

Steps towards a Third Space

A case study of multi-stakeholder communication mediated by a tangible tool

Andersen, Pernille Viktoria Kathja

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STEPS TOWARDS A THIRD SPACE

A CASE STUDY OF MULTI-STAKEHOLDER
COMMUNICATION MEDIATED BY A TANGIBLE TOOL

BY
PERNILLE VIKTORIA K. ANDERSEN

DISSERTATION SUBMITTED 2016



AALBORG UNIVERSITY
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Pernille Viktoria K. Andersen



AALBORG UNIVERSITY
DENMARK

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PhD supervisor: Prof. Ellen Christiansen
Aalborg University

Assistant PhD supervisor: Prof. Marianne Lykke
Aalborg University
Associate Professor Wendy Gunn
University of Southern Denmark

PhD committee: Prof. mso Anne Marie Kanstrup
Aalborg University
Prof. Jacob Buur
University of Southern Denmark Senior
Lecturer Karin Danielsson Öberg
Umeå University

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CV

Pernille V. K. Andersen received her Master of Arts (MA) in Learning and Innovative Changes from Aalborg University in 2011. She started as a PhD student at the Department of Communication and Psychology at Aalborg University in 2013. Andersen is affiliated with the eLearning Lab (eLL) Center for User Driven Innovation, Learning, and Design. Her research interests include multi-stakeholder communication and collaboration, theoretically as well as in practical cross-disciplinary research. This includes an interest in tool mediation and visual scaffolding as resources for involvement, collaboration, communication and mutual learning. Andersen's previous research has focused on learning, change management, and innovation in the public sector, building upon such methods as Action Learning and Action Research. Within this thesis, Andersen studies the implications of multi-stakeholder communication in the early phases of a cross-disciplinary research project concerning 'green' transitions. Her research is based on theories of communication, and informed by discussions of Participatory Design and Design Anthropology, as they relate to stakeholder engagement. In 2015, Andersen became a member of the Climate, Communication, and Sustainability group, Aalborg University, in which her research supports communication between citizens and municipalities in regards to climate concerns. Moreover, Andersen is part of a Scandinavian project funded by Interreg 2020, a program focused on adopting 'green' practices in local communities with support from municipal employees.

ENGLISH SUMMARY

Within the present PhD thesis, I explore and analyse the implications of multi-stakeholder communication in the early phases of practical, cross-disciplinary research. Specifically, my research explores and develops ideas for how communication mediated by a tangible tool can support multiple parties to move towards a common ground of mutual exploration of a problem space. This research is based on theories of communication, and derives support from the discussions inherent in Participatory Design and Design Anthropology in regards to stakeholder engagement.

The research is situated in a cross-disciplinary research project ‘UserTEC - User Practices, Technologies and Residential Energy Consumption’ and takes the form of a single case study. The primary data for in depth analysis in this research involve audio and video data collected through two partner-meeting workshops within UserTEC.

As part of my research a tangible and thought-provoking tool was developed and tested. I call the tool 3P. The design and evaluation of 3P is based on the idea, also explored within Participatory Design, that for multiple stakeholders to arrive at a common ground for joint action, all participants must leave their comfort zone and on equal footing try to act together in uncharted territory. An instance which in Participatory Design is termed ‘third spacing’. My research shows that arriving at ‘third space’ communication is complex; it takes time, effort, and skill. A problem analysis of the challenges of multi-stakeholder communication in UserTEC as well as attention towards theoretical studies of communication has lead me to suggest, that striving for dialogue is not a sufficient strategy in multi-stakeholder settings. Instead confrontation of antagonistic viewpoints must precede converging dialogue.

The design brief for 3P is based on problem analysis of the UserTEC communication, as well as inspired by the notion of reengagement with critical voices (a concept belonging to Design Anthropology). This research has lead to the following four requirements for the 3P tool to fulfil - requirements that have been refined throughout the research process. It must:

- **Encourage** reengagement with the current troubles, represented by situated dilemmas into versus-narratives.
- **Share** differentiated professional positions (differences in interests, assumptions and perceptions), based on a common frame of reference.
- **Explore** the key agreements and disagreements of a subject, and prompt the collective exploration of alternatives (a collectively expanded and elaborate understanding of a problem)
- **Overcome** communicative closure.

3P has been tested in a UserTEC partner workshop, in which video data has been generated. Data has been analysed bottom up, in accordance with situated interaction analysis, originally proposed by Jordan & Henderson (1995), as well as through various coding strategies, paying attention to what participants say, what they do while talking. By an analytical double take, I have selected passages where 3P encourage participants to engage with opposites, and analyse these passages, as both instrumental to keep the group on track, and as springboards to a ‘third space,’ where participants step out of their comfort zones and start listening to new ideas and see new possibilities.

My research demonstrates the complexity of what it takes to facilitate the often-ignored first step of bringing people of different professions together, when in a problem formulation situation. Empirical analysis has lead to the identification of four fundamental levels of participants’ communicative orientations, when interacting with 3P, that move from instrumental orientation to discursive expansion. These four orientations function as steps that are necessary to progress through - at least for the participants of this study - in order to move towards a ‘third space’ of mutual exploration. This research has lead to the development of a concept of communication, which I call ‘versus-communication’. It is a form of dialectical communication that arises when participants adopt and embrace (touch and refer to) dichotomous re-presentations of situated dilemmas through use of the 3P communication tool. In general, this form of communication seems to lead to a ‘third space’.

Within this research context, 3P has served as a probing instrument. Whether 3P has a future in practical, multi-stakeholder communication within the construction industry or as part of the ‘green transition’ agenda is a matter of further testing and development - research I’m keen to pursue.

DANSK RESUME

Nærværende Ph.d. afhandling konstituerer resultaterne af min forskning, inden for hvilken jeg udforsker, analyserer og diskuterer implikationerne for kommunikation mellem forskellige interessenter, I de tidlige stadier af tværfaglig forskning i praksis. Mere konkret søger jeg med min forskning at udforske og udvikle ideer til hvordan kommunikation kan understøttes af et fysisk materielt artefakt, og dermed facilitere interessenters etablering af en fælles udforskning og forståelse af et problemfelt. Jeg baserer min forskning på kommunikationsteorier suppleret af velfunderede diskussioner omhandlende interessent- og deltagerinvolvering, fra forskningsfelterne Participatory Design og Design Antropologi.

Funderet i det tværfaglige forskningsprojekt 'UserTEC, User Practices, Technologies and Residential Energy Consumption', konstitueres min forskning af et enkeltstående casestudie, I hvilken forbindelse lyd og video data udgør det primære datamateriale for min analyse. Datamateriale er indsamlet I forbindelse med to partnernøde-workshops afholdt i UserTEC.

Som led i min forskning, har jeg udviklet og testet et fysisk materielt og tankeprovokerende kommunikationsværktøj 3P. Såvel design som evaluering af 3P er baseret på antagelsen, at etableringen af en fælles forståelse, fordrer at alle interessenter fraviger deres tryghedszone og i fællesskab søge at navigere i det ukendte. Antagelsen udspringer af forskning indenfor Participatory Design feltet, hvor omtalte proces betegnes 'third spacing'. Min forskning påviser at etableringen af 'third space' kommunikation er en kompleks og tidskrævende proces, som stiller krav til såvel evne som indsats blandt interessenterne. En problemanalyse af udfordringerne ved kommunikationen blandt deltagerne i UserTEC, i reflekteret samspil med mit kommunikationsteoretiske fundament, leder mig til forståelsen af, at fokus på etablering af dialog er en utilstrækkelig strategi for samarbejde mellem mangfoldige interessenter. I stedet bør konfrontation og italesættelse af modstridende synspunkter gå forud for konvergerende dialog.

Designoplægget for 3P er baseret på en problemanalyse af kommunikationen i UserTEC, samt inspireret af den Design-Antropologiske forståelse af tilbagekanalisering af eksisterende kritiske røster. Baseret på dette konstitueres de følgende fire krav til designet af 3P kommunikationsværktøjet. Kravene er yderligere tilpasset og raffineret i forbindelse med design processen. 3P skal:

- **Tilskynde** tilbagekanalisering af diskursive forståelser af den aktuelle udfordring (situerede dilemmaer), repræsenteret i versus-narrativer
- **Dele** differentierede professionelle standpunkter (forskellige interesser, antagelser og forståelser) baseret på en fælles referenceramme
- **Udforske** centrale enigheder og uenigheder i forbindelse med et emne/problemfelt, med henblik på en samskabt forståelse af alternative løsninger (en samskabt udvidet forståelse af et problem)

- **Overvinde** afvikling af kommunikation

3P er testet under et UserTEC partnernøde, i hvilken forbindelse datamateriale er indsamlet i form af videooptagelser. Materialet er analyseret med udgangspunkt i Jordan og Henderson's rammeværk for analyse af situeret interaktion (1995), samt med anvendelse af kodningsstrategier. Særlig opmærksomhed har været rettet mod deltageres udtalelser og handlinger i forbindelse med ytringer. En yderligere analyse er foretaget af de passager, hvor 3P tilskynder deltagerne til involvering med modsatrettede synspunkter. Disse udvalgte passager er analyseret dels med et instrumentelt fokus på fastholdelsen af gruppens mål, og dels som indikationer på etableringen af 'third space', hvor deltagerne træder ud af deres tryghedszoner, lytter til nye ideer og anerkender nye muligheder.

Min forskning påviser kompleksiteten af de krav og udfordringer, der knytter sig til de ofte oversete skridt imod etableringen af et frugtbart fundament for samarbejde mellem mennesker med forskellige professionelle baggrunde. Det gør sig især gældende når disse befinder sig i en situation der kræver fælles udforskning af et problemfelt og fælles problemformulering. Den empiriske analyse har resulteret i identificeringen af fire fundamentale niveauer af deltager kommunikation under interaktion med kommunikationsværktøjet 3P. Disse niveauer spænder fra instrumental orientering til udvidet diskursiv orientering. Gennemgangen af de forskellige niveauer er identificeret som en nødvendig proces, for at kunne mødes i et 'third space' – i det mindste for deltagerne i dette projekt. Med udgangspunkt i tanken om italesættelse af modstridende synspunkter, og understøttet af den empiriske analyse, fører min forskning til udviklingen af et kommunikationskoncept som jeg betegner versus-kommunikation. Dette udgør en form for dialektisk kommunikation, som understøttes når deltagere adopterer og favner (berører og henviser til) dikotomiske repræsentationer af situerede dilemmaer, som materialiseres og visualiseres som modsætninger i 3P. Denne form for kommunikation forekommer at facilitere etableringen af 'third space' kommunikation blandt interessenterne.

3P har i min forskning udgjort et sonderingsinstrument. Hvorvidt 3P også rummer et fremtidigt potentiale som praktisk kommunikationsværktøj mellem interessenter i byggeindustrien, eller generelt mellem interessenter involveret i projekter om 'grøn omstilling', kræver yderligere afprøvning og udforskning. Udforskning som jeg ser frem til at forfølge.

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¹ <http://fivu.dk/forskning-og-innovation/tilskud-til-forskning-og-innovation/hvem-har-modtaget-tilskud/2012/resume-til-bevillinger-fra-det-strategiske-forskningsrad-programkomiteen-for-baeredygtig-energi-og-miljo-2012>

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CHAPTER 1. INTRODUCTION

The following PhD dissertation is a monograph. The present monograph is the outcome of my research in which I study and explore the challenges involved in multi-stakeholder communication and test the role of a tangible tool for facilitating communication. I started out my research at ground level in a work package within a research project with the aim of improving professional stakeholder communication with regard to household energy consumption. I studied stakeholder communication, including the ways to improve communication, and I researched household meaning-making with regard to energy consumption. From there, I developed and tested a tool for improving communication among professional stakeholders concerning household energy consumption. Throughout this process, I became increasingly interested in the role of a tool for multi-stakeholder communication, and I began digging further into this topic. The present monograph is a report from this line of research.

MOTIVATION AND RELEVANCE

The ‘law of the instrument’, ‘a golden hammer’ and ‘Maslow’s hammer (or gavel)’ are ways of referring to over-reliance on a familiar tool:

‘I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail.’(Maslow, 2004)

In this dissertation, I deal with the problem of overcoming ‘the law of the instrument’ for the benefit of forthcoming collaboration on a shared task or object, in cases where several professions are to work together. To overcome hammer-type conflicts among professionals, I have developed a communication tool, the use of which will require those participating to put their ‘hammers’ and other instruments away. The goal of such a tool is to encourage participants to start sharing and taking into account other parties’ interests, assumptions and problemunderstanings on a subject with a view towards shared communication.

Before I move on I should briefly account for the ‘hammer’ I typically prefer to use. One of my preferred tool of analysis is the analysis of language, with a focus on the opposing interests, assumptions and discourses of people of different professions. Different discourses, including the ways in which we label and express things, have different implications as to how people view the world and understand possibilities for action within it. This involves not only the mediation of action but also discursive co-construction.

To put the metaphor of the ‘law of the instrument’ into play, I would like to begin with a data excerpt. This excerpt is of a discussion between a sociologist and an engineer from a partners’ meeting in the UserTEC project, exploring ‘User

Practices, Technologies and Residential Energy Consumption’, which has served as a context of research for this thesis. The partners are situated in a workshop at one of the first bi-annual partner meetings at the start-up phase of the project. The partners have been asked what insights they need about user perspectives to improve their efforts regarding the development of energy consumption-related practices and technologies during the UserTEC research project. As the discussion unfolds between several partners, one of them, an engineer, presents one of his concerns about residential energy consumption in buildings:

‘Civil Engineer: I am very preoccupied with this. I still think that there is a major focus on energy consumption, and I understand this, but sometimes I think that one should turn it all around and ask. ‘Why is it that we build a building?’ We build a building because we want a good indoor climate, and that, I guess, is the main point with a building.

Others (hesitating): Nooooo.

Sociologist: Not for me, it isn’t.

Energy Supply Manager: When people go to buy a house, I think only few of them will answer that they want to have a good indoor climate. Most will answer that it is because it suits them location wise, or because it has a reasonable ...

Innovation Consultant: It is because one needs a home.

Civil Engineer: It is sort of because one is beyond this. The main point of a house is, presumably, that if it does not create a proper indoor climate, then why do you have a house? Build a statue instead.

Sociologist: It is because you find it beautiful, because you find it cosy, because you can see your kids grow up there.

Civil Engineer: But all of those things first require that you feel comfortable. Otherwise, live in the garden or in a really cosy tent in the garden.

Sociologist: But when you say a good indoor climate, that is a very specific way to ... that is, having a good home is not the same as having a good indoor climate.

Innovation Consultant: Well, If you take all of Maslow’s (Maslow’s hierarchy of needs: author’s addition), then the first thing I suppose is to get a roof over your head, but if that is the same as a good indoor climate ...

Civil Engineer: Yes, and that roof over the head will provide dryness ... for when it rains.

Innovation Consultant: Yes

Civil Engineer: Yes, exactly. Then you need a good temperature, then you need a ... and that is like ...

Sociologist: But I think that it is many things to many people. You would be able to find a lot of people who do not need a good temperature. Who prefer an old draughty house if it has a few beautiful nooks and crannies

and plaster ceilings and panel doors; it might be leaky and damp in places and a bit mouldy, but it is really romantic.

Civil Engineer: Yes, but it has to have a certain standard in order to use it as a house.

Innovation Consultant: I do not think that we all agree on that.'

(Transcription, Group 1, partner workshop d.10.10.13. Author's own translation)

The phrases highlighted in grey – 'build a building', 'buy a house' and 'need a home' – indicate three different discourses, one invoking materials and techniques of measurement and calculation, one evoking real estate and economics and one invoking psychology, practice theory and anthropology. The challenge is to make these discourses explicit as a stepping stone towards the goal to provide some common ground for communication. What they all have in common is a focus on residential energy consumption (the underlined text).

One of the overall goals in the UserTEC project is to develop research that provides concepts and knowledge about what to take into account when designing energy efficient technologies and energy saving technologies for residents in the future. The partners in the UserTEC project are required to do research together, but have different professional backgrounds. Hence, they need to understand each other's professional semantics. Defining the problems of how to create new energy-efficient building solutions in the future, as well as developing new technology or practices, adopting one of the partners worldviews rather than another would make a difference in what to look at and how the collaboration on a shared task or object might be approached. For instance, conceptualising a house and its main functions in terms of its provision of a comfortable climate rather than as of a social and cultural framework for a family to live in has implications for the foundations on which further research and collaboration can be initiated. It is important to state here that what I am examining is not new ways to save energy or develop a product; rather, I am exploring new ways to support the communication and exchange of different perceptions of a problem space among stakeholders in the initial phases of an inquiry.

The philosopher, psychologist and educational reformer John Dewey emphasised the importance of paying close attention to the way in which a problem space is described and questioned, since this determines the future steps of inquiry and has important implications for future actions. Attention to this issue raises questions about what is considered as valid evidence, which determine the judgemental criteria to assess whether new hypotheses and conceptual structures are relevant or not (Dewey, 1938). Inquiry in these first phases is synonymous with questioning and is characterised by uncertainty, unsettlement, disturbance, ambiguity, confusion and obscurity. This should not be understood as uncertainty that leads nowhere but which, when handled as a particular doubtfulness, may help to specify and open up lines of inquiry (Ibid.). I draw upon Dewey's theory of inquiry to stress the importance of providing time and a space to allow for the exchange of knowledge,

uncertainties and interests in these first phases of inquiry, define by Dewey as ‘the indeterminate situation’ and ‘institution of a problem’ (Dewey, 1938, pp. 105–118).

In the excerpt presented above, the communication situation and the experience of disagreement among the partners does not result in anything but an acceptance of their disagreement, as shown by the closing remark, ‘Well, I do not think that we all agree on that’. It is this sort of communicational closure that I try to find (material) ways to support overcoming in my research.

In particular, in the development of a communication tool in this research, I have sought to find ways to build into/represent these differences in approach and perceptions to find ways to ‘stay with the trouble’, as Donna Haraway (2014) puts it, in order to destabilise what is taken for granted. The goal is to engage a group with multiple professional backgrounds and interests in focussing on differences without resulting in immediate closure on disagreement or agreements, but instead encouraging an exploration of central issues of differences in perception. I have tried to find material ways to support communication that allows for an exploration of clearly differentiated positions, as well as for an exploration of alternatives, in order to provide a more nuanced understanding of a problem space. The purpose of my communication tool, called ‘3P’, is to create communicative spaces, where different professions experience, if not a need, then at least an interest in listening to each other to explore alternatives. The tool is designed in particular to assist multi-participant communication in exploratory situations in the first phases of an inquiry.

I am not the first researcher to see this as a challenge. Within the research community of Participatory Design, this issue has been debated in recent years for instance drawing on the concept of a ‘third space’ (Muller & Druin, 2012; Muller, 2003). My critical reading of these discussions was important in first framing the objectives of this study, and I still believe in the idea that all participants must move out of their own spheres of ideas to meet in a ‘third space’. However, before I move on, let me briefly summarise my critical reading of this discussion in the field of Participatory Design.

A third space can be described as a space where differences meet and where people can engage with one another to root reciprocal learning, exchange knowledge and participate together. Ideally, third spaces allow people of different cultures and different assumptions to open themselves up to questions, challenges, reinterpretations, refutations and negotiations to allow differences to meet. Across different research fields, different attributes have been applied to third spaces as: ‘material space’, ‘mental space’, ‘transformative space’, ‘recognised space’, ‘navigational space’, ‘conversational space’, ‘unsafe and conflicting space’, ‘learning space’, ‘dialogical space’, ‘creative space’ (Buchanan, 2010) and ‘real and imagined space’ (Soja, 1996). Gutiérrez, Baquedano, López and Tejeda (1999) describe third spaces and hybridity as useful lenses and theoretical tools for organising learning and for understanding the inherent diversity and heterogeneity of activity systems and learning events (Gutiérrez, Baquedano, López, & Tejeda, 1999,

p. 286). Keenan and Miehls (2008) use ideas from social and psychodynamic theories to describe third space activities as a way to support change processes. In addition, Muller (2003) gives an account of how different researchers and fields have labelled the third space as a 'third culture', 'third perspective', 'dynamic in-betweenness', 'third area', 'multicultural personality' or 'hybrid' space (Muller, 2003), where 'the combination of diverse voices leads to syntheses of perspectives and knowledges' (p. 10).

Ultimately, different areas and researchers describe the third space as an overlap of hybridity between different people, situations, cultures, artefacts and knowledge. Muller and Druin (2012) have argued that the field of Participatory Design contains its own third space, where a third space is 'a hybrid realm between the two distinct work domains of (a) technology developers/researchers and (b) end-users' (p. 7). Their focus is on the 'mutual learning and reciprocal validation of diverse perspectives' (p. 5). Muller and Druin summarise their main claims related to third spaces in Participatory Design in a table comprising overlapping fields, mutual learning, negotiations, co-creation, dialogues across and within differences and a reduced emphasis on authority (p. 12). They propose pursuing 'polivocal polity' as a step towards third space meetings. Polyvocal polity is concerned with how to create a 'meeting ground' for a 'widen(ed) . . . circle of participants' that can 'support the many voices being brought forth in order to create the new and to find ways of supporting this multivoicedness' (Buur & Bødker, 2000, in Muller & Druin, 2012, p. 1,130).

Many of the theoretical references mentioned above argue that third spaces are beneficial. Only a few articles address the difficulties of their ideological characteristics and the downsides and effort required to stage real hybrid or third space experiences. Critics of hybridity theory explain that it is too idealistic and that 'hybridity is too often used simply to uncritically describe a state of being, rather than analyse it' (Buchanan, 2010). This critique can be applied to Muller and Druin (2012) who provide a set of examples regarding methods and sites in the field of Participatory Design used to support the creation of third space experiences. These include workshops; story-collecting and story-telling through text; photography; drama; games for analysis and design and the co-creation of descriptive and functional prototypes. Muller and Druin describe the methods used to facilitate third space encounters by asking 'why' and 'how' to use specific methods. However this level of abstraction makes it difficult to understand what it takes to configure specific methods to attend to the specificity of a situation and context to support actual multivoicedness.

Hulme, Cracknell and Owens (2009) have proposed three ways to think about engagement with respect to the establishment of third spaces as 1) 'a recognised place', i.e., a place to hang confusion and to accept chaos in order to create a safe environment for knowledge exchange, 2) 'a navigational space', i.e., a platform that guides and encourages others to work with and between differences with respect to different discourses and professional knowledge and 3) 'a conversational space', i.e.,

a ‘place where cultural, social and epistemological changes take place as competing knowledge and discourses are translated, contrasted and drawn closer together’ (Hulme et al., 2009, p. 541). These three ways of thinking about engagement provide guidelines for how to facilitate engagement to support knowledge exchanges, negotiations and dialogues across and within differences. The idea of a third space meeting is to embrace differences; however, as my research will show, real exchanges between differences does not simply happen by bringing people of different worldviews together in the limited temporal space of a workshop. These spaces must be thoroughly and thoughtfully crafted. I argue that whether third space exchange happens may be directly related to the specificity of the tools employed in the situation. Workshops, by their nature, are limited by time and space; as such, correspondence that allows those of different professions and cultures to exchange ideas, as suggested in the original use of third space as a concept (Bhabha, 2004), is also limited.

Further, recent research has demonstrated how participants in collaborative workshop settings often seek balance, coherence and closure as a natural instinct to avoid unpleasant conflicts and opposition (Landegrebe, 2012; Liberman & Garfinkel, 2014). In a study on the challenges of creating hybrid spaces in collaborative and participatory multi-participant settings, in several tests of a participatory mapping method, participants were often observed to be overly eager to please the group; consequently, no new learning was initiated (Huybrechts, Dreessen, & Schepers, 2012). Landegrebe (2012) describes the challenge as follows:

‘Our findings demonstrate that the ideological ideas such as democracy and equality on which PI and PD are solidly founded are in fact not (fully) disseminated in ‘real life’ but that other values are of primordial concern to participants, i.e. that obtaining and maintaining harmony and progressivity (i.e. contiguity).’ (2012, p. 62)

This consensus-seeking stands in contrast to the ideals of participation and innovation, where contrasting views on different loci are of central importance to arrive at different understandings and to learn something previously unknown that must be known. It is also in contrast with the often idealised descriptions of how adversaries can be brought together to learn from their differences that are often seen in those who idealise third space theory (Bhabha, 2004; Muller, 2003).

Based on this understanding, the goal has been to build into my communication tool a way to contrast conflicting interests, assumptions and meanings and to make them explicit. This view towards differences and conflicts is in line with the arguments of Gottlieb, Larsen and Sørensen (2013) and Mack et al. (20013), who argue that conflicts are an important aspect of any innovative or developmental process and that conflicts must be subject to on-going negotiations between different people. The foundation on which novelty is built, they argue, emerges through the opposition of underlying themes and assumptions that may otherwise be absent in a dialogue. In addition, Sproedt and Larsen (2012) have argued that new meanings must be

negotiated based on differences in perspectives as a way to deal with conflicts and paradoxes in innovative practices. They state the following:

‘This implies a new perspective on management away from control of results based on objective measures, towards engaging in complex relations where (new) justified meaning is negotiated from different perspectives in subjective local interaction. We describe this as social shaping of innovation.’ (p. 1)

As such, ensuring dialogue between those with various perspectives and in various positions, even those with ideas that are contrary or opposing, is crucial. Wittgenstein has formulated this need for friction as follows:

‘We have got on the slippery ice where there is no friction and so in a certain sense the conditions are ideal, but also, just because of that, we are unable to walk: so we need friction. Back to the rough ground.’ (Wittgenstein, 1958, p. 46e, in Mouffe, 1999, pp. 750–1)

In other words, a friction-free space might easily become a space without forward movement in developing new insights and understandings with regard to the challenges of building energy-efficient technologies. Such an approach towards research and engagement incorporates the acknowledgement introduced by Star and Griesemer:

‘Consensus is not necessary for cooperation nor for successful conduct of work ... The creation of scientific knowledge depends on communication as well as on creating new findings. But because these new objects and methods means different things in different worlds, actors are faced with the task of reconciling these meanings if they wish to cooperate.’ (Star & Griesemer, 1989, p. 388)

Based on the presented theories, it is evident that the establishment of a third space requires multiple voices to be heard and shared. However, I find that a deeper understanding is needed on the specificity of how this occurs in practice in communication; thus, I explored this in my research.

Over the years, scholars from a range of disciplines have been concerned with how to facilitate negotiation, knowledge exchange and collaboration among participants in workshop encounters, meetings or other project settings. Within making-oriented fields such as Participatory design, User-centred design, Design Anthropology and Co-design, the suggestion is often made that spaces must be created where this challenge of bringing multiple people and perspectives together can be addressed and dealt with using different material and visual tools and techniques for involvement. These fields of research have often theorised on tools and design materials for engagement and reflection in action (e.g. Bertelsen, 2000; Binder, Brandt, Clark, & Halse, 2010; Bjerknes & Bratteteig, 1995; Brandt, 2006; Buur &

Matthews, 2008; Ehn, 1991; Eriksen, Brandt, Mattelmäki, & Vaajakallio, 2014; Gregory, 2003; Muller, 2003; Sanders & Strappers, 2013). Within the emerging field of Design Anthropology, the notion of tools as ‘things-to-think-and-do-things-with’ has been introduced as a way to provide a reflective aspect of possibilities within collaborative workshop settings (Gunn & Løgstrup, 2014; Kilbourn, 2013).

Methods for engagement and participation inspired by these traditions have often been concerned in some way with how to create spaces to facilitate mutual learning and knowledge exchange between end users and developers or between end users and other project stakeholders. However, little attention has been given to how specific tools and techniques are used to bring project partners together at the beginning of a collaborative project setting to explicitly, as a starting point and endeavour in itself 1) question the outset for even inviting in end-user knowledge in development processes, or 2) to explicitly identify, as a matter of concern, the values, attitudes and ways of looking at users and the problem space at hand that decision-makers, policy-makers and researchers are unconsciously building into our understanding of practices of future making with respect to technological development. To be more specific, the tools used for participatory engagement have often been concerned with bringing in the voice of the user; this is done either by representing the users’ voices through some sort of materialisation of insights from empirical material representing user needs, desires and practices, or by inviting users in to sit around the designable. However, little attention has been paid to the development and use of tools to support communication among experts/partners within a project setting to question experts’ professional assumptions and interests. In my research I demonstrate the importance of such an approach, which helps professionals with different backgrounds to listen to each other and engage in developing a shared communicative practice.

In this thesis, I introduce the idea that the ability to share agreement and disagreement among multiple partners implies making explicit different mental models. Here, mental models are referred to as professional assumptions, knowledge and interests. Furthermore, I argue that an important aspect of involvement and communication in the first phases of an inquiry is to find ways to build into our tools some way of moving from a unified centre of consensus towards a constructive focus on differences. This is especially the case where the goal is not solution setting but the creation of a communicative common ground for partners to meet and initiate collaborative research practices. This is a central argument of my thesis, which runs throughout the chapters that follow.

RESEARCH CONTEXT AND RESEARCH APPROACH

UserTEC is one of many research projects aiming to design future energy-efficient building technologies that better meet users’ local sense-making and future needs while reducing energy use. In the UserTEC project, however, the goal is not to develop new technologies as such but to identify problems and develop concepts and

insights about what to take into account when designing for energy savings for households. The partners represent a web of professions: system developers, engineers, suppliers, housing associations, window manufacturers, sociologists, humanists and scientists, all somehow interested or involved in energy transition for the future. In the context of this project, I have been invited, along with professor Ellen Christiansen, to host a range of workshops during the project's bi-annual partner meetings. The aim of these workshops is to engage the partners in discussions about professional assumptions, interests, implications and approaches to the design of energy-efficient building technologies. The different partners in this project agree in principle that reducing CO₂ emissions is the overall goal of new building technology, and they also agree that collaboration is both a necessity and a potential source of profit and success. However, despite all good will it is a challenge to make the partners's own position understood by other actors, let alone to arrive at a common formulation of a problem space that can direct and inform future action.

This communicative challenge of establishing a basis for exchange among different professional partners is, however, not only a UserTEC problem, but rather a general problem in collaborative endeavours, since people with different backgrounds inhabit different mental schemes and ways of knowing, speak different languages and refer to different practices, interests and agendas. Moreover, professional knowledge or expertise is often 'sticky' (Von Hippel, 1994). Important expertise or knowledge often 'sticks' to certain environments, practices, people and situations, and is thus difficult to share. Development of new technologies or practices happens within boundaries of different professional knowledge and work traditions stemming from each different organisation and branch, each of which has its own formal and informal education, language, background and goals. These boundaries deserve close attention in research that aims to break down or expand such boundaries for the purpose of creating common grounds for communication. 'Silo' thinking and 'task partitioned activities' – building on one set of loci and sub-problems of a single subject area – is a common challenge in processes of innovation or other forms of change process. An attempt has been made to meet this challenge through the development of a communication tool, which has been tested in the context of UserTEC.

I have gathered my empirical material through interviews with UserTEC partners, through workshop activities and through evaluation sessions, each study with its own separate purpose. The main source of the empirical data used in this thesis comprises video and audio recordings from two UserTEC partner workshops. The first workshop provided insight into discursively opposing interests among UserTEC partners, identified through transcripts of audio data and analysed through meaning condensation (Kvale, 1997) (introduced in Chapter 4). The other workshop provided video and audio data on how a specific communication tool actually worked in situ (Introduced in Chapter 5). For an overview of data capturing, see Table 1, p. 29. Data from the second workshop has been transcribed and analysed using an approach inspired by coding (Strauss & Corbin, 1998; Glaser, 1992; Neergaard & Leitch, 2015) and interaction analysis (Jordan & Henderson, 1995) to identify and

document 1) how the specific tool, 3P, in the workshop is used, manipulated and referred to by the partners and 2) how different understandings and standpoints among partners are exchanged, challenged, supported, aligned or rejected during the workshop. This is done to identify if, and if so, how the specificity of different material tools plays a significant role in this exchange, and assists in an expansion of the perception of the current problem space.

Video data of the communication tool in use in a UserTEC workshop was produced to take into account some recent critiques of the ways in which participatory tools are often evaluated (based on subsequent reflections of the researcher or facilitator, or by looking at the outcome instead of the process and manipulation of objects in situ) (Buur & Larsen, 2010; Heinemann et al., 2011; Heinemann, Mitchell, & Buur, 2009; Kilbourne, 2013; Landegrebe, 2012). Among others, Heinemann et al. (2011), building from language research and Interaction Design practices, have argued that the specific character and qualities of materials and tools have a significant impact by the way in which they support knowledge sharing and knowledge construction; ‘Some “things” serve merely to support the verbal and gestural interaction of participants in collaborative processes, whereas other ‘things’ apparently serve as actual catalysts in such processes for instance by creating new meaning or transforming knowledge on the other hand’ (p. 223). Currently, there is little research explaining or distinguishing between the specific epistemic and material qualities that a tool must have to either support the creation of new meaning or just function as a scaffold for participation in collaborative processes. Video data allow for detailed exploration of the use of objects in situ, so one of the interests in this project has been to use video data to look critically at whether a communication tool, 3P, developed for the specific context of UserTEC can be applied as an effective catalyst for participants in the explicit exchange of knowledge, interests and understandings towards expansion of a problem space.

