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Perspectives on Cooperative Design

SINNA LINDQUIST

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Abstract

The cooperative design approach, which research and practice have proven to be successful in several ways, is based on understanding users and their contexts through a variety of methods. This approach of working closely together with the users, however, is not the same thing as letting the users decide themselves what to design. Rather it means that designers in an interdisciplinary research team, working in close collaboration with the users, will use their design skills and collected knowledge about the users to produce good designs. Though cooperative design has proven successful, there are ways in which it could be improved.

Cooperative design derived as a result of criticism about the lack of focus on users in the design process. In this sense, cooperative design has been the critical view, whereas socio-cultural perspectives such as gender, values and power relations have been either suppressed, deliberately or not, or not taken into consideration to the full extent that they could be. In contrast, three important elements of cultural studies research are meaning, identity and power. Research in this field examines the relationship between people and context, and between cultural and social practices, as well as on forces that change or preserve power structures. One aim of this thesis is to emphasise the importance of these issues within cooperative design.

The focus of my thesis is to, through a phenomenological approach and a critical view of the different cooperative design projects I have participated in,

discuss issues that have either been part of the projects' structure, or have been imposed on the projects by circumstances that perhaps could not be foreseen. Three main issues that need further investigation to understand how they affect the design process are discussed: language and meaning, the individual in the group-oriented activities of cooperative design, and finally power relations and structures. I use myself as the subject through which the socio-cultural and critical viewpoints are shown. My aim is to show that there are aspects of the individual researcher in the cooperative design process that impact the design space and design.

Through a critical discussion of the projects and related issues, this thesis argues that the cooperative design process can involve data and methods that we do not always know how to handle. As a result, we can miss important aspects of the research or end up in difficult dilemmas. Therefore, we need to better understand on what grounds we make design decisions in the cooperative design process, investigate what effect the individual has in group-oriented design processes, and examine how culture, language and power structures guide us and how we use methods such as triangulation. I believe that researchers need to evaluate our cooperative design process from the outside, with the goal of improving these processes.

KEYWORDS: Cooperative design, design process, culture, individual, intersectionality, power structure, triangulation.

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I consider myself fortunate for having the opportunity to do my PhD at the Royal Institute of Technology (KTH) in the interdisciplinary Human Computer Interaction group, formerly the Centre for User-Oriented IT Design (CID), and to work with so many different issues in a broad spectrum of cooperative design projects. Most of all I feel privileged for having such good colleagues from whom I have learned so much. I want to thank you all for being such good friends, co-workers, supporters, supervisors, listeners, motivators, laughing companions, music providers, travelling mates, storytellers and combatants in our everyday work.

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Introduction

The snooper

On a late afternoon in autumn 2003, I was on a crowded subway train and standing close to a well-dressed, business-like lady. Sitting down with grocery bags around her feet and her suitcase on her lap, she held her mobile in her hand while checking her calendar and other papers. She was probably going home but was still busy working on the train. She took a deep breath, as deep as you can take in a rush-hour subway train, and dialled a number. I did not listen very carefully to what she said, but she sounded polite and correct, talking into her hands-free. After a few sentences I heard her say, "Yes, thank you, we have looked at your proposal, but we have to turn it down. We found that we will have to look elsewhere for …". I looked more closely at her and saw that she held her thumb over the mobile display while looking out the window into the black of the tunnel, still talking to someone to whom she had to turn down an offer of some sort. I became curious. Who was she talking to? Did she always hide the display? Had she noticed that people like me listened to what she said and also tried to see who she was calling? Why make such an important call in a public space? Why continue to work on the way home? Was she working with media or advertising? Film, perhaps?

Yes, I am an observer and a snooper! Watching people and trying to understand what they do and why is one of my biggest interests. If I am alone entering a subway carriage, I prefer sitting next to people that talk in their mobile phones. I like examining them, trying to make sense of what they say and how they say it, what they wear and how they act. To me it is an interesting way of spending those few minutes on the train.

I tell this story to give you an idea of what kind of person I am, and in certain respects this thesis can be seen as me applying my snooping skills to the different cooperative design projects I have worked on while at the Royal Institute of Technology (KTH). Another reason I bring up the story of the woman on the train is that it shows how differently we all approach and use what we often refer to as "new technology". I would never make an important business call in a crowded public space. The technology provides for this, but it does not necessarily mean I have to do it. I would not talk about relationships either. Actually, I'm not very fond of talking to people on the phone at all – though I love instant text messaging! It is a way of being extremely personal in a public setting, without exposing my life to the world. Still, sometimes I also have to hold my thumb over the display so that not everyone can see what I am typing ;).

I refer to my mobile phone as new technology, but though it is fairly new to me for many young people mobile phones have always been around. I sometimes find myself fascinated that such a small device can hold so much information. It allows me so much flexibility in my life (flexibility that I sometimes can do without), and it has almost become an inseparable part of me. For my children, on the other hand, it is not mobile phones that are fascinating but older, rotary bakelite phones. They found such a telephone in a wardrobe at home and were completely bewildered by the design – there were no buttons but just a hole to put your finger in. It took them some time to find out how to dial the right number, and when they eventually got it right, they called one of their friends over just to see the telephone. It was so old, so mechanical and so cool!

These stories emphasize that both the use and understanding of technology depend on who the user is and the context of the situation. In the same way, the backgrounds, perspectives and interests of people researching technology development in a cooperative design tradition will affect the outcome of the

research. This is in no way a minor point, given the interdisciplinary nature of human computer interaction (HCI) and cooperative design, which can include researchers with backgrounds in the arts, communication studies, ethnography, computer science, linguistics, industrial and graphical design, psychology, engineering, and many more areas. Any researcher will affect the performance of the research. That, I would think, is the reason for doing research in the first place. So, my background in ethnology as well as other knowledge I have will affect decisions I take, the methodologies I apply and, ultimately, the result of my research.

Aim

Cooperative design focuses on the user as a means to create effective, functional and meaningful designs for the user. The cooperative design approach, which research has proven to be successful in several ways, is based on understanding users and their contexts through a variety of methods. This approach of working closely together with the users, however, is not the same thing as letting the users decide themselves what to design. Rather it means that designers in an interdisciplinary research team will use their collected knowledge about the user and their design skills, and in close collaboration with the users, make good design.

Though cooperative design has proven successful, there are certain ways in which it could be improved. In the cooperative design process, socio-cultural perspectives are noted as important, yet they are not always taken into consideration. Cooperative design derived as a result of criticism about the lack of focus on users in the design process. In this sense, cooperative design has been the critical view, whereas socio-cultural perspectives such as gender, values and power relations have been either suppressed, deliberately or not, or not taken into consideration to the full extent that they could be. In contrast, three important elements of cultural studies research are meaning, identity and power (Hannerz, 1992). This kind of research examines the relationship between people and context, and between cultural and social practices, as well as on forces that change or preserve power structures. One aim of this thesis, therefore, is to emphasise the importance of these issues within cooperative design.

Though the interdisciplinary character of HCI and cooperative design is a great asset when investigating users' needs and making designs, there seems to be a lack of understanding of what the different methods and concepts from various disciplines might bring. Within a project group concepts are rarely investigated from a theoretical perspective, and discussions of methods, concepts, personal interests and goals are often not clearly and openly discussed. Furthermore, the interdisciplinary design groups are described as containing people with various scientific backgrounds, but what about other knowledge, experiences and perspectives that belong to the individual researcher? Can designers, whether researchers in a design team or trained designers, see beyond themselves as individuals when exploring the design space? Also, when performing cooperative design, sometimes there is a gap between what is found in the data and what should be delivered according to the project goals. So, how do you deal with important issues that are not within the scope of the design project?

The focus of my thesis is to, through a phenomenological approach and a critical view of the different cooperative design projects I have participated in, discuss perspectives that have either been part of the projects' structure, or have been imposed on the projects by circumstances that perhaps could not be foreseen. After six years in different kinds of design projects, most of which have been in the Scandinavian tradition of cooperative design, I have taken a step back and looked upon my own entrance into HCI and into the research projects I have taken part in. These projects have comprised part of my training in HCI and cooperative design. On a meta-level, in this thesis I will use myself as the subject through which the socio-cultural and critical viewpoints are shown. My aim is to put myself very deliberately into this text to show that there are other aspects of the individual researcher in the cooperative design process that might have impact on the design space and the design.

This thesis includes both previous analyses of various activities within the projects I have participated in, analyses of the projects as a whole, and a more reflective gaze on the projects, through ethnographic methods like observation and fieldwork and also through a sense of what is right or wrong. The work in cooperative design is based on taking the weaker stakeholder's side and attempting to empower the users through new, useful technology. This is one reason why I

work in this field. When I began studying HCI, I was frustrated when using computer-based tools that could have been easily improved if anyone studied the people using those tools. I believe that HCI and cooperative design, with their roots in academia and industry, have a great potential to improve computer-based tools, as well as to create theories and methods regarding the design and development of such tools. Unfortunately, though a critical stance has always been a part of HCI and the cooperative design tradition, discussions that would highlight aspects regarding socio-cultural issues and power relations have become a minor part of HCI research. These aspects can easily be disregarded as feelings, awkward matters that are difficult to handle. Nevertheless, aspects concerning values, power relations, prejudice and sometimes even ignorance affect our work in cooperative design projects and can sometimes put us in delicate situations.

So, in this thesis I will critically reflect upon the cooperative design practice in exploratory research projects, both the design process and the analysis of collected data. When data is analysed for a project, it is analysed not only according to the goals of the project, but it is also analysed – or filtered, if you will – through the perspectives and experiences of the individual researcher. Using myself as an example, through describing my background and objectives and through expressing myself in the text, I hope to show why certain socio-cultural perspectives are relevant to HCI and cooperative design.

Instructions for the reader

In the introduction I briefly present the aim of this thesis, which involves looking at how the researcher as an individual affects the cooperative design process. In order to ground my research and draw attention to the individual in the interdisciplinary work of cooperative design, I deliberately expose myself as an individual with interests and goals. My experiences, as a researcher and a person, are considered as part of the data. The data from the projects, and my interpretation of the data through my writing, are processed through me as an individual. The personal tone of the introduction is important for conveying this to the reader.

The papers presented in the "Summary of Papers" section are to be seen as examples of the goals and interests pursued in a variety of cooperative design research projects. These texts are included near the beginning of this thesis to constitute a main part of the empirical material. The summary of papers gives an overview of the variety of projects I have participated in. Most of the papers were jointly written, including papers A, B, C and D, and they express a shared group understanding of the projects, though they also indicate my own experiences and perspectives as a researcher in cooperative design. Paper E has a more personal character, and is more closely related to my own interests and background.

In the "Scientific Background" section the scientific field of ethnology is described, both as a means to show the perspective I take in this thesis and to explain my role in the projects. Also presented is the cooperative design tradition, in which I have been educated during my time at CID, the Centre for User-Oriented IT Design (Sundblad & Lenman 2001, Sundblad, 2005b).

In "Research Questions", queries about the individual in relation to the group in the design process are raised, based on my own experience of cooperative design and on the empirical material. The questions are formulated to guide the reader through the thesis and will be discussed in the final chapter.

In "Frame of Reference", my method is described and discussed. I apply a phenomenological, hermeneutic approach to the material, which includes both the cooperative design projects I have participated in and myself as an individual. The interpretation of such material is shown to be part of a hermeneutic tradition characterized by an iterative, reflexive process.

Through this reflective approach, three main perspectives on cooperative design will be discussed and examined: "Language and Meaning", focusing on language as the medium through which we create and understand meaning; "Understanding the individual" showing the body as the inevitable place through which we perceive and take in the world; and "Provocation, Politics and Power", showing how determination and values drive projects in certain directions.

In "Language and Meaning" theoretical frames are described in which the data are regarded as stories, regardless of whether the data are spoken interviews or physical creations such as design idea prototypes. Cultural and social implications, expressed through language, impact our understanding of what is happening and

affect the design process. Examples of such implications are given in the chapter "interLiving Stories".

In "Understanding the Individual", theories are presented about how to look at and understand the body as being both the place where the individual is and where individualisation takes place in relation to the world. Through my cooperative design experiences, the importance of understanding the individual is described, and I explore what might happen to group-coordinated activities in which categorisations of groups and individuals are used with little or no reflection.

In the chapter "Provocation, Politics and Power", the aim is to show how critical viewpoints and determination push projects in certain directions. The chapter also addresses the issue of our research producing information that we are sometimes unprepared to deal with, especially when this information does not point towards technology development.

In the "Conclusion and Discussion" chapter, my aim is to discuss the research questions based on the empirical material and the theoretical perspectives presented. Furthermore, I reflect upon the researching and writing subject, and the subject as part of the data, and what such considerations might bring to the cooperative design process. Finally, some open questions for future research are presented.

Summary of Papers

The five papers provide insight into both what exploratory cooperative design in a research setting can be like and my experience of it. The texts are briefly presented below in the list of publications and the context of their creation is described.

Paper A. Co-Designing Communication Technology with and for Families – Methods, Experience, Results and Impact for the Future

Lindquist, S., Westerlund, B., Sundblad, Y., Tobiasson, H., Beaudouin-Lafon, M. & W. Mackay. 2007. "Co-Designing Communication Technology with and for Families – Methods, Experience, Results and Impact for the Future", pp 99-119. *The Disappearing Computer: Interaction Design, System Infrastructures and Applications for Smart Environments.* Streitz, N., Kameas, A. & I. Mavrommati (Eds.), Heidelberg: Springer-Verlag.

This text was produced as a final presentation of the successful interLiving project, short for Designing Interactive Intergenerational Interfaces for Living Together, part of the EU Disappearing Computer Initiative. The project had two aims: to design new communication technology for family members, and to develop cooperative design methods. It was carried out in a very collaborative manner, between researchers in their own research group, between the research groups in the different countries, and between the researchers and the six families, three in Stockholm and three in Paris. After three years of work on interLiving,

we had developed methods such as cultural probes and technical probes, and produced workshop methodologies including video prototyping. We had through this work reached a deep and common understanding of the different families' needs and goals, and their ways of communicating. One important outcome of the project was that it showed that people want *communication appliances*, defined as simple-to-use, single-function devices that let people communicate, passively or actively with one or more remotely located friends or family members. The communication could mean sharing sounds, images, videos, texts or even touches. The desired style of communication may range from focused, synchronous contact to peripheral awareness of one another. Communication can occur over time, including leaving quick messages for oneself and others, and preserving and sharing memories over years.

My main contribution to the interdisciplinary interLiving research project was to provide the perspective and expertise of an ethnographer, which entailed bringing in methods and ideas from the cultural studies field and negotiating the practice of these with colleagues in a cooperative design setting. I put this book chapter together, combining previous texts and newly written parts based on discussions among the research group. All authors have contributed in various ways and it is impossible to separate who wrote what originally.

Paper B. Artefacts for Understanding

Lindquist, S. and B.Westerlund. 2004. "Artefacts for Understanding". Working papers in art and design, vol. 3, the role of the artefact in art & design research, www.herts.ac.uk/artdes1/research/papers/wpades/vol3/bwabs.html. 2007-08-22. Research Into Practice Conference, June 2004, London: University of Hertfordshire.

In this paper we discuss one aspect of the work in interLiving, namely the artefacts used and produced by researchers and participating family members in the collaborative work. Our aim with the paper was to examine how physical, tangible, shareable things can impact a design process, how they can be used throughout a project and what they can tell us about the users. The examples we used were cultural probes, produced by the researchers to be used by the family members, and objects produced at workshops, such as low-tech prototypes.

When using cultural probes as a method for *informing* the researcher about the user's context, and not just for *inspiring* the designer, as was the original idea (Gaver, Dunne and Pacenti 1999), the importance of being aware of how you design the probe will be the same as when using any kind of qualitative enquiry. How you pose a question will affect how the user perceives it and how it can be replied to, and the same is true of cultural probes when used as a qualitative enquiry. In the case of interLiving, it became apparent that the probes were received differently in the different households. This meant that the probe responses (photos, diaries, et cetera) and the ways in which they were presented became a source of data for understanding the families.

These artefacts, therefore, formed the basis of a shared understanding among the researchers, helping us to talk about certain aspects of communication, to remember discussions, and to trigger design ideas. Some of the artefacts also became part of a narrative about the specific family from which the artefact originated. One such example is the Bongofax, which showed that different family members who have different roles within the family also have different goals and needs for communication technology. The son wanted to use the Bongofax (described as a teleporter) to escape the house at certain times, while the father, on the other hand, thought the Bongofax was a stupid idea and instead wanted to use GPS to keep track of his sons.

My main contribution was to investigate, from a cultural perspective, the roles of artefacts in the cooperative design process. I initiated the writing of the paper, which was completed in collaboration with Bosse Westerlund.

Paper C. Ajmo Splite: Come on Split! Tell Us What You Think!

Baille, L., Philips, A., Roberts, J., Lindquist, S. & O. Sandor. 2005. "Ajmo Splite: Come on Split! Tell Us What You Think!", Published at the "Critical Computing – Between Sense and Sensibility" conference, August 2005, Aarhus, ACM Press, pp182-186.

The theme of the Convivio Summer School of 2004, held in Split, Croatia, was sustainable tourism. This paper describes the Ajmo Splite! research student project, which was about giving voice to the citizens of Split in order to influence politicians. The project was carried out over the two weeks of the summer school

and was conducted in an interdisciplinary, collaborative, user-centred manner, in which all project participants contributed not just with skills from their respective disciplines, but just as much with other knowledge and skills that were needed, such as construction, film editing, Croatian, interviewing, making presentations, arguing, generating ideas and negotiating.

We wanted to spark motivation through multiple interfaces, so that people could express themselves in many ways. The prototype that evolved from our conceptual discussions was a three-sided kiosk that served several functions: to provide information to local people about the project and the summer school, to capture video clips of people responding to the question of how well planning and control is organized in Split, and to provide a physical and more playful interface that allowed children to give voice to related issues.

The prototype was tested and shown in a public square in Split, in order to receive responses on the fact that the comments were made in public, displayed on a house wall inside Diocletian's Palace as well as on the visual and technical part of the prototype. The response from the public was not massive in any way, but to combine new technology with mocking politicians seemed to be a winning concept.

My main contribution to the project was to initiate, negotiate and carry out user-centred methods to inform the project about the target group. The resulting conference paper was a cooperative achievement. A report by Ovidiu Sandor and myself was used as the starting point of the paper. Lynne Baille completed a rough first draft based on this report, notes taken during the project and our final presentation at the Convivio summer school. The paper was completed using an iterative process with help from all authors.

Paper D. Reflective Practitioners in a Reflective Practice: Cooperative Design and Delicate Matters

Lindquist, S. & C. Bogdan. 2007. "Reflective Practitioners in a Reflective Practice: Cooperative Design and Delicate Matters". (To be submitted to CHI2008). 10 pages.

Within the Copland project, a cooperative design project aimed at understanding different nomadic teacher groups and their community of practice

in order to develop new communicative systems of technology, a study was made in Stockholm of teachers who instruct students in their native languages (known as *modersmålslärare* in Swedish – MML for short). Through an ethnographic field study, we found that the MML are in a difficult position. They know that they do a valuable job and are appreciated by children, parents and society, but their daily work is not sufficiently supported by the organisations that they depend upon. This and other circumstances have led to a high rate of medical leave among the MML, among other things. Once this was discovered, the design process stopped. We found ourselves, the researchers in the project, stuck in an ethical dilemma between different stakeholders. On the one hand we needed to develop technology according to research plans, but on the other hand the information we found about the teachers' working conditions was pointing in directions other than new technology.

This paper uses the MML case to highlight issues concerning cooperative design methods in exploratory technology development research and poses two sets of questions: First, what meaning, objectives and assumptions is a design grounded on, and how do we know that the collected data is the right data to base that design on? Second, what should be done with the "slag-info"? Slag is the useful waste in metallurgic reactions, but the term is used here figuratively to refer to the unutilized but perhaps useful, interesting data that is generated through triangulating methods in cooperative design projects. Some methods generate more data from the users' daily practices than researchers are capable of taking into account, and perhaps even taking notice of, in the scope of a project, as in the case with the MML. Although certain data might not lead to technological solutions, can it be used in other ways?

As a result of the failure of our design process, we became aware of our underlying objectives and assumptions regarding what is important in our research. Unfortunately, within cooperative design we rarely discuss such issues, and reflecting on these matters is not part of our common practice.

Cristian Bogdan did the field study, and the findings were analysed and discussed among the research group composed of Minna Räsänen, Ovidiu Sandor, Kristina Groth, Yngve Sundblad and myself. I initiated and wrote this paper, in collaboration with Cristian Bogdan, based on a workshop presentation at CHI 2006, Montreal, Canada.

Paper E.The Researcher's Role at Stake – The Meeting Between the Objective Researcher and the Subjective Individual

Lindquist, S. 2005. "The researcher's role at stake – The meeting between the objective researcher and the subjective individual". CID-307 Technical report CID/KTH, Stockholm: KTH. (Swedish short version: Forskarrollen sätts på prov- möte mellan den objektiva forskarrollen och den subjektiva människan i forskning om teknik, in Book of abstracts, Genuskonferensen Teori möter verklighet, Malmö 2005).

This paper came about after a field study for the Daphne project, a three-year interdisciplinary technology development research project. My colleague and I were assigned to visit a noisy, dirty workplace to observe communication in a constrained environment. We decided to make our observations in a family business, a small bakery with five employees. After just a little while of observing, an old man who was a baker made a harmless, sexist joke directed to my colleague and me, as if we were a couple. A little later he made another such joke, and I realised that I was a bit offended. Due to these jokes I changed the focus of my observation. Instead of watching the communication practices of the workers, I noticed, for example, the many calendars with nude ladies but only one showing the right year. My attention was drawn to the postcards on the notice board, one showing a tiny Asian woman (or was it a girl?) in the lap of a much older white man. My colleague saw other things, such as how they covered every electronic communication device in plastic bags, and how they planned what to bake first based on parameters such as orders, time of day, day of the week and month.

To me it became apparent that we all, as researchers in different cooperative design projects, never talk about who we are and what we represent in terms of gender, age, social group, appearance, et cetera, except regarding our scientific backgrounds. For example, we neglect to examine how our gender heritage and our pre-understanding and preconceptions will influence the design.

The paper was presented under the theme of Gender and Technology at the gender conference *Teori möter verklighet* (Theory Meets Reality) in Malmö, Sweden, 2005.

Background

Ethnology and ethnography

I present below my scientific background, which is grounded in cultural studies and ethnology. This information is meant to provide an understanding of my academic inheritance, viewpoints and research perspectives, both in the cooperative design projects that comprise my data and in this thesis.

