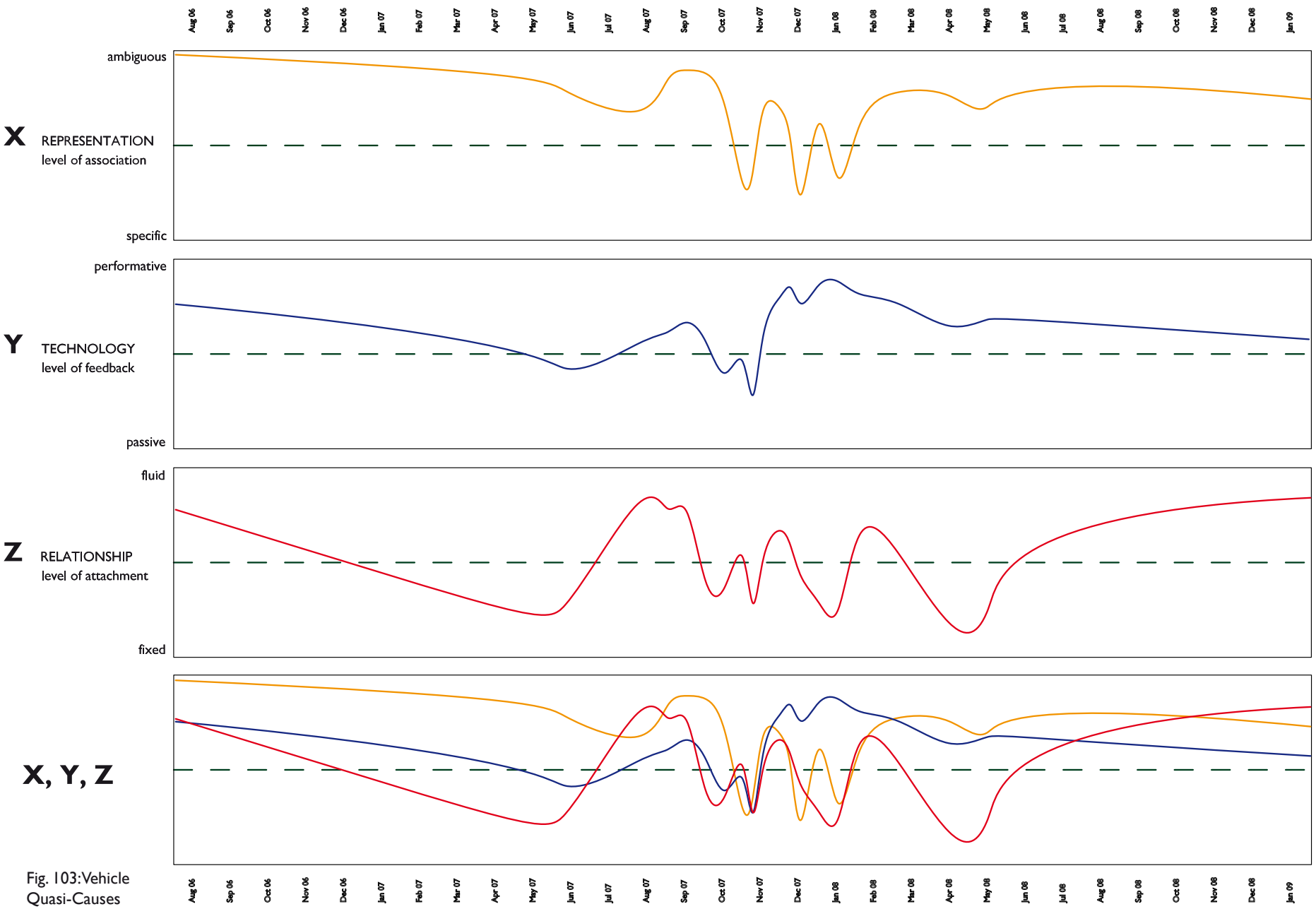
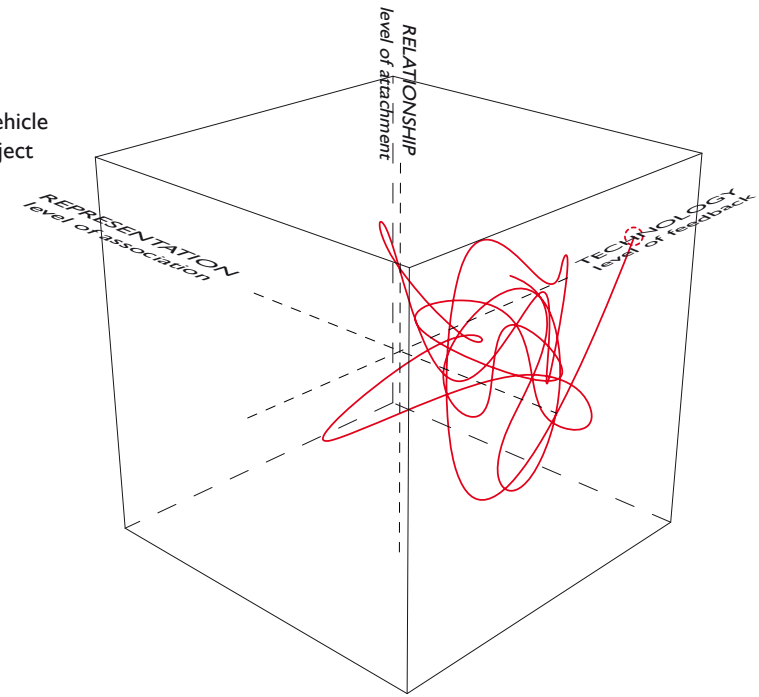
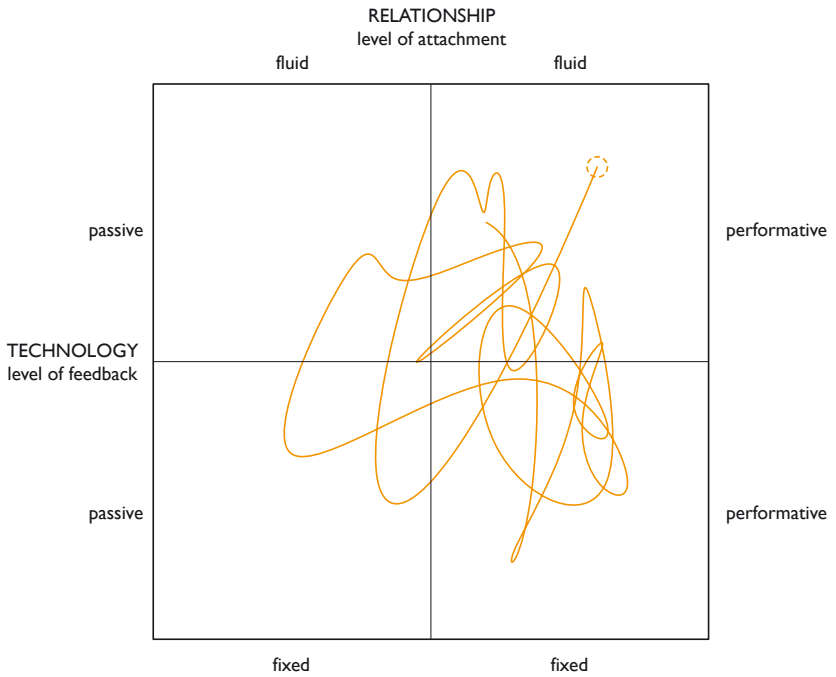
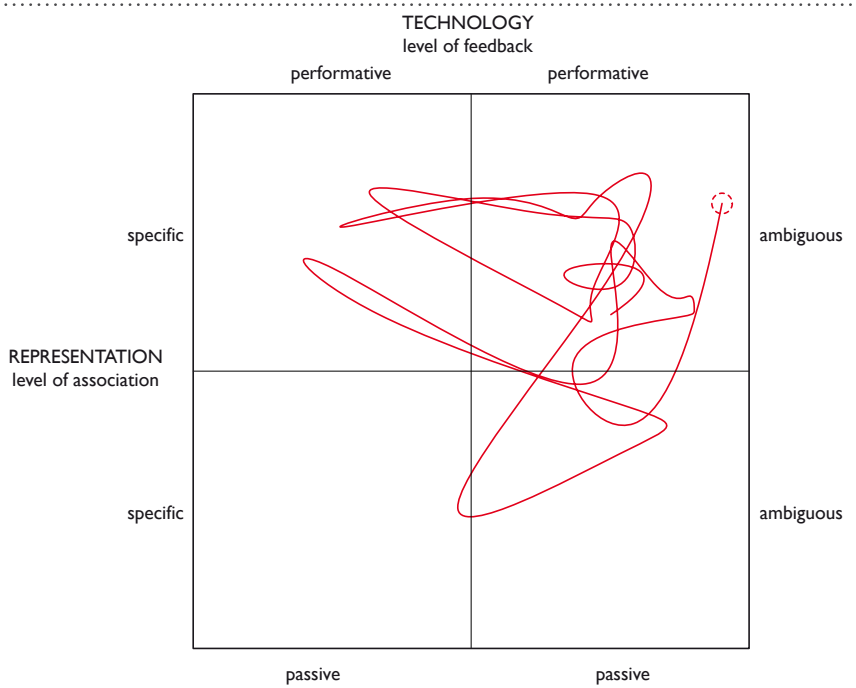


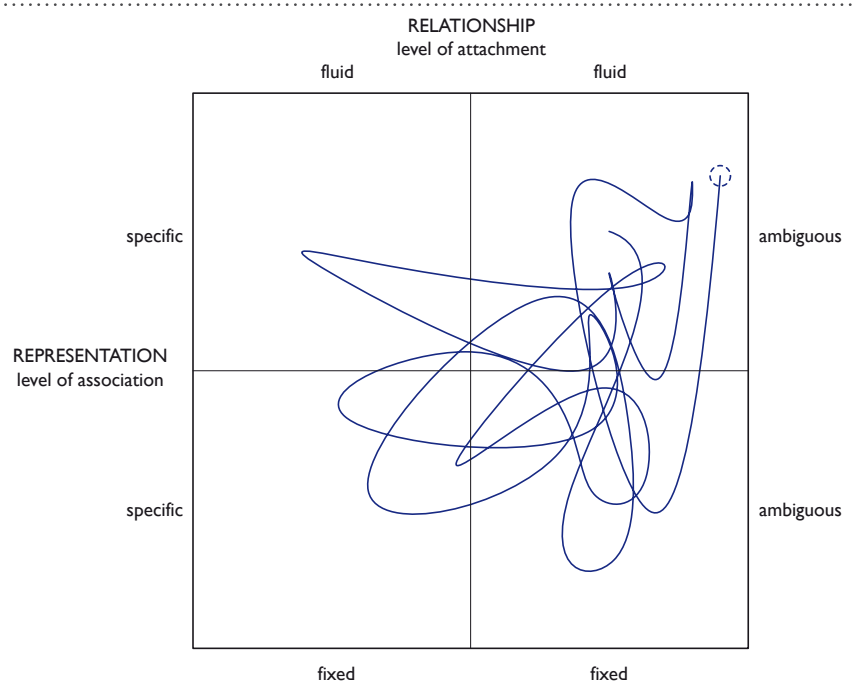
Fig. 103:Vehicle Quasi-Causes

Fig. 104: Vehicle
Quasi-Object









C: Performative Urban Spaces

The studies of performative urban spaces was one of the most obvious continuations of the NoRA project, to test out the potentials of computational technologies and methods at more specified and fixed locations. Here a contact from the Urban Design Research Group in Aalborg resulted in a dialogue, workshop and additional consultancy work for the Municipality of Copenhagen to treat the potential transformation of an existing traffic space into a more lively and divers street life as a backbone for the local neighbourhood.

Background

The project 'Performative Urban Spaces' has been carried out in collaboration between the Municipality of Copenhagen and Aalborg University through this PhD project and initially assisted by Esben Skouboe Poulsen and Ditte Bendix Lanng from the Department of Architecture & Design. The project was introduced by presentations and workshops at the Municipality of Copenhagen in June 2007 along with a comprehensive municipal agenda to rethink the street scape of Amagerbrogade, Copenhagen, in relation to traffic congestion, shopping and a more lively locally supported public space. The project was part of a more general framework considering how the much neglected street of Amagerbrogade could compete with the new services and spaces at the newly developed 'Orestad', which has implemented all the 'right' new programs of the contemporary city with new Shopping Centres, elevated electric railway (part of the Copenhagen subway), Concert Hall, University, housing and offices etc. To stimulate the life of the more traditional city and shopping facilities, the more overall project emphasized how the urban development could emphasize key values of these spaces, and how they could transform into more contemporary spaces.

The contribution from this PhD project was in the beginning to develop a catalogue of example projects that considered how new technologies could inspire local activities in a sustainable and active street scape. Hereafter to look for possibilities to realize experiments that could test out the potential of local interactions through situated technologies. Thus the main idea that inspired the meetings with the municipality was the introduction of new effects that could afford new interactions and behaviours basically extending time spend on the street for social activities. The performative technologies were approached as a new backbone of the area to hook up on the existing networks and activities and integrate as part of the existing street scape on multiple levels. Thus it was considered as an alternative

Fig. 105: Aerial photo of Amagerbrogade, Copenhagen.

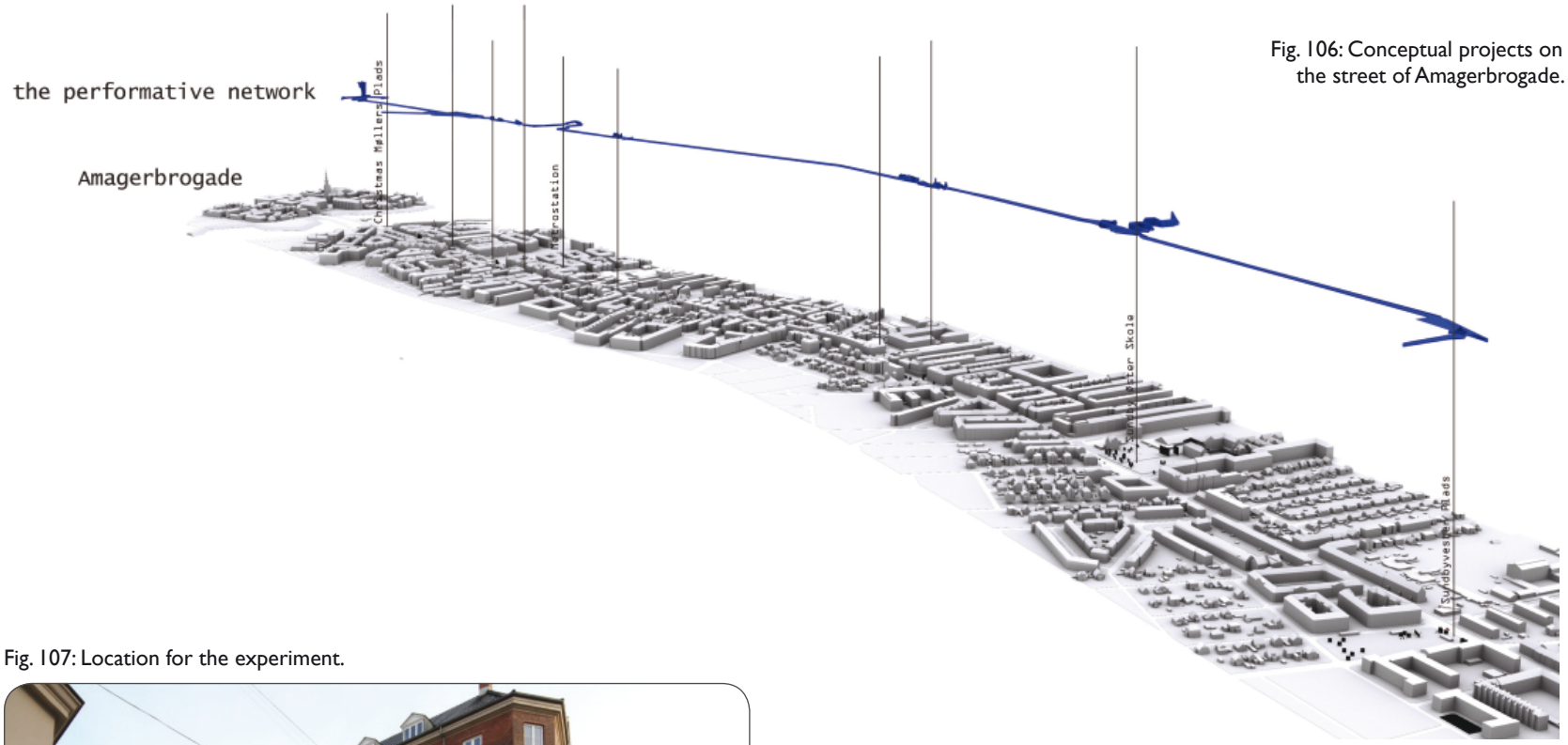


Fig. 106: Conceptual projects on the street of Amagerbrogade.

Fig. 107: Location for the experiment.

Fig. 108: Amagerbrogade near the experiment.

social infrastructure that could act as a plug-in to space and exploit technologies that could connect diverse social groups through interactions in urban space.

Throughout the summer and fall 2007, the project group scanned through a series of examples projects, visited the site and carried out brainstorms on how to use the existing local activities to extend with performative technologies and alternative urban interiors. The work was finally condensed into 10 proposals that took off from specific locations at Amagerbrogade. By reframing how the street scape would appear through interactive technologies, the proposals varied from alternative urban furniture's, street pavements, urban stages, dynamic landmarks, digital facades and bill boards, playful areas and sustainable public transport. They were all described at a conceptual level however with rather specific design proposals including schemes for how interactions could occur. The project group finally concluded the initial study by proposing a framework for possible future experiments through five recommendations for new design initiatives.

Performativity

The performative urban spaces in Amagerbrogade are approached through the concepts of local interaction and place-making through a sustainable, collective and vibrant urban life. Here the integration of wireless networks, sensor technologies and pervasive computing was designed in relation to ten very specific locations in Amagerbrogade, which all contained the potential for a renewed approach to local interactions. Additionally the general framework was much inspired by the 'Digital Mile' project, developed for the City of Zaragoza by a joint program between the program in City Design and Development and the Media Lab at MIT, Boston. Performativity here implies a concept much related to the 'Open Source' City (Frenchman & Rojas, 2006) as a digitally mediated public place as described in the 'Digital Mile'.

However considering Amagerbrogade as a remarkably diverse and differentiated street scape along the mile-long stretch, it was additional emphasized how particular locations and services could benefit from being underspecified and information circulated to a broader audience. Thus it should not only contain an integration of a broadband digital infrastructure feeding individual units and services, but should specifically hook up on existing programs and spaces. This should imply the development of a more locally rooted performative urbanism, which acting in the footsteps of the more traditional performative urbanism could be upgraded as a more participatory and bottom-up approach to urban life, provided that the participants could exploit and understand the new more sophisticated networks and technologies.

These studies of how performative grounds could be more advanced and integrated in a dense city as part of a dense traffic space, was additionally considered as part of a general 'shared space' concept. A newly developed concept for a street scape implemented with great success in e.g. Holland and England combining different speeds and users in the same space without formal restrictions and signage. Instead the users negotiate the use of the space and speed on their own, including the radical concept of having a levelled street without edges and dedicated driving lanes, pedestrian areas etc. This idea emphasizes more spontaneous behaviours and the regulation of norms through interaction between different modes of transportation, instead of fixing representation and thus regulating use and access through signposting and separation; an approach which exploit the ideas of risk compensation theory as a way of interacting rather than top-down regulation.

From a series of ideas and sketches these ten projects were selected for conceptualization with the Municipality of Copenhagen. Six of them are illustrated on these pages and additionally these four projects were presented along with a series of specific reference projects and technologies.

Resource Monitor and the Active Furniture

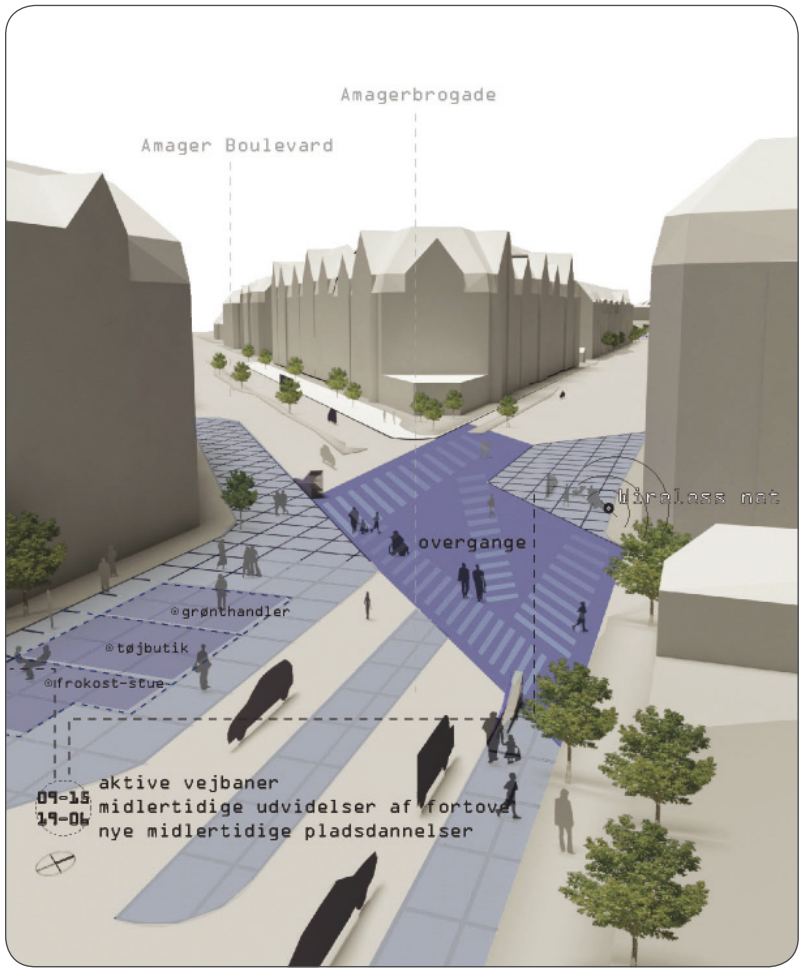
The performative furniture is specified as a section of the street with a registration of activity levels and consumption patterns over time, and compares the consumption of electricity, communication, water, heat, pollution levels etc. among the different neighbourhoods. The information is aggregated at a general level for comparison and will increase discussion through the different environmental footprints, when different groups are present on the street.

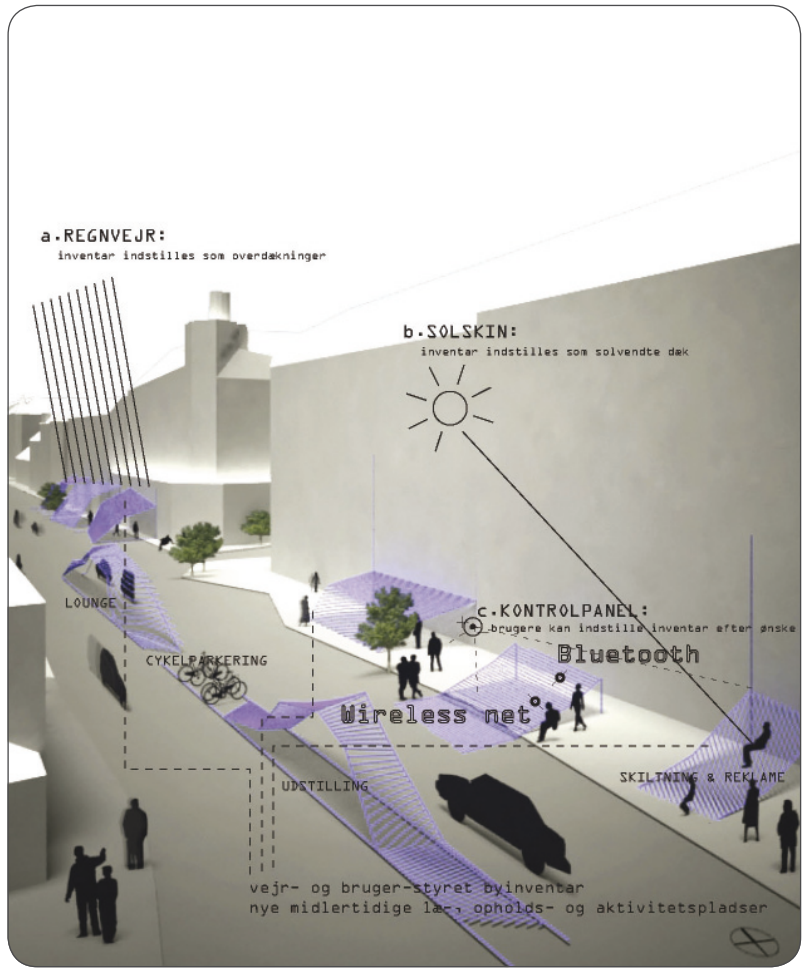
Net Café and Digital Facades

Digital facades are spreading throughout the world for more and more sophisticated purposes. Here the local net café is proposed extended to the street level to involve other user groups as part of urban gaming by transforming the grid of an existing facade into a simple media facade. Instead of having the gaming culture hide in the dark hidden spaces with luminous individual flat screens, the city is involved as part of alternative games through an urban shelter.

Active Road Surfaces and Crossings (Fig. 109)
Analysis showed that much of the activity happened only at one side of the street with few crossings mainly because of dense traffic during peak hours. However during other times large areas of the streets weren't used with the low traffic density at the same time as dedicated crossings still fixed the routes of the pedestrians at one side of the street. By integrating the concept of active street surfaces through light and changing materials, part of the street scape can be leased out and new crossings appear as needed. Tracking technologies combined with customized pavements allow for a kinetic street scape integrating locative media and a variety of programming purposes.

Multi-functional Street Interior (Fig.110)
Part of the street is dedicated for temporary spaces with a multi-functional street interior, which partly autonomous and partly controlled can enter different configurations depending on weather and activities. Here the kinetic structures combines with information technologies to allow for temporary workspaces, recreational uses and general information exchange.





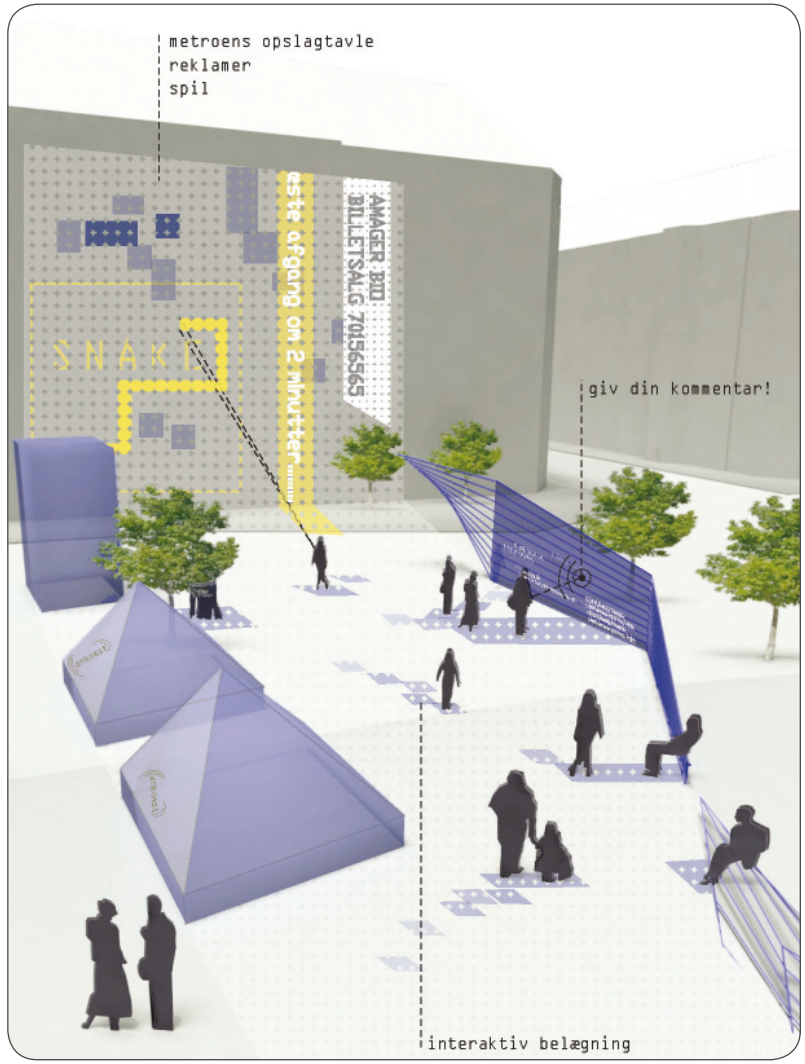
Plug-in Stage
A plug-in stage is a natural extension of the urban space in relation to the existing old cinema and culture square. Here both individual and collective spontaneous performances can be carried out through integrated performance equipment allowing for wireless plug-in with recording and network storage.

Furniture's for exhibition and information exchange
Part of the street scape is being changed into a temporary plaza where the local shops, institutions or private organizations can lease pieces of the interactive furniture for exhibitions, events and interactive bill boarding. Through the networked applications, integrated media and flexible arrangements the local actors could potentially customize and collaborate on common campaigns or services. The activities on the street dramatically increases the levels of functionality of the street scape at the same time as increasing the requirements for awareness between different speeds during the time of day and week.

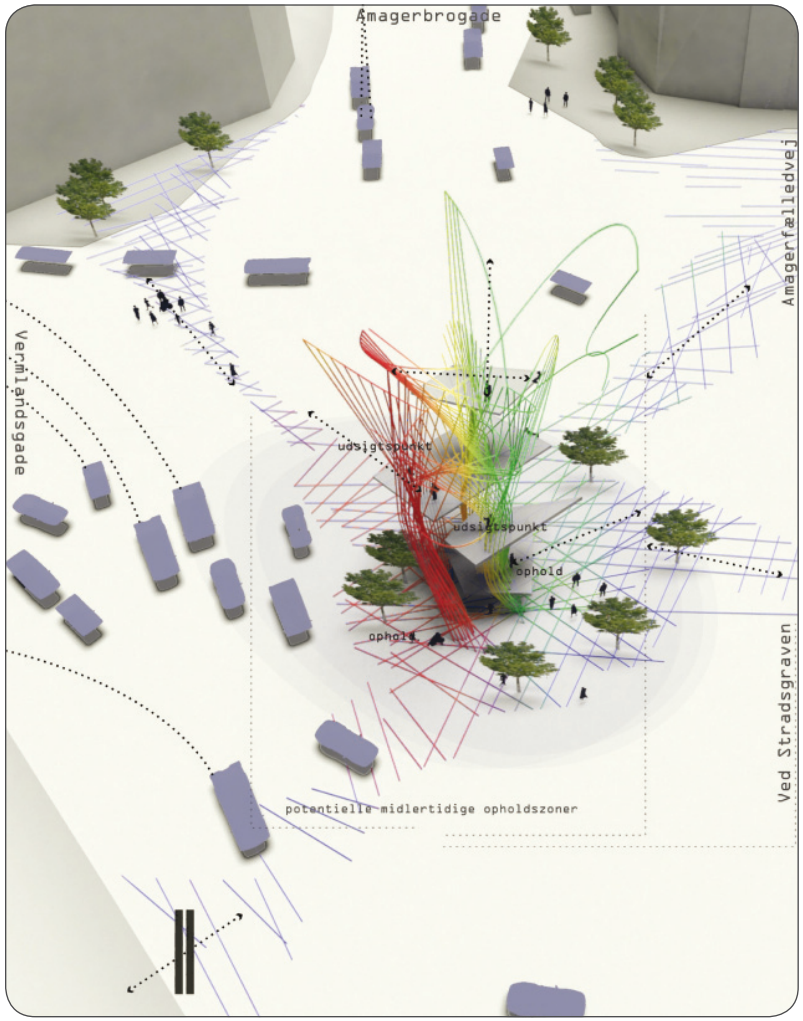
Activity Areas and Play
An existing play area near the school is enhanced by sensor technologies to involve greater feedback as part of the activities as well as to store and exchange levels of play from one child to another. Existing urban furniture, trees and pavements are enhanced by audio feedback together with new play areas supported by mobile phones and portable computers.

Overall relationships
Technology – level of feedback
The technologies described here are ranging from the basic reactive technologies required to support a more basic responsive infrastructure to the idealized intelligent kinetic installations allowing for both user customization and autonomous behaviours in relation traffic congestions and weather patterns. These different states are determined based on which activities and actors they are intended to mediate and which relationships to couple. The main idea however exploits the complete idea about a performative street arising gradually from the step-by-step implementations of elements, which the uses can get acquainted with. This requires the introduction of a new digital infrastructure based on an open source principle, which by far is characterized by the current closed systems characterising all kinds of urban flow management. Any system that would imply the possibility for users to access real-time information about activity patterns on a neighbourhood or architectural level and sub-sequent adapting to these

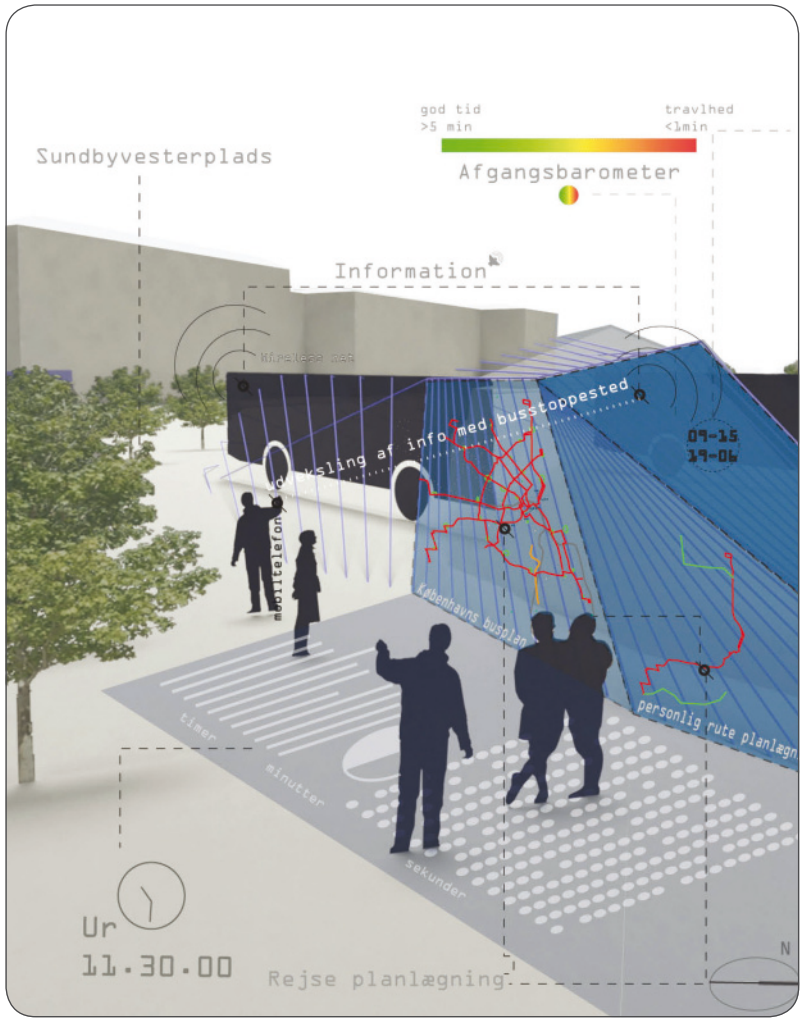
Bulletin Board and Dynamic Signs (Fig. 111)
The main square next to the underground and shopping centre is enhanced by digital bulletin boards informing about current local activities and with levels of user generated content. The space is being overlaid with greetings and opinions and the system can select and display the most appropriate content depending on time and people.