Development and design of the communication tool is based on different theoretical, methodological and empirical experiences, actions and observations. Empirical studies comprise observations in practice about the challenges of multi-stakeholder communication in the context of UserTEC. Design Anthropology has inspired practices concerning how to think about material and critical engagement with a group of multiple stakeholders – the UserTEC partners (Gunn & Donovan, 2012; Gunn, Otto, and Smith, 2013). Of central importance here is Design Anthropology’s ideas about and practices of a) building connections between past and present knowledge and understandings in order to imagine a possible future, b) making implicit understandings explicit in order to open up the taken-for-granted, inspired by practices of ethnography, and c) how to work actively with the institutionalisation of insights from practice and how they are made tangible through engaging processes inspired by practices of design. The concept of a ‘third space’ (Bhabha, 2004; Muller, 2003) is used because it provides an interesting focus on difference as a constructive and generative force to describe encounters where knowledge, culture and meanings are exchanged between people with different professional backgrounds. Ideally, third spaces allow old assumptions and different

cultures to be open to question, reinterpretation, refutation and negotiation precisely because of the meeting of differences.

When collecting data through workshops in the UserTEC case, I have been working as a participant interventionist. This involves researcher acting as a facilitator, intervening and at the same time using these interventions to collect data. By using different tools and techniques to instigate involvement by the people under study in UserTEC, the role as a researcher shifts from that of observer to one of participant-provoker, providing an active and reflexive reengagement with the context of analysis (Gunn, Otto & Smith, 2013).

Theories of communication have been applied (Chapter 3) to elaborate on epistemological positions, to present the theoretical framework I use to define and delimit my understanding of the challenges of multi-stakeholder communication and to understand the potential in developing tangible tools to enhance communication between multiple stakeholders. These theories counter Bråten's concept of model power (Bråten, 1973), Habermass' concept of an ideal speech situation (1981), and Sennett's thoughts on dialectical communication skills (2009; 2012). The potential of using tangible tools to enhance communication and interaction between multiple stakeholders has been addressed through the concepts of boundary objects (Star, 2010; Star & Greisemer, 1989) and mediating instruments/artefacts (Engeström, 1993; Vygotsky, 1986).

PROBLEM STATEMENT AND OBJECTIVE

In sum, this dissertation is concerned with exploring the challenges of multi-stakeholder communication in the early phases of an inquiry within a project setting, and how to develop a tool to support the exchange of agreements and disagreements among multiple stakeholders in order to create a common ground for communication. This work is situated in an understanding that explicit exchange of professional viewpoints is hard to arrive at because participants in collaborative workshop settings often seek balance and coherence as a natural instinct, to avoid unpleasant conflicts and opposition. In this thesis, I introduce the idea that a constructive focus on disagreement implies making explicit the different mental models as a way of sharing agreements and disagreements. Furthermore, I argue that an important aspect of involvement and communication in the first phases of inquiry, where the goal is not solution setting but problem formation, is to build into our tools ways of moving from a unified centre towards an explicit exploration of opposing and conflicting concerns. This implies dissensus seeking rather than consensus seeking. The objective is to be able to identify possibilities as well as challenges in developing a tool that enables multiple partners to exchange opposing views – to open up, contrast, question, challenge, reinterpret, refute and negotiate meanings, cultures and professional knowledge. The aim is, at least, to create a common ground for exchange, and at best, to expand the boundaries of professional

interest within and between different silos. Through my research, I have come to formulate the following thesis:

Supporting communication among multiple stakeholders begins with the acknowledgement of differences between professional partners' intentions, positions and assumptions. I have arrived at this thesis, which in a way is the outcome of my research in an attempt to answer the following questions: *What are the specific challenges of multi-stakeholder communication situations within the UserTEC research context and what can I generalise?*

Furthermore, in utilising a prototype of a communication tool 3P, that was developed as part of this thesis, I have sought to study: *How tool-mediation can lead communicating parties to move towards a third space, a common ground, for participants' mutual exploration of a problem space?*

PHILOSOPHICAL RESEARCH FOUNDATION

‘We shall not cease from exploration/And the end of all our
exploring/Will be to arrive where we started/And know the place for the
first time’ (T. S. Eliot, in Kolb, 1984).

The pedagogical and epistemological principles on the basis of which I trained to become researcher are based on an understanding of professional inquiry as a process of experiential learning. I regard one of the goals of doing research for a PhD, and of becoming a researcher, to be learning how to learn. I see this as a dialectical process between observing, acting in the world and reflecting on those observations using academic methods and techniques. Thus, it is fair to regard the process of acquiring academic knowledge and doing inquiry as a process of experiential learning. Building on Kolb (1984), who is inspired by the views of Dewey, Lewin and Piaget regarding how learning takes place, experiential learning is defined as ‘the process whereby knowledge is created through the transformation of experiences’ (p. 38). Experiential learning has appeared within the field of psychology and learning as a counter-response or add-on to other cognitive or rationalist theories of learning. The more rationalistic traditions focus primarily on aspects of knowledge acquisition or transfer and the recall of abstract knowledge and symbols, emphasising content and outcome in the learning process (Kolb, 1984). By contrast, experiential learning pays attention to the process itself of adaptation and learning. Kolb (1984) defines experiential learning theory as ‘a holistic integrative perspective on learning that combines experience, perception, cognition and behaviour’ (p. 21). Thus, the central idea of experiential learning is that learning is a ‘dialectic process integrating experience and concepts, observations and actions’ (p. 22) Using this definition of experiential learning acknowledges the subject position of the researcher and the role of subjectivity as a conscious and unconscious experience in the process of inquiry. This also incorporates a dialectical correspondence with other human beings (the partners/informants/participants in UserTEC and other researchers and practitioners who have contributed with

comments, observations and insights), as well as with materials and tools (the environment and tools used for observation, reflection and action).

From this perspective, learning is understood as a process filled with tensions and conflict in the confrontation between different modes of learning abilities; between concrete experience abilities, reflective observation abilities, abstract conceptualisation abilities and active experimentation abilities (Kolb, 1984: 30). These inherent tensions and conflicts are very much the reality experienced when conducting research looking from different perspectives, using different tools and moving back and forth between different observations and actions. Experiential learning is the overall pedagogical foundation that has guided how I understand the practice of researching and thus the practice of becoming a qualitative researcher.

In my research, then, turning the process of experiential learning into professional inquiry requires adherence to specific scientific paradigms, requiring observations, actions and reflections to follow a set of epistemological assumptions and commitments suitable for studying the research topic of interest (Guba & Lincoln, 1994, p. 108). Adhering to a specific research paradigm helps to determine whether something is viewed as central or irrelevant, building from a specific repertoire of conscious choices about tools and solutions. Paradigms and, as such, professional knowledge make us look at means and ends from a specific point of view, which also means leaving other competing views aside. This is no exception in the research reported here.

Doing research as an iterative experiential process, between ‘experience and concepts, observations and actions’, requires an exploratory approach to research. This also means that research in this thesis is not the result of trying to answer a fixed pre-set question but that the research process has contributed with new questions, and thus new requirements for actions, as well as observations along the way. The specific methods used are described in Chapter 4 and Chapter 5 and will describe further how observations and actions have been made at different levels of inquiry.

I build from Dewey’s definition of professional inquiry as ‘the directed or controlled transformation of an indeterminate situation into a determinately unified one’ (Dewey, 1938, p. 117). This transformation is composed of two kinds of operation, which are in close correspondence with each other through iterative phases of inquiry. The first kind of operation is concerned with ideational or conceptual subject matter, which marks possible ways towards a resolution, by examining how meanings in question are co-related to other meanings. The second kind of operation is about techniques and structures for observing, leading to the location and description of a given problem.

According to Dewey, these kinds of operations are existential and as such modify the past existential situation into a situation in which conditions that were previously obscure or overlooked take on a new significance. This is made possible by shifting between observations and hypotheses, which may transverse, reject or change past

conditions, and thus the very basis on which the inquiry was initiated, as has been the case in my work. As part of a larger research project, embodying some predefined frames from within, the possibilities for research and scope are defined beforehand. I started by following the structures and frames within work package 2 in UserTEC (described in Chapter 2) to expand these frames and dig into a specific research question based upon ongoing experience and observation in practice. This process is described and elaborated on throughout the thesis, where I specify why and how different choices of approach and methodology were made at different levels to answer the research question of interest. The thesis is thus ordered into four parts: 1) Exploring the communication challenge, 2) Developing a communication tool, 3P 3) Empirical work: Analysing 3P tool mediated interaction and 4) Discussion and conclusion.

PRESENTING RESEARCH ACTIVITIES AND DATA

Table 1 below presents the entirety of research activities and data gathered as part of this thesis, even though not all of the data has been subject to close analysis. It is relevant to present the entirety of the data given the philosophical standpoint that practical experience plays a central role in determining how one's journey in the research takes place.

The data presented in the yellow rows of Table 1 was gathered to understand the challenges within the domain of UserTEC, as well as how to find a focus within it. How the specific data was used to frame the initial problem understanding is described in Chapter 2.

The data presented in the blue rows of Table 1 comprises different workshop activities involving the UserTEC partners. Two of these workshops, which are referred to as WS1 and WS2, have been subject to close data analysis in this thesis. Why these particular workshops were chosen is explained in Chapter 2. The two workshops are described in Chapter 2 and Chapter 5, and are marked by *** in Table 1. Choosing just two workshops for close analysis in this thesis allows for in-depth exploration and critical reflection on the specific challenges of multi-stakeholder communication as well as a specific communication tool's role in this.

Activities presented in the last row comprise data about the communication tool tested in other contexts. The data has not been subject to close analysis in this thesis because it goes beyond the scope of the research question addressed here. The data will be saved for subsequent analysis.

Table 1

Research Activities and Data

	What	Focus	Participants	Data capturing
Feb. 2013 Initial study: Families living with IHC (Intelligent Home Control)	Interview and walk-along	How users (in situ) talk about smart home technologies in their homes with regard to appropriation of technological solutions.	3 families living with IHC Home Control for 8 years.	Audio and video recording
4 May 2013 Initial study: Negotiation between husband and wife about IHC	Interview and walk-along	A negotiation situation between a husband and wife about managing and controlling their IHC.	One couple (husband and wife).	Audio and video recording
August-September 2013 Initial UserTEC partner/company visits	Interview	To discover how the companies want to be involved in WP2 and what kind of challenge they face with regard to users' knowledge.	Grundfos, Saseco, Inwido, Velux, Fjernvarme Fyn, Ringgarden, Affald Varme Aarhus.	Audio recording
10 October 2013 *** (WS1) UserTEC partner meeting	Workshop	'Challenge WP2: To make user voices count', in which participants are encouraged to talk about 1) What they want to hear from users/about users and 2) Where user voices fit into	UserTEC research partners, business partners, WP leaders, PhDs (37	Audio and video recording

		development in their cases.	partners in all).	
18 December 2013 2nd UserTEC partner visit	Open/unstructured dialogues Workshop	To discuss employees' perceptions of their users and usage (who are the users, what do you know about the users' wishes and desires regarding usage) and to discuss the challenges and possibilities regarding uptake of user knowledge in the company.	Inwido (window manufacturer): 7 employees (the R&D chief, 3 brand managers, 3 product chiefs and a designer).	Audio recording
8 April 2014 *** (WS2) UserTEC partner meeting	Workshop Oral Evaluation	'Communication workshop WP2: Finding ways towards a productive dialogue', in which participants are involved in a workshop using the communication tool. The scope of the workshop is to discuss different positions regarding users and usage for the future design of energy-efficient building technologies.	Research partners, business partners, WP leaders, PhDs in UserTEC (17 people in all).	Audio and video recording
1 October 2014 UserTEC partner meeting	Workshop	'Representing the end user of energy in private households/of Home Control Technology in a generic form'. Based on lectures, the goal is to inspire, confront and discuss the relationships between the disciplines involved in UserTEC, and to improve understanding of others' practices and perspectives.	Research partners, WP leaders, PhDs in UserTEC (17 people in all).	Audio and video recording

4 October 2014 Experience design master programme	Workshop	Students' interaction with the communication tool, in project groups. The narratives in the tool have been changed and new ones inserted, in order to focus on different aspects of experience design. The tool is used among the group to discuss central considerations regarding issues relevant for development and reflection on the group's specific experience design projects/solutions/ideas.	Students from a Master's class in experience design from Aalborg University AAU (two groups).	Video and audio recording
27 October and 10 November 2014 Graduate study programme in experience design	Workshop	Data is collected through students' interaction with the tool in their project groups. The narratives in the tool have been changed and new ones inserted, in order to focus on different aspects of experience design. The tool is used among the group to discuss central considerations regarding issues relevant for development and reflection on the group's specific experience design projects/solutions/ideas.	Students from 7th semester of experience design AAU (five groups).	Video and audio recording
3 March 2015 Research project – the patient network – PulseUP	Project meeting	Data is collected in a one-hour workshop, where the communication tool is used by the network partners to discuss three central areas for further concern in the ongoing work: whether users are receivers or partners; whether exercise is based on instruction or peer learning;	Doctors, health personnel, researchers from health informatics, project leader (7 people in	Audio and video recording

		and whether networking is about coffee or exercise/health.	all).	
14 August 2015 Research seminar on participatory tools	Workshop	The theme of the seminar is ‘Critique in and of design: Explorations of various tools and techniques for including critical thinking in participatory design’. Data is collected from a one-hour engagement with the research partners. The researchers explore the communication tool by responding to the same versus-narratives that were designed for UserTEC WS2. In this workshop, the participants use the tools and respond to the narratives as end users. An evaluation session is held afterwards in which the partners evaluate their experiences with the tools and offer ideas for improvement.	7 national and international researchers from the broad field of Humanities and ICT.	Audio recording

PRESENTING THE RESEARCH PROCESS

Figure 1 below depicts the research process with respect to the relation between the data-capturing activities described above as well as data-analysis activities and the development of 3P. The research activities shown between the two stippled vertical lines represent the primary research focus of this thesis.

The horizontal line in Figure 1 represents a linear timeline from the start to the end of my research process.

The two green boxes on the upper side of the timeline represent the two central workshops, ‘WS1’ and ‘WS2’. The blue boxes beneath the timeline represent the data analysis conducted in between data collection and other research activities. WS1 provides empirical material about UserTEC partners’ different perceptions on the collective UserTEC goal, the different partners’ conceptualisations of possible directions towards this goal and the challenges involved in obtaining the goal. Insight into discursively opposing interests among UserTEC partners were identified from WS1 through transcripts of audio data and then analysed through meaning condensation (Kvale, 1997), which is introduced in Chapter 2.

The purple box represents the development of the communication tool between WS1 and WS2. I built my design work based on pragmatic epistemology, the challenge experienced in WS1, the discussion in the Participatory Design community about the concept of a third space and the emerging field of Design Anthropology (Gunn, Otto, & Smith, 2013; Gunn & Donovan, 2012). I also draw on the field of Interaction Design research with respect to the use of tangible and visual tools as collaborative research design tools. The development and design of the 3P tool are described in detail in Chapter 4.

WS2 provided video and audio data on how a specific communication tool, 3P, actually worked in situ (as introduced in Chapter 5). When conducting the analysis after WS2, I break away from the methods of Design Anthropology to attend to coding strategies inspired from Grounded Theory (Strauss & Corbin, 1998; Glaser, 1992; Neergaard & Leitch, 2015) and Interaction Analysis (Jordan & Henderson, 1995). The empirical work conducted based on WS2 is described in Chapter 5.

The curved line in Figure 1 is used as a symbol of the realisation process of experiential learning, weaving between actions, observations and reflection, represented by the different methods and tools used for data capturing and data analysis. This line is not linear; rather, it is iterative, weaving back and forth.

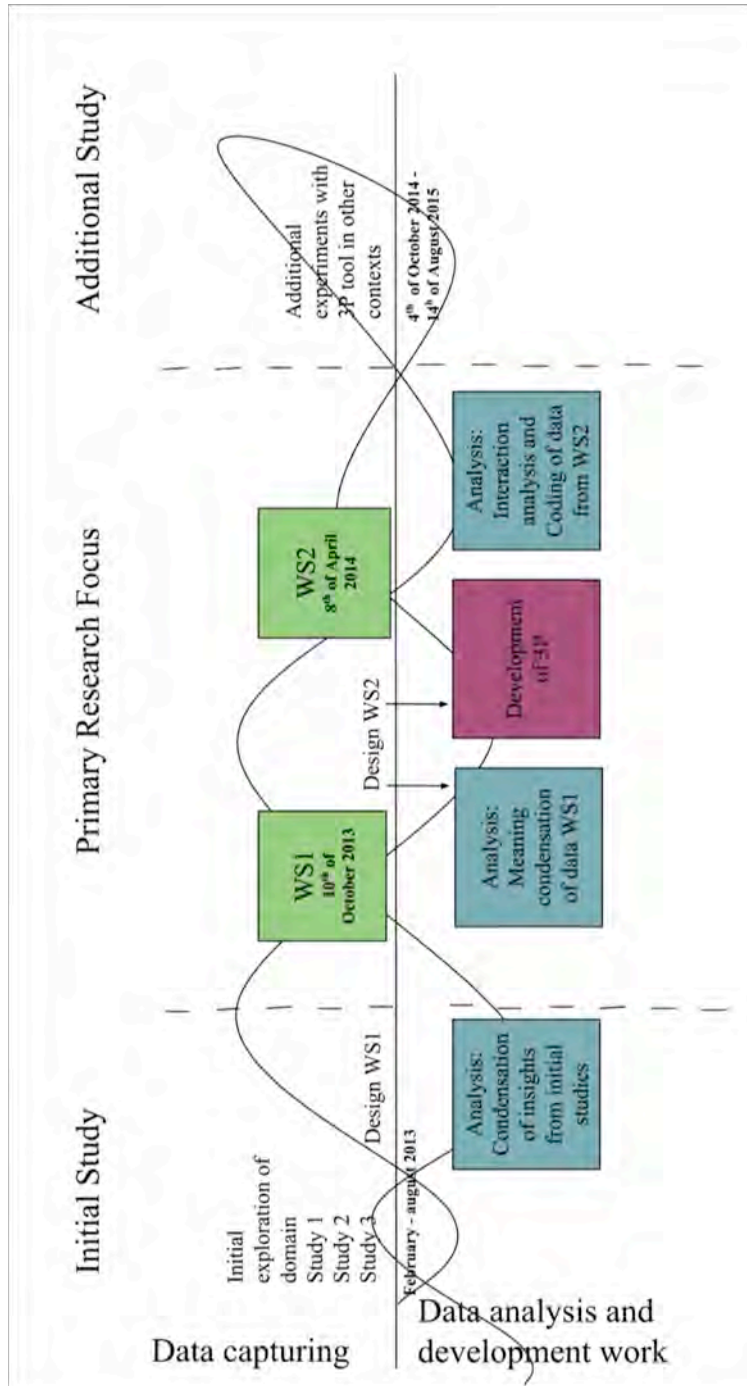


Figure 1. Research process.

CHAPTER 2. BOUNDARIES AND SCOPE OF RESEARCH: FINDING MY FOCUS WITHIN A LARGER RESEARCH PROJECT

The UserTEC project, ‘User Practices, Technologies and Residential Energy Consumption’, has provided the context within which I study and explore the challenges of multi-stakeholder communication. Being a part of, as well as being funded by, a larger research project means possibilities for research with a predetermined scope. In this chapter, I present the UserTEC project followed by an account of how I developed my specific research question.

USERTEC: A MULTIPARTNER PROJECT SETTING

Purpose and organisation

UserTEC: User Practices, Technologies and Residential Energy Consumption is a five year (2013–2017) multidisciplinary research project supported by Innovation Fund Denmark. The project is based at Aalborg University and is conducted in cooperation with national and international universities and business partners within the building and energy sectors.

UserTEC is one of many research projects that aims to achieve energy savings and meet user needs in the course of developing energy technologies. In this global research endeavour, UserTEC stands out due to its social science and engineering perspective that focuses on the communication surrounding household energy consumption between end users, designers, engineers and architects as well as energy companies and utilities. UserTEC aims to enhance the communication between these parties. It is with the focal point of communication that I have conducted this research. The overall aim of the UserTEC project is described as follows:

‘The aim of the project is to use unique data to analyse in detail the everyday life practices of households in relation to energy consumption. Furthermore the aim is to use these insights to enhance communication on energy consumption between actors as well as to develop energy

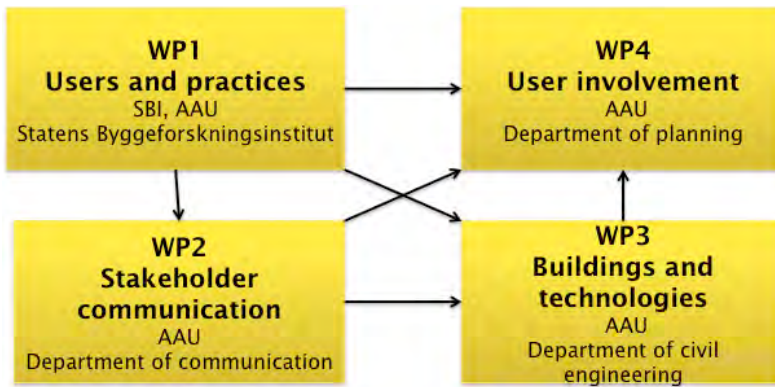
efficient building technologies and renovation processes that better respond to the way ordinary people actually live in their homes'.²

The project is divided into four work packages, each with its own purpose. My research falls within WP2:

- WP1: To undertake detailed qualitative and quantitative analysis of users' everyday practices and how these relate to the household's energy consumption.
- WP2: To analyse and enhance better communication about households' energy consumption between end users, designers, engineers and architects, as well as energy companies and utilities.
- WP3: To develop and test new user-adapted energy-efficient building technologies.
- WP4: To analyse and enhance better user involvement in low-energy construction processes, as well as in energy refurbishment of existing housing.

Project partners

The project is multidisciplinary and the WPs are anchored in different research disciplines. WP1 is anchored in sociology and managed by the Danish Building Research Institute, Aalborg University. WP2 is anchored at the Department of Psychology and Communication, Aalborg University. WP3 is based in the engineering research disciplines and managed by the Department of Civil Engineering, Aalborg University. WP 4 is based in sociology and managed by the Department of Development and Planning, Aalborg University. The figure below shows the different work packages and their relationship.



² <http://sbi.dk/usertec>

Beside belonging to the above mentioned research fields, the project partners comprise a range of other international and national research institutions:

- Department of Energetics at Politecnico di Torino
- Department of Architecture at the University of Cambridge
- Department of TEVS – Technology, Everyday Life and Society at the University of Linköping
- The Environmental Change Institute at the University of Oxford
- Department of OTB Research for the Built Environment at Delft University of Technology
- Department of Civil Engineering at the Technical University of Denmark.

Major Danish and international companies involved in some way in the building and energy sectors are also partners:

- Velux A/S, a window manufacturer
- Danfoss A/S, a heat pump supplier
- Saceco, a producer and provider of energy consumption measuring instruments
- IT energy, an energy system software development and consulting firm
- Affaldvarme Aarhus, an energy supplier
- FjernvarmeFyn, an energy supplier
- Sydenengi, an energy supplier
- Energinet.dk, a research consultancy with expertise in supplier security
- Realdania Byg, a funding organisation focused on the milieu of the built environment and city planning

For a detailed list of all partners, visit <http://sbi.dk/usertec/partners>. When I refer in general to the word ‘partners’ in this thesis, I refer to representatives from these companies or institutions.

Collaborative activities in UserTEC

While the majority of communication between UserTEC research partners takes place within the work packages, the UserTEC bi-annual partner meetings constitute the core site for joint knowledge juxtaposition between the different disciplines, and hence the key source of data for my project. These meetings include participants from all project partners, and I have been part of designing and developing three workshops at the bi-annual meetings, the aim of which has been to transgress the local site-specific activities of UserTEC partners (for a description, see Table 1, p. 29).

BUILDING ACQUAINTANCE AND FAMILIARITY WITH THE DOMAIN OF USERTEC: UNDERSTANDING THE COMMUNICATION CHALLENGE IN THE CONTEXT OF USERTEC WP2

The specific objective of WP2 was formulated at the UserTEC kick-off meeting as follows:

- Bridge the gap between building design intentions and user understandings by developing a shared language.
- Study communication between builders, maintenance people and households, and find a language and concepts they can have in common.
- Make a ‘tool-box’ out of this language and these concepts.

In order to build acquaintance and familiarity with the domain of UserTEC, I first conducted empirical end user studies to learn first-hand how end users perceive energy saving in their residential contexts (see the yellow rows of Table 1). The studies comprised interviews with families living with IHC® (Intelligent House Control) systems and were focused on how users (in situ) talked about smart home technologies in their homes with regard to appropriation of technological solutions. In addition, a negotiation situation between a husband and wife about how to manage and control their IHC® helped me understand the communication surrounding the implementation of energy saving technologies in the home. To compare the empirical studies of users, I read additional studies on user practices, behaviours and local sense-making in relation to energy consumption in households (Darby, 2006; Gill, Tierney, Pegg, & Allan, 2011; Gram-Hanssen, 2008; Gram-Hanssen, 2011; Groupa & Darby, 2011). Based on the insight gained through these studies, I concluded that the IHC® marketing discourse and the way this product is designed does not currently comply with the users’ everyday practices and thinking (Christiansen & Andersen, 2013). When I familiarised myself with the research literature on this topic, I found that other researchers have already pointed out that many of the technical solutions designed to support energy saving in households are often concerned with the end goal of more comfortable and easy living, effortless control of home environment, better ways of life, and the reduction of routine tasks within one’s own home, etc. (Strengers 2014), which may correspond very little with individuals’ actual concern and daily home-life practices. Thus, my first understanding of the challenge of WP2 surrounded the apparent contradiction between design and engineering on the one hand and use on the other, a contradiction and framing well-known in the research on Computer-Supported Cooperative Work and Human–Computer Interaction (Bowers, 1994; Grudin, 1994; Nardi, 1996). Therefore, my first idea of a research approach in WP2 was to apply the Scandinavian tradition of system design described in, for example, Gregory (2003), and the collective resource approach (Ehn and Kyng, 1987), for the sake of user empowerment in technology development (Von Hippel, 1994). An assessment of the arguments and suggested approaches is given in Christiansen and Andersen

(2013). The collective resource approach is concerned with how to bring together the technical scientific approach of modelling, predicting and designing and the social science approach of describing and understanding. In practice, in the UserTEC context, however, it turned out that there was no space in the project plan for me to adopt or experiment with a collective resource approach among the specific partners/companies or between the WPs.

As part of my initial studies (see Table 1), I paid a visit to UserTEC's Danish business partners. I realised that the business partners' main interest in participating in the project was to acquire a 'key to the users,' that is, to learn more about how users work and prioritise in relation to each company's respective products, which I found was out of the scope of my project.

It is worth mentioning here that the construction and building sector, in which UserTEC is anchored, is a sector guided by standardised and market-driven requirements, where building regulations, engineering models and quantitative, hard statistical facts are foundational in initiating change and development. This was the conclusion of a recent project, 'The Indoor Climate and Quality of Life Project,' reported in Buur (2012), with certain aspects similar to UserTEC. The conclusions were drawn (from both research-oriented institutions and the construction industry) concerning how difficult it is to implement more user-oriented participatory practice within the construction industry, let alone simply including the voices of users (Clausen & Gunn, 2015). According to the authors, challenges are caused by different conceptions of the user, limitations of knowledge-sharing, and limited uptake of user knowledge in companies: 'the engineers we interviewed mainly related comfort themes to (enact) existing products, marketing and business strategies and infrastructures of engineering models and systems' (Clausen & Gunn, 2015, p. 87). These circumstances in the construction industry often downplays a more humanistic view of technological development, as well as the importance of collaboration, communication and sharing across professional boundaries. This restrains possibilities where perceptions and ideas of diverse paradigms can be shared to expand individual professions' perception of the challenge faced in relation to energy saving systems and the role of the user in operating these systems in the future.

Based on the above mentioned studies I concluded that it would not be enough to present the stakeholders of UserTEC with more user studies on user behaviour, needs, or desires, in order to bridge the gap and pinpoint frictions between design intentions and user understandings. Rather the challenge in a project setting such as UserTEC is to find ways to explore and make explicit for collective attention different understandings and positions taken by different disciplines regarding the challenges of designing more energy efficient technologies in the future. When making different positions explicit for collective attention the aim is to question the assumptions that determine producers and decisionmakers' willingness to listen to users. Such questioning requires activities in which a collective effort toward communication and problem orientation within UserTEC can build a foundation

around a collective ‘general’ problem understanding, instead of sub-issues of one subject area and paradigm as is currently the case.

In general, a green transition involves a web of stakeholders, including utilities, entrepreneurs, housing associations and manufacturers. It involves an interesting mix of fields of expertise that extends beyond engineers and architects to include sociologists, housing associations, salespeople and innovation consultants. UserTEC is no exception. Attending to such a diverse field, and given my background in learning and change studies, I found that a key issue is to force underlying values, which inform preferred or imagined outcomes, to come to the surface. I was also inspired by Bateson (1972), who problematized the means-end discourse of social change when trying to understand other people, cultures and goals, which often ignores underlying value systems. Bateson suggests that we instead support and look for ‘direction’ and ‘value’ in situ (Bateson 1972, p.162).

Aiming to make implicit values and intentions explicit implies a critical perspective on values, attitudes and ways of looking at the world that have been unconsciously built into our understandings of technology (Sengers et al. 2005, p. 50). As Haraway puts it, the goal of a critical approach is ‘to destabilize what we as professions take for granted’ (Haraway, 2014).

One might think that bringing together people of multiple professions, as is done by UserTEC, might reveal underlying clashing values through communication. However, in the introductory quote, I show that this is not necessarily the case. It is difficult to exceed the boundaries of one’s own vision. Dewey (1983), in his theory of communication, gives at least one explanation as to why people tend to stay within the boundaries of their own perspectives. He explains this as people’s lack of willingness to examine the underlying relationships between their own position and somebody else’s. We make an immediate comparison; if we see a conflict, we either pursue the conflict or just acknowledge the difference. We rarely step back and invite the other into a co-examination of underlying premises. As Dewey states:

‘When a suggested meaning is immediately accepted, inquiry is cut short. Hence the conclusion reached is not grounded, even if it happens to be correct. The check upon immediate acceptance is the examination of the meaning as a meaning. This examination consists in noting what the meaning in question implies in relation to other meanings in the system of which it is a member, the formulated relation constituting a proposition.’ (Dewey, 1983, p. 111)

My focus on revealing underlying assumptions has developed in tandem with the recognition of differences of understanding among the partners, observed at the biannual partner meetings of UserTEC. The aim of these meetings is to facilitate activities that transgress the local, site-specific activities of respective UserTEC partners. The recognition of a communication gap of contrasting interests and understandings among the partners came from observations of the first UserTEC

partner-meeting workshop (WS1). This workshop I had designed to discuss and collaboratively define the kind of knowledge being sought, as well as to encourage partners to claim interest in the project. The workshop was named ‘Challenge WP2: To make user voices count’. Thirty-seven research partners participated: business partners, research partners, WP leaders and PhDs. The workshop was designed to explore and discuss insights into what kind of user perspectives the partners needed in order to improve practices and technologies related to energy consumption in their respective professions. To scaffold dialogue among the partners, I gave them a paper with a concentric circle for mapping out and prioritizing central interests (see Figure 2). A full description of the workshop can be found in Appendix F.



Figure 2. UserTEC partners engaged in discussions in WS1.

My findings, developed from an analysis of this workshop, revealed opposing conceptualizations about how the problem of energy saving in households was perceived in general, and especially how central issues revolved around different understandings at the ideological level as to the role of the future user and future technologies. I identified three recurring opposing categorizations of tensions and blind spots from discussions in the workshop, which constitute the central findings: 1) ‘Users as being flexible vs. technology as being flexible’, presenting an opposition as to whether future users should adapt to technical standards, or whether technology should be designed to adapt to users' everyday activities 2) ‘Users as passive consumers vs. users as active co-creators’, presenting different views as to how technology is appropriated within everyday practices 3) ‘Educate users vs. learn from users’, presenting different positions as to whether to educate users about how to involve technology within their everyday practices, or to learn from users and user-practices how technologies may be appropriately located within on-going everyday practices. These categorisations are further described in Chapter 4, including an explanation of how they were identified analytically.

The opposing conceptualizations among the UserTEC professionals were not addressed, made aware of or orientated to in the workshop situation but instead they appeared through my analysis. Returning to the issue of the unwillingness to confront differences, it must be noted that, in my first partner meeting, partners were not required to collaborate on a specific shared task by the project description. Nothing in the situation forced them to step outside of their professional silos and their own work packages and see problems anew. As such, the opposing conceptualizations remained 'blind' to the partners throughout the workshop.

Based on the insights presented here, I became interested in how to re-present these opposing conceptualizations in such a way as to reengage the partners in explicit discussions about current and future approaches, interests and agendas in early phases of inquiry. The goal of such reengagement was to make the partners see and listen to other positions and the values underlying both their own and other perspectives. As such, a central question became how I could facilitate a space where partners could begin to collaboratively explore multiple understandings of the UserTEC problem space as well as how I could make the partners focus explicitly on contrasting interests, understandings and agendas as an activity in itself.

I have argued that facilitating such openings might pave the way for a common basis for communication, thus overcoming 'the law of the hammer' for the benefit of forthcoming collaboration on shared tasks or objects in cases where several professions are to work together. Therefore, I designed a workshop for the second UserTEC partner meeting to explore how to support communication concerning issues of opposing interest among stakeholders. Before I move on to the outcome of this, let me discuss the theoretical studies that allowed me to understand the fundamental challenges of multi-stakeholder communication, which were of importance in designing the 3P tool.