To understand my scientific background one should also have an understanding of the origins of ethnology. Swedish ethnology began in the second half of the 19th century, developing mainly from archaeology and strongly influenced by the national romanticism of the period. Ethnology was then called *folklivsforskning* (folklife research) and focused on investigating Swedish culture from a comparative perspective. The second half of the 19th century was a period of significant social and technological change. The modernisation of Swedish society included the introduction of steamboats, railroads, telephones and the telegraph, combined with migration to cities, a new order of agricultural work and life, emigration, and economic upturns and downturns. Such changes were accompanied by nationalism, Scandinavianism, the formation of new churches and beliefs, and movements for sobriety, improved working conditions and voting rights (Hammarlund-Larsson 2004). Many believed that the traces of the

pre-industrial agricultural society were about to disappear. It almost became a Swedish national movement to collect agricultural and domestic tools, clothes and houses, as well as customs, stories and music, to be shown at museums and stored in archives. Two main proponents of collecting and preserving objects and customs were Arthur Hazelius, who founded Skansen, the first open-air museum in the world, and The Nordic Museum in Stockholm, and Per Arvid Säve who founded Gotlands Fornsal, The Historical Museum of Gotland (Palmenfelt 1993). Hazelius emphasized the importance of informing people about their heritage and culture during, as he described it in a letter to a friend, "this time of slack nationalism" (*i denna tid af slapp nationalkänsla*) (letter from Arthur Hazelius to Thure Cederström 11 October 1885, The Nordic Museum's Hazelius archive, in Hammarlund-Larsson 2004:11).

Ethnological research focuses on humans in a cultural perspective, aiming to study human activity and bring to light why we do what we do, both in the present and past. The theories and methods used are very much the same as in anthropology. Ethnology is comprised of cultural and sociological theories, field studies, interviews and observation techniques, and uses writing as the primary method of stating findings. Traditionally, ethnologists have studied folk (rural) culture. Over the last fifty years, however, the focus has shifted towards a broader understanding of what folk culture is, now including the cultures and subcultures of, for example, industrial workers, fishermen, Goth rockers and geeks. Today there are nearly no limits, neither in space or time, for what the ethnological field may contain. Ethnology aims to establish a deeper understanding of the cultural human being. Investigating and analysing material culture is one part of the ethnological project, and meeting people in their own lives, going out in the field, is another.

In archaeology, my first academic career, the task is to understand people through their belongings and things, such as houses, boats or other traces left in the landscape. The archaeologist tries to make sense of a previous culture from its remains, an interesting and complex task. The vanished humans extend themselves through their artefacts into our own time and space, but do not reveal themselves. We must analyse the objects left behind and interpret their meanings. Archaeology and ethnology are closely related disciplines in that they

both study human activity through physical remains. The disciplines can be seen on a timeline, with archaeology concerned with prehistory in both practical and theoretical ways, and ethnology concerned with historic times. Ethnology as an academic subject developed from archaeology, and there is still a connection between the two disciplines as regards archive studies, museum work and understanding agriculture and culture.

Ethnography, the study and systematic recording of human cultures and also the descriptive work produced from such research, is what anthropologists and ethnologists do (Wolcott 1999). Ethnography is both a *process* (method) and a *product* (the writings). Wolcott notes ethnography is often more associated with processes rather than products, stating, "Thus for many of today's qualitative-oriented researchers, to be 'doing ethnography' has become a shorthand expression for describing how they intend to gather data, without necessarily suggesting or implying, and certainly without promising, that the outcome of their efforts will be framed as ethnography" (Wolcott 1999:41). In human computer interaction (HCI), ethnography is mainly considered as a method, to go out in the field, in a contemporary setting that is populated with users (as for example in Arvola 2003; Bogdan 2003; Hedman, 2004; Normark 2002; Rönkköö 2002). It is a way to gather information about the user's needs, wishes and desires, in order to inform the design (Crabtree 2003; Simonsen & Kensing 1998). The field in ethnology can be many things: a contemporary workspace, a blog, the contents of boxes in an archive, articles in a newspaper or an urban public space. The field can be both in the present and in the past, and one can look at the field as being in the documents themselves, including both the previous and present contexts of those documents (Wolcott 1999). The methods used to deepen the understanding of a subject are obviously dependent on the field. Archive studies or observations, separate or combined, are common ethnological approaches to investigate the field (Londos 1993; Palmenfelt 1993)

Being part of the action (as a participant observer) is one possible way of entering the field (Öhlander 1996). Sometimes this can be difficult, as in the study of how men constitute their identities through hair practices, i.e. how men take care of their body hair and why they do it (Lindquist 2000). It was not possible for me to be part of their activity when it happened, for example, when

they shaved their scrotum in the shower. I had to rely on interviews to get the men's stories about their hair practices and relate them to how these matters were described and talked about in different media.

Many anthropologists and ethnologists are critical of the way ethnography as method is used. As Wolcott puts it, "Ethnography is for many a romanticized idea about 'living one's way into a culture'" (Wolcott 1999:43). When it comes to ethnographical methods in HCI research, I often find there is a lack of description regarding what was actually done, such as what was experienced, why things happened, and how and why methods and research were performed the way they were. The term "ethnography" is used in some way (or variants such as "ethnographically inspired" or "quick-and-dirty ethnography") to ensure the reader that someone has actually been out there in the real world. The focus is too much on merely going out somewhere and writing descriptions of what is seen, instead of on truly entering and investigating a field to capture experiences. The line between the two ways of approaching a field is fine. The difference has to do with research tradition and the purpose of the research, as well as with attitude, reflection, language and embodied experience.

To be reflective is central in any research, or at least it should be. Reflexivity is an important part of any ethnographic approach and methodology; I must bring myself as a researcher forward within the research work and place myself as subject and object in relation to the field (Lindquist 2005). What am I doing and why? What do I see and why? In the meeting with the other (an informant or research object, for example) the researcher's self is there all the time (Wolcott 2001). An early example is that of the famous anthropologist Bronislaw Malinowski (1884-1942), where he in his private diary from the Trobriands, islands that are part of Papua New Guinea, shows a different side of himself than that of the official researcher. In his personal diary he calls the informants "bloody niggers" while in his scientific writing he portray theirs lives impartially (Malinowski 1967). He thinks like two different persons, the subjective narrow-minded white man and the objective broad-minded scientist. In his personal diary, the two roles can meet and talk more freely about things that in a scientific work would have been unmentionable. Malinowski did his ethnographic fieldwork in the Trobriands in the 1920s. Positivistic research was the ruling tradition of the time, which

meant that an objective distance between oneself and one's objects was the correct way to present good research. Today, self-reflection is an integrated part of all ethnographic scientific work and should be presented within the written research (Ehn & Klein 1994).

It should also be mentioned that the practice of writing is important in ethnology. The written word is the most important tool I have to collect what I experience in any field. It is also the main tool I have to express myself to an audience. Writing is an act that continues through the whole ethnographic research process, from the first notes on a piece of paper when observing, to transcribing an interview, to analysing data and finally to writing the research text (Klein 1990). It is through words and language that my knowledge is constructed and shown.

Cooperative design in HCI, a political stance

There are many names for system and technology development design processes that focus on the user and user participation, such as participatory design (PD), the Scandinavian tradition, cooperative design, the collective resource approach and the critical approach. These design processes are all different ways of dealing with what has been called "democracy and skill" (Bjerknes, Ehn and Kyng 1987:56) and user participation (Bansler 1989; Bjerknes, et al. 1987; Bjerknes and Bratteteig, 1995; Bødker, Ehn, Sjögren and Sundblad 2000; Suchman, Schuler and Namioka 1993). How these processes relate to each other can be debated. One could argue that cooperative design and the Scandinavian tradition are part of the PD tradition (as described in Dourish 2006, for example), or that they shares similar perspectives but still constitute different approaches to bringing users into the design process. One process may view users as design partners (as described in Druin 2005, for example) and another may view users as experts on their own contexts (as described in Lindquist et al. 2007, Paper A, for example). Regardless of the differences, these approaches stem from an interest in bringing the users, their skills and know-how, their needs and desires, into the design process in order to make useful and meaningful designs.

These design processes involve issues concerning power, and in Scandinavia they began with a political agenda to shift the perspective from the management-oriented processes of traditional system and technology development to user/worker-oriented processes. Bjerknes writes, "Historically the starting point for user participation in system development was the discussion about the relationship between work and democratic values in Scandinavia around 1960" (Bjerknes 1995:75). The Scandinavian tradition and the cooperative design approach are examples of design processes that arose from a political stance. Their development projects are user oriented, rather than management oriented, thus forming a critical approach to other kinds of development projects (Bjerknes and Bratteteig 1995).

Many of the core concepts for these design processes were developed in SIMULA in 1967. SIMULA was an object-oriented language, developed not only as a programming language but also as a mechanism to communicate complex systems to users in their own words (Nygaard 1990). Inspired by this approach, the Centre for Working Life, (Arbetslivscentrum in Swedish) developed these design concepts further, for example with the work performed in the DEMOS project (Democratic Planning and Control in Working Life, Computers, Industrial Democracy and Trade Unions) (Ehn 1989). These projects started at about the same time that co-determination laws were being passed in Sweden. The democratization of the workplace in some Scandinavian countries was brought about by employee influence through unions and collaboration with management. In the DEMOS project, the method of which was called work-oriented action research, working groups were formed with local unions, using academic researchers as resources. The starting point of the investigations was always the perspective of the workers. In The Norwegian Iron and Metal Workers Union (NJMF) project, using the so-called "collective resource approach", strategies were developed for workers to influence designs (Bjerkenes, Ehn and Kyng 1987).

In the early 1980s, cooperative design projects focused on the skills of the workers and how these could be used as leverage to push computer system design more towards a user perspective. The theoretical starting point was Braverman's (1974) assertion that dividing labour and deskilling workers is dehumanising.

Thus, the issues of quality of work and workers' skills were placed in the foreground of system design projects. An example of this was the UTOPIA project (Bødker, Ehn, Kammersgaard, Kyng and Sundblad 1987). The major achievements of the UTOPIA project (Utbildning, Teknik och Produkt i Arbetskvalitetsperspektiv), started in 1981, were the development of experience-based design methods, created by focusing on hands-on experiences (Bødker et al. 1987; Ehn 1989). The researchers, however, ran into several difficulties in trying to apply the tools and techniques of traditional system development while strongly involving the users (graphics workers). As a solution, the project used low-tech prototypes, mock-ups and sketches, and borrowed techniques and methods from industrial design and invented new ones.

A number of projects were initiated in the 1990s, including The AT project (with AT short for Arbejdstilsynet, the Danish national labour inspection service) (Bødker, Christiansen, Ehn, Markussen, Mogensen, and Trigg 1993), and the EureCoop/EuroCode projects (Grønbæk, Kyng and Mogensen 1995). Researchers during this period called for cooperative design to strive towards involving users more fully in the design process (Greenbaum and Kyng 1991; Bødker et al. 2000). This meant full participation in the design process and not just nominal or symbolic representation in meetings or on committees. The assumption in cooperative design projects is that a joint understanding and solving of a problem based on expertise knowledge and values is better than a more traditional hierarchal decision-making structure (Lantz, Räsänen and Forstorp 2006). User involvement should also mean creating new ways for designers and users to work together and not just fitting users into an already existing system development process. The Centre for User-Oriented IT Design (CID) in Stockholm was one research group where cooperative design formed the core of all research, both in terms of finding new methods for bringing the users into the design process, to capture their needs and desires, and in terms of collaborating across disciplines (Sundblad and Lenman 2001; Sundblad 2005b).

Cooperative design today is an approach characterized by its concern for developing more humane, creative and effective relationships between those involved in the design and use of technology (Suchman et al. 1993). The design process involves cooperation between researchers, designers, developers and users,

all working collaboratively and having a say in the process. Several techniques have been adopted and developed, the most prominent of which are scenarios, early prototyping/mock-ups, participatory design workshops, contextual design and contextual inquiry, ethnographic field methods, probes, and informal interviews. Researchers, designers, developers and users are all seen as experts in their respective fields and about their own situations. Some see cooperative design (and participatory design, too, for that matter) as giving "all power to the users". The point of cooperative design, however, is not to give the decision-making power to the users, but rather that the designer makes design decisions in close cooperation with the users.

A common issue in design projects of both academic and industrial origin is determining who the user of a system or technology is, though "stakeholder" might be a more accurate way of describing the user. In cooperative design there is a rather quiet but still ongoing debate about what terms to use. The word "user" is somewhat problematic. In some contexts the concept is controversial in that it diminishes the individual. It reduces an individual to a user of a system, for example, who is then perhaps not seen as an actual person fulfilling her tasks. In addition, the term does not say anything about relations to other stakeholders. When studying the interaction between humans and computers, the choice of terms reflects the understanding of what is occurring. Other terms for user are person, end-user, novice, expert-user, partner, stakeholder, direct user (customer), indirect user (customer's customer), and so on, words that all tell a little more about the user's position and activity (Lantz 2007-07-16).

The role of the researcher in cooperative design is not always clear, or perhaps one should say not stable. Some cooperative design researchers claim they are doing design, others technology development or simply research. There are many variables that affect how one can view the roles, whether one is focusing on design, research, development, technology research, methodology research, the interdisciplinary nature of design, improvements or explorative projects, and so on. The roles change according to who is looking at the participants, but also depending on the expected outcome of the project (Lantz, et al. 2006; Lindquist 2005). Though research has been done on the role of the participant in cooperative design projects, and also on how to define cooperative design, such as

whether it is design-oriented research or research-oriented design (Fällman 2003), there has still not been enough research done "from-the-outside" on cooperative design research projects. In all of the projects in which I have participated, a point was reached when we had to reflect on the process and retrospectively analyze our work methods, not only as a natural part of doing research, but also as a sincere question: How do we do what we do? Often, the experiences of the project are described by individuals or groups who have been deeply involved in the process they are reflecting upon (Elovaara, Igira & Mörtberg 2006; Lindquist 2006; Räsänen and Lindquist 2005). This means that the analysis can become a matter of negotiating viewpoints, shortcomings and achievements, in accordance to relations within a project team. To investigate projects from an outside perspective, not from the view of a design research partner, and with the interest of improving the design process, could possibly be one way of investigating what is really going on in the design process.

As described above, design processes in Scandinavia, including cooperative design, began in relation to democratic values. Even the word "cooperative" can be seen as implying a political concept about striving for equality and togetherness. In Sweden, ideas of cooperation and togetherness manifest themselves in many ways in organizations, authorities and workplaces, and are part of the conceptual foundation of Swedish society and the discourse of the Swedish people (Daun 2005; Löfgren 1993; Nyce and Timka 2002). An example of this would be the Social Democratic Party's idea of Sweden as folkhemmet (the people's home), in which a class society is replaced by a system of equality. It is also possible to find layers of political discourse in Swedish design (Ahl, Olsson and Kleberg 2001). The concepts of jämlikhet (equality), lagom (moderation), and social and economic trygghet (security), which are central to Swedish society, are in the discourse of Swedish design translated into terms such as unpretentious, frugal, democratic, honest, socially aware, equitable, relaxed, accessible, practical and functional (Murphy 2006-06-30, 2006-07-31).

Though these concepts could easily be used for describing values and cultural signification in cooperative design, values are seldom talked about in cooperative design, even though we all know we have them and live by them (Beck 2002). One exception to this lack of discussion, however, is the book The Obvious

and the Essential – Interpreting Software Development and Organizational Change, by Jenny Öhman Persson. The book shows the importance of being aware of and questioning our values and preconceived notions in HCI research and technology and systems development, in order to avoid misinterpretations and biased categories and design decisions (Öhman Persson 2004). Nonetheless, the question of how we make ourselves aware of and make use of values in our work has not been sufficiently discussed or resolved.

Recently efforts have been made within the HCI community to critically examine the values for the cooperative design process and to bring the notion of values into systems development (Beck 2002). The Value Sensitive Design research lab, co-directed by Batya Friedman, one of the most renowned researchers within this field, has developed a theoretical framework and methods for connecting designers of technological systems with others who understand the values of the different stakeholders in systems (Friedman, Kahn, and Borning 2006). Through the Tripartite Methodology based on conceptual, empirical and technical investigations, and based on strengths and techniques from user-centred design approaches as those mentioned above, Value Sensitive Design seeks to bring in values that centre on human well-being, dignity, justice, welfare and human rights in an iterative process, functioning both on concrete and abstract levels (Friedman 2004). This approach's most valuable contribution to the HCI community is that it acknowledges that values, whatever they may be, are important aspects of understanding interaction between humans and computer systems and should play a role in design processes (described for example in Walldius, Sundblad & Borning 2005).

Research Questions

Within cooperative design, as I have experienced and understood it, there is an ambition to give equal importance to the voices of all participants in the collective design space. Though there is a collective interest to make good, user-centred designs, the process relies on the individuals within: design practitioners and users.

There are different ways of looking at the user in technology development research as well as in cooperative design. One way of approaching the user is to look at a group or a cluster of people, a family for example, who presumably have common interests because of their group belonging. Another way is to look at the individual, or rather take the individual's perspective, to see the person who both does and does not have common interests with other individuals. The group's and the individual's interests might or might not go hand in hand.

Cooperative design research is a dualistic and sometimes contradictory task where power relations have to be taken into consideration. The relation of groups to individuals, addressed above, is one, but there are many stakeholders involved in cooperative design, such as researchers, developers, users, customers and managers. All have their specific interests in doing cooperative design and research, and all have different agendas regarding what should be considered a successful achievement, improvement or goal.

— How do we in cooperative design projects look out for the interests of the individuals in group-oriented activities?
— On what grounds in a cooperative design project do we define the context, design space, problems and assets?
— How do we give voice to different interests, and are we aware of which voices are heard and not heard in the design process?

There are no simple answers to these questions. Rather, I hope through my empirical material and this thesis to give insights that will support and enhance the discussion of these issues.

Frame of Reference

Phenomenology and hermeneutics

My research approach could be described as phenomenological and hermeneutic, in that I will use the projects I have participated in, and the data collected in these projects, to reflect upon the significance and role of subjectivity, describing and analysing experiences, and interpretation in cooperative design research.

With a phenomenological approach, research begins with examining a phenomenon in itself. However, we cannot capture the real phenomenon, but merely the individual's experience of it (Husserl 1992). Therefore research grounded in phenomenology involves giving rich and accurate descriptions of how a phenomenon appears, and demonstrating how the phenomenon acquires its meaning (Husserl 1992). In other words, phenomenology focuses on the experience of a phenomenon. Such an approach for me as a researcher means that I will have to be as truthful to my experience of the phenomenon as possible, and then make an analysis on the basis of that experience. My aim is to describe as completely and accurately as possible my experiences of the projects in which I have participated. In one sense, one can talk about the researcher taking an inside perspective, trying to explain and describe the phenomenon from his or her own point of view (Karlsson 1995). The cooperative design projects will be shown through my own experiences of them.

We all give meaning to what we experience, which implies that the subject, who experiences and describes, will be visible through the text. Subjectivity can therefore be seen as an important aspect of writing a thesis. To give a clear view of why the phenomena are shown here as they are, I have tried to describe my background, both scientific and perhaps even a bit personal, to give the reader a more in-depth understanding of the writing subject.

Related to phenomenology is hermeneutics, the study of methodological principles of interpretation. With a hermeneutic approach, we can learn how to interpret and what it means to interpret, investigating interpretation from an epistemological perspective. As a tool of thought, hermeneutics oscillates between practical work with texts and reflections on knowledge, on the conditions of interpretation and understanding. Since hermeneutics involves theories about how theories or interpretations work, the study of hermeneutics is characterized by circularity. Hermeneutics is therefore always part of its own meta-theory (Engdahl, Holmberg, Lysell, Mellberg and Olsson 1977:7). In the hermeneutic circle there is a continuous process of input, interpretation and understanding. When referring to this thesis project, data means both the complete set of cooperative design research projects as well as the data they contain. The interpretation has been an iterative, ongoing process both within the project groups as well as within the individual participating researcher. This text is just one imprint of the data at one certain time, based on other writings on the matter, and the data may be part of new texts in the future.

Research in cultural studies, such as ethnology, is commonly concerned with examining phenomena from a subjective point of view. There is often a phenomenological and hermeneutic approach to the subject of study (Arvidsson, Genrup, Jacobsson, Lundgen, and Lövkrona 1990; Londos 1993; Palmenfelt 1993). In one example, in *Uppåt väggarna i svenska hem* (Up the Walls in Swedish Homes) 1993, Londos uses a hermeneutic method to analyse and interpret the collected data, which includes both artefacts and the words of informants regarding art on the walls in people's homes. She writes that she has to "knead" the collected data through critical interpretation and understanding, based on her own experiences and pre-understanding, in order to get a deeper understanding of the interaction between people and their pictures. In this kind of research, there

is an internal relation between the researcher's experiences and reflections, which can be difficult to express verbally. The process of interpreting and understanding cannot be shown on a flowchart. This means that the researcher's own culture and language are closely connected to the input and the outcome of the research, because it is through the researcher that a phenomenon is shown.

The hermeneutic process of input, interpretation and understanding can serve as the basis for understanding cooperative design in a richer way. Gadamer noted the potential of hermeneutics to inform both how we think about subjectivity and the human sciences, writing, "The hermeneutics developed here is not, therefore, a methodology of the human sciences, but an attempt to understand what the human sciences truly are, beyond their methodological self-consciousness, and what connects them with the totality of our experience of world" (Gadamer 1995:xxiii). Hermeneutics, then, also offers ways of thinking about the construction of the subject, by showing the unity between thought, language and the world.

The role of language is of utter importance in this thesis, as the data and empirical material of the projects are based on language, and it is the means through which the descriptions, interpretations and analyses are presented here. The political theorist Chantal Mouffe writes about language and relative time: "It is through language that the horizon of our present is constituted; this language bears the mark of the past; it is the life of the past in the present and thus constitutes the movement of tradition" (Mouffe 1993:17). Language is what I use to communicate the past, and while doing this the past is brought into the present and this creates something new, a new story and new understanding.

I have been told that the word "hermeneutics" derives from the Greek word Ἑρμηνεύς meaning interpreter, relating to Hermes, the god of eloquent speech. He brought messages from the gods to the people, and to do so he had to interpret the messages so that the people would understand them. Unlike Hermes, I do not intend to bring any god-like messages (I know my limits!), but I am the one who will make the interpretations and write this material. This is my analysis and interpretation, based on my experiences and position within the field of HCI, and on common theories and empirical data from cooperative design projects.

Reflection and participation

I am caught between engagement and scepticism; between my unreflective ongoing presence in the world and my speculative or detached awareness of that engagement. It is out of that interplay between those nodes of attention that I come to understandings. Understanding is reflexive (Young 1987:4).

During my time as a doctoral student at IPlab, the Information and Presentation Lab, and CID, the Centre For User-Oriented IT Design, today jointly called the HCI Group, at the Royal Institute of Technology (KTH), I have participated in several different projects, most of which have had the objectives of exploring new methods of investigating certain issues, such as family communication, mobile video telephone communication and the effects of tourism, as well as developing innovative methods to obtain a broad and joint understanding of users and their contexts, such as grandparents in a family, sign language speakers using mobile phones, and inhabitants of Split, Croatia. Within some of these projects I have, together with research partners in interdisciplinary groups, conducted studies in the field as a means to investigate how to approach a certain design space for certain users in a certain context.