Traffic Stimulating Street Mirror (Fig. 112)
The street mirrors of the traditional city had the purpose of looking around corners, but with new sensor technologies and faster computation processes a traditional traffic light could transform into a mediated roundabout. Here the contemporary street contains a real-time scanning of the roundabout for potential collisions and indicate this through colour response or remote feedback in the car. At the same this structure allow for a new view-point from where to enjoy full view over both Amagerbrogade and the old part of Copenhagen.



Public Transportation and the Narrative Traffic Space (Fig. 113)
The public transportation system through Amagerbrogade with the main hub at Sundbyvester Plads represents an important place for the exchange of local knowledge. Through an interactive furniture piece the routes of Copenhagen can be navigated and real-time information examined on current schedules and activities throughout the street. The buses is equipped with gps and cameras as well as possibilities for user generated content exchanged at the bus stop as for inspiration for new local trips starting from Amagerbrogade.



with the possibility of responding collectively with new proposals, would significantly change the approach to urban neighbourhoods in general.

Representation – level of association

Despite the high ambitions from the conceptual framework, it is interesting to note that performative technologies are still highly influenced and constrained by the different layers of existing traditions, practice and the architecture of the place thus in the beginning only adding one new element to a palette of already situated technologies. Any openings indicating actual social behaviour based on these intensions would be an achievement, especially in relation to a dense traffic space where restrictions are much more common than the spontaneous acts. Thus ambiguity here is twofold as it is suggested as a highly open system customized to each situation and place, which however needs to be integrated among all the many other influencing factors and negotiated with the current regulations of flow, before it actually will enter a more fully interactive engaging place. In the end however, as described in the background theory, neighbourhoods as well as nation-states or cultures that are able to adapt and go into a higher degree of cultural exchange rather than enclose their specific characteristics are the one to develop rather than diminish.

Relationship - level of attachment

Level of attachment is not yet fully explored as a situated case, as there are widespread possibilities through the different concepts. Some of the issues were additionally detailed through the discussions of more specific experiments with the municipality as well as integrated in the 'social lighting' study to appear in the later case study, however the overall idea of performativity and levels of attachment would also happen at the level of an urban neighbourhood. Although the specific neighbourhood of Amagerbrogade is highly diverse by different national cultures, habits and groups, it would only contribute to the place if this significance would be shared and represented at the level of the street. In the next level each group or sub-culture would emerge with its own specific place-making technologies, networks and sub-domains layered and interweaved in relationships that are highly unimaginable.

Such a case-study in an existing 'thick' urban tradition without the many specific experiments on the street level, can only exist as a first initial opening, as they would need to be perceived and absorbed by the local communities of practice and not only circulated and approved at the administrative level before gaining meaning for the site.

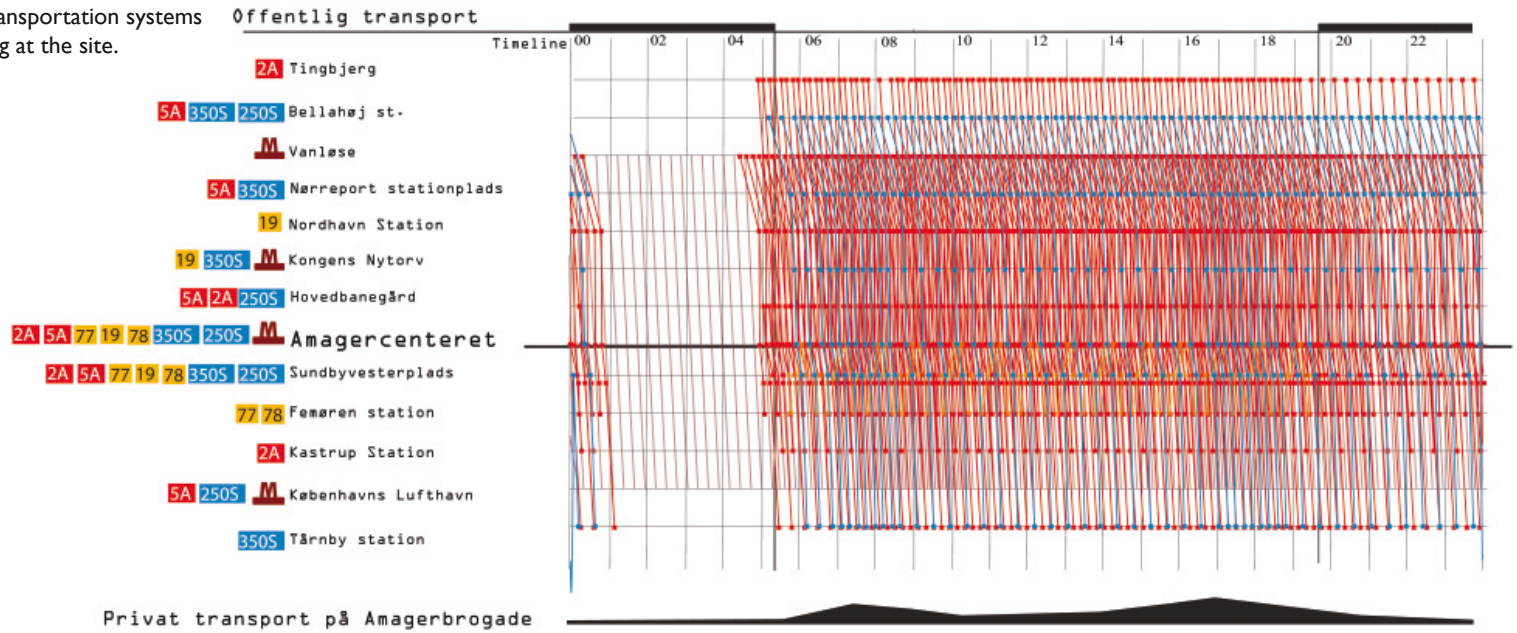
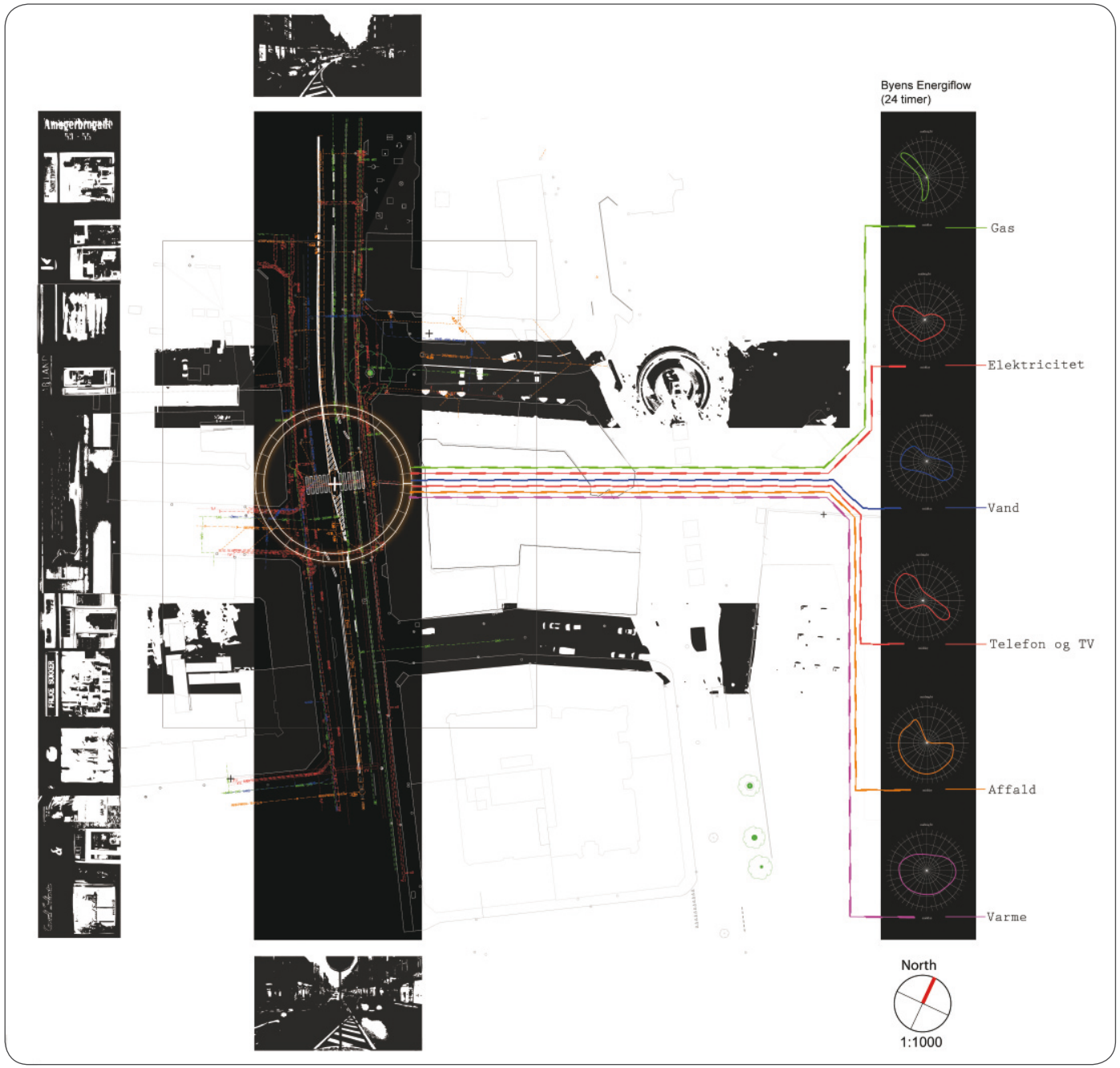


Fig. 114: Transportation systems intersecting at the site.

Fig. 115: Analysis of urban infrastructures at the initial site for the experiment.



Feedback on material

The Municipality of Copenhagen was handed over the material; however the feedback was a little difficult to interpret. They were apparently very impressed with the material and proposals but couldn't make any specific decisions on how to proceed with an experiment or additionally where to start a possible dialogue with citizens or other relevant actors. Instead the material was maintained in the background, and the project was continued by selecting a specific site to discuss how an implementation of an experiment could look like, and the research project continued with more elaborate analysis together with city planners and architects. At the same time the PhD project was supported by a graduate student in digital design, who was aware of some of the site constraints from previous projects as well as had a strong interest in performative designs. Through this collaboration a series of new studies was carried out at Blekingegade, Copenhagen – a street connecting Amagerbrogade, the nearby underground station and indoor shopping centre; a location that along with a temporary food stand seemed obvious for experiments on interaction with traffic flows and shopping.

Different analysis exploiting the time and quantities of traffic flows, technical infrastructures, aggregations of people, shopping hours and transportation patterns were carried out at the same time as the Municipality did some more detailed studies on demographics and local narratives. The analysis was condensed into a project proposal that included the development of a new urban furniture that circulated site specific information gathered from auditory input, movements of people and traffic and transformed into actions through multiple seating levels, feedback of narratives as part of seating and in general a seating area with interactive lighting. Thus the project included multiple levels of design integration as part of urban furniture starting from simple overlays of flow systems through interactive technologies. However again it was difficult to get a detailed response from the Municipality on how to proceed with the proposal. The project was being experienced as being too complicated and too distant from the current user groups and their daily life on the street, and they were not interested in testing out feedback technologies on the site.

About one year later, just before finishing the PhD, there was finally a feedback from the municipal to integrate parts of the project proposal as part of an interactive urban lighting scheme in Blekingegade. Here some of the experiences from one of the other case projects were used in the initial prototypes to develop more detailed models for the specific location. The description of this final implementation is found in the last part of the 'social lighting' section concerning 'interactive street lighting'. Besides the municipal feedback and the prolonging discussion on integration or testing of some of these technologies, the examples have been additional discussed at different venues and occasions. They are considered highly interesting in regards to the potentials for involving locals into a new digital realm and with the spaces and possibilities they open up for new usages; however additionally people are similarly concerned with the more dramatic impact on the city in general.

Many of the reference projects indicate that people actually would like to interact with these systems and spaces through new mediated platforms, but also that they mostly have been tested out and proofed successful as part of temporary event spaces. A continuation of such projects would clearly involve prototypes at the same time as involving users, shops, companies, and apartments etc. into the actual application of these technologies to support their own ideas about the city, personal narratives and new activities. This has also been part of the main recommendations that performativity would enhance a 'shared space' philosophy by being able to customize places and exploit them as platforms to support and extend current activities. However as described, the municipal found the material 'very interesting' but did not provide any specific information as regards to which projects or concepts that could be the most relevant to test out, but about half a year later they decided to continue the ideas proposal at a more specific location.

Experiment at Blekingegade

The municipality opened up for an experiment to take place at Blekingegade, at a plaza next to Amagerbrogade and connected to the underground and shopping centre. Additional analysis exploiting the existing physical infrastructures, activities and networks were considered as background information for the citizens to occupy. A schematic concept for the circulation of locative information based on user feedback integrated in simple urban furniture along with an interactive lighting design was described as starting point for a dialogue. Here the small plaza was treated as a hub for information on Amagerbrogade and auditory and light feedback was introduced in a 'gossip' bench along with a simple concept for a more playful actuated bench, digital bulletin board and similar. The municipal however decided to postpone any feedback and decisions on the project until an unknown time. The arguments mainly concerned problems of costs, too short time for realization, problems with damage to the installation and people, as well as concerns if it would be too much of an event or

installation, instead of being considered something valuable for the local neighbourhood. Basically they believed that the 'ordinary' citizens would not be able to understand these technologies and thus not engage with them, as well as it would be too general of a concept to fit the place. From the researchers point of view it seems like the municipality had difficulties doing such 'open' underspecified experiments both of practical reasons but maybe more because of political reasons.

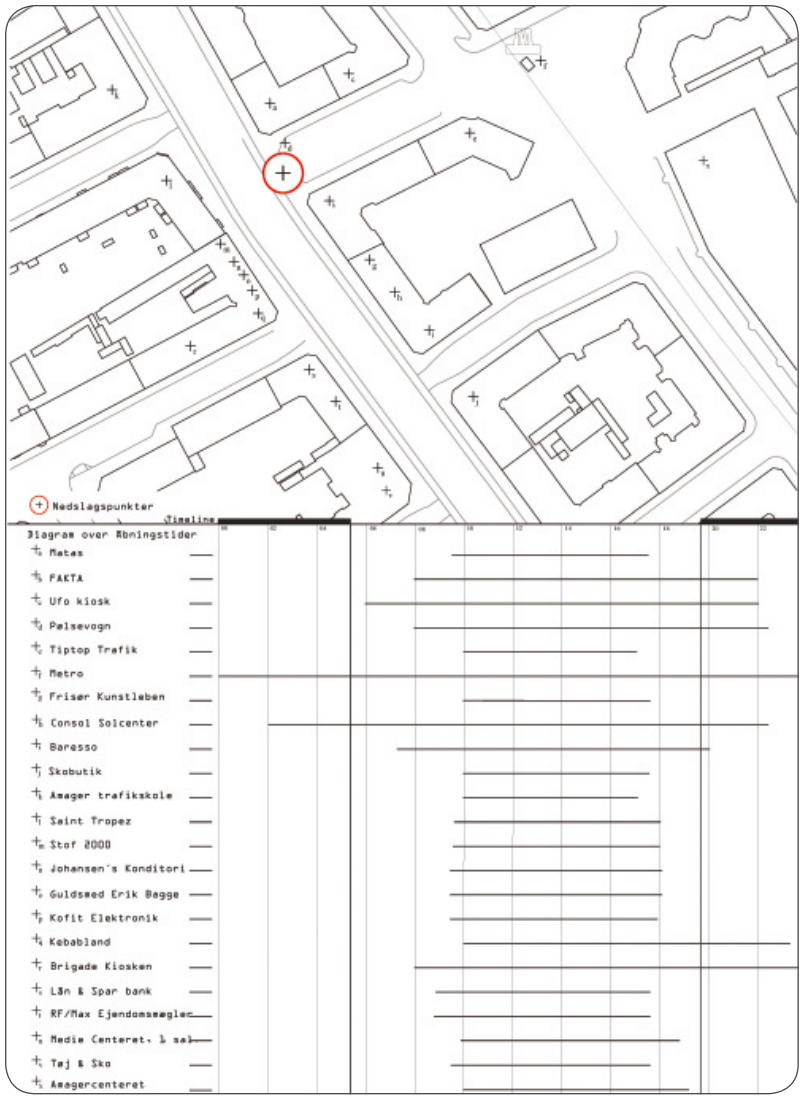


Fig. 116: (left) Opening hours for all commercial activities in the area.

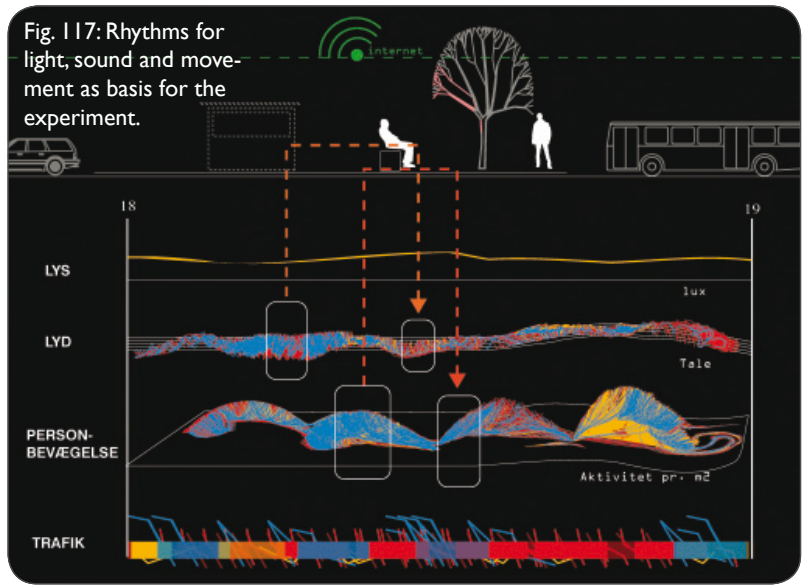


Fig. 117: Rhythms for light, sound and movement as basis for the experiment.

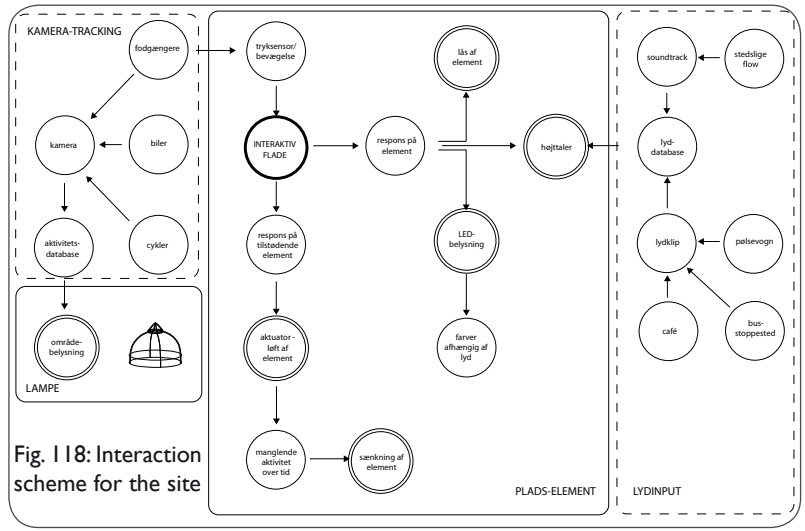


Fig. 118: Interaction scheme for the site

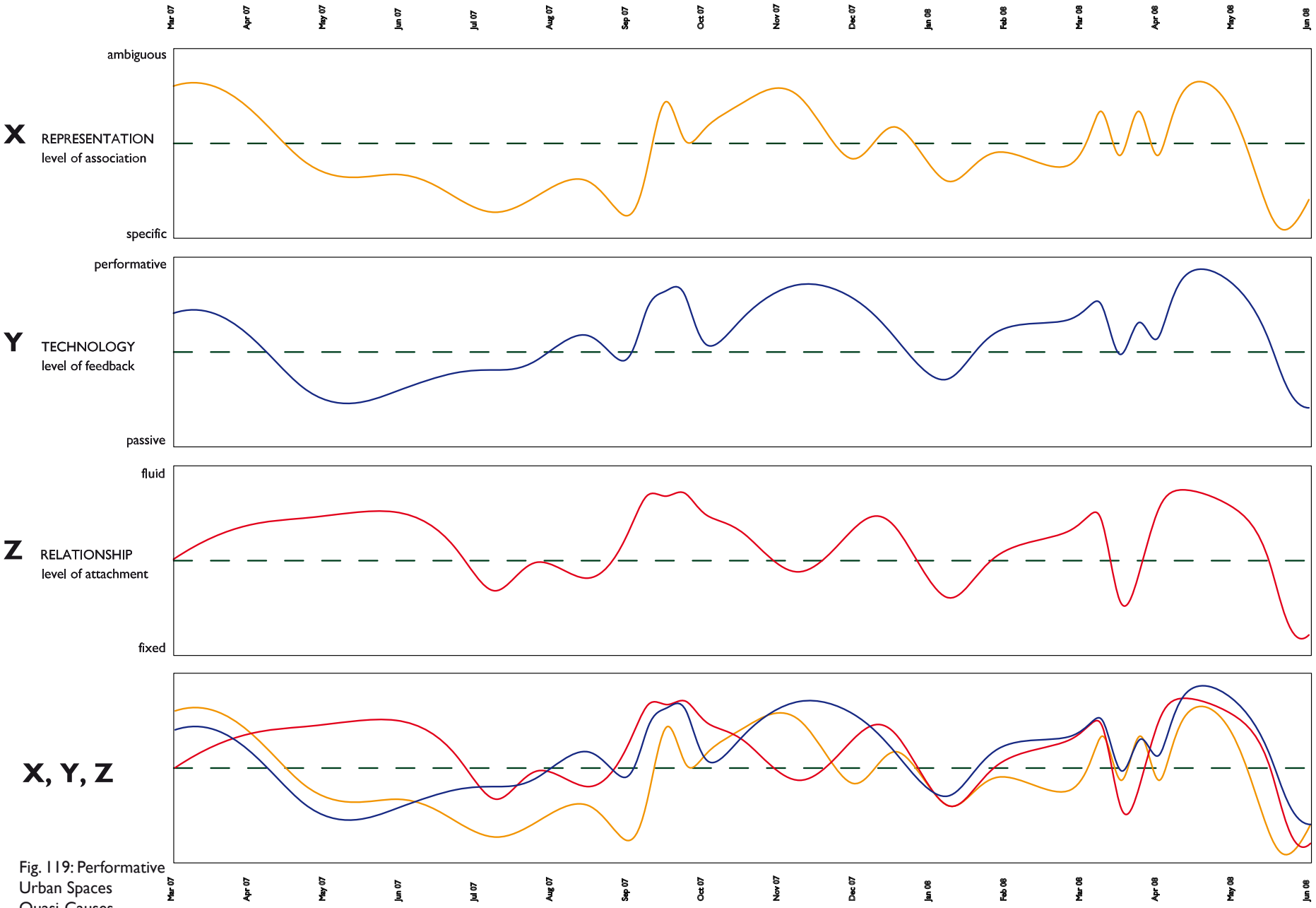
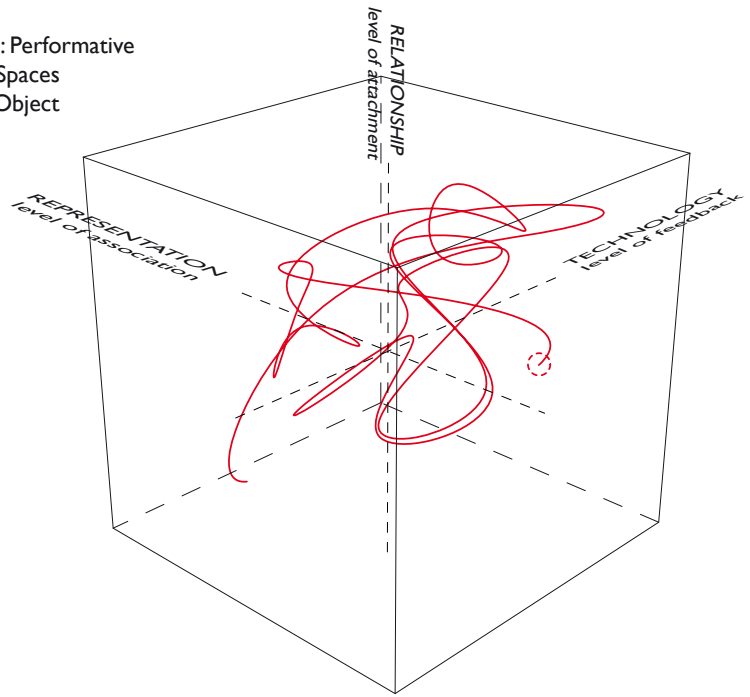
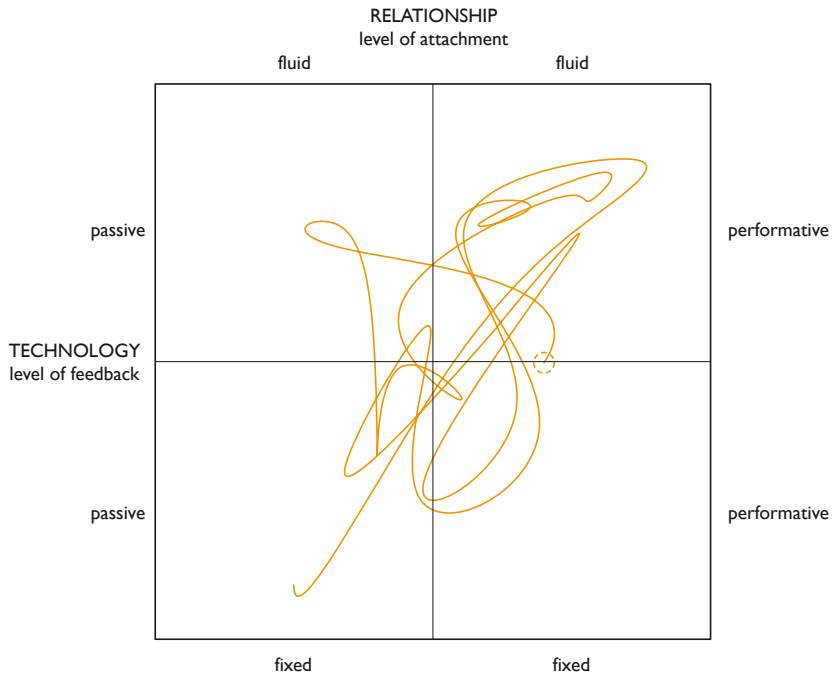
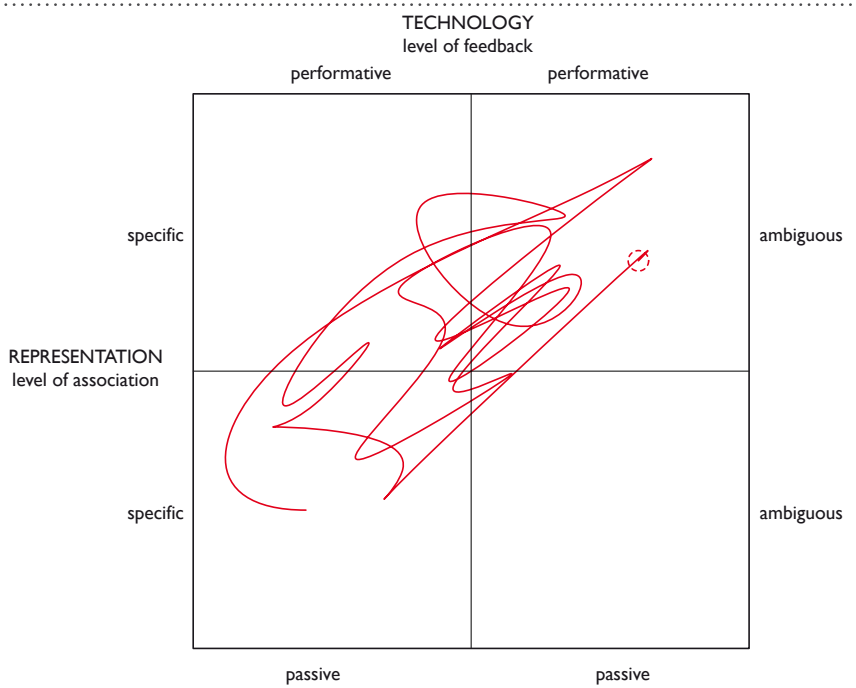


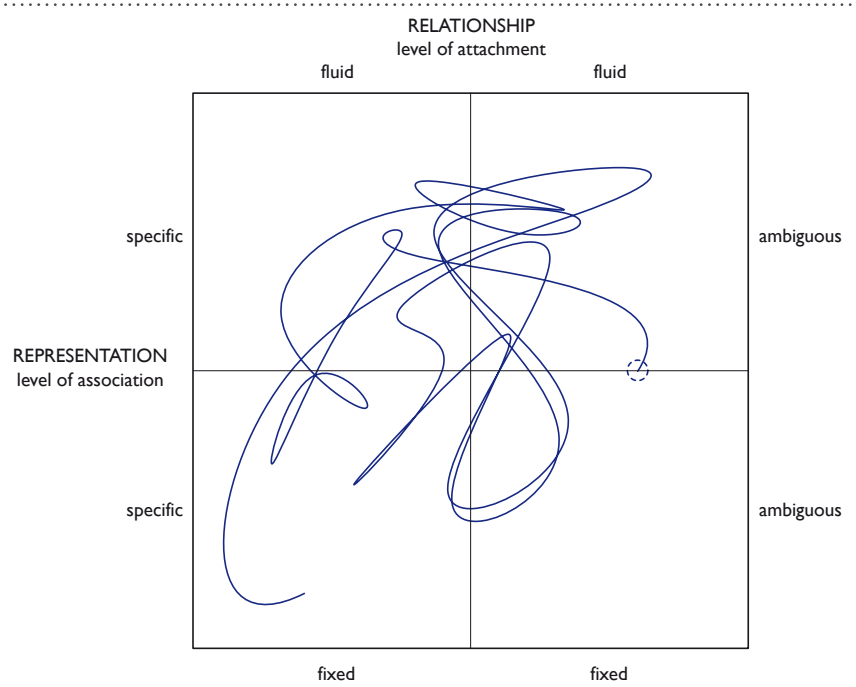
Fig. 119: Performative Urban Spaces Quasi-Causes

Fig. 120: Performative Urban Spaces Quasi-Object









D: Interactive Sculptural Lighting

The project regarding an interactive sculptural lighting was started up in a close relationship with the local engineering firm, Korsbaek & Partner and the engineer John Bo Nielsen, with the idea of considering a more adaptable and performative lighting as an integrated urban interior for selected more active urban plazas. The initial studies and brainstorming for this kind of more dynamic lighting was started years before the actual beginning of the research project; however the methods, technologies and general approach to performative environments restarted the very basic idea behind project with new energy and opportunities.

Background

The initial idea emphasized a kinetic lighting element, which could revolve and follow moving objects in a public space. Several kinetic structures was investigated to achieve maximum range with the most efficient and elegant structure, at the same time as incorporating a more performative and participatory element to lighting and urban life. At the same time the performative approach investigated how the traditional urban interior could be transformed into urban spaces with more diverse activities and longer duration. Here the urban lighting was part of a research towards a more directional and specific lighting that followed the real-time activities on the street, at the same time as using an alternative design proposal and new media to extend the possibilities of interaction in the street scape.

Initially different plazas and urban spaces were considered for the proposal, but just before the final drafting of the project, the maybe most interesting space was made available as a potential implementation area. The Kennedy Plaza in Aalborg is a highly dynamic plaza stretched out between the train station, public park, shopping centre with large parking facilities and near the inner city of Aalborg. Thus the plaza appears as a transportation hub for both visitors and commuters to and from Aalborg and presented some obvious possibilities for implementation.

Along with the first conceptual studies that investigated how light could move to different places on a plaza through actuated movement at the same time as adding a performative media as a focal point of the structure, studies were also carried out on the life and activities on the plaza. Most flows moved passively through the plaza with dedicated goals at the boundary areas, however a few were settling at somehow unpredictable spots mostly due to the fact that tramps had taking over the centre of the plaza leaving no meaningful landmarks for other people. At the same time

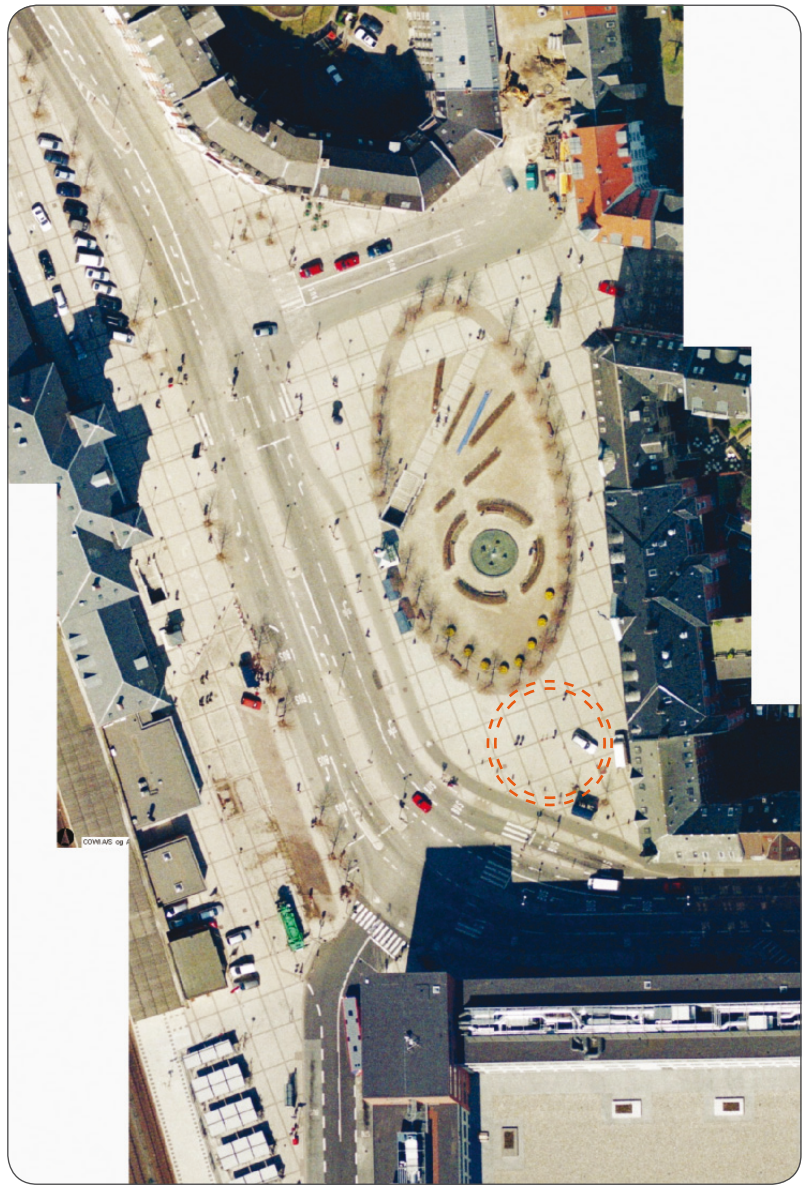


Fig. 121: Kennedy Plaza, Aalborg, with the site in the lower end of the plaza.