CHAPTER 3. POSITIONING MY PROBLEM UNDERSTANDING WITHIN A THEORETICAL FRAMEWORK

Communication is a major part of multi-stakeholder collaboration, whether the collaboration is taking place for the first time or whether it is happening in new circumstances or involves new participants. In such cases, habits are either broken or created. Communication surrounding the conditions for collaboration typically requires negotiation and has been addressed in the research field of Computer-Supported Cooperative Work (CSCW), where it has been labelled ‘articulation work’ (Schmidt, 2011). In the CSCW context, emphasis has been placed on articulation and awareness. Awareness practices can very well be understood as ‘the work to make work work’. The importance attributed to the concept of awareness in CSCW research largely derives from this insight, and there is a close conceptual affinity between concepts like ‘situated action’, ‘articulation work’ and ‘mutual awareness’ (Schmidt, 2011, p. 352). I take a somewhat different approach given that my research goal is to analyse and enhance the communication surrounding household energy consumption between designers, engineers and architects as well as energy companies and utilities. My focus is on what makes the discourses of those with different professions meet and move forward together. Hence, I use the term ‘multi-stakeholder communication’, but the object I address with this term is what Schmidt calls ‘the work to make work work’.

In this section, I elaborate my epistemological position and present the theoretical framework I use to define and delimit my understanding of the challenges of multi-stakeholder communication, as well as the potential in developing tangible tools to enhance communication between multiple stakeholders.

THEORETICAL PERSPECTIVES ON MULTI-STAKEHOLDER COMMUNICATION AND THE IMPLICATIONS THEREOF

The challenge of establishing a common ground whereon different conceptual models and interests can be shared among adversaries is of specific concern to UserTEC, as well as of general concern in the majority of collaborative efforts. Individuals of different backgrounds have different mental schemes and ways of knowing (Lakoff & Johansson, 2003), speak different languages, and draw on different practices, interests, and agendas. Moreover, the professional development of new technologies or practices takes place within the confines of different professional knowledge bases and work traditions, each of which derives from its own means of formal and informal education, languages, cultural background, and

goals. These criteria thus deserve close attention in research that aims to either break down or expand such confines to establish a common ground for communication.

Bråten describes how understanding takes place either on the premises of own models or on the premises of others' models. An important feature of Bråten's model power approach to communication is his critique of what he calls the 'power-through-communication' paradigm (Bråten, 1973). This paradigm holds that lack of power among marginalised people may be appeased by inviting them to dialogue. For the purposes of the research conducted here, one can understand the same to be possible for marginalised discourses. Such dialogue, however, whether intended or not, may become pseudo-dialogue if a given participant's ideas, questions or viewpoints are excluded or considered irrelevant within a specific discursive practice by a more model strong participant. For this issue, Bråten suggests that individuals engage in dialogue based on what he calls the 'power-through-model' paradigm (Ibid.). Participants in a communication situation can be characterised as either 'model strong' or 'model weak'. Model strong participants will typically be able to provide strong ideas in nuanced language within a specific subject area. For example, in the UserTEC project, the sociologists are model strong in terms of approaches toward quantitative analysis, measurable data collection, graphs, statistics, and so on. When I as a humanist enter into a dialogue about such things, I represent a model weak part of the discourse. Similarly, engineers are strong in technical construction, technical knowledge, measurements, mathematics, and graphs, among other things, and the company partners are model strong in terms of business models, business cases, and practical professional knowledge. Model weak participants in a communication situation, often represented by other professional disciplines than the model strong disciplines, are not particularly familiar with a given subject area of focus, and as such, their ability to discuss, elaborate on or reject knowledge within a specific field or subject is reduced. One of the motivations to develop a communication tool is thus to create a space that allows room for multiple models of thinking. The central tenets of Bråten's theory are here borrowed from Kanstrup and Christiansen (2005) to provide an overview of the basic ideas of model power:

'1) If participant A is to be able to control x it is necessary that x is developed on the premises of A.

2) If two participants, A and B, are to be able to communicate it is necessary that they have access to models on the subject area.

3) Following this, a trade or conversation between a model strong A and a model weak B means that the model weak B will try to acquire the models of the model strong A.

4) Following 1 and 3; the better the model weak B succeeds in acquiring A's models, which are developed on the premises of A, the more B will be under A's control' (Bråten 1983, in Kanstrup & Christiansen, 2005).

Bråten proposes to minimise what he calls the ‘influence gap’ by causing individuals to reflect ‘on whose premises a model is developed’. In this study, I have drawn upon the following reflection of Kanstrup and Christiansen on the implications of the power-through-model paradigm:

‘Bråten may be right in his observation that model power seems to disappear (for a while) when participants are aware of the theory. Because if we become aware of our idealized cognitive models, we not only understand their importance for our identity building, we also understand that diverging views may have equally importance for their beholder’ (ibid. p. 2).

The authors’ reflection on model power in relation to researchers use of participatory design approaches towards engagement of users, can further be applied to communication and engagement of project partners in multi-stakeholder contexts. If model power apparently disappears (for a while) when participants are aware of a theory and of their own idealised cognitive models, the challenge of developing a communication tool for multi-stakeholder communication is to provide a base or frame for disparate views to be expressed on an equal playing field. One of the goals of developing and designing such a tool is to take discussions revolving around the future of energy saving in households to another level of abstraction. That is, not to discuss *what to do* in the future, but the underlying values upon which understandings of what to do are based, in order to ask *why to do it* in relation to idealized and rational assumptions. In other words, the goal is to begin to question in a collaborative manner the origins of dominant premises or idealized cognitive models (e.g., standardisation ideals, engineering ideals, sociologic ideals, etc.). Such an effort should aim toward, following the reasoning of Von Hippel (1994) that innovation must consider more than one site, locus, logic and discursive framing, exposing differences at the outset of an initiative to arrive at a collectively defined problem. The central idea of the communication tool in this study is to invite participants to choose between and question variations of different perceptions of a problemspace so as to allow for, in Star’s words (2010), ‘flexible interpretative freedom’, and at best to invite participants to discuss the premises or foundations on which they have built their understandings for the sake of others’ recognition. Without such freedom, it can be difficult to create a foundation for common problem formulation. Kanstrup and Christiansen (2005) advocate making model power explicit, including different ways of thinking, for the sake of reflection:

‘Committing to participation does not do the trick: Model power as conceptualized here is an inescapable part of any communication – the more common ground as Clark [9] has pointed out, the less we pay attention, but it is still there. Lifting it up and making it subject to reflection is a way of making it loos its silent power-grip upon communication.’ (p. 168)

In utilizing a communication tool to support a specific kind of dialogue, one could say that I as a facilitator represent the model strong part in the partner-meeting. However, the use of the communication tool to scaffold communication is my attempt to, at least to some degree, suspend model power rather than enforce it. Nonetheless, it is important to consider critically whether such a tool, to a certain extent, suspends model power or simply reproduces the issue of model power, in turn perhaps making it even more complex and difficult to discern whose model holds power via it no longer explicit but blurred in efforts toward interpretative flexibility. In such a case, the downfall could be that each partner merely clings on to its own underlying cognitive models/understandings, resulting in what Habermas has termed closed strategic communication (Habermas, 1981), which refers to when partners aim at different goals that are not made explicit, and hence are not possible to negotiate or communicate about in an collaborative manner.

An ideal communication situation between multiple stakeholders: A dialectic- or dialogic exploration of a problem space?

To understand the different forms of communicative social orientation, I built upon Habermas' theory of communicative action (1981). In his theory, he distinguishes between two types of communicative action: goal-oriented, as a socially strategic action, and action-orientated, towards mutual understanding, as a socially communicative action. In Habermas' view, an ideal communication situation would have participants reflect upon and have a dialogue about underlying rationales and values to reach a mutual understanding as opposed to merely discussing strategic goal orientations. He states:

‘The doubly contingent process of reaching understanding rests on the interpretive accomplishments of actors who—so long as they are not oriented egocentrically to their own success but to mutual understanding, and so long as they want to achieve their goals by way of communicative agreement—must endeavor to arrive at a common definition of a situation.’ (Habermas, 1987, p. 74)

The features of an ideal communication situation have been described by Mouffe (2000) based on the views of Benhabib, who sums up what it takes to govern an ideal communication situation:

‘1) participation in such deliberation is governed by the norms of equality and symmetry; all have the same chances to initiate speech acts, to question, to interrogate, and to open debate; 2) all have the right to question the assigned topics of the conversation; and 3) all have the right to initiate reflexive arguments about the very rule of the discourse procedure and the way in which they are applied and carried out.’ (Mouffe 2000, p. 4-5)

Even though these may be the ideals of communication when people are engaged in social interactions, Mouffe problematises the very notion of the ‘ideal speech situation’, which he considers to be ‘conceived as the asymptotic ideal of intersubjective communication free of constraints, where the participants arrive at consensus by means of rational argumentation’ (Mouffe, 2000, p. 751). According to Mouffe, such a rational consensus cannot be obtained.

Sennett (2012) is inspired by Michael Bakhtin in his view of dialogic exchange as ‘a discussion which does not resolve itself by finding common ground’ (p. 19). It is a skill of exchange that focuses on the receptiveness of the covert rather than the overt, which means that this form of communication is more about seeking an emphatic understanding of the other than finding rational endpoints. Dialectical discussions are by nature more disciplined than dialogic discussions. Dialectical thinking involves conflicting concerns and oppositions, the goal of which is to access their various strengths and weaknesses, whereas dialogic thinking is about identification with the other and trying to understand what he or she understands. This effort is made not to reach a common ground, but to dwell with the other, to listen to them with interest and empathy. According to Sennett, a dialectic exploration lacks the ideal of listening with interest and empathy that dialogic exploration includes. Dialogically oriented explorations are about being in the wrong and encouraging multiple perspectives to co-exist at the same time, whereas dialectical explorations seek resolution based on thesis and antithesis, based on debating and questioning knowledge in a more critical rational manner. Hence, a central question of importance for me as designer of a communication tool is to ask whether to support a dialogical or a dialectical approach with the goal of problem identification in a multi-stakeholder setting. In my design of the communication tool, counter-points and opposition have been built into what I have termed the ‘versus categories’ of the tool (explained in Chapter 4). Such a feature encourages participants to participate in a dialectical rather than dialogic exploration of a given problem space.

In the introduction to this thesis, the central aim of the communication tool was stated to be to support the explicit exchange of differences of interest. This notion was inspired by the concept of ‘agonistic pluralism’ (Mouffe, 1999), which follows that all voices are given presence in a workshop situation, and this not as an effort toward ideal consensus, but to expose and reflect upon different meanings in a larger system of meanings. According to Mouffe (1999), we cannot reach a rational consensus without exclusion, but we can aim at a ‘conflictual consensus,’ which involves discerning clearly differentiated perspectives so as to allow for alternatives and the establishment of spaces where adversaries take interest in listening to each other:

‘Since those ethico-political principles can only exist, however, through many different and conflicting interpretations, such a consensus is bound to be a ‘conflictual consensus.’ This is why a pluralist democracy needs to make room for dissent and for the institutions through which it can be

manifested. Its survival depends on collective identities forming around clearly differentiated positions, as well as on the possibility of choosing between real alternatives. To borrow a term from system theory, we could say that pluralist politics should be envisaged as a ‘mixed-game,’ i.e., in part collaborative and in part conflictual and not as a wholly co-operative game as most liberal pluralists would have it.’ (Mouffe, 1999, p. 756)

In order to ‘make room for dissent’, it can be recognized that an important aspect of formulating and identifying problems is to focus on nuances of understanding, when questioning different approaches and assumptions. In this respect, the intention of the communication tool is to establish discursively a dialectical way of communicating that revolves around the dislocation of discourses via thesis, antithesis and synthesis, which may in turn lead to closure. One can then question, when using the communication tool in the workshop, whether closure is an intended outcome, as in the first phases of inquiry it is important to open up spaces and lines of inquiry. It is here argued that by examining and questioning the thesis and antithesis of partners in relation to perceptions of current and future potentials and bottlenecks of energy efficient solutions, it is possible to reach a layer of communication wherein one becomes more knowledgeable about the foundations on which decisions about the future are made.

MEDIATING COMMUNICATION AMONG MULTIPLE PARTNERS THROUGH OBJECTS

The overall goal for the 3P tool I have developed, is to facilitate communication about household energy consumption, preferably in a way so that participants realize both their own and the other participants’ positions towards this. I lean towards an understanding of the tool as what Star and Greisemer (1989) and Star (2010) termed a ‘boundary object’, which is defined as plastic, interpreted differently across communities and having enough immutable content to maintain integrity. They state:

‘Objects which are both plastic enough to adapt to local needs and the constraints of several parties employing them, yet robust enough to maintain a common identity across sites . . . They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds.’ (p. 393)

This definition matches my wish to obtain ‘interpretative flexibility’ in order to facilitate dialectical exploration. I expand my understanding of the tool as a boundary object to generate learning and development, as conceptualised by activity

theory as a mediating instrument/artefact. In referring to the communication tool of this research as a mediating artefact, I am building upon the notion of a communication tool as a medium for interaction between a subject and object, which has its origin in Vygotsky (1986) and later Cole and Engeström (1993). According to Vygotsky, knowledge and consciousness are mediated by tools in any given activity:

‘...human higher mental functions must be viewed as products of *mediated activity*...material tool, which served as a mediator between the human hand and the object upon which the tool acts...Like material tools, psychological tools are artificial formations. Both are naturally social but while material tools are aimed at the control over process in nature, psychological tools master natural forms of individual behaviour and cognition’ (Vygotsky 1986, p. xxiv and xxv)

Mediating instruments are thus important both for representing prior knowledge and learning and for negotiating and constructing new meaning. In my case, I have materialised the participants’ prior knowledge as representations in the 3P tool’s design. Thus, the tool is not a mediating instrument in the sense of being a cultural materialisation of a given activity as a result of group interaction (including manifested rules and acceptable interactions). Rather, I have made representation based on observations of discursive interaction (described in Chapter 4). Thus, 3P is not decided upon or introduced by a community, but a mediating instrument designed for dialectic exploration between partners (the subjects) concerning the potential and implications of energy efficient technologies for households in the future.

My studies in Participatory Design research have brought a major challenge in multi-stakeholder communication to my attention that revolves around how model power is exercised, as I have described above. Therefore, I want the tool to be robust enough to assist communication as influenced by model power. To achieve this, I have argued that the tool must deliberately destabilise discourses and demand that participants assess the various strengths and weaknesses of their intentions, which qualifies as dialectical communication (Sennett, 2012).

In this context, the motivation is to allow UserTEC partners, who each hold different levels of expertise in different professional sectors, to engage in a discussion based on a shared foundation. To facilitate this, I have made representations of the positions and values into what I call ‘versus categories’ (as described in Chapter 4). These are empirical categories representing knowledge and interests around central dilemmas in UserTEC which has been included in the tool for discussion. The idea of ‘versus categories’ is presented in Chapter 4. The categories were included to ensure that each of the partners’ horizons of experience was accommodated by the tool. In order to claim the tool to work as a boundary object in practice, it has to be able to accommodate, at least to some extent, each of the partners’ different mental models, inviting them to share thoughts and interests within a common ground of

communication. This common ground is foundational in the tool's design, represented by the different visual and tangible elements of which it consist (presented in Chapter 4). Furthermore, this common ground plays a part in the way engagement is facilitated via the tool, including its rules of engagement, which propose having a dialogue within a versus framing as prescribed by the different versus categories in the tool. As a mediating artefact and a boundary object, the communication tool thus provides a focus for representing and negotiating existing knowledge on different levels based on different interests and experiences.

According to Star (2010), one of the central ideas concerning the architecture of a boundary object is that they 'are a sort of arrangement that allows different groups to work together without consensus' (p. 602). Star further explains the term 'boundary' with reference to boundary objects as 'a shared space, where exactly that sense of here and there are confounded'. Within the field of design and design research, the term 'boundary object' is commonly used to refer to a means of aligning differences in processes of construction, cooperation and conception so as to reach a shared end goal (Dalsgaard, Halskov and Baseballe, 2014). The specific design of my tool was not chosen to confound a sense of here and there in terms of different partners' professional experience. Rather, as explained prior, the tool has been designed to make differences among partners explicit to all. The tool is intended to clarify and delineate the aspects of a problem space to allow professional differences to coexist. The term boundary object in the context of this study can be understood to relate to shared representation that allows for the interpretative flexibility of different versus categories in an exploratory partner meeting. Where I differ in my tool design from that of Star's description of a boundary object is that I do not attempt to confound the here and there of different interpretative repertoires, but rather seek to make an explicit distinction between different partners' professional experience, which the interpretative flexibility and mapping aspect of the tool's design is intended to assist with (described Chapter 4). The idea of a boundary object in Star's original use invites different partners without struggle to explicate where they come from with respect to underlying values and mental models. The explicit focus on differences of interest and intention in my use of the communication tool in this research represents an addition to the notion of a boundary object.

SUMMING UP

Table 2 below provides an overview of the theoretical underpinnings that have been assigned to position the intentions of the communication tool developed as part of my research. It is important to mention that what is described here is an ideal communication situation, and the timeframe of a partner meeting might not be enough to actually reach such an ideal. Nonetheless, the theories of Table 2 serves as a guideline for how to think about what effective communication means, and hence what must be taken into account when building tools to support the kind of communication challenges addressed here.

Table 2

Overview of Theoretical Framework for Tool-Mediated Communication

Theory	Inspiration	Aim /ideals
(Bråten 1973; Christiansen & Kanstrup, 2005)	<i>Model power</i>	To suspend model power
(Star & Greisemer, 1989; Star, 2010)	<i>Boundary object</i>	To allow for interpretative flexibility
(Vygotsky 1986; Cole & Engeström, 1993)	<i>Mediating artefact</i>	To allow for a dialectic exploration of a topic based on representations of existing knowledge
(Muffe, 1999, 2000)	<i>Agonistic pluralism</i>	To clearly differentiate positions that allow for alternatives and to allow for ‘conflictual consensus’. Also, to create spaces where adversaries experience the need to listen to each other.
(Habermas, 1981)	<i>Ideal speech situation</i>	Create spaces for speech situations where all ‘have the right to question the assigned topics of the conversation; and... all have the right to initiate reflexive arguments about the very rule of the discourse procedure and the way in which they are applied and carried out.’
(Sennett, 2009, 2012)	<i>Dialogic/dialectic corporation</i>	To destabilize discourses and assess the various strengths and weaknesses of intentions concerning the establishment of a common ground for communication.

Before presenting the design of 3P, I would once again like to remind the reader that the overall focus of this PhD is concerned with multi-stakeholder engagement/communication related to problem identification and exploration. While such an issue can be conceptualised in many different models and via many different approaches, I have chosen to develop and explore the creation of a communication tool that focuses heavily on friction and opposition in the early phases of stakeholder inquiry. My effort to assist a group of people to negotiate, reflect on, and trigger ideas before giving an answer relates to the notion of a tool as something that serves to evoke and stage thoughts (Gunn, Otto & Smith 2013). Tools are integral to human beings, whose knowledge is comprised of a mixture of many things deriving from both different internal and external experiences. Many attitudes become firmly rooted over extended periods of time, and therefore require deconstruction and collaborative negotiation in multi-partner projects.

CHAPTER 4. DEVELOPMENT AND DESIGN OF THE 3P COMMUNICATION TOOL

This part of my thesis gives an account of the development of a communication prototype tool, which I have called the 3P tool. The term ‘3P’ is an acronym for positions, perspectives and priorities, three central features of the prototype described in this chapter.

The context of the design brief was unfolded in Chapter 1, thus, I open here by directly stating the design brief, which is twofold: A) to design a communication tool, and B), through critical reflection on the design process, to provide a base of design methodological reflections.

The audience for the tool comprises participants in exploratory project meetings in which the timeframe is fixed but the roles of the participants, as well as the outcome of the project, are not yet nailed down. The scope of the tool is to help the partners to explicate expectations with respect to the UserTEC project direction and their individual roles, but primarily to help them through the initial discussion – necessary, but always difficult – about how they, individually, conceive of the problem, the problem space and its context.

I build my design work on inspiration from the emerging field of Design Anthropology (DA). I also draw on what I have picked up from the field of Interaction Design research with respect to the use of tangible and visual tools as collaborative design research tools. DA is characterised by an inductive approach to inquiry, a focus on what emerges in the process of bringing diverse people together to collaborate. DA studies have a strong emphasis on how tools can be used to re-engage with findings in a manner in which differences and similarities can be shared, contrasted and communicated.

DA: PROVIDING A FRAMEWORK FOR DESIGNING STAKEHOLDER ENGAGEMENT

DA has been my prime inspiration for thinking about engagement with UserTEC project partners. Of central importance for the research conducted here is DA’s ideas on and practices regarding:

- building connections between the past and present in order to imagine a possible future
- making implicit understandings explicit in order to open up the taken-for-granted, inspired by the practices of ethnography

- actively working with institutionalisation of insights and how they are made tangible through engaging processes inspired by practices of Design.

What DA provides is an explicit attention to differences in understanding and an active attention to how to re-engage with these differences, with a view to opening up lines of inquiry. Specifically, the methodological underpinnings of DA have guided the work of how to bring back research findings of WP1 on opposition in interest and perceptions of the problem space of UserTEC in order to re-engage with these findings in WP2 through the 3P tool. In my research, I have primarily been inspired by two anthologies: *Design anthropology: Theory and practice*, edited by Gunn, Otto and Smith (2013), and *Design and anthropology*, edited by Gunn and Donovan (2012).

However, before I move on to describe how DA has inspired my thesis work, I briefly position DA in relation to Participatory Design (PD). As a research field, PD has grown out of Interaction Design, based on designers' desire to take end-users seriously as partners in the development process, whereas DA has grown out of a branch of Anthropology becoming interested in the development of – mostly digital – artefacts and new ways of working. There is a blurred overlap between PD and DA with regard to what is instrumental to what: Do anthropological studies help the design process, or do Design – eventually co-design – and artefacts provide a way of gaining anthropological insights?

When it comes to research methods, DA is an emerging field, combining research practices, concepts and methods from the broader fields of both Design and Anthropology: Design is concerned with *what should become*, while Anthropology is concerned with re-interpretation of *what is*. Through a combination of elements from Design and Anthropology, DA seeks to combine the becoming of something and the re-interpretation of the past and the present; 'Against design's concern with creation, innovation, and "future-making" (Björgvinsson, Ehn, and Hillgren 2010), Anthropology systematically investigates the past to understand the present, including its modes of anticipating the future' (Gunn, Otto & Smith, 2013, p. 4).

How the study draws from practices of Anthropology in DA

Drawing from practices of Anthropology means focusing on descriptions, observations and interpretations of *what is*. These descriptions are often conducted to make implicit understandings explicit by drawing contrasts and opening up new insights that were previously overlooked or obscure (Gunn, Otto & Smith, 2013, p. xiv). 'The role of the anthropologist within Design Anthropology practices involving ethnographic observations is to reveal differences and crossovers in order to allow people to have a more sophisticated way of knowing what they do, and to make many different understandings present' (Leach, 2010, in Gunn and Donovan 2012, p. 7). In my research, I have found that the difference in thinking between the engineering 'solution orientation' and the anthropological 'insight orientation' lies in their operation, in many ways, both open and subtle.

In my development work, when I have chosen to build on the insight orientation, it is because, in analysing the workshop data, I have found that paying attention to differences, both the implicit and those explicitly stated, is what allows many different understandings to be voiced alongside each other. In this way, room is made not only for re-interpretation but also for new narratives to emerge. For example, in UserTEC, terms like ‘anticipation’ or ‘emerging’ are not used and prediction about the future is dealt with through statistics or calculations. This may be because UserTEC operates in a solution-oriented discourse. To ‘anticipate’, on the contrary, is to look at the past and present values, interests and knowledge as the basis for anticipation of a future. The goal is then to look for direction implicit in means, based on what we expect, wish for, are interested in, need, want, aspire, believe, etc. This line of thinking is supported by the argument of Bateson (1972) (elaborated on in Chapter 2).

The different thinking modes – solution oriented or insight oriented – are also embedded in tools for thinking used. For instance calculations and statistics of current practices are part of the solution-oriented approach, or ways of listening to people’s beliefs, perspectives, desires, hopes, dreams, and so on, are part of the insight-oriented approach.

This difference has an implication for formulation of purpose, and in my case for explorative project meetings, because of the difference between defining solutions and defining a direction in which to seek solutions. Gunn, Otto and Smith (2013) emphasise the challenges addressed by the methodological underpinnings of DA: ‘it is a great challenge for design anthropology to extend the temporal horizon both forward and backward, to anchor images of the future in reliable constructions of the past, thus avoiding the risk of ‘defuturing’ that is inherent in Design (Fry 2011) and of generalising and essentialising modern values of innovation and change (Suchman 2011)’ (Gunn, Otto & Smith, 2013, p. 4).

Describing emergent issues

Methods, theories and concepts from the field of Design have contributed insights to my development work, especially with respect to institutionalisation of insights and how they can be made tangible. DA focuses on the socio-material orientation of and experimentation with materials, which is also naturally inherent in the practices of Design, but in DA, material artefacts/tools are used instrumentally in relation to research, used to engage people in collaborative processes of exploration and data gathering, as well as to guide a research process, whereas in Design, where the supposed outcome is a product or a service, for example, prototypes are directly instrumental to the development of this outcome.

‘Design anthropology not only remains in the realm of critical discourse but can also provide constructive critique aiming towards rethinking what design and innovation can be. Designing in this way offers a specific kind of anthropology – a research-based practice with the critical

– and becomes a form of mediation, but neither attaches to anthropology or design but something different is constituted during the transitioning and positioning of peoples. Engaging with Design Anthropology practices in this way can be transformative and is based upon a critical positioning that aims as discussed earlier, to recast assumptions and reframe relations between using and producing, designing and using, peoples and things.’ (Gunn & Donovan, 2012, p. 12)

The ‘constructive critique’ addressed in the quote has to do with DA’s attempt to find material ways to institutionalise findings and bring these back to research partners.

From the DA insight-oriented approach, I bring the following to my development work:

- the idea of material tools as a medium of engagement to assist a group of people to negotiate, dwell, reflect, trigger, etc., before giving an answer
- the notion of tools as ‘things-to-think-and-do-things-with’ in DA, introduced as a way to provide a reflective aspect on possibilities within collaborative workshop settings, to evoke and stage thoughts (Gunn & Løgstrup, 2014; Gunn, Otto & Smith 2013; Kilbourn, 2013);
- the view that ‘materials to think with are not only mnemonic devices because these materials are making social relations possible’ (Nufus & Anderson 2010, in Gunn & Donovan, 2012, p.7) and as such they often are termed mediating artefacts, mediating objects, epistemic objects or boundary objects.

This last function of materials as mediators is so crucial to my development work that I devoted a section to the concept ‘mediating artefact’ in Chapter 3. There are many ways in which an artefact can mediate the relationship between an object and a subject and provide space for interpretative flexibility and boundary-crossing activities. A key quality of a mediating artefact is the way it becomes coded. It becomes coded through interpretation. Coding to interpretation depends, of course, on the way the artefact designers explicitly coded it in the first place. Here I will not summarise entire theories of semiotics. For my purpose, I work with coding as always an interaction between the encoded and the decoded on a gradual scale from explicitly undercodified to explicitly coded. One could argue that the more undercodified the materials are (e.g. play dough, symbolic representations, pictures, wooden pieces, plastic, toys, etc.), the more they rely on a metaphorical representation of sense making, and the more possible viewpoints and interpretations they invite. Since undercodified materials do not by themselves provide any meaning, they have to be given meaning. By contrast, the more tools are oriented at as things as pre-designed ways of supporting the verbal and gestural interaction of participants in the form of a more ‘game-oriented’ setup, using rules and regulations, the more it might be possible to control or guide specific ways of involving people. When designing a communication tool as a means to open lines of

inquiry, it is important to consider how restrictedly or openly people should be able to relate to a specific topic, question or dilemma. The 3P tool developed as part of this thesis is used to guide a rather topic-specific dialogue, and to guide or ‘force’ attention to opposing professional values, assumptions and interests; thus, the tool aligns with the idea of a highly codified tool, resembling, for instance, those of design games (Brandt, 2006; Brandt & Messeter, 2004; Brandt, Messeter & Binder, 2008). The aim of involving people through a design game is to support collaborative work practices or user-centred practices as a way to organise participation in PD projects to generate insights into the beliefs, desires and dreams of the participants towards the shaping of future artefacts. Here, the idea of the 3P tool is once again highlighted, as a specific attempt to ‘re-engage with current findings’ of a discourse community to support communication about differences in perception – another goal, but with the same material frame such as a Design Game.

Undercodified artefacts and materials are often used as means of assessing tacit knowledge or tacit knowing (Nonaka, 1995) and sticky knowledge (Von Hippel, 1994), knowledge that exists in an embodied, tacit form but which has not been articulated before. What undercodified artefacts provide to this form of knowledge is a means of externalisation and articulation of embodied tacit knowledge through metaphoric representation (Gauntlett, 2007; Hahn 2009; Lakoff & Johansson, 2003). I operate with the presumption that the knowledge of importance for explicit exchange of difference is already there as discursively available utterances manifested in professional assumptions and interests that have been articulated before. Thus, 3P has been designed not to externalise and articulate tacit knowledge but to assist in an explicit exchange of assumptions and interests articulated in interplay with other people, others’ perspectives and others’ gainsaying. As such, 3P is designed as a scaffold and catalyst for thinking and arguing based in principles of highly codified representations.

How the study draws on ideals of research engagement with people in DA

Gunn and Donovan (2012) distinguish between DA as doing Anthropology *of, with* and *for* Design. The *of* and *for* are about delivering insights about the present world of a user, situation or context and aims at delivering specific insights for a designer to act directly on, when, for example, delivering a design or a concept. The research conducted here is inspired by the concept of ‘Anthropology *with*’, since, as already stated, the goal is not to achieve understanding to formulate final synthesis but to open up different lines of inquiry. Opening up these different lines of inquiry includes the possibility of doing ethnography together with people engaged in other disciplines, which makes people part of the process of interpretation, and potentially enables them to question the interpretations made along the way (Gunn & Donovan, 2012)

In the context of DA, doing Anthropology or research with people means that engagement with people must incorporate the establishment of a form of correspondence between the people involved in research investigations and the researcher/facilitator (Gatt & Ingold, 2013). This correspondence is about moving along with people; ‘To correspond with the world in short, is not to describe it, or to represent it, but to answer to it’ (ibid, p. 144). The authors give an example of how correspondence can be understood by referring to a popular example from Schultz (1951). Schultz explains correspondence or moving along as an act of engaging in making music: ‘The players in a string quartet, for example are not exchanging musical ideas – they are not inter-acting, in that sense – but are rather moving along together, listening as they play, and playing as they listen, at every moment sharing in each other’s vivid present’ (Schultz, 1951, as cited in Otto & Smith, 2013, p. 143). Building from this understanding engagement of the partners in UserTEC is about designing a tool that helps facilitate spaces that allow people to observe, listen and respond in order to be able to ‘answer’. Doing research with is an ideal. To correspond with people is a beautiful thought but it requires equal consent from both. Hence, in practice, it can be difficult to approach each other through correspondence but it does not mean that it is not a relation to aim at.

In my research, establishment of correspondence has been sought by listening to the different partners, treating their discussions with respect – listening to their most burning issues and difficulties, as unfolded in WS1, and bringing these back to WS2 in the form of engagement with 3P. Building on DA, focus has been on the people, the UserTEC partners, as actively engaged in observations, as well as in re-interpretation of these observations. Moreover, I use the concept of reengagement with voices to make knowledge, ideas and new insights (what is observed and what is experienced from data in WS1) explicit to the UserTEC partners to enable further negotiation, reframing, contestation, rejection or refinement. Thus, ‘moving along together’ is established as a correspondence between researcher and partners and between partner and partner towards joint answers (of what to take into account to move forward with the process of inquiry, in this case, about what to take into account to design better technologies in the future). This is done through joint interpretation of past and present situations (professional knowledge, interests, aspirations, hopes, ideas, interests) towards dialogue about future situations.

Doing research *with* incorporates the role of the researcher as a facilitator, who is intervening while at the same time using these interventions to collect data (Gunn, Otto & Smith, 2013). Being a participant interventionist and not only a participant observer manifests itself in the intention of intervention in practice – here addressed through reengagement with ethnographic findings from WS1. Inspired by Christiansen (2014), the participant interventionist takes on the role of ‘articulation worker’, since participants in multi-stakeholder setting; ‘hold many models of issues, which will have to be expressed in many languages, should they unfold on equal terms; hence someone must take the responsibility for making these models public to the participants, a process, which requires listening and responding to all

issues raised' (Christiansen, 2014, p. 1). These skills of listening and responding are understood in terms of the famous quotation by Kierkegaard about the art of helping:

'But all true helping begins with a humbling. The helper must first humble himself under the person he wants to help and thereby understand that to help is not to dominate, but to serve, that to help is not to be the most dominating, but the most patient, that to help is a willingness, for the time being, to put up with being in the wrong and not understanding what the other understands.' (Kierkegaard 1964, cited in Christiansen, 2013, p. 7)

As such, the act of listening and responding is also about 'being in the wrong'. This is relevant to consider when bringing back research findings from WS1. Listening to the people with humility, treating their discussions with respect and bringing central issues back through 3P require a space that can embrace rejection from the partners to understand what the partners understand by the findings.