As a cooperative design team member, my particular tasks were to observe, interview, write, participate in design workshops and meetings, and ensure that the users' voices were heard throughout the projects. Of course other team members also worked to include user perspectives in the projects, but this was one of my main responsibilities. I have, therefore, not been an outsider observer, but rather a participant observer, someone with a specific role in the projects.

To describe my method in this thesis, I will have to describe the distinction between two perspectives on the same data. The projects I have participated in and will refer to here are technology and method development projects. The material and data were mostly collected for reasons other than to be presented here. They were collected to inform the design process and to shape the design. Therefore, the analyses and interpretations in this thesis of this collected data are both interpretations of previous analyses made during the projects and new interpretations of the raw data. There is, consequently, a temporal parameter to

bring into the description of the data interpretation. Some of the analyses and interpretations were made during the projects with the knowledge that we had at the time and for the purposes of the projects. For this thesis this data has been interpreted again with the knowledge I have now. I have the collected data, the recollection of making and/or collecting the data, and the interpretations of the data at my disposal, all mixed in one single archive to be used and presented here.

All my knowledge about the projects and the participating groups and individuals, including what participants have told me about their lives and what designers achieved in the projects, is based on my interpretation. I have tried to put myself aside in order to view these participants as objectively as I can. Nevertheless, aspects of who I am will shine through the reflections and interpretations I have made. I was there, and it is through me that you read about it here. One can say that reflexivity is thinking about one's own thinking (Babcock 1980). I am in charge of deciding what is important to put forward and what is not, what stories are significant or constitute a turning point, and what stories should be put aside. I use myself as an instrument of appraisal, to understand the projects and the participants within, and the reflection of these projects in this format, this thesis, will be through me. This is important in understanding my viewpoint and my critique of cooperative design. It is very well possible that I have missed important information about participating groups and individuals, as I have not been present at every moment of the projects. Nonetheless, one way to make this text as correct and truthful as possible is to be reflexive and descriptive about myself as a participant and an individual in this context.

There are many ways of interpreting the data I have access to, depending on the perspective and focus of the investigation and my experience. One important element of design work is to analyse and interpret data in a group, which means both sharing and negotiating understanding. This means that some of my own understanding is built on a shared understanding with other researchers. To illustrate the problematic division between focusing on individuals versus focusing on a group, and the importance of a critical perspective in cooperative design projects, I reflect in this thesis on my interests and experiences within this field. This thesis, then, is based not only on the analyses I make here but just as much on analyses made during the projects.

There are several implications that should be considered when discussing language in this study. When conducting ethnographical research, and with other kinds of research, knowledge is first achieved when the research is written about (Klein 1990). It is when the white sheet starts to be filled with letters that researchers begin to understand what they know. This is a creative act, and it is I, the writer, who performs it. The tool I have is language, which is related to my cultural heritage, and it is not possible to separate the two. This thesis must be presented in English, but most of the gathered material is in Swedish, which impacts how the data can and will be presented. Notes and quotations must be translated, and the writer's knowledge of the English language will affect how this is done, and how meanings will be expressed. Here I will tell my story, where the presented papers and other texts are reflections of each other and even reflections of me. I take a phenomenological, hermeneutic approach to the material, in order to emphasize my points about the importance of individuals, interpretation and understanding in the cooperative design process.

All of these studies and projects have raised new questions as well as contributed to the planning of future work. I have learned different things from all of the projects. They have formed the basis of my education in human computer interaction (HCI) and cooperative design. Below I will present the cooperative design research projects I have participated in as the empirical material of this thesis. I will highlight certain aspects of those projects and discuss them in relation to a theoretical framework and myself.

Language and Meaning

Language is the most important medium we have to create meaning. Through spoken, written or thought language we perceive what other people mean, and also what we mean ourselves, making language and meaning totally inseparable. Language can be seen as a set of practices that evolve over time (Hedman 1994; Wittgenstein 1953, 1992). Meaning is a central concept in philosophy, as well as in phenomenological research in humanistic and social sciences. To understand the use of the word meaning, we need to look for explanations of meaning (Cooper 2003; Wittgenstein 1969). In other words, if we understand words and concepts by trying to understand their uses and roles, then meaning should be understood in the same way, namely by investigating the use of meaning. Meaning is to be understood through reflection on what counts as explanations of meaning.

There are different concepts that can be used to describe the way we perceive and comprehend the world. For instance, artefacts can be seen as social actors in an interactive world; when we use the artefacts we are engaging in a social dialogue. We then use concepts like *making sense, understandable* and *meaningful* to describe how something should be perceived when the design of the artefacts is good (Antonovsky 1987; Ilstedt Hjelm 2004). Ilstedt Hjelm states that the design makes sense when the use is considered comprehendible, manageable and meaningful, and that meaningfulness entails a motivation to do something, that sense-making is created in relation to an action. When we get

feedback that is foreseeable and desired from our interaction with artefacts, then the design of those artefacts is good.

Meaning, however, is created or shaped in relation to everything. It is not something valued, positive or negative. All the things we possess, all the people we know and all our interactions have meaning to us. Something can make sense to us whether we experience it as pleasant and enjoyable or unpleasant and dull, or whether it is an experience, skill, feature or artefact. Some meanings we share with others, and still some meanings are explicitly our own. Such meanings are not in things or in actions in themselves. We shape and understand the meaning that gives meaning to us. Meanings are in us, in our bodies, and are created as we interact with the surrounding world.

Meanings are always created within a discourse, through language in a process of social interaction, and at the same time they become part of the discourse (Fairclough 2001; Foucault 1993). Things that are told over and over, almost as mantras, by groups of people or by individuals, will define and enforce the discourse. One such example is the way in which within cooperative design ethnographic studies, or ethnographically inspired studies, or "quick-and-dirty" ethnography, have become the way to understand the context of the users. The ethno-word is the key to success, in terms of understanding users (Räsänen and Lindquist 2005). The ethno-word becomes part of the discourse of a successful approach in cooperative design, without necessarily being properly described or questioned. Yet what is it about the ethno-concept that makes it successful? Is it the people who perform the studies, the method itself, or both? Should lightweight use of ethnographic methods be used by anyone in a design project to inform the design process, or should this be done by ethnographers making "real" ethnographies of the user contexts? There is a continuous discussion of what ethnographic studies should entail in HCI and cooperative design, both of which define and enforce the ethno-word discourse (Dourish 2006; Räsänen 2007; Räsänen and Nyce 2006; Stolterman 2006).

Meaning is not only created through actions or through what is said, it is also created by what is not done or said (Foucault 1979). As a result, information about what is not said or done can also aid the design process (Mörtberg and Studedahl 2005). What can and cannot be said is a matter of discourse and is

strongly related to power (Foucault 1993). My intention here is not to make a discursive analysis of the cooperative design field, but it could be beneficial to analyze how certain areas, such as sex, violence and abuse, relate to technology development in a cooperative design tradition. Areas such as these are typically difficult for the cooperative design research community to handle (Silverberg 2006; Machulis 2006).

In this thesis I investigate meaning, using a phenomenological approach. Language, in any form, is what I use to grasp at that meaning.

Stories and their contexts

To narrate is to tell or relate a story, to tell something to someone. There needs to be two parties: the narrator and the receiver. The two parties can include one or many storytellers, and one listener or a larger audience. You can also tell a story to yourself, in which you are both parties (Prince 1987). In the projects described in this thesis we dealt with the spoken and unspoken meanings of the participating individuals. I refer to the information told to the researchers in the project as narratives and stories, whether or not those telling us this information would describe them as such themselves. I investigate the stories of the participants in order to understand their spoken and lived strategies, what they want and need, what is important to them and what is not, what is left unspoken and what is made explicit. There are important ethical aspects to consider regarding how these stories are presented here. I will walk the fine line of trying to describe the project participants without them feeling unpleasantly exposed, or neglected for that matter, by examining some cultural aspects of their lives as they relate them. By participants I mean participants from the user side as well as research participants, including myself.

The narratives in all the projects, particularly in the interLiving project, have sprung out of many different situations. All of the stories were told under specific circumstances, where time and place were crucial, making a story directly related to the context in which it was told. The context and circumstances surrounding the telling of a story often affect the story being told, or reversed, the story relates to the context. To be able to see and analyse what the context does to

a story, and vice versa, I have studied Katharine Young's phenomenological model of framing different contextual aspects of a story. Young's model visualizes the diverse ontological realities present when a story is told (Young 1987).

Young's work started out as an investigation of folk tales in Wales. When using interviews to collect the stories of the village people, she discovered that the conversations she entered in, that is, their contexts, had many frames of narrative significance. To understand the tales, she also needed to understand the context in which the stories were told. The context included the geographical site, the villages in the countryside, the houses people lived in and how the inhabitants visited each other, their relations, and finally all of their collected knowledge, about the past, present and each other.

When you listen to a story and interpret it, the present and past are being knitted together in the story that is being told to you, and the narrator might have a different agenda for telling the story than you have for listening to it. Seen in this way, storytelling can be seen as a complex process in which different aspects of the story and its context interact and affect each other. My conception of the projects, including the participants as well as the data, has most probably changed over the years. Different experiences and knowledge, collected at different times and under different circumstances, have been put on top of each other, sometimes to add more flesh to the bone, sometimes to push unimportant information away. The perspectives from which I conducted my studies have also changed over time due to the direction of project research and my own interests.

All of the stories I have access to through the projects could be framed with the same phenomenological tool established by Young, meaning that the contexts of the different stories could be charted in some way. Instead, however, the stories I will tell from the projects will be primarily put into context through my writing. My aim is to describe the contexts of those stories in order to relate them to perspectives on cooperative design.

Culture through language

Part of understanding the contexts of stories involves understanding the spoken and unspoken cultural meanings of the participating individuals. Cultural,

context-bound implications should be considered when discussing language. Making sense of what is going on is usually no problem in our everyday lives. If we know the social and cultural context, as well as the present and extended context of our lives, we can understand what is said without actually knowing exactly what someone is talking about. To illustrate what I mean, the following is a conversation that my mother overheard many years ago:

"Do you have a boy in your class whose name is Olle?"

"No."

"What's his name then?"

"Lars."

End of conversation. This was my brother and me, thirty years ago, talking about a boy in my class when I was in sixth grade and my brother, who is called Olle, was in fourth grade. We went to the same elementary school in a nice neighbourhood in a fairly posh community close to Stockholm. The conversation is clearly context bound. We were both in the same context physically, and also looking at the world from a shared perspective at the time. We lived in the same house, with the same mother, knew the same people, and so on. We did not think alike (any 12-year-old girl would give her arm not to be like her 10-year-old brother!), but we shared many references, and knew the same context in a wider perspective. How could I know that the boy my brother was referring to as Olle was Lars? Well, because I know that a boy looking like Lars and named Lars could from my brother's point of view, and mine, be mixed up with an Olle. He could certainly not be mixed up with a Djamil, Christopher or Ali.

The reason that we could understand what we meant in this conversation had to do with a shared cultural, social and political perspective. What I want to illustrate with this story is the complexity of cultural togetherness. Sometimes we have so much in common that we do not have to be explicit. We think that we understand what is going on and often we do. Other times, however, we think we understand but we really do not, believing in a shared understanding that is really not shared at all.

Understanding artefacts

Archaeologists and historical anthropologists often begin by investigating the physical remains of human activity, and from that build an understanding of a culture. Such researchers base their studies on material culture, which is what is left behind when people's words, thoughts and actions are gone (Appadurai 1986; Tilley 1990).

In cooperative design research work, on the other hand, artefacts play different roles in different stages of the design process. Artefacts are part of the researcher's investigation of the user's context. In a home, for example, artefacts could be the shoes in the hall, the photos of loved ones on a bookshelf and the dusty cords lying in a messy pile on the floor (Sundblad 2004). At work, artefacts could include calculators in plastic bags, calendars of nude women, and rolling pins, as in the bakery study (Paper E). Artefacts can also, however, be the outcome of a process, and they can play a role in mediating information and knowledge (Paper B).

In the world of design, *affordance* is an often used and debated concept that was invented by psychologist James J. Gibson to refer to the actionable properties between things in the world and an actor (a person or animal). Affordances are naturally existing relationships and do not have to be visible, known or desirable (Gibson 1977; 1979; Norman 1988; 1990; 1999). I believe the terms affordance and meaning are similar but not equivalent concepts. Affordance, deriving from psychological interpretations of how we perceive the world, is perhaps more closely related to the outer world, the artefacts, while meaning, deriving from philosophy and the social sciences, refers to processes going on within the subject, the human, in relation to the world. When we talk about affordance in artefacts we mean that the artefact is showing us its intentional use and purpose. A handrail for example, is smooth and shaped for a hand, and it is placed at a certain height from the ground so that we can place our hands on it, follow its shape, and lean on it while we move. The handrail also affords other uses, depending on the features of the rail's shape, strength, placement and position in relation to the surrounding world. For example, you could stretch your sheets on it, hang from it, put your chewed gum on it, tie burglars to it, or step on it.

We have conceptual pictures and comprehensions about what an artefact means, about what information it provides and what it can be used for. We know what a handrail is and how it should be used because they have a certain shape and are seen in certain contexts, we have used them before and have a name for them. The concept defines the object, and the object defines the concept. Since my focus is on the human activity of creating meaning through stories and expressions, I will look at artefacts and how they relate to the context of their existence, rather than at objects as having affordance.

Reading material culture

In the data from all the projects there is a whole set of expressed meanings in notes, drawings, artefacts, photos, films, diaries, and so on. This is a result of using different methods to explore the context of users, their needs and desires. It is not a simple task to analyse and interpret this vast amount of material into text. In some cases the material is relatively easy to interpret, such as with the video prototypes, because the film shows the users expressing their own design ideas grounded in real experiences. Other data needs more analysis and explanation because it includes artefacts or annotated comments belonging to a larger context. There have been attempts to present such material in a thesis or other book format, for example Daria Loi's *thesis-as-suitcase*. She explores "the potential of travelling containers to articulate the multiple facets of a research thesis" (Loi 2004:1; 2005). Loi's work relates to the issue in participatory design of how to mediate and give justice to methods and results that are so intertwined with artefacts that the artefacts become part of the methodology.

Referring to the definition of language as an open-ended set of practices, I consider this vast material, the common and shared collection of words and items, as a language of the projects. My aim is to contextualize the data through critical interpretations related to my research questions. One way to order the total gathered material from the projects is to divide it into *data* and *artefacts*. What I mean with data is the whole written body: notes, annotations, transcriptions, translations, drawings, pictures, et cetera. With artefact I mean everything that is an object, irrespective of whether it is virtual or physical. For example, a probe diary in the interLiving project is an artefact containing data.

The artefacts can be made by user participants, researchers or both. Continuing with the probe diary example, the probe diaries were first designed and made by the researchers to be given to the participating households. Then, individuals in the households wrote down their communication stories, long or short, and some also put artefacts in the diaries, like a postcard, ticket and golf tee. So, the artefact produced by the researchers was filled with data produced by family participants, and sometimes that data was in the form of artefacts, representing user information (Paper B).

This division of data and artefacts is in no way indisputable or even consistent. There is an overlap between the two categories, where the data and the artefact are the same. This is most noticeable in the artefacts made by the users for showing their design ideas. In this case, the artefact can be seen as the collected design idea data. Nevertheless, making a distinction between data and artefacts has been useful for me when analysing this material in the present, when the data and artefacts are no longer part of the design process. When I look at the diaries today, I see a complete set of data representing the whole research group, including individuals within the families as well as the researchers. This data is also an artefact representing a section of the whole cooperative design project. One can say that I have analysed this data totally subjectively, from my point of view, and examined some issues that I would like to look into further.

interLiving Stories

The data from the interLiving project, short for Designing Interactive Intergenerational Interfaces for Living Together, comprises the main material for my thesis. This project was my first experience with HCI, and was my training school into this field, as I came to work with prominent researchers with special interests in cooperative design. The joint report on the achievements of the project, its outcome and deficiencies, are fully described in Paper A. In Paper B the use and understanding of artefacts in the interLiving design process is described. My aim here is to describe and exemplify certain aspects of the project in order to show how they relate to my research questions.

The project involved three intergenerational families in Sweden and three in France. Each family contained several, typically three, households. The three participating families in Stockholm consisted of eight households spread across the city, the archipelago and the countryside. As the user group in this project was the family, the groups were not homogenous at all. The participants' ages varied from one year to 73. Their skills and capabilities differed massively. In addition, over the three years of the project the participants grew older, meaning that their individual skills and capabilities changed over time. It was important to bear this in mind when decisions were made on which method to use and what technology to develop. My main references here are primarily from the work done together with the Swedish families, where most of my participation was focused.

Triangulation

interLiving had two related objectives: to develop novel and appreciated communication artefacts and to improve design methods. Depending on the user's differentiation, we had to approach individuals in different ways. It was important for the project to find suitable forms for acquiring the right information. Mixing and trying out methods was one way of approaching the group.

The EU IST FET research initiative The Disappearing Computer, of which interLiving was a part, strongly emphasized the importance and value of bringing in end users as design and development partners (Wejchert 2001). The interLiving project was therefore based on the Scandinavian cooperative design tradition, and had an interdisciplinary approach with researchers from computer science, engineering, ethnography, industrial design, graphical design and psychology. As a result of their backgrounds, the researchers had different ways of conducting research, design and technology development work. At least two researchers from the team were expected to be present at every activity with the families. This meant that we all worked fairly close with the users, both in their homes and at the lab. Having two people present at the same time, in the same context, reduced the "handing over of information" between researchers and enabled them to discuss their experiences.

The project aim was to develop, together with families, technologies that facilitate communication between generations of family members living in different households. To achieve this we committed ourselves to creating new methods of working together, both across disciplinary boundaries and with the users, that is, the families. In this interdisciplinary cooperative design project we used well-known methods and also invented new ones.

In the project we used a combination of diverse collaborative methods to understand the needs of the families in their everyday lives, to develop innovative artefacts that supported these needs and to examine the impact of such technologies. These methods included workshops (Mackay 2000; Westerlund, Lindquist, Mackay and Sundblad 2003), cultural probes (Gaver et al. 1999), technology probes (Beaudouin-Lafon, Bederson, Conversy, Eiderbäck, and Hutchinson 2002; Hutchinson 2003), interviews, prototypes, observations,

video brainstorming, prototyping in the homes, and individual assignments (Beaudouin-Lafon, Druin, Harvard, Lindquist, Mackay, Plaisant, Sundblad and Westerlund 2001). This approach of using three or more methods to validate results is known as triangulation (Mackay 1997; Taylor and Bogdan 1998; Westerlund et al. 2003).

Little is actually known about where, why, when and how the ideas that lead to successful solutions are generated (Davis and Talbot 1987). When triangulating methods, an approach that produces a lot of different data such as drawings, photos, diaries, notes, videos and artefacts, there is a great deal to analyse but also more data to draw conclusions and ideas from. The methodology of holding family workshops, for example, was developed in interLiving and used and cultivated further in later projects, such as Project K (Räsänen 2007; Räsänen, Thuresson and Wiberg 2005), the Copland project (Groth, Lindqvist, Bogdan, Lidskog, Sundblad and Sandor 2006) and the EU-funded NEPOMUK project – the social semantic desktop (Laurière, Solleiro, Trüg, Bogdan, Groth and Lannerö 2007). The methodology for the workshops is theoretically simple, but it produces a vast amount of data, of different types and quality. The workshops are based on the central belief that design should start off with real people's real experiences. The objective is to ground the design ideas in the lives of the user participants. Instead of general, unspecific descriptions, the focus should be on actual descriptions of real situations that make sense to all participants. These descriptions should cover the whole context of a situation. From the descriptions the participants make scenarios, both written and drawn, which will then be staged and videotaped. The videotaping of the scenarios is important because through videotaped scenario iterations the participants refine their design ideas. To illustrate characters and ideas in the scenarios they make quick-and-dirty prototypes (Lindquist and Westerlund 2005a; Lindquist and Westerlund 2005b; Westerlund and Lindquist 2007).

Another important aspect of triangulation in the interLiving case was that the different kinds of data, and the different media it was collected and stored in, helped to bridge understanding between the researchers, and also between researchers and family members. It meant that there were different ways to describe, illustrate and communicate an idea or a thought.

A variety of methods and an interdisciplinary research team are part of triangulation as a conceptual tool. With each researcher's scientific background there is a set of well-tried methods. When working in an interdisciplinary team, as in interLiving, researchers have to find new ways of working together, to blend the different methods and perspectives into joint interdisciplinary research work. To put this into practice in interLiving, we as researchers needed to be confident in our own tradition of methodology and have an open mind to other methods. Other important factors were being open to creative suggestions and letting all our skills shine through, not only those acquired from studies in our own scientific field, but those gained through life experiences. This also meant that data generated through a method from one scientific field was used by researchers from other fields. For example, the log files that the computer scientist used to control that the software worked properly were transformed into pictures, which were then printed out and used by the ethnographer in interviews with the users to get a deeper understanding of their context and strategies. Another such example was the probe photos; they were originally intended to inspire the design process but they were also used to help the programmer understand the context in which the technology was to be implemented and tested.

In interdisciplinary groups, researchers have different scientific and cultural backgrounds, which is shown in their use of different terms. Below is an example taken from the interLiving interdisciplinary research group. One afternoon, I overheard an industrial designer and a computer scientist discussing difficulties with building a prototype. They had no difficulty in understanding each other, but the computer scientist was talking about "which subroutines to call" and how to do this, and the designer was talking about the same thing but in terms of "plug-ins". The group of researchers should have the same focus, namely to perform good design in a cooperative manner, but their perspectives are different and therefore their language will also vary.

The utterances are pointing back to the two researchers' respective scientific backgrounds, but as regards design and prototype building they are also pointing forward, towards design decisions that will be made. A subroutine and a plug-in do not have the same connotations, and they do not necessarily mean the same thing. They are rather words that describe functionality and action, and supposedly show a direction where the design is heading.

Probing

Cultural probes, a technique developed by Bill Gaver and his team at the Royal College of Arts in London (Gaver et al. 1999), were used and developed further in interLiving. The initial thought with cultural probes was to create artefacts to give to the users for them to use and collect information about themselves, which would in turn be used to inspire the design team. In interLiving the gathered data from the cultural probes, containing maps, postcards and disposable cameras, both informed and inspired the cooperative design process, and would also serve as a basis for interviews with the users and for common discussions (Sundblad 2004).