Fig. 122: Kennedy Plaza

Fig. 123: Waiting for friends.

Fig. 124: Most common activities on the plaza.

Fig. 125: Waiting for the train.

the activities at the train station and shopping centre presented themselves as highly passive activities where the most noticeable behaviours were introvert, mental activities and flickering with the mobile phone.
Based on the background theory and other case projects, it was essential not to consider urban space just as a rational and functionally optimized street scape that negotiated flows in-between stationary functions. Instead urban space is considered as the turning point for a diverse urban life across the time of day and year, and performative technologies that both are personalized, interactive, networked and potentially acting as social platforms are highly relevant for especially areas like the Kennedy Plaza.
Here the city can essentially become a stage for human encounters mediated through new type of performative designs at the same as it reiterates concepts of identity and branding of the city itself. At the same time much of the current street interior are meant to fix existing activities and hold them on designated spots, however instead the approach to follow people along their movement and offer them alternative possibilities for action would be a way to mediate encounters by extending an existing dynamism.

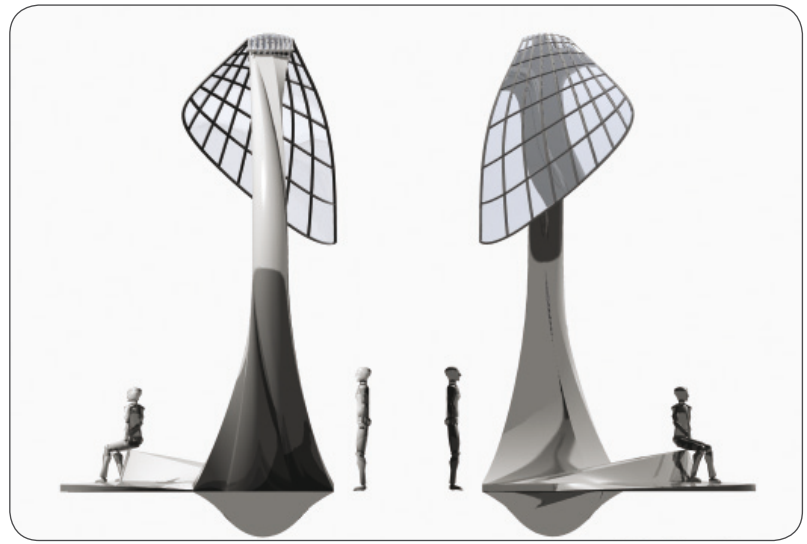


Fig. 126: Front and back view

Artis Kinema

Knowing how essential these low-level and increasingly hybrid interactions on the street level are for the development of the citizens identification with the city, it was essential to design a movement that existed as part of the urban encounters as an inspiration for an extended experience of the city. Here Artis Kinema is a 'moving artistic object', or a quasi-object', which is spotting activities on the plaza and moves to illuminate approaching people with the top-element to follow them across the plaza. Through the integrated media on the top element, people are able to affect both the appearance on the screen, at the same time as they through their body negotiate the turning path of the sculptural lighting.
The lighting is personalized and during evenings it invites for a more safe space for recreation, at the same time as it offers a platform for potential social interactions at the landscaped seating or under the media element. The turning point for the design concept was the explorations of kinetic structures inspired by dissipative structures working as open systems far from equilibrium and constantly exchanging energy with its environment. This elusive form is created by the relationships on the site as a local focus point, and it is twisting up into a sculptural body with an interactive lighting surface. Through parametric studies the form is optimized in order to reach as far as possible on a plaza, at the same time as creating an encircled space and place around the sculpture. Through its circular movements contained

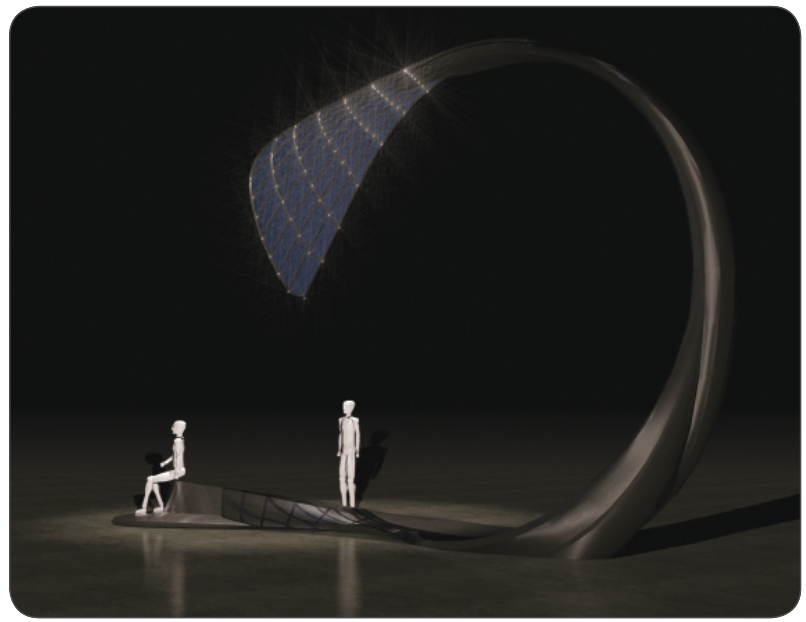
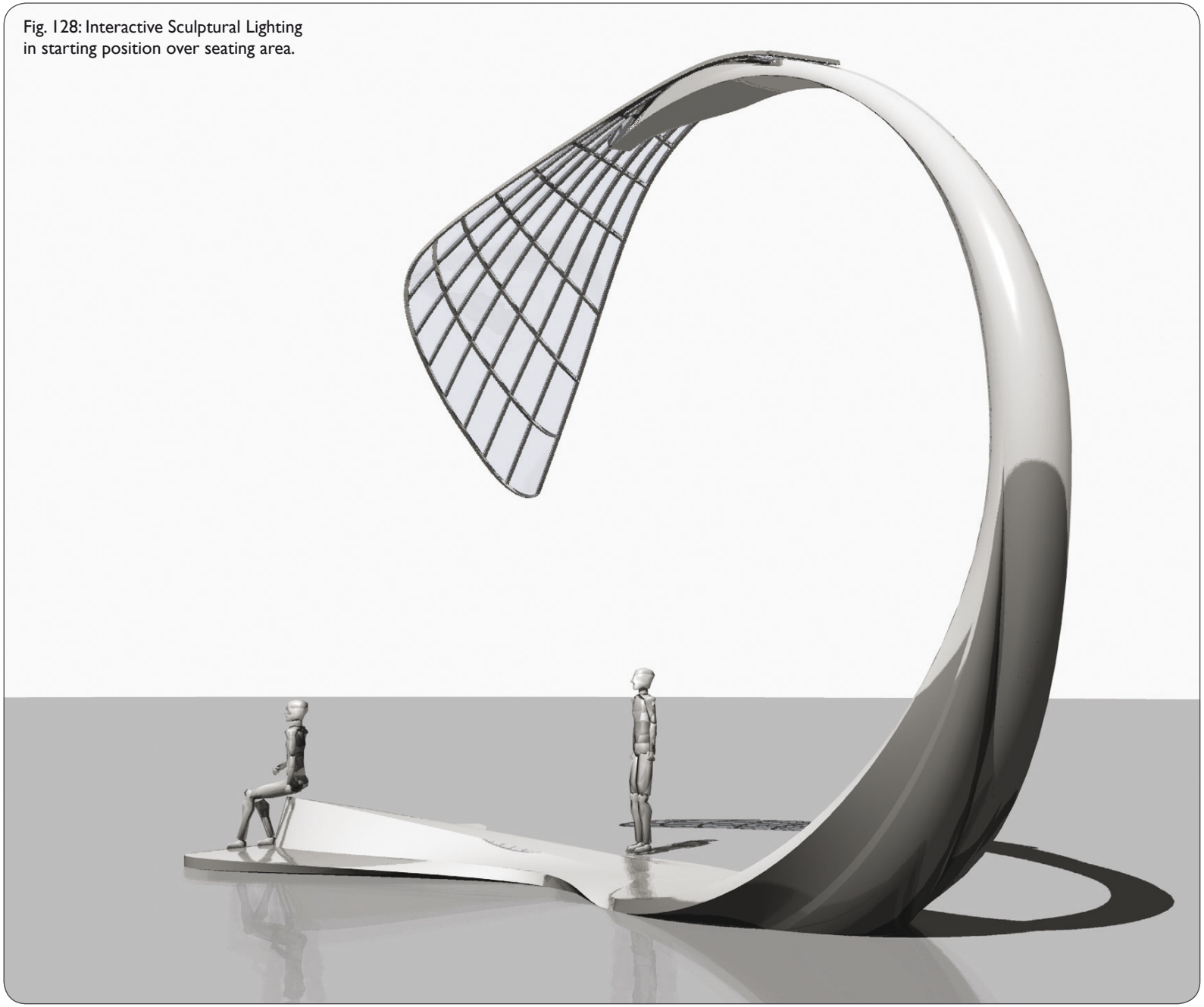


Fig. 127: Illumination at night

Fig. 128: Interactive Sculptural Lighting in starting position over seating area.



through three main elements, it captures moving elements, negotiates its position among groups of people and tries to maintain their stay through ongoing interaction.

The base element is a temporary seating area cast in concrete with a polyurethane (PU) surface treatment. The base is sliding into the lower body also in concrete and containing the technical installations. The upper part of the body is milled in carbon fibre covered with PU, and on top is mounted a head structure in an aluminium grid with plexiglas elements, solar cells and integrated LED lighting. A 360 degree tracking systems is achieved through an integrated laser system in the lower body, which initiate the first movements towards the moving elements. Two motors are positioning the three elements in relation to the activities around the element, and camera tracking in the top element responds more specifically to the behaviours of the tracked elements.

Performativity

The interactive sculptural lighting project is performative in many ways. First of all it is one of its main ambitions to stage the flows of everyday life through a kinetic structure following moving elements as well as additionally illuminating them during evening and maintaining them at the site for a longer time. Here it acts with mobility patterns and can be specified towards specific urban tasks as e.g. following groups of people and changing the media element in relation to essential group behaviours. It has been designed from a series of performative studies looking into how design can respond to the complex patterns of urban behaviours, and through parametric design optimized to reach as far as possible still maintaining an ability to collapse and fold. The design does not prescribe a specific association for the space, and through its movements, it reconfigures the space at its proximity acting as an attractor for new activities.

Through the perspective of these new performative urban artefacts', the city is no-longer just a rational and optimized surface intended for the mediation between stationary functions, but instead acting as a dynamic centre for a diverse urban life across day and year. These artefact's act in extension of current mobile technologies and increasingly interactive settings, which actuate more multi-functional and alternative recreational and social purposes as a basis for a renewed and constantly evolving identity of the place. The city becomes a stage with a series of networked points, which trigger new relations through alternative interactive designs and do not fix any potential existing dynamic and creativity but frames how the city can develop.

Fig. 129 Turning by rotating the upper parts.

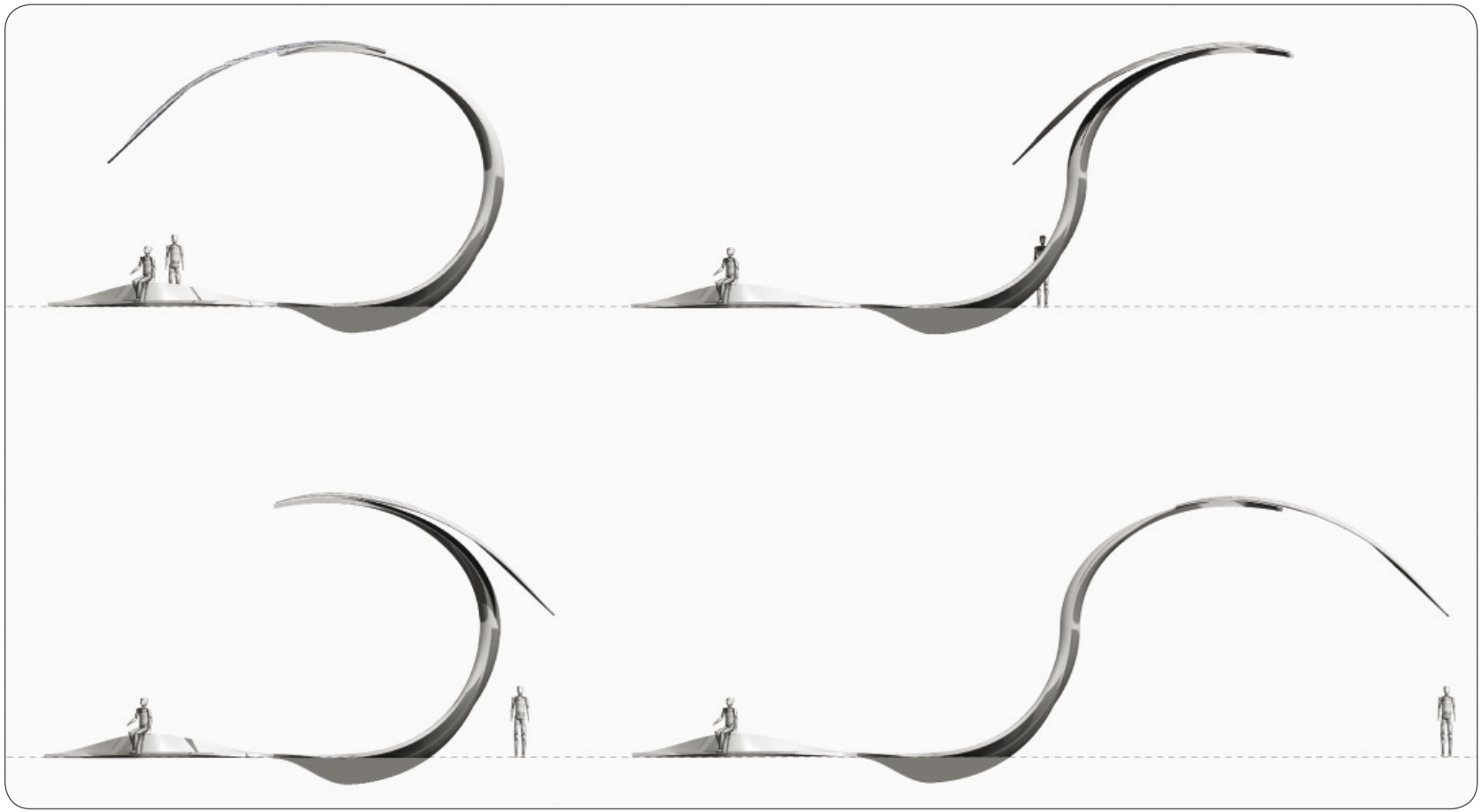


Fig. 130: Side view of turning light

Overall relationships

Technology – level of feedback

The interactive sculptural lighting works across the different levels of feedback. Initially it tracks and moves gradually almost through reactive patterns, however goes quickly into more interactive movements depending on the behaviours of the tracked elements. It works through dialogue to augment different ways to move and tries to dislocate the pre-conscious and rationally intended path over the plaza. If it succeeds in attracting the elements in target to a central seating area, it unfolds again to find new subjects to stimulate. Here the technologies are acting as a specific extension of the moving bodies in choreography between objects and subjects. The integrated media element acts through light and sound to additionally extend the moving bodies into an interactive setting, which changes according to the behaviours of the assembled group.

Representation – level of association

The lighting is always in change. If there are no activity on the site it rotates very slowly to look for potential subjects at the same time as keeping track of optimal sun locations for charging energy through the solar cells. Thus it will potentially never look the same but always change through the twisting of the turning elements; however in overall it moves from a long stretch to capture moving elements into a closed condition to facilitate the assembled elements. Its representation is based on dissipative structures, which do not exist without dynamic parameters; however it additionally works to stimulate new orders in complexity and spontaneous social relations.

Relationship - level of attachment

Attachment through bodily affect is central to the understanding of how this kinaesthetic element mediates social encounters in the city. Not only does it work as an attractor but at the same time emphasizes how collaborations can make it enter certain patterns of movement. Thus collaboration and social interactions through temporary attachment is central for creating new relationships and potentially opening up for alternative activities. The identity of place and social relationships are stimulated through collective effects in the quasi-object, thus extending mediation into potentially meaningful encounters. Encounters which extend into interactions and throughout day and year go into repeating patterns creating a framework for recognition of place through affect. Here the interactive sculptural light gradually maintains place through its dynamic character.

Fig. 131: Artis Kinema at the Kennedy Plaza.

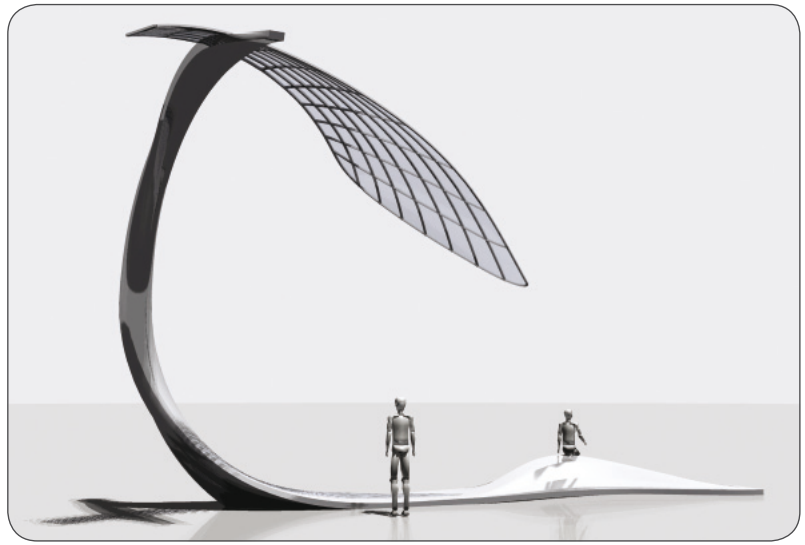


Fig. 132: Rotating light

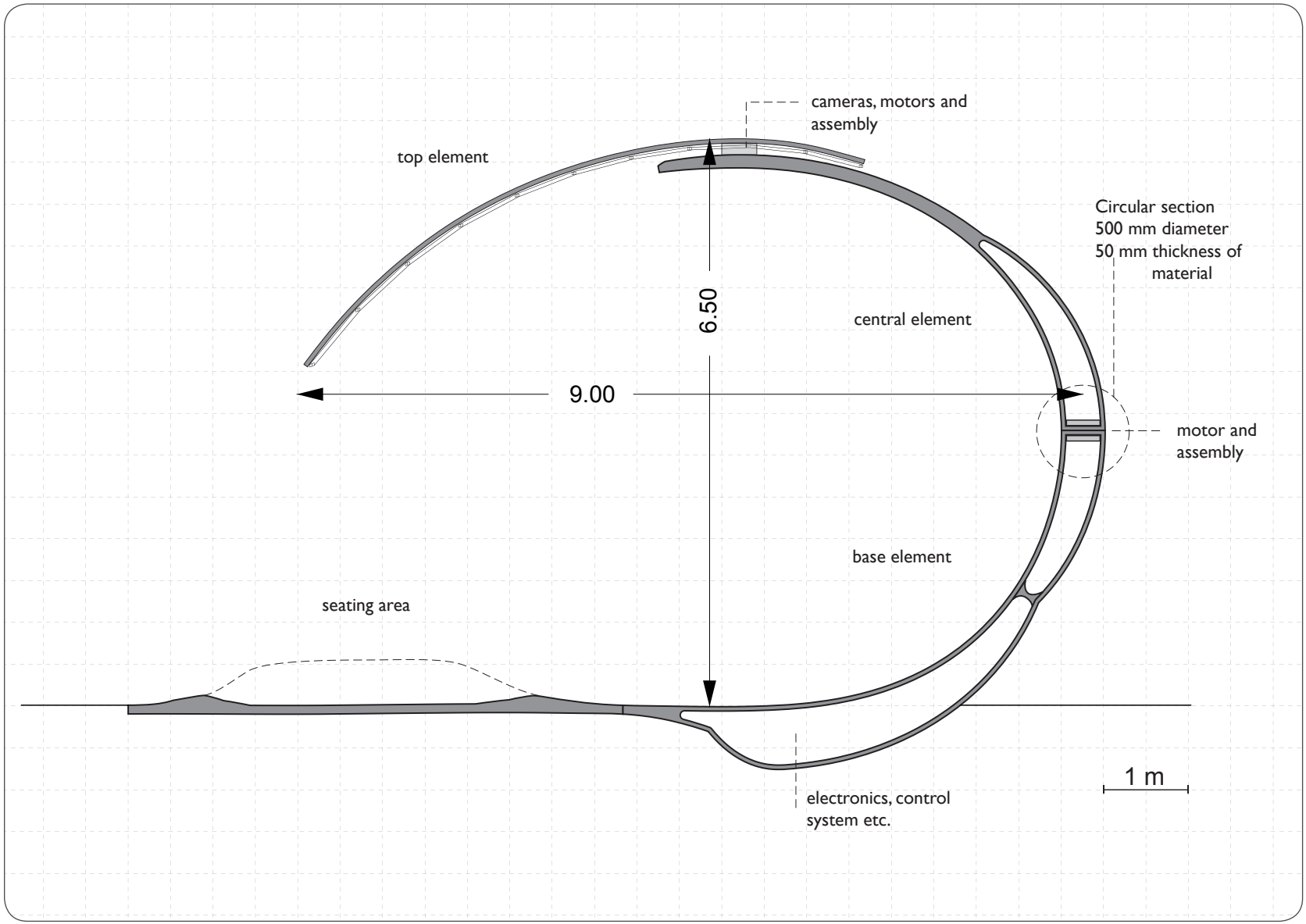


Fig. 133: Section

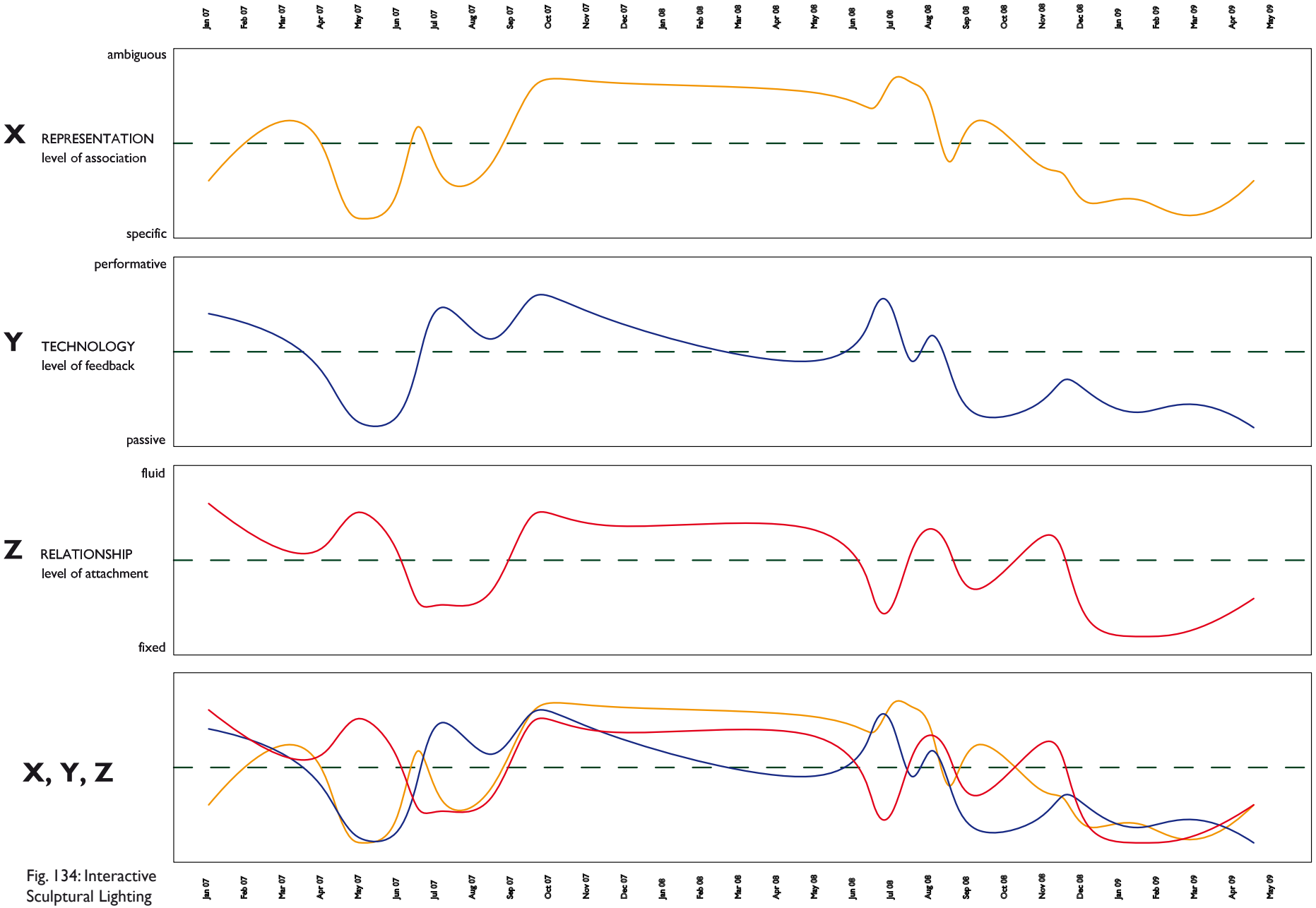
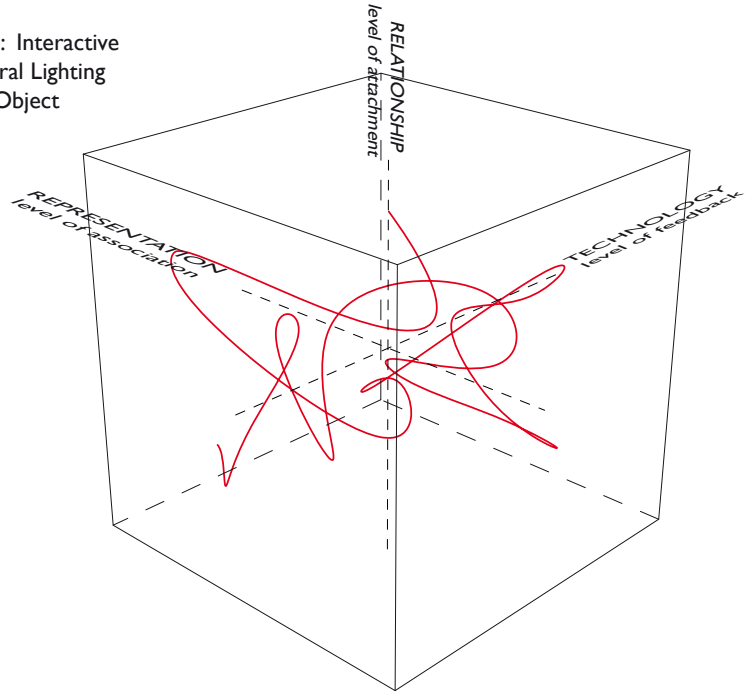
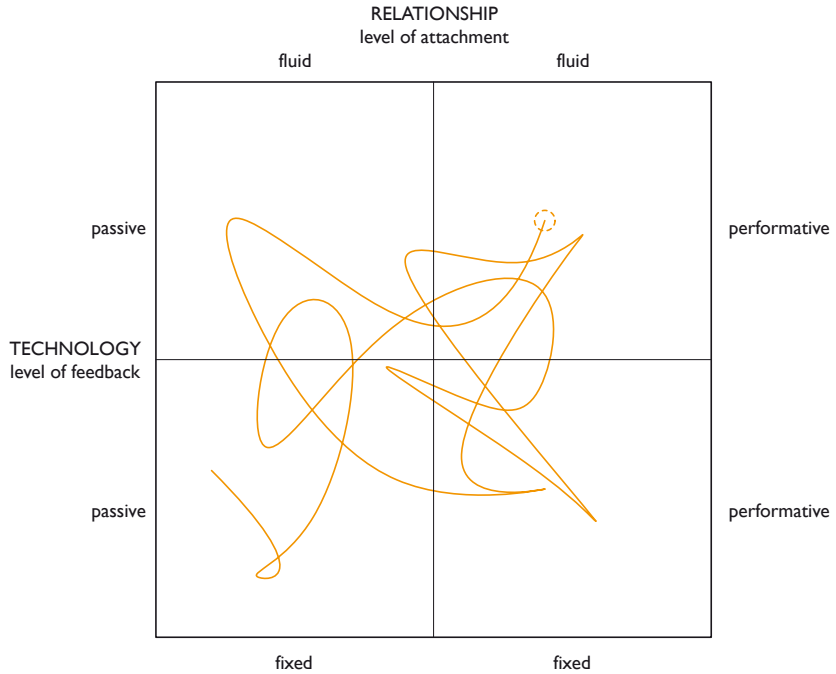
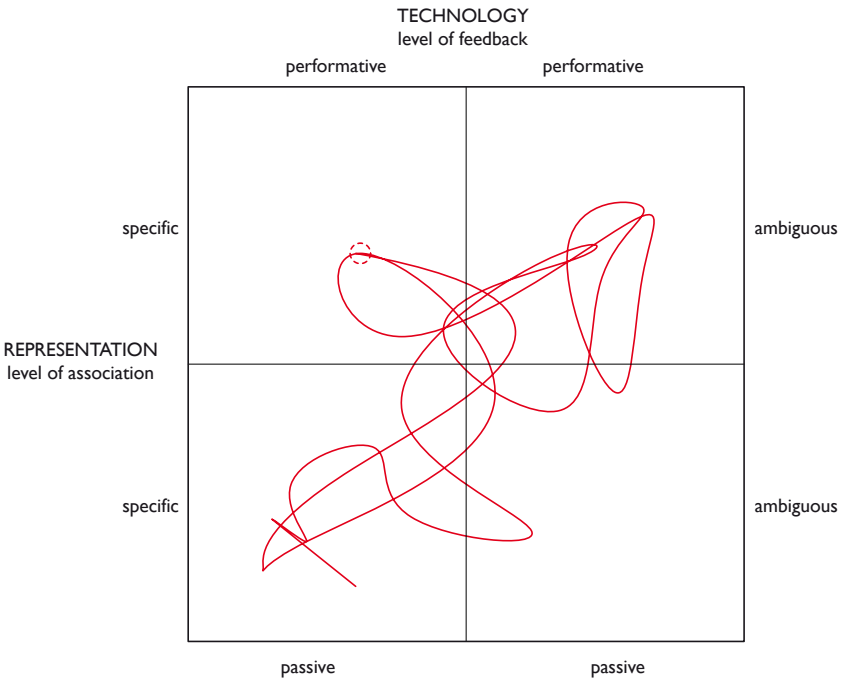


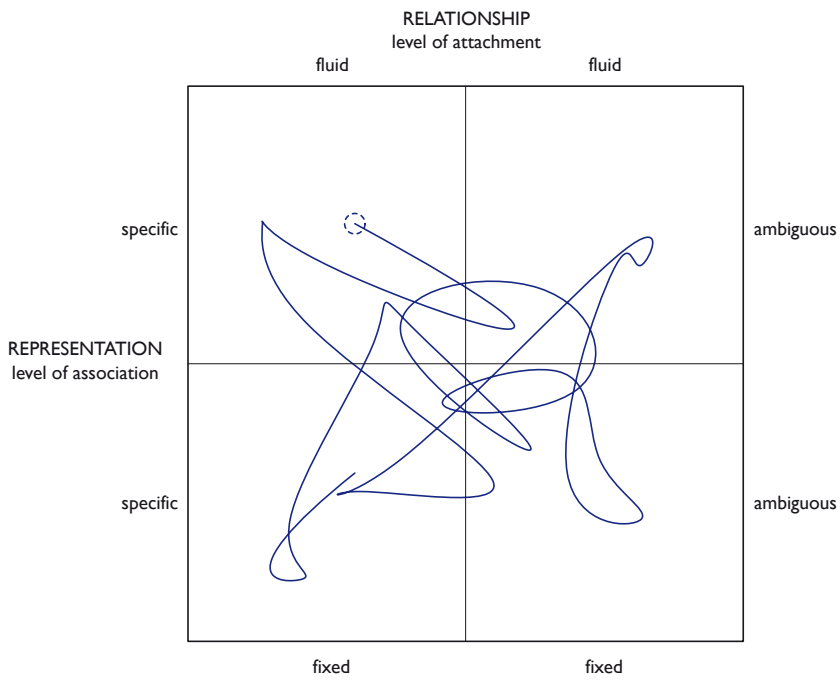
Fig. 134: Interactive Sculptural Lighting Quasi-Causes

Fig. 135: Interactive Sculptural Lighting Quasi-Object









E: Eco-Pet

Eco-Pet is a research project developed at the MIT Mobile Experience Lab, in collaboration with the Province of Brescia and the colleagues at MIT, Colleen Kaman and Lorenza Parisi. It was initiated by a workshop at the Mobile Experience Lab emphasizing sustainability by promoting learning and civic engagement through new media. The project was sponsored and carried out in close collaboration with the Province of Brescia in Italy through an intense dialogue, local site studies and interviews at the local province. The project had the main purpose of redefining the relationships between urban sustainability and the local youth by imagining new forms of communication and services to foster learning, knowledge and social inclusion, as well as exploring innovative designs for embedding electronics into the urban fabric including public transportation. The main problems emphasized how the youth weren't aware of sustainable issues, indicated 'mis-behaviours' when using new media both through violence and not socially oriented purposes, and additionally the government was out of reach and couldn't get through with new messages and information campaigns to the youth.
The initial studies from the Province of Brescia showed that environmental issues ranked as one of the most important issues for the youth, however at the same time they possessed some of the largest and most energy-consuming cars at an early age and additionally driving drunk instead of using public transportation. Through a series of workshops and group sessions, the theme was approached through discussions, research and design explorations working towards a mid-term presentation in Brescia and final presentation and delivery for potential realization at the MIT.