Limitations of the research in relation to DA

Limited by the context of UserTEC, engagement with people has been conducted through exploratory project meetings. To talk distinctly about Design by Ethnography or Ethnography for Design (Gunn & Donovan 2012, pp. 6–9) would require longer ethnographic observations and data materials building on contextual, longitudinal and a more holistic approach to research. As such, the potential of doing observations in, for instance, companies, or at other sites to look for behaviour, actions and practices of the UserTEC partners is here limited to a focus on discourse in action from the initial studies, as well as WS1. Different discourses, including the ways in which things are labelled and expressed, have different implications as to how people view the world and understand possibilities for action within it. Thus, looking at language use allows for an exploration of people's perceptions of a topic of interest, including identification of modes of anticipating a future. Moreover, one of the main goals of this thesis is to examine how tools can support the creation of thirdconceptual spaces for communication in order to expand the current problem space. As such, the goal has been to create small spaces for engagement in the form of a workshop setting, as well as to study a communication tool, 3P, that has the form of a tangible artefact. All things considered, what DA provides in this research is the ethnographer's ideas of making explicit differences and designs ideas about using tangible and material tools to engage people in collaborative processes of interpretation. My intention with 3P, by way of producing a communication artefact, has thus been regarded both as a way to do ethnography – by engaging the UserTEC partners, as research participants exploring questions about knowledge and different practices – and as a way of representing prior ethnographic knowledge (collected from prior workshops) for engagement in a tangible form for the partners to 'answer' to.

FROM THEORIES OF DA TO PRACTICAL APPLICATION: THE PROCESS OF DEVELOPING 3P

In Part One, I made clear why a focus on difference in interest, assumptions and perception is a valuable and necessary starting point for collaborative inquiry in an exploratory project meeting between multiple stakeholders. The central argument for such a particular focus on explicated differences in interest is based on a critical perspective of looking for values implicit in means instead of predefined end-goals. The goal of this is to create a common ground for communication from which to generate a collective examination and expansion of a perceived problem space. Such an examination should set out from multiple discourses rather than sub-issues of one subject area and paradigm, as is the current case. The main problem of the current communication situation has been formulated as communication characterised by closure. As such, the problem has been framed as a matter of professional silo thinking, one-way communication and disagreeing, leading nowhere but to an acceptance of partners' disagreement. This suggests the need for a better mediating artefact between the partners in the form of a communication tool. The goal of such a tool is to provide space for interpretative flexibility and boundary-crossing communicative activities between the partners in order to:

- re-present dilemmas
- scaffold communication on opposing conceptualisations and blind spots to alter taken-for-granted assumptions about users and use represented by different professions' problem understanding of a collaborative project
- create awareness of differing perspectives and make them explicit
- stimulate debate on which activities and values partners should take into account in supporting users future practices of energy use

Development of 3P sets out from the three fundamental steps illustrated in Figure 5 below, inspired by practices from DA. Briefly described here, the steps are 1) juxtaposing partners' conceptualisations of project goals in order to identify dilemmas; 2) re-presenting situated dilemmas into scenarios; and 3) 'dressing' a tangible artefact in categories of dichotomy/opposition. These are the steps necessary for development of 3P but also generic steps for future application and use of 3P in the future.

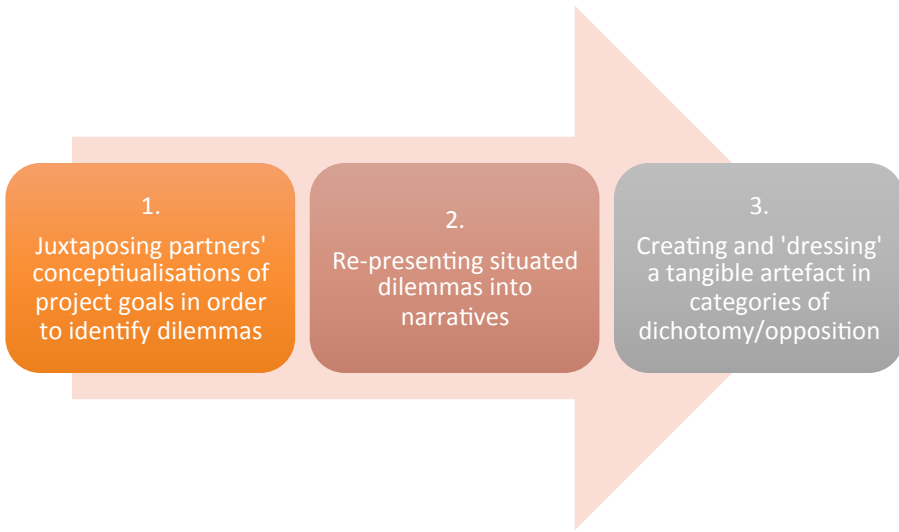


Figure 5. The process of designing the 3P prototype tool inspired by practices of DA.

The first step, ‘juxtaposing partners’ conceptualisations of project goals in order to identify dilemmas’, covers creation as well as collection of empirical material about partners’ different perceptions of the collective project goal, the different partners’ conceptualisations of possible directions towards this goal, and the challenges thereof (WS1 was set up to provide this kind of empirical material described in Chapter 2). What is searched for from the empirical material are clashes and tensions in perception, across several project partners, that are not compatible with each other. It is these opposing conceptualisations that constitute what I refer to as dilemmas.

In the second step, ‘re-presenting situated dilemmas into scenarios’, the dilemmas identified in the first step are turned into fictive scenarios inspired by partners’ utterances. These scenarios are thus explicated and articulated conceptualisations of individual partners’ interests and assumptions put into categories of dichotomies. These dichotomy-based scenarios I have named ‘versus-narratives’, which serves as a way to re-present emergent issues through opposition. ‘Versus-narratives’ is a term I will elaborate on and explicate in detail in what follows.

The third step, ‘creating and ‘dressing’ a tangible artefact in categories of dichotomy/opposition’, is concerned with the creation of a material structure that can incorporate the versus narratives and display them in a material form in categories of opposition, a material form that also provides a visual ground, a frame and a display of these categories to guide a focused discussion on one category at a time. This also incorporates an attempt to provide a material structure and material elements/rules that encourage a group of stakeholders to share, negotiate and compare thoughts and meanings. A more detailed description of each of the steps of

Figure 5 is provided below, but first I will present the Design context and collaboration of which 3P is an outcome.

Design context and collaboration

The 3P prototype is the outcome of collaboration in an ‘out-of-UserTEC’ setting. In the fall of 2013, I was a visiting researcher for three weeks at SPIRE, a former research centre at the Mads Clausen Institute, University of Southern Denmark.³

Working with researchers at SPIRE on Design materials and Design problems as a visual and material foundation for collaborative activities between multiple stakeholders also allowed me to collaborate with students in Interaction Design Engineering (IDE), grounded in discussions around DA. My affiliation with, as well as work within, the context of UserTEC contributed the case material for this collaboration. Ideas about material engagement were tried out with some first-year IDE students from SPIRE as part of their semester course ‘Collaborative Forms: Design Anthropology Inquiry’.

The process of developing a prototype with IDE students

3P was developed through several iterations of engagement between the IDE students, associate professor Wendy Gunn, Master’s student Wafa Said Mosleh and me during the semester course. The 3P prototype is an outcome of this collaboration. For the students, the collaboration was a learning process about ways in which DA practices can be used as means of bringing different stakeholders together in collaborative inquiry, as well as about ways to involve tangible tools in this endeavour. For me, it was a step taken towards method and tool development, building a prototype as a framework for ways of handling a specific sort of communication challenge in a multi-stakeholder project setting.

Table (3) displays the various steps taken towards development of the 3P prototype. These steps are based on the overall framework of DA presented in Figure 5 above. The table displays 1) ‘Focus’ (in the developmental process); 2) ‘time period’ (when the activity took place); 3) ‘Activity/purpose’ (what we did and why); and 4) ‘Participants’ (who took part in the activity).

³[http://findresearcher.sdu.dk/portal/da/publications/spire-research-summary-20082013\(6de92f9c-b324-4b91-8c22-2be539a411fe\).html](http://findresearcher.sdu.dk/portal/da/publications/spire-research-summary-20082013(6de92f9c-b324-4b91-8c22-2be539a411fe).html)

Table 3

Activities in Relation to 3P Prototype Development.

Focus	Time period 2014	Activity/purpose	Participants
Identifying dilemmas from empirical material	25th of February	Skype meeting with IDE students introducing the UserTEC case	Pernille via SKYPE, IDE students
	3rd of March	Students engaged in co-analysing the workshop transcripts	Wafa, Wendy, IDE students
Re-presenting situated dilemmas into scenarios and material form-giving of a communication tool	11th of March	Discussing central findings from analysis of transcripts Students present concept ideas based on findings from the 3rd of March Discussions on 1) how to give interactional and communicational means a visual tangible form and 2) how to make stakeholder opposition explicit and tangible Deciding on more concepts to move forward with	Pernille, Wafa, Wendy, IDE students
	17th of March	Students send a mail with reflections on their mock-up ideas for discussion on the 18th of March	Pernille, IDE students
	18th of March	Narrowing down of mock-up ideas – combining concept ideas and deciding on a final concept idea	Pernille, Wafa, IDE students
	(18th of March – 31st of March)	Creating 3P: Students work with digital sketches of the tool, laser cutter of wood and acrylic materials, painting and assembling and finalising of the physical tool	Pernille via SKYPE on 26th of March, IDE students

Test	8th of April	The 3P tool is used in a UserTEC partner meeting setting WS2	Pernille, Wafa,
Evaluation	13th of May	Feedback seminar: Presenting video recordings of 3P in use in WS2 and feedback from the UserTEC partner Discussion: What can be learnt from the process of designing the 3P tool? What can we learn about involvement?	Pernille, IDE students

In the following, descriptions are given of the various steps and activities conducted towards development of the final prototype.

Identifying dilemmas from empirical material

I established students' involvement in the design process by giving an introduction to the challenge of UserTEC WP2, as well as printouts of transcripts of audio recordings from the WS1 UserTEC partner meeting (described in Chapter 2). Briefly recollected here, WS1 was conducted the 10th of October, 2013, at the second bi-annual partner meeting at SBI Copenhagen. The workshop was named 'Challenge WP2 – to make user voices count', and participants were encouraged to talk about 1) what they would like to know or hear from/about users and 2) where user voices fit into development in the partners' different cases. Thirty-seven research or business partners from UserTEC participated in the workshop. Participants comprised WP leaders and PhDs, as well as business partners from a window manufacturing company, a heat pump supplier, a housing association, a district heating company, a producer and provider of energy consumption measuring instruments, an energy systems software development and consulting firm and a funding organisation focused on the milieu of the built environment and city planning.

In order to understand the communication that evolved between the UserTEC partners, the students engaged in co-analysis through meaning condensation of the transcripts. From full transcripts, meanings were condensed into smaller formulations, from which central points were formulated in a few words (Kvale, 1997). The outcome of this was written on Post-its put onto an A3 poster (see Figure 4 below). The students described their engagement with the empirical material in their final semester booklet, expressing surprise when reflecting upon their learning as to 'how radically different the project partners' views upon the user were; 'Our team came to realise that different companies define the user in very different ways, and often by stereotyping them instead of considering them as people with actual lives, routines, attitudes and practices' (IDE students semester report, 2014). I take this statement to be a reinforcement of my own interpretation of the communication among the UserTEC partners. The communication is filled with biased perceptions, guiding preferred endpoints for future practices of users. These oppositions are not

addressed in the current communication, and are only available for attention and identification through the meaning condensation; thus, the aim is to bring these back for display and reengagement with the partners.



Figure 4: Outcome of meaning condensation work

I compared and contrasted my findings with those of students. The central findings from this are presented in Table 4 below. The central findings, formed into three overall dilemmas, have been chosen from a larger number of possible dilemmas identified in the data. The goal has been to narrow down and identify the most general, significant and transversal dilemmas from the data from all partners, and not only dilemmas specific to one partner or subject area. The left-side column of Table 4 represents utterances from partners, taken from transcripts; the second column represents a condensation of these utterances; and the last row represents the verbalisation of preliminary dilemmas.

Table 4

The Process of Turning Utterances into Dilemmas for Reengagement

Utterances from UserTEC partners	Meaning condensatio n	Preliminar y dilemma
<p>‘When people set the same thermostat for 24 degrees, why doesn’t, after one and a half hour the thermostat slowly drop back to 16. Then they would have to go in again and say – ‘Oh, it is too cold now’. In the meantime, you have saved 50 percent of the energy. Treating every user as a laboratory animal.’</p> <p>‘People seem to be more adaptable than technology is.’</p> <p>‘Technology is also changing people’s behaviour or way of doing things.’</p>	Users adapting to technology	1. Where to place flexibility?
<p>‘If you intend, for instance, to lower the temperature to, for instance, 20 degrees, you cannot do it without some kind of interaction with people and involving them.’</p> <p>‘I think that every room according to their respective activity can be optimized differently...Like this question for example [what users enjoy the most when being at home: Authors addition] can be applied for every room differently. So, and then we know what they are doing in the bedroom for the whole week, and when they are there, and in the living room, and what kind of stuff they do in every room. From there we can build on some kind of automotive system.’</p>	Technology adapting to users	
<p>‘Doesn’t one really just want it to work without having to do anything?’</p> <p>‘The users do not do anything.... Why don’t the users do anything?’</p> <p>‘I would like to automate energy consumption. I would like that people don’t have to think about energy consumption, that the systems just work for them.’</p>	Users are passive receivers	2. How to approach appropriatio n?
<p>‘Don’t believe in automation.’</p> <p>‘We don’t change behaviour; we as energy specialists don’t</p>	Users are active practitioners	

<p>change behaviour. There are so many other things going on in my house ... I'm much more interested in how people would like to behave. Not to constrain them but to find the right technology to allow them to live the life they want to live.'</p> <p>'The reason my son is using other rooms more has nothing to do with heating the room or not heating the room. It is simply that he wants to use it. They have iPads. They can go where they want ... energy isn't a driving force in a household.'</p> <p>'So in a way I am more interested now in understanding why people behave as they do, how they would like to behave. Not to constrain them but to find the right technology to allow them to live the life they want to live.'</p>	and caring home-keepers	
<p>'There are lots of opportunities, but people are not aware of this.'</p> <p>'You need feedback to change behaviour.'</p> <p>'We must provoke people to learn by setting some regulations that require action by users in order to change the temperature.'</p> <p>'You should learn, for instance, that your habit of tumble drying clothes is actually consuming 20 percent of your house's electricity consumption.'</p> <p>'If we had asked the user, the car would never have been invented.'</p>	Educate users	3. Where to place decision making?
<p>'What do users enjoy most when being at home? This could be the driver of energy change because it will match what is important to the user.'</p> <p>'Are spaces/homes a constraining or constructing factor in energy savings?'</p> <p>'Yes, but I mean, are they going to be asked about their ideas on how to save energy? Are they going to be asked what is the majority view of people? I do not know if they have any idea about that.'</p> <p>'If we are going to understand why people behave as they do, we need to come up with completely new explanations instead of the current explanations we often use.'</p>	Learn from users	

Through the process of meaning condensation, three overall opposing concerns were identified and turned into dilemmas about different perceptions of how users and use stood in opposition to each other when the partners talked about what insights they needed about users' perspectives to improve their efforts regarding the development of practices and technologies concerning energy consumption. These overall dilemmas, representing opposing understandings and interests, were framed into the three following categories and dilemmas of importance to bring back for further discussion among the UserTEC partners. These categories have been termed 'versus categories' in the 3P tool, a term explained further on p. 72-74.

- a) 'Where to place flexibility? - Users as flexible vs. technology as flexible'. Presenting opposing positions on whether future users should adapt to technical standards or whether technology should be designed to adapt to users' everyday activities.
- b) 'How to approach appropriation? - Users as passive consumers vs. users as active co-creators'. Presenting different views on how technology is appropriated within everyday practices.
- c) 'Where to place decision making? - Educate users vs. learn from users'. Presenting different positions on whether to educate users about how to involve technology within their everyday practices or to learn from users and user practices how technologies may be appropriately located within ongoing everyday practices.

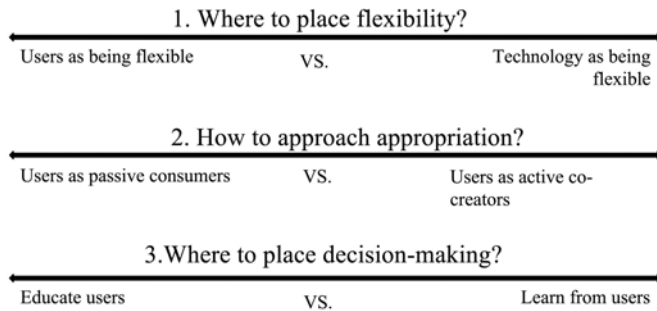


Figure 5. The three overall versus categories and their poles

The identification of the three overall dilemmas, based on an analysis of utterances from transcripts, have been the main inspiration for setting the main framework for what to bring back for discussion concerning emergent issues between the UserTEC partners.

Designing material reengagement with emergent issues

Inspired by DA and the notion of representing the past in the present to envision a possible future, the biggest challenge was how to re-present the stakeholders for existing assumptions/dilemmas as a springboard for discussions about the current and future users of energy-efficient technologies and the users' role and in operating future systems. As such, the challenge was to give these aims of interactional and communicational means a visual tangible form. Students sought inspiration from various places: from existing games from childhood, from materials present in the Design studio at the SPIRE research centre, from elements in everyday life, or from ideas emerging from 'pure' imagination, etc. This led to several initial concept ideas. In a joint collaboration between researchers and students, the initial ideas were evaluated on the basis of the intended engagement of the partners as already described. Central concepts were then selected, reframed and integrated into three different mock-up models. The mock-ups are presented in Figure 6 and briefly described thereafter.



Figure 6. The three mock-up models. From left to right: Model 1, Model 2 and Model 3.

The basic concept of Model 1 is to let the UserTEC partners build their own future user. The main materials used were cards in different colours and a human figure to 'impersonate' the term of 'users' and keep the participants on the topic laid out for discussion. The mock-up also suggests the use of cards/scenarios or situations to show statements from the transcripts as a way to involve in discussions (of the past and present) the understandings of users and their role in operating future energy-efficient systems. These statements are placed on the blue and green cards on the site of the game board. (IDE students semester report, 2014)

Model 2 was made with inspiration from some of the main categories and dilemmas identified from analysis of the transcripts. The idea was to create a reflective dialogue without referring in written words to the categories. This is done through different symbolic representations shown on a wheel for discussion. The main idea was to make the partners reflect upon the symbolic representation of, for example, money or technology, and try to relate this to their present/past understandings of the user in order to envision a possible future user. (IDE students semester report, 2014)

Model 3 shows a game consisting of a game board on which the categories identified through analysis of the transcripts constitute the basis. The model consists of different fields in various colours, each representing a category. In addition, a box with written statements and pictures from transcripts are provided, as well as a magnetic board on which the partners can place their responses to the statements. (IDE students semester report, 2014)

Based on the central ideas and concepts of the three overall models, I drew the first sketch of the final prototype (see Figure 7 and 8). The final prototype design and the argumentation for its form and function are given in detail below.

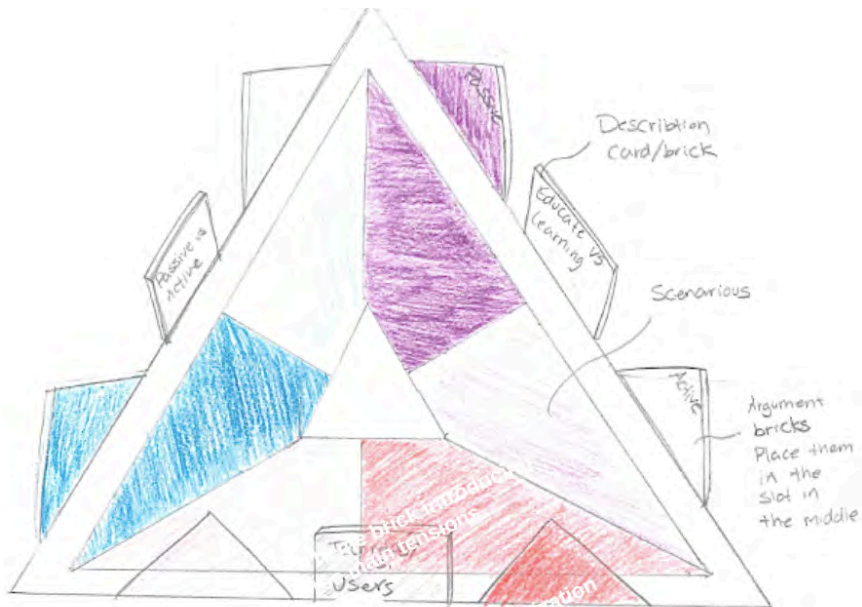


Figure 7. The first sketch of what became the 3P tool prototype



Figure 8. The final 3P prototype

PRESENTING THE 3P TOOL

The 3P tool is here introduced, providing descriptions of its material structures, its content and its pragmatic procedure of use. The material structures of the 3P tool embody/characterise the tool's material and tangible elements as well as the composition of those elements, thus representing a material structure for engagement. The tool's content covers context-specific narratives and text, as well as empirical categories/dilemmas, representing a contextual framing for communication. The pragmatic procedure of the tool's use refers to the process, procedures and rules of the tool in use. One by one, the features of the tool are described hereafter. The tool's different visual, tangible and narrative essentials are:

- Three conflicting dilemmas for discussion. I call them 'versus categories'.
- Eighteen triggers for conversation. I call them 'versus-narratives'.
- A physical materialisation of the syntactic structure of the tool, made to frame and guide interactional conversation. This is referred to as the 'tool base'.
- A physical materialisation of syntactic space for mapping and prioritising. I call this the '3D tower'.
- Six physical materialisations of triangles for writing down and retaining the main arguments of a group. I call these 'priority bricks'.
- A written introduction, introducing a topic laid out for discussion. I call this 'Introduction sheet'.

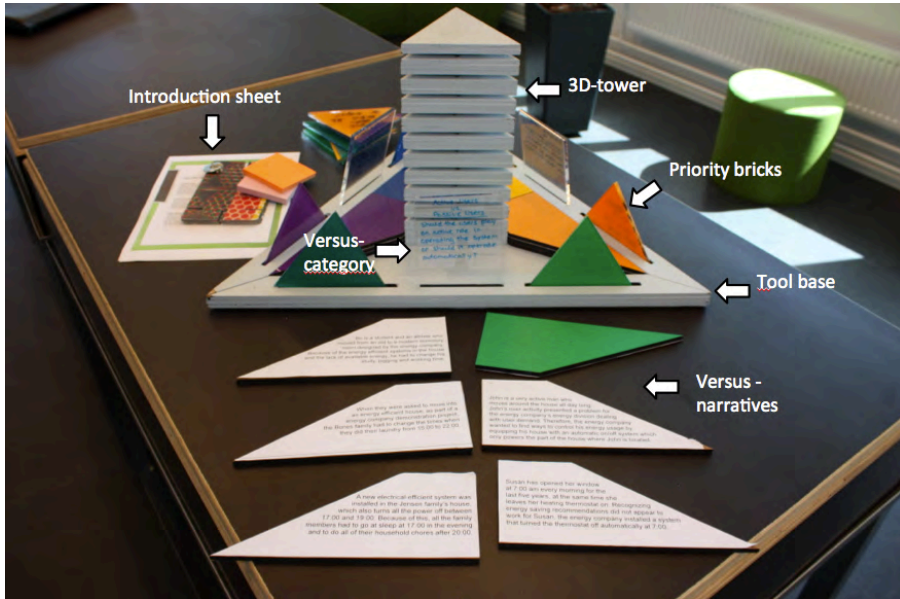


Figure 9. Essentials of the 3P tool.

This material and the rules for operating it form the basis of the 3P tool. When 3P is to be used, it has to be dressed for the occasion: dilemmas must be formulated, which requires a facilitator who has – prior to the dressing – provided material from which to draw the dilemmas and formulate the versus-narratives. In this way, 3P is a package of pre-codified materials (triangular pieces, the facilitator providing material for the dilemmas, and the narratives) and facilitation. As such, the final prototype and its elements provide a framework for engagement and communication. What is central for the materials and structure of 3P in combination is that they seek to take into account and represent a specific view/approach towards communication, seeking to facilitate a dialectical communication through an explicit attention to difference in interest, perception and assumptions put in opposition to each other. The aim of this is to assist in a collective explicit exploration of different perceptions of a current problem space as described in Chapter 3.

RE-PRESENTING SITUATED DILEMMAS INTO VERSUS-CATEGORIES IN 3P: DRESSING A TANGIBLE ARTEFACT IN CATEGORIES OF DICHOTOMY/OPPOSITION

Versus categories: Focus points for discussion

The tool is built from three focus points for discussion. I call them ‘versus categories’. Conceptually, the tool is meant to generate opposites in the minds of its users – the versus categories – partly because the intention is to invite participants to

take in polarities, partly because the texts themselves present opposing viewpoints. The versus categories are materialised in 3P on a written introduction on an A4 sheet and are displayed on three transparent ‘theme-bricks’ in the tool (see Figure 9 above). For an example of a written introduction, see Appendix G. The versus framing of the topics laid out for discussion present a way of placing tensions on the agenda and encouraging discussions about arguments and counterarguments. The idea is to make explicit and emphasise conflicting concerns for further conversation, elaboration, rejection and exchange.

Versus-narratives: Triggering communication

The tool is also built on 18 narratives, which I term ‘versus-narratives’, printed on paper glued to an acrylic wooden piece (see Figure 9). These narratives present a way of attending to existing frictions between differing disciplinary and professional positioning and knowledge. The versus-narratives are sub-categories of the overall versus categories identified from empirical material, as explained in this chapter. A visual representation of how the versus categories are linked with the versus-narratives is pictured in Figure 10 hereafter.

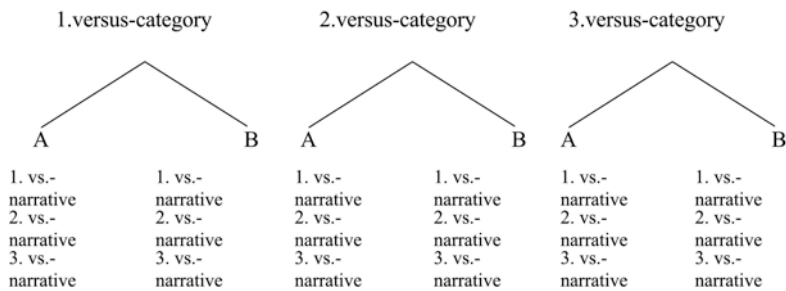


Figure 10. A graphic overview of the relationship between the three versus categories and 18 versus-narratives.

As shown, the tool comprises three overall versus categories and 18 versus-narratives. Depicted in the figure are six versus-narratives under each overall versus category. Labels ‘A’ and ‘B’ represent two distinct perspectives – two poles – on the overall versus category. These poles have been exemplified through three narratives representing perspective ‘A’ and three narratives representing perspective ‘B’.

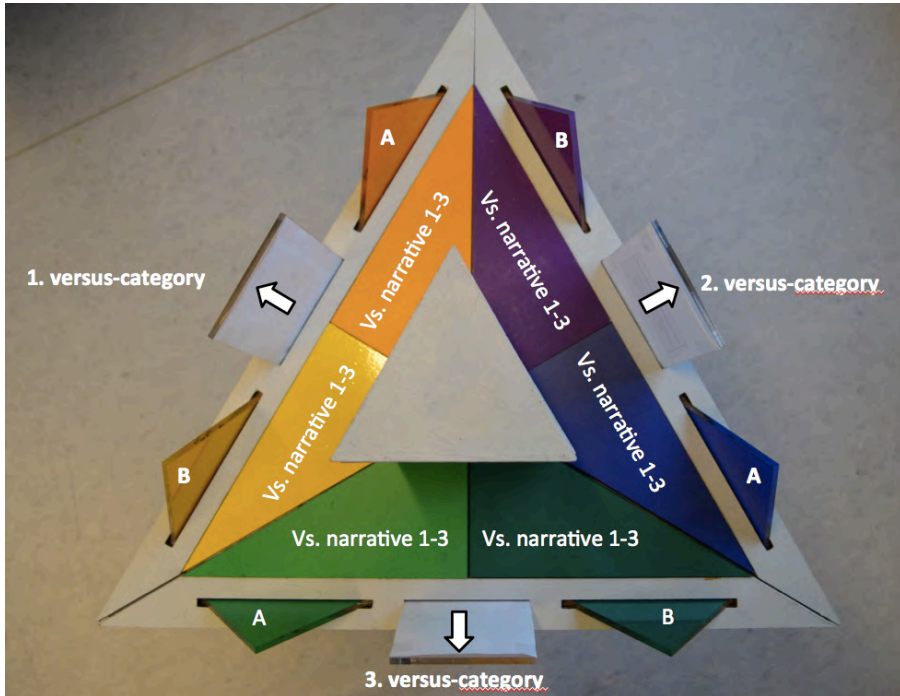


Figure 11. The 3P tool from above, depicting where the versus categories and versus-narratives are placed in the tool.

The versus-narratives included in the 3P tool are made with a touch of provocation, exaggerating statements taken from the partners' own formulations from empirical data displayed in Table 4, p. 66. Table 5 below shows how utterances from Table 4 have been formed into versus-narratives with reference to the three overall versus categories that were identified in the development process: 1) Where to place flexibility; 2) How to approach appropriation; and 3) Where to place decision making. The colours in the scheme display how the specific versus-narrative is coupled to the colours in the tool.

Table 5

The Result of Utterances from Table 4 Formed into Versus-narratives

Where to place flexibility?	
Technology adapting to the users' everyday activities vs. Users adapting to technical standards	
Technology adapting to the user	User adapting to technology
A) John is a very active man who moves	B) A new electrical-efficient system was

<p>around the house all day long. John's overactivity presented a problem for the energy company's energy division dealing with user demand. Therefore, the energy company wanted to find ways to control John's energy usage by equipping his house with an automatic on/off system that only powers the part of the house where John is located.</p> <p>A) Susan has opened her window at 7:00 am every morning for the last five years, but at the same time she leaves her heating thermostat on. Recognising energy-saving recommendations did not appear to work for Susan, so the energy company installed a system that turned the thermostat off automatically at 7:00.</p> <p>A) Jill and James travel a lot with their work and for pleasure; so much so that they are rarely at home. After they were contacted by an energy company representative, Jill and James had a new electrical SMART grid installed in their home that encouraged the couple to remember to turn off all electrical devices before leaving by showing them the amount of money they could lose if they didn't do it.</p>	<p>installed in the Jensen family's house that also turns all the power off between 17:00 and 19:00. Because of this, all the family members had to go to sleep at 17:00 in the evening and to do all of their household chores after 20:00.</p> <p>B) When they were asked to move into an energy-efficient house, as part of an energy company demonstration project, the Bones family had to change the time they did their laundry from 15:00 to 22:00.</p> <p>B) Bo is a student and an athlete who moved from an old to a modern dormitory room designed by the energy company. Because of the energy-efficient systems in the house and the lack of available energy, he had to change his study, jogging and working times.</p>
<p style="text-align: center;">How to approach appropriation?</p> <p style="text-align: center;">Users as passive receivers of technology vs. Users as active and caring 'home-keepers'</p>	
<p style="text-align: center;">Users as passive receivers of technology</p>	<p style="text-align: center;">Users as active and caring 'home-keepers'</p>
<p>A) Mr. Miller does not care about the energy consumption in his apartment because he knows everyone in the buildings pays the same.</p> <p>A) Mrs. Watson lives in a beach house where she cannot open the windows when she wants fresh air because the windows are</p>	<p>B) Mathew lives in a house and has limited economic resources to pay for his energy bills. Yesterday, he used 70% of his weekly budget in one day, and it was necessary to wait until the next day to use electrical appliances in his house. Despite this, he has worked out alternative ways of keeping his house warm without the need to use</p>

<p>operated automatically.</p> <p>A) Claus went on a weeklong holiday and when he returned home late in the evening, the house was too cold and he had to wait until the heating system heated up the living space so he could sleep comfortably.</p>	<p>electricity.</p> <p>B) Charlotte gets an electricity bill each month with an analysis of her energy consumption during daytime and nighttime. She now knows that the energy at night costs less money, and as a result she washes her clothes during the night despite waking her neighbours.</p> <p>B) Thomas turns up the thermostat when he feels that his room is getting too cold. When the room gets too hot, he will open a window instead of turning down the thermostat.</p>
<p style="text-align: center;">Where to place decision making?</p> <p style="text-align: center;">Educate users about future use and technological possibilities vs. Learn from users and user practices</p>	
<p style="text-align: center;">Educate users</p>	<p style="text-align: center;">Learn from users</p>
<p>A) Mrs. Jensen has to go to a seminar once every month to stay updated on how her smart system works.</p> <p>A) The neighbourhood in Nørregade has been educated about how to save energy in private households in order to sustain the environment. Their entire energy supply will shut down if they do not save 10% of their previous year's consumption.</p> <p>A) In 2020, the Danish government launched a new energy-saving campaign. In each household, one person became an educated energy manager. Tom, married and a father of three children, was given the power to control and track his family's energy consumption.</p>	<p>B) A number of companies have decided to hire anthropologists to live among energy users for 10 years. They hope to learn about the users' everyday practices and how users have adapted to smart technologies in their homes. This is the next evolutionary step after Professor Thomas Rasmussen visited an African tribe in 2010.</p> <p>B) Once a week, company stakeholders have to attend a course, arranged by a group of users. The presented themes are, for example, 'How do I like my interface?' or 'An introduction to a user's home'.</p> <p>B) A group of 20 users has been invited to the lab to teach about the new energy system that they are about to create. The company stakeholders are observing their activities.</p>

The overall versus categories and versus-narratives displayed in Table 5 above was distributed in the 3P tool, as shown in Figure 12 hereafter.