Technology probes, which were developed in interLiving (Hutchinson, Mackay, Westerlund, Bederson, Druin, Plaisant, Beaudouin-Lafon, Conversy, Evans, Hansen, Roussel, Eiderbäck, Lindquist and Sundblad 2003), combine the social science goal of collecting data about the use of a technology in a real-world setting, the engineering goal of field testing a technology, and the design goal of inspiring users (and designers) to create new kinds of technology. The probes were designed to be extremely simple, with a single function, while leaving the interpretation of how to use them as open as possible. The goal was to feed the design process; participants gained experience and new ideas from living with new technologies, and researchers obtained data and design ideas from the participants and their use of these technologies in context. A probe's single function must be sufficiently attractive for users to want to interact with it as it is, without training or externally imposed use requirements. A successful technology probe will inspire ideas and should have interpretive flexibility, encouraging users to generate unexpected uses (Orlikowski 1992).

The technology probes helped us to address the following three methodological challenges. First, they provided an unobtrusive way to learn about a specific family's communication while letting them maintain their privacy. Second, they let the participants use and explore novel communication technologies in their own homes, which provided a deeper foundation for later collaborative prototyping activities. Third, they provided us with feedback on what was important concerning aspects of the interface, based on the families' patterns, their level of use and their reactions over a period of time.

The videoProbe was one of two original technology probes. Its function was to take snapshots of the daily life of families at home and exchange them with family members living in other households. The videoProbe was triggered by changes in the environment, for example, a person entering the frame and standing still in front of it for a little while. The other technology probe developed, the messageProbe, enabled family members to draw and write on a shared surface across households. Successive writing pads were generated and shuffled backwards on a display screen with a drawing pen.

Both probes combined the goals of gathering data about daily family life, inspiring ideas for new communication technologies and testing them in real-world settings. Family members living in remote households could share pictures, drawings and personal information with each other via a closed, secure network. The probes not only provided an intimate view of the families and filled the requirement for a real-world system, but also led us to the novel concept of networked communication appliances.

Shared understanding and intentions

Joint family workshops had at least two objectives: to generate design ideas and to allow the families and researchers to get to know one another. Each workshop activity started with an introduction that framed and focused the work, such as showing video clips of interviews from the households or displaying photos taken by the families illustrating their environment. After the introduction the participants shared a real and recent experience that had meant something to them, a use scenario. The scenario could deal with something problematic, like a breakdown in the internal family communication, or it could be something pleasant, like a family vacation. Typically, a scenario involved some type of communication with others. That the scenarios were experienced and real helped to keep the work relevant to and reflecting their lives, expressing real needs and desires. Also, a variety of brainstorming activities and design games were conducted, which helped us all explore different design ideas.

Far more is revealed and communicated through acting out, instead of only relying on spoken language. Therefore, we encouraged the family members

to show us how they would like things to work, how they would want to interact with artefacts and in what context. The groups developed design scenarios and built simple low-tech prototypes with a variety of prototyping materials. The design scenarios were acted out with the help of the prototypes, and were often recorded on video. These video prototypes thus demonstrated novel technologies that the families might want to have in their homes.

Bongofax

In interLiving, as with other cooperative design research projects, there were stories told by both user participants and researchers that were outside the scope of the research itself, but were possibly just as important to the design process, though on a different level of understanding. These stories did not point in any clear direction regarding design decisions, but most certainly affected the project as a whole. One example from interLiving is the story of the Bongofax.

The Bongofax was created and named by a young teenage boy during a joint family interLiving workshop at CID. The idea can briefly be described as a science fiction teleporter. The boy presented his idea to the whole group of researchers and family participants by telling us his scenario: "If, for example, the toilet in your home is occupied or something, you can just dial your granny's telephone number, jump into the machine, and them pop up at her place, use the bathroom and then dial your home number, jump into the machine again and come back home". While he was telling us this, his father looked a bit uncomfortable and tried to interrupt the presentation. He thought the idea was stupid. The father, instead, presented the idea of putting GPSs on all his sons, so that he could keep track of them: "Every time we need to go somewhere and I tell the kids to wait out by the car, they are all gone by the time I come out. It is the same thing every time. I never know where they are".

The Bongofax prototype, and the father's response to it, was the first artefact that clearly represented the asymmetric communication patterns in the families. Our interpretation included the stories of the boy and the father, but just as much the whole context in which they were told (Lindquist 2004). One important discovery was that artefacts helped us to construct and understand our shared intentions within the research group. As a result of the Bongofax and the

story around it, the implicit intention of the researchers to develop communication technology and not surveillance equipment became more explicit. The story not only helped to reveal the shared intentions of the researchers, but it also revealed asymmetric communication in the families and the different intentions of the father and his sons.

"Dagis" - Cultural togetherness

The stories in the interLiving project were told in Swedish and in a Swedish context, together with Swedish researchers. In such circumstances, common references often do not need to be explained. We believe that we know the same things, and we do not have to negotiate these understandings. However, such assumptions about shared understandings can sometimes be false. During a joint family workshop in the beginning of the interLiving project, one of the participating grandparents said that it was so fun to do the workshop activities, saying that it "feels almost like dagis!" (*dagis* being the Swedish word for a children's day care centre or preschool). Everyone present, researchers as well as family participants, seemed to understand what he was referring to. At least we thought we knew and simply nodded, smilingly in a joint understanding. We were presumably referring back to our own positive experience of dagis, where children spend a great deal of time playing and creating together with friends. Dagis is incorporated in the Swedish way of living as one of the platforms where the individual in a democratic state is fostered (Ehn 1983). I would think that most Swedes have a relation to the concept and to the actual place, but I also suppose that not all Swedes would refer to dagis as something fun. The opposite is probably quite common, too.

The dagis comment was one of those everyday casual remarks that someone says without giving it deep meaning. The comment is brought up here not because it seriously affected the direction of the workshop, but because it illustrates the risk in assuming shared understandings. The researchers and user participants in the Swedish part of the interLiving project had many similarities: all were white, middle class, and well educated, and most lived in nuclear families in the Stockholm area or in close relation to relatives. With such similarities, it is easy to see how we could assume that everyone thought that dagis is a good

and fun thing. When people seem to share the same cultural context, this could be good in that it leads to less misinterpretation of what is going on within that context. On the other hand, it can make you blind to certain aspects of that same context if you have strong preconceptions about it.

The dagis example shows two important elements in the interplay of language and cultural context. One is that understanding the cultural context in which a language is used is essential. The two are connected and cannot be interpreted separately if we want to make sense of what is going on, if we want to understand the interaction (Gadamer 1995). When we share a cultural context, therefore, we can make sense without necessarily being explicit in what we mean, even if what we say on the surface seems nonsensical. At the same time, however, we must be careful in assuming how much of a cultural context we actually share with others in order to avoid misinterpretations and misunderstandings.

One of my responsibilities in the project was to keep in contact with the Swedish families, which resulted in a close connection with many of their members. Methods like observations and interviews gave me an insight into their private sphere, but also vice versa. After three years of close collaboration, I think we all, both family members and researchers, had a mutual understanding of many aspects of our respective lives. Such a close connection with one another was perhaps both helpful and problematic for the project. One issue that became apparent was the research ethics on how to approach our subjects, that is, the family members. The more we got to know each other the more our approach became somewhat blurred and relied more on assumptions about the subjects. For example, at the end of the project we did not ask for permission to use pictures in publications until after they were published, even though at the beginning of the project we had told them that we would not publish anything that could reveal their identities (photos, names, data) without asking for permission first. This was not the result of us acting incautiously necessarily, but rather that based on our close connection with the subjects and our knowledge of them we assumed that the publishing of such photos was acceptable. At other times we took more precautions than the participants asked for, simply because we knew our world of research and they did not. Given our extensive cooperation with the participants, and the assumptions we made about how well we knew them, we might have

missed asking certain questions or even listened less carefully to certain answers. Could it be that we missed important data simply because we thought we already knew?

Reasons for telling

There are different reasons for why people want to tell stories. As William Labov has pointed out in his work about black English vernacular, stories are considered worth telling if they relate the experiences of unique events. He writes, "If an event becomes common enough, it is no longer a violation of an expected rule of behaviour, and it is not reportable" (Labov 1972:371). Such an explanation of storytelling could be true for some of the stories told within the framework of our interLiving methodology, where stories are told about unusual events in relation to the ordinary, such as the "breakdown situation". Reporting what is unique or unusual can be one way for users to describe their needs (Westerlund and Lindquist 2007.)

One such story, about an event that deviated from the norm, was told during a videotaped joint family interview. The woman in the family was working full time and married to a man who worked more than full time and travelled frequently. She was also the mother of four children, aged between 11 and 23. In the story she told, she was out jogging and had left her mobile phone at home. After her exercise some of her family members were annoyed because they could not reach her, as they usually could. In the videotaped interview she raises her voice and states very clearly, "It's not everybody's right to be able to contact me at any time!" Her story showed how communication technology can be troublesome and annoying at times, and also how certain parents can be regarded as the dispatch central in a big family.

There are also other reasons to tell a story than divergence from regular behaviour. For example, there is a difference between the point of a story and the point for telling a story. The critique Young has put forward on Labov's work is his inability to make this distinction clear, between the story and the telling of the story. She means that Labov focuses on the events of a story and shows less interest in the context in which the story is told (Young 1987). This distinction is

important here. Within some families in the interLiving project, for example, the repetition of a story was the whole point of the story. These stories, told by the same or different family members, made the family appear coherent and collected. The repetition was a way of shaping family togetherness and consistency.

One such story was told by the parents in one family about their grown-up daughters. They explained that when the two daughters were teenagers the family lived in the countryside, but the parents worked in town or elsewhere. Therefore, it was important to inform each other of their whereabouts, such as whether anyone needed a lift or to be fetched at the bus stop and at what time, or whether they were going to call at a certain hour or stay over at a friend's place. The whole family wrote notes to one another, and the parents described how their daughters had become masters in making notes. Today the daughters are in their 30s, and they have kept this way of communicating to family members with playful notes and text messages. This story was shared and agreed upon by most or all members of the family. It can be seen as an official story to make sense of the group of family members, who they are and how they communicate, both among themselves and with the outer world.

Another example from the interLiving project was a grandmother who repeatedly stated, "I don't know anything about computers!" This statement was made in spite of the fact that she told us that before retirement she had worked in the Stockholm city library as one of the user experts on computer procurement, and that she had used computers on a daily basis to complete her work. Though of course one could speculate about why she would make such a statement despite her work experience, the statement affected how she was regarded in the project. It was said so many times, not just by her, that somehow the statement became a fact, and we as researchers acted according to that. When installing the messageProbe in their home, we did not talk much about it with her, but explained it mostly to her husband. When the researchers (men) and her husband were dealing with the technology, she and I sat down on the sofa and talked about family relations and communication instead. Perhaps she had had enough to do with computers at work, and this was her way of getting around it, or perhaps outside of work she regarded computers as belonging to the world of men. When listening to stories, therefore, researchers should not only listen to

them for their content, but should also consider their context, why they are being told and reflect upon which story will become the "true" one.

Understanding the Individual

One way we can understand how people relate to new technology is to examine people as individuals. My aim here is to investigate how we can deepen our understanding of the individual in relation to culture and society, and how this understanding can be useful in cooperative design in general and in specific design processes. This section will establish a theoretical framework from which we can discuss how to understand the individual, in relation to the body, roles and groups, in cooperative design research projects.

Individualisation is the process by which people construct their sense of self. Ziehe argues that for individuals in contemporary society, as compared to earlier times, the making of the self is characterized by three vital conditions: an increased reflexivity, where there is a greater possibility to reflect on ourselves and actions, and in relation to the surrounding world; an experienced "makeability", where there is a feeling that everything is possible and achievable; and finally an increased individualisation, where the smallest unit of a group is not the family but the individual (Ziehe 1989). Such characteristics of individualisation are important both when looking at individuals in cooperative design projects in relation to a group, but also for the overall aim of this thesis in which my own person, as a subject, is presented.

Ziehe also argued that today people are presented with more choices about who they want to be, or at least there is the appearance of more choices,

whether or not they can be actualized. In many ways, people do People are the individuals they inhabit, they create their own lives and have the possibility to make changes and be who they want, in relation to their surroundings. However, the circumstances under which their lives take place, such as the conditions they are born into, cannot be chosen (Husserl 1992). Related to the choices individuals have or do not have, and their life conditions, is the direct connection between the lived lives and the told lives. An individual's life stories consist of individualized understandings of that person's actions or inactions. The stories individuals tell themselves and others about their lives create an inner logic and meaning in the lives that are told about. So, the representations of a life, life stories, not only reflect upon the lived life, but also constitute the lived life (Hall 1992).

In this way, we can see individuals as shaped both by their life conditions and by the life stories they tell. Life conditions are things that have happened to the individual, wished for or not, while life stories created by individuals both communicate and constitute their lives. The forces that frame the choices we can make, which divide realistic choices from dreams, are inevitably connected to a world of conditions, but they are also connected to options presented through life stories. Therefore, the lived life and the told life are inseparable. One can say that the told life stories intervene with the lived life even before it has been lived, so that life stories can form future stories. Life stories are not just reflexive, but they are also constitutive. You live your life as a story that is not yet told. The way your story is told is directly connected to how you live your life (Bauman 2002). Nevertheless, though life stories can shape individuals' lives, it is important to note they cannot decide to not be themselves. This is not possible, because the self as a subject and object is negotiated within the human body.

Everyone has an identity, but it is not something fixed or predefined. Identity is a continuously ongoing process where reflections of the self are negotiated, altered and adjusted from our own perspective (Hannertz 1992). Hannertz relates perspective to *habitus*, understood as systems of dispositions (Bourdieu 1993; Broady 1990). The individual interprets the world from the position he or she has in the social structure. How perspectives are generated is a matter of which roles we give ourselves, which are often based on gender, race, class and age.

Habitus is created by the life the individual has lived. All the impressions, events and experiences of an individual become part of the individual body, which in return reflects the society and social situation that the individual is part of. It is a process of negotiating the past and present. Habitus is constructed from the past and taken into the present to make a platform for the future (Frykman and Gilje 2003). The identity is located in just this process. We all have an individual habitus, but there are also classes of habitus, meaning that people with similar background and experiences share habitus. This means that we are in some respects similar, and not solitary individuals without comparison.

Body

The body can be described as the place where the individual is. Young writes, "The body is the self, the site of my experiences, the fulcrum of my movements, the source of my perspectives. I experience myself as embodied" (Young 1997:1). The body is where life stories are told and the place that is affected by them. It is where the ongoing process of self-making takes place. For a long period of time discussions about the body have focused on the Cartesian mind-body dichotomy, as a means of understanding thinking about ourselves, the world and how we are situated in the world. Descartes imagined us as firstly situated within the body, but he also saw the tensions between the physicality of the body, and the volatile nature of the mind (Hedman 2004).

The question at stake in this thesis, however, is not the philosophical issue of the mind-body dichotomy. The interesting contrast for this thesis is not mind versus body, which can be seen as a problem invented by its own terminology, but the body as self in relation to the body as object. Individuals do not just have bodies, but they are their bodies. The body as self refers to how you perceive yourself, and the body as object refers to how you are perceived by others. There is a difference between being a body and representing a body (Drakos 1997; Young 1997).

The Other

In one of the projects in which I participated, the Daphne project, issues arose related to researchers as individuals and researchers as inhabiting bodies. Daphne was a three-year interdisciplinary research technology development project with a wide scope of interests. First, one of the goals of the project was to develop new theories and concepts about understanding and facilitate interaction across a wide range of physical settings, each offering different levels of digital support. Second, the project aimed to generate new design and evaluation methods appropriate to these settings, based on a combination of approaches from cognitive science, social science, art and design. The project also aimed to create new devices to establish new relationships between users, activities and devices across a broad set of physical environments. The final objective of the project was to develop new forms of adaptive infrastructure to connect heterogeneous environments offering different levels of support, and enable the use of different kinds of devices as users move between various locales (Sundblad 2005a).

Part of my role in the Daphne project was to conduct field studies, together with a colleague, in workplaces such as power stations and a bakery. Though the bakery study was successful in terms of understanding a workspace, it did not lead to technology development for the project. From my experiences in the field, it became apparent that even researchers are categorized as women or men and are expected to act as such. This brought forward important questions about the objective researcher within cooperative design. From my point of view, the bakery study did not proceed as planned, and morequestions than answers arose. Though I had prepared for my observational field studies, I was not prepared for my own feelings when a worker in the bakery made my colleague and me the subject of sexist jokes. My reaction was also surprising to me, since I myself can make such jokes when with friends. As an ethnologist I am trained to do observational field studies, and I thought that I would be prepared for unplanned situations. As a result of my reaction, I was not able to perform the field study as it should have been performed.

This study made me aware of the lack of discussion in cooperative design about researchers as individuals and as embodied. In the lab my colleague and I had never talked about the fact that we are not just researchers, whatever that

entails, but also representatives of the bodies we inhabit. In our bodies we are regarded in certain ways by other people and ourselves. My work partner and I had never mentioned that we might represent our research project in different ways based on our gender, age, social group, appearance, and so on. Such factors may or may not have implications for the design, but when we neglect to examine them we could be neglecting important aspects of the design process.

Going through my reactions in the field, I also came to the conclusion that there is a difference between doing field observations for ethnological studies and doing them for cooperative design. In ethnology the approach is phenomenological in that the aim is to investigate what is in the field and what the findings mean. In exploratory cooperative design projects like Daphne, the approach might seem phenomenological, with the aim of investigating what is in the field, but the difference is it has contribute to the design process and preferably lead to technology development. When ethnological methods are used for cooperative design purposes, this can result in the methods revealing more information than we need, and more importantly, information that we are not sure how to handle (Räsänen and Lindquist 2005). This information could be significant to the research in other ways, but perhaps not for technology development (Paper E).

Dichotomies, group belonging and pre-understanding

In order to investigate groups as well as individuals, we need to understand how and why we use certain concepts. Concepts such as man and woman, for example, are not often defined explicitly in our work. Rather, the definitions we use are grounded in the implicit conventions about what we consider a man or woman to be. Perhaps by defining such terms we can be more precise, inclusive and innovative in our cooperative design work.

Through life, we all carry with us an understanding of our own bodies, and this understanding shapes us into the individuals we are. Our understanding of our bodies is created in the meeting between the individual and society and between body and the understanding of the body. Judith Butler, a researcher and feminist whose theories contributed to the development of queer theory, argues that

the sex of the body never precedes gender, meaning that there is no predefined natural given sex, male or female, upon which gender is constructed. We all ascribe the body with meaning and cannot understand biological sex without interpreting it through the knowledge and experiences we have. Butler speaks of the construction of sex and gender as a form of performance. Gender is performed from the perspective of the culture's definition of sex identity (Butler 1997). In addition, the two sexes of man and woman can be understood as primarily a verbal and semantic structure (Butler 1997; Laquer 1994).

The concept of biological sex as it is commonly used corresponds to two categories: woman and man. The two categories stand in opposition to one another. Using polarities, dichotomies and predefined themes is a well-known approach to make the world understandable. Dichotomy pairs, like man/woman, human/animal, self/other, mind/body, reality/appearance, are relative in relation to one another. In the man/woman dichotomy, man has generally been perceived as the norm with woman as the other, whereas in the human/animal dichotomy a woman would be the norm in relation to an animal. This means that the categories can move between different hierarchic structures, and that dichotomies are ideological and therefore context bound (Haraway 1991).

In fact, the use of dichotomies can be understood as one expression of the modern Western culture in which we live today (Ehn and Löfgren 2001). However, though creating oppositional pairs is a powerful method of structuring and bringing order to complex material, it should not necessarily be conceived of as representing the truth. Through the law of separation (*isärhållandets lag*), which describes society as constructed on the difference of men from women, the male norm is legitimated (Hirdman 1988; 1991). Gender conventions, however, not only involve looking at men and women as people and individuals, but also issues related to space, practices and artefacts. The individual, the practice (handling an artefact) and the place (context) define each other (Hirdman 1988).

An example of how the practice, place and individual define each other is the traditional separation of the world into public and private spheres, with the former the place of men and the latter the place of women. (Berner 1996; Berner and Sundin 1996; Ilstedt-Hjelm, Lindquist and Wiklund 2004). The home is the private sphere and the territory of women, whereas the public

sphere, including research, politics and the judicial system, is the territory of men. Women, therefore, have performed women-typical tasks in the home while men have performed men-typical tasks outside the home in the public space, though this description of the world is slowly changing. Looked at in this way, we can see how technology is scalable when it is related to our perception of sex. Technology is scalable in the sense that artefacts and actions are considered more or less technological when studied from a context-bound situation. We need to consider who is using the technological artefact, where and how.

Mothers

The self can be explained as part of a performance (Goffman 1959). Identity can be described as a performed act where different roles and masks have their place in relation to the context in which the individual is performing the self. This theatrical approach to identity, of the individual performing different roles, can be a useful model, but we must keep in mind that individuals negotiate actions continuously.

When looking at the individual in relation to groups of people, or groups in relation to other groups, the acting is sometimes more deliberate. In some constellations of groups we all act according to how we are supposed to act, for example, in a workshop situation the researchers act as leaders and the others act as participants (comparable to teacher and class). The context we are in, the role we take on or are given, and our previous experience help us to perform ourselves in a predictable way. This is not to say that there is only one way to act.

One common way of approaching the user in cooperative design is to look at a group, a cluster of people who presumably have common interests because of their group belonging. In one of the interLiving family workshops, everybody, including family members and researchers from both Sweden and France, were put into discussion groups based on categories such as mothers, fathers, grandparents and children. One researcher said of the discussion in the mother group something like, “It is so typical of mothers, just wanting to keep track of their family members”. This comment could have come from any of us, because we, the researchers, found the result from the mother’s group, a shared interactive calendar, to be predictable and quite boring.

What is most interesting about the groupings at the workshop is the question, what constitutes a mother? Is it that she has given birth to a child? Is it that she is taking care of a child? Is a mother someone who is responsible of taking care of and coordinating things in her family? Is it only women of a certain age who can be mothers? The everyday common understanding of the concept mother was used in order to cluster five women of different nationalities into one group, calling it The Mothers Group. The group represented one of the roles, the mother, in a family, but we did not define what this concept entailed in relation to our cultural understandings. It is significant that the concept of mother, or father, child or grandparent, for that matter, was not discussed and evaluated by the researchers or the users. Relations between the groups were discussed, but gender and role-specific activities were never on our agenda when it came to creating a shared understanding. No one meant to be mean or unfair to the mothers, but this example illustrates how easy it is to be prejudiced towards a certain group of people when a concept, in this case mother, is used in an unreflective way.

A problematic aspect of cooperative design is that we usually want to make designs for more than one person, and therefore we cluster people into groups hoping to find group-specific design solutions. The idea seems to be that a group can determine what design to make because we all, researchers as well as users, should have the same unspoken common cultural understanding of certain concepts. The mothers, in this example, would probably define themselves first as mothers and second as individuals while taking part in The Mothers Group. Instead, it would be interesting to define what we mean by mother, mothering, and motherhood in relation to other roles in a family, and then start the design process based on such definitions. Through such reflection we can perhaps establish more precise methods and more innovative, inclusive designs, and develop a better understanding of users. Perhaps in grouping mothers together in the way we did, we encourage them to act in certain ways in their roles as mothers. Finally, it is important to note that shared interactive calendars could certainly be interesting and useful for anyone, not just mothers.