Background

The project proposed the development of an 'Eco-Pet', as a tool that records geo-referenced environmental information like sound and air quality and exchanges that information among users on a multimedia website. The users are actively engaged in using the eco-pet, and the project thus proposes to close the gap between environmental enthusiasm and agency through an aspect of active learning and civic engagement. It was of particular interest to examine how performative technologies could encourage vibrant, constructive social engagement across urban spaces by fostering environmental awareness and user-friendly public transportation; additionally how this transformation re-imagines social networks, urban culture and the city itself. The team explored a series of projects involving environmental awareness, data collection and sharing, interactive urban environments and personal objects. While doing research in Brescia, the team collected qualitative data and interviews from multiple youth groups about their habits, use of mobile technologies and public transportation, as well as their views on the urban environment.
Through a series of iterations, the Eco-Pet was designed as a digital pet that circulates through physical space with its owner as a cell phone charm or bag attachment, and which the user keeps healthy by limiting the amount of excessive noise or excessive pollution the device encounters over time. The research is informed by Sherry Turkle's work on emotional attachments to mobile objects and the use of these objects to create common narratives of experience and place. These objects are intended to have an emotional meaning for the user and will become more evocative as they are customized; thus, the Eco-Pet might be thought of as an extension of the individual taking on the qualities of its owner.

Eco-Pet advances the concept that actors come to define themselves and others through interactions by the mediaries that they circulate within society, and considers how media transform these identities and interactions. This blurring of physical and digital space encourages the extension of private social networks into urban space, allowing citizens to more fully engage with the ecology and geography of the city. With the Eco-Pet as a monitoring device it records geo-referenced environmental information like audio and air quality and exchanges the information among users. Furthermore, as the device travels along the transportation system, it distributes recorded sounds and data via mesh networking. Gathering this data, embedding it in digital networks, interactive urban structures and circulating it in a social network also makes it a game, encouraging playful and ad-hoc interactions between individual users and groups as they embark on quests, individually and collaboratively, to record, exchange audio and make re-mixes to share with one another through interactive public spaces, distributed screens, online web interfaces, and the devices themselves.

With this Eco-Pet is also about process. As a data collection device, Eco-pet could help communities map relative pollution in their own neighbourhoods and thus increase their ability to reduce health threats at the community level. This is particularly important in the case of air pollution, as relative levels vary greatly by factors like exact location and time of day. Unlike many environmental projects that assume technical fixes can address issues of pollution and climate change, this project redefines 'scientific knowledge' and 'environmental sustainability' within social networks.

Fig. 136: Shadowing the youth in Brescia to understand mobility patterns and activities.

Fig. 137: Use of music players as part of public transportation.

Fig. 138: Current activities at a local bus stop. with students waiting.

The Eco-Pet will potentially work on two social levels. As an intensely social ambient awareness tool in which users continuously share small bits of location-specific information, Eco-Pets will encourage them to create or deepen shared understanding of the shared spaces – intersections, schools, stores, and bus stops – where everyday life takes place. As a playful recording device, Eco-pet encourages users to actively consider how dynamic environmental qualities like sound and air inform our shared experience; for example, understanding how the exchange of sounds could encourage a more vibrant community, or how the acquisition of community with relevant scientific knowledge becomes a fun, non-technical activity. Thus, this project aims to tie social networks and the formation of friendship and affiliations to the formation of knowledge-building communities.

Eco-Pet also attempts to broaden the social definition of "environmental awareness" itself, from one that measures pollution levels to one that integrates community. This is pedagogical as much as it is tactical. On a tactical level, this accumulated knowledge will allow individuals and community opportunities to become better integrated into the decision making and design of their social spaces but will also offer governmental institutions and communities an avenue to join together to address systemic issues in a community. By embedding data acquisition within a digital network, the device encourages 'serious play' as well as ad-hoc interactions between individual users and groups as they embark on quests, individually and collaboratively, to record audio and air quality measurements around the city. This blurring of virtual and real spaces not only encourages the extension of private social networks into urban space, encouraging citizens to more fully engage with the ecology of the city or any geographically-defined space, but also shifts the discussions to one centred around agency, awareness, and community health, where the circulating object shapes the personal understanding of the surroundings.

Performativity

The Eco-Pet contains the characteristics of the previously mentioned 'Open Spime' project, as a circulating device gathering data about the environment as well as being customized and personalized by its users. The Eco-Pet is a performative object in how it both shapes individual knowledge and the environment through its circulation through the city. Additionally the Eco-Pet enters as part of an upgraded infrastructure with interactive installations embedded as part of existing transit nodes, which extend the use and experience of waiting time as well as create new public domains and spaces of exchange through small collective performances. Essentially the Eco-Pet is acting both as a mediator of an increased environmental awareness as well as a mediator of social relationships by the playful circulating of the geo-referenced environmental information.

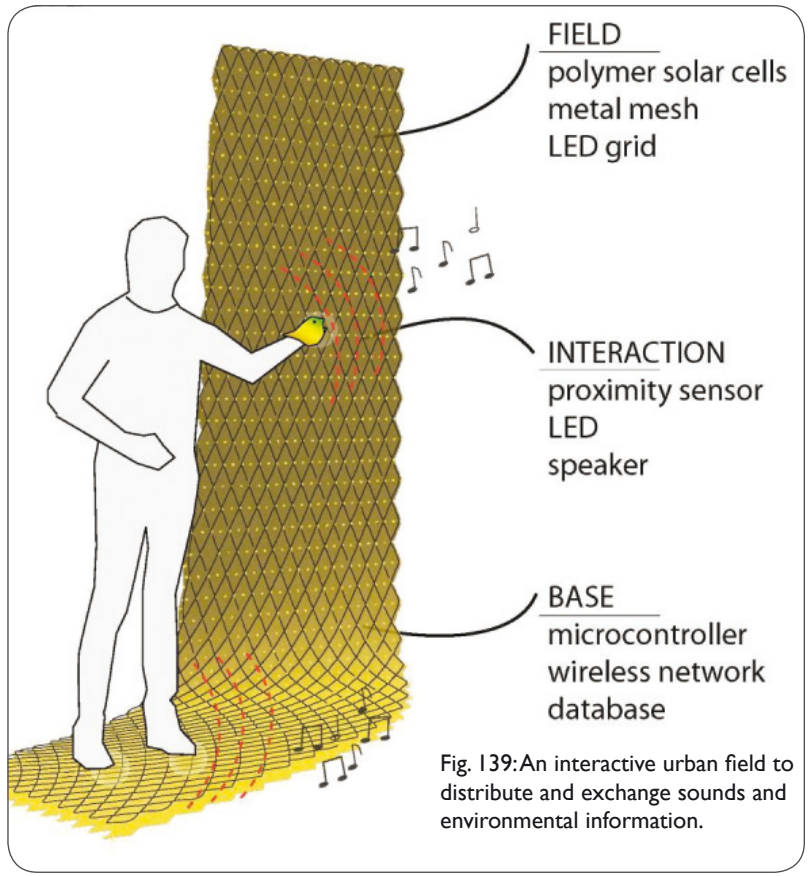


Fig. 139: An interactive urban field to distribute and exchange sounds and environmental information.

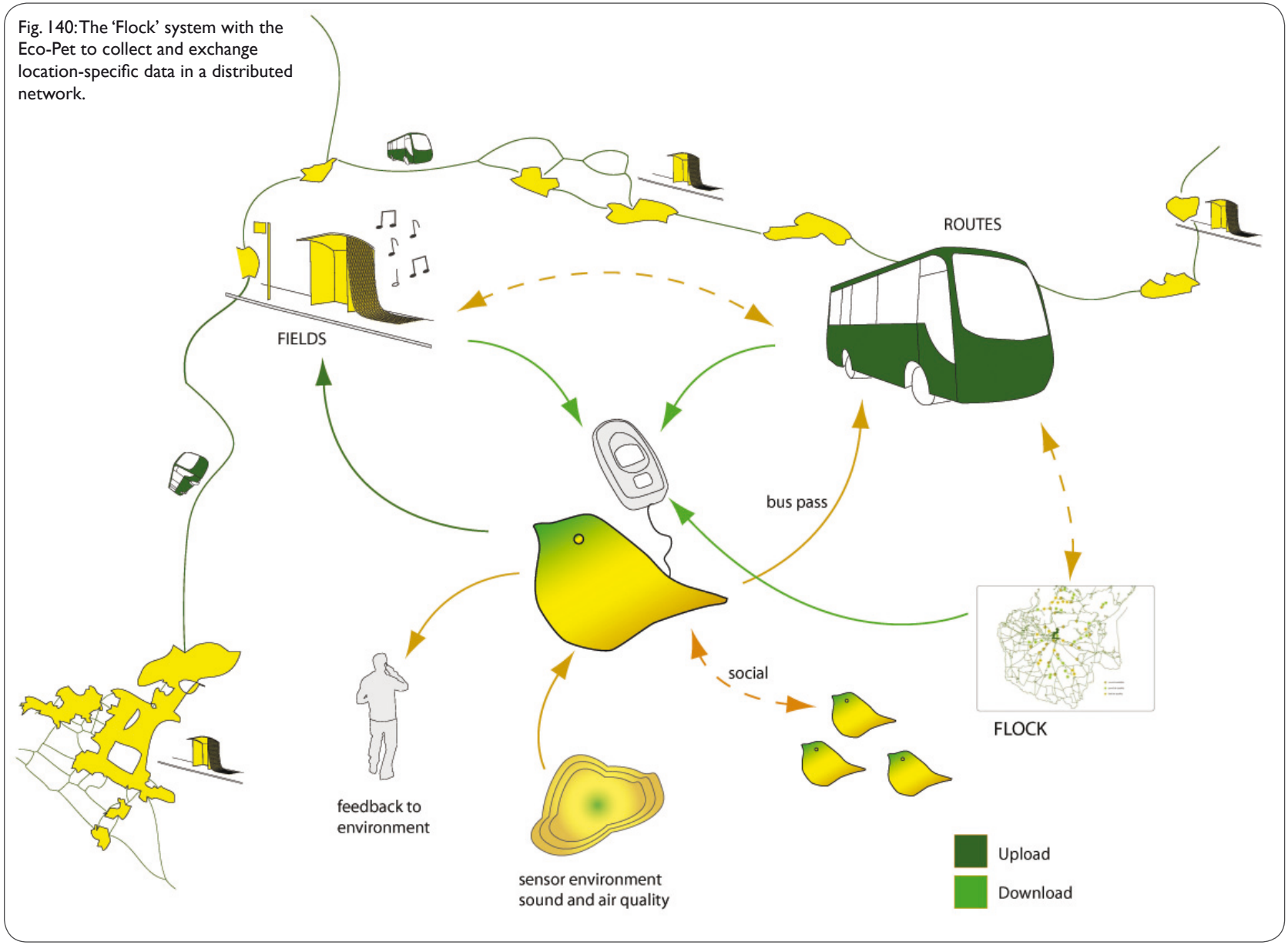


Fig. 140: The 'Flock' system with the Eco-Pet to collect and exchange location-specific data in a distributed network.

Overall relationships

Technology – level of feedback

The Eco-Pet consists of the basic characteristics of performative technologies with a RFID chip with memory storage, peer-to-peer networking and a GPS module. Additionally a microphone and pollution sensor acts as the basic sensors for environmental information to be expressed through an integrated speaker, and lights to change the colour of the device. The Eco-Pet can be interfaced through one button to record sounds as well as accessed remotely to change the content of the device.

The Eco-Pet also emphasizes the central issue of performative technologies. Here the platform is in place both as part of the integration in the device as well as the shared virtual and real platforms for exchanging information; however the technologies additionally need to promote this exploitation and usage of information among location-specific users thus intersecting place and the social. This is potentially existing as part of the community-based efforts to integrate these services among existing public infrastructures e.g. bus cards and bus stops along with learning purposes and youth culture.

Representation – level of association

The Eco-Pet is based on an existing Italian tradition of attaching charms to bags to illustrate a more personalized culture. Here the device contains the basic technologies, but can be accustomed through attachments to other devices as well as with additional marks or brands. The associations are thus based on a specific environmental concept illustrated through the singing of birds changing colours depending on the quality of the local air, however can be accustomed and thus potentially more ambiguous through use.

The content with audio clips is rather specific however as with any sound they can be difficult to associate without a clear context. It helps that the users collect the sounds themselves, but additionally the ability to create mash-ups by recording and exchanging clips through installations and web-interfaces move the sounds to become more ambiguous, however at the same time potentially becoming more social and attached to its users.

Relationship - level of attachment

The attachment exists at multiple levels at the same time. The Eco-Pet can be fixed to its user based on customization of both the expression and the personal content with recorded sounds, mashups and location-specific data. At the same time the aggregation of this information, the exterior expression of the Eco-Pet changing according to its user and the possibility to share content, will inscribe it as part of more fluid relationships potentially creating an actor-network through a bottom-up approach.

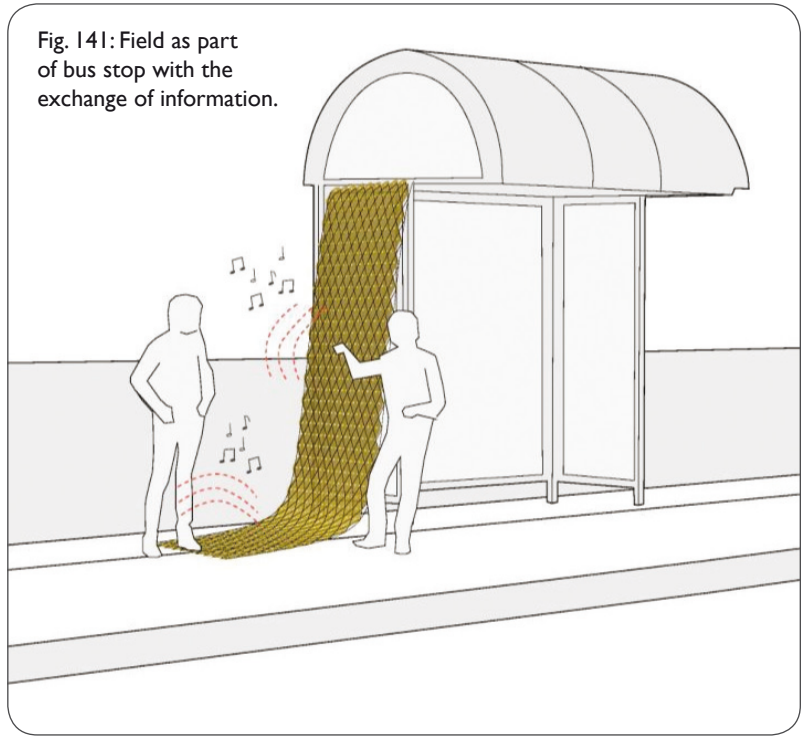


Fig. 141: Field as part of bus stop with the exchange of information.

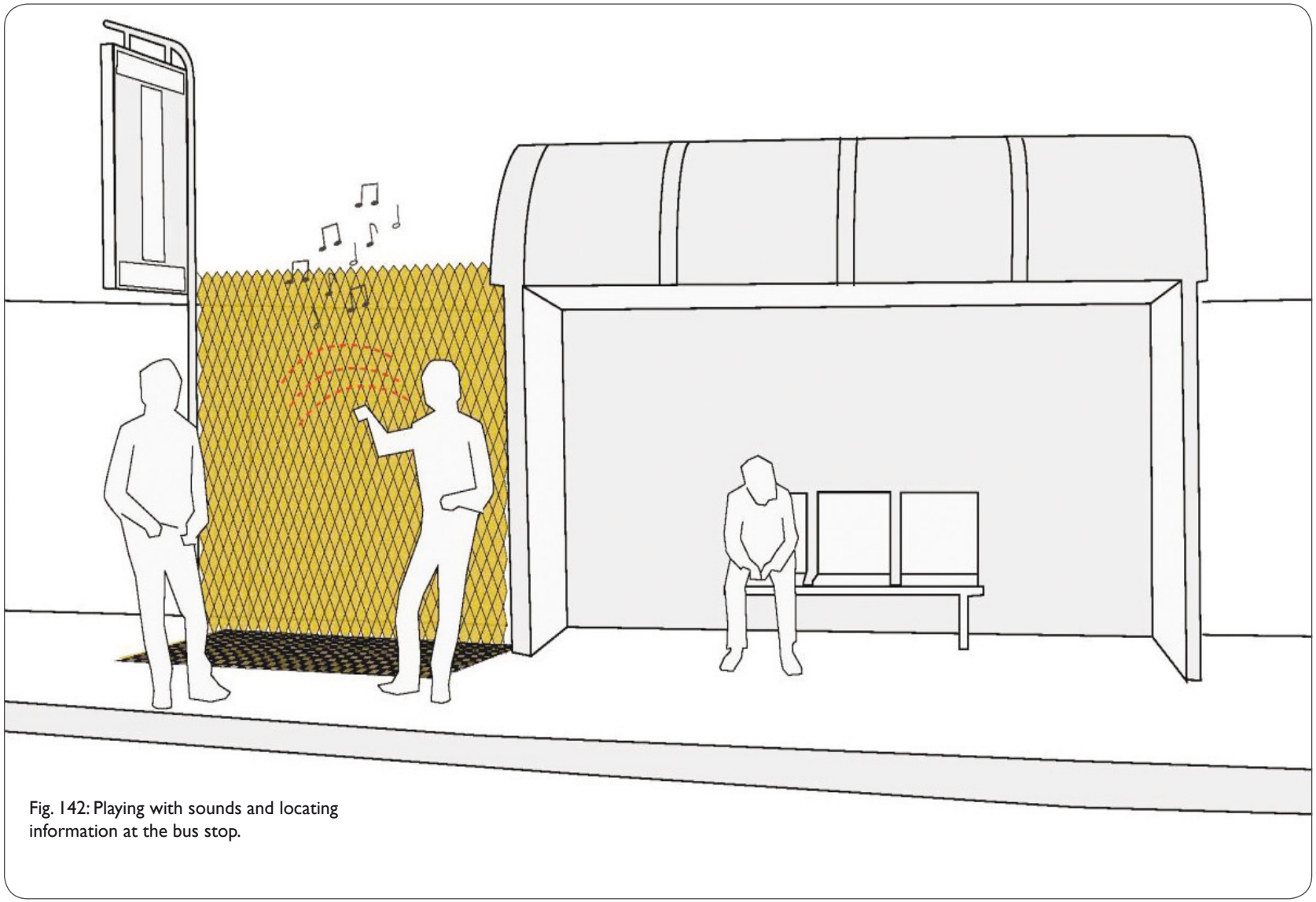


Fig. 142: Playing with sounds and locating information at the bus stop.

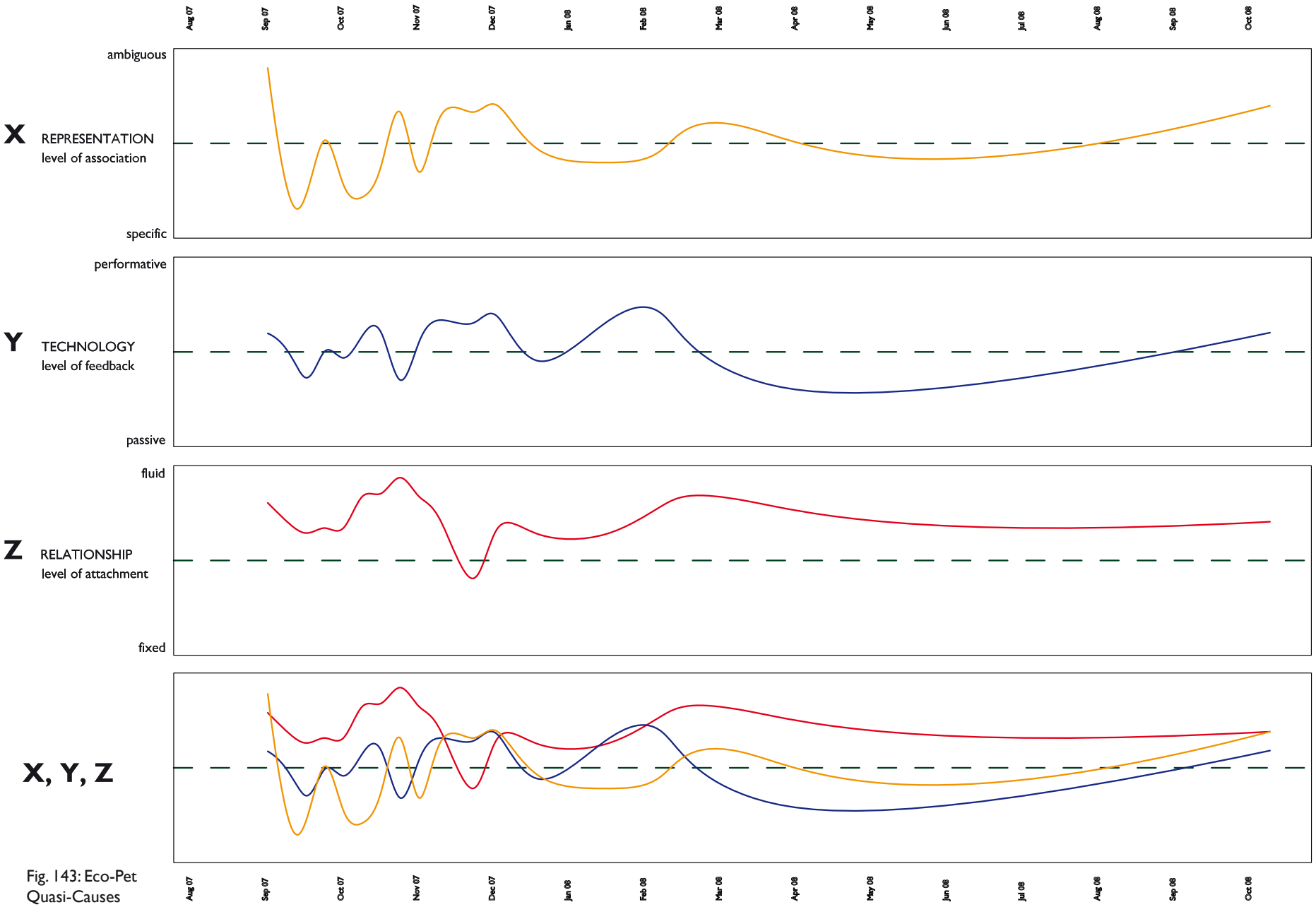
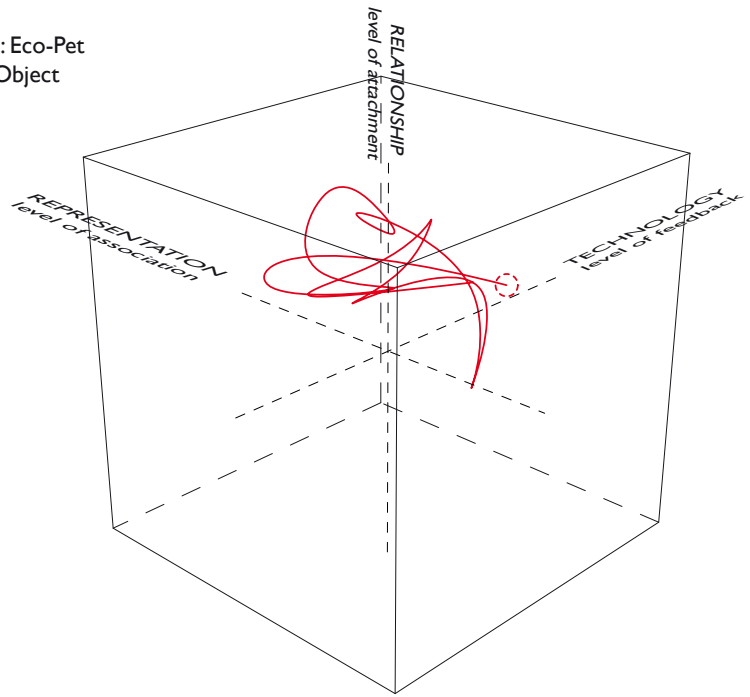
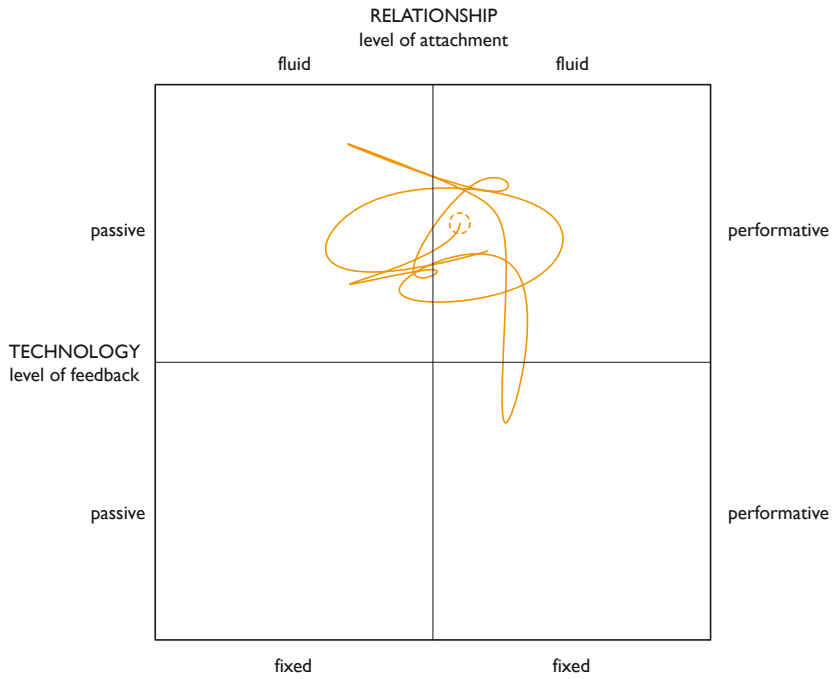
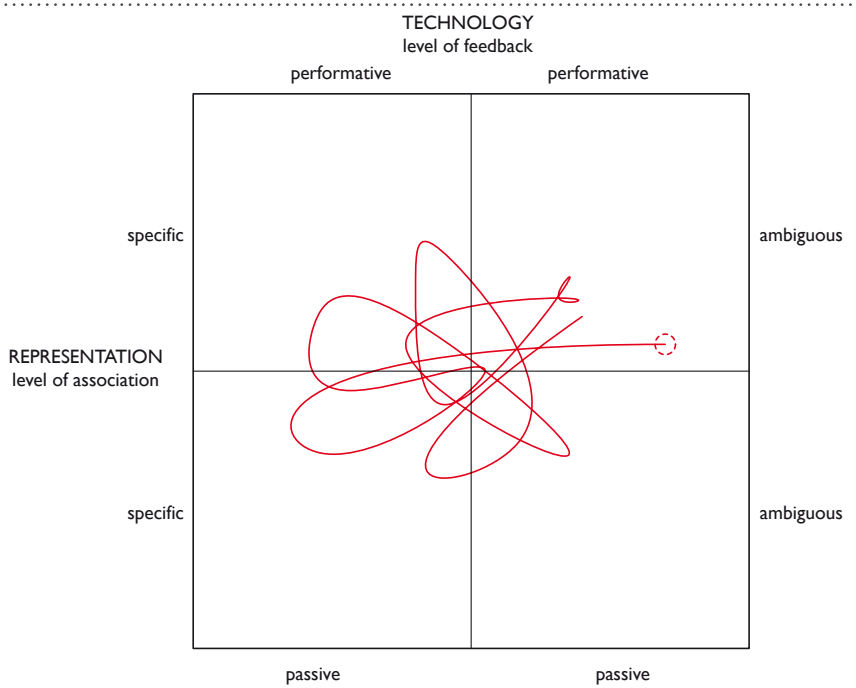


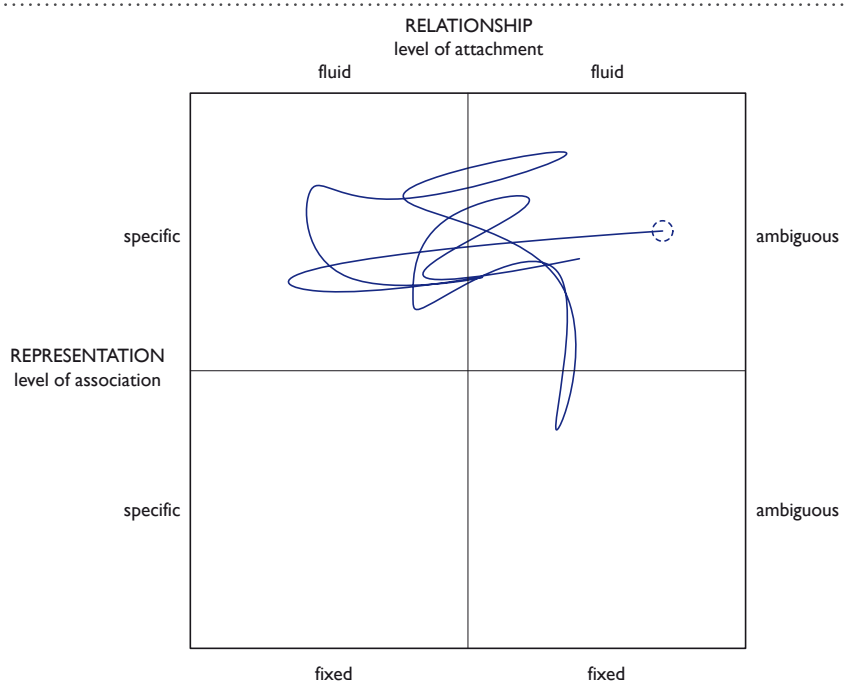
Fig. 143: Eco-Pet
Quasi-Causes

Fig. 144: Eco-Pet
Quasi-Object









F: Social Lighting

The social lighting project describes four cases containing the same overall objectives concerning performative technologies and lighting design. The first project extends directly from the NoRA project to further investigate the challenges of interactive lighting as part of event programs, however additionally all the lightings project concerned more experiments within specialized lighting designs including the overall issues of social lighting in different contexts. The first project was a lighting design carried out for the Nibe Festival in Denmark, which was continued into a more focused prototype for an interactive lighting application. Afterwards came a proposal for a more artistic lighting customized for different spaces and people, and in the end the experiences from these three projects was finally integrated into an urban lighting scheme for Copenhagen, as a demonstrator for the Copenhagen Climate Conference regarding more sustainable urban lighting schemes.

Background

The lighting design for the NoRA pavilion was a central and integrated concept both as regards to the customized lighting for the specific users, mainly the national cooking team, as well as the scenario for the adaptable lighting scheme mediating the urban relationships as part of the architectural skin. Here lighting was synchronized with the different activity levels characterizing the dynamics of the building and site, and thus part of a situated approach to lighting design. These relationships between different levels of participation playing with light as a way to mediate collective presence as well as more general environmental phenomena, was continued as part of a lighting design for the Nibe Festival 2007. This project was developed in collaboration with Jeffrey David Serio, a former student at Aalborg University, Digital Design, doing his graduate project within the framework of performative environments, and it moved the technologies from being attached to a stationary main frame computer as in the NoRA project to become integrated as part of stand-alone lights.

Nibe Festival

The Nibe Festival is a returning event, which each year gathers more than 30.000 people for 4 days of concert arrangements (Nibe Festival, 2007). The different stages of the festival are spread out in a small forest close to the city of Nibe in Denmark, but stitched together by a centrally located path connecting each of the main stages with additionally activities, small shops, bars and more spontaneous performances. This path has for many years been installed with a very low-tech lighting design based on a chain of incandescent lights on each side, however the festival organizers were very interested in experiments which could upgrade this lighting design to both make it more appealing for the space inbetween the main stages, as well as to involve the visitors and performers in a more customized and active lighting scheme supplementing the life of the festival.

The design process involved a series of meetings to discuss reference projects, difference types of lighting, interaction schemes as well as economy and maintenance issues. The lighting design, which was finally installed for the festival, consisted of a series of hanging balloons containing a halogen light, a microphone and a microprocessor to adjust the lighting intensity depending on the sounds from the below activities. The lights were thus expressed as large floating lighting bulbs, which slowly dimmed up and down depending on the sound levels obtained from a hanging microphone. When the large stages at each end of the path started up the performances, they triggered the intensity of the illuminated balloons making the path appear as a moving equalizer and thus extending the stage activities into the forest and interweaving the different performances. Additionally, the visitors moving between the different concerts, or staying at the bar's,

Fig. 145: Jungle Path and the hanging balloons .

Fig. 146: The illuminated balloon with hanging microphone.

Fig. 147: Jungle Path with visitor testing the interaction.

shops or for the temporary activities, were engaged in dimming the light through their voice or noisy activities.
The reactive lighting worked for one night only. It appeared not as dramatic with the sound from the large concerts, but was affected directly by the individual sounds below the balloons, mostly because of the directional microphones. This worked well mainly because it added some feedback for the visitors to additionally contribute to the spontaneous activities, however heavy rain already the first night, kept shutting down the microprocessors because of both high humidity and an unstable power supply in the forest. The interaction with the balloons was then shut down, but still they appeared as the large floating lighting bulbs as a more elegant lighting design for the path and festival arrangement as a whole.

Social Lighting Prototype

The experience from the Nibe Festival inspired a more detailed focus on social lighting schemes, here expressed through the concept that more people collaborating on the interaction would create emergent lighting effects to additionally support a common place for the participants. This however, would require a lighting scheme with multiple sensors, potentially networked, to involve several groups of people within the range of an intense space. The initial programming from the Nibe Festival was detailed, extended and integrated into a small prototype with LED lights and motion sensors. Each sensor dimmed one light, and affecting several of the other sensors during a longer time span involved additional lighting effects as well as the feedback was expressed through the digital manipulation of a virtual form. Thus here the lighting was becoming a media for co-creation affecting a digital form as a carpet extended in space depending on the effects of the multiple activities.

The technologies were integrated into a small mock-up developed at the MIT, and tested out by some colleagues trying to make sense of the multiple effects. The distance between the sensors however seemed insufficient, where it was more conceived as a table lamp and the virtual effect didn't make the immediate sense, where the participants were more focused on the specific lighting effect. The new prototype needed to be extended into a more carefully designed lighting application, which both would be conceived as a lighting element at the same as expressing how it could engage multiple activities in the space and thus gather around it a series of independent elements.

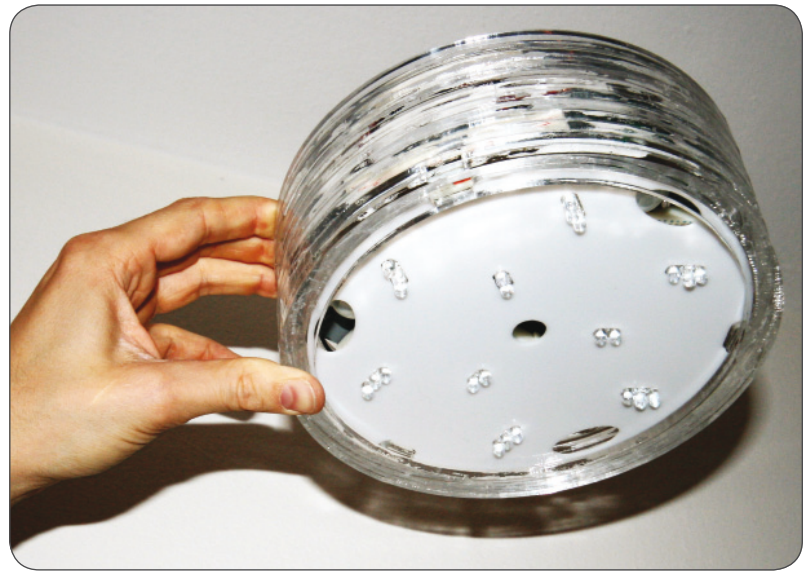


Fig. 148: Mock-up made from laser cutted acrylic pieces glued on top of each other.