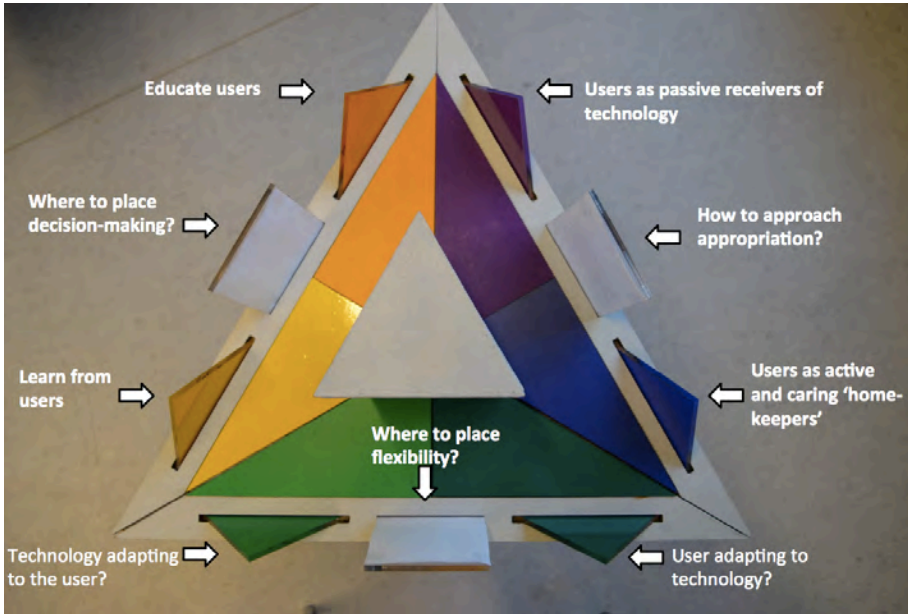


Figure 12. The versus categories' and versus-narratives' places in the tool.

By making existing stakeholders' interests and perspectives explicit and tangible in the form of 'provocative' versus-narratives, the aim is to challenge the stakeholders' current knowledge and assumptions, while at the same time allowing them to think critically about possible futures (future practices, future needs and the consequences thereof); 'As participants explore their own beliefs or experiences during a dialogical research encounter, opportunities for conversational detours arise that stimulate reflection on past successes and failures' (Basette, 2004, p. 26). The use of narratives is well known in participatory activities, where they are often used as triggers for conversation, analysis or feedback (Salvador and Howells, 1998; Salvador & Sato, 1998, 1999, as cited in Muller, 2003; Tufte & Mefalopulos, 2009, as cited in Hinthorne & Schneider, 2012). In 3P, the versus-narratives have been developed to present knowledge about perceived dilemmas and opposing positions about a topic between multiple stakeholders as a way of mirroring existing assumptions and to trigger conversation. This is in line with Bødker and Christiansen (1994), who propose using scenarios to 'let different perspectives talk to each other through joint activities, and provide opportunities for the participants to switch between multiple views, emphasising even conflicting concerns' (Bødker & Christiansen, 1994, p. 2). Scenarios are well known in the HCCI literature. In particular, scenarios are used within the usability work or software and requirement engineering practices to help the designer envision specific use situations and persons as the basis for an overall design (Bødker, 2000). Scenarios can either be

crafted on the basis of actual user studies, and as such present actual user needs, practices, concerns, aspirations, etc., or they can be based in fictive ideas. In 3P, fictive scenarios are created on the basis of actual utterances from past communication between a group of stakeholders, which are transformed into scenarios (re)presenting different views on as well as perceptions about the user, a use situation or users.

MATERIAL STRUCTURES

Tool base: Framing and guiding interactional communication

The base of the tool is formed as a wooden triangle indicating a visible distinction between the three main versus categories. The tool base consists of a frame within which the three versus categories and the versus-narratives are placed. A 3D tower is placed in the middle of the base. The visible distinction, using different colours and a triangle form, has been made in order to keep/guide a focused discussion among participants on one versus category at a time, and to guide communicational interaction.

The 3D tower: Mapping and prioritising

The 3D tower is placed in the middle of the tool base. The 3D tower is made out of a stack of wooden triangles with empty spaces between them (Figure 9 above). The tower is used to invite a group of stakeholders to discuss and negotiate possible directions for the future while also allowing opposition and disagreement. The tower assists a group of stakeholders in becoming aware of where a joint understanding and direction is possible or not. In parallel, the physical tower helps document these processes of negotiation for later analysis by a researcher.

Inherent in the 3D tower shape is a spatial orientation towards prioritising by ranking positions as high or low. Positions are statements of writings made on the triangle bricks (see Figure 9 above) about a group's take on the overall versus category. These statements are then placed either high or low in the tower, depending on their importance for future practices or research. The higher in the tower the more important. If statements are equally important, participants are asked to place them at the same level. When the process of negotiation is materialised in the form of a tower, people are forced to take a stand and to place the specific arguments in relation to other arguments, mapping out relations between the different versus categories. The notion of mapping activities is well known within Design (Brandt, 2006; Roos, 2006; Sanders & Strappers, 2013) and the strengths of this approach can be described thus:

‘Maps can help people to orient themselves or ‘think strategically’, by offering a language by which complex options can be simply understood, communicated, bounced around and debated, enabling a group to focus

in order to learn about themselves and what they want to achieve, and locate themselves in relation to the environment. They can also foster ‘acting’ strategically’ by getting people beyond indecision so as to begin the process of mapping and talking a course.’ (Cummings & Wilson, 2003, in Roos, 2006; p. 79)

Using prioritising and mapping techniques, in the form of dilemmas and discussions put in relation to each other in a 3D tower, the idea is to stage a debate about ideas, understandings, positions, perspectives and priorities of importance for a specific subject. Moreover, the triangle bricks placed in the 3D tower are meant to create a colour code that, in the end, can be compared across more groups within a partner-meeting workshop situation, since each of the coloured triangles is related to a specific versus category. Thus, a visual base for comparison and discussion between the groups is provided.



Figure 13. The 3D tower. The picture exemplifies how the ‘priority bricks’ with stakeholder statements are inserted in the tower and prioritised as either low or high according to their importance to the specific ‘versus categories’.

PRAGMATICS OF 3P: RULES AND PROCEDURE FOR USE

Chapter 5 includes a description of how 3P has been used among the UserTEC stakeholders in WS2. Here I present a general description of how 3P might be used and introduced in an exploratory partner-meeting setting (Figure 14 below).

Introduction:

1. The overall theme and goal of the exploratory stakeholder project meeting is introduced by the facilitator/researcher

(e.g. in UserTEC, this was framed as follows: ‘Could you agree on which perspectives and approaches to take into account in future practices the future when designing more energy efficient solutions for households?’)

The tool in use:

13.45–14.30 Working with 3P

Work with one of the three ‘versus categories’ at a time, and go through the following steps:

1. **Read aloud** the six ‘versus-narratives’ under each of the three overall ‘versus categories’.
2. **Discuss and share** individual understandings, standpoints and perceived implications in relation to the specific ‘versus category’.
3. **Synthesise and write down** on the ‘priority brick’ the main points of your discussion, as well as specific positions and standpoints taken in relation to the specific category.
4. **Map and prioritise** your ‘priority brick’ in the ‘3D tower’ according to your ranking of value. The goal is to rank your arguments about what views, dilemmas and potentials to take into account when discussing XX. The most important should be placed at the top, the less important further down. If equally important, place at the same level.
5. **Prepare for presentation** (spend at least 5 min. to get ready for a plenum presentation, in which you present your final mapping in your towers)

14.30–14.40 Break.

14.40–15.05 Plenum presentation (present your priorities in your towers).

15.05–15.30 Plenum evaluation of the 3P tool and workshop experience.

Figure 14. Example of a facilitation guideline for use of 3P in an exploratory partner meeting

Based in a pragmatic/pragmatist understanding of developmental work, the application of 3P is here introduced as a proposition for instructive rules, since in practice the use, application and appropriation of its use will depend on the specific use situation and users. Despite the practical understanding that the tool will be used differently in different contexts, some basic steps of use are proposed. The material

structure of the tool is rather strongly coded, presenting a firm structure and base, while the content is based on context-specific explorations and specifications that are themselves based on empirical material formed into versus categories and narratives; as such, they should always be context specific.

As part of the 3P tool use, an 'introduction sheet' (Appendix G) must be handed out to the participants, setting the main framework for discussions, introducing the three overall 'versus categories'/dilemmas for reengagement.



Figure 15. 3P in use in an exploratory partner meeting, where participants are discussing one of the overall 'versus categories'. In the front, six versus-narratives are laid out on the table, together with the 'introduction sheet'.

CHAPTER 5. EMPIRICAL WORK: ANALYSING 3P TOOL-MEDIATED INTERACTION

‘At the beginning of my journey, I was naive. I didn’t yet know that the answers vanish as one continues to travel, that there is only further complexity, that there are still more interrelationships and more questions.’ (Kaaплан, 1996, p. 7, in Strauss & Corbin, 1998, p. 55)

Kaaплан reflects on the complexities and insights gained through a journey. The same complexity is often experienced when immersing oneself in data and trying to master the art of exploratory grounded analysis. It highlights the need, as a researcher, to clearly decide for the journey 1) where and how to immerse into the data, 2) how to order the data and new insights and 3) where the analysis is closed off and why. These questions are addressed in the first part of the chapter, introducing the analytic focus, the analytic approach and the units of data. In the second part of this chapter, the actual analysis is unfolded and the central findings are identified and described.

The empirically grounded analysis is here conducted in order to answer the second overall research question of this research, which is: How can tool mediation lead communicating parties to move towards a third space, a common ground, for participants’ mutual exploration of a problem setting?

In the previous chapters, the 3P prototype development was addressed through pragmatic and theoretical considerations. When spending a lot of time and effort in developing a specific tool, it is easy to fall in love with one’s own ideas and intentions. In order to try to put away – to the extent possible – these pre-defined scopes and intentions of tool use, a grounded exploratory analysis is here unfolded, grounded in what emerges from the data. The intent is to, as openly as possible, try to figure out how the 3P tool is actually used.

First, I introduce the framework on which I ground my analysis. The main problem has been framed as silo thinking, resulting in communication and disagreement that leads nowhere but to acknowledgement of participants’ disagreement. This has motivated my design of a communication tool with the goal of making the participants step out of their comfort zone in their respective silos in order to:

- **encourage** reengagement with current ‘troubles’ re-presented by situated dilemmas into versus-narratives
- **share** differentiated professional positions (differences in interest, assumptions and perceptions) based in a common ground of reference

- **explore** key agreements and disagreements of a subject matter/problem space towards a collective exploration of alternatives (a collectively expanded and elaborated problem understanding)
- **overcome** communicational closure

Specifically, the 3P tool's material structures, its content and its pragmatic procedure of use have been designed to:

- **Make tensions explicit** among the communicating actors
- **Provoke and trigger** – to de-stabilise the taken-for-granted assumptions, values and interests about a topic
- **Scaffold awareness** of differing perspectives
- **Stimulate Debate** – on activities and values stakeholders must support in the future
- **Create a Common ground** – for negotiation and communication
- **Juxtapose perspectives** – facilitate the mixing of different perspectives using visual grounds of versus categories

My conclusion from analysing the discourses of the participants' discussions in the UserTEC project meetings is that the participants fail to reach one another, and that one possible reason for this may be the different stakeholder positions: the companies seem driven by an economic agenda – to sell more products – which aligns with their current business case; the suppliers seem to have an agency agenda – to be able to control, regulate and access data about users and use; the engineers seem driven by a techno-optimistic agenda – to make users understand and align with the technologically available solutions; while the sociologists are interested in uncovering practices and behaviour in order to make better descriptions of how to understand users. However, such diversity is probably an inescapable condition in multi-stakeholder interaction, and hence a challenge to be dealt with in multi-stakeholder communication in general, should multiple discourses eventually meet. My analysis reveals how hard it is in reality to arrive at a common ground for multiple discourses to meet.

CREATING A FRAMEWORK FOR ANALYSIS

The analytic framework described hereafter has the purpose of helping me identify how to look and what to look at in order to identify and understand 3P tool-mediated interactions and their implications with respect to the issues just listed above. The analytic approach is based on the different levels of data processing and data analysis described in Table 6. There is a connection, as well as a clear distinction, between the different levels of analysis. The first two levels of analysis are based on primarily descriptive approaches – describing and mapping participants' tool interactions – whereas the third level is interpretative, assessing implications for tool use.

Table 6.

Analytic levels applied to identifying and understanding tool interactions

	Analytic level	Analytic strategy	Analytic focus
Level 1	Transcription	Transforming video data into text.	<i>What do the participants touch, manipulate and refer to in their interaction with the tool?</i>
Level 2	Description, Coding and Conceptual ordering	Applying coding strategies of ‘Open coding’; ‘Line-by-line’ analysis, ‘constant comparison’ and ‘axial coding’.	<i>How do the participants specifically touch, manipulate and refer to the tool? And what are the patterns of tool manipulation?</i>

Unit of data

The unit of data selected for in-depth analysis in this chapter comprises video- and audio recordings of UserTEC partners interacting with the 3P tool in a UserTEC partner-meeting workshop. The data originate from the second partner-meeting workshop with the theme ‘Communication workshop WP2 – Towards finding ways of having a productive dialogue’. The overall goal of this workshop was twofold: 1) to bring back and discuss the central dilemmas and opposing perceptions of the users’ role in relation to the future design of energy-efficient building technologies, which had been identified by analysis from the first workshop, WS1 (see Chapter 2 and 4), and 2) to test the 3P tools’ role in this endeavour. (For a description of WS2, see Appendix G).

Seventeen participants, divided into three groups of five or six people, participated. The participants’ interactions with the 3P tool within each of these three different groups constitute the central focus of analysis. Each group’s work constitutes 50 minutes of video recordings. The raw video material has resulted in a corpus of 129 pages of transcriptions containing 1362 paragraphs of transactions. The term ‘transactions’ refers to the total of communicational shifts between the participants – marked by an □ in the transcript (see Appendices C, D and E). Each group is a mix of different professions and people in UserTEC, represented by the companies – Affaldvarme Aarhus, Grundfos, Inwido, Realdania Byg and Fjernvarme Fyn – as well as researchers from Plan Aalborg University, DTU, SBI, Cambridge University, Oxford University and Delft University. The specific combinations of participants in the three groups are listed at the top of Appendices C, D and E. The groups are referred to in the analysis as ‘Group one – the blue group’ (Appendix C), ‘Group two – the red group’ (Appendix D) or ‘Group three – the green group’ (Appendix E).



Figure 16. Example of raw video footage of participants' engagement with the 3P tool used for detailed data analysis.

The specific dataset of WS2 has been chosen for detailed analysis, out of a larger dataset of 3P in use (as presented Chapter 2). The development of 3P and the specific versus categories in it has been designed for the specific communication challenge of UserTEC, so it is interesting to judge its function in precisely this setting. It would be relevant to analyse 3P in other settings, too, obviously, for comparison of its generic and setting-specific functioning. However, focusing on a limited dataset in this thesis allows for an in-depth analysis, the aim of which is explained below.

Capturing and analysing video data of participants' 3P tool-mediated interaction

Video data allow for repeated readings of the data material, and for slowing down to grasp the complexity of participants' tool-mediated interaction and the context thereof (Jordan and Henderson, 1995; Alrø & Dirkinck-Holmfeld, 1997). In order to answer the research questions, this level of data analysis is essential to understand *how* the participants touch, manipulate and refer to the tool. This is the basis for identifying *patterns of tool manipulation* and from that to be able to judge the function of the tool and whether it actually overcomes forms of coherence-seeking behaviour and communicative closing for the benefit of exchange and exploration. Judging the tool only by the outcome or by subsequent reflections of a researcher or the people under study would not provide explanatory power for the complexities and nuances that lead to or delimit participants' exchange, juxtaposition and expansion of the current perception of central dilemmas. A better understanding of the details of an artefact used in situ is important when the aim is to contribute to

continuous development and refinement of methods and tools used in practice, since it is the details that come to matter.

When forming my analytical approach, my first inspiration was Jordan and Henderson's (1995) Interaction Analysis approach, which the authors characterise as follows:

‘An interdisciplinary method for empirical investigation of the interaction of human beings with each other and with objects in their environment. It investigates human activity such as talk, nonverbal interaction, and the use of artefacts and technologies, identifying routine practices and problems and the resources for their solution.’ (Jordan & Henderson, 1995, p. 39)

This approach is based on anthropological (participant observation) as well as ethnomethodological approaches described in, for example, Liberman & Garfinkel (2014). The aim is to access how participants describe and make visible to others their own local order and intentions. Often, ways of seeing and looking at data using an Interaction Analysis approach are concerned with looking for, for example, ‘turn taking’, ‘participation structures’, ‘trouble and repair’, ‘object manipulation’, etc. (Jordan & Henderson, 1995) Here, a specific focus is given to object manipulation, allowing for concentration on a basic premise of artefacts as either limiting or enhancing interactions in a group:

‘For Interaction Analysis, the basic premise is that artefacts and technologies set up a social field within which certain activities become very likely, others possible, and still others very improbable or impossible. One of our central interests lies in understanding what kinds of activities and interactions particular material objects engender and support and how these change.’ (Jordan & Henderson, 1995, p. 75)

I have accordingly focused on how the specific elements of 3P are manipulated in situ, how they are related to talk, the role they play in constructing arguments and exchange, how they are manipulated and used, and how they are modified (Ibid. p, 77).

Turning raw video data into transcripts

An often-used approach to video data analysis is to look for structures of events in data, make content logging and formulate preliminary hypothetical beliefs about what is happening in data, after which transcriptions are initiated at central spots (Jordan and Henderson 1995). I have found it necessary to not only transcribe central spots but also to transcribe the totality of data from all three UserTEC groups' work with 3P. This is done to exclude random picks or down strokes in the data material in order to try to avoid circular argumentation where theoretical and pragmatic ambitions are simply reproduced. In addition, my aim has been to

understand overall patterns as well as the influence of the meetings' rhythm, and how this rhythm develops, before immersing myself into analysis of central spots.

The transcription software program Transana® (Woods & Fassnacht, 2013) has been used to transform raw videodata into transcripts. Transana® provides a visual connection between video footage, audio and a transcript template in the same setup (see Figure 17 for illustration).

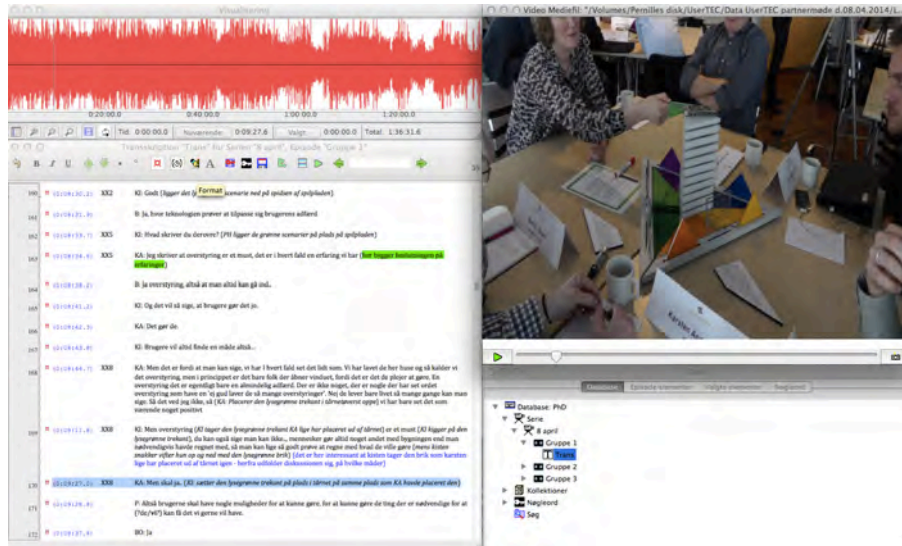


Figure 17. Screenshot of Transana® work processing video and audio footage. A transcript template is visible on the left and the raw video data on the right.

Transana® also allows for customisation of the transcript template. In developing a suitable template, I have been inspired by ‘Columnar transcript approach for verbal and nonverbal behaviour’ from Jordan and Henderson (1995, p. 102). This approach suggests arranging a transcript into three columns: 1) frame (timestamp), 2) activity and 3) talk. Figure 18 illustrates my analytical procedure of turning raw videodata into transcripts.

Times tamp	Tool-mediated TMA code	Talk (description of the specific interaction with the tool)
(0:39: 47.6)	XX17	R: (<i>Peger på de blå scenarier på spilpladen</i>). Det var denne her. Det var noget R. Skrev Flere (griner)
(0:39: 52.9)	XX7	R: Nå, det er nok fordi at det er denne her (<i>R: tager den lilla trekant ud fra tårnet og ser på den.</i>) ‘active control for those who want’ (<i>R: sætter den lilla brik tilbage</i>) og ‘passive for the rest’

Figure 18. Example of Transana® transcript template

As a way to order and represent the raw data, the three modes of Figure 18 – ‘Timestamp’, ‘Tool-mediated activity code’ and ‘Talk’ – provide a combination that makes it possible to map, backtrack and identify the relationship between a tool-mediated activity and how it is used in context, to be able to identify how the different 3P tool elements take on significance in the participants’ interactions.

The ‘Activity’ column in the transcript template proposed by Jordan and Henderson (1995) has been modified here (Figure 18) to comprise what I call ‘tool-mediated activity codes’. Mapping specific ‘tool-mediated activity codes’ rather than displaying the total of bodily and gestural ‘activities’ of the groups is inspired by Bødker’s (1996) approach of mapping a situation in order to study ‘an artefact in use’ – where she uses a columnar approach to map out what specific objects, and how specific objects are referred to or used in a situation (Bødker, 1996, p. 164), the what and how is here mapped/comprised under the column ‘tool-mediated activity code’ in the Transana® transcript template – displaying observations of actions where the participants use or refer to the tool, such as touching, moving or pointing at a versus-narrative, a priority-brick, a versus category, the introduction sheet, the tool base or the 3D tower. My criteria for identifying ‘tool-mediated activity codes’ are data driven. They are grounded in what emerges from or is happening in data. As such, coding is already initiated at the transcription level – for identified situations of tool manipulation, see Figure 19.

Tool-mediated activity codes
XX1: A new versus-narrative is read aloud
XX2: Touches a versus-narrative
XX4: Reading aloud from versus category brick
XX5: Writing down on the priority-brick
XX7: Touches the priority-brick
XX8: Placing priority-bricks
XX9: Touching the versus category brick
XX11: Points at priority-brick
XX12: Touches the tool (the overall tool or in general)
XX14: Points at versus category brick
XX15: Rotates tool
XX16: Using/referring to the A4 ‘Introduction sheet’ with descriptions of the three overall versus categories (dilemmas)
XX17: Points at versus-narrative

XX18 (or marked XX): Points generally towards the tool
--

Figure 19: Illustration of ‘tool-mediated activity codes’ identified from data

The ‘tool-mediated activity codes’ (hereafter referred to as TMA codes) from the three transcripts of the UserTEC partner groups have been mapped and counted in the findings section on p. 93. Some TMA codes will naturally occur more often than others do, since they may be more central for the tool’s mediating qualities than others. For example, while some of 3P’s elements by nature require actions and manipulation (e.g. the versus-narratives and the priority-bricks), others are used as a means of orientation (e.g. the A4 ‘Introduction sheet’ and the versus category-brick). Identifying the total of TMA codes is not aimed at constructing quantitative claims of any sort. Rather, this approach is applied to identify deviations and patterns in participants’ interaction with the 3P tool, as a way to identify where to immerse into the rather large set of data for a closer examination – to detect what makes a difference with respect to participants’ tool-mediated interactions.

Using coding strategies to order TMA codes in order to understand their contextual significance

Coding strategies used within Grounded Theory (GT) (Glaser, 1992; Neergaard & Leitch, 2015; Strauss & Corbin, 1998) have been applied to significant parts of the data where conducting an additional in-depth exploration was necessary in order to reveal and understand the significance, details and contextual patterns of the TMA codes.

In this work, I apply what O’Reilly, Paper and Marx (2012) have called an ‘à la carte approach to grounded theory’, in which coding strategies of GT are used as means by which to code and analyse data, rather than as a holistic and strict methodological/analytic approach. The research conducted here is not designed to develop theory, as is the intention and endpoint of GT. Rather, coding strategies are applied simply, inspired by the coding strategies of ‘open coding’ (Corbin & Strauss, 1990) in the form of ‘line-by-line analysis’ and ‘constant comparison’. Line-by-line analysis allows for submersion into an understanding/identification of how central TMA codes are contextually conditioned, while ‘constant comparison’ makes it possible to search for similarities as well as differences in relation to a specific TMA code within and across different groups. The idea of line-by-line analysis is ‘comparing like with like, to look for emerging patterns’ (Bøllingtoft, in Neergaard & Leich, 2015, p. 79). These emerging patterns are then formed into categories of analytic significance of participants’ contextualised/specialised tool manipulation.

The coding strategies are operationalised in a coding scheme. Figure 20 below illustrates my analytical procedure for turning TMA codes into more specialised categories of contextual tool use.


			
Total of indications of tool use in relation to a TMA code	Characteristics in gestural and verbal expressions related to participants' tool use	Condensing characteristics of versus-narrative use	Forming initial categories
XX2 (0:00:55.2), (0:02:05.9), (0:02:36.6), (0:02:48.8), (0:03:31.7),	'I will just take another one (<i>picks up a new light green versus-narrative from the game board</i>) to see what happens.'	Metacommunication about what they are doing, how to move in using the tool, what to do next, who does what	Instrumental orientation and distribution of task
XX2 (0:01:27.4)	'It is very easy (<i>waves the dark green versus-narrative up and down and puts it down on the table</i>) to immediately say, this is not fair.'	A versus-narrative triggering a response immediately after it has been read aloud from one group member (as to what it proposes)	Triggering an immediate response
XX2 (0:06:23.5), (0:09:10.3), (0:31:31.0), (0:50:31.9)	'But this one actually (<i>points at a ?light green? versus-narrative</i>) is (a very long pause) I mean, it is self-given, that obviously the user is right to do things differently. But to me it is..'	A versus-narrative leading to an interpretation of the significance of what the versus-narrative proposes and a personal positioning	Elaborating on own assumptions, interests and interpretations of a versus-narrative text

Figure 20. Illustration of the analytical procedure of turning TMA codes into specialised categories of participants' contextualised tool manipulation.

The analytical procedure in Figure 20 is used to systematically examine the total appearance of TMA codes in context within the different groups. For instance, in the example, the TMA code XX2 (touching a versus-narrative) is systematically examined to understand different contextual applications and significances. The first column of Figure 20 displays the specific TMA code chosen for closer analysis as well as where in the data the code occurs. The second row lists examples of TMA codes' contextual appearance as part of participants' utterances. The third row is a

condensed description of a specific phenomenon identified from the contextual appearance of the TMA code. These descriptions are then conceptually ordered in the last row, forming initial categories of significances and deviations in participants' contextualised tool use. Some of the contextualised examples characterising TMA codes in use fit within several categories, but they are inserted at the spot where they make the best case in point about use and significance.

The 'constant comparison' used to form the initial categories in Figure 20 has in some instances been subject to 'axial coding', where the initial categories are looked at in order to find their interconnectedness and deviations (Glaser, 1992; Strauss & Corbin, 1998). Axial coding means that the categories are compared at a higher conceptual level by looking at specifications of relationships between categories to provide explanations for the phenomenon of tool use that are more precise. Since the goal of 3P is to assist the participants in their problem exploration, the question sought at this level is to understand the specificity of how 3P tool elements mediate communication that, in turn, encourages the exploration of a problem space as well as expanding current perceptions of a problem space.

In the findings section presented below, the different levels of analysis have been applied to a smaller or bigger extent to the totality of TMA codes. In the following part, key findings will be highlighted to exemplify significant challenges and significant possibilities in participants' 3P tool use in relation to the problem formulation of this thesis.

FINDINGS – SHOWING SITUATIONS OF TOOL-MEDIATED INTERACTIONS

The TMA codes of the Transana® transcript (Appendices C, D and E) have been grouped and inserted in Table 7 below, showing occurrences of tool-mediated activities distributed over the three different groups. From a total corpus of 129 pages of transcriptions and 1362 paragraphs of transactions, 522 tool-mediated interactions have been identified. Briefly recall here each of the 3P tools contains eighteen versus-narratives in total, six priority-bricks for insertion in the tower, three versus category-bricks and one A4 introduction sheet (see Appendix G).

Table 7.

List of the total of TMA codes identified from data.

TMA code	Occur- ences GR1	Occur- ences GR2	Occur- ences GR3
XX1: A new versus-narrative is read aloud	5	18	11
XX2: Touches a versus-narrative (e.g. weaving, holding, stroking, tapping, etc.)	18	28	47
XX4: Reading aloud from versus category brick	1	2	4
XX5: Writing down on the priority-brick	8	57	8
XX7: Touches the priority-brick (e.g. weaving, holding, stroking, tapping etc.	34	29	8
XX8: Placing priority-bricks in the 3D tower	15	15	3
XX9: Touching the versus category brick (e.g. weaving, holding, stroking, tapping etc.)	13	8	3
XX11: Points at priority-brick	12	9	2
XX12: Touches the tool (the overall tool or in general)	1	1	0
XX14: Points at versus category brick	10	1	1
XX15: Rotates tool	9	0	2

XX16: Using/referring to the A4 'Introduction sheet' with descriptions of the three overall versus categories (dilemmas)	8	5	0
XX17: Point at versus-narrative	3	5	57
XX18 (or marked XX): Points indefinite towards the tool	23	30	12
Total tool activities/interactions	160	208	158
Total Transactions marked by the Transana [®] code ■ in Appendices C, D and E.	486	413	463
Total transactions without tool activity	326	205	305

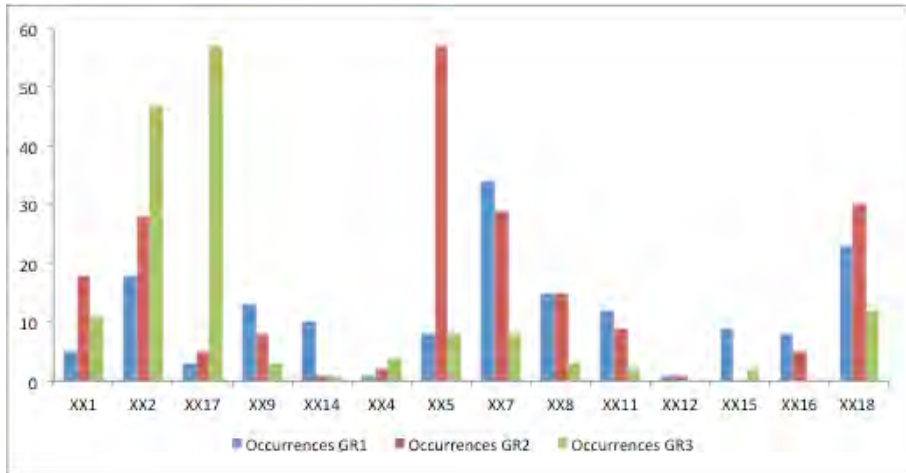


Figure 21. A graphic representation of the TMA codes from Table 7.

The significance of the numbers of Table 7 and Figure 21, combined with preliminary observations from data, are hereafter elaborated for each of the three groups, one at a time: first the blue group, then the red group, and finally the green group. For each group, specific excerpts are dragged in as explanatory examples to situate tool use in context. As the blue group's members execute their discussion in Danish, the excerpts from this group are kept in the original language. The excerpts are divided into two columns, showing the ATM code and the 'verbal' expression of which they are part. Findings from all three groups are summed up and compared in the final section of this chapter.

THE BLUE GROUP

The blue group has 486 transactions, of which 160 are mediated by a tool activity. This group has the most frequent variation in tool use distributed over different TMA codes, and the fewest deviations of a single TMA code. The group has only made use of 5 versus-narratives (XX1 *a new versus-narrative is read aloud*) out of 18, and by looking at data where XX1 occurs, it is clear that the versus-narratives are mainly being used at the beginning of the group work, when discussing the first versus category, after which they are no longer used. The tool consists of 18 versus-narratives, 6 for each overall category. All were meant for the participants' use. One must therefore assume that the versus-narratives were not that appealing for this group. Judging from the numbers, as well as from preliminary observations in the transcriptions, this group uses the overall versus categories as the main common reference point to guide the discussions. This might suggest that for the boundary function of the tool to unfold, a large number of versus-narratives were not needed in this group. Instead, the TMA codes XX7, *touches priority-brick*, and XX11, *points at priority-brick*, stand out as the tool elements most applied in the group work, 34 and 12 times, respectively. Observations suggest that the priority-bricks play a leading role as an orientating/mediating device for communication and exchange in the blue group. Data sequences are provided below that show examples of *how* and for *what* means the significant TMA codes highlighted here take on significance in context as part of the participants' communication and interaction.

Insight: Assisting in a versus-framing of viewpoints

In the excerpt below, the participants have just discussed one of the overall versus categories in the tool 'Technology adapting to the user vs. user adapting to technology'. The group moves on to discuss the next versus category in the 3P tool, 'Educating users vs. learning from users'. Introducing this versus category, the participants were encouraged to discuss where to place decision-making – whether to educate users about future use and technological possibilities or to learn from users and user practices. The excerpt, together with the following excerpt, show how different understandings are presented and mediated using the priority-bricks (XX7 *touches priority-brick*/XX11 *points at priority-brick*), based on the overall versus category and how understanding shifts are challenged, supported, aligned or rejected. In the following sequence KI, the sociologist, directs the group's attention toward the new versus category for discussion, 'Educating users vs. learning from users'. P, the engineer takes a standpoint in response to this:

	P: ja, jamen jeg tror faktisk i virkeligheden at vi kommer, hvis vi nu skal hurtigt lige komme med en løsning, så tror jeg faktisk at vi kommer til samme løsning på alle tre spørgsmål ikke...
	H: Ja, (? hvis de skal indimellem?)