Intersectionality

When studying from a critical perspective how the individual relates to the world, factors such as gender, age, bodily constitutions and acquired skills are important aspects to take into consideration. There are many approaches to understanding the individual and the self. From a gender studies perspective, which can be both politically and scientifically informed, one can investigate different aspects of the individual, including gender, class and race (Hallberg 2004). Within gender research the concept of intersectionality is used to analyze how these aspects of the individual intersect and relate to one another, and how such categories name, inform and cluster aspects of meaning (West and Fenstermaker 1995).

In everyday life, we use certain categories in a practical and often unreflective way. They help us create meaning in our everyday language. In the case with the mothers in interLiving, we formed the workshop group based on the common unreflective term mother and not based on specific clusters of meaning like ethnicity, education and class. In *Doing Difference* (1995) West and Fenstermaker study clusters of meaning, and apply their theories and findings to real life on real individuals, to show how the mechanisms of gender, class and race work. They write, "When these factors of race, class and gender absolutely collapse is whenever you try to use them as automatic concepts of connection" (Jordan 1985:46). While these concepts may work very well as indexes of commonly felt conflict, they have little predictive value when used as elements of connection (West and Fenstermaker 1995).

Such clusters can work as mechanisms producing inequality when used in certain ways. The intersectional way to study these clusters of meaning and their mechanisms is to start working from the outside, from a wide perspective, in which the individual is objectified as a representative of a cluster. The researcher should then move closer to the inside, towards an individual understanding of these mechanisms, thus subjectifying the individual within such a cluster of meaning.

Race, class and gender can be viewed as axes of social structure, while the individual person experiences them simultaneously. I would argue that there are two approaches to questioning and understanding the individual and the self.

The first is to look at the clusters of meaning, like West and Fenstermaker do, and relate them to the individual. The second is to study the individual from the subject's position, to investigate the individual's own world and life, and from that small world, relate the individual to society. The first standpoint is more of looking at the individual, while the latter is more of looking from the individual's perspective.

The group versus the individual

Studies of design, technology and the design process in HCI from a gender perspective, in which gender is considered to involve both male of female aspects and not only concern women, seem to be extremely rare, though there are good examples (such as Flores Montano and Johansson 2004; Vänje 2005). There are also other group belongings besides gender that are problematic in terms of understanding how we perceive technology. Clustering people according to their age is very common. Elderly people, for example, are often clustered into one group and are often understood as people who know very little about new technology, which of course does not have to be the case (Männikkö-Barbutiu 2002). When thinking about the grandmother in the interLiving project who said she did not know anything about computers, it was easy for us, the researchers, to believe her because she belonged both to an older generation and she was a woman. These two categories are probably so strong in our understanding of people that even if we knew she had a history of using computers and also in procuring computer tools, we did not acknowledge this with our behaviour towards her.

Children and teenagers are also clustered into groups, and we believe that there are certain skills they have only because of their age. Their capabilities are connected to their group belonging, and the group is defined by an age, a number actually. This has to do with our preconception of them, which is grounded in experiences we have had with individuals pertaining to a certain age. Such groupings are related to our prejudices about what it means to belong to a certain group or category.

We can often find ourselves making such assumptions about individuals, making it easy to believe that all individuals belonging to a certain group have the same skills and capabilities. Or rather, it is too easy to generalize and ignore the individual within a group. Instead, we should investigate what the

individuals actually are capable of, listen to their stories and experiences, and try to understand them beyond categories of age or sex. We should also examine ourselves to see what and who we are, and what we stand for. Knowledge about users and ourselves should be seen in the light of the culture and social context in which we live, in order to get a deeper understanding about what designs to make and for whom they are relevant. It can be methodologically correct to find users through demographic statistics, but this is not to say that those statistics should be used as a basis for understanding someone's capabilities, needs or desires. Rather, there could be reason to look at how the demographics actually relate to certain user requirements.

Referring back to the political aspects of cooperative design, in the left-wing political debate there is a concern with how to approach the individual within the political community. The debate exemplifies the philosophical and conceptual problems of resolving the tension between the individualisation of society today and the political goals and values of a democratic community (Mouffe 1993). The task of what is called radical democracy is to transform and redefine different interest groups in order to ensure that the specific interests of all of them converge or are considered together. For example, the struggle for workers' rights should not be pursued at the cost of immigrants, women or consumers.

When considering the increasing individualisation of society, I can see a correlation between cooperative design and radical democracy in terms of how to approach the individual within a community or group-coordinated activity. Regarding cooperative design, we need to not only reflect on the problematic relation between the individual and the group, but also on the foundations, viewpoints and values of the cooperative design idea in general.

Provocation, Politics and Power

Provoke means excite, stimulate, pique or irritate. Provocation as a method has been used in art since the beginning of the 20th century in the radical avant-garde movements (Walker 1999). Provocation in combination with technology has been successfully used to highlight modern phenomena and to critically examine what new technology can do for us (for examples, see Dunne and Raby 2001; Lundberg, Ibrahim, Jönsson, Lindquist and Quarfordt 2002). Artists have used provocation in order to encourage people to take a more active part in political issues and society. Josh Kinberg, for example, with his interactive protest/performance "Bikes Against Bush", rigged a bicycle so that it could receive text messages from anyone via the Internet, and then print them in chalk letters on the sidewalk as he was cycling around town (Kinberg 2004). Other examples of technology-mediated conceptual art installations are "Distributed Justice" by the prominent artist Andreja Kuluncic, who created conceptual interactive art on justice and the state (Kuluncic 2004), and "Watch Out! – The Eyes of the City" by Maurice Benayoun, an interactive installation questioning the urban, big-brother phenomenon (Benayoun 2004). Such art installations have played an important role in evoking thoughts on the exploration of spaces, democracy and peoples' influence in society. Interaction design researchers have used provocation as part of their method to both inspire themselves and to raise arguable issues (for examples, see Gaver 1999; Habib Engqvist, Hovmöller, Lindquist, Röör and Sweger 2004).

Empowering people

Technology has often been utilized to address the needs of specific communities. Understanding how technology could be incorporated into solutions for sustainable tourism was an interesting design challenge posed by the Convivio network (Convivio 2007). "Ajmo Splite! Come on Split! Tell Us What You Think!" became the title of a politically inspired interdisciplinary cooperative design project, aiming to develop a public space that would provide a link for the citizens of Split, Croatia, to their authorities and politicians, something that citizens feel lacking today (Paper C). The principle for the design was to enhance the socio-political environment and to actually solve real problems. The idea was to spark motivation through multiple interfaces, other than those already existing such as telephones and e-mail, so that people could express themselves in the way they preferred. Our conceptual discussions were at first vague and undirected but became increasingly intense and directed when we got into the field of politics and empowering of people. The prototype that evolved was a three-sided kiosk that served to provide information to locals about the project and to capture video clips of people responding to the question: "How well is urban planning and control organized in Split?"

The question, a political hot potato, was raised as a provocative part of the installation to get people to actually test the prototype. Urban planning and rapid development was a big issue at the time. The landscape and the panorama along the Croatian coast are stunningly beautiful, and until about ten years ago Split, a costal town, had not been particularly exploited. Today, new buildings are popping up out of the ground at amazing speed, most of which are along the coast. You would see new blocks of flats in less than a month's time, built without the oversight of the authorities and without a necessary infrastructure of roads, garbage collection, electricity, schools, hospital, and so on. According to the locals we spoke to, the corruption in their society makes all efforts in preventing such construction activities meaningless. Some individuals will gain from it, and society as a whole has no control.

Delicate matters – the MML study

The overall theme of the recently finished cooperative design research project called CoPland was technology support for knowledge sharing (Copland, 2007-08-14). CoP stands for Community of Practice, an influential approach to understanding "learning in doing" by Jean Lave and Etienne Wenger (Wenger 1998). The target group of the project was teachers who work in a nomadic situation. That is, these were teachers who had one employer but worked in several different locations and in different contexts, meaning also over different durations, and who also used various kinds of technology in their daily work.

Our approach was to understand work and knowledge dissemination based on being present at the workplace and following the work as it unfolded. The importance of knowledge sharing and the nomadic aspects were immediately apparent features of the teachers' work. The chosen target groups in Copland were teachers of Swedish abroad (Sandor, Bogdan, and Groth 2005), teachers from schools in the Stockholm archipelago (Groth, Lindqvist, Bogdan, Lidskog, Sundblad and Sandor 2006) and teachers of native languages in Stockholm (modermålslärare, here called MML), as described in Paper D. Below I will give a brief description of the work performed in the MML study, with a focus on the critical aspects of cooperative design that arose from that study (Paper D).

MML – teachers of native languages

Children with at least one parent born in another country have the opportunity to get extra education within that parent's language and culture. In Stockholm, with about one million inhabitants, there are around 400 teachers of native languages, MML, teaching 14,100 pupils in 60 languages and the respective cultures of those languages. These kinds of teachers are very rare when looked at from a global perspective. Sweden is one of the few countries in the world that provides such education, and no other country provides such a language diversity and national coverage as Sweden. The aim for providing this service at schools to all pupils who speak a foreign language is to enable better integration into the Swedish society. One main thought is that if you have good knowledge of your own and you parents' language and culture, you will find an easier way

into Swedish society. This is important for the identity and self-esteem of every individual child. Such an education gives a foundation for every kind of learning, meaning that it is easier for them to learn their second language, Swedish, but also to learn about other subjects. In addition, it is of great importance for a society to have bilingual and multilingual members.

To get to know the MML group, to understand their context and to get a wide comprehension of the different forces and stakeholders that impact their work, researchers in the project observed and interviewed four teachers in the Spanish group, visited Språkcentrum who employs the teachers, and visited the Swedish National Agency for School Improvement, which hosts an intranet called Tema Modersmål (Tema Modersmål, 2006-07-31).

MML give several types of language lessons, but lessons in mother tongues are the most common (70 percent in Stockholm). MML also give instruction in other subjects (30 percent in Stockholm) for children who recently arrived to Sweden and cannot follow lessons in Swedish. They also help pupils with special needs and teach classes completely in native languages for students aged 1-6. Their number has decreased during the 1990s, as it was thought that children who receive education in mother tongues do not learn enough Swedish. Research, however, proved that such students are generally better in Swedish and languages than the average pupil.

An MML teacher typically goes to 3-10 schools each week, where they stay a minimum of 90 minutes, thus teaching 17-19 hours a week in total, and spending the rest of the working hours, up to 35, on development, meetings, lecture preparation, et cetera. The time and travel costs to and between schools are not reimbursed. Teachers are supposed to be in continuous contact with the class leaders in each school and also with the parents in order to adjust their classes to what is going on. They need to schedule around occasional outdoor activities (*friluftsdagar*), school field trips or special themes that the school might be working on for a certain month. All this scheduling information is very important for the MML to know about in order to adjust their teaching.

Travelling all the time between schools means that MML do not get to see their peers very often, usually just once a week. They all have colleagues, but they are typically dispersed over time and space in Stockholm schools. There

are semi-monthly meetings for teachers of the same language, or language group. Smaller languages, in terms of employed teachers, do not have their own group and instead a number of languages are grouped together. Previously the native language lessons were held during normal school hours. Today, they are in the afternoon or even late afternoon, and many children are tired or have other activities, like sports and music. Due to the late hour, sometimes a school's facilities and services are not available for the teachers to use.

A contradictory situation

MML are in a difficult situation since there are many different and contradictory opinions about the value of their work. Some parents want their children to learn their native language, but the children must do this in their spare time after school and are perhaps not as keen as their parents. Authorities acknowledge native language teaching as very important and ultimately good for society, but the schools sometimes think that such teaching is a burden and can forget MML teachers when planning localities and activities. The teachers are in the crossfire of all this, knowing they contribute something valuable to both the individual and society, but at the same time their efforts are not appreciated by both some students, who want to be doing other activities, and by some schools, who do not count MML as real teachers.

To deepen our understanding of their daily activities and consider what kinds of new technology could enhance their planning, communication and teaching, we had a half-day video prototyping workshop with seven teachers and a staff member from Språkcentrum (who normally employs the MML). It became clear to us that MML have a unique knowledge about many schools in Stockholm, knowledge that the schools do not necessarily have about themselves. MML see patterns between the individual schools, for example, how some schools display their short- and long-term planning on shared surfaces, such as white or blackboards in the teachers' meeting room and outside the administrative office. This information is not necessarily seen by the MML because they do not go to the same school every day. Also, their tight schedules make it hard for them to go and look at that information first and then to the classroom. If such information were distributed electronically to the MML, everyone would gain from it. One

example could be that if a MML knows that the children between six and ten are going to the theatre the whole day, the teacher can adjust the class to the older pupils.

My colleague conducted thorough ethnographically inspired field observations, as well as interviews and questionnaires, and got both interesting and quite alarming data that pointed us in a direction other than developing technology for this group. Many questions arose. The data itself had a character of being so important that just leaving it would be to betray and be disloyal to the teachers who had shared parts of their lives with us. How should we deal with this data? Are we capable of handling it ourselves? Do we have the necessary competence to deal with it? Is it reasonable for us to report this, considering that we are being funded to develop technology?

These experiences and data from the MML study led to a discussion about the reflective researcher within cooperative design research projects, and about what the practice of combining methods from different research areas to make new technology can lead to. The MML case showed that such a method gave us insight into more complex and important issues than we could at least initially handle. We asked ourselves if there were other methods we should have used instead, and whether we needed to evaluate our methods differently. Finally, we discussed how we can report delicate matters that are more sociological or cultural nature when our funding is for design and technology development research.

This knowledge also caused us to be gentler in our ongoing approach and work with the MML. After another workshop with both new and previous participants, we learned more about the everyday problems the MML have in finding efficient ways of communicating with other teachers, pupils and their parents, schools and their staff. We also became more convinced, however, that they also have a unique knowledge about the different schools, how the schools communicate different things in different ways, and how this relates to the overarching organisation. We have not as yet applied this knowledge from the MML study into any technology development.

Conclusion and Discussion

My wanderings back and forth between descriptions of the projects and theoretical aspects of them are in this chapter reflected on through the three research questions stated at the beginning of this thesis. Aspects of these questions are then further discussed under the headings "Triangulation of methods and disciplines", "Power structures" and "The subject in the process". Finally some ideas for future research are identified.

— How do we in cooperative design projects look out for the interests of individuals in group-oriented activities?

A common way of approaching the user in cooperative design is to look at a group, a cluster of people, who presumably have common interests because of their group belonging. Such groups could be, for example, people with hearing disabilities, teachers of native languages or mothers. In the interLiving project, where the families represented a group of people belonging to each other through kinship, it became apparent that there were both similarities between and a deep knowledge about family members' communication patterns. Another way of approaching the user is to look at the individual, or rather take the individual's perspective, and examine what interests they have or do not have in common with other individuals. The group and the individual's interests may or may not go hand in hand.

In the interLiving project, it became clear that all members of the families shared the overarching goal of having pleasant, smooth, affectionate, fun, efficient and concise communication. What this meant, however, both in terms of technology experience and use and communication patterns, was not the same thing for respective individuals in the same family. Rather, depending on the individual's personal relations and role in the family, the preferred way of communicating varied.

Another aspect of considering the relation of individuals to groups is to examine the individual in research groups, how we look upon each other and ourselves. I believe that forming interdisciplinary groups for cooperative design research, with different scientific perspectives involved in both collecting and analysing data, is good in that it provides a broad understanding of the design context. However, part of cooperative design research involves entering a field, a context populated with people who do not necessarily see only a researcher, but also an individual, as in the bakery case. We should be aware in our practice that there are several realities going on at the same time, and that there are several aspects of an individual, all present at the same time. The interaction of researchers and participants, individuals and groups, and researchers and people in the field can all be happening simultaneously. I believe that the cooperative design tradition, with its history in prioritizing cooperative group work, is too much focused on the group aspect of design activities. There is a lack in understanding of the importance of the individual in the process, which I think is grounded in misunderstanding how and when to be objective and subjective in this kind of research. One way of being objective is not to ignore yourself as an individual but to be as open and truthful as you can about yourself and your project.

— On what grounds do we define the context, the design space, problems and assets?

In cooperative design there is a will to take actions in order to make a positive change. Though this desire and energy to make changes usually comes from the researcher, one can also look at this desire for change in relation to the origin of cooperative design. A political agenda that values sympathy and compassion

for the weaker party can be seen as a one of the founding pillars of cooperative design work. In the case with the Splitians, it was their struggle with authorities and politicians that made the research group take action and come to design decisions. An important result from a couple of the projects was that we found it necessary to widen the design space and scope of the problems by considering more fundamental values related to power structures and ethics, and not just consider what new technology could do for the users.

In the interLiving example of the father who wanted to track his sons with GPS, and whether the research team wanted to develop surveillance technology, it was clear that certain values were guiding the direction of the project. We did not want to make technology that keeps track of others without them knowing about it, if that is what we mean by surveillance. Within the cooperative design practice, a process with a strong political emphasis and a background in workplace law enforcement, the ethical issues of surveillance at workplaces have already been dealt with to some extent (Räsänen 2007). In addition, surveillance of family members at home is not necessarily the same thing as surveillance of employees at work. Such technology at home could possibly relate to concern about loved ones. One mother clearly stated that she did not wanted to be reachable all the time, meaning that she had a right to keep her mobile turned off sometimes. Mobile phones are not surveillance, but of course they can be used for that. All of this has to do with the ethical, social and cultural issues of how we perceive the meaning of a technology in a certain context.

I consider it to be problematic that we make designs grounded on the ideal of taking the weaker party's side, or on ethics and values regarding how technology should be used, without making it explicit to ourselves that these ideals and values are in fact part of our design requirements. We should break down such implicit assumptions, beliefs, ideals and values into smaller pieces of understanding, and examine how they affect design decision making and the design itself.

— How do we give voice to different interests, and are we aware of which voices are heard and not heard in the design process?

In everyday life, we use names of things, people and categories in a practical and often unreflective way. They help us create meaning in our everyday language. In interLiving we used the common understanding of mother to cluster a group without looking into what it means to be a mother. The "typical" and boring result from the mother workshop group was perhaps not a result of them being mothers. There were so many factors that could have affected the result, such as language and cultural barriers, specific individuals and group dynamics, and so on. The quick interpretation that "it is so typical of mothers, just wanting to keep track of their family members", and the "boring" result from their group, could probably be related to our own understanding of what it means to be a mother.

At the same time, the mother who did not wanted to be reachable, said at one point that she gets concerned about her daughters when they are out late and she wants to reach them but sometimes they turn their mobile phones off. Perhaps a typical quality of being a mother is to want to keep track of loved ones. On the other hand, there was the father who wanted to trace his children with GPS, so maybe this quality has more to do with parents in general than with mothers or fathers in particular. We listened to the parents but had our own agenda to follow, in which everything that could be interpreted as surveillance was abandoned. A different thing happened with the grandmother who stated that she did not know anything about computers. Despite all of the other contradictory facts she presented to us about her computer experience, we believed her that she did not know anything. These examples hopefully illustrate the importance of reflecting on our own assumptions, understandings and preconceptions, without which we can easily believe in something that is not true.

The very nature of the cooperative design process is group oriented, and it focuses on the user as belonging to a group, and researchers as belonging to an interdisciplinary research group. So, one can wonder why it is even important to bring up the importance of the individual, when clearly the main focus lies elsewhere. The importance, as I see it, is that we will not fully understand our own design process, if we do not understand the different parts of the very same

process. Without considering the individuals that make up groups, we cannot understand or know who we are giving a voice to.

Triangulation of methods and disciplines

In cooperative design we bring in different methods from different disciplines. We use these methods to understand the field, users, problems and design space. This also means that all researchers bring in their own proven and well-known methods, though sometimes they are modified for a particular research field or to suit a personal research interest.

Triangulating research means taking into account different individuals representing different viewpoints in the field, in order to observe the same thing at the same time but from different perspectives (Paper A). An advantage of this method is that in the design process we do not need to share all the information between the researchers. We all know a certain field so well that we can give new, sometimes individually collected input from the field, and in doing so add to our understanding of the context. This means that our different knowledge contributes to the design in a more direct way.

Even diverse methods from different fields can evolve into one method for exploring many things. The technology probe, a result of triangulating researchers, combined the social science goal of collecting data about the use of the technology in a real-world setting, the engineering goal of field testing the technology and the design goal of inspiring users. The triangulation of researchers can of course be considered a part of any interdisciplinary work, where researchers from different backgrounds work towards a joint goal. This method, however, is particularly important for cooperative design in that the combined work of the researchers, along with their various perspectives, shapes and strengthens the design in a way that would be hard to achieve with any other method.

Power structures

Gender research is still one of the areas related to power relations that are often neglected. There are probably many reasons for this neglect, such as not enough knowledge within design about gender research and what it can offer,

and a preconceived misinterpretation that gender research only has to do with relations between men and women. Still another reason could be that it is painful to envision gender and power-related negligence in a work group or project in which there is the idea that "we are all among equals", even if such negligence is not done deliberately (Ilstedt Hjelm, Lindquist and Wiklund 2004).

Certain issues are never dealt with or mentioned, and this just as much adds to the prevailing discourse. Although there are topics that are relevant and interesting regarding studying new technology in the domestic environment and what it does to families, these topics might be too sensitive and difficult to address within the discourse of cooperative design, research and technology development. Sex or violence related issues, for example, are seldom if ever raised, probably because they are considered inappropriate or taboo in many contexts. In research that does not explicitly address aspects of sexuality and violence, it can be difficult to talk about these matters. This is not to say, however, that they are impossible or unimportant topics to deal with (Silverberg 2006; Machulis 2006).

What I want to pinpoint is that there are biases and unexpressed values in cooperative design technology development. There are awkward subjects and delicate matters that the technology development research community or the cooperative design community are not very fond of addressing (Paper D). To acknowledge these topics is to acknowledge that we are part of a discourse that shapes what we think and how we envision what we do.

The political agenda that cooperative design was founded on, as part of changing how technology and systems development at workplaces was done, is in many respects still important but not often acknowledged. The field of cooperative design studies has been expanded, and it is no longer just workplaces where the stakeholders are usually clearly defined within known power structures. The field now includes families, disabled people and residents of Split, for example, in which roles and power structures are often not clearly defined. Given this lack of clear definitions, it could be even more important to examine exactly just these kinds of roles and power structures.

In the cooperative design projects I have participated in, I have observed two main groups of stakeholders: users and researchers. These groups have different interests in the cooperative design process, with the users being directly concerned specialists on their situation, and the researchers wanting to gain new knowledge about that situation for possible design work. The stakeholders

usually enter the design process under different conditions, based on the kind of power structure existing between the researchers, users and other participants. The researchers are the ones leading the discussions, and driving and pushing the project work in a certain direction. It is often up to t he researchers to invite the participating users to take their turn and share something about themselves. This means that what the users reveal about themselves and how this is understood is almost always a matter of the skill of the researcher, which is important to keep in mind.