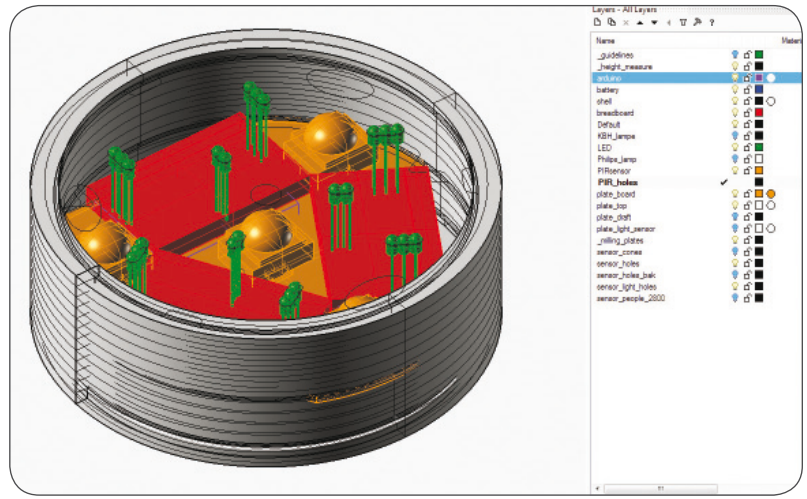


Fig. 149 3D model to locate electronic and sensor positions.

Fig. 150: Effect of two sensors.

Fig. 151: Effect from all sensors.

Candela Morph

To further investigate the affects of the social lighting, the prototype was presented at a few conferences and events describing the initial experiments. These discussions ended up in an invitation to exhibit and test out the concept at a Smart Space Conference in Denmark, which contained a collection of intelligent materials and applications meant to inspire guests to test out and engage with the prototypes. The prototype however needed to be further developed to become an actual application for a space, and the project entered collaboration with students and colleagues at the Department of Architecture & Design and Media Technology in Aalborg.
This concept involved the integration of the interactive programming in an adaptable structure described as 'Candela Morph'. Here Candela Morph becomes an intelligent light that investigates the direction, shape and differentiations of light through studies of activities in the surrounding space. The starting point for the light is a modular structure, which can be individually customized based on the dimensions of the space, trajectories of movement, other light sources and interior, and through the motion sensors and LED, the light and structure adapts to the architectural space. The structure of the lamp can be shaped individually and encourage own experiments with movement, forms, light and shadow, which extends into real-time when people are approaching.

The sensors each affect a RGB LED, which starts a gradient of colours depending on activity, and when more sensors are affected at the same time, all sensors enter a more active colourful pattern for a short period. Candela Morph is thus using the variation in light to inject a refined dynamism in the space and aims at collecting people passing by into a social space. The first encounters were quiet difficult to interpret, and thus the programming was refined to create a more specific feedback, but then people also became more aware of the effect and slowly move around to study the changing effects that they triggered. Only a few people recognized that more people gathering around the light, would make it appear differently, mostly due to the fact that the object was staged as an isolated exhibition object, and people glanced on a distance to make other people 'finish' the interaction.

When asking the participants about the effects and their perception of the light, they responded with a few very different responses. First group was triggered by how it changed slowly based on to a question about the meaning of interaction, they responded:'Interact? Of course, I believe it is the whole point. I want it to personalize and see that I can influence it!' A

Fig. 152: Candela Morph as office prototype.

Fig. 153: Candela Morph with the Design Group.

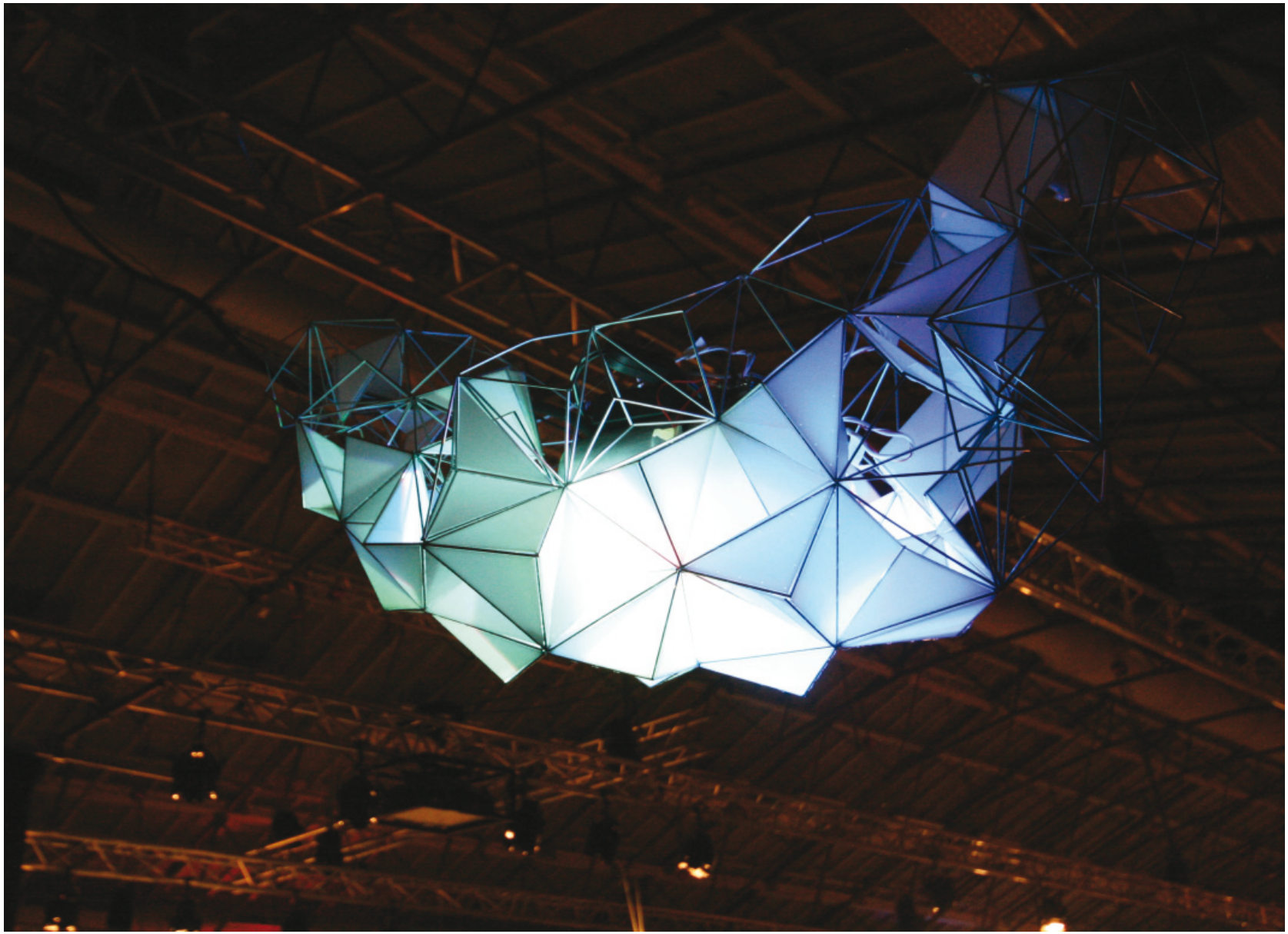


Fig. 154: Candela Morph at the Smart Space conference.

theme also appearing when discussing the structure, where the modular and customized appearance of the lamp itself, led to a range of new ideas for how to extend the structure and make people assemble it themselves. At the other end some people were a little confused on what actually triggered the effect, because they weren't aware of the sensors and locations,. These people were rather quickly uninterested because they basically felt a little stupid, although they could perceive no effect, when they stood still. The last group was very focused on the more sustainable potentials of the light. Here not only for the light to dim up and down according to activity, but how in general the light could influence behaviour, lower energy consumptions and in the next level inform about sustainable behaviour.

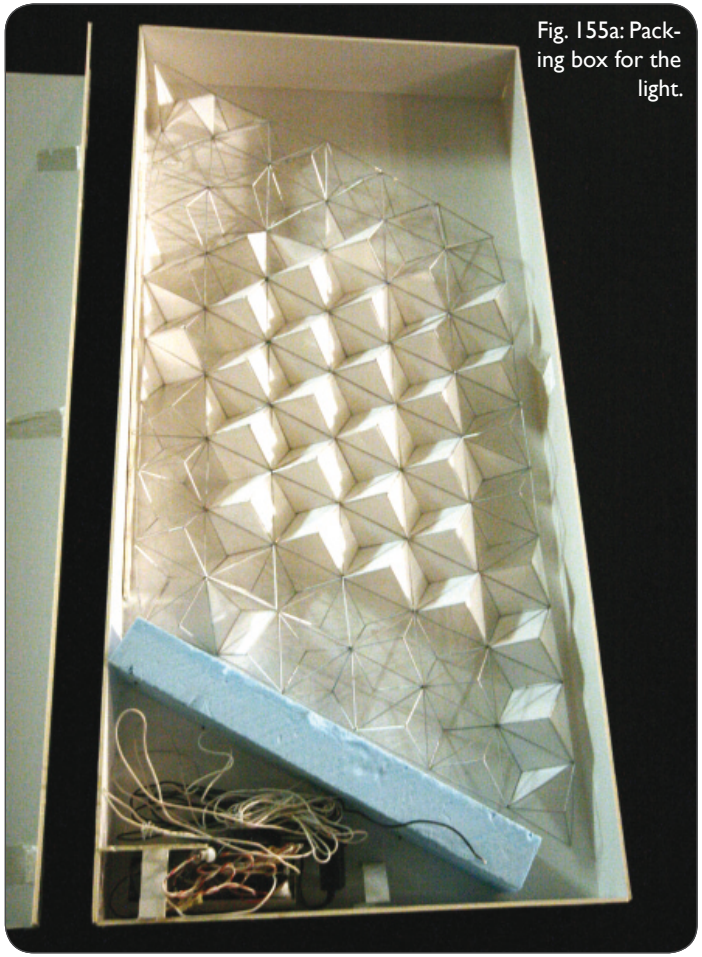
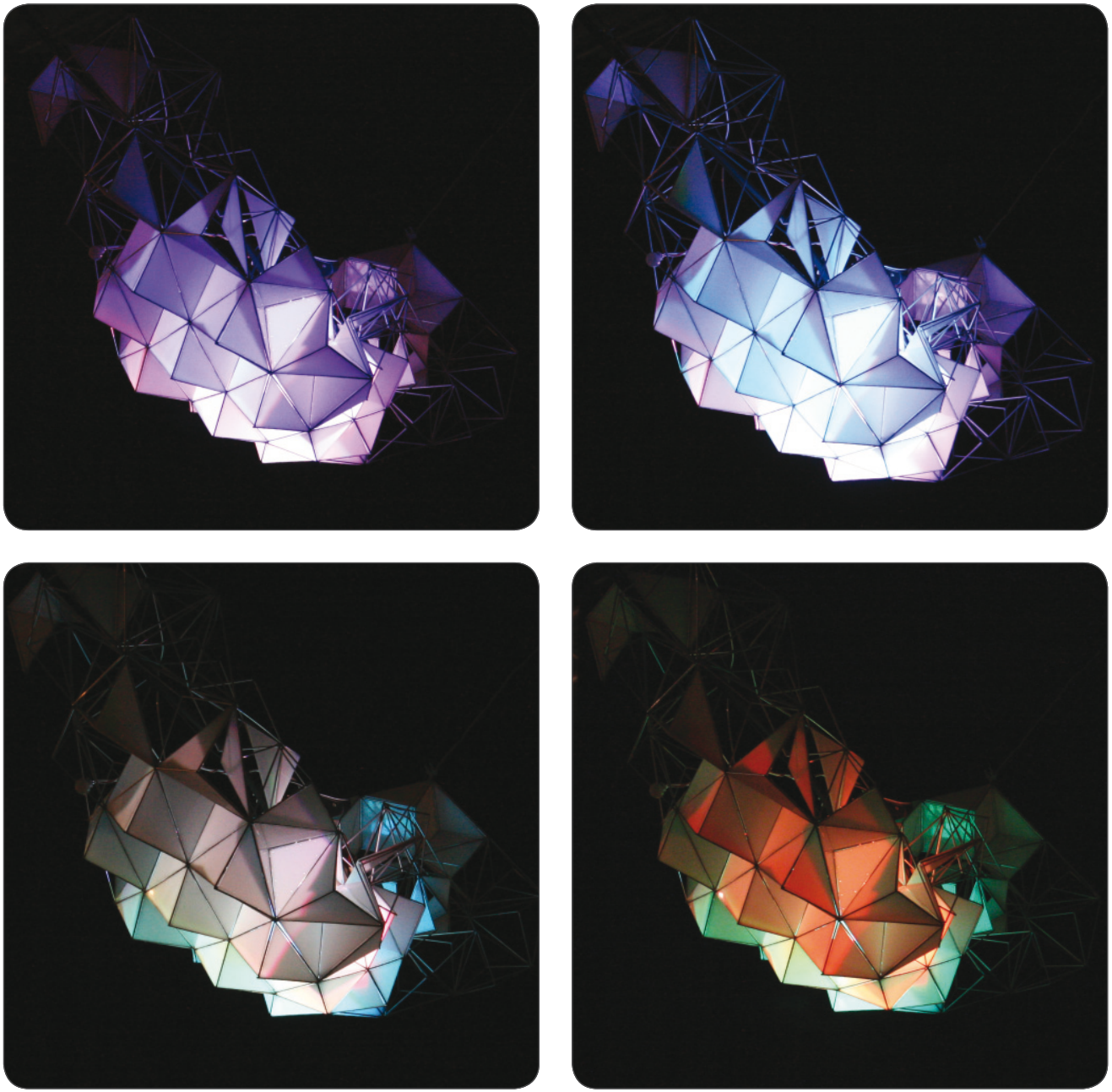


Fig. 155a: Packing box for the light.

Fig. 155b: Candela Morph at the Smart Space entrance.

Fig. 156-159: Different expressions depending on sensor effect.



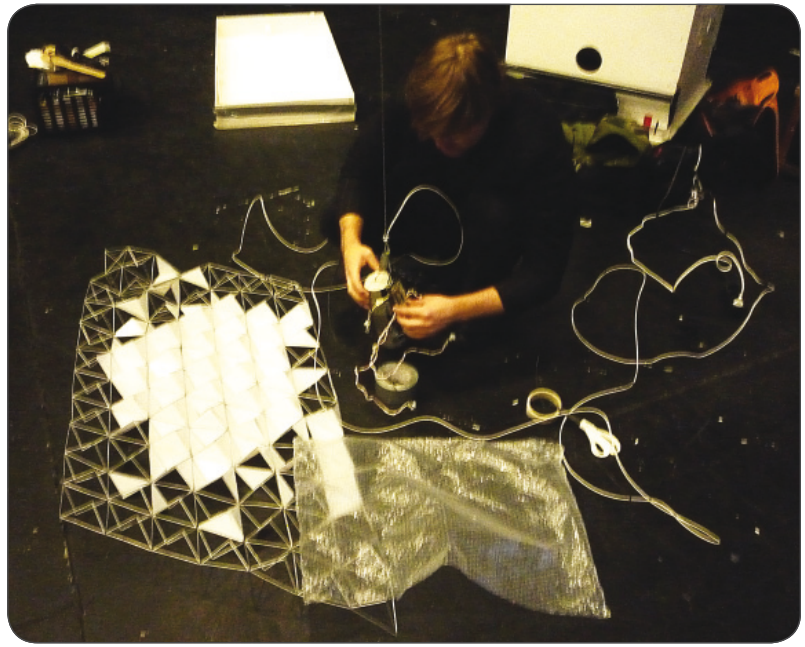
After the first presentations at the Smart Space Conference, the light was changed just a bit and additionally presented at the large NEXT 2009 exhibition of new technologies in Denmark. The light was customized in a new way according to the very different space. Unfortunately the location wasn't that obvious as regards to interaction with too many activities, and people mostly perceived it as an artistic autonomous light.
The feedback from the conferences and exhibitions led to a knowledge about both the more specific effects based on different contexts and locations of sensors and lights as well as a series of new potentials and applications to test out in a context more integrated with everyday life activities.

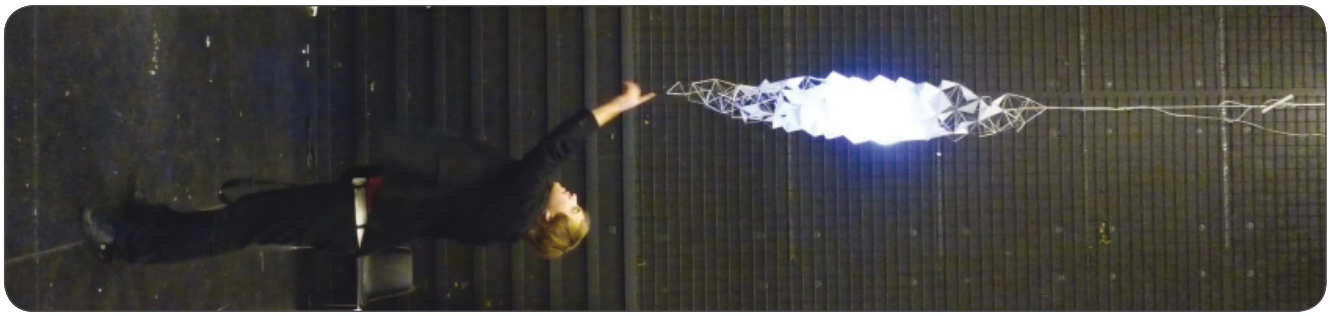
Fig. 160: Hanging up the light for the NEXT conference.

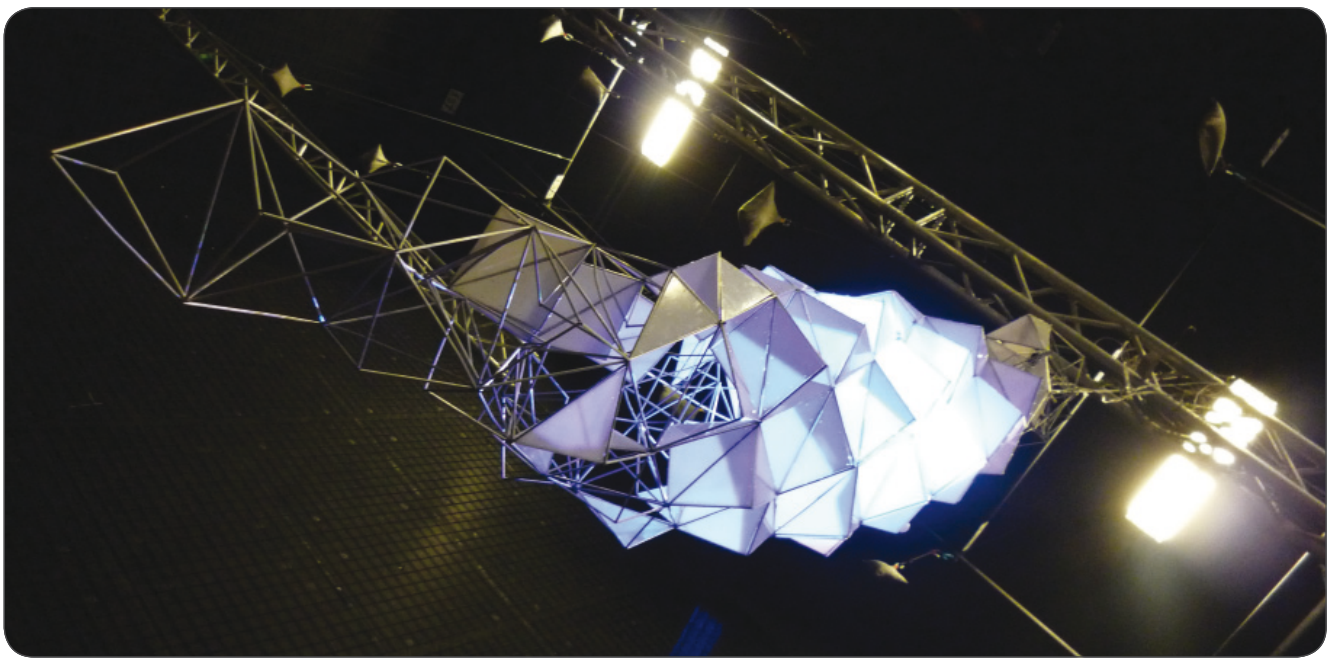
Fig. 161: Control unit for the light.

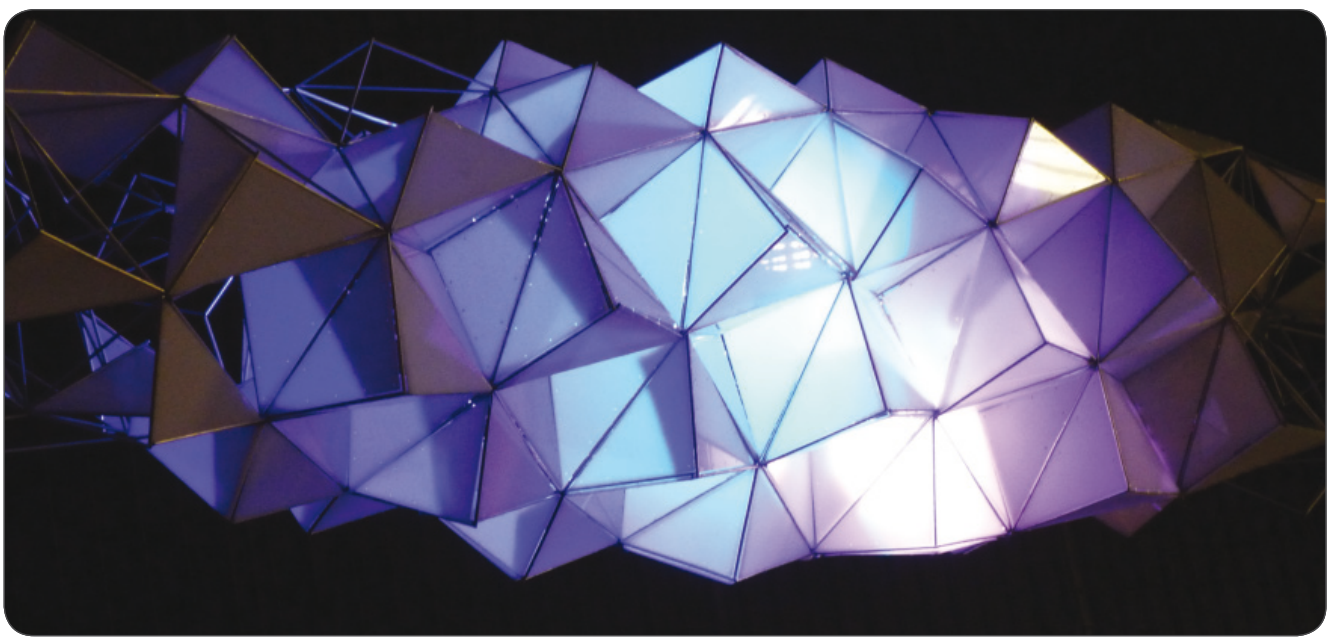
Fig. 163-65 (next page): Candela Morph for the NEXT conference.

Fig. 162: Assembling Candela Morph for a new location.









Interactive Street Lighting

The final stage in the experiments with social lighting was the integration of sensor technologies and feedback into an urban scheme as part of an upgraded street lighting. Here the Copenhagen Municipality funded an experiment in the street of Blekingegade in Copenhagen, and Philips Lighting additionally supported with LED fixtures and production facilities. Student's and Colleague's from the Department of Media Technology assisted on the programming and the wireless setup. The essential part of this lighting experiment was to test out the affect of interactive lighting schemes on urban life and with an additional sustainable benefit. This final lighting experiment thus had three overall aims:

- Functionally; to adjust lighting according to activity level and location
- Sustainable; to use low-consuming LED-fixtures, dimming and potentially photo-voltaic
- Social; to introduce emergent lighting effects stimulating social and playful behaviour

Additionally the project was outlining scenarios for a 0-energy performative street lighting to be presented at the Copenhagen Climate Conference including additional features as a fully intelligent traffic lighting with a learning system based on urban life as well as integrated wireless networks and automatic positioning systems in a fully digital infrastructure based on lighting; perspectives that are technological achievable within the coming years. To make a low-cost fully operational experiment, it was decided to use the existing lighting fixtures in Copenhagen, 'the Copenhagen Fixture' (Danish: Københavnerlampe), which most of the existing street lighting consists of. The house of the fixture was emptied for existing technologies and new LED lighting technologies, IR motion sensors and an intelligent control unit with an Xbee network module was installed to allow for an individual configuration of lighting levels at different parts of a street. Six LED modules from Philips/ColorKinetics each covered a section of a street space with the main focus on the pedestrian areas and with each fixture connected to a motion sensor. The first basic configuration thus extended from the initial interaction studies with the other more artistic fixtures, to include more specific lighting levels for special parts of a street space, and additionally the LED modules were able to differentiate the lighting temperature and colours. The lighting had a base illumination which increased in brightness when people approached. Depending on speed and amount of people in the space, the lighting temperature changes from cold white-blue to white-red indicating potential interactions.

Fig. 166: Mock-up and interaction studies.

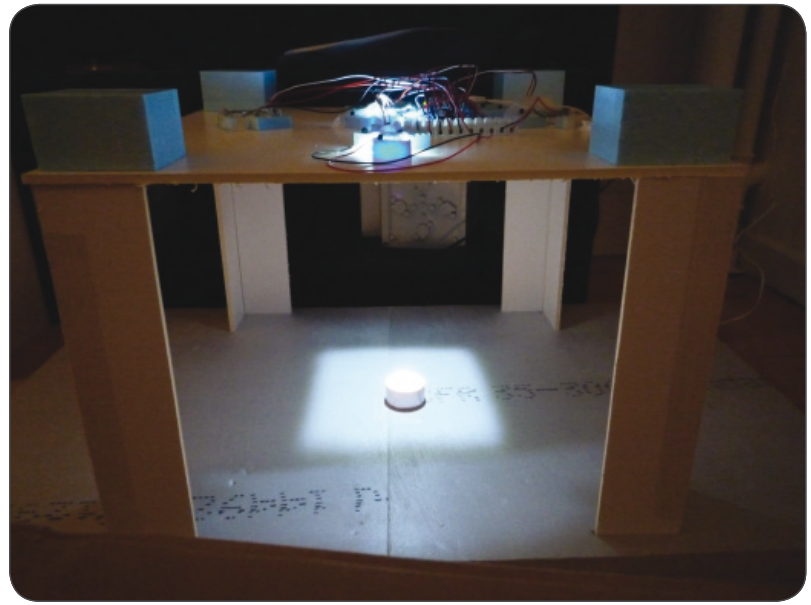


Fig. 167: Mock-up with study of sensor location and dimming.

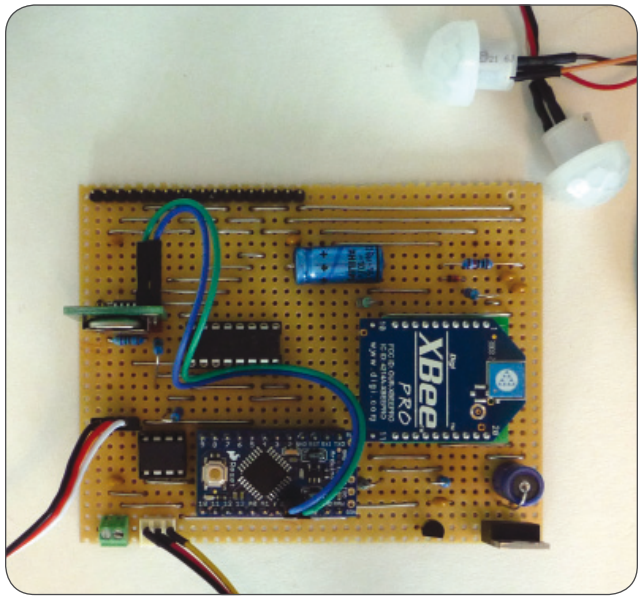


Fig. 168: Control module for the sensors driving the DMX to the lights.

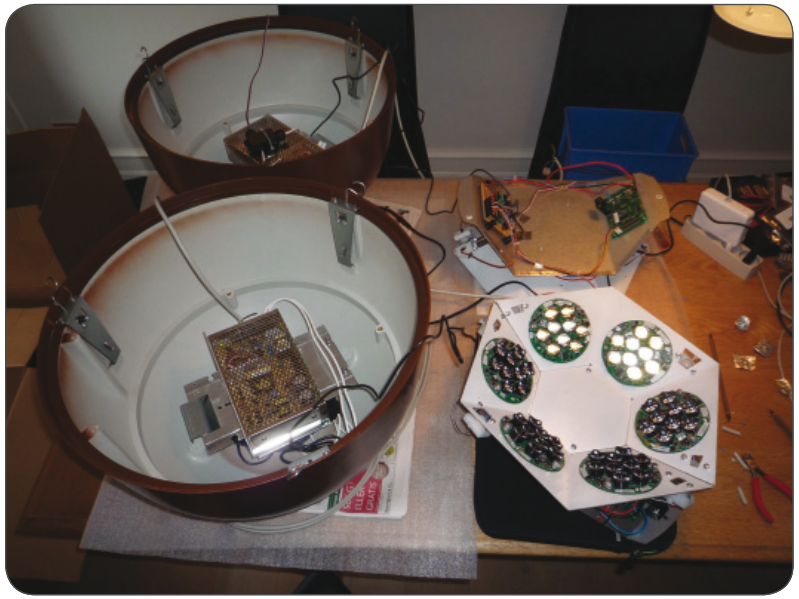


Fig. 169: Final testing with the dis-assembled lights.

Fig. 170: New hanging street light.

Fig. 171: Old hanging street light.

Fig. 172: New street light at daytime.

Additionally the lights were installed with a current meter, which could measure the power consumption in real-time and send it through the wireless Xbee module to a local computer. From here the power consumption was presented for the municipality and could potentially involve a live feed to the street or to a networked server for both control and measurement of lights. When there were no activity on the street, the lamp only used 9W compared to the old 150W lights, and slowly this consum, could increase to around 90 W at full power, however only rarely with all lights on at the same time.

The lights were installed on May 7th and the initial studies of interaction were carried out on a traditional weekday. However at the first setting the sensors were unstable due to the heavy unbreakable and highly reflective glass cover, which is placed as an inclined plane in relation to the sensors. While finishing the research it was currently investigated to change this plate back to an older version, which would work more efficiently with the sensors.

Nevertheless, on May 7th the wireless control of the individual LED modules allowed for an individual configuration of the light according to presence of people passing by the site between 10 pm and 1 am. About half of the people did not notice a slow dimming effect of the lighting, and did not even recognize the significantly lower lighting levels. However when the effect was made a little more dramatic, some people stopped and began to engage with the lighting. The most interesting example was a large group of young people coming out from the nearby shop and suddenly realizing the light when they passed the street. 'Hey', one said when noticing the effect of the light just stepping into the emerging spot, and shouted 'look, I am in the spotlight', and started dancing while the light slowly dimmed. Some other young people were generally just impressed with the feature of controlling a public light setting and were very interested in how it worked, and how they would be able to participate in creating dedicated light spaces.

A more detailed analysis of interactions based on the real-time standalone sensors is currently awaiting the change in the glass plate, while the municipal feedback is making a more detailed investigation of the possibilities with these lights. However they already ensured that they seemed very prospective and wanted them to be included as part of a walking tour together with the Climate Conference participants. This is not only due to the interaction and general light levels, but more related to the possibility

Fig. 173: System diagram for the street lights.

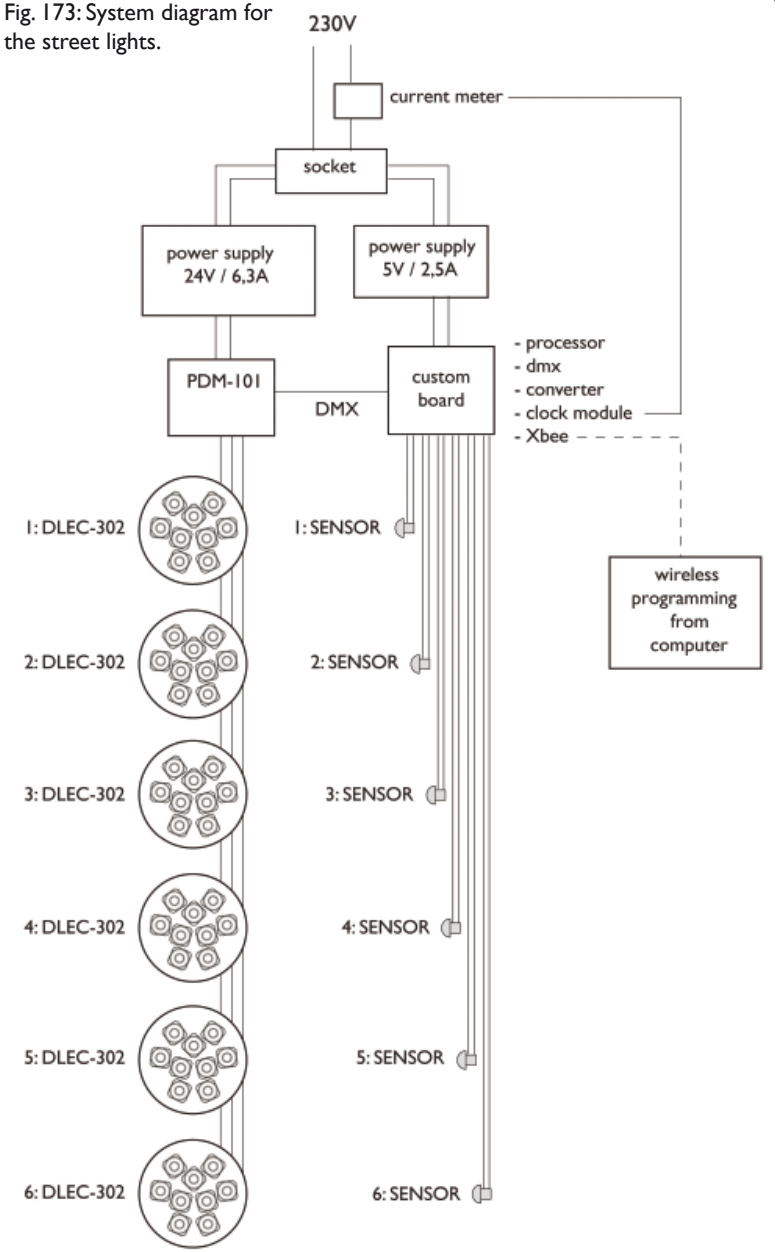


Fig. 174: Real-time power consumption interface with lights at standby.