<p>XX 7 11 14</p>	<p>P: ... som vi gjorde på det første spørgsmål. Fordi her (<i>peger på tårnet hvor de grønne trekanter er placeret</i>) handler det, her (<i>tager 'priority' brikken fra spilpladen fra den lilla/blå kategori</i>) der handler det om at selvfølgelig skal systemet kunne operere automatisk, så den kan håndtere de situationer hvor vi ikke selv har nogle ønsker. Altså når vi ikke er hjemme, så skal systemet kunne fungere når vi ikke er hjemme, eller når vi ikke har nogle ønsker. Men selvfølgelig, hvis det er sådan at vi har nogle ønsker om at det skal være anderledes, så skal vi jo kunne være aktive og kunne gøre det. (<i>Peger mod den 'orange kategori' 'educating users'</i>) Og det samme med uddannelse ikke, jamen selvfølgelig skal vi jo, vi er nød til at have en eller anden form for læring når der kommer et nyt system ind, hvordan skal det bruges. Men på den anden side så skal systemet jo også ligesom være indrettet på hvad det er vi gerne vil og sørge for at levere det vi gerne vil. Så det vil sige at systemet skal også have lært af hvad er dine ønsker og hvordan skal jeg så agere for at opfylde de ønsker, så jeg vil. Jeg tror vi kommer til den samme situation (<i>tager den lysegrønne 'priority-brick' 'technology adapting to users' ud af tårnet og sætter den ind igen</i>) at vi vil have den der (<i>peger på det orange/gule tema 'educating users vs. learn from users'</i>) brugerdelen..</p>
	<p>B: den skal være øverst...</p>
<p>XXI 2</p>	<p>P: (<i>holder på tårnet øverst oppe</i>) brugerdelen eller menneskedelen vil vi have øverst og så vil vi have (<i>flytter hånden en smule længere ned på tårnet</i>) teknologien under.</p>

(GR 1, time: 0:20:16.7–0:21:32.8, Appendix C)

Besides being an example of how P positions his viewpoint, this is also an example of how the tool frames the rhetoric used for argumentation, as P also uses the versus-rhetoric for his line of argumentation as laid out in the overall versus categories (while physically referring to, pointing, touching or rearranging), and in this way enables discussion on arguments and counterarguments, to compare and contrast viewpoints. As such, P advocates for both sites of the three overall versus categories, which is also the purpose of using the tool – to take into account contrasting possibilities in a discussion. One could question, though, whether the tool only helps in laying out viewpoints and does not necessarily facilitate in combining understandings or help in *developing* viewpoints or understandings, or in questioning them more deeply. I will return to this question in Chapter 6. In the excerpt, the tool is used as a reference point for thought and focus. P uses the colour-coded categories as a reference point for both stating where the new category should be placed (educating users vs. learning from users) in relation to their earlier agreements made by the previous positions inserted in the tower. P uses a 'we' in his utterance when stating that the user-part or human-part must be inserted into the top of the tower; in doing so, he uses this deictic 'we' as if this viewpoint is a representation of the whole group. In the following utterance, which is a

continuation of the above discussion, KI shifts the focus by stating that something is missing in their conversation. She does so by referring to (pointing at) the overall versus categories presented on the A4 ‘introduction sheet’ (XX16) several times:

XX 16	KI: Altså jeg sidder og synes at det der kommer til at mangle i denne her diskussion det er jo hele tiden at ehm, og det er jo i hvert fald for nogles vedkommende, så må det være sådan, at det man så sælger til folk det er komfort. Men det er altså ikke sådan at vi bare i det her samfund ønsker mere og mere komfort hele tiden. Og mange af de her (<i>peger på A4 ‘introduction sheet’ med en beskrivelse af de overordnede versus-kategorier</i>) altså mange af de her dilemmaer de bliver måske lidt, jamen.. Altså, og jeg tror på den anden side ikk ... (0:22:37.8) Så på en eller anden måde (<i>ligger hånden ovenpå ‘introduction sheet’</i>) kan man så sige, så er der (<i>peger på ‘introduction sheet’</i>) en bal (?viser balance med hænderne?). Og så har jeg jo også den der med at jeg tror på at komfortnormer er noget som udvikler sig, og det udvikler sig blandt andet med den teknologi som vi giver folk. Så der er også et eller andet der hedder, hvordan laver vi.. Altså de her dilemmaer (<i>peger på ‘introduction sheet’</i>), der skal vi også have det tænkt ind, altså hvis vi gør det for nemt for folk at få lige præcis hvad de vil have hele tiden. Altså jeg kan godt se at det er et dårligt salgsargument at vi skal lave noget teknologi der gør det svært at få det for godt fordi at.
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(GR 1, time: 0:21:39.0, Appendix C)

This is also an example of how the categories do not constrain the group to the specific versus categories and arguments but leave space for the participants to fill in the ‘in between’ or the missing understandings of the overall versus category laid out for discussion by the researcher.

Insight: The tool used as a way to reach common ground and redirect attention

In the data, there are several instances where the tool functions as a reference point for establishing common ground, not in terms of reaching the same understanding but in terms of finding a common outset and focus for discussion – the priority-bricks (XX7/XX11) and the versus category brick (XX14) are used here as means to redirect the attention and focus of the discussion.

XX1 4	KI: Men det (<i>peger på versus-kategorien under den orange/gule kategori ‘educating vs. learn from users’</i>) vi sidder og siger her nu, er det mere ‘learning from users’ eller er det mere ‘educating users’?
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(GR 1, time: 0:32:57.9, Appendix C)

XX1 1	KA: (<i>Holder den lysegrønne og mørkegrønne trekant overfor hinanden og ryster dem</i>) Men hvad er dilemmaet her..
	KI: Hvad er problemet så..
XX 7	KA: det er (<i>holder den lysegrønne trekant fremfor den mørkegrønne</i>) brugere, at brugeren skal være i kontrol og (<i>svinger den mørkegrønne trekant op foran sig</i>) at systemet skal være i kontrol eller.

(GR 1, time: 0:07:02.0–0:07:04.1, Appendix C)

On the basis of these examples, the priority-bricks and the category they represent help participants to formulate questions and prevent them from rushing forward and agreeing on easy answers just to get it over with – it supports deconstruction rather than construction.

Insight: The tool used as a shared reference point, and the questioning of assumptions

In the paragraphs below, another example is displayed of how, specifically, the tool-mediated activity represented by XX14 (*pointing at versus category brick*) and XX9 (*touching the versus category brick*) function as a shared reference point for communication and questioning of assumptions in relation to the overall versus category laid out for discussion:

XX1 4	B: men hvordan vil du (<i>peger mod versus-kategorien under den orange/gule kategori 'educating vs. learn from'</i>) separere det 'educating' og 'learning from users'.
XX	KI: Men er vi ikke enige om (<i>peger på spilpladens kant ud for den orange kategori 'educating users'</i>) at vi ikke tror..
	B: ...fordi hvor ligge forskellen?
	KA: Man kan sige hvis du nu tager..
	B: Er det ?holdning ?eller...
XX9 14 18	KI: Nej, men jeg tror også at jeg vil sige at (<i>peger på versus-kategorien under den gule/orange kategori</i>) 'learning from users' det handler så om at man går ud og lærer hvad det er brugerne gør (<i>peger mod den anden kategori mørkegrøn 'Users adapting to technology'/lysegrøn 'Technology adapting to users' på den anden side af toolet</i>), og så bruger man det i sin teknologi (<i>peger mod den orange/gule kategori</i>) så hænger den sammen herover til (<i>tapper med fingeren på den mørkegrønne/lysegrønne kategori</i>).
	B: Ja, i stedet for at man går ud og lærer dem den teknologi man selv har

	fundet på, eller hvad?
XX1 4	KI: Ja, det hænger lidt sammen med at så lærer (<i>tager hånden og føre den ud foran versus-kategorien under den orange/gule kategori</i>) du fra brugerne, og så tilpasser du en teknologi der passer til det (<i>peger mod den lysegrønne/mørkegrønne kategori</i>)

(GR 1, time: 0:34:48.3–0:35:11.8, Appendix C)

The above example indicates that the versus categories of 3P function well in keeping the group's attention and dialogue on the topic laid out for discussion. In addition, the participants use the 3P tool elements, in this case the 'versus categories', to support and underpin the part of the overall discussions they are referring to, building from or questioning. On the basis of this form of tool use, KI, the sociologist, is able to relate, connect and recall the current discussion of 'Educating users vs. learning from users' to an earlier discussion and decision made about where to place appropriation ('Technology adapting vs. users adapting'): '*KI: Nej, men jeg tror også at jeg vil sige at (peger på versus-kategorien under den gule/orange kategori) 'learning from users' det handler så om at man går ud og lærer hvad det er brugerne gør (peger mod den mørkegrønne/lysegrønne kategori 'Users adapting to technology vs. Technology adapting to users' på den anden side af toolet), og så bruger man det i sin teknologi (peger mod den orange/gule kategori) så hænger den sammen herover til (tapper med fingeren på den mørkegrønne/lysegrønne kategori)*'. In this way, the tool facilitates revisits to former agreements and assists KI in combining the current discussion with how it relates to the part they have discussed about technology.

Insight: Prioritising – making a decision about position

The excerpt below shows how the tool is used/dragged in when one of the priority-bricks (an argument or position) is to be placed in the tower in the blue group. In this example, KI, the sociologist, is initiating an attempt to insert the yellow priority-brick in the tower 'learning from users', on which she has written '*we should learn from the users so we can develop intuitive technology*'. In the following excerpt, the priority-bricks (XX7 *touches a priority-brick*, XX8 *placing a priority-brick*, XX11 *points at priority-brick*) are referred to frequently, and are manipulated and used to mediate this part of the discussion, as joint negotiation about the position of the arguments in the 3D tower unfolds:

XX8	KI: Hvor langt op får den lov at komme (<i>Ki holder den gule trekant ud for tårnet</i>)
XX8	P: ej, den skal højt op (<i>referer til den gule trekant</i>)
XX	KI: skal den højt op? (<i>referer til den gule trekant</i>)
XX8	Flere siger ja (<i>referer til den gule trekant</i>)

XX8	KI: Skal den derop, eller højere? (<i>referer til den gule trekant</i>)
	KI: Ja, hvad er de andre (<i>rækker ud efter den lysegrønne trekant i toppen</i>)
	P: Nej, det var brugeroverstyring
XX8	KI: Den her er...(<i>tager den orange trekant ud af tårnet og flytter den en tak op</i>)
	KA: Jeg, eh
XX7	KI: det (?bruger?), og hvad siger vi (<i>tager den lysegrønne trekant ud af tårnet, for at se på den</i>)
	R: Overstyring er vigtigt
XX7	KI: Overstyring er vigtig (<i>sætter den lysegrønne trekant tilbage i tårnet</i>) Og den her ovre (<i>tager den lilla trekant ud af tårnet og læser fra den</i>) det er 'active control for those who wants' (<i>KI. sætter den lilla trekant tilbage</i>), og det er det samme i virkeligheden. Og så de her to de er på niveau (<i>KI tager den mørkegrønne trekant ud og læser</i>) 'fleksibelt formativt' hvad handler det om?
XX1 7	KA: det er den grønne derovre (<i>peger på de grønne scenarier, som ligger på spilpladen.</i>)
XX7	KI: Det er 'teknologi versus user'. Og den er lige nu (<i>tager fat i den gule trekant i tårnet</i>) på niveau med at vi skal lære fra brugerne (<i>ser på det skrevne på den gule trekanten og sætter den tilbage i tårnet igen</i>) så vi kan udvikle intuitiv teknologi. Jo, det er da sådan det det samme.
	Flere: Jaaa
XX7	KI: Så det passer jo fint til at de ligger på niveau (<i>KI: tager den blå brik trekant ud af tårnet og se på den</i>) og hvad er det her ..
	KA: det hænger jo sammen med at vi får (?spændenere?) og lettere
XX7 /11	KI: ..(<i>læser videre</i>) 'passive for the rest' (<i>KI. sætter den blå trekant ind igen</i>) Hvad betyder den 'passive for the rest' (<i>KI: peger på den blå trekant mens hun sætter den tilbage i tårnet</i>)
XX	R: (<i>Peget på de blå scenarier på spilpladen</i>). Det var denne her. Det var noget R. Skev Flere (griner)
XX7	R: Nå, det er nok fordi at det er denne her (<i>R: tager den lilla trekant ud fra tårnet og ser på den.</i>) 'active control for those who want' (<i>R: sætter den lilla brik tilbage</i>) og 'passive for the rest'.

	Bo: aarh, så de hænger sammen
XX1 1	KI: Så de hænger sammen, og skal den (<i>KI: peger på den blå trekant</i>) ligge dernede?
	R: jaa, (trækker på ja), ja, ej det er vel også ret vigtigt at systemet også virker.
XX1 1	KA: det er lige før de to (<i>peger på den blå og lilla trekant med to fingre</i>) ligger på samme niveau. De to kundegrupper er ikke nogle jeg kan,. Vi kan ikke tillade os at favorisere den ene fremfor den anden, fordi en der køber er...
XX7	KI: Men den her (<i>tager fat i den gule trekant i tårnet og hiver den lidt ud</i>) er jo i så fald vigtigere fordi at den..
XX7	R: Hvaa, står der der (<i>tager den lilla trekant ud af tårnet og bruger den til at pege mod den gule trekant</i>)
XX7	KI: det er det der 'vi skal lære..'
	B: det har KI skrevet
XX1 1	KI: ..'vi skal lære fra brugerne så vi kan udvikle intuitiv energi'. Det er fordi jeg ikke tror på det der (<i>peger på den blå trekant i tårnet</i>)
	R: Jamen, står der ikke det samme på alle dem her? (skriv hvad der referers til her)
	KA og KI: Jo det gør der
	B: Jo, for du kan oversætte
XX7	KA; Så hvis du sætter den ind på.. (<i>rykker den blå trekant en smule så der er plads til den lilla trekant på samme niveau som den blå i tårnet</i>)
XX8	R: på den her, så er den mindst vigtig (<i>sætter den lilla trekant ind i tårnet</i>)
	KA: så de er lige vigtige de to
	KI: men skal de være så langt nede så?
	B: jah, det
	KI: det skal de måske
XX	KA: det kommer an på hvad der er højt og lavt (<i>peger på tårnet fornedet</i>)
XX	KI: Jamen, det her (<i>peger på tårnet for oven</i>) er højt
XX1 1	R: Men, er der en der kan forklare mig hvad forskellen er på den der (<i>peger først på den gule trekant, så på den blå trekant og derefter på den</i>)

	<i>lilla trekant som sidder overfor hinanden)</i> to er
	KA: Ingen
XX7 /11	KI: ej hernede, der siger du (<i>peger på den blå trekant</i>), joo (<i>tager fat i den gule trekant</i>) det her er noget andet. Det her det siger (<i>sætter den gule trekant på plads igen og peger på den</i>) at du skal lave en teknologi som gør det nemt for brugerne at bruge den. Det siger den her (<i>peger op den lilla trekant</i>) sådan set slet ikke noget om. Den siger at brugerne skal have lov til at bruge..lov til at pille ved teknologien hvis det er det de vil. De skal have mulighed for det.
	R: Ja, der er selvfølgelig en forskel der.
	KI: det er noget andet
	R: Ja

(GR 1, time: 0:38:33.8–0:41:18.5, Appendix C)

In the example, the tool allows the participants to revisit prior decisions. It functions as a kind of memory device, holding them up to prior agreements and allowing for the re-ranking of decisions. KI is running through the previous positions and arguments placed in the tower, to orient herself and the group. She reads aloud, using the priority-bricks and the written text on them as a mnemonic device to recall prior decisions. It is evident how R, BO and KA also intervene in this recalling and reordering of previous positions: '*KA: Så hvis du sætter den ind på..(rykker den blå trekant en smule så der er plads til den lilla trekant på samme niveau som den blå i tårnet)...*' *på den her, så er den mindst vigtig (sætter den lilla trekant ind i tårnet)*'. In this group, the rearranging and ranking of priorities and decisions takes place as a joint effort, at least when it comes to the physical ranking of the arguments. It is also evident how R attends to a priority-brick to ask for clarification; '*R: Men, er der en der kan forklare mig hvad forskellen er på den der (peger først på den gule trekant og så på den blå trekant og den lilla trekant som sidder overfor hinanden)*'. Summing up the materialisation of positions and standpoints represented by the participants' own statements on the priority-bricks performs the function of revisiting, sharing and negotiating the significance as well as relationships between decisions and discussions made along the way in the group's work. The priority-brick and the written text on it cannot be meaningfully placed without an orientation to the former decisions and remembering of other standpoints taken.

THE RED GROUP

The red group has 413 transactions (see Appendix D) out of which 208 are mediated by a tool activity. On the basis of the numbers, this group has the most frequent tool activity. Some sort of tool activity is taking place for almost 50% of the workshop time. The TMA codes of Table 7, combined with contextual observations, indicate

that the red group is the only group that makes use of all the versus-narratives – a new versus-narrative is read aloud 18 times (XX1), which is the total amount of versus-narratives in the tool. The group stands out with respect to TMA code XX5 (*writing down on priority-brick*), with 58 occurrences, which means that a lot of time is spend in this group on this particular activity. With regard to TMA code XX8 (*placing priority-bricks*), the red group is the only group that ends up writing down on all the priority-bricks, as well as placing all of the priority-bricks for each overall category in the tower. However, a closer look at the data suggests that when 3P tool elements are touched in this group, it is often as an orientating activity rather than as argumentation or a constructive activity towards exploration of the versus categories laid out for discussion. Data sequences are provided below showing examples of *how* and *for what means* the significant TMA codes highlighted here take on significance in context as part of the participants' communication and interaction.

Insight: Versus-narratives referred to as means of orientation and distribution of the groupwork

A dominant part (33 occurrences) of the TMA codes of versus-narrative use identified in the red group XX2 (*touching a versus-narrative*) and XX17 (*points at a versus-narrative*) is related/limited to some form of orientating activity using the tool: using the versus-narratives as a means of distribution of the task given, turning and pointing at a versus-narrative, or figuring out what overall versus category the specific versus-narrative refers to. The excerpt below depicts one of several examples where a versus-narrative is primarily used as a way of mediating the participants' distribution of work in terms of the task given. The group members are at the beginning of their groupwork and the professor on sustainable design and architecture, KS, initiates the work:

XX2	KS: All right, so we do them in pairs. (<i>SD picks up a purple versus-narrative and hands it to KS</i>)
XX2	KS: Ah okay, so we do not read them in pairs (of versus) (<i>puts the purple versus-narrative he holds in his hand back on the gameboard</i>). So we start with the active and then (?XX?).
XX2	HV: So you take the purple one (<i>points at AS who holds a blue versus-narrative</i>), I take the blue ones (<i>points at the blue versus-narrative he is holding in his own hand</i>) and then we (<i>moves his hand in a circle above the tool</i>) ...
XX2	AS: And we read it aloud for each other (<i>flips the blue versus-narrative in his hand</i>).
XX2	HV: Yes, surely (<i>touches the blue versus-narrative AS is holding in his hand</i>).

XX2	SD: So there are three of each, I think (<i>Different people [SD, AS, KS] are picking up the purple and blue versus-narratives from the game board</i>). Okay.
XX2	KS: You (<i>hands over a blue versus-narrative to SD</i>) can have this one.
XX2	SD: Thank you (<i>takes her own purple versus-narrative from the toolbase and not the blue versus-narrative KS is handing her</i>). No, I think I am purple.
XX2	HV: You are purple (<i>KS hands the blue versus-narrative to AS instead</i>) and you are blue (<i>directed at AS</i>).
XX2 /XX 17	AS: Okay, so we have to read it out loud for each other. This one (<i>points at the blue versus-narratives in his hand</i>) ..

(GR 2, time: 0:02:01.9–0:02:56.9, Appendix D)



Figure 22. An example of the red group's use of the versus-narratives for orientation: the participants point, hand each other versus-narratives and distribute tasks.

The excerpts hereafter display one of several examples identified from data in the red group where attention to, as well as manipulation of, a versus-narrative (XX2) is mainly used as simple individual orientation, rather than as an instrument for sharing or discussion. For example, in the excerpt displayed below, the text shows how one

participant is talking while another participant is turning a versus-narrative to look at the colour of it to determine its affiliation to the overall versus category:

XX2	AS: No, I did not actually. (<i>MJ turns over the yellow versus-narrative to look at the back side</i>) But it is the same as in Aarhus. We are just from Fyn, another part of Denmark.
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(GR 2, time: 0:45:20.2, Appendix D)

Insight: Orientation towards the versus-narrative to understand its intention and categorisation

Several examples have been identified from the red group of versus-narrative mediated interactions XX2 (*touching a versus-narrative*) and the use of and reference to the priority-bricks XX11 (*pointing at priority-brick*) and XX7 (*touches a priority-brick*). However, the versus-narratives and priority-bricks in this group do not trigger the participants to make their own interpretation of the versus categories of which they are part. Rather, the presence of these elements sparks a dialogue concerned with figuring out the possible intention and categorisation of these priority-bricks or versus-narratives. In general, the red group seems to have difficulty figuring out how the different versus-narratives within one of the overall versus categories belong to one another. This difficulty, seen in several examples, is depicted by one example here:

XX11	KS: What do you want to put on this one (<i>points at the purple priority-brick on the table in front of MJ</i>), (?that is?) the passive?
XX7	MJ: Was it not a passive (<i>holds the purple priority-brick in her hand</i>)?
XX11	KS: No, that is an active user.
	AS: That is the active users yeah.

(GR 2, time: 0:22:25.3–0:22:31.5, Appendix D)

In the excerpt, one of the participants, a professor of social dimensions of energy use, is reading aloud from a versus-narrative. As is seen in the excerpt, the first reaction to the versus-narrative is to understand/figure out the intention of the versus-narrative and then what side of the versus category the specific versus-narrative belongs to, when they discuss whether the versus-narrative is an example of the consequences of an active or passive user, under the overall versus category ‘*How to approach appropriation?*’ The intention of the specific versus-narrative was supposed to represent a passive user, but the participants are discussing how a specific part of the versus-narrative text sounds more active to them:

XX1	SD: And (reading aloud from versus-narrative) ‘Mathew lives in a house and he has limited economic resources to pay for his energy bills. Yesterday he used seventy percent of his weekly budget in one day. And it was necessary to wait until the next day to use electric appliances in his house’. Ahhh, it is not quite clear whether it, well ...
	KS: He used up his budget..
XX 17	SD: He used up his budget (<i>points with a finger on the versus-narrative</i>), but why does that make him passive. I am not quite clear about that. Anyway, this sounds active to me (<i>SD continues reading aloud from the versus-narrative</i>) ‘Despite this, he has worked out alternative ways of keeping his house warm without the need to use the electricity’. Now that sounds active to me.
	LM: That is because that is a system blocking him.
	SD: Yes, this is, yes, it is why it was necessary. Was it because he was not allowed to use anymore or what? This sounds active to me.
	AS: Also to me.
	SD and MJ: Yeah.
	SD: Were you involved at all with designing these?
	MJ and LM: No.
	SD: So you cannot enlighten us. (laughs)
XX 16	MJ: But the overall versus category we should discuss, maybe we could do that in a way. (<i>Referring to the A4 ‘introduction sheet’ with the overall versus categories</i>)

(GR 2, time: 0:04:42.1–0:05:54.1, Appendix D)

These kinds of observation exemplify how the versus-narratives do not necessarily help the participants further in their exploration, i.e. in contributing their own standpoints and interest in the dilemmas. Rather, the examples show how the versus-narratives are rather confusing and, as such, limit progress. Therefore, the participants leave the versus-narratives, as shown in the excerpt, to go back to discussing the overall versus category as a way to move on. This might suggest the importance of well-designed versus-narratives, since otherwise they become a hindrance for the group’s progress – or it might suggest that it is just not possible to make versus-narratives that fit with all participants’ own categorisations. Versus-narratives triggering discussions about the intention as well as categorisation of the elements in the tool may be a necessary first step in a recognition process, trying to negotiate common ground from where to start a discussion, but when this type of confusing or limiting versus-narrative use becomes the norm in the group, and when

it is not only a matter of understanding the versus-narrative but also a direct mismatch with the participants' own categorisation schemes, this prevents the group from reaching a point where they get to contribute and exchange their own ideas and positions with respect to the categories and dilemmas laid out for discussion. As with the blue group, it seems that the red group in the examples presented hereafter have more success responding to the overall versus categories laid out for discussion.

Insight: Reference to the versus category as a way to claim position in the discussion

The excerpt below is a continuation of the previous excerpt above, where MJ, the sociologist, just suggested looking away from the specific versus-narrative to attend to discussion of the overall versus categories. She does so by reading aloud from the A4 'introduction sheet', while AS, the customer centre chief from an utility company, places the acrylic brick with the versus category on top of the 3D tower. On the brick is written '*how to approach appropriation: users as passive consumers vs. users as active co-creators*'. HV, a professor on Housing Quality & Process Innovation, responds to MJ's request, positioning himself in the discussion by providing a clear problem understanding:

XX9	HV: Shall I give my perception (AS <i>picks up the acrylic versus category-brick from the tower and puts it back on the tool side</i>) on this?
	Others: (laugh).
	MJ: Yes.
	HV: I have the idea that people are basically lazy. I mean the majority of the lazy do not want to do anything, would like to rely on a system that works well, controls everything well, but technology mostly is not completely working like people do, so yeah, we are somewhere in between.
	MJ: Yeah.
	HV: People still are lazy, the systems are not operating as the people would like to see them, so they have to do something, and then they come into conflict with an inadequate control system, mostly. So, as long as systems do not fully supply automatic, whatever. Taking care of their comfort, as they would like. Ahmm, yeah, that is still a dilemma. So you should try to find some kind of user, you have to apply a little bit on their active role. But I think, at the end, it should go towards a more automatic.
	LM: So it might be like a flexible system which is automatically, well, most of the time functions automatically and then. But the problem is that maybe the user should have the possibility of acting if it, sometimes, it is

	not adequate.
	HV: It depends also maybe on the type of users. Like we had a discussion in the previous settings.
	LM: Yeah.

(GR 2, time: 0:06:12.4–0:07:53.9, Appendix D)

As is seen here, it is not a tool element or a specific versus-narrative that facilitates or triggers HV's response, but rather MJ's decision to return to the A4 'introduction sheet', to read aloud the dilemma. One could say, based on this example, that this group could just as well have had the dilemmas presented on the A4 'introduction sheet', without a specific tool. The other tool elements, besides the brick showing the overall categories (XX9), apparently have no scaffolding function in this discussion other than as a way to redirect attention to a specific versus category suggested for discussion. Another thing to extract from the example, however, is how HV's utterance '*but technology mostly is not completely working like people do, so yeah, we are somewhere in between*' is comparable to the communication characterised in the blue group where one participant takes into account both sides of an overall dilemma – as it is framed on the 'introduction sheet'. This 'in-between framing' of dilemmas impels participants to take into account more perspectives. However, this taking of other perspectives into account remains overall at an abstract level in relation to the overall dilemmas, without a nuanced discussion of the implications of the specific perspectives on a dilemma. Later, in relation to the green group, I will show how a nuanced attention to the narrative text and, as such, different aspects of a versus/category, leads the group to stay longer with the dilemma, as well as examine different understandings of it more in depth.

Insight: Handling tool elements as restricted displays and individual orientation

As mentioned earlier, the red group stands out with respect to its use of the TMA code XX5, *writing down on priority-brick*, with 58 occurrences. From the data, it is noticeable that the writing down on the priority-brick often happens as a one-man performance, by one participant, or between two participants in the group, while the rest of the group are discussing something else. In the example below, MJ, a sociologist, is saying out loud what she intends to write down on the brick, while she is writing, but she receives no answer. Instead, the other group members start discussing something else. It is not until the end of the excerpt that two of the participants join in on what to write, but still without the remaining two group members paying attention:

XX5	MJ: So automatic default ... (OSP) (<i>MJ writes down on the purple priority-brick</i>)
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XX5	AS: So say like this, I think, do you know the Danfoss living system (OSP)? <i>(MJ writes down on the purple priority-brick with help from KS)</i>
XX5	SD: No. <i>(MJ writes down on the purple priority-brick)</i>
XX5	AS: Okay, Danfoss made such a living system that does anything for you, with a central display where you can control everything. And we can see that a lot of people have invested in this. And actually some of them are using more energy now than before. <i>(MJ writes down on the purple priority-brick)</i>
XX5	HN: Okay. <i>(MJ writes down on the purple priority-brick)</i>
XX5	AS: We had them when we did the billing. They came to us. Why are we using more? We just invested twenty thousand kroner in this, and it should do everything for us.
XX5	SD: Is this written up somewhere, has this been, is there a report? <i>(MJ writes down on the purple priority-brick with help from KS and LM)</i>
XX5	<i>(KS, MJ and LM are all talking about the writing on the purple and blue priority-bricks)</i>

(GR 2, time: 0:20:51.4–0:21:27.4, Appendix D)

The excerpt shows how the idea about what to write and conclude in the group based on their discussion does not take place in a collaborative or joint manner. Given that a lot of the time is spent on writing down on the priority-brick in a non-collaborative manner, the group dynamics disappears, and the collaborative discussion fails to happen and is replaced by a focus on solving the task, namely, getting something down in writing on the priority-brick. In addition, insertion in the 3D tower of arguments written on the priority-bricks is done by either MJ alone in several instances or together with one of the other participants. This is seen, for instance, in the following situations, where other participants are engaged in discussions, while MJ handles the priority-bricks:

XX8 14	KS: Then this one <i>(KS points at the yellow priority-brick)</i> goes high <i>(KS points at the tower)</i> goes to around here. <i>(MJ is placing the yellow priority-brick in the tower without attention from the rest of the group except KS)</i>
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(GR 2, time: 0:45:11.8, Appendix D)

XX8	SK: And I suppose it is a (?water fresh?) <i>(MJ puts the dark green priority-brick in the tower without negotiating with the rest)</i> question to ask is it not? If you ask, should users adapt to technology? You might say, no they do not, they should not, but they may, they might. If a new technology is
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given to them, and they want to respond to it.

(GR 2, time: 0:36:05.0, Appendix D)

By definition, the prioritisation in the tower, as well as writing down, was meant as a scaffolding social activity triggering the participants to argue for their statements in a joint effort. However, this activity in the red group becomes a closing activity – hindering a collaborative exploration and orientation, for the benefit of one or two participants' focus on solving the task they were given using 3P.

In addition, the distribution of the versus-narratives in this group is characterised by a rhythm in which the versus-narratives are read aloud by one of the participants, after which they are stacked either on the table in front of the participants (see Figure 23) or put back into the tool base immediately after being read aloud. This restricts collective access to the content of the versus-narrative.



Figure 23. Example of how the red group stacks the versus-narratives in front of one group member after they are read aloud (the right side of the picture)

Comparing the socio-material distribution of the versus-narratives across all the groups, it is apparent how the green group leaves the versus-narratives out on the table, which makes information and reference available (displayed on p. 117) This simple thing – a distribution of materials among participants and organising displays – seems to be of importance in order to facilitate sharing.

THE GREEN GROUP

The green group is especially interesting with respect to the participants' ability to integrate the nuances of different interpretations and suggestions of the versus-narratives. The versus-narratives seem to have an important scaffolding effect for different forms of exploratory communication when integrated in this more nuanced way. Thus, I have subjected the green group to coding and a more in-depth analysis

with respect to differences in gestural and verbal expressions manifested in relation to participants' attention towards a versus-narrative.

The green group has 158 TMA codes as part of the participants' interaction, and two codes are remarkably dominant within this group, namely XX2 (*touching a versus-narrative*) and XX17 (*pointing at a versus-narrative*), with 47 and 57 occurrences, respectively. TMA code XX1, *a new versus-narrative is introduced*, is identified 12 times out of a total of 18 versus-narratives, which means that the group only manages to get through two of the three overall versus categories. From this, as well as from additional contextual observations of the participants' interaction with the versus-narratives, it seems that the versus-narratives play a significant mediating role in their conversations. Observations indicate that this group in particular manages to have a rich exchange in the communication about the specific versus-narratives laid out for discussion. Consequently, it seems that the group stays longer with the specific categories – and as such stays longer with the specific dilemmas represented in the tool.

Since the goal of 3P is to move dialogue from exchange of interests, assumptions and perceptions towards juxtaposition of these, and further still towards a shared expanded problem perception, it is vital to understand what brings group members to move forward on this path. Close observations indicate that the orientation towards the versus-narratives (XX2 and XX17) holds quite different functions and importance with respect to how they take on significance for the participants, when they are integrated in the process of setting up viewpoints, exchange viewpoints and highlight or formulate arguments in the green group. Thus, in order to characterise gestural and verbal expressions manifested in relation to participants' use of the versus-narrative, the coding strategies (explained on p. 90) have been used, and the results of this systematic analysis is presented in Table 8 below. Table 8 is a condensed scheme of the full coding displayed in Appendix B. The TMA codes (XX2 and XX17) resulted in fifteen different categories depicting nuances in gestural and verbal expressions manifested in relation to participants' interaction with, or reference to, a versus-narrative in Table 8.