The subject in the process

I enter the world through my perception and that entrance centres my experience (Young, 1987:3).

In this thesis I have presented and discussed the projects I have participated in, and various theories and subjects that relate to these projects, some in more depth than others. The reason for describing and discussing many theories was not to confuse the reader, or an attempt to present comprehensive analyses of these theories, but rather to show that many aspects of cooperative design have still not been the subject of research.

Also in this thesis I have tried to show how we all approach cooperative design as individuals, regardless of our scientific backgrounds. Certain individuals bring certain aspects to the design practice, not just the methodologies and knowledge from their field, but also their complete system of dispositions, their habitus. For me, critically exploring cooperative design projects in order to make the design approach sharper, clearer and preferably more interesting is important. The reasons for telling the story of the snooper at the beginning of this thesis was to convey how listening to people and observing their behaviours is one of my small amusements in life, but also that this activity is part of my work. I have of course observed my colleagues during our projects together, but since I did not ask them beforehand if I could use them as study objects, this led me to use myself as an example in this text.

Future research

I believe that cooperative design could benefit from reflection upon itself, perhaps through a discursive analysis on the cooperative design field, as well as through research on the process. Cooperative design can be seen from different perspectives. If cooperative design is viewed as technology development research, that is, when the funding and final result focus on the creation of new technology, then the necessity for research from the outside on the process seems minor, though of course it is always important to reflect on the methods used within the process and to evaluate and validate your results. If, on the other hand, cooperative design research projects focus on design, that is, defining the design space, finding (new) methods to do so, enhancing the participation of users in the design process, and knowing when and how design decisions are made, then the cooperative design process should be examined from the outside.

The role of the researcher in cooperative design can change depending on the goals and aspirations of the researcher. Some cooperative design researchers say they are doing design, others technology development or simply research. The role of any participant within cooperative design changes with each project and also during the different phases of the process. One can view the roles as focusing on design, research, development, the interdisciplinary nature of the work, technology and methodology research, improvement or explorative projects, and so on. The roles change according to who is looking at the actors, but also depending on the expected outcome of the project (Lantz, et al. 2006; Lindquist, 2005). Although research has been done on the role of the participant in cooperative design projects, and also on how to define cooperative design, whether it is design-oriented research or research-oriented design (Fällman 2003), there is still not enough research on cooperative design research projects.

All the projects I have participated in have reached a point when reflection upon the process and a retrospective analysis of work methods becomes necessary, not only as a natural part of doing research, but also as a sincere question of how do we do what we do? Often the experiences discussed are from an individual or members of a group who have been deeply involved in the very same process upon which they are reflecting (Lindquist 2006; Räsänen and Lindquist 2005).

This means that the analysis of the process and work methods can be a matter of negotiating viewpoints, shortcomings and achievements, in accordance to relations within a project team. What is needed and desired is an openness in the design process, where everybody involved can give critical input (Öhman Persson 2004). The design process itself should be researched by someone from outside the design process, with the goal of improving the design practice. This research could of course be conducted by ethnographers (Dourish 2006; Räsänen 2007), but probably by any researcher with a certain interest in the process and a desire to improve it.

We seem unaware sometimes of why we cluster people into groups. The individuals in a family, or the people in a work unit, probably have common interests, such as having good communication, for example. This is of course a very general interest, but it is a clearly defined goal that the individuals within the group want or need to achieve. Other times we cluster groups of users in a way that is not defined or acknowledged, or rather, that we have not reflected enough on what it is in a word or concept that defines a user group. In order to produce good designs, it is important that we acknowledge what qualities and constraints are in a group and make them visible.

When a concept is not common knowledge, we try to define it so it will be clear to everyone and powerful in the design process. However, when we do have common knowledge about a word, like mother (one of the oldest words there is), we tend to rely on our preconception of it, the common meaning of it, instead of defining what it constitutes in the cooperative design practice. We need to learn more about how to understand and interpret language and words, both from an overall cultural perspective as well from an individual perspective. We as researchers in cooperative design processes will benefit from trying to find out who we are ourselves, including our perspectives, our objectives and values, and our knowledge that is not related to our scientific backgrounds. Applying theoretical perspectives to the individual in relation to the group, and to ourselves, users and other stakeholders, whether it is intersectionality, habitus or any other relevant theoretical framework, will help clarify on what grounds we define the design space and make design decisions.

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Paper A

Co-designing Communication Technology with and for Families – Methods, Experience, Results and Impact

Sinna Lindquist[1], Bo Westerlund[1], Yngve Sundblad[1], Helena Tobiasson[1], Michel Beaudouin-Lafon[2], and Wendy Mackay[3]

[1] CID at KTH in Stockholm, Sweden
[2] LRI at Université Paris Sud, France
[3] INRIA in Paris, France

1 Introduction

In academia and in industry there have been many projects focusing on technology in domestic spaces and the Smart home (Hindus 2001; Smith 2000). The focus has been on the place, i.e. the home, and the people living there, rather than the people and the places they inhabit. In this chapter we share experience from using cooperative and novel design methods developed within the project interLiving – Designing Interactive, Intergenerational Interfaces for Living Together. The methods were intended to involve families, both as groups and individuals of all ages, as well as the multidisciplinary research group, in co-design of communication devices for families. We highlight methods, results and impact for future research and development. Research presented here aimed to develop novel and appreciated communication artefacts and to improve design methods within participatory design.

The project research group consisted of a Swedish-French consortium that integrated social science, computer science and design. We established multi-year relationships with six families, three in Greater Stockholm and three in Greater Paris, each with multiple generations in two or three households

Approximately 50 family members in the extended families ranging in age from an infant born at the start of the project to a 76-year-old, have engaged in a wide variety of activities, including home interviews and observations, cultural probes (such as their own use of, diaries and still or video cameras to capture aspects of their home lives) and a series of family workshops (sometimes with individual families, groups of families from one country, or with both French and Swedish families). The photo below, shows the whole interLiving team, researchers and family members from both France and Sweden during a joint workshop (Figure 1).

The families did not only provide us with information about themselves, but also tested novel research methods and prototyped a variety of design ideas and tried some of them in their homes or their whereabouts.

With the methods described here we managed to increase our understanding of multi-household interfamily communication, develop and test innovative communication artefacts, and identify the need for new communication appliances for exchange of personal information within families and other close networks.

We identified the needs for interfamily communication as lightweight ways to stay in touch and facilitate everyday interaction. Although the family members actively

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Fig. 1. French and Swedish families together with researchers at a joint workshop in Paris

use telephone (and some, electronic mail), it was clear that more subtle, less intrusive, forms of communication were missing. We began with shared surfaces across households and then expanded our designs to incorporate ideas from the families and ourselves. We developed a set of working prototypes, which we installed and evaluated in the families' homes over weeks and months.

In order to spread the interLiving methodology in The Disappearing Computer community and among other large audiences, e.g. at conferences, a specific method, the Interactive Thread, was developed for collecting and sharing design experience,

2 Objectives

The research objectives were to create longitudinal, collaborative relationships with distributed families as the foundation for exploring new methods of collaborative design, and to support the needs of these families by developing and testing a variety of innovative artefacts that disappear into the fabric of everyday family life and are used for a length of time.

Thus one specific aim was to try out, modify and describe different methods for co-designing with persons in private and intimate settings. We wanted to develop methods that let the family members participate and influence the design throughout the whole process.

3 Approaches

Here we describe several approaches used for understanding and gaining information about the problems, needs and desires of the families and their members in intergenerational communication.

3.1 Longitudinal Research; Designing with Real People in a Long-Term Relation

There is, of course, knowledge about family life among all of us. We all belong to a family and we all have relations to our parents and siblings, grandparents and cousins. We all have experience of relations and communication, both good and bad. But we saw the participating families, and the individuals within them, as our experts.

The approach was to try to make us, researchers as well as family members, work as a team sharing research and expert experience.

All families are different and we need methods for obtaining an in-depth understanding of how family members communicate, in order to identify areas for improvement. However, we couldn't simply track them in their daily activities or videotape them at home. This would have been too time-consuming in relation to input gained, as well as intrusive for the observed family members.

In similar household settings videotaping has been used in other research projects. One example is the Equator project where they collected about 6000 hours of video with cameras mounted at fixed locations, which gave a rich understanding of family life in a home, but often missed the fine granularity of interaction between the individuals. Other drawbacks with their method was the time it takes to go through hours and hours of video (approximately 27 years!) and the fact that they couldn't put cameras in certain areas or rooms, like in the bathroom or in the bedrooms (Crabtree 2002).

Instead, we had to find creative ways of gathering information about the family members while ensuring their privacy. We had to mix well-known methods with exploring new ones.

An important element of our research agenda was to identify the design problem. As Crabtree et al. (2002) point out; the question is less how to build a particular system, but rather determining what to build. We needed effective ways to interact with the families, in order to generate and explore potential design ideas. We needed all individuals' input, especially ideas that derived from their particular family contexts, relationships and communication needs.

We had to find ways of setting our design space, i.e. possible solutions, together with the families (Westerlund 2005). Although problem setting is a natural part of design, the amount of freedom and uncertainty in interLiving was extreme. The problem setting that usually is done during a design process goes hand in hand with problem solving as a way of learning about aspects of the future situation of use, as discussed by Schön (1993, p 18). The activity of problem setting becomes an inquiry into this situation, in order to understand what it is. Thus, the task of problem setting also makes a contribution to the designer's understanding (Gedenryd 1998, p 83). Our roughly outlined design space was information technology for facilitatating intergenerational communication within families.

Also, we need methods for determining success in the real world. A system, that works technically in the lab or receives a positive response in a user evaluation study, may not be accepted by family members in the context of their daily life. Unlike work settings, in which we often can define goals or metrics for success, in a home setting we must rely on more qualitative forms of evaluation. While there may be some recognizable tasks, such as coordinating appointments among family members, much of family life does not involve goals, and views of success may differ. For example, parents may highly value a system that tracks their teenage son, but he may find it oppressive. We need ways to evaluate systems outside the lab and see how and if they are accepted in the real world.

Through the three years of interLiving we have been more and more convinced that designing in close relation with users is an effective way to generate and ground ideas. One cannot simply ask users just to tell what innovative technologies they want in the future. Instead, one has to provide tools and a creative environment that encourages them, as well as us, to explore novel ideas together.

3.2 Triangulation

From the Scandinavian participatory design tradition (Bødker et al. 2000), from cultural probe ideas (Gaver et al. 1999), and from experience of several other user oriented projects as well as the broad scientific variety of the project members we had the opportunity in interLiving to use and further develop a spectrum of methods. These included observation, interviews, cultural probes and technology probes in the homes, and family workshops with scenarios, film-scripts, design games, mock-ups, video prototyping and presentation of novel technologies.

Thus we got complementary and overlapping information through the use of different methods, which made it possible to triangulate (Mackay and Fayard 1997), broadening the perspective and gaining better understanding of the advantages and disadvantages of the methods themselves.

3.3 Working Closely Together in Synchronous Interdisciplinary Teams

With co-operative design we also mean that the interdisciplinary research group, consisting of industrial designers, computer scientists, ethnographers, psychologists, etc. should work closely together continuously during the whole project.

Both the Swedish and the French research laboratories are multidisciplinary, with expertise in computer science, social science, as well as industrial and graphic design. This proved to be an enormous advantage, providing different perspectives and creative solutions, but was also a risk, due to the potentially large communication gap involved in “handing over” information from one discipline to the other (Lantz et al. 2005). Our solution was to involve everyone in all activities, with at least two researchers from different backgrounds present whenever we worked with the family members. Computer scientists interviewed, and ethnographers prototyped. This naturally gave us a broader perspective on family communication in its context, but also increased the level of shared understanding among the researchers both about the user context but, just as important, about what respective researcher contributes in the collaborative work, with the intention to make better design.

3.4 Problems, Needs or Desires?

What should we try to find in our studies? It could be a "problem", it could be "need", i.e. trying to find something that is lacking or something that is important and which can be improved. But family life is not only a unit for physical survival. Thus we also tried to look for potential and actual "desires". Fulfilling needs and desires are concepts that often are used as goals for artefacts. Both concepts are part of the construction of something as meaningful.

"Design concerns itself with the meanings artefacts can acquire by their users" (Krippendorff 1995, p 153). We all create meaning with artefacts and the world around us (Cooper 2003). The concept of "meaning" and the negotiation between need and desire, was of importance in this project. It is important to notice that meaning, in artefacts for example, is constructed by its user(s). From a design aspect we realise that if something is to be regarded as meaningful, it has to be designed and consciously shaped in order to have an expression and character that will both ease the operation and fit into the existing environments (Ilstedt Hjelm 2004). Therefore it was crucial to get inspiration from as real and concrete situations and environments as possible. It is important to keep in mind that these different concepts let us describe and reflect on the world seen through different models. Models are simplified explanations used for emphasising some aspects and suppressing other aspects. This is very useful and revealing, but we must always be careful because the models do not describe the whole real life situation.

3.5 From No Predefined Technology via Technology Probes to Prototypes

One other important approach was to begin this research strand with no specific solution or technology in mind except a general notion to look for communication surfaces. With communication surface we mean any kind of space, virtual or physical, where communication is taking place. From the initial investigations in the project, focused on understanding the communication needs of the families, we could gradually introduce meaningful technology, starting with technology probes for further understanding, and then introducing, testing and evaluating prototypes.

4 Methodology

In the interLiving project we needed to understand what was considered meaningful to people in their specific context. Several different methods were used in combination, such as cultural probes, interviews, observations, workshops, video brainstorming, prototyping in the homes, technology probes and individual assignments. These are described below and the experience from them in the next main section.

There are of course many different ways to combine methods and no approach can guarantee success. Little is actually known about where, why, when and how the ideas, that lead to successful solutions, are generated (Davis and Talbot 1987).

4.1 Cultural Communication Probes

Cultural probes, a technique developed by Bill Gaver in a team at Royal College of Art (Gaver et al. 1999) was used and developed further in interLiving. The initial thought with cultural probes is to create inspirational artefacts that are handed over to the users for them to use and to collect information about themselves, in order to inspire the design team. In interLiving the gathered data from the cultural probes, containing maps, postcards, disposable cameras, etc., was rather used in the collaborative design process (Figure 2). The first activity with the families after having established contact was for the researchers to send out kits with a variety of cultural probes to each household, with containers aimed for the households to fill with their real life experiences (see Figure 2). Through these we intended to get examples of real communication in real contexts. Another aim was to make the content serve as a basis for common discussions and interviews but also to trigger the joint work.

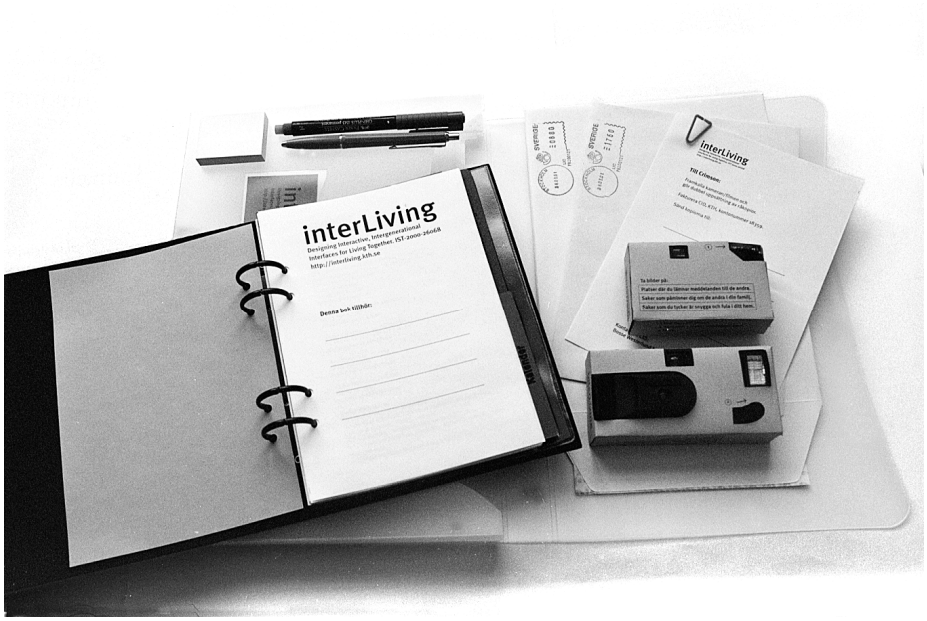

Fig. 2. Cultural communication probe kit: diary and camera

4.2 Family Workshops

The joint family workshops had at least two objectives: to generate design ideas and to get to know one another, both across families and families and researchers. Each workshop activity started with an introduction that framed and focussed the work, such as showing video clips of interviews from the households or displaying photos taken by the families illustrating their environment.

After the introduction the participants express something real and recent that has had some meaning to them, a *use scenario*. It could deal with something problematic, like a breakdown in the internal family communication, or it could be something

pleasant, like a family vacation. Typically, a scenario involves some type of communication with others. The concrete, experienced scenario helps to keep the work relevant to and reflecting on real life, expressing real needs and desires. Also, a variety of brainstorming activities and design games were conducted, which helped us and the family members to explore different design ideas.

Far more is revealed and communicated through acting out, instead of only relying on spoken language. Therefore we encouraged the family members to show us how they would like things to work, how they want to interact with artefacts and in what context. The groups developed *design scenarios* and built simple low-tech prototypes with a variety of prototyping materials. The design scenarios were acted out with the help of the low-tech prototypes. The scenarios were often documented as *video prototypes*; the acting out was recorded on video, thus demonstrating novel technologies that they might want to have in their homes.

4.3 Technology Probes

Technology Probes, invented in interLiving, (Hutchinson et al. 2003), combine the social science goal of collecting data about the use of the technology in a real-world setting, the engineering goal of field-testing the technology and the design goal of inspiring users (and designers) to think of new kinds of technology. Technology probes are designed to be extremely simple, usually with a single function, while leaving the interpretation of how to use them as open as possible. The goal is to feed the design process: participants gain experience and new ideas from living with new technologies and researchers obtain data and design ideas from the participants and their use of these technologies in context. Note that technology probes should not be viewed as early prototypes. They must be technically sound and robust enough to be used on a day-to-day basis without technical support. At the same time, they are designed to be thrown away and are not considered technical precursors to later systems. Technology probes should have a single function, with as simple and direct an interface as possible. A probe's single function must be sufficiently attractive for the users to want to interact with it as is, without training or externally imposed use requirements. A successful technology probe will inspire ideas and should have interpretive flexibility encouraging users to generate unexpected uses (Orlikowski 1992).

The technology probes helped us to address the following three methodological challenges.

1. Providing a non-obtrusive way to learn about a specific family's communication while letting them control their privacy,
2. Letting them use and explore novel communication technologies in their own homes, which provides a much deeper foundation for later collaborative prototyping activities, and
3. Providing a preliminary measure of success, based on the families' patterns and level of use and their reactions over a period of time.

The *videoProbe* is one of two original technology probes (Figure 3). Its function is to take snapshots of daily life of families at home and exchange them with family members living in other households. It is triggered by someone standing still in front of it for a while.

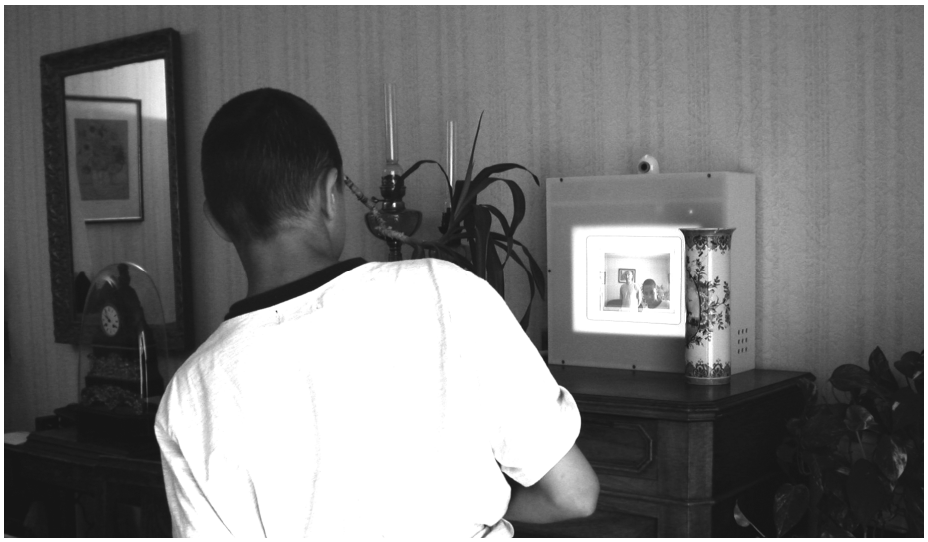

Fig. 3. The videoProbe displays still images taken at a connected remote household

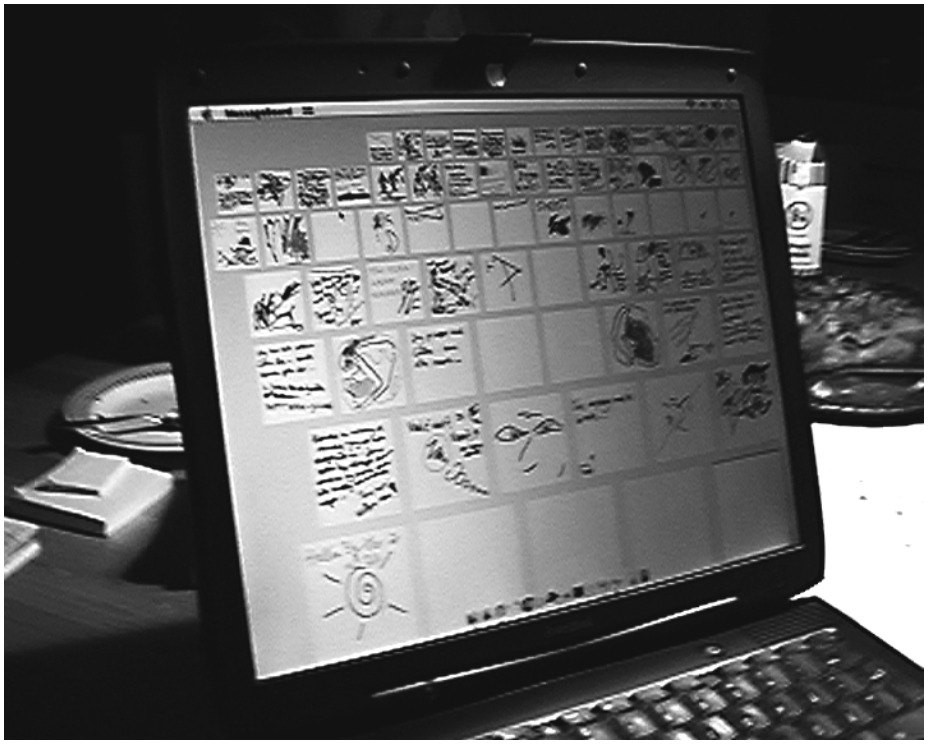

Fig. 4. MessageProbe (on laptop, installed on Wacom and MacCube at families)

Another technology probe, the *messageProbe*, enables family members to draw and write on a shared surface across households (Figure 4). Successive writing pads are generated and shuffled backwards on a display screen with drawing pen. Figure 5 shows examples of usage of the messageProbe.