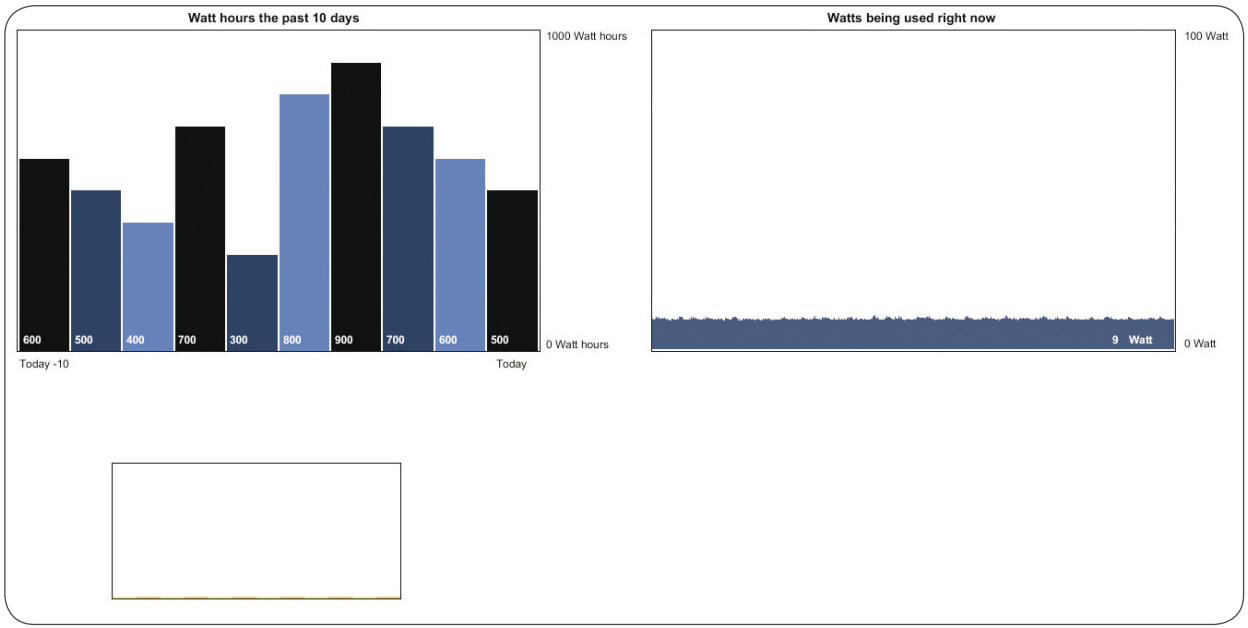
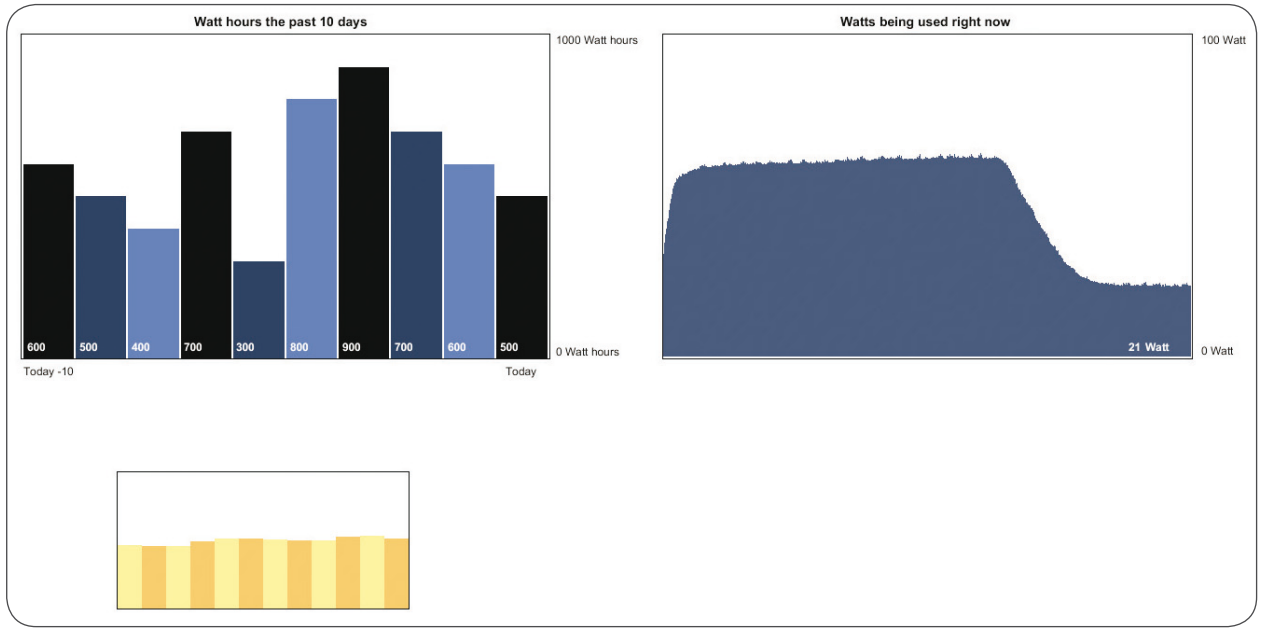


Fig. 175: Real-time power consumption interface with all lights at 50%.



for seeing individual power consumption per light as a real-time illustration, at the same time as having an aggregated value of power consumption during 10 days. This is highly interesting not only because of activity levels and energy, but because these values additionally represent levels of street activity per minute in the dedicated street zones. These data have not previously been investigated on such a level of detail in a street scape, where traditional methods would include gps or mobile phone tracking or a more detailed camera tracking for special installations. Here the sensors do indicate levels of activity over time although quantity is not very specific, and it provides a sense of place and use during the dark hours. An additional upgrade with a simple camera tracking version has been considered and discussed with the Copenhagen Municipality, which would include a more specific understanding of types of people, activities, specific locations, interactions and similar.

Performativity

The investigations of the social lighting applications are central to the understanding of performativity. Here different levels of feedback are gradually implemented to investigate how participants perceive the engagement with responsive light in different settings. As regards to the lighting designs, they are in most cases conceived as specific performance-related applications, at the same time as they appear more naturally for people to understand as being active and responsive to behaviour. Based on the tradition of urban lighting, where it through industrialization was integrated through continuous large-scale urban infrastructures as common and always glowing and waste-full infrastructures, the performative lighting goes back in time investigating how light again is embodied as an individual effect. Here light is part of a personal condition to illuminate individual spaces as an indicator of levels of activity and presence, however at the same time the performative element comes into being through the emergent effects when participants join activities with immediate social feedbacks. Although the different experiments work from very basic assumptions of ubiquitous technologies mainly initiated by reactive patterns of light, they gradually extend into performative patterns, when the feedback is situated as part of location-specific actors through mediation and creating an assemblage of objects, subjects and places. As for these examples, the light becomes the mediator which stimulates how humans increasingly perform for each other, and thus stimulate relationships through the very basic technologies.

Fig. 176: Street with the old lights.

Fig. 177: Street with new lights installed.

Fig. 178: New lights installed and with the old lights at the main street at the end of the road.

Overall relationships

Technology – level of feedback

The technologies involved here extend from the reactive to interactive technologies and with the directions set out as part of the final experiments also extended into performative and networked applications. The more these systems are part of peer-to-peer connections inscribing objects and subjects as part of integrated designs, the more they will appear with closer ties at the same time as they are open for access and individual affect. These technologies do not necessarily need to be more intelligent, but they need to be able to sensor local activities based on individual effect and circulate them as part of collective applications. Now especially for this project with the very different applications and presentations as well as the short events at which the lights were working, it also has become clear how vulnerable these technologies are. At one moment it is moved around as a dead and disassembled skeleton, until efforts are put into revitalising it for some days, before it again breaks, surprises in other ways or again will be shutted off. The very basic acts of the designers circulations with the object, participating in constantly modifying it might very well be the most performative of the acts, and the social light is the object which mediates the research relationships, which by far would have been very difficult without it.

Representation – level of association

The associations of light is usually very specific and represent the basic requirements for functional and social spaces, however these projects work with gradually more ambiguous associations in order to stimulate curiosity around the notion and meaning of objects, however still triggered by the very specific responses of light to behaviour. When the associations get too specific they lock up the freedom of interactions and spontaneity as well as the do not take into account the obvious potentials of integrating underspecified designs to gather around them a more diverse set of actors. As these examples illustrate, this gets more complicated the more complex the relationships are and the more serious the contexts become, as when these applications move into street life, where the technologies align with the basic functional requirements of a street scape. Here ambiguous associations are more difficult and more risky but nevertheless works at certain times of the day and in specific situations as illustrated with shared space concepts. Thus as with the level of feedback also associations differ depending on the contextual and situational relationships with different objects, and how it is being gradually accustomed to interactions.

Relationship - level of attachment

As with the changing nature of light, these relationships are only rarely fixed; instead every minor moment indicates a change in intensity, rhythm or colour and always as in a restless position. As for some of the last experiments the relationships between movement or gesture and the change in light entered a really elegant play between humans and objects additionally supporting collective environments. Thus the social lights are essentially fluid and they constantly engage and reach out for more connections to appear, until it almost enters its own autonomous drama as a dissipative object caught between different forces.

Strangely enough this does not seems like the way light is being conceived as part of modern culture. Here light is something highly restricted and fixed to support very specialized purposes and only rarely maintained as something open and uncontrollable as the a camp fire. It almost seems to come to a point where interactions are not something obvious anymore but instead control systems and fixed relationships aimed at settling any controversies are the most desired states leaving nothing to chance. Here the basics of light comes into place between the highly specific and controlled environments and the very collective open performance-related and mediated environments to bridge different states of involvement through interaction.

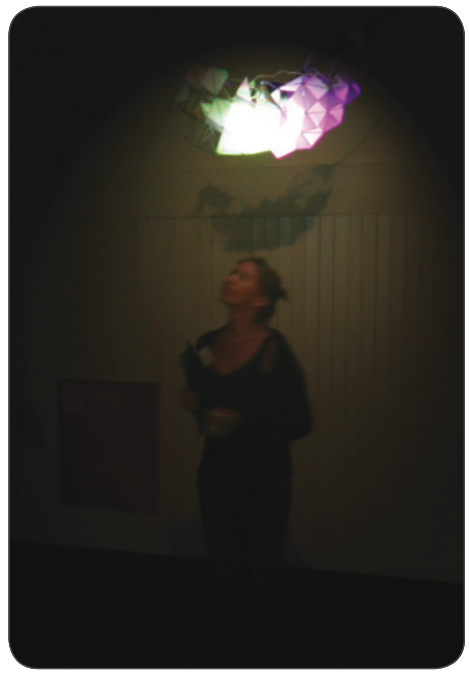


Fig. 179: Candela Morph with an individual visitor.

Fig. 180-183: Candela Morph with groups of people.

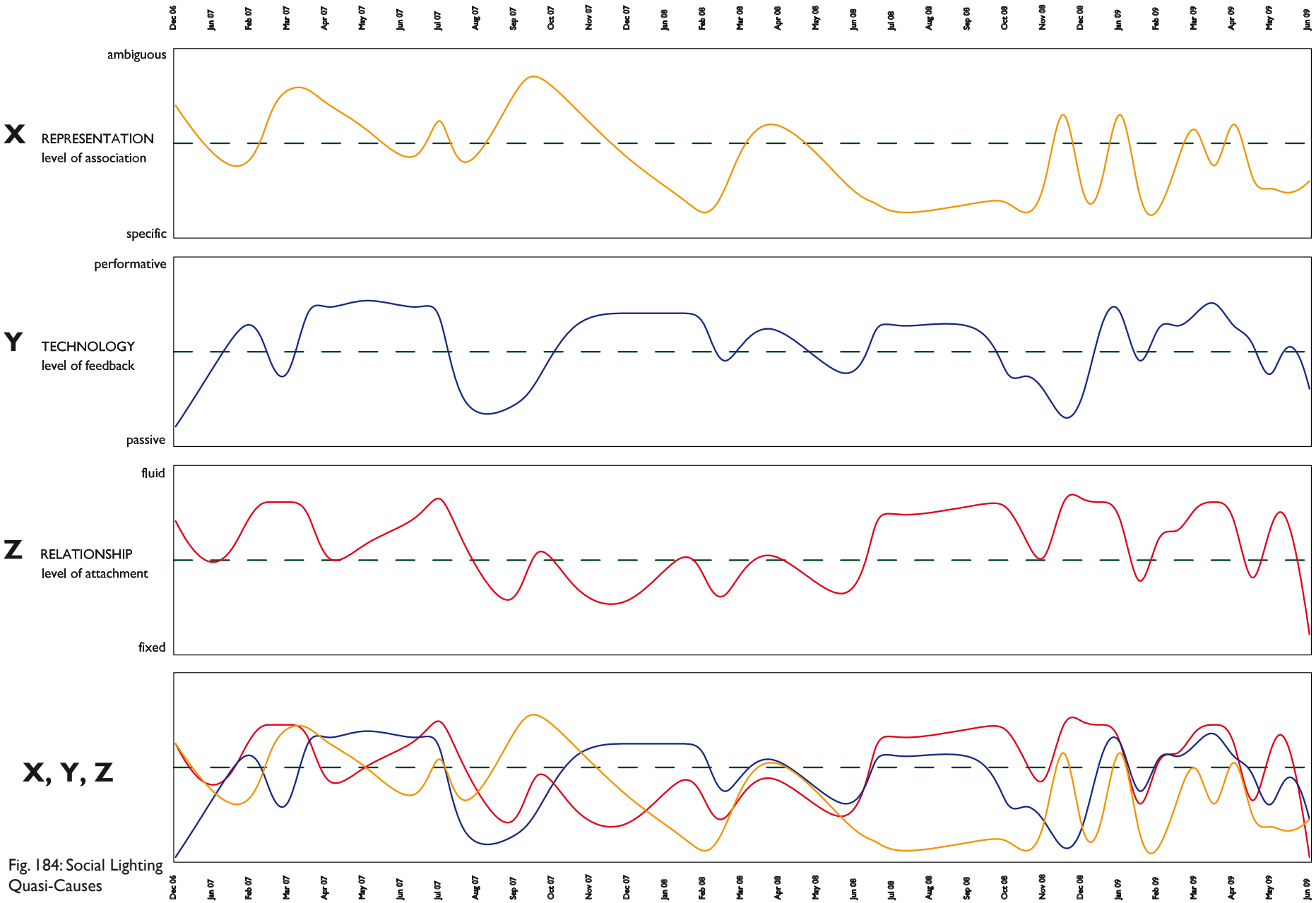
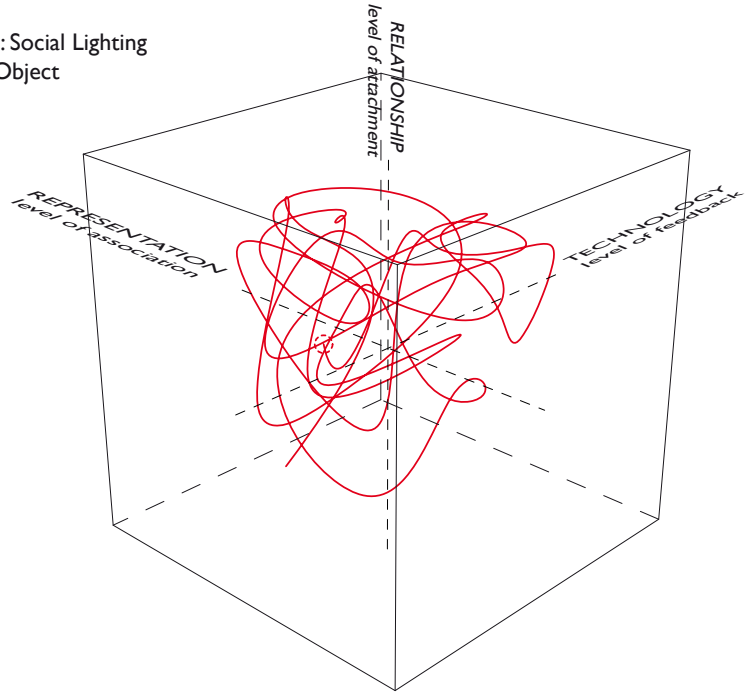
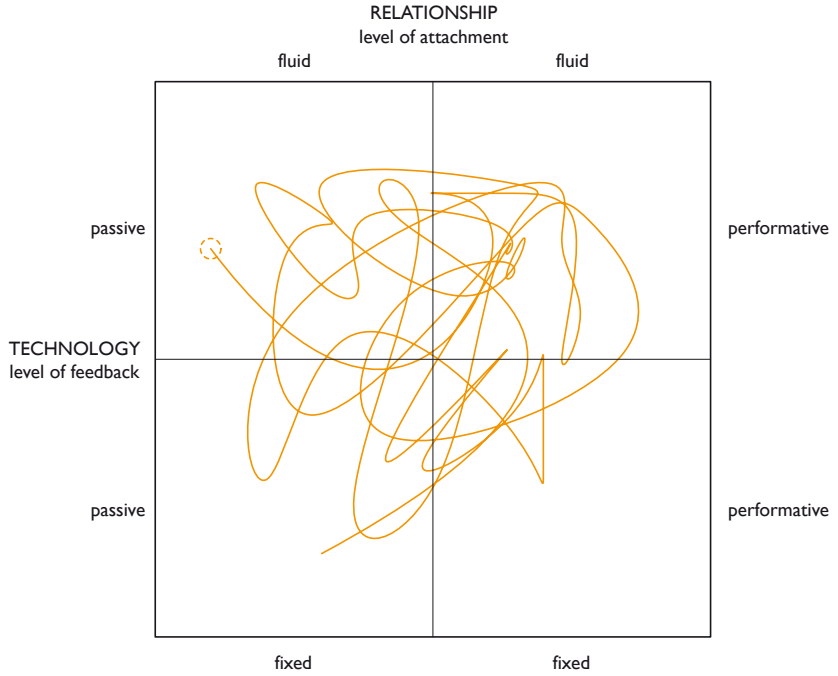
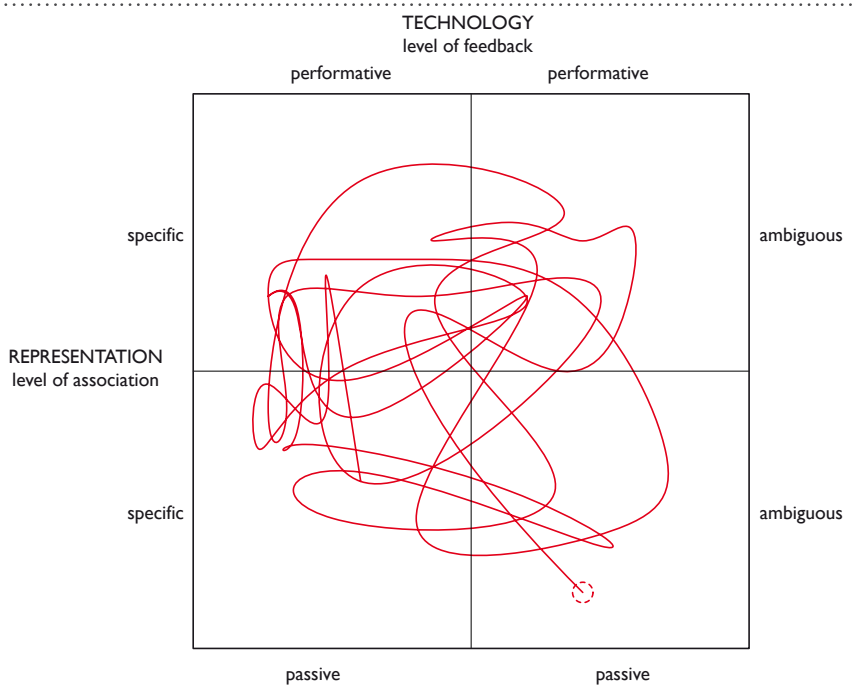


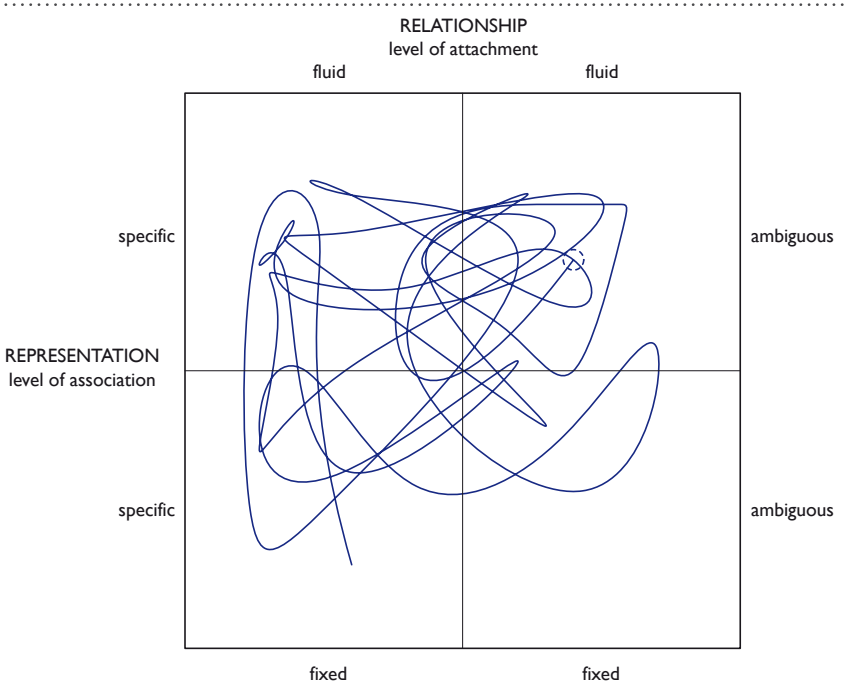
Fig. 184: Social Lighting Quasi-Causes

Fig. 185: Social Lighting
Quasi-Object









Summary

The case projects all share the fundamentals of the performative object extended from the initial studies of NoRA. This implies a process involving a high degree of experimentation, input from a variety of different actors and purposeful integration of performative technologies to evaluate its impact on the design process, the social life and places. However additionally they occupy different domains as regards to realization, integration of feedback technologies and scale, in order to achieve an overall framework for cross-disciplinary design knowledge considering the influence of computational technologies. These technologies are tested beyond the single ideas about software and ubiquitous computing, but as an integrated idea which in the end will feed back the sensor input from the experiments directly into a software platform and collective design knowledge.
The case projects are also performative in the sense that they presented themselves as possible projects to explore after presenting the initial results from NoRA. This means that besides being generated based on the research groups and collaborations, which the researcher occupied during the studies, they were all initiated after a discussion of NoRA, which inspired the design development of the case projects. For this reason the case projects are investigated through the common project framework presenting many overlaps but also possible additions in the understanding of the use of the framework.

The quasi-object as mediator

The conclusion on how the quasi-object acted as mediator in the design of the case projects can be illustrated by emphasizing some of the different phases in the case projects.

NoRA

As part of the NoRA project, which despite many challenges finally condensed into an experienced artefact at the Venice Biennale, the level of association changed rapidly throughout the course of the project. There were some problems in the end where certain concepts finally ended out being too ambiguous although it was the idea to make it work underspecified; however in general this process had a good level of progression between both specific analysis, calculations and models and some more abstract conceptual ideas keeping pace in the discussions.

At the same time the involved technologies started from passive technologies at the specific site and later involving more complex feedback systems, but had some challenges of integrating the traditional passive logic as a starting point for the concept; however in the end the technologies were used at full scope before condensed into the performed practice and again turned off after exhibition.

Initially the relationships were slowly changing throughout almost a year before they realized into some fixed relationships to initiate the specific development of the concept. At certain periods it became too fluid, where no-one knew where to settle and which actors (human and non-human) to count in for the project, however with a twist the relationships succeeded to reach the top fluid at the event before rocketing into new challenges.

For the NoRA project, it is specifically interesting that the different coordinates seem to follow a general pattern of synchronization, implying that there might be some relationships between ambiguous, performative and fluid processes in opposition to specific, passive and fixed processes in order to keep pace in a project.

As for an overall judgement of the project, the appearance of NoRA in the upper right corners of the square diagrams also presents the basic conception of the project as a realization of a very ambitious project.

Social Lighting

The social lighting project more clearly indicates how the level of association shifts from being ambiguous to specific within each development. Here the four main phases of the project ending up with the quick final exhibitions in the end, describe how each development becomes more specific before being realized and experienced.

As regards to technology, the project involved very interactive processes without always finalizing the specific design concepts. The section describes how the project is focusing on very specific material processes two times in the project, and the rest of the time mainly using virtual studies as the basis of the development.

The relationships for the social lighting project had some rather strange phases of rapid progression in fluid relationships and slow progressions in more solitude and fixed relationships, which appear with the very characteristic lines above and under the middle.

As regards to synchronization, it can be seen how the end prototypes of the social lighting project became some of the more successful phases in the project, where all coordinates are following each other, before the project slowly dies out.

The description of the overall patterns through the squared diagrams is rather difficult to conclude anything from, as they most spread around the middle, indicating the wide scope of different applications and contexts for the project.

Interactive Sculptural Lighting
The representation of the sculptural lighting shows how the project basically was treated too specific in the beginning for a real good concept to emerge. First after a long period of ambiguity, it finally condensed into a refined concept to be well formulated; however it still lacks its real application and final result as regards to experience.

The technologies used were working pretty well for the process although it was very different from the other projects. It started out very performative and condensed into a passive model and then looped into new performative studies, which took way too long. In the end it is now represented with some very passive technologies awaiting a final boost.

The relationships in this project are difficult to conclude, mainly because the actors involved haven't been that many. Over long periods of time it has been settled in more or less fluid relationships, which however didn't really match before looking into a more specific project site in the end.

The synchronization of the project coordinates also here seem to travel with some relationships, only with one major difference in the beginning, primarily due to the presentation and discussions of the project at a new research institution at that period.

The patterns comparing different coordinates is interesting in the sense that they occupy almost a diagonal slot of the squared diagrams, illustrating that the project moved very dramatic between different phases of intensity and rest.

The Eco-Pet
The representation of eco-pet started out really well with good progression and feedbacks between ambiguous and specific objects, however at the final presentation in Dec 07, it had the problems of getting specific, which in turn affected how the project never really finalized for realization.

The technologies had the challenge of the design group that it was a very interdisciplinary group, where most design progressions were done at a level of many analyses, discussions, writings and some sketching, but not going to full extent with physical modelling and performative studies.

The relationships were maintained at a very fluid level only getting fixed just before a presentation in Dec 07, which seemed too late for such a loop. A problem the design group maintained throughout the project.

The project was out of synch at many times and can't really be exemplified as a good reference how a performative project can progress.

The lack of feedback throughout the process is also illustrated by the squared diagrams, with an uneven balance to the one side of the diagram.

Performative Urban Spaces
The performative urban spaces project can be seen to be highly influenced by some slow political processes within the municipal agendas. The representations get specific over a long time and have slow feedback loops although pretty successful. One major leap is in Sept 07 where some networked design sessions quickly transformed the project from being an idea for selected sites to very specific concepts and digital models.

The level of feedback is based on many interactive scenarios and some tests, however not fully realized in physical and tactile prototypes and sketches. A condition which maybe could have resolved some of the problems of realization in the end for instance by using more mock-ups of site-specific events in Jan/Feb 08.

The relationships were pretty fluid and hardly any decisions were fixed to any site or group, but instead moving slowly throughout the project. This leaves open many unresolved questions of attachment.

The synchronization between the different coordinates illustrates a rather successful project including the last part, before it however in the end goes completely passive due to lack of realization.

The patterns from the different coordinations have some interesting diagonal developments moving between the specific/passive/fixed and the fluid/performative/ambiuous indicating some degree of progressive conceptualization.

Performative Vehicle
The representations of the performative vehicle describe a process very ambiguous in the beginning without a clear idea about application, which is described by a great deal of an analysis' of technological possibilities. However the lack of specific judgements slowly kills the conceptual clarity and in the end leaves most of the project open without realization.

The technologies implied a lot of sketching and diagramming which turned into more interactive discussions and studies, however only half-way realizing the full potential of the performative studies, which didn't find its actual application.

The relationships in the project worked rather well through the research collaboration, although the feedbacks in the important phases between the actual and the possible weren't dramatic enough to stimulate actual attachment.

A comparison of the coordinates indicate that the use of more specific representations in the beginning and later some more performative technologies might have made a better start of the project. Additionally some more specific physical prototypes around the presentations in Dec 07, could have clarified how the project could end.

When looking at the overall squared diagrams, it illustrates a very conceptual project, which lacked some more specific applications or sites as regards to both the design studies and possible realization.

Comparative studies
The comparative studies of the different project indicate some rather obvious proposals for future design processes.

First of all ambiguity has a lot to do with the progression of the conceptual idea for the project and how many times it should be tested out, reiterated and communicated. At most times it would start out with a conceptual idea, which is validated based on how specific it can be communicated afterwards. Then the iterations start to generate the design concept and progressing throughout feedback with analysis, calculations and constructions slowly moving into a divergence of the conceptual with the realistic. In the end the project can end out being very ambiguous or very specific depending on the design expressions.

Secondly as regards to technology, projects can start out both as strictly passive observations and minor sketches or as complex algorithms or fluid simulations, however for a successful progression they should feed into the opposite in order to evaluate the idea with different scopes of feedback. Importantly here the very digital augmented studies at most times gain most relevance and acceptance if they are also materialized in physical prototypes; this also to involve non-technological users into the process, which might change within short time. In the end also here the project can extend into more performative applications or alternatively more or less passive. This integration of the level of feedback is highly influenced by which type of application and the intended context e.g. private or public, individual or collective.

Lastly the relationships start out very fluid in the beginning in order to have very social relationships to go together forming a concept. This transforms into more or less fixed relationships while evaluating the network, and then jumps at most times again because new actors need to be involved with new knowledge several times throughout the project. Just before realization, the project fixes the boundaries and then releases the relationships for the design to integrate with a site or user.

As regards to the squared diagrams it is important to notice how the diagonal processes stimulate more innovation and progress than the linier acts. Here because this imply having at least two coordinates to work together on developing the project, instead of having linier and more static progression in just one coordinate. This at the same time states certain levels of synchronized processes, where the lines of flight spread out to get the most inertia for the next step.

The quasi-object as experience
Only a few of the case projects are fully realized as an on-site experience, however additionally the other case projects have been presented in various occasions at the level of mock-ups and prototypes, which gave some feedback on its possible real applications.

Especially in the NoRA project, the grounding of place was happening, when NoRA acted as a mediator between figure and ground and the individual and collective, thus acting as the quasi-object, or collective agent. Specifically this happens when the figure, or object in focus, appears as part of a common ground, or said in another way, when the individual effect is coupled with a collective impact in the architectural space. This transformation from the figure to the ground, the individual to the collective as well as potentially also the local to the global is a social process. It implies that isolated bodily phenomena are embodied through a social process.
It doesn't matter if it is concerning a social process of human or non-human agents, but it should move the effect from being isolated and non-existing to being part of a collective idea embodied in space. Thus places come into being by the social embodiment of information through physical artefacts', and the quasi-object is this artefact aggregating the individual effects into common and collective objects.

Now this could be expressed as a kind of easy job, if everything that is aggregating some pieces of individually experienced information into potentially collective media would transform into places. This is true to some sense when looking at the many reference projects, where computation is stimulating the sense of place and meaningful activities, no-matter if it is integrated into the urban domain, architecture or specific portable designs; especially considering the massive explosion of social media platforms;. However only rarely they are maintaining places over a long time, because a properly placed project needs to work with the changing conditions of a site, and thus involve a more continuous creativity not to die out.

The NoRA project and the Social Lighting projects emphasized how the integration of individual sensor input for circulation among a common framework, staged the activities as a basis for both place-making and a social engagement. However additionally this implies that the more this interaction is reflected by the mental image of the individual, and grounded in the everyday situations and behaviours, the more meaningful and valuable they become to understand as part of the common platforms. This is a great benefit for the companies, organizations and institutions which already have this information available through behavioural analysis or logging of information; however a slower procedure can basically be achieved by understanding basic procedures of everyday life, which can be extended by new platforms. If it is possible for the individual to not only influence the environment through local platforms, but also provide the environmental data, which are circulated and reflected collectively, the more it seems to influence the conception of place. Also here again the social process involves being part of a game or a procedure to gather pieces of information, which is relevant for the individual and can be circulated through performative designs, and the more it stimulate place, the social and in general cultural production.

10 Conclusion

The influence of performativity

The overall ambition for the research was to consider how the background of performativity could stimulate a new approach to architecture and urban design based on the emergent effects of computational technologies. The research involved case studies as part of a research-through-design methodology, where the engaged feedback between theory and practice through design-oriented experiments and reflections acted as drivers for a new framework for a performative design process. This implied a detailed theoretical basis, engaged relationships to different design projects and a continuous critical reframing of the method and framework for future design studies based on this overall research question:

> *How can an understanding of `Performative Environments' treating the emergent effects of interactive technologies explore a new framework for the integration of socio-technical systems in architecture and urbanism?*

The research project specified these studies in closer detail with the first question dealing with the introduction of performativity.

> *What is the origin of performativity, its essential characteristics and the related influence on architecture and urbanism?*

Here the research project studied the background of performativity within linguistics, performance studies and theatre, as well as how it was reflected in the architecture and urban design professions. The importance of acts and effects through the impact of pervasive computing, mobile networks and advanced sensor technologies describes a design process which is influenced by an increasing amount of complex parameters both as part of the design process and in the realized designs. These technologies are also creating bodily affects in relation to how they mediate interactions and social life. Performativity is here described as the iterative feedback loops acting as repetitions shaping context, which integrates local effects as a basis for larger emergent effects as an outcome of a continuous process. The information exchanged throughout these processes is essential for understanding how performatives are assembled into environments and bodily affects.

These characteristics of performativity have also influenced the field of urbanism in regards to the development of more open prepared grounds allowing for spontaneous acts to occur. Thus these grounds inspire for a bottom-up urban culture, which is performative in the sense that it is created through the multiple feedbacks between different actors and at most times also mediated by new information technologies. The urban is constituted through the correlated relationships developed through real-time interactions based on common infrastructures in opposition to a top-down planned environment. This urbanism is increasingly facilitated through software taking into account both a time-based perspective of urban design as well as the multiple and divers infrastructural, natural and cultural forces driving the emergence of the city.

Related tendencies also apply to the field of architectural design. Here it is essential that the architectural environment exists as part of the dynamics of urban culture and is continuously part of a cultural adaptation, which is now also increasingly under pressure from electronic media, pervasive computing and mobile networks. More recent architectural practices are considering architecture as an emergent effect of a large variety of different complex inputs, which are not controlled, but instead treated as forces and stimuli for the general development of the design. At the same time these new technologies and methods are moving towards a more responsive architecture, which not only treats the design as an iterative evolving process involving multiple actors, but also integrates these responses into the realized buildings as a basis for real-time affects on bodies and space. When architecture is no-longer just in the hands of one designer, but treated as an evolving experiment acting in extension of a society which increasingly circulates fragments of culture, it also exists primarily as a process focusing on methods and continuous inputs which is constantly evaluated towards both an original intent as well as the more surprisingly emergent effects. From these recent tendencies architecture is performative both in regards to the design process augmented through new digital technologies and as an object which acts, adapts and in general is involved in a dialogue with the environment.