Table 8.

Characteristics in gestural and verbal expressions manifested in relation to participants' versus-narrative use in the green group.

Total of ATM codes (XX2/XX17) identified from transcripts	Descriptions of characteristics in gestural and verbal expressions related to participants' use of versus-narratives	Categories
XX17 (0:00:27.9), (0:02:47.8) XX2 (0:00:55.2), (0:02:05.9),	1. Instrumental distribution of task – to meta-communicate about what they are doing, how to use the tool, what to do next, who does what,	Instrumental orientation and distribution of task

(0:02:36.6), (0:02:48.8), (0:03:31.7), (0:27:51.5), (0:30:42.4), (0:31:44.2), (0:49:14.9)	whether to hand a versus-narrative to somebody else or take a versus- narrative from somebody	
XX17 (0:27:35.2), (0:27:37.1), (0:31:06.4)	2. Referring to the versus-narrative to meta-communicate about how their discussions are interlinked with the other categories, or other parts of their discussions	Meta- communicate about where they are in a discussion
XX2 (0:00:28.3), (0:00:35.8), (0:00:37.0), (0:01:13.2), (0:01:17.8), (0:01:23.9), (0:03:22.2), (0:03:31.7), (0:04:32.5), (0:04:36.8), (0:05:27.1), (0:06:19.8), (0:29:36.7), (0:29:37.9), (0:29:47.0), (0:29:51.8), (0:29:59.5), (0:00:55.2). XX17 (0:03:21.6), (0:05:31.2), (0:05:35.2), (0:30:43.8), (0:31:20.7), (0:31:25.7), (0:01:32.0)	3. An orientating activity as a realm of understanding what versus category the versus-narrative belongs to – discussing how to understand the meaning and intention of a specific versus-narrative (emphasis is here an attempt to understand what the facilitator means by a category and not what the participants understand by the category)	An orientating activity – grasping intentions of the versus-narrative text
XX2 (0:06:23.5), (0:09:10.3), (0:31:31.0), (0:50:31.9), (0:01:27.4) XX17 (0:05:19.9), (0:06:08.5), (0:06:29.2), (0:07:13.8), (0:19:12.5), (0:25:09.7), (0:27:01.6), (0:31:30.8), (0:31:35.1), (0:42:37.4), (0:42:43.5), (0:05:14.4)	4. Versus-narrative(s) leading to an interpretation of the importance and significance of what it proposes, and a personal positioning in the discussion	Elaborating on their own assumptions, interests and interpretations of a versus- narrative text
XX2 (0:20:02.3), (0:31:35.2), (0:32:07.0) XX17 (0:08:00.8), (0:19:53.0), (0:20:22.4), (0:25:32.8), 0:28:43.8), (0:31:44.3), (0:32:08.7)	5. A specific part of a versus- narrative, used as a reference point – to elaborate on a viewpoint	Nuancing an understanding

XX2 (0:06:31.8), (0:18:55.9), (0:19:17.5) XX17 (0:41:43.2), (0:42:34.0), (0:49:30.9), (0:51:45.4)	6. Two different versus categories of versus-narratives (e.g. a green and a light green) are used as reference point to compare and contrast opposing understandings, or to fill in the ‘in between’	Contrasting understandings
XX17 (0:06:54.6)	7. Using more versus-narratives to switch between perspectives (within one versus category)	Nuancing an understanding
XX17 (0:32:56.3)	8. Using more versus-narratives within the same versus category to emphasise a specific understanding	Emphasising an understanding
XX2 (0:09:04.6)	9. Difference in meanings of versus-narratives within one site of a versus category used to nuance an understanding of a discussion	Nuancing an understanding
XX2 (0:50:31.9), (0:51:20.5), (0:33:47.9), (0:33:47.9) XX17 (0:08:11.8), (0:42:44.8), (0:44:00.1), (0:49:17.8), (0:50:46.2), (0:33:10.3), (0:40:27.4).	10. Versus-narrative used to compare with or reflect on current ‘factual’ knowledge or factual practices as either a way to validate the idea of the versus-narrative or to elaborate on the idea the versus-narrative proposes with reference to current practices	Validating or elaborating on a view
XX2 (0:30:27.9), (0:34:44.3), (0:35:22.5), (0:36:53.1) XX17 (0:08:42.1), (0:21:15.2), (0:30:35.2), (0:33:22.2)	11. Versus-narrative used as a reference to elaborate on another more overall dilemma	Versus-narratives leading to proposal of new dilemmas
XX17 (0:37:08.4), (0:37:29.9)	12. Reference to versus-narrative used as a way to position a new understanding in relation to the story the current versus-narratives proposes	Elaborating on a view

XX17 (0:38:36.6), (0:42:40.5)	13. Versus-narrative used to envision how to approach a specific problem – how to understand and handle a dilemma	Envisioning implications for future
XX2 (0:39:08.5) XX17 (0:38:47.8), (0:39:02.4), (0:49:17.8), (0:49:30.9) (0:09:13.8), (0:28:28.2)	14. Versus-narrative used as a reference point to explicitly position a personal viewpoint, preference or story in the discussion	Positioning a personal viewpoint
XX2 (0:01:27.1), (0:41:41.9) XX17 (0:33:03.4)	15. Indefinite or unclear use – one participant just holding on to a versus-narrative, not referring to it, or looking at it: just holding it in his/her hand	Indefinite use

I have organised Table 8's findings conceptually in the sub-categories and core categories depicted in Figure 24 below, in order to visualise patterns in the versus-narrative's mediated interaction. Figure 24 shows my categorisation of characteristics in participants' gestural and verbal expressions.

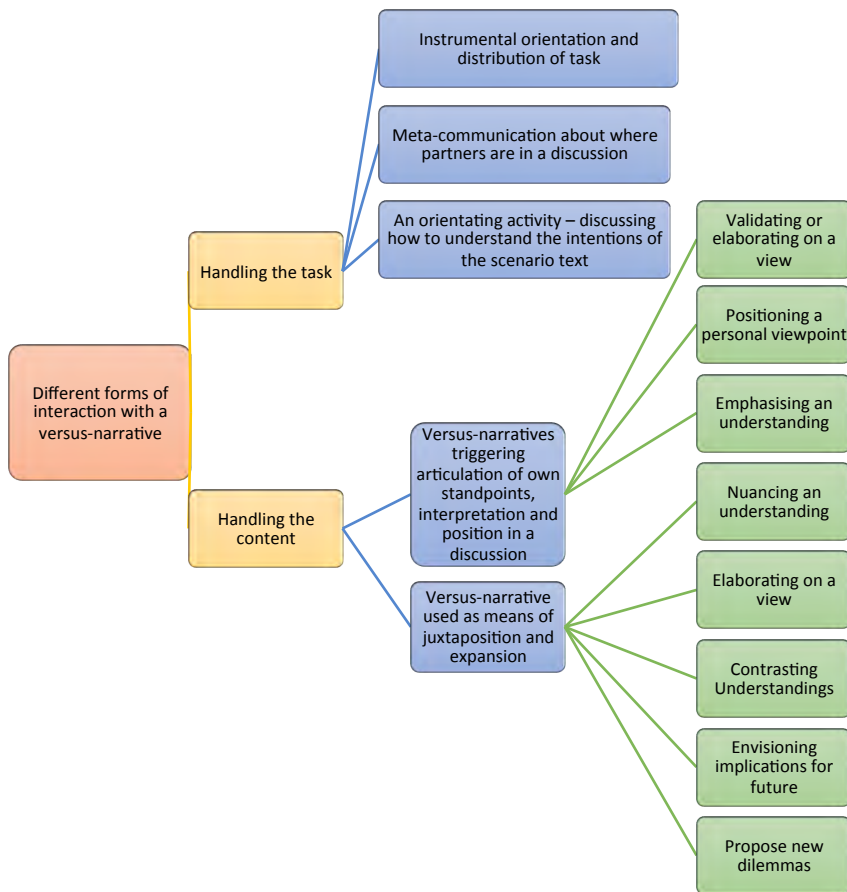


Figure 24. Categories of characteristics in participants' gestural and verbal expressions in relation to participants' use of a versus-narrative in the green group.

Two core categories emerged from the conceptual organisation in Figure 24. I label the first core category 'handling the task' = instances, where the interaction with a versus-narrative is characterised by an orientation towards rules and procedures of the tool, as well as characterised by an attempt to understand the intent of the versus-narrative text. The second core category I have labelled 'handling the content' = instances where interaction with a versus-narrative is characterised by different forms of exploration of a dilemma, where a versus-narrative triggers articulation of a participant's own interpretation, assumptions and interests, and where a versus-narrative is oriented towards as means of juxtaposing these interpretations, which might lead to an expanded problem perception.

The first core category covers instances of *interpretation of the intentions of the versus-narratives*. The second core category (participants' personal stories, professional interests or factual knowledge) covers instances of interpretation of *the significance of a versus-narrative*.

The core category of 'handling the task' is not elaborated further here, but briefly elaborated in Chapter 6. The core category of 'handling the context' refers to those processes that lead to a more nuanced or in-depth exploratory practice – from individual goal orientations and interests towards a collective description of a problem area challenges and possibilities. I will go into more detail with my findings about what mediates progress in the groups' communication, and what hinders or obstructs progress while also supporting the groups in 'staying with trouble'.

Insight: Versus-narrative triggering articulation of participants' own standpoints, interpretations and positions in a discussion

The category of Figure 24 'Versus-narrative triggering articulation of participants' own standpoints, interpretations and positions in a discussion' is conceptually constructed by the sub-categories of Figure 24:

- Validating or elaborating on a view
- Positioning a personal viewpoint
- Emphasising an understanding

In principle, these sub-categories are examples of exchange; something is exchanged – an assumption, a value, a perspective, a personal viewpoint, etc. Here, different forms of exchange are elaborated.

Participants' interaction with a versus-narrative identified here involves either 1) a *triggering function* – directly triggering a response or recollection from a participant, or 2) a *mediating function*, where the versus-narrative is oriented to and dragged in to implicate, explicate or emphasise the participant's own assumptions and interests as part of a discussion or as a way to re-address prior arguments. Both functions incorporate the use of the versus-narratives as a *public display* (Jordan & Henderson, 1995), which means that the versus-narratives are made available for all of the participants, where they are used as a common visual ground of collective reference. Figure 25 below shows how the versus-narratives are made available for all group members. This is in contrast to the example p. 110 of the red group. This simple availability of distribution and organisation of displays in the green group is of importance in order for the participants to facilitate an explicit exchange.



Figure 25. Participants discuss one of the overall versus categories. The versus-narratives are laid out on the table for all the participants to refer to.

Participants' interaction with the versus-narratives shows how the versus-narratives are dragged in, either to nuance a specific part of a versus-narrative, by using it as reference point to elaborate on a viewpoint, or to situate the ideas of the versus-narrative text in relation to the current discussion. The communication characterised by participants' interaction with the versus-narrative towards exchange in this category is manifested in expressions such as:

HJ: 'Yeah, yeah, but I am just saying they can do this?' (*points at ?? versus-narrative*)

'It (?should?) already exist.' (*points at a the light green versus-narrative with the story of Susan*)

'But it is something similar (*picks up the yellow versus-narrative and put it back on the table*) to what we are doing in this project...'

(*JS reaches out to point at the orange versus-narrative AH was pointing at before*) 'This example reminds a little bit about this television program.'

HJ: 'As I see it, eh. So to me what is a bit interesting to me (*holding his finger on the orange versus-narrative he just read*) about this, is that we actually with what has been done right now, with the ... like build regulation, it is quite in this direction.' (*HJ Points at an orange versus-narrative*)

HB: 'Or regardless of if it is Danish or not, but it is very much in this (*puts his whole hand on all the orange versus-narratives on the table*)

over here, right' (*puts his whole hand on all the orange versus-narratives on the table*).

The examples depict what is shared when referring to or dragging in versus-narratives – an attention to *what is* – declaring and positioning past and present meanings and knowledge, comparing the versus-narrative to existing knowledge, such as comparing the meaning of the narrative to what the participants are doing in the UserTEC project, a former television program on sustainability, an existing technology in the 'story of Susan' or the building regulation. Thus, the examples show how the versus-narratives are used to compare with or reflect on current 'factual' knowledge or factual practices as either a way of validating the idea of the versus-narrative or of elaborating on the idea the versus-narrative proposes with reference to current practices.

Other examples of participants' interaction with the versus-narrative under this category show how participants drag narratives in to explicitly declare a professional position and standpoint in the discussion:

HJ: 'I mean, personally I am much more over here (*pointing at a yellow versus-narrative at the table – learning from users*). I mean, from our point of view, we need to understand the users better to make better solutions for them. Trying to teach them.'

JS: 'We would probably be (*points towards the orange versus-narratives*) over here. But in another way.'

HJ: 'This is (*points at the yellow versus-narrative*) what we do in my team...'

It is interesting to see the green group's ability to transgress and reflect beyond their own level of interest, when referring to the versus-narratives. For example:

HJ: 'Ah, okay, so I think from my, if we as a society want to do something, this (*points at a yellow versus-narrative – learning from users*) is not going to do a lot I think. But (*puts his hands flat on more yellow versus-narratives*) I know from a corporate perspective, this (*points at the same specific yellow versus-narrative*) matters a lot to me. Because, I mean, but I am not necessarily...'

From the excerpt, it is evident how HJ recognises that the best solution is not necessarily corresponding with what he is interested in – but showing these interests on the table in dichotomies it becomes possible to drag them in, to inform decisions about limits and possibilities for further elaboration and motivation. It is important to acknowledge these instances of realising that one could also take a different position.

Insight: Versus-narrative used as means of juxtaposition and expansion

The core category '*Versus-narrative used as means of juxtaposition and expansion*' is conceptually constructed by the sub-categories of Figure 24:

- Nuancing an understanding
- Elaborating on a view
- Contrasting Understandings
- Envisioning implications for future
- Propose new dilemmas

The characteristics of this category are identified as situations where 1) differences in meanings of versus-narratives within one site of a versus category are used to nuance an understanding of a discussion, or 2) two opposing versus-narratives within one versus category (e.g. 'Technology adapting to the users' everyday activities vs. Users adapting to technical standards') are used as a reference point to compare and contrast opposing understandings, or to fill in the 'in between' or missing perspective in the discussion. Both functions incorporate participants' interaction with the versus-narratives as a way to contrast understanding initiated or triggered by the versus-framing and versus categories designed into the 3P tool.

The communication accompanied by participants' interaction with the versus-narratives in this category is characterised by utterances such as '*both and*', '*it is not a black-and-white thing*', '*there is a difference between*', '*there is a lot more happening*', '*this one ... that one*', '*it is more nuanced than that*', '*this is in between*', '*So well it is an interplay between*' '*this ... whereas this,*' etc. (see Appendix B 'Table of TMA codes')

As in the previous examples just mentioned above, the versus-framing and versus-rhetoric in this category support elaboration of more views in a discussion, instead of claiming a one-sided viewpoint.

In the excerpt below, an example is given in which participants deal with one of the overall dilemmas by attending to the versus-narratives. The participants have in a collaborative effort read aloud all the versus-narratives of one of the overall versus categories, 'Where to place flexibility?: Technology adapting to the users' everyday activities vs. Users adapting to technical standards' (the former represented by light green versus-narratives, the latter by dark green). The participants have laid the versus-narratives out on the table (see Figure 25) and focus their discussion on versus-narratives of 'Technology adapting to users everyday activities', after which the single versus-narratives are dragged in to discuss, question and juxtapose perspectives. For my analytical purposes, it is important to show how several participants take turns to contribute different perspectives with reference to the different versus-narratives. One of the participants, HN, a senior researcher and civil engineer, directs attention to one of the versus-narratives that has just been read aloud, expressing his appreciation for the perspective of the narrative, which he

interprets as being about users' 'free choice'. After this, another of the participants, HJ, a department head and also an engineer, raises a concern about the meaning of one of the other versus-narratives, after which the following discussion unfolds:

XX2	HN: This is okay I think (<i>picks the same light green versus-narrative as HJ was touching before to look at it</i>), a free choice that is good (<i>puts the versus-narrative back down</i>).
XX1 7	HJ: To me, this one (<i>points at a light green versus-narrative</i>) still stands out a bit.
XX1 7	JS: (? makes this a difference?) There is a difference between having someone else deciding what is smart, good or efficient, and then implying (<i>hold his hands upon a dark green versus-narratives</i>) something about a family or demonstrating (<i>holds his hands upon a light green versus-narrative</i>) that this is stupid behaviour, you could save money if you did that, because they (<i>points at a light green versus-narratives</i>) still have the free will not to adhere to the motivation.
XX1 7	HJ: Yeah, true, so on these two (<i>points at two light green versus-narratives</i>), the first ones it just happens, so if this one (<i>points at a light green versus-narrative</i>) was at the same level, it would just show the ... it would just turn the electrical devices off when they left.
	JS: Yes, there would be a ?XX? censor and then as soon as they are out it will shut down.
	Others: Yes.
XX1 7	HJ: But this one actually (<i>points at a light green versus-narrative</i>) is (a very long pause) I mean, it is self-given, that obviously the users are right to do things differently. But to me it is.
	JS: I think that it is very hard not to agree, that there must be a wide space for users to define what they think is nice to do. I guess we all know the stories about this whole idea of just having a button in an office building, being able to turn. They might not change the temperature a lot, but just the satisfaction of trying to adjust something individually makes people happier, and I guess this is exactly the same thing in homes.
XX1 7	AH: Yeah. There is also this (<i>taps his fingers at a specific light green versus-narrative lying on the table</i>), so Susan also sees like, so now the technology takes over her (<i>pointing towards the same versus-narrative</i>) daily practice of...
XX3 /XX 17	JS: But exactly that story (<i>points his hands towards a light green versus-narratives</i>) also shows that it is not a black (<i>turn his fingers to point towards the row of dark green versus-narratives</i>) and white thing (<i>points towards the row of light green versus-narratives</i>). I

	mean, if it's also the question of who decides (<i>pointing at a light green versus-narrative</i>) if Susan has to have this regulator or not. I mean, if it is Susan who (<i>points at a light green versus-narrative</i>) goes out and by it (<i>points at a light green versus-narrative</i>) realising I forget to shut it off, every time I am opening my window I forget this. So if I had this device (<i>points at a light green versus-narrative</i>), it would remember it for me. And this is a totally different scene.
	AH: I know, yeah. That would probably be the case.
XX/ 17	HN: It (?should?) already exist (<i>points at a the light green versus-narrative with the story of Susan</i>), a system that switches off automatically when you open the window. When it gets cold too fast it turns off. So I think that is a good, that is okay to have this. It does not take away your free will ...
	JS: Free will away..
	HN: You are not limited.
	HJ: But, the most free will in this one (<i>touches a light green versus-narrative</i>) is on this one, right?

(GR 3, time: 0:06:29.2–0:09:04.6, Appendix E)

This whole line of reasoning and discussing unfolds between four of the five participants in the group. As indicated by the bold letters, almost every utterance starts with directing attention towards a versus-narrative, where one participant at a time builds on top of another participant's utterances: 'there is a difference between', 'so on these two', 'so if this one', 'but this one actually', 'there is also this', 'exactly that story'. These deictic references to the versus-narratives help direct collective attention towards the nuances of a narrative text as well as triggering the participants to revisit and utter different understandings. This exchange and process is visualised in Figure 26.

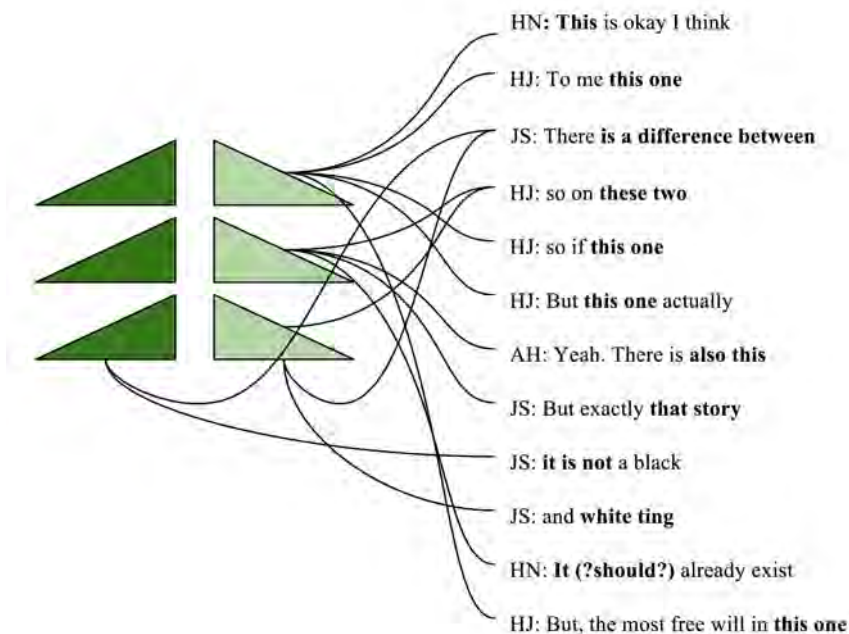


Figure 26. A condensed visualisation of participants' communicative exchange and interaction with versus-narratives (from the transcript extract p. 120 above).

On the basis of the participants' direct references to the narrative text, different understandings of 'free choice' introduced by the first participant are examined. First, HN expresses his appreciation for the perspective of the narrative, which he interprets as being about users' 'free choice'. Then, HJ raises a concern about the meaning of one of the other versus-narratives: 'To me, this one still stands out a bit'. JS tries to express his understanding of the difference between the light green narratives (Technology adapting to the users' everyday activities) and the dark green narratives (Users adapting to technical standards), where he highlights the difference between 'having someone else deciding what is smart, good or efficient and then implying something about a family or demonstrating stupid behaviour'. On this basis, JS proposes that the concept of free will is about the free will not to adhere to the motivation. HJ then attends to the nuances of this understanding, referring to two specific versus-narratives and then returning to the versus-narrative about which he uttered 'but this one still stands out a bit', but now with an elaborated understanding of how to understand the difference between the versus-narratives, on the basis of which he states that 'obviously the users are right to do things differently'. JS then follows up, stating that there 'must be a wide space for users, to define what they think is nice to do', based on an understanding of users' 'satisfaction when being able to adjust something'. HN enters the discussion with reference to a specific

versus-narrative, from where he highlights a concern about 'how technology takes over her (the person in the narrative) daily practice'. This leads JS to point out how the dilemma is 'not a black-and-white thing', but about 'who decides' in these matters of home regulation of energy use. JS does so by both pointing between the dark green and light green rows of versus-narratives on the table. HN joins in by stating that the 'automatic system' proposed in one of the versus-narratives 'already exists', and that the idea of such a system is 'okay' because it 'does not take away your free will'. Hereafter, HJ returns to point at the same versus-narrative as he did at the beginning of the excerpt, starting to determine in which examples 'the most free will' is to be found, after which the discussion continues.

The green group has in general an affirmative and supportive way of communicating, both attending to the prior uttered points and understandings and directing attention to new nuances of the discussion. It is important here to emphasise how this attention to new nuances is always made with direct reference to the versus-narratives.

In the following examples, orientation and juxtaposition of perspectives are made by one participant alone, and the act of taking several perspectives into account in the discussion is not triggered by interaction and communication with other participants but directly triggered by the versus-rhetoric and visually available dichotomic framing within one versus category. The opposite perspective of what the participants claim to be interested in is thus not represented by the other participants, but from ideas conceptualised and presented through the versus category suggesting two outer poles re-framed and re-interpreted by the participants:

'This (waves his hand in front of the dark green versus-narratives), whereas if this works (points at the light green versus-narrative with the John story – equipping a house with an automatic on-off system), so let's say this is perfect, right. Then this is at no cost to the user, right. I mean, if it really works, and the same with this, right (points at the light green Susan versus-narrative – automatic thermostat) if it always does what the user is actually looking for, then I see this (points at the Susan versus-narrative) much more taking place. This one (touches the last light green versus-narrative on the table with the story of Gina and James – showing the amount of money they could lose if they do not shut off their system during long trips away), this one I see is a bit more annoying, I have to say. Aaahh, you show we an amount, yeah okay, you could lose one and a half kroner.' (GR 3, time 0:19:17.5–0:19:52.5, Appendix E)

JS: 'So, well, it is an interplay between (weaving his hands back and forth between the orange and yellow versus-narratives) education (points towards the orange versus-narratives – education) and learning (points towards the yellow versus-narratives – learning). Because one cannot work without the other' (waving his hand between the categories). (GR 3, time 0:42:34.0–0:42:37.4, Appendix E)

HB: ‘I think (*points at the versus-narratives at the table*) this is in between, because we cannot really ... get rid of the regulation, or we really need the regulation to ... in certain ways that people would have the energy retrofit because if we do not have any policy, we do not impose anything on people, they do whatever they want, and in that case many people would have low standards or consider other things like (??), instead of other parameters than the environmental parameters then. But still we want to learn what the user wants. We do not want to let them feel they are out of their freedom, they don’t have choices.’ (GR 3, time 0:41:43.2–0:42:25.9, Appendix E)

As can be seen from the examples, opposites are taken into account and examined. The perspectives that failed to meet each other in the first workshop seem to be considered equally in this second workshop by the participants. This is done by referring to both poles of the dilemma. This versus-framing of dilemmas also seems in some instances to lead the participants to understand more fundamental problems of others’ challenges, as is seen in this example:

HJ: ‘Active users passive users’, I think. I do not know. But I think this is also the (*points back and forth between the orange versus-narratives and the yellow versus-narratives*) the fundamental problem of the challenge you guys are facing and running into, right? How much can we force upon people (*points at HN*)?’ (GR 3, time 0:51:45.4–0:52:01.9, Appendix E)

I conclude that many perspectives are examined on the basis of direct reference to the nuances of the versus-narratives or on the basis of the overall versus-framing, as well as perspectives that do not necessarily match the participants’ own interests or problem understanding, but a more general problem understanding. This happens when the participants are confronted with perspectives they do not necessarily align with, but where they acknowledge that it might still be a perspective to take into account.

LESSONS LEARNT ABOUT THE THREE GROUPS' 3P TOOL USE: SUMMING UP FINDINGS FROM THE EMPIRICAL ANALYSIS

My analysis of the three groups' communication and interaction around 3P has shown how difficult and complex it is to understand people's mediated communication – for members of the groups between themselves and for me as a researcher. All groups had the same point of departure: the context of use, the setting, the rules, the introduction and the help available were equal. However, they ended up with quite diverging communicative practices when interacting with the 3P tool. I summarise the most significant differences here.

I characterise the red group's manipulation of, or reference to, a versus-narrative as mainly an orientating activity rather than an argumentative or constructive activity, where nuances of perspectives are examined towards exploration of the versus categories laid out for discussion. It is not self-given that the versus-narratives are needed in order to have a productive dialogue or a rich exchange. However, in the red group, the examples show a general inclination to complete the job they have been assigned, using the versus-narratives and the rules of the tool as dialogic starters. Nonetheless, as the group moves along, the tool elements become more of an obstacle to be overcome. I assume this to be due to the fact that the red group mainly uses the versus-narrative for clarification: what does the facilitator mean? In fact, the group spends a lot of time without initiating new learning, exchange or the like. In addition, the group members turn to the tool elements on an individual basis, which means that the 3P tool in several cases fails to function as a mediator of communication.

The red group makes use of all the versus-narratives. The participants write down on all the priority-bricks, and they place all the priority-bricks in the tower. At first, the group's work seems like a job well done, judged from the use of single tool elements. However, from a communication theoretical point of view and from the point of view of the purpose of using the 3P tool, the task is completed without a collaborative effort, with restricted display, and from time to time with the tool having a directly limiting function. The red group's attempt to fulfil the task as correctly as possible seems to be a hindrance to their exchange and discussion. However, this is not only caused by their way of using 3P. When I look into the context of the versus-narrative use, I find that this group in its interactions somehow lacks communicative skills: several times, one group member is actually triggered by the overall versus category to ask a more reflective question about the nature of the overall category, the dilemma it represents, or the like. However, the other participants neglect this opening in favour of moving on to another category or writing down on the priority-brick. Altogether, the examples and findings highlighted from the red group show that the communication and tool manipulation exercised are closure-seeking rather than explorative.

The green group is especially interesting with respect to participants' use of the versus-narratives. It is evident that the participants engage with the versus-

narratives, and reflect, reject or elaborate on their significance, a behaviour that leads to openings rather than closure in the communication. The openings seem to depend on the participants' ability to stay with and examine the nuances of a narrative text and reflect upon its relevance. The versus-narratives seem to have a scaffolding effect, resulting in different forms of exploratory communication when integrated in this more nuanced way. I have shown examples where the versus-narratives serve as triggers for participants, prompting them to contribute their own perceptions (personal stories, professional interests or factual knowledge) about the significance of a versus-narrative, and I have shown examples where the tool scaffolds juxtapositioning of perspectives and encourages participants to take opposites into account, at times even opposites that do not correspond with their own values or interests. Often, two opposing versus-narratives (e.g. a dark green one and a light green one) are used as reference points to compare and contrast opposing understandings or to fill the 'in between' of two opposite poles that cannot easily come together. This creates synergies of exchange and progress in the conversation, commanding explication of their own assumptions and interests, contrasted by other participants' intentions in the discussion or by the intent built into the versus-narrative. This versus-framing is interesting for a discussion where the goal is to take into account more perspectives. The versus-framing – dilemmas put into dichotomies – might be highlighted as one of the tool's central qualities.

In the blue group, the 3P mediated communication is mainly based on the overall versus categories, the priority-bricks and an attention towards the colours that represent different perspectives. These elements of 3P are used as means of organising viewpoints as well as a means for participants to construct, underline or visually show their position in the dialogue. The rhetoric of opposition represented by the versus categories is often used in this group as a way to take into consideration contrasting views – or both sides of the versus categories – while physically referring to (pointing, touching or rearranging) tool elements. This versus-rhetoric encourages participants to both utter arguments and counterarguments when discussing a dilemma, precisely in the way that can be seen in the green group. However, the blue group often makes use of the versus-rhetoric, referring 'upwards' to the overall categories, mediated by the versus category brick or the priority-bricks rather than by reference to the nuances of a narrative text, as is seen in the green group. This rather loose use of the tool, not adhering more specifically to the versus-narrative text, allows the participants to fill in the 'in between' or missing parts of the discussion guided by the overall versus categories. However, this leads to more unfocused discussions in which one or more of the participants uses the overall versus category several times to redirect attention in the discussion. It also seems that the 3P's ability to facilitate the mixing of understandings or the development of viewpoints, let alone questioning them more deeply, is missed when the tool is used loosely.

For all three groups, it is evident that the explicit polarisation in the versus-narratives lead participants to observe that the dilemmas that are represented are 'not

only a black-and-white thing', although they may personally hold a 'black-and-white' perspective. This indicates that participants are willing, and maybe experience a need to, take into account more perspectives. The question is, of course, whether this acknowledgement of the existence of other perspectives is forced without a critically oriented and argued juxtaposition, and therefore rather a way of seeking peace and closure than an attempt to open new horizons. This is something I elaborate on in the concluding chapter.

The versus-narratives and versus-framing of dilemmas in 3P are identified as particularly interesting with respect to their function in a group's exploratory communicative practice. Therefore, the further summation of central findings below centre around the versus-narratives' role in the exploratory communicative practice of the UserTEC participants.

When analysing the material, especially that from the green group, just presented, I realise that I have already, from the outset, carried with me, as a blindness if you will, an ideal about how successful 3P-mediated communication would look, or in other words, an image of how people talk when they move towards a third space together (as described Chapter 3). Rationally, I do not subscribe to the idea of putting a template over actual conversations, counting instances of mappings and calling the result a successful 3P-mediated communication. I would like to make clear that my premise is that communication is situated, one of a kind and unpredictable. On the other hand, my in situ findings must, in order to deserve the label 'research', be communicated with a message of general interest, which in my case is to make multiple stakeholders acknowledge differences, become interested in other perspectives and gradually align and move towards a common new terrain of problem formulations. In formulating a message of general interest, the ideal of a communication situation serves me as a guideline, when I want to evaluate the qualities of the 3P tool for my stated purpose. The following chapter present such an evaluation.

CHAPTER 6. DISCUSSION: POTENTIAL AND LIMITATIONS OF THIRD SPACE COMMUNICATION

In my research, I raised the following question: 2) How can tool-mediation lead communicating parties to move towards a third space, a common ground, for participants' mutual exploration of a problem setting?

Before I begin my discussion of how my research contributes to answering this research question, I would like to draw together the lines of my research which my empirical work must be evaluated against and situated upon.

In Chapters 1, 2 and 3, I argued for the relevance of mediating multi-stakeholder communication, both theoretically as well as practically in cross-disciplinary research, such as in UserTEC's project.. I have argued that, before moving towards a common understanding, differences in positions must be confronted. Since these differences are often tacit to their beholders, a mediating tool is useful in making them explicitly available for reengagement. I built a prototype of a communication tool, the 3P tool, based on my analysis of UserTEC workshop communication.

I formulated 3P's design brief drawing on inspiration from the fields of Design Anthropology, pragmatic epistemology and Participatory Design, particularly the discussion surrounding the concept of a third space. This design brief work led me to four requirements for the 3P tool to fulfil. The following requirements have been refined throughout my research process:

- **Encourage** reengagement with the current troubles represented by situated dilemmas into versus-narratives.
- **Share** differentiated professional positions (differences in interests, assumptions and perceptions) based on a common frame of reference.
- **Explore** the key agreements and disagreements of a subject matter/problem space towards the collective exploration of alternatives (a collectively expanded and elaborate understanding of a problem)
- **Overcome** communicative closure.