Both examples combine the goals of gathering data about daily family life, inspiring ideas for new communication technologies and testing them in real-world settings. Family members living in remote households can share pictures, drawings and personal information with each other via a closed, secure network. The probes did not only provide an intimate view of the families and the requirements for a real-world system, but also led us to the novel concept of networked communication appliances.

Fig. 5. MessageProbe drawings between two adult sisters and between niece and aunt

Two other technology probes were developed: Mimo and TokiTok. Mimo is a card that allows multiple people, both local and geographically separated, to record and mix video with a tangible interface.

TokiTok is an artefact investigating awareness. When you knock at it in your home it gives away a knock in another connected household. Thus it is a low bandwidth audio channel between two locations that reacts to vibration.

4.4 Prototypes vs Technology Probes

Traditional high-tech prototypes are important for further understanding and reflection of real use situations and usability. They appear later in the design process than technology probes and neither of them can replace the other, they complement each other:

Functionality: Technology probes should be as simple as possible, usually with a single main purpose and two or three easily accessible functions. Prototypes may have many layers of functionality and address a range of needs, not all of which may even be implemented.

Usability: Technology probes are not primarily about usability in the HCI sense, so during the use period, we do not change functions. For prototypes, usability is a primary concern and the design is expected to change during the use period to accommodate input from users.

Logging: Technology probes collect data about relationships within the family and help family members (and us) generate ideas for new technology. We should provide ways of visualizing the use of the probes, which can be discussed by both users and designers. Prototypes can collect data as well, but this is not a primary goal.

Flexibility: Although technology probes should not offer many functionality choices, they should be designed to be open-ended with respect to use, and users should be encouraged to reinterpret them and use them in unexpected ways. Prototypes are generally more focused as to purpose and expected manner of use.

Design phase: Technology probes are intended to be introduced early in the design process as a tool for challenging pre-existing ideas and influencing future design. Prototypes appear later in the design process and are improved iteratively, rather than thrown away.

4.5 Interactive Thread

One way of sharing the explored and developed methods among the Disappearing Computer community was the Interactive Thread, a Participatory Design Toolkit in the form of a kit of cards, developed within interLiving, with methods and activities from a variety of disciplines that span the design process (Mackay et al. 2003), It was first used at the DIS2002 conference in London and then at several other such gatherings These special events had several complementary goals: to encourage participants to collaborate with each other in an interactive event, to share and discuss research methods developed by the interLiving project, and to take advantage of the collective design skills of our colleagues to contribute to the development of technologies for a design problem with detail-rich data and design ideas.

Participants receive a Participatory Design Toolkit composed of a set of 12 printed cards. Each describes a participatory design technique, illustrated with a short (15 minute) exercise.

The special sessions can be organised in three parts. The Interactive Thread is introduced in session 1 and the Participatory Design Toolkit is handed out and a specific design problem is described. Participants will then collaborate with each other on two data-gathering exercises: creating a relationship map and using a Polaroid camera as a cultural probe. The results can be assembled into a large poster centrally displayed (Figure 6).

We think that a good way for people to understand participatory design methods is to actively participate in a collaborative design exercise. Thus an enjoyable, educational experience is created for the participants, and, at the same time, it provides new ideas and critical feedback to the design problem.

Summing up, the intention of the Interactive Thread is to meet the following objectives.

- Encourage participants to meet each other and discuss interaction design strategies,
- Teach relevant interactive design techniques
- Test design methods developed by interLiving in new contexts, and
- Gather data and design inspirations about a specific design problem, e.g. family communication.

Fig. 6. Interactive Thread activity at DIS 2002

5 Experience from Activities

5.1 Probing for Understanding

We designed and produced kits of probes. Each of our households got one kit. The kits were produced so that all the contents would have an integrated appearance. It was important that they gave the users a notion of importance and respect. The "questions" and tasks were very open-ended and we hoped that there would be some unexpected results. We tried to make the probes so that all family members, from one to 76 years old, could contribute. There were plastic pockets to encourage and make it easier for people to collect and send us things. The kit also contained a diary that the family members should write in during a period of two weeks, one work week and one leisure week, and repackaged, disposable cameras with questions printed on them.

We framed the photo probe with three assignments: "Take photos of: places where you leave messages to the others, things that remind you of the others in your family and things that you find pretty or ugly in your home." The purpose of the probe photos was to encourage family members to take pictures of their home environment, emphasizing communication places, artefacts and aesthetics. We wanted the families and their members to reveal to us where and how they find a communication through an artefact meaningful and start a dialogue about aesthetics, Figure 7 and 8 show examples of places where the families leave messages to others in their household.

We wanted spontaneous reactions but we also wanted the people to reflect afterwards on the photos and why they took them. Therefore we had arranged so that the developed photos were sent back to the families for annotating. And after annotation the families sent the photos to us.

The probe photos that were sent to us from the different households had some similarities. Most of the photos of things that were considered "nice" were simply interiors in their homes. People have a hard time making technology fit into their life. Most other things in a household are there because they are experienced as meaningful.

Fig. 7. A shared communication surface. Family members can by a quick overview of the objects see who is home, etc.

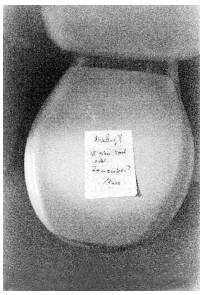

Fig. 8. Example of a strategy for getting important messages read. The note lies on the toilet lid

5.2 Probe Diaries

Our probe diaries were interesting for several reasons. We often got several views on the same situation. One Friday Hanna reflected over calling her mother Barbro. But she decided to call the next day instead because she wanted to talk for a long time. Barbro wrote in her own diary that she had thought of calling Hanna the same Friday but decided to wait until Saturday. The reason for this was that she felt that they had a lot to talk about.

The diary probe is a good tool for revealing stories like the one above. This information would be hard to get with other methods because it is about non-communication. The probes gave us insight into the families, but mostly from a few people's view. Head of family = head of probe! We needed a better way of letting all express themselves.

5.3 Probing Different Ages

Different probes help to explore the design space from different perspectives. For the smallest children participating, 3,5 and 1,5 years old, the probes were easy to relate to and simple to handle. The children were given a Polaroid camera and asked to take

pictures of things they wanted to show to somebody in their family. The photos were then put into a photo album and their parents annotated them with the children's stories.

The older children, 9 to 14 years old, were lent a simple digital video camera with the assignment to: Describe everyday activities to somebody from outer space that understands your language.

In one of the grandparents' homes it became obvious through observations and interviews that photos of grandchildren, children and events are important in their life. Therefore the grandparents were assigned to make a video describing how they used their collections of photos.

Through these various ways of approaching different age groups we achieved both more interest for the project from these groups and a better understanding of the their everyday life. It is clear that the probes have revealed a lot of information about the complexity and the context seen from the users perspective.

5.4 Workshops

The workshops were carried out on weekends and lasted around five hours including lunch. One objective with the workshops was to help the family members generate and develop design ideas that they experience as meaningful. They were hands-on design exercises in four to five steps.

We started the workshop activities by introducing something that frames or focuses the work. This is not done so much verbally as visually, like showing video clips from interviews with the households. One workshop started with a stack of 17 drawings. Each drawing was inspired by a list of quotes from what the family members had spoken about earlier in the project. The drawings can actually be seen as a form of analysis and synthesises of these quotes. These drawings framed the work into these areas but also opened up for reinterpretations. This feedback gives all participants the opportunity to correct or verify our descriptions. This also gives the different families understandings of the other participating families.

After this introduction the workshops usually continued with a "use scenario" (Figure 9). This is often developed with the help of the *critical incident technique* where the participants express something real and recent that has had some meaning to them. It could have been something problematic, a breakdown or it could be something nice that had happened to them. Usually this should have to do with some type of communication with others. All this helps keeping the work relevant to and reflecting the participants' real life, expressing real needs and desires.

The third step concerned the generation of ideas. Normally a shorter brainstorming sessionwas followed by everybody sharing ideas.

The fourth and longest part was where the groups used one or more of the design ideas to change the use scenario into a better working scenario, a design scenario. Here they did design work, made decisions and contraced the design space. It is important that they show us how they want things to work, how they interact with the artefact and in what context (Westerlund and Lindquist 2006). Therefore the groups were asked to build simple low-tech prototypes of material that we supplied. The members of the group may act out the scenario with the help of the prototype. Sometimes this step was presented as a video prototype. The acting out can be documented on video, other times as a series of photos (Mackay 2000; Ylirisku and Buur 2006).

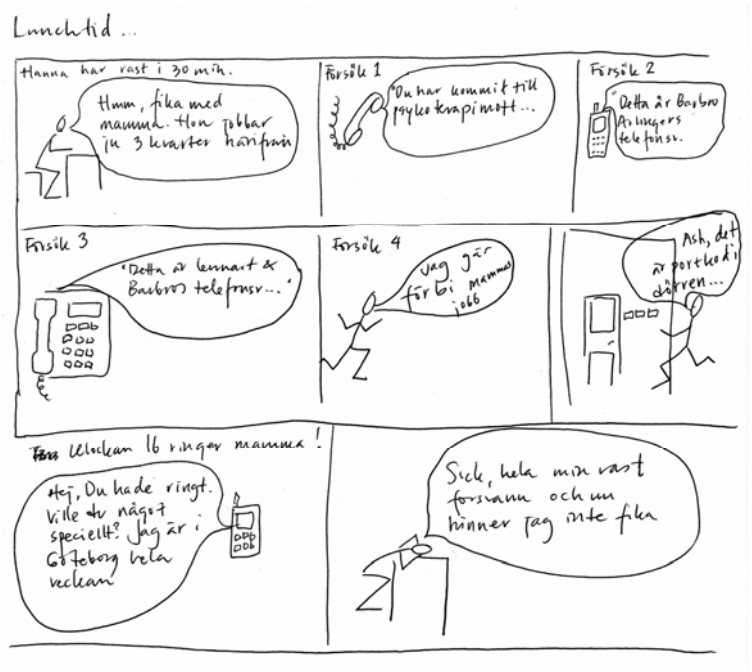

Fig. 9. A storyboard of a use scenario describing several problems encountered when a daughter tried to have lunch with her mother

Fig. 10. A family workshop discussing low-tech mock-ups

Of course, a lot of exchange of ideas takes place in spoken and written language, but the use of artefacts helps diminishing misinterpretation and negotiation. Figure 10 shows how family members discuss low-tech prototypes. Developing beyond spoken language forces the ideas to be more precisely described (Loi 2004). When a course of events is shown, all the necessary interaction also has to be figured out and the scenarios contain more details. Both the design idea and the contexts are described better. This way of using artefacts also makes it easier to involve people of all ages.

Finally all groups presented their design scenarios and we all reflected on them. It is through that activity that the design is put into other contexts, evaluated, through the other participants. As an example, the fathers and mothers were the most active and suggested family wide control systems. One of the teenage boys built a model of a teleporting device, the “BongoFax”, that could be regarded as an escape machine (figure 11). The control that the parents found meaningful to have over their children’s location and homework status had very little correspondence in the children’s world.

Fig. 11. The BongoFax

5.5 Installation of Technology in Households

Installing new technology into old buildings, in which many of us live, isn’t always an easy task. Homes that have had previous inhabitants very often have home made installations and solutions to interior problems. Also, the different technology and service providers do not always "talk” to each other.

Installing the videoProbe in the families’ households proved more difficult than anticipated. Technology probes must run flawlessly: users will stop using an unreliable system. This is somewhat at odds with the requirement that a technology probe is unfinished and open to interpretation by users, and it requires extra work to make the system robust. For example, we discovered that our ADSL provider shuts down the connection once a day and allocates a new IP number, requiring the router to be reinitialised. In order to make the system as robust as possible, we implemented

various watchdogs that check if the videoProbe software is running and responsive and if the network connection is up. If one test fails, the software client is killed and launched again.

The same kinds of problems arouse when installing the messageProbe in some of the households in Stockholm. The families' houses and flats were not newly built, and certainly not with consideration of bringing in tons of new technology equipment that needs electricity and other network connections. This altogether made our installations a continuously ongoing activity of calling different service providers and meetings with families in their homes, which all required a lot of time.

5.6 Prototyping in the Households

In exploratory technology development future use of future artefacts is in focus. In order to tune in the design space both low-tech and high-tech prototypes were installed and used directly in the families' homes. The use of the prototypes was then discussed and evaluated in workshop-like activities in the families' homes. This step naturally gives us a lot of specific information about the use in context. "The practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings, which have been implicit in his behaviour. He carries out an experiment which serves to generate both a new understanding of the phenomenon and a change in the situation." (Schön 1983, p 68)

5.7 Prototypes

Several prototypes considered as innovative distributed communication artefacts were developed and tested using shared surfaces. We describe two such prototypes below: MirrorSapce and InkPad.

MirrorSpace is a proximity-based physical telepresence video appliance. In an empty space, MirrorSpace looks and behaves like an ordinary household mirror (Figure 12). It is in fact augmented with a live-streamed video and is linked to other mirrors that are distributed in remote or local locations.

Fig. 12. & Fig. 13. A MirrorSpace and a superimposed MirrorSpace image

An ultrasonic distance sensor affects the video image rendering in real time. Depending on the physical distance between people and their mirror, the image of themselves and other people will alter. The live video streams from all active places are superimposed onto MirrorSpace, so that two people can make eye contact and merge their portraits into one MirrorSpace with superimposed pictures (Figure 13).

InkPad consists of a shared surface on which the user can draw virtually with time-constrained ink. It is a digital message surface for drawing/writing and sharing notes in real time at a distance, e.g. between households. The ink is supplied by pens handled with interaction device, e.g. mouse, pen or finger, and can have temporal properties such as disappearing after a while, recurring every Monday morning etc. This makes the InkPad useful for messages, reminders and real-time communication both within households and between households. Our intention is to enable communication of both important facts and more informal chatting in a way both youngsters, adults, and elder members of the family, computer literate or not, could find useful and fun.

Fig. 14. The InkPad installed in one of the households

6 Results

The research carried out within the interLiving project has successfully:

- Increased our understanding of multi-household family communication, via a longitudinal study of six families, and of co-adaptation of technology by users;
- Generated novel design methods (specifically, *technology probes* and the *Interactive Thread* as design methods), which have been published and actively shared with other projects;
- Developed and tested innovative distributed communication artefacts using shared surfaces, including four technology probes, all intended for communication between households: VideoProbe (shared video clips), MessageProbe (shared notes), Mimo (shared video mix) and TokiTok (shared knocks), as well as three proto-

types: MirrorSpace (proximity-based shared video), FamilyCalendar (paper interface to an on-line calendar), and InkPad (time-constrained shared ink).

- Identified the foundation for a new category of technology devices, called communication appliances, which provide small, secure networks for exchanging personal information within co-located and distributed families.

These innovations in context, process and technology result from our multidisciplinary approach and have served both to define new research problems and to solve them.

7 Lessons Learned - Understanding Design Space

A lot of effort was put into understanding and defining the design space, i.e. possible solutions. This design space is of course constrained by the individual family members' needs and desires but also by the researchers' notion of the project's aim. Not much of this was really known in the beginning of the project except the overall aim of developing "technologies that facilitate communication between generations of family members". The activities that we conducted together with the households gave us answers to what could be interesting but, equally important, what would not fit into the design space. Working with all the different methods gave us over time a clearer view over possible solutions.

To get brilliant design ideas directly from the family members was not really feasible. The ideas they designed and presented were mostly not suitable to go ahead and develop, either because technology isn't there yet to realise them or because it worked against common values and principles of the research team, such as privacy issues and integrity. Instead their ideas proved to be vehicles that enabled us to develop a deep and shared understanding of the families' needs and desires. This knowledge became shared among the researchers and was used to generate design ideas. If you have a common and shared knowledge of your material, the users (here families) and the technology, you as a research group stand on a firmer ground when you decide what to design.

7.1 Problematic Providers and Technology Instead of Problematic Users

In technology development research it is often said that it is time consuming working with users (Blomberg and Henderson 1990). This is true in the sense that you have to spend time with them in the beginning of a project and you need to adjust your methods according to the specific user group.

In interLiving we believed *the users*, distributed over vast areas and in different countries, would be problematic. Instead it turned out to be a real challenge to get *the technology* working. There are many independent factors that can play a decisive role. We would never have guessed that getting broadband to every household and make internet connected applications run smoothly through that would be so complicated and time consuming. We had many technology breakdowns, which all were related to the technology itself but also to companies providing commercial services which was more alarming, Our experience with running technology probes and prototypes, in this case in existing homes and dependent of commercial solutions and service pro-

viders, was a time consuming activity, probably more time consuming than working with people.

Our pre understanding of what it could be like to work with the families made us carefully choose and use methods and also prepare for unforeseen occurrences. The commercial solutions that we paid were assumed to just work, so when they didn't, we didn't have a good back-up plan.

7.2 Impact for the Future

The design methods described above have already begun to be adopted by other researchers (such as IBM Research, University of Toronto) and have been actively sought by industry (Philips, VTT, Nokia) to help them define requirements for technologies for the home. Longitudinal studies of families provide unique insights into family communication and our published results add to the relevant research literature. The software for some prototypes is currently available via the web under a free software licence. The MirrorSpace has been exhibited in several prestigious exhibitions, including Centre Pompidou.

However, the largest potential long-term impact will derive from our strategy for developing and deploying communication appliances. Although this will require additional research in a future project, the expected impact could be very large, enabling a whole new set of technology artefacts of a style that are currently limited to laboratory research prototypes, but should be usable by a large proportion of the general public.

The research philosophy (multi-disciplinary, collaborative design) of this work, its perspective (families first, not technologies), and a desire to explore a new design space (technologies for distributed, multi-generational families), were achieved via the work with families, development and sharing of innovative design methods and creation of novel communication technologies. We have also been extremely fortunate to identify a new research area of communication appliances and we are now proceeding to the next step, which is to clearly articulate this new type of family network and its associated applications.

The computer industry has repeatedly demonstrated its skill in developing faster, cheaper, smaller, and smarter networked devices. Yet, the most difficult challenge is often truly understanding and satisfying user needs. Just *what* technology makes sense for ordinary people, in the course of their everyday lives? Although general-purpose *information appliances* have been promised for almost 20 years, the vision remains largely unfulfilled. Despite a few notable exceptions, particularly mobile telephones and SMS messaging, many of the promised devices have failed as products (as witnessed by reports from E-Bay of increasing numbers of barely-used e-gadgets for sale) or remained in the labs. Our own research, involving longitudinal, participatory design with families at home, shows that people want *communication appliances*, defined as simple-to-use, single-function devices that let people communicate, passively or actively with one or more remotely-located friends or family. Shared information might include sound, images, video, text or even touch. The desired style of connection may range from focused, synchronous contact to peripheral awareness of one another. Communication can occur over a distance, to other households or places. Communication can also occur over time, including leaving quick messages for oneself and others and preserving and sharing memories over years.

Finally, this experience has been so rewarding not only for the researchers but also for the families and their members that they are most willing to continue as design partners. A continued such relation, in investigating the opportunities mentioned above, will make long-term, longitudinal user studies possible.

Acknowledgements

We extend warm thanks to our approximately 50 family members as design partners in Greater Stockholm and in Greater Paris.

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Paper B

Artefacts for understanding

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http://www.herts.ac.uk/artdes1/research/papers/wpades/vol3/bwabs.html

Abstract

This paper discusses two aspects of artefacts in the design process. The first is how artefacts can be used to inform researchers about people's context, desires, concerns and needs and constraints. The second is how artefacts can facilitate the construction of shared knowledge that is needed during multidisciplinary research projects.

Theses two ways of looking at artefacts will be discussed mainly through the empirical material of the interLiving project, a 3-year multidisciplinary cooperative design technology development project and also through several cooperative design workshops conducted at CID, Centre for User Oriented IT Design.

Introduction

Artefacts

Different disciplines look upon artefacts in different ways according to what the discipline requires. Many researchers have the material culture, the artifacts, as their empirical material, perhaps the only material they can acquire, like archaeologists for example. The artefacts are the physical remains of human activity, the starting point for understanding of a culture (Appadurai, 1986, Tilley, 1990).

Artefact derives from latin *arte factum,* which means artificial. In general, that implies an object made by the human hand, an artificial object. Artefacts are manmade for a specific purpose with an intention of fulfilling that purpose. Sometimes they also fulfill unspoken purposes. This paper addresses some aspects of the intentionally made artefacts and their way through the cooperative design process and how they will be attached with new meanings on the way.

interLiving and cooperative design

interLiving, Designing Interactive, Intergenerational Interfaces for Living Together, is funded by EU's program IST FET "Disappearing Computer" and the partners are CID (Centre for User Oriented IT-Design) at the Royal Institute of Technology in Stockholm, INRIA (Institut Nationale de Recherche en Informatique et Automatique) and LRI (Laboratoire de Recherche en Informatique Université de Paris-Sud) in Paris.

At the start of the project there was no explicit need, desire or problem that was to be addressed. Nor was there any specific technology that was preferred.

Our approach was to:
• engage with several real families for a longitudinal cooperative design process,

• have a multi-disciplinary team of researchers from ethnology, psychology, graphic design, industrial design, interaction design and computer science and art.
• use a collection of diverse cooperative design and other methods.

One aim of the interLiving project was to investigate and develop new methods to work in close collaboration with the users through out the whole project. Our experiences form interLiving have been fed into other work performed at CID. We have conducted several workshops with different user groups, mostly with people that have different disabilities.

Cooperative design derives from a Scandinavian tradition of working closely with the users throughout the whole design process (Bødker, et al., 1987, Greenbaum and Kyng 1991). The users in interLiving are three families in Sweden and three in France. Each family contains several, typically three, households. The participants' ages vary from one year to 73. The user group is the family and therefore not homogenous at all. Their skills and capabilities differ massively. Over the three years of the project as the participants grew older they changed their individual skills and capabilities.

Multi-disciplinary work

The multidisciplinary teams contained researchers from ethnology, psychology, graphic design, industrial design and computer science. To understand as many aspects of an individual's needs, goals, wishes and desires, and to give input to the design, we have chosen a multi-disciplinary approach that draws from social sciences and design and engineering fields. This approach, called triangulation (Mackay & Fayard, 1997) assumes that we will learn more if we experiment with multiple methods to investigate the same aspect or question. Each science has it own well-tried methods, which work well in its own context. When working in a multi disciplinary team, as in interLiving, we had to tear down barriers of firm and grounded knowledge of how you do research and find new ways of working together, to blend the different methods and perspectives into joint multi-disciplinary research work.