Emergence is considered the element which ties together the effects of performativity. As part of complex systems emergence describes the new properties which arises through interaction and can't be deduced from the individual components. It has been a characteristic of biology but now increasingly interesting for systems lying between the artificial engineered and the human. Like with swarms, which react faster than the sum of the individuals based on the same properties, emergence essentially becomes an effect arising from social interactions. Through these interactions each element accumulates information and the collective organization becomes

the environment by being open for exchange. Emergence can then be described as what happens in the process of exchange between the elements, or between the designer and the environment. Thus the point being that new technologies are extending these notions of emergence into more hybrid systems and are able to facilitate and organize a significantly large scope of information from individual acts, but also additionally mediate these exchanges where the emergent conditions are again becoming emergent on top of each other continuing into more autonomous processes. As part of design work emergence becomes the value sustained both through the design process to allow for further development as well as the experienced value in lived spaces. Performativity can describe the complex origination of this value through interactions among both human and non-human actors.

These introductory chapters responded to the first research question as a starting point for a more elaborate theoretical investigation of the significance of performative technologies, leading to the second research question:

> *What is the significance of performative technologies, and how do they relate to interactivity, networks and the experience of architecture and urbanism?*

Here the integration of new technologies is getting pervasive over time added on top of existing practices and with meaning provided through specific applications. Cybernetics introduced computational technologies with control systems inspired by how living organisms developed in a feedback with its environment, and the first regulatory systems have developed and found its way into especially the architectural and urban concepts of the 1960's and 70's. Later second-order cybernetics introduced intelligent interactive systems, which were provided as open flexible environments to stimulate urban development and the general life of the street, similar to the ideas from the contemporary urban designers at that time. These concepts extended into more evolving planning systems and concepts of ecological and living cities, as well as the more high-tech architectural traditions. These experiments are now more thoroughly integrated into new architectural projects and artistic experiments as illustrated in the example projects presented throughout this thesis. However the more specific concepts of interactivity is now more recently being extended as part of more site-specific real-time experiments indicating a growing tradition of using computational technologies as a bottom-up approach to place-making and bodily affects.

Along with integrated computational feedback, also the distributed network and internet has shaped a new emerging culture largely defined through the access to a wealth of information platforms and services. Here the flows of information directed from the individual, is an essential part of defining place through interaction with mobile applications or the embedded technologies at sites. It is a culture which customizes and reorganizes information flows to participate in creating new performative content, which is part of a social process with both human and non-human actors. Place is constantly transformed through new situated technologies, which at the same time extends and affects the human body. Through the descriptions of ubiquitous and pervasive computing, with the integration of technologies in everyday objects as well as the distributed condition of a previously virtual approach to computational technologies, the research is providing a framework for how these technologies are emerging primarily through new mobile platforms.

Additionally the research is proposing a framework to describe how the integration of computational technologies can be analysed through its gradual integration of feedback procedures from passive responses to performative feedbacks. Here the performative technologies are introducing how bodily affects are situated through networked technologies with the embodiment of location-specific actors through a mediation of the architectural environment. This additionally introduces performative technologies as important non-human actors with the same agency as human actors, and inscribing the bodily and often mobile conditions of urban culture into complex socio-technical systems.

The research project is stating the importance of, first of all, to trace how these non-human actors are affecting the experience of place as well as the future potential of integrating them with material practices to reinforce bodily affect and embodiment. Secondly it emphasizes how to carefully consider how these socio-technical systems are designed as underspecified open systems, which gather around them location-specific actors as a basis for more emergent and collective environments. The essential of these designs is the focus on how change is an evitable part of both the process of designing and the integration of informational feedback within each object, here presented as quasi-objects. In general the 'quasi'-metaphor presents how change is accommodated for through new computational technologies throughout design processes and objects, at the same time as the integration of 'information' which provides access to a given place; a quasi-notion which also is exemplified in how humans are increasingly constructed from and extended by new embedded technologies as part of the human body.

As a more specific response to the second research question, the reference projects as well as the stated case projects clearly indicate, that performative technologies are significantly changing how the design process is acting as more distributed practices with more embedded complex parameters increasingly circulated throughout the process of designing. The conceptual approach to architecture and urbanism is facilitated by computational technologies, which are non-human actors acting as a potential social infrastructure; however mostly providing new more efficient tools for optimization than currently more creative ways of conceptualizing the design. At the same time the experience of architecture and urbanism, both as part of the design process and as part of the realized building projects, is increasingly mediated by software, sensor technologies, common media platforms and mobile individual objects. Here embodiment becomes central for the understanding of performativity, because it is the coupling of the physical artefact and the sharing of specific information, which can be transformed by the individual actor and circulated within the network, which shapes the overall experience of the social. Performativity is thus part of an information-system constantly represented in a changing and circulated artefact, which constitutes how environments are created. It is processes that constantly need to be maintained in order to exist, and environments and cultures that are not developed and constantly re-considered will not exist for long. Not only do these artefacts or objects shape our relationships but also the introduced technologies generally transform to become more intelligent objects, which are acting autonomous according to the pre-supposed acts and networks.

The new methods of performativity

These platforms and technologies as non-human actors are thus an integrated part of both process and realized design and are getting increasingly more intelligent, distributed and integrated with a bodily practice; issues which should be reflected in how the architectural and urban design professions are developing new tools and methods for dealing with performativity and experience. These increasingly social processes tying human and non-human actors together in new networks, lead to the final development of a specific socio-technical framework and its application within a series of case projects responding to the final research question:

> *Can the experimentation with performative technologies through a case-based design methodology propose a new framework, which describes the relationships between human and non-human actors, inspire a more place-based and social approach to architecture and urbanism?*

The research project presents a specific methodology based on research-through-design, on how multiple feedbacks can be obtained between theoretical foundations and design experiments to be tested out in practice, and to evaluate the influence of performative technologies on design and experience. This research method is additionally reflected in the development of a new performative framework describing the interrelated relationships between computational technologies, associations to the designed artefacts and the levels of attachment.

The introduction of performativity as a general conception of computational technologies within the design profession can at first appear rather abstract, however there are additionally some very specific outcomes of the research with proposals for how new performative design proposals can develop with the positive affect for the social and places. First of all performative environments need to take seriously the affect of non-human actors; here not only considered through the traditionally semiotic influence of the relationships to objects, but also how objects with intelligent technologies can sense environments and circulate information in social networks to seduce both the design process and the experience of place. As exemplified with the reference projects throughout this thesis, these computational technologies are already an integrated part of the experience of architecture and urban space, through new kinds of informational objects responding to specific activities and behaviour. Performativity thus includes the idea that environments now already are interactive, but also that these interactive environments collaborate and self-organize in networks behind our back and potentially unaware of its consequences. However as interactivity was originally introduced for optimization purposes and control systems, it is important to inscribe other routines in these environments. These routines are based on local information, which makes sense for the social life of human actors in place, and thus not only as a generic availability of information.

This is for instance illustrated as part of the NoRA project, where the site-specific fluid parameters acted as drivers for the conceptual project, at the same time as the integrated sensor technologies mediated the individual presence through a collective and potentially social platform as part of the architectural ambience. A condition additionally emphasized with the affects of 'social lighting' to stimulate engagement with place, or with the mobilized 'eco-pets' acting as sensing devices, distributors and mediators' of site-specific information to be geo-located and exchanged through urban platforms. For an urban site, for instance, this implies that interactive

technologies should be integrated with the purpose of inter-subjectivity or as positive stimuli for the neighbourhood, where the specific object is the figure which points to the environment through sensing and aggregations; although this information appears layered among different groups and time periods, the quasi-object acts as the artefact which joins the material, the informational and the site through bodily affects. Information out-of-place is only of relevance if it contains the same patterns, as if discussing the same agenda or involved with the same activities, which appear from the local sensors as a system of collective intelligence; else it doesn't participate in the actor-network. At the same time these objects need local platforms in order to be embodied as illustrated through the many examples of collective platforms, which circulate and aggregate information as part of mobility. No handheld device will ever stimulate local interactions unless this information is circulated among site-specific networks, and not only circulated in closed networks and corridors where they do not mediate or transform interactions. Instead this integration as part of architectural and urban settings stimulate engagement, provided that it also as quasi-objects maintain the underspecified nature of interactivity making people able to contribute.

At the same time the processes of performativity including the development of design, are required to enter a more refined discussion as regards to the elements of technology, representation and relationship. The brick, the chair and the robot are all technologies developed with certain techniques, but they do not act with the same effect. Here the first diagram described the difference in feedback from passive to performative technologies, and additionally this need to be compared with the characteristics of material practices and the social through levels of attachment and how representations are sustained with different levels of associations. This is basically presented as a new language of performativity both as a tool available for a profession influenced by more complex decision-processes but also as a general language for academics and critical thinkers. The different elements are inscribed in one framework, where throughout the design process of negotiation it can be validated which technologies are used, which representations are externalized and to which level they create relationships. The overall diagram and tracing of the quasi-object, described as how information is embodied into a common narrative, will determine how emergence will be created throughout the process and with which result. Without a tracing of the quasi-object it will not be possible to create emergence and thus understand how places or sociality is sustained, however it will be possible to foresee and try to schedule an idea of how to create the place or the innovative object by more specifically working with these coordinates.

The interesting part here is that as part of the design process, the quasi-object becomes the mediator which stimulates the emergence of value in design. As described, value emerges through interaction and it comes into being by moving between figure and ground, the individual and the collective, the player and the field and the abstract and the concrete. It basically describes how creativity is situated as represented by the quasi-object throughout the course of a project. This seems apparent for instance as part of how sensor feedback is aggregated in NoRA, how bodily behaviours are embedded in urban artefacts through the sculptural lighting and how the performative vehicle transforms a site at each new location by presenting an availability of extended functionality. It would be difficult to understand and make sense of an environment if it were constantly and always under influence of performative technologies, if the change did not resemble the actual requirement of the available human actors. This would imply a restless condition of multiple feedback in a primarily networked environment; a condition many gamers or virtual believers in the 80's would recognize. Basically it would be a very advanced geo-locating system with no grid or reference point. As with the reference to the new theories of the social, it should be maintained by being fluid and in movement, but at certain times this crystallizes into fixed groups or organizations as a basis for new changes to emerge. These considerations imply that a design process evolves in a dynamic balance in the same way as an urban neighbourhood or architectural space moves in different rhythms.

With the above knowledge, it is clear that there are some obvious findings as regards to how the quasi-object changes the future of design processes through computational technologies. In general, the quasi-object as a mediator goes through different stages as part of the design process, which can be compared to a feedback loop, and ties the actors to the network as a social relation. In specific this feedback loop emphasizes how an iterative process works, and how the quasi-object assembles the different influences through the process. The quasi-object stabilizes the relationships in the process and situates the information relevant for the project, and drives the transitions of the design between the virtual, actual, possible and real.

This feedback loop can be illustrated based on how the project framework is set up, and how it is realized as part of the case projects, where the quasi-object territorializes the specific project information, in a similar way for all the different coordinates.
When the first ideas are initiated in a project, it happens with a sense of ambiguity in representation and a fluid relationship. This is required for a project idea to emerge, as they can't happen in fixed relationships, where all possible effects and conclusions are already settled. However as regards to technology and mediation, this can evolve both performative and passive feedbacks, however with a growing tendency towards more interactive sessions and discussions. This phase is virtual, as previously mentioned not in the sense of technology and networks, but because it is associated with imagination and knowledge with a new capacity to act, but which isn't in effect yet.

The second phase of a project involves the actualization, which imply a transformation of the ideas or new qualities and can be compared to the idea of a concept. This also imply starting a feedback moving from the specific representation of an idea, which has been almost fixed among certain actors or 'carved in stone', before it is getting ambiguous and tempting as well as maturing the idea in a fluid relationship. This is an important phase, which does not happen as a linier process but along with an ongoing virtualization, and it starts the feedback which needs to be successfully ended with the actualization.

Actualization is thus maturing the idea through the concept and leading to the phase of the possible. As mentioned the process of the possible is close to the real, but it doesn't have an existence, and the logic applying to make it real haven't been executed. Thus the phase of the possible implies an integration of the knowledge, which makes the actual possible and thus ends the feedback which creates the basis for the real. Here the ambiguous representations are getting specific, the fluid relationships are constituted into fixed conventions and the technologies are moving from being performative and explorative to mostly passive and self-explained. The two phases of the actual and the possible have been simplified, and as illustrated through the case projects, this is a feedback happening many times throughout the course of a project.

Finally, in this review of a performative process, the possible has now clarified the inconsistencies for the real to emerge. For the design to fully realize is now only to apply the specific processes of materialization, which is fed by the arguments of the full performative loop. At this point in the process, the actor-network is in place, because it merely becomes a matter of translating the possible into the real.
Here the quasi-object ensures how iterations with feedback and emergence can happen across the different phases of the design process, although the specific progression of a design projects is happening very linier towards implementation.

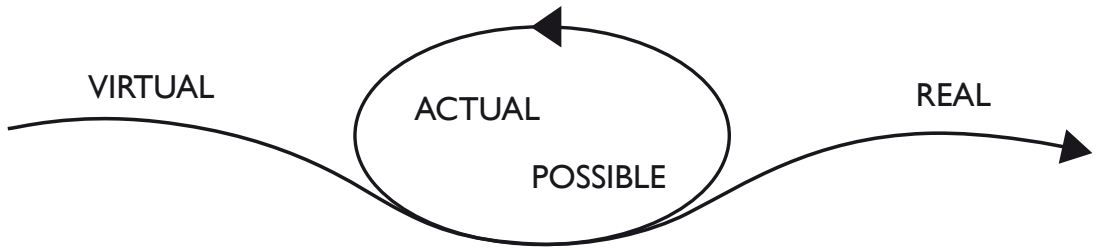


Fig. 186: Iterations with the quasi-object as driver for the feedback loop between the actual and the possible.

Experiencing the real

In the same way as this quasi-object is a mediator of the design process, it also becomes the media for interaction on a specific site with the realized design. Throughout the description of the framework and cases, this has been described as two separate phases, because this has been the most beneficial way to describe how the quasi-object work in respect to existing design traditions. Here usually the design process and the realized object or building is treated differently because different actors takes over the responsibility, and the designers and architects are leaving the stage after realization, or sometimes even before. However as a concluding remark the real potential of the quasi-object is revealed when the same performative object, which is acting as a mediator of information as part of the design process, also is implemented as a site-specific performative design. For instance as part of NoRA the dynamic parameters relating to the emergence of the envelope, was again underspecified as part of the embedded sensor technologies affecting the ambience when people were moving around the pavilion. It is the same parameters driving the initial form and design patterns, which is extended into the site.

Although the participants are not informed about this relationship, it anyway seems to create a relationship between the representation of the object and the situated acts. This relationship is not apparent for instance as part of the vehicle and ecopet, as these objects are more closely defined as systems to integrate on different sites, however the sculptural lighting exemplify similar conditions. As part of the sculptural lighting the specific parameters used for the form-development is based on how to extend a structure and circulate it for specific flows; a structure which is represented as in a movement, and additionally maintained through its engagement with participants.

Again this is combining the design parameters and the integrated sensor input from the local conditions. This integration is unique and will stimulate the social life and places, because it means that the real-time performativity of the interactive setting will correspond directly to the parameters intended throughout the virtualization of the project. It is a link, which maintains a dynamic balance with the potential users of a space, a building or a product, and emphasizes how the first conceptual ideas of a project, is directly linked to the experience of the place. The embodiment of the work is here directly dependant on the chain of possibilities, potentially running all the way from the conceptual ideas as part of virtualization, but especially within the framework of actualization and the possible. This real-time update is not only relevant for the actors that are users, but can now be extended to any human or nun-human actor.

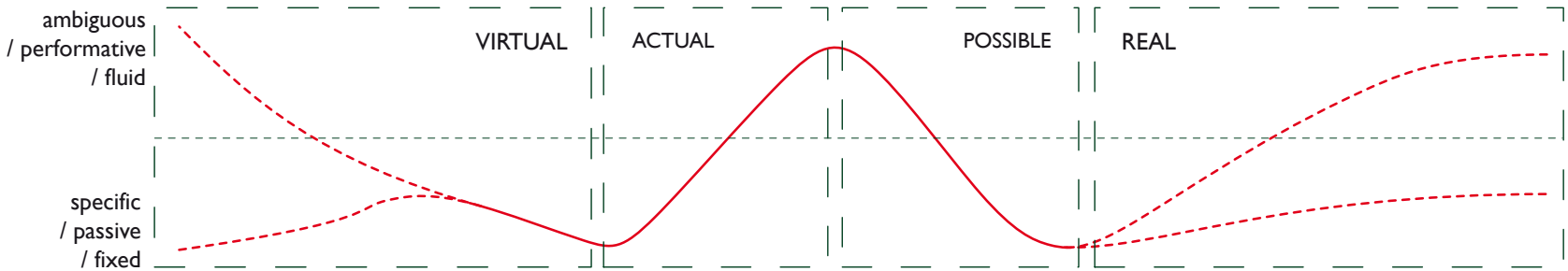


Fig. 187: The performative process and the influence of the different coordinates. In the beginning, a project is ambiguous and fluid and with either performative or fixed technologies. By the end of the project all directions are possible depending on the design intend.

The territorialized elements acting through the quasi-object participate in shaping the process and design and also become part of the process of emergence. This is also why it is relevant not only to speak of actant's but to create figurative and potentially tangible relationships with the object, thus integrating it as an actor making a difference for the project. Integrating actors like natural environmental processes of a site, traffic flows, urban interior providing a constraint for the space or e.g. digital networks, not only all inscribe relationships but also meanings to the process, most importantly because the presence of these actors will also make the actor-networks stronger. A strong actor-network, generated through access and interaction, creates ties between human and non-human actors and thus also produces the local knowledge and determines the identity of the human actors. This process of integration is complex but manageable through the quasi-object, but it also stimulates the dynamics of the place itself, because the inclusion of the actors in the first place, makes it possible for faster iterations and accommodations of new actors and changing conditions. For more temporary places like transit areas, it requires a strong relationship with digital networks to create these ties, but it is extremely valuable for both the project and the experience in the end.

With the realization of the quasi-object, the dynamics of a design process is no-longer realized only as a decision on a fixation of a wealth of potential encounters and meanings, which could be brought to life in a real life setting, but it will accommodate the basis for a vibrant and creative environment both in balance with and constantly reshaping place according to the present activities and actors. Not only does it seems to compare to organic processes of continuous growth and decay, but it takes the best parts from the more mechanistic and now digital age and the natural processes to join in new active systems, which supports each other throughout the life of a place. The interactivity, networks and potential intelligent contributions from systems provides the possibility to constantly compare current activities with not only optimized ways of living, but also as proposals for new social encounters and alternative activities through embedded information and effectors. This process of providing a new experience of a place is more aligned with how an experience would actually take effect, instead of the more simplistic views of computational software and simulations.

Perspective

Before the final assessments with more critical perspectives, it would be highly relevant for a moment to dwell with the additional future perspectives of the performative framework and the above integration of the quasi-objects. When designing architects and designers traditionally took over the faith of the users, but through the process of designing a space, they more or less involved with the site-specific networks, and thus creating their own experience as a pseudo-place. The experienced place might in the end mean more for the architects and designers, because they were involved in gathering information, creating frameworks and mediating the content for the new space, thus tying them to an actor-network and potentially being blind for the perspective of other occupants. This is especially apparent looking at some of the case projects, which do not make a significant impact on other actors before it is specifically integrated in interactive prototypes or engaged with a specific dialogue as part of the process. The point here is that the quasi-object can become the interactive architecture which provides the platform for users themselves to gather local information, and thereby feed back this information through embodiment and creating place as a process of empowerment. This influence of the users can both integrate as part of the design process as per the above or as part of the realized performative design, which is acting underspecified open for individual behaviours.

What is suggested with the quasi-object is to integrate the potentials of actor-networks as real-time intelligent environments, which continuously create and re-create itself in a process of negotiation between natural and artificial systems. The most obvious consequence of this development will become the alignment of organic and technical systems, which operates by supporting each other throughout the life of buildings and places; thus not a matter of control but a matter of designing for performative loops between different levels of natural and artificial systems. At a more simple level, the future integration of pervasive computing, advanced sensor technologies and mobile networks driving the feedback loops with the possibility for emergence between the actual and the possible, will additionally close the loop and tie together the virtual and the real.

This relationship between the virtual and the real almost has resemblances to the idea about ubiquitous computing and the illustration of the feedbacks in second-order cybernetics. At the same time it functions a bit like an autopoietic organization however with the strong difference that it is open to the environment more like an allopoietic concept.

This combination of a self-making design process, which is fed by the environment, can be described as how actor-networks are functioning by integrating various relationships through mediation, which in turn translates the environment around it. Here human actors are inscribed in a performative system of technologies, where activities and changes to the environments (human or non-human) are directly linked to the idea about the virtual system to start up a design process involving the feedback of the actual and possible. The actual and possible becomes the mediation happening between actors involved in the design process, and in this open-ended social process, place is already starting the defining moment at the level of virtualization.

However for this scenario to work out there are several factors that need to further develop. These factors are primarily related to how the interfaces between the different phases are revealed and translated through new quasi-objects as well as how these systems in the end will interact with human culture.

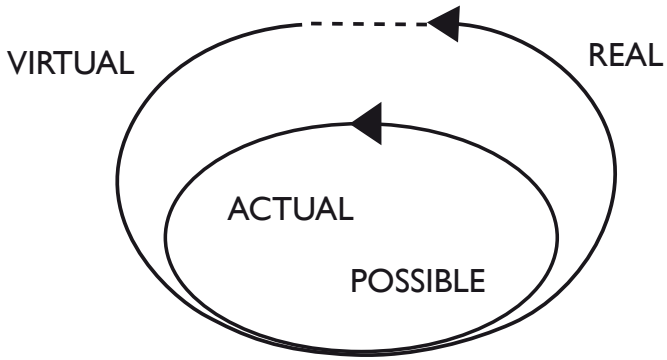


Fig. 188: The full implementation of the quasi-object closes the full feedback loop.

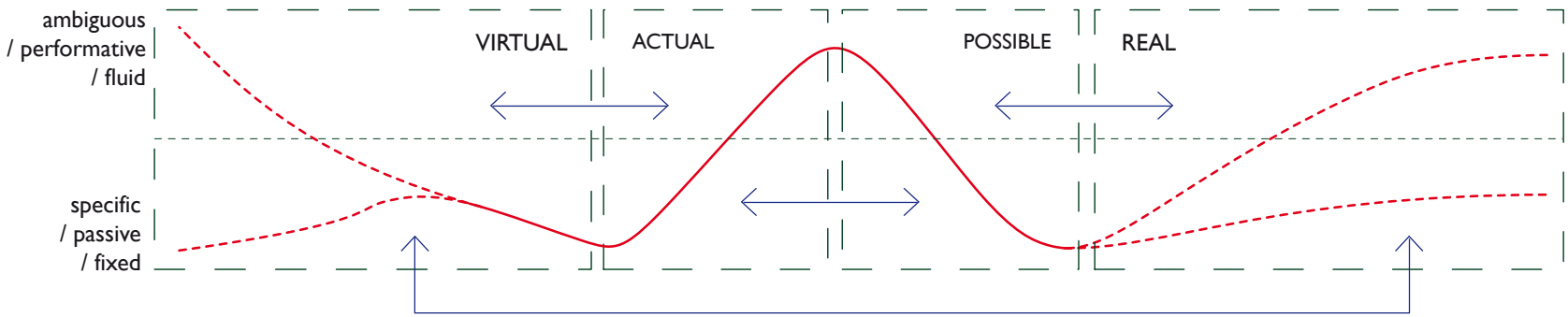


Fig. 189: The quasi-object mediates between the different phases of a project.

The interactions that are important are not only the boundary areas between the different phases but also depending on the position of the representations, technologies and relationships in the framework. The overall factor is the specific development of a quasi-object, which contains the stated properties to mediate between the different states in the process.

First of all this quasi-object needs a digital representation which act as a database of all information gathered, circulated and changed throughout the course of the project. It is a database which reference the time-space of each occurrence creating a difference for the project, and it can always be referred to from any moment throughout the process. These tools are beginning to develop as part of for instance project wiki's, project webs, blogs or similar, which means that they can categorize any meaningful information as a basis for discussion and further development. However although these databases are beginning to be more advanced with both texts, images and movies as well as applications which contains possibilities for networked modifications of content as diagrams and digital models, it still lack a great deal for the actual and fluent integration in a design process to happen. In reality these applications are currently only working in-between phases at certain deliverables, but instead with quasi-objects they can now situate this knowledge and mediate it locally though site-specific objects. Here it is not only simply a 'data-object', but the quasi-object exemplifies how this data relates to actual effects on a site.

Secondly this database now containing the relevant time-space dependant information needs to be actor-specific. This implies that not only is it one common database for all information being stored and modified throughout the project, but it needs to be addressed specifically to each actor. Currently this apply to human actors, as when a person is modifying a file, however in this system each object carries an index or a reference in order to understand what kind of agency changed the design process. This is extremely relevant and important because already now design development is highly constrained by sophisticated actions, which are generally referred to as 'software'. This isn't just 'software' but it is a specific manipulation of certain applications on one specific computer (or several) running as a complex network of smaller processes. It is processes that needs to be able to be traced back and is important for any future creative process beginning to involve levels of intelligence. Some would argue that any creative process is initiated by a human, however no-matter we are not yet at the level of artificial intelligence affecting the design models, this will come in due time to seriously consider a proper system.

Thirdly any of these actors, which feed information into the quasi-object, needs to be extended with the relevant sensor technologies and networks. The actors, which do not contain the same level of sensors, will not be able to make sense in the actor-network; basically they will be forgotten. This means that ideally any technology that begins to integrate in culture as a basis for the circulation of information needs to be extended among all actors as soon as possible. This logic have also been relevant and discussed among human actors as regards to for instance mobile phones and portable computers to be distributed to schools and elderly, who are not on the same technological level, or for instance in more developing countries. The quasi-objects can relay such developments for a certain period, which is exemplified later, but in general when computation extends to only certain groups, this creates an uneven balance in how they are represented in the processes of cultural production. The actors, which are not connected or able to act, are not part of the performative feedback loop, and the designs and spaces that are developed, are only for marginal groups. For some design cases and places this is not a problem, because this is the idea to limit focus, but especially for the development of neighbourhoods and public architecture, all actors need access to the platform; or to say it in another way, these technologies need to be democratized.

Now, as mentioned this is an ideal situation, when each object that potentially makes a difference for the design should be connected and feeding information into the performative process, but it is a most likely future scenario, where all biological systems as well as bricks, books, kitchen equipment, vehicles etc. all are feeding information into the system to update status. Important also because these objects not only are bricks, books and equipment, but they will contain the possibility to process information and thereby affect the network and place. Any place exists because of the relationships inscribed in the actor-network, and when bricks begin to diffuse, change appearance or even location, books begin to read or impose knowledge to space autonomously, almost like the electric doll that you can't shut off, and the kitchen equipment to become the nightmare of your uncles deadly workshop of unsafe machinery, you would wish for that these systems were connected. These connections are important, because this scenario seems more likely to come before the scenario implying that all the objects will speak together fluently and collaborate on purposes that we do not like.

Does this represent chaos? Not at all. Maybe it for a moment seems very complex to organize and represent these actors in the system, maybe even just as actant's in the beginning, but this is by far less complex, as when we are trying to address objects that are not connected, like having the problem of finding your keys because you can't call them up. After all, the connections and the mesh-networking exist for this to happen, and do not seem complicated as regards to technical solutions. The real challenges are contained in the existing powers of traditional organizations and hierarchies, who are determined to plan for and control any intended outcome and experience of architecture and urbanism. Thus it is to realize how common grounds with underspecified technologies can stimulate urban life and interactions, instead of being planned for and fixed through predetermined designs; this represents empowerment of the human actors, who have an actual relationship to a design and site.

As regards to the quasi-object, these scenarios make it even more relevant, because such development will not happen overnight, although the technologies are already available. Not only does the quasi-object act as the representation of the aggregated information relevant for the project in focus, but also it provides the possibilities to represent an actor not available or connected. For instance, when designing for a new architectural project a lot of basic knowledge is usually derived from a site, at the same time as trying to get a grip on the client organization, budget etc. This knowledge is extremely provisional like the flows of people on the site, the forces of the wind, the conditions of the local materials, the ground water levels and earth conditions along with a series of parameters, which change over the course of a second. This information is usually treated in an abstract way by making assumptions about both the current conditions and the possible effects, but in the end no-one comes near the real, because it is constantly changing. The fact is that the change is the real, and when designing for any place or client, the parameters of change would be far more relevant than knowing any outdated statistics. Not because that there would be any chance to make a design that would encapsulate all the dynamics of a place and program, before the actualization and the laying out of the possible, but because this circulation of dynamic site-specific information will completely change how the design process is executed. Any human capacity, who would start up a design process, would hopefully take into consideration the presented dynamic parameters of a site or a condition, if it were available, and not falling back into a simplification which is in the end is unrealistic. By any means the ideal would be that any designer would begin to actually prepare for change, no-matter if we are talking about changing behaviours at a site or foreseeing a climate crisis. This would happen because the collective representation of the site specific information, feeding directly into the process, would inscribe the dynamics of the site into the actor-network. The quasi-object is the vehicle, which gathers this information and makes it available for virtuality to appear, the actualization to work on present constraints and for the possible to adjust to the real; here the quasi-object is the ultimate empirical instrument feeding practical knowledge into a theoretical virtual beginning.

Parametric design hasn't yet become the great concept for architecture and most likely because the drivers for this software are the measurable evidence-based statistics, which can be most easily extracted. The information, which is complex, dynamic and maybe most importantly very difficult to quantify, is the information that is needed for architects to be inspired and for more humanistic environments to grow. This implies the coupling of constructions with emotions and the bodily affects with the functional program, which in the end would initiate a virtualization based on the experience of the whole from the parts, before starting just the basic conceptual framework. The place where parametric design has already succeeded somehow, is between the actual and the possible, and to some extend also between the possible and the real; at least in theory, as still constructions seems to be over-dimensioned by far, indoor climates are still useless at many occasions and roofs still fall down. Whatsoever, the next real applications that will be developed will not only couple the real and virtual, as mentioned above with the vehicles of site-specific information, but feed into the processes between the virtual and the actual. In this space there is a high requirement for new applications both artificial and biological, which can extend our human capacity to think new ways forward. As part of traditional processes the presented solutions are usually already present before we are starting to design, but with the stated methods and tools, the concepts can be initially more de-territorialized from the existing group relationships and more specifically focusing on stating ambitious challenges for the future processes of a site. This will happen gradually through the feedback from the real, but the most promising perspective rests in the possibility for cross-disciplinary processes to integrate between the virtual and the actual. Architects and designers are the ones to impose design thinking and to constantly propose alternatives through scenarios and models. However they need to be challenged by the diversity of inputs from artists, psychologists, anthropologists, marketing professionals, politician's etc. to be able to present a significant contribution of knowledge as a proper starting point for imagination. The critical

part of a design project exists in the beginning of the project and not as part of making the possible real, and these inputs will exists when the interdisciplinary is coupled with site-specific information. The quasi-object becomes the interdisciplinary forum which starts discussions based on real-time sensor input from a complex territory.

The final perspective of the quasi-object and the performative process concerns how this influence place-making and the social. Essentially the availability of site-specific technologies, which augment through collective platforms depending on the different actor-networks and agendas specific for certain groups, will be potentially social. These platforms exchange information about human and non-human actors and inscribe them in networks of exchange, and the actors that are connected are the ones to shape place. The success of the quasi-object to differentiate this information and embody it as part of meaningful artefacts, will to a certain extend determine the success for a new sociality. However this doesn't seem like a problem of the quasi-object itself or the performative process, but is especially a design issue dealing with how the specific selection of objects and interactions will occur with the stated actors. Additionally the way the quasi-object makes available an open underspecified design process by sensors and effectors, is also potentially a way to integrate human actors into the general process of place all along; here place is created through interaction and the availability to affect the design process creates the necessary attachment for the meaning to appear, when the design is actualized. Additionally the possibility for networked applications responding to interactive environments presents the possibility for environments to prepare for certain actors to arrive e.g. at transit areas, and thereby configure spaces for specialized purposes. This includes the potential for spaces to intelligently propose new usages based on the availability of networked information, and thus develop for a customized purpose before arrival. In the end the quasi-object is thus allowing for human actors to project their own patterns into the environment to negotiate the transformation of a place; a process involving perception, effect and individual conception of a place.

When architecture and design acknowledge the importance of access to constitute environments, they additionally value how meaning and knowledge is created through mediated interactions. Here mainly because the objects that are part of our social world shape how the culture develops. Thus it generally doesn't matter if it concerns the constitution of an urban neighbourhood, a lively architectural plaza, business complex or family house, or a unique piece of personal equipment, because the ability for the 'thing' to attach relationships and meaning through interactions and circulate this within the specific network, will determined how well place and identity emerges. This is part of a process of translation where the objects have certain limited networks with certain information packages and distribution corridors specially customized for that environment, but when they enter a performative process involving the actors into processes of both contribution and collective representations, they shape the social and thus also the physical place. It is not very different from how the physical boundaries have shaped how GIS systems are coded, or how telephone networks are geo-located, because each place will have certain local information and protocols, which is required to be unique for the place or for the 'actor-network' to emerge. These mediations however happen on top of each other like layers of infrastructure or network applications running through the same infrastructure, thus making different places exists in the same spaces and to be interwoven across physical addresses.

Assessment

This research project has faced several challenges. This mainly due to the high ambitions of the researcher to challenge how theory and practice could develop cumulative throughout the project, by combining the extensive scope of theoretical knowledge with design intends and real-life experiments to be evaluated within a the fixed timeframe of the PhD project. All along the researcher was an integrated part of the evaluated projects, which led to the very positive factors of being able with a great level of detail to trace any influence to the design and progress, however additionally with the rather schizophrenic working methods of sometimes critiquing own starting points and decisions. On this background the final framework appeared rather late in the research project and even though more simplified versions of the frameworks and diagrams were developed throughout the course of the project, it would have been more beneficial to have a more clear image of this perspective before the final design proposals. That is why it also would be very relevant to again participate in a research design, where this framework will be more externalized as regards to the how knowledge is sustained through the quasi-object and in the end realized in an experiment; a subject which is currently being investigated.