In Chapter 5 by an analytical double take, I have first selected passages where 3P encouraged participants to engage with opposites. Then, I analysed these passages both as instrumental to keep the group on track and as springboards to creating a third space, where they were able to step out of their comfort zones and start listening to new ideas and see new possibilities.

I present my discussion and a synthesis of the research findings with the aim of evaluating how the research was conducted to answer the research question. The

main aim of this chapter is to conceptualise what is needed to facilitate the often ignored first step of bringing people of different professions together when confronted with a problem formulation situation. This conceptualisation is based on my in-depth analysis of the 3P-mediated communication in the green group, which led me to identify four fundamental levels of participants' communicative orientation that seem necessary – at least for these participants – to move towards a third space of mutual exploration. In the light of this analysis, I will compare the ways in which the two other groups proceeded and suggest what hindered participants from reaching a third space. These insights, although explorative, allow me to identify important steps for modifying the 3P tool further. I will introduce ideas for the future modification of 3P at the end of this chapter.

Communicative orientation and exchange when interacting with 3P

My in-depth analysis has revealed several diverse ways in which participants orientate towards (touching, pointing, referring or integrating) a versus-narrative as part of their communication or interaction with one another. These differences in orientation are presented as categories in Table 8, p. 111 (coding scheme). The categories of Table 8 were organised into sub-categories and core categories, as depicted in Figure 24, p. 115, in order to visualise patterns in the versus-narrative-mediated interaction. For the purpose of clarification, I have described these patterns as four levels (p. 131), going from what I characterise as the most basic form of orientation towards the most expansive form of orientation. I use the four levels to illustrate what it takes to reach a level of reengagement with the dilemmas of 3P when using the 3P tool. Here, reengagement is understood as the participants' ability to reach beyond the interpretation of the intentions of the versus-narrative towards contributing personal stories, professional interests, factual knowledge or reflective questions to interpret, judge or reject the significance of a versus-narrative. The point is to show that arriving at a third space communication of mutual exploration is not simple; it takes time, effort and the skills of the participants. From the outset, the tool was meant to allow a participant to jump into a discussion of the dilemmas. However, empirical findings have brought to my realisation that remembering the steps required to become a skilled user of an unknown tool and understanding the intention of a facilitator are necessary before being able to engage with and contribute to the subject matter of a tool. Metaphorically, the four levels presented can be understood as a quest in a game, where the first levels of skills and engagement are needed in order to reach a higher level of engagement towards third space communication.

Each level hereafter is an illustration of how participants' interaction with a versus-narrative, including nuances in questioning, inquiring, consulting and considering new perspectives, is coherent with their differences in the collaboration and communication. I have formulated 'signature' sentences as they appear in the data (Chapter 5) as illustrations under each of the four levels, which are outlined below.

1. **Taking an instrumental orientation towards versus-narratives**
 - How do we understand the task of using 3P?
 - You do this; I take that.
2. **Understanding the intent of versus-narratives**
 - Do we understand the intention and categorisation of the versus-narrative?
 - Does the versus-narrative text make sense to us?
3. **Engaging, sharing and elaborating on versus-narratives based on participants' own interpretation of their significance and their interest levels**
 - How do we interpret the intentions?
 - What is our understanding of this?
 - Is this significant? If so, how?

This interpretation is enhanced using a versus-narrative as a scaffold to emphasise, nuance and contrast an understanding:

 - Emphasising an understanding:
 - 'So what I think or understand by this ...'
 - Nuancing an understanding:
 - 'On the basis of ...'
 - Elaborating on an understanding:
 - 'This has nothing to do with ...but with ...'
 - Positioning a personal viewpoint:
 - 'From my perspective, this is what we do ...'
4. **Expanding the current perceptions of versus-narratives**
 - Contrasting understandings and considering different perspectives:
 - 'Both...and', 'It is in between' or 'It is not black and white'.
 - Proposing new dilemmas:
 - 'On the basis of this...', 'Taking it further...' or 'This could also mean ...'
 - Envisioning implications for the future:
 - 'So, this could be ...', 'This means that ...', or 'We must ...'

The first two levels indicate basic orientation steps in exploratory collaborative inquiry practice to assist collaboration. However, given the purpose of seeking common ground and expanding on shared problem formulation, it is rather problematic if participants do not advance from the two first levels of tool orientation, as was seen in the red group and the blue group. In terms of the research, this raises the question of what hinders participants from progressing further. Likewise, it is important to understand how the participants' orientation towards the versus-narratives takes on significance when they are integrated in setting up viewpoints, exchanging viewpoints and highlighting or formulating arguments, as exemplified by Levels 3 and 4. I can point out the consequences of reaching different levels of engagement with 3P, but I cannot explain the details of

why they have been reached. Therefore, for now, I have restricted myself to presenting a categorisation of how the mediation of 3P transpires and what communicative forms are essential when engaging in exploratory partner meetings with the aim of co-producing insights and inquiries. The exchange, juxtaposition and expansion of perspectives seems to be based on the ability to master a rich communication practice that occurs through a versus communication practice. Such attention to the specificity of a communicative practice is rarely mentioned in the literature on Participatory Design or on Design Anthropology. Therefore, I consider this in detail focus on the differences of communicative practices as part of my research contribution to show the implications of skilful and less skilful tool-mediated communication. Using the different levels, I have depicted how different forms of tool use relate to participants' communicative practices and at what levels it becomes possible to exchange viewpoints to expand the problem perceptions of a third space.

An expanded understanding of a problem space is here correlated with a participants' comfort level in a third space, where participants can exchange interests, gain insights, elaborate on ideas based on a combination of voices and listen and respond to one another, which opens a space for joint communication. The four different steps are described below, focusing on the potential as well as the limitations of third space communication when interacting with 3P from Levels 1–4. This potential and the limitations are discussed based on how communication and interaction are manifested both empirically and theoretically on the perspectives of communication presented Chapter 3.

Levels 1 and 2: Taking an instrumental orientation towards versus-narratives and understanding the intent of versus-narratives

Level 1, taking an instrumental orientation towards a versus-narrative, comprises the hands-on operational use of the material, where a versus-narrative is used as a means of dividing and distributing labour, meta-communicating about group activities, explaining next moves, outlining who completes what tasks, constraining or giving access to different participants, etc. This is observed in all groups and is a phenomenon parallel to what Schmidt (2011) termed 'articulation work' (as described Chapter 3). As such, the use of versus-narratives and the tangible elements of the tool affiliated with the concept of articulation work represents a basic orientation in a group of people who are asked to solve a task in a collaborative effort. In this case, they were asked to use the 3P tool and the versus-narratives to discuss three key dilemmas. It is remarkable how the blue group and red group transcended this level of work-orientation articulation towards a versus-narrative only a few times. For these two groups, the tool seems to have been more of a hindrance; it was something extra to deal with rather than a scaffold for exploring and exchanging assumptions, interests and perceptions of the dilemmas. I see this in situations where:

- The conceptualisation of versus-narratives does not comply with or correspond to the participants' own mental model. Thus, they cannot challenge their current perceptions of dilemmas a meaningful way, let alone trigger a new response or perspective.
- The 3P tool's elements are subject to restricted access from one participant and are therefore unavailable as public displays for the whole group to make use of or refer to.
- The participants are too eager to understand the facilitators' intent with versus-narratives at the expense of contributing their own interpretations to elaborate on their perceptions of a dilemma, which could be an argument for not using pre-defined categories in future research. This is something to explore further.
- Questions triggered by one participant's reference to a versus-narrative are overlooked or neglected for the benefit of moving on with the task, such as writing down information, moving to the next category or placing priority on the 3D tower.

I will now move on to what it takes to advance from the first two levels of engagement to an exploratory communicative practice, where participants can engage with, and maybe even expand, the individual perceptions of central dilemmas. What is presented below is based on the findings of the best practices of tool use, as determined by analysing the green group.

Level 3: Engaging, sharing and elaborating on versus-narratives based on participants' own interpretation of their significance and their interest levels

At Level 3, participants begin to consider opposing and diverse perspectives of a discussion. They begin to exchange interests and identify where insights have been gained. I infer that it is not until the participants reach this level of exchange that the exploration of dilemmas and the discussion can move forward. It is especially at this level that I can identify the versus-narratives to play a role. As such, 3P's elements have a scaffolding effect when used beyond Levels 1 and 2, as it is able to both mediate and trigger participants in exchanging their perspectives. However, the tool alone is not responsible for this. The quality and level of exchange is directly linked to and corresponds with the participants' social skills of engaging in questioning, answering questions, listening to and considering the perspectives of others and the 3P tool's versus-narratives. The exchange that occurs at Level 3 is important for reaching expanded collective problem perception, which is made possible in Level 4.

3P was designed to assist professionals in sharing their perspectives based on finding common ground; in my research context, this means finding a visual or material reference point of attention rather than mental common ground, i.e., all must obtain the same understanding. Indeed, it is the opposite: all participants must

move jointly into a third space, what is, for them, conceptually uncharted territory. 3P supports this, being a tool to which all participants are required to relate, especially in terms of its versus categories and versus-narratives. It is evident from the analysis that the tool establishes a common point of reference for exploration. This happens especially when the participants make use of the versus-narratives as public displays available to touch and refer to, as seen in the green group's practice of using the tool. In these instances, especially in Level 3, the versus-narratives provide a common reference point for the group to redirect attention, increase the sharing of meanings, contrast nuances, clarify assumptions, clearly state professional positions and claim interest in the discussions.

Several findings in Chapter 5 show how the act of claiming interest or setting personal positions does not necessarily lead to further communication. Instead, the findings suggest that it is when participants make use of the clear dichotomies in versus framing that interests and dilemmas can be examined discursively. Theoretically, I have advocated for a dialectical communication practice. I maintain that understanding the quality of a dialogue requires the ability to examine and check meanings in a larger system of meanings. This is done by interpreting intent and reframing others' understandings or interests in such a way that communication can move forward (as explained Chapter 3). Therefore, immediately accepted or rejected positions of a participant claiming an interest or interpretation, as seen in some instances in the red and blue groups, equally constrain a discussion, preventing it from moving forward if it is not mirrored by another participant's intent. For instance, in the green group, participants listened to the narrative text and then reframed it. In contrast to the red group's communicative practices around the versus-narratives, the green group did not simply reproduce the intent of the versus-narrative but reframed it to reflect the participants' contributions and assumptions. This highlights the issue of differences in communicative skills. As such, the quality of an exploratory communicative praxis and the ability to exchange understanding of a problem depends on a participant's ability to both listen and respond with intent. The red and blue groups also exchanged meanings but often remained on the level of the 'fetish of assertion', as described in Chapter 3, in which communication is about uttering statements as truths or beliefs that are not followed by a willingness to listen to other perspectives for the sake of renegotiation.

As mentioned several times, one of the goals of using 3P was to allow the participants to 'stay with the tensions'. In the green group, the versus-narratives played a significant role in keeping the group focused on the topics laid out for discussion and in allowing them to firmly base arguments on the narrative representation and their own interpretations. From the first workshop, and as illustrated by Excerpt I presented at the opening of the thesis, what appears to be central is how perspectives are exchanged but not taken in. As already stated, the partners of UserTEC were not forced to collaborate towards a shared product or practice; however, as participants in the research project, they were encouraged to share their perspectives on how to support better practices of users' energy savings

in the future. This lack of need and pressure may explain why the first workshop resulted in several discussions that ended with statements like, ‘Well, I do not think we agree’. Conflicting viewpoints can be valuable for exploratory practices since they call for explicit examination. Participant engagement or disengagement relies on the motivation and the situation, as participants may not find engagement worth the effort. What is central to highlight here is how the versus-narratives represent conflicting messages. This means that even if a participant shies away, or if conflicting messages are not represented in the conversation even though they exist, the 3P tool invites engagement. Therefore, if participants turn away, they must reject both the conflict and the tool, which makes rejection more difficult. This was seen in the green group when they embraced the perspective of a narrative text even though they disagreed with its original premises.

Another central finding to highlight is that the exchange of assumptions and interests between the participants as empirically documented in Level 3 primarily centres on value expressions. Only a few times did the participants claim professional interests or explicitly state a professionally preferred approach towards a dilemma. The versus-narratives were designed to be both pragmatic and idealistic: pragmatic because they describe everyday situations, which people in every profession can relate to, and idealistic because these everyday situations are framed into two opposing ideals about how a user should be allowed to act or listen. This causes the model’s power to disappear or blur for the benefit of equal contribution. Earlier in Chapter 3, I introduced the notion of model weak participants in a communication situation from Bråten’s (1973) theory on model power. The challenge of model weak participants, who are not particularly familiar with a given subject in the area of focus, is that their ability to discuss, elaborate on or reject knowledge is reduced. The nature of the narratives seems to invite a discussion on equal footing, where model power is blurred because participants seem to contribute without attending to their own professional instruments for suggestions for possible solutions to future problems. 3P seems to take model power out of the equation since the characteristics of the dilemmas and the ways in which the participants are invited to discuss them do not require a strong professional identity. This form of discussion, which is not about persuading others but instead about examining dichotomies, leads to communicative exploration rather than closure.

While it is beneficial that all participants are able to contribute to the dilemmas on equal footing, it may also be a problem, as professional knowledge is disregarded to allow for the discussion of values and assumptions as idealised cognitive models. Even so, based on the analysis, I maintain that it is important to suspend model power from the outset in order to create common ground where participants can meet to explore different problem perceptions and initiate further inquiries.

Level 4: Expanding the current perceptions of versus-narratives

I judge the 3P tool's potential in supporting the expansion of problem understanding based on the empirical findings of Level 4, which show whether the tool allows for further problem understanding, such as seeking new perspectives or considering other perspectives. It is in the material dichotomous interaction between the participant and the versus-narrative (pointing, manipulating and touching opposites) that the versus rhetoric, in which more perspectives are considered, is supported and discursively constructed and articulated. The act of positioning oneself in a discussion in Level 4 is accompanied by a willingness to look at challenges represented by the versus category differently. From the analysis, it is evident that this is directly triggered by participants' adoption of the versus rhetoric and the framing of the tool as a visually available dichotomy. When participants engage in contrasting opposites, it leads to the following situations of discursive expansion:

- Participants formulate or consider perspectives that are not their own based on versus-narrative representations.
- Participants recognise that the dilemmas are not all black and white and that they need to consider more perspectives.
- Participants are forced to discuss the 'in between' of opposing dilemmas since dilemmas harden into opposing positions.
- Participants end up suggesting alternatives situated between the two outer poles of the dilemma.

Consequently, this form of communication leads the participants to consider one or several perspectives that do not necessarily correspond with their own beliefs or priorities (as exemplified on p. 124). In an evaluation session that was held after the participants' interaction with 3P, several participants made clear statements recognising the need for multiple perspectives to co-exist, which participants in the red group reflected upon:

HV: 'You have to figure out, 'Are they formulated in the right way?''

MJ: 'And they are very much related, as well'.

HV: 'But it is never completely one or the other'.

AS: 'No, most of the answers are somewhere in between'.

In several instances, the versus-narratives and the versus framing of the dilemmas available from the tool led the participants to express or realise that the dilemmas could not be addressed by solely attending to, or taking in, one perspective, but that they must rely on an 'in between' perspective, where opposing ideas are both given importance.

While I have been able to show the potential for this form of communication, it is also important to outline the limitations to expanding towards third space meetings. When participants end up with suggestions for alternatives that are situated between the two outer poles of the dilemma, the position it represents might become a vague middle way, reaching what Mouffe (1999) called a 'conflictual consensus', i.e., an

elaborated view of circumstances where some opt-out in favour of other circumstances (as described in Chapter 3). A researcher in the blue group explained this as ‘taking in both perspectives’, stating that it is not that difficult to reach an agreement because an agreement takes place on a value-proposition level and that they are not obligated to act on it in the future. He also stated that for real opposition to exist between different perspectives and choices, future discussions must be more specific:

But I don’t think that we found it that difficult to reach an agreement . . . The top one (*referring to the coloured brick in the top of the tower*) was that all the products should be very intuitive. We could all agree on that because we did not have to invest anything in it. And I think that if you want to create opposition, you really need to be much more specific. So, say, now, we are going to design a thermostat, now, we are going to design something. So, you need to invest something in it so you can also see that, okay, we want anything to be intuitive, but we are going to need to spend 90% of our development time on making it intuitive, so what is the downside of this? Then, you can start discussing. How important is it actually?

This is also an example of how difficult it might be to ask people to discuss value propositions for a future solution without giving them a specific practice to anchor the discussion in. This is especially true if the narratives are considered invalid, as they were in some examples given to the red and blue groups.

This ‘in between’ of two opposites is seen in the participants’ writings on the priority bricks (as depicted in Appendix A). The priority bricks represent the participants’ joint recommendations for future ideals to be considered. (A full presentation of the participants’ recommendations can be found in Appendix A). The green group, for instance, wrote on two equally placed priority bricks in the 3D tower as follows: ‘active control for those who want it’ and ‘passive for the rest’ (Appendix A). Likewise, the red group placed two priority bricks at the same level as follows: ‘individual control to meet different needs’ and ‘automatically default set for energy’. On the one hand, this is an indication of how the participants took more perspectives on a single dilemma into consideration, which might be an indication of the discursive expansion of the perceived problem space, which is the very aim of 3P. On the other hand, taking opposite perspectives into consideration as recommendations for future actions would, according to Mouffe (1999) (as elaborated on in Chapter 3), be described as a vague middle way because it is an ideal without constraints. According to Mouffe (1999) we cannot reach a rational consensus without exclusion, but we can aim at a ‘conflictual consensus’, which involves discerning clearly differentiated perspectives so as to allow for ‘alternatives’. By looking critically at the outcome as well as at the process as a whole, we have seen that clearly differentiated perspectives are examined only when the participants reach above Level 3. Even then, we may question how deeply these

have been discerned. They may not discern real alternatives to choose from with respect to further action based on these recommendations. It is crucial to remember how the workshop is set up, i.e., not to provide recommendations of concrete action for future products or processes to be developed but instead to expand on current perspectives of the problems as a shared ground from which to build the foundation for future joint actions.

When it comes to the groups' plenum presentations and recommendations (which can be found in Appendix A), all groups ended by arguing one way or another that the user must 'be on top', that is, that they must be a top priority. This presents a change from the first workshop, where several partners uttered that users are lazy and cannot be trusted. Some engineers began with the starting point that users do not understand technology or principles for saving; thus, they believed it was better for technology to overrule users. The participants in the three groups independently favoured the residents' autonomy and free will. This is seen by the positioning of the light green priority bricks in the towers (Appendix A), on which the three groups wrote, 'Manual override is a must' (blue group), 'Technology is there for us' (red group) and 'Yes, users first. Users' free choice to submit to adaptation. And then feedback and motivation' (green group). In this respect, it can be assumed that 3P helped to develop some form of elaborated understanding of the user, as the participants showed an understanding of the importance of users' free will.

The red group's plenum presentation mainly centred on the statements written down on the priority bricks in the 3D tower. Like the blue group, the red group did not present a more nuanced understanding of the slogans or their meanings. Conversely, the green group's plenum presentation was longer and more nuanced. A direct line cannot be drawn from the green group's ability to initiate a more nuanced discussion with the outset in the versus-narratives to their more nuanced presentation since the quality of a presentation also depends on the presenter. It is striking, though, that the green group's presentation was not just a presentation of slogans, as the other presentations were, but also of what it means to put users first (see Appendix A).

However, to judge whether the three groups' recognition of the importance of user autonomy and free will is in fact a result of an elaborated and juxtaposed understanding, a conflictual consensus, or simply a forced consideration of perspectives would require further analysis. Inspecting the participants' utterances and following how different discursive utterances unfolded on the subject would be required. Disregarding this uncertainty, I propose my central contribution in the following section.

Versus communication as a concept of exchange to support third space experiences

I propose a concept for what I call versus communication. Versus communication is a concept of dialectical communication that arises through the interaction and orientation with the 3P tool specifically, i.e., when participants adopt and embrace

(touch and refer to) the dichotomous representation of the situated dilemmas materialised and visualised as opposites. Versus communication is an enhancement of the original outset for my research based on the concepts of dialectical communication from Sennett's (XX) communication theory and on reengagement with critical voices from the field of Design Anthropology (XX), where engagement is about drawing contrasts together to open up new insights that were previously overlooked by collaborating partners.

Versus communication is also based on a critical view of constraint-free dialogical ideals, which can be found in Muller and Druin's (2012) descriptions of a third space. Muller and Druin mostly highlight the benefits of attributes related to a third space, defining a third space as something that can be found when bringing different people together in joint activities (elaborated Chapter 1). I have shown that creating third spaces might be much more complex when trying to understand the relation between participant interaction and a tool that supports communication in a third space.

Further, I introduced the idea of versus categories to represent the experienced reality of a problem from prior empirical observations. Then, I organised them in versus-narratives to provoke and coax the participants out of their professional silos. My empirical analysis gives me reason to believe that versus-narratives and the versus structure for a unit is the most important part of 3P when it comes to engaging participants in versus communication.

My findings show that dialectical communication is beneficial and even crucial for participants to enter a third space together. Dialogical communication is not enough because the movement towards a third space, as I have shown, requires participants to move from an empathic acknowledgement of 'the other' (a dialogical quality) towards an actual examination of a dilemma based on differences in interests to assess various the strengths and weaknesses of a specific point of view.

Dialogical communication, where participants show sympathy or an acknowledgement of the other, does not lead participants to reach other endpoints where new perspectives are integrated into further dialogue. Rather, it becomes an ascertainment of 'what exists' but provides no closure. This form of communication is important for building trust. However, dialectical communication, where 'both and' leads the participant to question, inquire and consult the narratives represented, may move the focus from 'what is' towards an elaborated problem understanding of 'what should be' considered in the future. Versus communication is thus developed through a specific form of interaction with and orientation towards the 3P tool in Level 4 of the model (p. 131).

I infer that versus communication happens when narratives invite us to remember our own similar or different experiences and when participants intuitively feel an urge to balance the values expressed, such as, 'It is not that bad' or, 'It is not that good', so that participants are tempted to engage in the discussion and express their experiences, emotions and values. Since this happens in communication, they

continue to juxtapose their experiences. Naming and framing what the group can actually agree and disagree about allows them to conquer initially uncharted territory.

In my case this happens as follows. The participants set out from a position they know, based on one of the opposite sides of a versus category. From there, participants offer personal experiences, expressing a value or claiming an interest. (This is a form of communication seen in Level 3 on p. 131.) They then try to balance this known position by gradually approaching, rejecting or considering each other's perspectives or the perspectives of the opposite versus-narrative within a versus category. (This is a form of communication seen in Level 4 on p. 131.) This movement move the participants towards a form of synthesis or a shared place, making the 3P a dialectical tool in the Hegelian sense (as described in Chapter 3), as it moved participants from 'abstract-negative-concrete', which is the correct direction when creating common ground for partners to come together to discuss foundations for future designs. To move towards a form of synthesis or shared place, this dialectical exchange moves from the black and white framings of a problem space and can lead to sympathy or an acknowledgement of the other. In addition, it can also allow participants to realise the need for more perspectives to be considered in order to frame and understand a dilemma. As such, the approach offered by 3P can contribute to the creation of a third space, where multiple voices are not only externalised but are also juxtaposed. This movement from dilemmas placed in opposition with one another as they lead to a third space is synthesised in Figure 27.

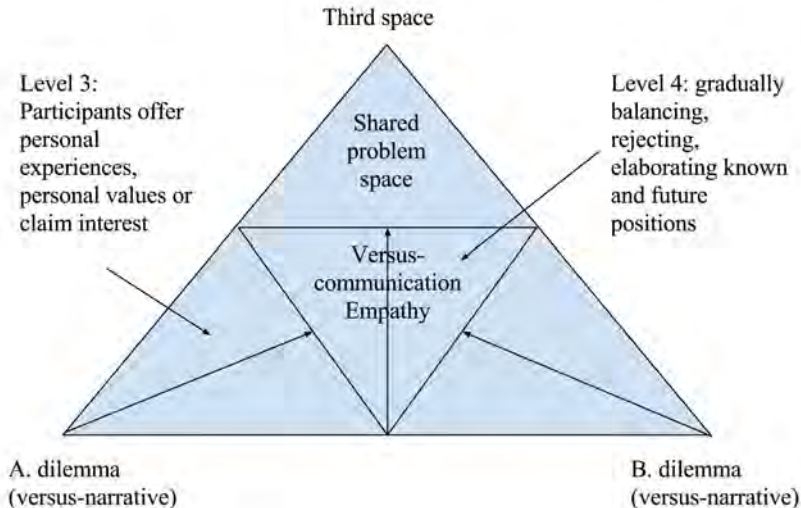


Figure 27: Moving communication towards a third space through explicitly questioned dichotomies.

Based on my findings, I maintain that an important aspect of creating involvement between parties and dialogues in a third space is forcing communication to move away from a unified centre towards a constructive focus on differences.

Tool-mediated communication to create a third space

As I have shown, the 3P tool can shape a third space movement for UserTEC workshop participants. My initial focus was at the ‘make tool’ level (Sanders & Strappers, 2013); the 3P tool should offer a confined space as a reference point and a conceptual workplace for exchanging meaning, including tangible elements to hold, move, place and replace. In addition, it should provide a reflective aspect on possibilities to evoke and stage thoughts (Gunn & Løgstrup, 2014; Gunn, Otto, & Smith 2013; Kilbourn, 2013). In choosing my tool’s material, I moved gradually from the idea of an undercodified tool towards a highly codified tool since the intention has been to represent discourses and narratives through situated dilemmas, as described Chapter 4.

As I have pointed out in Chapter 4, a difference exists between what Schön (1983) and Dewey (1938) refer to as ‘doing’, i.e., configuring materials and situations to make a finished product, and what I have done. Namely, I focused on the insights, which are gained by entering the consequences of imagined doings based on current discourses and existing knowledge (situated dilemmas), and how they can be brought back for reengagement inspired from practices of DA. In Participatory Design and Design Anthropology, re-engaging with people towards the creation of a third space is often action-oriented, involving experiments with prototypes, mock-ups or ‘make tools’ for participants to collaboratively configure materials and situations towards building a future product or practice. Based on my empirical analysis, I have gradually developed an understanding of tool-mediated engagement to also include other aspects which contribute insight on how to facilitate the understanding of the other through mediated communication as well as how this require communication skills. My research has taught me that a focus on how to assist people in juxtaposing perspectives towards a polyvocal polity, which Muller and Druin (2012) call for, and how they actually come to mix these, is important. This polyvocal polity has to do with how to create a meeting ground for participants’ voices to be brought forth (Buur & Bødker, 2000, in Muller & Druin, 2012, p. 1130). As I have shown through my empirical work, it is not enough to support participants in externalising and bringing forth multiple voices. In addition it is important to assist participants to share and juxtapose their voices in a manner where they say: ‘Well, we do not agree’, but still feel interested in listening to each others’ perspectives for communication to move forward. The goal of such an approach as I have shown is to assist participants in choosing between real alternatives to achieve a conflictual consensus (Mouffe, 1999), which is not based on merging voices but

instead on assessing the various strengths and weaknesses of these voices to achieve an elaborate understanding of a problem.

Exactly this in detailed understanding of how to arrive at such an understanding of the other and how to assist participants in considering contrasting perspectives through communicative engagement using tools is given little attention in the current literature in Participatory Design and Design Anthropology. This is especially true in relation to research on ‘mediating artefacts’, ‘mediating objects’, ‘epistemic objects’ or ‘boundary objects’, the functions of which are to mediate activity between objects and subjects and to provide a space for interpretative flexibility and boundary-crossing activities (Star & Griesemer, 1989; Star, 2010).

When it comes to analysing tool-mediated communication, my analysis points to a need for further empirical research on:

- what types of communicative orientation best assists movement towards an understanding of the other or other perspectives
- how different elements of a mediating tool can further either dialectical or dialogical communication
- how to scaffold the juxtaposition of perspectives that do not lead to immediate communicative closure and
- how to overcome articulation work orientation when engaging with the materials and rules of a tool.

In conclusion, I have been able to show examples of how, in the course of participants using 3P, people move towards a third space, where they can share a common understanding of a problem space. Would they – those groups with gifted communicators - have been able to do so also without 3P? Probably. In my view, however, my findings show the specifics of what might hinder communication in some cases, and support a movement towards a third space in other cases. This is enough to make me eager to continue improving both design and use practice of 3P even though there are other communication tools and techniques available on the market, such as for instance Lego Serious Play®. My analysis has convinced me that 3P’s deliberate support of dialectical as opposed to dialogical communication is worth further research, both practically in workshops and theoretically in terms of communication theory.

Improvements to 3P-mediated communication

Based on my empirical work, I have shown the limitations for reaching beyond articulation work orientation as well as what leads to communicative exploration in groups based on the metaphor of different levels of a quest. The goal is to get participants all the way through the quest. Even though I acknowledge that communication is always situated, one of a kind and unpredictable, my empirical insights suggest a possible framework for improving 3P-mediated communication to support participants through all four levels of the quest.

I have shown that attention towards the nuanced evaluation of the perception of a versus-narrative and towards other participants' reframings of a versus-narrative allows conversations to develop. I have also shown how this is dependent on the participants' communicative skills. In the future, the tool might combine the present design and the following:

- different forms of question types to situate and encourage specific forms of reflections that trigger participants to stay with a question as well as examine different understandings
- different forms of rules, procedures and techniques for listening.

I have shown that one of the limitations to reaching beyond articulation work orientation is as simple as the restricted display of materials and text and the participants' inclination to place and replace materials without paying attention to the rest of the group. Therefore, I plan to create procedures that encourage participants to make use of the tool's elements as public displays, as they are available for all participants to touch and refer to. This can be done by focusing on 2D scaffolds that show participants where to place versus-narratives on the table in front of the tool to reflect the practice of the green group (depicted p. 117).

I have shown that the groups developed slogans as part of their work with 3P. I have also argued that the meanings of these slogans in some of the groups were too general or unclear as to their significance and meaning for further action. Thus, a next step in 3P tool development might be to assist participants to unpack their understanding of these and to assist participants in operationalising these slogans to guide future actions.

These ideas for improving 3P require that the categories of engagement are the 'right' ones, experienced as both relevant and significant by participants. Therefore, 3P's improved design should assess procedures and methods to find the best way to re-present situated dilemmas. This should be done to evaluate whether 3P and the versus-narratives might be designed to meet the mental schemes and categorisations of single participants more effectively. In addition, the improved 3P must explore whether the representation of dilemmas of dialectical exploration is best supported through narratives and highly codified tools (as discussed Chapter 4) or whether other forms of representing the situated dilemmas must be considered.

CHAPTER 7. CONCLUSION

Given my starting point and assignment to enhance communication between UserTEC partners, my research argues for tool-mediated communication in problem exploration in a multi-stakeholder setting. The outcome of my research on the communication surrounding household energy consumption between designers, engineers and architects as well as energy companies and utilities is a new form of communication that I call versus communication. I propose implementing versus communication in projects undergoing a green transition in building technology but also in phases of green transition, where for instance municipalities want to provide projects and initiatives in collaboration with citizens and utilities.

The communication problems in multi-stakeholder communication, which I have researched is double: it moves towards solutions before the problem formulation has been negotiated, and it seeks closure before diverging values and worldviews have been exchanged. I have not found research on either topic. The field of Participatory Design within the Human–Computer Interaction field addresses the issues involved in profession transcendence and model power, but it does not seek a deeper understanding of what it takes to facilitate the first step in multi-stakeholder communication. In the field of Design Anthropology, which also inspired my work on reengagement with critical voices, research on communication is also limited.

From the field of Participatory Design, I have taken up the idea of establishing a third space to exchange viewpoints and ideas, which is uncharted territory. However, I argue that it is not enough to bring people with differences together to articulate their thoughts or state their intentions to reach third space communication. The move towards third space communication requires assistance to, in addition, assist participants juxtapose their voice. Therefore, my research has led me to develop the concept of versus communication.

The bulk of my empirical work consisted of analysing the difficulties in moving communication towards a third space. A prototype tool, 3P, was designed to support these difficulties in a workshop where participants were intended to reach a mutual ground of problem exploration. From this workshop, an in-depth analysis of the data was conducted.

Both my problem analysis, my design and my evaluation has been deep and time consuming. I have been explicit about my way of working, in order to allow the reader to follow my reasoning. The case is not representative, as multi-stakeholder communication has not been studied in quantitative terms. I cannot argue that actual communication would not pan out differently in other circumstances from what I have captured. However, my analysis of UserTEC multi-stakeholder communication before I introduced versus communication and my analysis after its introduction illustrates my point: in the initial stages of multi-stakeholder meetings,

communication appears to be counter-intuitive and hence in need of support to avoid participants jumping directly to solution mode to seek harmony and agreement.

Looking forward, I would like to stress that versus communication should not only be tied to 3P. I see 3P as a scaffold for versus communication in establishing third space experiences. However, I can imagine many other ways for versus communication to unfold that should be explored further.

The message I hope readers will take away from the research I have presented here is, that should green transition succeed, and it must, technology, policy and regulation development, along with analysis of the users practice, are not enough. Communication between various stakeholders of green transition is the glue that ties these initiatives together; therefore, communication must find a space to live where participants under mild pressure are forced to not only express but also juxtapose their positions and concerns. For this to happen, we must reach a public acknowledgement that this is important.

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APPENDIX

Appendixes of this research comprise confidential data. Therefore appendixes are distributed in a separate document available for the Ph.D committee only. Selected documents can be made available for other readers on request.

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