When making some final comparisons of the performative framework, and the example of the stated ideal progress of a design project as regards to the three coordinates, it turns out that there are some obvious explanations for why these projects progressed as they did. For instance the NoRA project almost follow the pattern of a design process as sketched above in the conclusion and with many iterations between the actual and the possible; a significance which is also exemplified by the large scope of projects, which continued in the same track of NoRA on the Venice Biennale 2008. Here the feedback technologies, the sensor relationships to the environment, the use of fluid dynamics software etc. all appeared as part of 2008 projects similar to NoRA, although these wasn't to be found in 2006. Probably NoRA did not start that process of these performative technologies, but clearly it was inscribed in the formation of new computational tools of the same kind. As regards to the 'performative vehicle' it wasn't specific enough and clear enough on the use of passive technologies; a condition similar to the 'performative urban spaces', however here more concerning the use of passive technologies and fixed relationships. The 'ecopet' can nearly be exemplified as a never-ending story with only few situated procedures, and the 'interactive sculptural lighting' as a successful project although delayed dramatically throughout the different phases. The 'social lighting' is especially interesting because it turned out to be rather successful as an experiment although the relationships weren't really fixed at any time. This leads to some reflections on how a truly performative project actually could exist as part of fluid relationships, where emergence would determine progress instead of relying on necessarily predetermined fixed phases of work.

Designing with Theory and Practice

The case projects beginning with the NoRA pavilion for the Biennale are selected from a range of different project in which the researcher participated. In the end these projects was selected across scale, level of implementation and complexity in design methods and technologies. As regards to the methods and goals of a research project, this has led to the development of a new design framework, which describes the use of performative technologies compared to representations and relationships through the course of a project design. However the research has fought many battles to have more empirical studies on how these technologies in the end would be experienced in use as part of realization, especially with very conservative clients and in rather constrained public spaces, but again this is important as regard to how the research will feed back into the cultural production of a design practice. This has been compensated for through the large scope of reference projects observed during the research, but also this last loop is highly interesting because the critical perspective of evaluating the experiments is not always feeding back to another level of theory, but instead embodied in new designs; a subject relevant for the interdisciplinary scope of this work, but also very problematic because of the mixed theories of the social and natural sciences. This is a critique which the research is much aware of. The stated research methods described how theory, design and experimentation are interrelated and develop in a feedback, however in reality experimentation also sometimes feed directly into new designs, based on the same theory but with additional layers of critical reflections. As important as it is to sometimes let loose on the processes of theory, writing and discussions without a specific concern for the object, it is also valuable sometimes to design mainly through intuition without the heavy clouds of theory. Thus to make a future simplification of the research-through-design method, the experiments doesn't necessarily need to be theorized in detail with an additional layer each time, but instead embodied as a more simplified affect to be described.

When approaching practice with the stated theory and framework, it has at many times been too overwhelming for it to comprehend and embody this in their own work. Throughout the course of the research project, the researcher learned how to simplify the aspects of performativity and technology in order to make it more available for both discussions and as an instrument for realization. This simplification was based on ANT and how each decision, material element and embedded technology could be considered as being part of a network of relationships, which severely influenced how design was constituted. Here practice, mainly understood as municipal decision-makers, clients, architects and contractors, was quiet clear on what this meant for the design and realization of a project, but still it requires a lot from the partners to fully accept this methodology compared to their existing practice. Additionally after a more thoroughly exemplification of the difference in feedback technologies, they also understood how this change with computational technologies can be dramatic for their professional field, but although convinced they couldn't fully ignore current working procedure. The many examples, which are currently realized internationally and the several more under development, are understood very clearly, but still these professions want even more practical and physical evidence of the value of interactions and issues of place and the social, to fully comprehend the impact. When the sometimes rather abstract descriptions of the framework is specified as part of how practice carry out design work as regards to technologies, design proposals and documents and the stated relationships in the organization, it seems as a durable instrument for the process; however its impact needs to be additionally addressed through more design projects and discussions between academic and practice, or even better as part of common design work. This design work will additionally exemplify how interdisciplinary professions can collaborate on place-making beyond the traditional dichotomy between architects and engineers, scientists and practitioners.

Performativity as paradigm

This project has investigated the issue of performativity as regards to its cultural background and influence on the general design work. From the many examples and large scope of theoretical work, there is a clear picture of how many of the processes involved with contemporary culture and design are getting increasingly performative, in the sense that they are shaped by many forces and complex parameters, actors and interests, especially considering computational technologies as important actors. However the performative framework is not to be considered as a dogma for the future of design work, but more as a tool to externalize this complexity with non-human actors to allow for a higher degree of emergence both through the process and as part of the realized design; additionally to inscribe a higher degree of environmentalism where these dynamic factors are also inscribed all the way through the design process. The one real important argument to consider as regards to performativity is that until now architecture and art don't seem to be very successful by just adding more parameters to the complexity of the process. These parameters still need to be carefully selected as part of the conceptualization phases with a design intend, and it needs a quasi-object, which supports these phases and actors throughout the design work. Thus the issue of 'more' is not the main conclusion of performativity in this thesis, but through the framework to be able tp present when and how different levels of feedback with technologies, representations and relationships can support different phases of the work, and thus also suppress certain elements. Here a design process starts by following one or few actors and then inscribe them in more complex relationships when they need to be territorialized and placed.

The other aspect which becomes rather difficult to treat as part of performativity is the issue of empowerment and power. This hasn't been a very specific subject in this thesis, but nevertheless it is the conclusion that empowerment and underspecified designs allow for more actors to take hold in the project and thus also for places to emerge both through the process and in the realized projects. However this process of empowerment will require a radical change in the traditional professions, organizations and procedures. As described, the network metaphor is having a great deal of influence on more democratized processes of design and place, but also these networks are exerting different levels of influence where new hierarchies emerge by the way technologies are integrated. Performativity could thus appear as the ultimate democratized tool but is nevertheless a rather idealistic condition of contemporary culture, where the agency of the quasi-object is not and never will be completely neutral, although exemplified as a common platform. Instead new technologies will advance the process of design intelligence to work not only with scenarios, new scripted design tools based on sensor input and multiple actors but to extend these into real places and situations, where 'quasi-objects' will mediate the relationship between places, people and technologies. Quasi-objects will be circulating to situate knowledge.

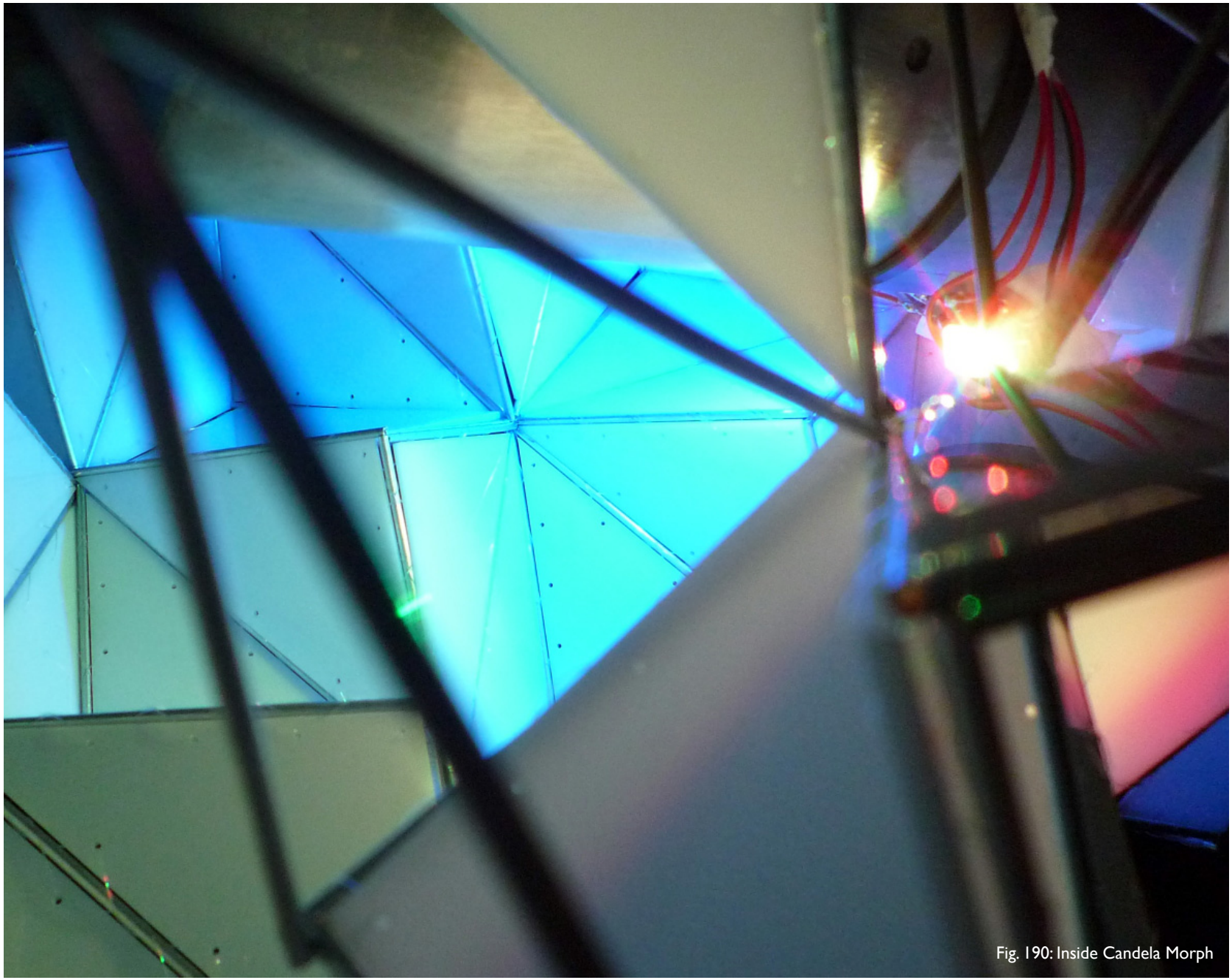


Fig. 190: Inside Candela Morph

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APPENDIX

Articles and Papers

The following papers and articles produced during the PhD are available from this website: *http://www.aod.aau.dk/staff/bsth/phd_publ/*

1: Performative Environments: Architecture Acting with Flows. / Thomsen, Bo Stjerne. I: Architectural Theory Review. 2008; vol. 13, no. 3, 01.12.2008. p. 320-336

2: Performativ arkitektur. / Thomsen, Bo Stjerne. I: Arkitekten. 2007 ; vol. 109, nr. 6, p. 48-51

3: Performative Byrum på Amagerbrogade. / Thomsen, Bo Stjerne; Poulsen, Esben Skoubo (Illustrator) ; Lanng, Ditte Bendix (Illustrator). 1 udg. Aalborg : Institut for Arkitektur og Design, 2007.

4: Performative Urban Environments: Increasing Media Connectivity. / Jensen, Ole B. ; Thomsen, Bo Stjerne. I: Mediacity: Situations, Practices and Encounters. red. / Frank Eckardt. Berlin : Frank & Timme, 2008. p. 407-429

5: Design Science Through Architectural Experiments. / Thomsen, Bo Stjerne. 2008. s. 1-11 Konferencen: Architectural Inquiries, Göteborg, Sverige, April 24th - April 26th, 2008.

6: Ecopet. / Thomsen, Bo Stjerne ; Parisi, Lorenza ; Kaman, Colleen. 2008. p1-5 Konferencen: The Mobile City, Rotterdam, Holland, February 26th - February 28th, 2008.

7: Performative Experiments and Cultural Re-Planning : Recapturing the Spectacle of the City. / Andersson, Lasse ; Thomsen, Bo Stjerne. I: Nordisk Arkitekturforskning. 2008 ; vol. 20, no. 1, Trondheim: p. 39-51

8: Performative Urban Architecture : place-making in-between architecture and socio-technical systems. / Thomsen, Bo Stjerne ; Jensen, Ole B.. 2008. p. 1-16 Konferencen: American Association of Geographers (AAG) Annual Conference, Boston, USA, April 14th 2008 - April 20th 2008

9: Performative Urbanism: grounding experience through experiments / Thomsen, Bo Stjerne; Poulsen, Esben Skouboe. p. 1-14, Conference Architecture and Stages in the Experience City, Aalborg Sept. 2009

Quasi-Causes

NoRA
Oct 9, 2004: (10, -8, 8)
Initial idea on exhibiting in Venice based on visit at the Danish pavilion

Jun 2005: (4, 4, 6)
Application process for the regional funds from EU

Aug 31, 2005: (-6, -6, -8)
Organizational meetings

Sep 01, 2005: (-8, -2, -6)
Application sent to the funding committee

Oct 13, 2005: (-4, -4, -4)
Final Application sent to the funding committee

Oct 24, 2005: (6, 2, 4)
Hani Rashid, inspirations for the Biennale project

Dec 12, 2005: (-2, -2, 8)
Workshop in Skagen

Dec 15, 2005: (6, 1, 4)
Preparations for the Biennale project 'analysis, sketching, synthesis, presentation'

Jan 16, 2006: (-8, -6, -2)
'Dear Mr. Richard Burdett. ... it has been a continuous desire to exhibit how we work with urban and architecture issues at the department.'… The project will be carried out as an interdisciplinary design approach in collaboration with local developers, authorities, university and with external consultants within interdisciplinary design methods and sustainable concepts.'

Jan 31, 2006: (8, 2, 6)
Initial 'meta-city' concept

Feb 1, 06: (8, 4, 8)
Conceptual Brief for the Biennale contribution.
'...an adaptable structure that can enter different configurations depending on the input from the environment.'
'… could lead to new integrated design methods and technologies...'

Feb 4, 2006: (2, -4, -2)
Workshop with Municipality of Skagen

Feb 11, 2006: (5, -4, 2)
Exhibition at Aalborg Kunstpavillon, Skagen process

Feb 27, 2006: (-7, -2, -2)
Main projects startup

Mar 2, 2006: (-10, -8, -2)
Meeting at the Danish Architecture Centre, Copenhagen

Mar 2, 2006: (6, 4, 2)
Presentation of adaptable architecture

Mar 15, 2006: (-8, -8, -6)
Introductory student mtg.

Mar 19, 2006: (8, 4, 6)
Design workshop, urban design

Mar 19, 2006: (-6, -4, -6)
Budget application for the department

Mar 20, 2006: (6, 2, 6)
Initial concept sent to the Biennale

Apr 2, 2006: (-8, -8, -7)
Biennale board starting up

Apr 3, 2006: (8, 4, 4)
Workshop with artist Christian Lemmerz

Apr 07-10, 2006: (10, 8, 8)
Selection of architectural concept
'...conceptually focused on a newly developed design method with the basis in local climatic values as part of the individual areas.'

Apr 11, 2006: (-8, 6, 6)
Formation of a new design group.

Apr 11, 2006: (6, 2, -4)
Design concept sent to Mr. Burdett in Venice
'...a dynamic and vibrant environment where the visitors at the Biennale will be invited for design performances and events'
'...the relation between people, society and architecture reflected in the qualities of daily life.'

Apr 12, 2006: (-4, -4, 6)
Critique of concept and design group

Apr 14, 2006: (-2, -4, 2)
New material released for head of university a.o.

Apr 16, 2006: (-8, 2, -8)
Final architectural program

Apr 20, 2006: (-10, -4, -4)
Problem with a kitchen in the pavilion

Apr 23, 2006: (6, 6, 6)
Initial conceptual text

Apr 26, 2006: (8, 8, 8)
Workshop with the Culinary team

Apr 27, 2006: (-6, -4, -4)
New location proposals

May 1, 2006: (-8, -4, 2)
Specifications of programming requirements

May 5, 2006: (-8, -2, -8)
Contract with local coordinator in Venice

May 6, 2006: (-4, -4, -6)
Final project description sent to the Biennale.

May 8, 2006: (-10, -8, -8)
Sick professor.

May 15, 2006: (8, 8, -6)
Industrial design concepts for the Biennale

May 15, 2006: (-8, 0, 2)
Handing over all royalties. 'I explicitly authorize the Foundation La Biennale di venezia to reproduce the works in question in the official publications of the 10th International Architecture Exhibition...'

May 17, 2006: (-6, 2, 2)
Initial input from the structural engineer.
'...rough estimate on doing the drawings and calculations acoording to DS412 or EC3.'

May 18, 2006: (-8, -4, 2)
Refined structural concept

May 25, 2006: (-6, 2, 4)
Meeting with structural engineer

May 27, 2006: (-8, -6, -4)
Initial plan and section drawings

May 29, 2006: (-8, -6, -8)
New structural model

Jun 1, 2006: (-8, -8, -6)
Confirmation on budget and time schedule

Jun 2, 2006: (2, -8, 4)
Meeting with facade supplier and specifications

Jun 10, 2006: (6, 8, 6)
Proposals for architectural enclosure

Jun 12, 2006: (-8, -4, 4)
Design for new architectural base

Jun 14, 2006: (2, 4, 6)
Storyboard for the interactive systems

Jun 15, 2006: (-4, -8, 2)
Meeting with 3M concerning facade fixation

Jun 16, 2006: (4, 6, 4)
Concept for the electric installations

Jun 18, 2006: (-10, -6, -8)
Invoicing for steel and facade.

Jun 20, 2006: (-6, 4, 4)
Final design for the satelites

Jun 21, 2006: (-6, -4, 6)
Final design for the furniture

Jun 22, 2006: (8, 8, 6)
Conceptual movies digital design

Jun 26, 2006: (-10, -6, -6)
Specification of furniture details

Jun 28, 2006: (-10, -8, -8)
Agreement on cutting method for facade

Jul 7, 2006: (4, 2, 0)
Exhibition workshop

Jul 9, 2006: (-8, -4, -8)
Final design details for the satelites

Jul 10, 2006: (2, 6, 8)
Finalizing exhibition concept.

Jul 12, 2006: (-6, -6, -4)
Specification of door concept

Jul 15, 2006: (-10, -6, -6)
Cutting files for the facade are sent

Jul 17, 2006: (8, -2, -8)
New proposal for site

Jul 20, 2006: (-4, 4, 6)
Support statements for the project are sent.

Jul 22-24, 2006: (-6, 2, 6)
Venice to examine alternative sites

Jul 28, 2006: (-4, 6, 8)
Biennale accepting the new location at Isola di San Servolo
'Dear Prof. Fisker,
Today we have been informed that the pavilion of NoRA will be installed in the Isola de San Servolo and we confirm that we accept the new location'
Renato Quaglia, Managing Director

Jul 28, 2006: (8, 8, 2)
Soundscape final concept

Aug 1, 2006: (-8, 2, -6)
Ordering final details for the kitchen

Aug 2, 2006: (-8, 4, -6)
Facade panels damaged

Aug 3, 2006: (-8, -8, -8)
Packing concept for pavilion

Aug 8, 2006: (6, -2, 6)
Press release out

Aug 10, 2006: (-4, 2, 4)
Confirmation of the remaining electrical equipment

Aug 11, 2006: (-10, -2, -4)
Insurance considerations of the pavilion

Aug 14, 2006: (-10, 2, -6)
Ordering final electrical equipment

Aug 15, 2006: (-6, 4, 6)
Ordering a boat in Venice for transport of people and supply

Aug 16, 2006: (-8, -8, 6)
Meeting with the construction team

Aug 17, 2006: (-10, 2, -6)
Ordering the lights for the pavilion and mattress for the accommodation

Aug 18, 2006: (-10, -4, 2)
Confirmation of kitchen production

Aug 21, 2006: (6, 6, -4)
Request for internet for the pavilion

Aug 22, 2006: (-2, -6, -6)
Facade tests

Aug 22, 2006: (-8, -6, -8)
Final packing list

Aug 22, 2006: (4, 8, 6)
Programming of sound and light

Aug. 23, 2006: (2, -6, -6)
Final overview of cables and plugs

Aug 24, 2006: (-6, 4, 4)
Final confirmation on building cranes

Aug 25, 2006: (-6, -6, 6)
Preparation of guide for San Michele

Aug 26, 2006: (4, 6, 2)
Activity levels prepared for sound and light scenario

Aug 27, 2006: (-6, -2, 4)
Work team leaving for Venice.

Aug 28, 2006: (-8, 2, 6)
Truck leaving Denmark for Venice

Aug 28, 2006: (-10, -8, -8)
No financial support from the department

Sep 1, 2006: (-8, 2, 4)
Arrival at San Michele, Venice

Sep 5, 2006: (-8, 4, 6)
Invitations for opening is released

Sep 9, 2006: (6, 8, 10)
Opening at Isola di San Servolo

Sep 12, 2006: ((-8, -2, 10))
Congratulations from the University staff

Sep 15, 2006: (-4, 4, -2)
Project status concerning equipment

Sep 19, 2006: (-10, -8, -8)
Securing the roof

Sep 22, 2006: (8, 6, 8)
Event at the pavilion in Venice

Sep 29, 2006: (-8, 2, -4)
Agreement with facade supplier on final costs

Oct 10, 2006: (-8, 2, 8)
NoRA visit

Oct 15, 2006: (0, 0, 8)
Final list of equipment

Oct 22, 2006: (8, -2, 2)
Evaluation of the project

Nov 10, 2006: (-2, 2, 6)
Presentation of NoRA at Media City

Nov 15, 2006: (6, -8, -10)
Pavillion deassembled and packing

Jan 8, 2007: (6, 4, -2)
NoRA at the 'www.interactivearchitecture.org'

July 12, 2007: (4, 6, 6)
NoRA in Skagen

Oct 12, 2007: (6, 8, 10)
NoRA at the Culture Night in Aalborg

Jun, 2008: (10, 10, 10)
Scheduled for ending NoRA at the Roskilde Festival

Performative Vehicle - Quasi-Causes

Feb 24, 06: (9, 6, 7)
Awareness of the City Car concept between Gehry and MIT

May 05, 07: (8, 1, -5)
Sketchting ideas for the vehicle as a furniture

May 16, 07: (6, -4, -8)
Review of Public City Car Presentation

Aug 12, 07: (2, 1, 10)
Study of car infrastructures

Aug 30, 07: (8, 2, 4)
Discussion of Performative Vehicle approach

Sep 05, 07: (8, 2, 7)
Introduction to the current City Car

Sep 12, 07: (8, 3, 7)
Ideasion for vehicle concepts

Sep 20, 07: (7, 2, -4)
Vehicle studies for transformable enclosure

Sep 24, 07: (4, 7, 7)
Discussion and presentation of Shanghai Future Infrastructure

Sep 25, 07: (7, -4, -3)
Sketching the vehicle as a relationship

Sep 26, 07: (-8, 6, 5)
City Car, wireless power studies

Oct 4, 07: (-5, 2, 4)
Multi-model transportation and detailing of concept

Oct 10, 07: (8, -2, 2)
Car Concepts Research

Oct 12, 07: (7, -2, 6)
Sustainable Cities Charette

Oct 18, 07: (-4, -8, -7)
Highway Statistics Research

Nov 1, 07: (6, 4, 2)
Discussion with Wayne Cherry, GM

Nov 2, 07: (7, 8, -5)
Follow-up on GM discussion

Nov 13, 07: (4, 6, -5)
Parametric Model startup

Nov 14, 07: (4, 5, -2)
Status, discussion, Smart Cities Group

Nov 20, 07: (1, 7, 2)
Form studies for shape transformations

Nov 26, 07: (-9, 4, -2)
Structural and Material Concepts

Nov 28, 07: (8, 8, -4)
Parametric study of adaptable seat

Dec 05, 07: (3, 2, 5)
Status presentation, Smart Cities Group

Dec 06, 07: (6, 1, -4)
Presentation of vehicle engineering

Dec 19, 07: (-8, 8, -7)
Presentation for General Motors

Jan 10, 08: (4, 5, 6)
Meeting with Bill Mitchell

Feb 13, 08: (6, 6, -2)
Design study of customized urban lounge

Apr 1, 08: (6, 2, -8)
Concept regarding bodily customized carpet

May 05, 08: (1, 4, -7)
Design detailing of customized carpet

May 27, 08: (8, 4, 4)
Critical Mobility Workshop

Nov 21, 08: (5, 2, 5)
Mobilities, STS, workshop

Performative Urban Spaces / Social Lighting

Mar 15, 07: (6, 4, 0)
Introduction to the project in Amagerbrogade

Mar 29, 07: (8, 6, 3)
Discussion on approach and references with municipality

Apr 24, 07: (-6, -7, 4)
Meeting with Copenhagen Municipality on overall Amagerbrogade framework

Jun 04, 07: (-1, -3, 6)
Information and goals for seminar and workshop

Jun 26, 07: (-5, -2, 2)
Workshop regarding Amagerbrogade concept

Jul 08, 07: (-8, -2, -6)
Overall concept development for Amagerbrogade

Jul 23, 07: (-6, -2, 2)
Site research concerning traffic

Aug 16, 07: (-2, 3, -3)
Agreement with municipality on experiment

Sep 5, 07: (-9, -4, 2)
Model and images from the municipality

Sep 7, 07: (-3, 6, 7)
Setup of web-log with site proposals and material

Sep 10, 07: (7, 5, 5)
Ideasion for the performative concepts

Sep 26, 07: (-2, 8, 8)
Selection of ideas and detailing of delivery

Oct 03, 07: (2, -1, 4)
Shared space proposal from Rambøll

Oct19; 07: (4, 4, 4)
Description and visualizations of ideas catalogue

Nov 12, 07: (-5, -2, 6)
Confirmation on location for experiment

Nov 15, 07: (7, 7, -3)
Ideasion for Amagerbrogade Experiment

Nov 25, 07: (-4, -3, -8)
Delivery of example catalogue

Dec 02, 07: (-6, 5, 4)
Research and discussions on infrastructure availability

Dec 19, 07: (5, 2, 6)
Conceptual diagram for the site

Jan 15, 08: (-8, -6, -8)
Schedule and cost analysis

Jan 21, 08: (2, 3, 2)
Meeting with the Municipality of Copenhagen regarding experiment

Mar 11, 08: (-6, 2, 1)
Site study of activities and urban elements

Mar 13, 08: (7, 8, 8)
Discussion of flow concepts for the experiment

Mar 27, 08: (-5, -4, -8)
Material studies for adaptable street element

Mar 30, 08: (8, 6, -2)
Meeting with municipality in Copenhagen

Apr 3, 08: (-6, -2, 6)
Article about the project in the Copenhagen Magazine
Apr 14, 08: (8, 9, 8)
Parametric user dependant site model

May 7, 08: (6, 7, 6)
Discussion of initial proposal for interactive street surface

May 20, 08: (-9, 1, 2)
Delivering proposal for furniture experiment

May 30, 08: (-10, -5, -10)
Copenhagen Municipality stopping the experiment without arguments

Jun 02, 08: (-6, -5, -8)
Additional feedback from Copenhagen Municipality

Robotic Lighting

Jan 17, 07: (-4, 4, 5)
Meeting discussing the conceptual approach

Mar 15, 07: (7, 2, -1)
Parametric framework

Apr 16, 07: (-8, -5, 4)
Site analysis at the Kennedy Plaza

Apr 29, 07: (-7, -8, 6)
Considerations regarding flow on Kennedy site

Jun 1, 07: (-8, -7, 2)
Decision on best location

Jun 23, 07: (5, -2, -6)
Sketching in break during conference

Jul 6, 07: (-6, 7, -4)
Conceptual design

Aug 31, 07: (-4, -2, -6)
Conceptual illustrations

Sep 10, 07: (8, 7, 7)
Presentation and discussion at MIT

Oct 18, 07: (6, 4, 2)
Refinement of movement and studies of kinetic structures

Jun 1, 08: (6, -4, 6)
Meeting with potential collaborators

Jun 8, 08: (2, 6, -6)
Detailed design development

Jun 30, 08: (8, 6, -6)
Parametric design concept

Jul 3, 08: (4, 4, -4)
Design concept refined for location

Jul 07, 07: (5, -4, 1)
Discussion of technical requirements for location

Jul 14, 08: (-4, 2, -2)
Animation studies and visualization

Aug 04, 08: (6, 4, -2)
Presentation for Martin Lighting A/S

Aug 7, 08: (4, 5, 4)
Presentation for Aalborg Municipality, TMU

Aug 10, 08: (-6, -2, 2)
Design revisions based on feedback

Aug 18, 08: (6, -7, -6)
Conceptual descriptions

Nov 11, 08: (-4, -6, 3)
Meeting with City Architect, Aalborg

Nov 13, 08: (-2, -2, 2)
Application for Branding Aalborg

Dec 2, 08: (-8, -4, -7)
Feedback from branding Aalborg – 'it's a beautiful project, but its a municipal project.'

Jan 14, 09: (-4, -8, -8)
Application for the Danish National Foundation of Arts

Feb 27, 09: (-9, -4, -8)
Feedback from Foundation – 'decided not to support the idea'.

Apr 16, 09: (-4, -8, -4)
Application for the Foundation of Arts, Aalborg

Eco-Pet

Sep 10, 07: (7, 1, 5)
Startup meeting

Sep 17, 07: (-8, 1, 4)
Research and presentation about Brescia

Sep 24, 07: (-7, -6, 2)
Planning the Brescia trip

Sep 28, 07: (4, 2, 4)
Conceptual design of urban relationships

Oct 1, 07: (-6, -2, 2)
Midterm presentation of urban system

Oct 15, 07: (-6, 2, 8)
Discussion of objects for vehicle sharing

Oct 19, 07: (-4, 4, 5)
Finalizing presentation of the Eco-Pet

Oct 26, 07: (8, -6, 9)
Studies and presentation of Concept in Brescia

Nov 02, 07: (-7, 2, 6)
Feedback from Brescia studies

Nov 15, 07: (6, 3, 5)
Discussion of Eco-Pet system

Dec 03, 07: (2, 2, -6)
Material and technology studies

Dec 08, 07: (5, 5, 6)
Finalizing the overall system

Dec 10, 07: (-2, -4, 2)
Presentation and project review

Jan 22, 08: (-2, 4, 2)
Discussion with the Mobile City conference organizers

Feb 18, 08: (-2, 6, 6)
Blog descriptions for The Mobile City conference

Feb 28, 08: (6, -4, 7)
Discussions at the Mobile City conference

May 16, 08: (-6, -5, 2)
Update of design details and project budget

Oct 15, 08: (4, 2, 4)
Funding research for the Global Seed Fund

Social Lighting

Initial project for the Nibe Festival

Nov 20, 06: (4, -8, 4)
Discussion of initial idea of project at the Nibe Festival

Jan 05, 07: (-2, -2, -4)
Project introduction

Feb 02, 07: (-4, 5, 6)
Introduction to collaborators

Feb 19, 07: (4, -2, 6)
Response from collaborators

Mar 06, 07: (6, 3, 6)
Meeting regarding light fot the festival in Nibe

Mar 13, 07: (6, 6, 6)
Platform for sharing material

Apr 16, 07: (4, 4, -2)
Initial concept

Apr 25, 07: (2, 6, 2)
Concept proposal

Jun 26, 07: (-4, 4, 4)
Proposal approved

Jul 05, 07: (6, 6, 8)
Opening of the festival and project

Jul 8, 07: (-6, -8, 2)
Revisiting the festival, problems with the board

Prototype for social lighting

Aug 28, 07: (6, -6, -8)
Initial social lighting concept

Sep 20, 07: (8, -4, 4)
Presentation of initial concept
Oct 12, 07: (4, 4, -3)
First programming tests

Nov 20, 07: (-2, 4, -6)
Conceptual design incl. programming

Jan 28, 08: (-6, 4, 2)
Testing programming

Feb 05, 08: (-8, 4, -2)
Ordering materials

Feb 20, 08: (-6, -3, -6)
Cutting and assembling the prototype

Mar 20, 08: (6, 6, 4)
Testing out interaction

Continuing with Interactive Street Lights, Copenhagen

Jun 02, 08: (-6, -5, -8)
Feedback from Copenhagen Municipality

Jun 10, 08: (-6, 4, 6)
Analysis of light and sensor areas in Blekingegade

Jul 09, 08: (-8, 2, 3)
Calculations and light specifications received from Philips

Oct 13, 08: (-6, 4, 5)
Scenarios for the effect of interactive street light

Oct 15, 09: (-6, -4, 6)
Presentation of social lighting at conference

Oct 29, 08: (-8, -2, 2)
Invitation to exhibit at the Smart Space conference

Nov 11, 08: (2, -4, 2)
Email from Copenhagen Municipality; maybe possibilities for experiment

Nov 13, 08: (-6, -4, -1)
Review of overall programming study

Nov 15, 08: (8, -8, 8)
Mtg. discussing options for social light installation

Nov 21, 08: (-5, 4, -6)
Additional motion sensor research
Nov 25, 08: (-6, -2, 4)
Construction details and preparations for Candela Morph

Dec 04, 08: (-8, -6, 6)
Assembling the Candela Morph Structure

Dec 05, 08: (5, 3, 2)
Discussion on schedule and organization for Amagerbrogade

Dec 07, 08: (8, -6, -6)
Conceptual description for the Candela Morph

Dec 11, 08: (-6, 4, 6)
Finalizing the programming for Candela Morph

Dec 13, 08: (8, 5, 6)
Interactions with Candela Morph at the Smart Space conference

Dec 15, 08: (-6, 4, 6)
Approval of experiment with interactive lighting

Jan 12, 09: (-8, -4, -5)
Budget for the street lamp

Jan 23, 09: (-6, -2, 3)
Approval of budget at Municipality of Copenhagen

Feb 16, 09 (-8, 4, 4)
Official invitation from the NEXT conference

Feb 20, 09: (-2, 2, 2)
Preparing mock-up for mtg. with municipality

Feb23, 09: (4, 4, 6)
Presentation at the Municipality of Copenhagen

Mar 10, 09: (6, 2, 0)
Extension of concept for the NEXT conference

Mar 21, 09: (-4, 6, 4)
Descriptions and specifications for the exhibition at NEXT

Mar 28, 09: (-6, -8, 8)
Assembling the structure for NEXT

Mar 30, 09: (-8, 5, -4)
Details for the sensor areas, Amagerbrogade

Apr 1, 09: (-6, 6, 6)
Finalizing the programming for NEXT

Apr 2, 09: (-6, -4, 2)
Setting up the installation at NEXT

Apr 3, 09: (-6, -2, -6)
Detailed production drawings for Philips

Apr 4, 09: (6, 2, 6)
Test and discussions of interactions at NEXT

Apr 19, 09: (-6, 1, -6)
System setup specifications

Apr 20, 09: (2, 4, 2)
Coordination of assembly and installation

Apr 28, 09: (2, 8, 4)
Studies of energy consumption patterns

Apr 29, 09: (-2, 4, 2)
Discussion with Philips on status of plates

May 5, 09: (-8, -5, -8)
Information material for the local citizens

May 6, 09: (-8, 2, 8)
Assembly of lights and final adjustments

May 7, 09: (-4, -6, 6)
Installation of lights in the street

May 7, 09: (-6, 3, 6)
Observation and analysis of effect

May 15, 09: (-4, -4, -7)
Analysis of video material

This publication describes the outcome of a three year PhD project carried out at Aalborg University and Massachusetts Institute of Technology from 2006-2009.

The project explores how integrated computational technologies effects architecture and urbanism and develops a new framework describing the social interaction between human and non-human actors. It rests on a theoretical basis of performativity, architectural and urban theory, pervasive computing and mobile networks, which is exemplified and evaluated through six design projects.

Performative environments reframe how objects and subjects are increasingly tied together in social relationships each continuously affecting and redefining the representation of space and the affect on place.
These mutual relationships become an intricate issue for both the design and experience of contemporary architecture and urbanism, and the project describes new ways forward as regards to process, methods and future concerns for the design professions.