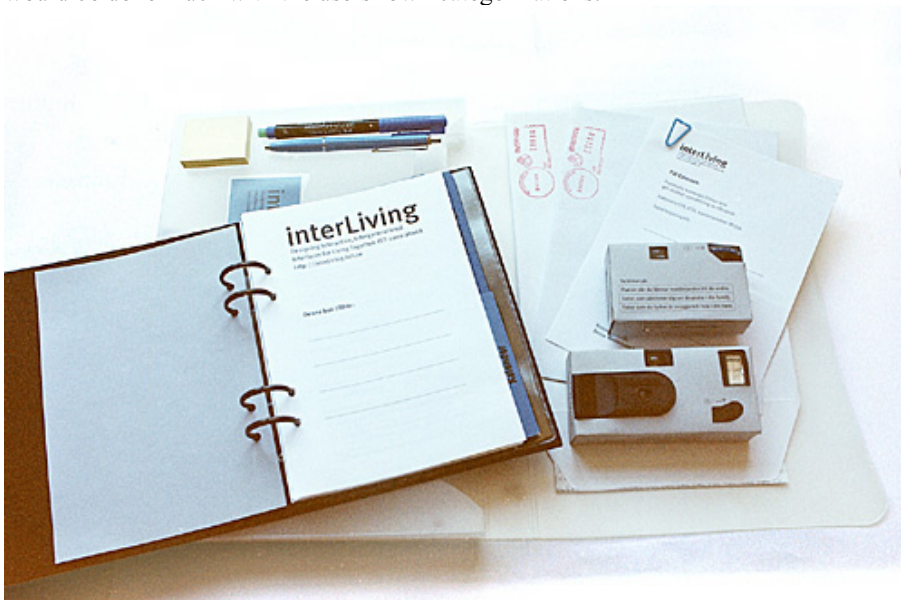
This means that the collected and generated 'data', which is normally used in one discipline, will be used by researchers with other backgrounds. The log files, for example, that a computer scientist normally use to control that the software is working properly, can also be used by an ethnographer to get a better understanding of the users context and strategies.

Methods

To understand users needs and desires we are using a variety of research and development methods from cooperative design, CSCW (computer supported cooperative work), industrial design and ethnography. Some of the methods used are cultural probes (Gaver, B. & Pacenti, E. 1999), workshops (Westerlund et al, 2003), technology probes (Hutchinson, H. et al, 2002), observation and interviews.

The *cultural probe* method is an open-ended self-documentation activity that in our case involved taking photos and video as well as writing diary. These would hopefully reveal more of the individuals' preferences, desires, context and needs. This

would be done much with the users' own categorizations.

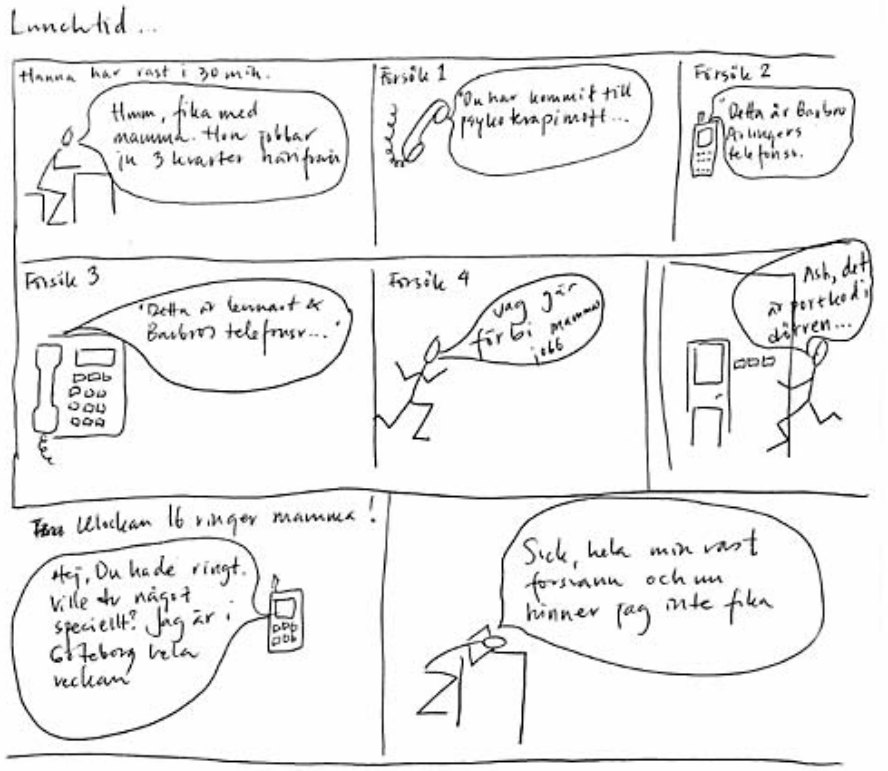


[1_cultural_probe_kit.jpg | The kit of cultural probes given to the families.]

Technology probes were invented to collect information of how users would use, to them a not known shared communication artefact. The technology probes are based on well-known technology, they should be easy to use and open-ended. Technology probes combines the social science goal of collecting data about the technology use in a real-world setting, the engineering goal of field-testing technology and the design goal of inspiring users and designers.

[2_video_probe.jpg | The videoProbe is an example of a technology probe.]

The *workshops* themselves included several methods, like brainstorming, building scenarios, video-prototyping, low-tech prototyping, etc (interLiving, 2003). Instead of general descriptions that are reduced and without detail, we focus on actual descriptions of real situations that make sense to the family members. These descriptions should cover the whole context of the situation. We encouraged the group to think of communication situations that would have been problematic. From that they made scenarios, both written and drawn, but most importantly stage it and videotape it. Through videotaped scenario iterations they refined their design ideas.



[3_workshop_scenario.jpg | A use scenario describing a communication breakdown.]

Artefacts *used* by the users

The cultural probes, which in them selves are sets of designed artefacts, are used by the users. Each household in interLiving filled diaries with words, drawings, tickets etc. concerning their family communication. When looking in them, we understood that it was mostly one person from each household that had been annotating the diary. The notes were only one person's point of view. How they had written and what varied a lot.

Red family, Thursday the 17th of April
David called friend
Monica called David
Monica called Maria at work

Maths called Maria on mobile

Maths, Maria, David ate at a pizzeria

Maria & David hit on the driving range with David's new golf set.

Blue family, Thursday the 17th of April
Mother called to check how things were. Sussi called and asked how we felt after the weekend.

Green family, Thursday the 17th of April
Back at work – many messages during the day on the answering machine at the reception. Can't make it to call everyone – bring that part of work home. Calls, during the evening, some patients to book appointments. Some work e-mails were collected on the home computer.
On the way home from work I call Lennart from the car to his car, wondering who has time to do the shopping. It will be me, who has come a bit further on my way home. In the shop, Sara calls – wondering if we can baby-sit in the weekend. Give some times and activities – she is thinking and will call back.

All three examples are written by mothers, about their own and other family members communication. These three women wrote the most in the household diaries. Husbands and children wrote too, but not as much. That made us aware that what is said comes mostly form one perspective and one way of writing.

Artefacts *created* by the users

A more explicit task was to take photos of "places where you leave messages to others", "things that remind you of others" and "things that look nice and ugly". They used the probe cameras to take photos in response to the questions. They then sent the film to a photo-lab, received the photos some days later and then annotated them on the back with remarks concerning the questions. This activity addressed all household members but it turned out that it was mostly one of them doing it.

It became obvious that this format, the diary where you write your experiences, works well with people who like writing. The cameras, two per household, were not enough to receive input from all members. To get everyone engaged in the task, we would need to make probes to give to all family members, and to adjust every probe for that specific individual, according to capabilities and age etc.

Perhaps the most important part of videotaping a scenario at a workshop is that the design idea must be very clear. The medium itself, with frames and sequences, sound or not sound, forces you to be very specific, or else the idea will not be understood. The video is the shared artefact that enables a team to make a shared understanding of an idea.

[4_simple_prototype.jpg | The tape dispenser here represents a recording device.)

To visualize the design idea, you can make prototypes, artefacts, which enable you to describe the idea to yourself but also to the project group. One example from the interLiving project was the BongoFax.

[5_bongofax.jpg | The BongoFax prototype.]

The BongoFax was created by a teenage boy during a joint family workshop at CID. The idea it represented is more or less a tele-porter. The boy presented it to the whole group by telling us his scenario.

If for example the toilet in your home is occupied or something, you can just dial your granny's telephone number, jump into the machine, and them pop up at her place, use the bathroom and then dial your home number, jump into the machine again and come back home.

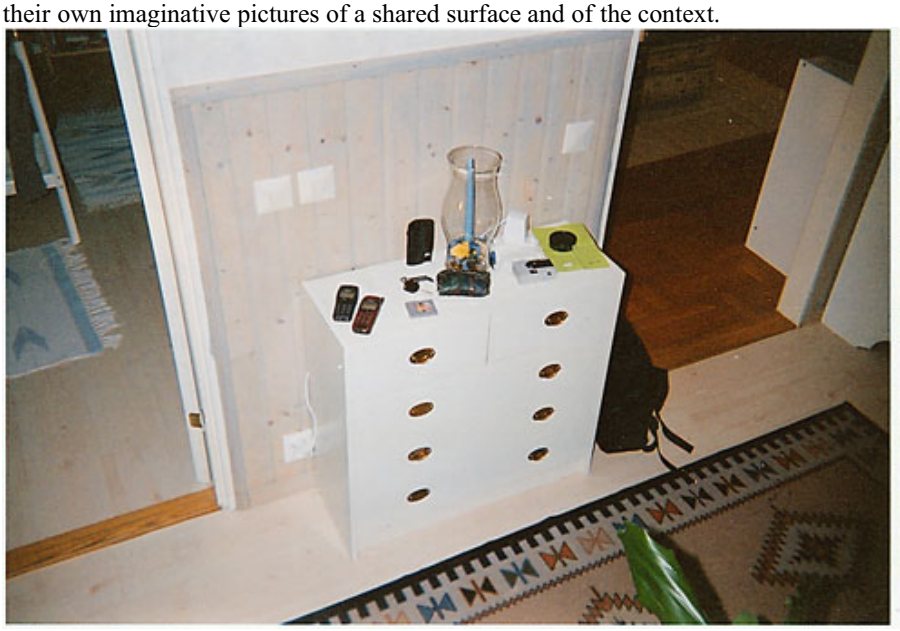
While he was telling the whole group this, his father looked a bit uncomfortable and tried to interrupt the presentation. He thought the idea was a bit stupid. The father instead, presented the idea to put GPSs on all his sons, so that he could keep track of them.
Every time we need to go somewhere and I tell the kids to wait out by the car, they are all gone by the time I come out. It is the same thing every time. I never know where they are.

These prototypes were the first and perhaps the most obvious artefacts to represent the asymmetric communication pattern in the families and especially within the households that were created in interLiving.

Artefacts in the process

The artefacts became tools to think with as well as vehicles for revealing needs and desires.

Probe photos, were used as starting points for the interviews that followed. They became the tangible thoughts on communication surfaces in the home, as in the case with the drawer. Through the paper print photo the team and the users could hold on, see and talk about the same specified *shared surface*, shown in a specified context. Verbal descriptions of the same context would have made the research group make their own imaginative pictures of a shared surface and of the context.



[6_shared_surface.jpg | The top of this drawer worked as a shared information surface.]

When working with small children, 2-4 years old, you need to have tangible, visible things to concentrate the activities around. Concepts and abstractions do not work very well at all. We gave the youngest interLiving children Polaroid cameras so that they could create a photo, a representation of something, right away. They could then make comments and a grown up could write it down on the very same representation. They then put them in a photo album. And afterwards the children could show us, the researchers, their album. The older children used video cameras to represent their daily lives in movies.

The children liked the cameras very much because of the obvious way of how to handle it, the robustness and the instant delivery of the photos. The Polaroid became the entrance to the cooperative work with them. The albums became representations of many things but very obviously that children grow and their perspectives change fast.

[7_interview_video.jpg | A video cut from an interview regarding a childs photos.)

All the interviews were recorded on video, and cuts from the different interviews were assembled into a summary that the researchers made. This summary video was used to frame the work in one of the following workshops. The sequences in the video became the shared reference about a topic that all participants could relate to. From that the workshop could start.

The meaning of artefacts, summarizing thoughts

Throughout the whole interLiving process we learned that artefacts have several different roles.

- For the users to inform the research group about their lives, experiences, needs and desires etc. (workshop outcome, videos, probes, etc)
- To facilitate reflection in action and interactive cognition (prototypes, workshop outcome, videos, probes, etc)
- To feed the design process with design ideas. (prototypes, videos, etc.)
- For the multidisciplinary team to construct shared understandings both of the family members. (all)
- For the multidisciplinary team to construct shared intentions of the design space. (all)

The first three items in the list are rather obvious and expected. Artefacts can of course facilitate someone to communicate issues to someone else. The photo and video artefacts worked as representations in ways that words hardly could have done. This is especially important since nearly half of the participants were children. It is also well known that artefacts help us to reflect and understand in different ways

(Schön, 1983. Gedenryd 1998:115). Although design ideas are what you hope that a design workshop will result in we found that these designs actually more contributed to our understanding of the users needs, desires, experiences and contexts.

Shared understandings and intentions

One very important discovery for us was that artefacts helped us to construct and understand our shared intentions. The BongoFax and the story around it became the representation of our intent of developing communication technology, and not surveillance equipment, i.e. the researchers implicit intentions. It is also one representation of the asymmetric communication, i.e. it helps to reveal the different intentions that the father and his sons have.

Another shared object on the topic of asymmetry is a video clip from an interview with one of the mothers, expressing that it is not everybody's right to be able to reach her all the time. She was referring to mobile phones and that she sometimes shut it off, just to be alone. Our intensions of making communication technology that is not intrusive became clear to us in that video clip as well as in the BongoFax example. These needs of sometimes being left alone, overlap with our intentions with the communication technology and thus gives us a clearer view of the preferred design space.

Concepts have different meaning to people with different background, i.e. from different disciplines. The artefacts provide a non-verbal representation that can be easier to understand and work together with than words. This is very obvious when working with children. The problem is language barriers.

When working in multidisciplinary groups, you may speak the same national language but you seem to oppress the fact that with different disciplines comes different meanings of the same concepts. Of course, both spoken and written language is of utter importance since it helps us to define and be explicit. But if language is a barrier, the artefact can help to open up and to make us reach a shared understanding.

All these artefacts (photos, diaries, videos, prototypes, etc.) play important roles for our individual understandings. But they are even more important for the construction of shared understanding among all the researchers from different disciplines that were engaged. The artefacts facilitate communication within the research team as well as with the family members, the future users.

In the workshops it was also important not to rely only on spoken language. After grounding the workshops in scenarios that were meaningful for the family members we asked them to produce simple prototypes and scenarios with which they showed us in what ways they envision using the ideas for 'future artefacts'. These design scenarios, including prototypes, were represented with video prototypes, another artefact. One can argue that a sequence of video is not an artefact. But the point we want to make is that the video sequence and what is shown on it, represents the shared knowledge. It becomes the artefact to cling on to in the process if we start to loose track. Then we can go back to that artefact and relate to it as a representation of previous work, but also as a reference to what we once did, thought and knew.

Thus hand in hand with our understanding of the family members, partly through artefacts, we gradually increased our understanding of the design space, i.e. the possible future artefacts that could fulfil some of the communication desires and needs that they had.

[8_prototypes.jpg | These prototypes revealed a couples desire to keep in touch during work.]

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We gratefully thank our family design partners for their contributions, as well as all the other researchers involved in interLiving in Sweden, France and USA, without whom this work could not have been conducted. The interLiving project, IST-2000-26068, was supported by EU IST FET, the Disappearing Computer Initiative

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Paper C

Ajmo Splite: Come on Split! Tell us what you think!

L. Baillie	A.Philips	J.Roberts	S. Lindquist	O. Sandor
FTW	Philips, Interact Lab	Motorola	CID	CID
Vienna	University of Sussex	Chicago	KTH	KTH
Austria	UK	USA	Sweden	Sweden
baillie@ftw.at	a.d.phillips@sussex.ac.uk	joi_roberts@hotmail.com	sinna@nada.kth.se	ovidiu@nada.kth.se

ABSTRACT

Technology has often been utilized to address the needs of specific communities. Understanding how technology could be incorporated into solutions for sustainable tourism is a particularly interesting design challenge. This paper describes how we tried to meet such a challenge in an effort to help the residents of Split, Croatia enter into a dialogue with their local authorities about how to develop sustainable tourism within the specific socio-political constraints of their region.

Categories and Subject Descriptors

H.5 Information Interfaces and Presentation (I.7); H5.2 User Interfaces: User-centered design.

General Terms

Human Factors, Experimentation.

Keywords

Interaction design, Participatory design, Children, Tourism, Mobile Communication, Political Design and Public Displays.

1. INTRODUCTION

In the EU, there has been a shift from the concept of mass tourism (i.e. the traditional sun and sand holiday) to that of sustainable tourism which places an emphasis on the natural landscape and history of an area [Sunsdseth, 2004; European Report, 2004]. Sustainable tourism, however, consists of more than this cursory transition. While striving to satisfy visiting tourists, sustainable tourism also seeks to protect and enhance opportunities for the future of the host region and its citizens. One of the goals of our short project was to explore Split, Croatia as a center for tourism and to investigate how sustainability would fit into such an environment.

This paper describes "Ajmo Splite: Come on Split! Tell us what you think!", the solution proposed by the project team to address the sustainable tourism problem in Split. The paper further describes our design process and ultimately the event which we used to encourage interaction between the public and our prototype. We draw conclusions as to what we learnt from undertaking such a design challenge and what we accomplished by building a hi-tech prototype.

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2. POLITICALLY DRIVEN DESIGN

Other interaction designers and artists have tried, using their designs or art work, to encourage people to take a more active part in politics. For example, Josh Kinberg [Kinberg, 2004] rigged his bicycle (see Figure 1) so that it could receive text messages from the internet and print them in chalk letters on the side walk. He said that his 'Bikes Against Bush' was an interactive protest/performance.

Figure 1. Josh Kinberg sharing political messages via his bike.

In a different but related direction, a Scandinavian organization is trying to develop visual methods in an aim to help small pressure groups join forces to lobby politicians. The visualization helps the small pressure groups to see quickly and easily which other groups are active in their area and to join forces on specific issues in order to exert more pressure. It was found that before this program was created the disparate groups had little interaction with each other.

Researchers have, however also commented on the negative impact that the growth of new information technologies has had on political debate [Nold, 2003]. The reach of capitalism to become global has enabled a new kind of decentralized protest to emerge. These groups are formed by protest leaders that can activate groups of people quickly via mobile phones, through websites, mailing lists, and SMS trees. These tactics have been so effective that they have forced organizations such as the World Trade Organization and the G8 to move their meetings to ever more inaccessible and policed spaces. It has also been argued that telecommunications technology has proved to be a political activist nemesis through the use of 'Flash mobs'. Flash mobs are started when someone sends an SMS message to a mailing list naming a date, place, and time to meet. At the meeting place, instructions are given as to what to do. These are usually trivial things such as: 'at 6.30, start waving your arms in the air and after ten minutes walk away'. It has been claimed that the Flash Mob raises complex issues about leadership and political purpose. For instance, Flash Mobs do not have a visible leader because the

SMS that initiates the process is anonymous and at the meeting place, no single person starts the protest. There is also often no discernable political point to be made.

In addition to these examples of technology-mediated political expression, conceptual art installations have played a role in thoughts of democracy and the exploration of spaces. Two very prominent artists, Andreja Kuluncic [Kuluncic, 2004], who created some conceptual works on distributive justice and state, and Maurice Benayoun [Benayoun, 2004], who exhibited 'Watch Out!', have both investigated the issues put forward here. In one sense their work can be seen as similar to our "Ajmo Splite" concept. The similarities lie in the cornerstones of our prototype particularly the kiosk, multiple ways of messaging to a broad audience and the underlying political stance. Admittedly, a technology prototype will never be conceptual art and the art of Kuluncic and Benayoun cannot serve as prototypes for technology development. However, the two are quite similar and can be used for the same purpose within a given socio-political context.

Some of the design methodologies used by the "Ajmo Splite" team have also arisen from the body politic. Participatory design had its very first origins in the democratization of the workplace in some Scandinavian countries. Brought about by employee influence through unions and collaboration with management. Participatory Design is not a single theory or technique, but rather an approach that is characterized by concern with a more humane, creative, and effective relationship between those involved in technology's design and its use [Suchman, Schuler & Namioka, 1993]. Several techniques have been adopted and/or developed to expedite participatory design, the most prominent being scenarios, early prototyping/mock-ups, participatory design workshops in various guises, contextual design, contextual inquiry, ethnographic field methods, probes, and informal interviews.

One of the founders of participatory design Pelle Ehn [2004] recently commented that cities could be viewed as collective interaction design. If this is true, then participatory practices could be used successfully to involve citizens in that design process. It should be added that some of the most important places in cities are not buildings but spaces or intersections through which the populace wanders. It is this `public wandering` that contributed to the start of the French revolution. In the summer of 1789 one of the most important events of the French revolution was started by a group of peaceful strollers. This crowd, galvanized by the news of a popular minister's dismissal, formed themselves into a group that stormed the Invalides building, ultimately leading to the frontal assault on the Bastille [Nold, 2003]. The image that this leaves is a vision of the public domain that is not about formal physical space but about temporal intersection points where informal exchanges can take place. The success of the "Ajmo Splite" project was dependent upon both our understanding of the importance of these temporal intersections and the role of informal exchanges in the city of Split.

3. BEGINNINGS

The project began, as most projects do, with vague concepts and general ideas of what could be accomplished by the team. We defined four pillars upon which our design should be built: sustainable tourism, mobile telecommunications, previous experiences of the group, and the information provided by the locals and the tourists.

From there, we agreed upon two possible avenues of investigation. First, develop a solution for tourists: this seemed the more logical and more intuitive choice for the group as we could, in part, put ourselves in the position of tourists. Secondly, develop something for locals: this seemed counter-intuitive to the group as we were not all locals and therefore could not truly know what they needed or wanted. Furthermore, we felt that given the time span of the project (i.e. two weeks) we could not gather enough information about the locals to make an informed decision about their needs. However, we did not want to abandon this idea and so aimed to find out information from locals about their needs with an aim of including their thoughts in the design process.

4. REQUIREMENTS GATHERING

We began our investigation by undertaking a short literature review of previous research in the area of mobile telecommunications. The reason for this review was to inform ourselves of what had been previously accomplished so that we could draw upon those experiences. The second activity we engaged in was a set of city tours. Split officials kindly offered to provide a formal tour of their city. This tour helped us to think about our role as tourists and to identify what the city officials perceived was of interest to those visiting their city. To gain a fuller view of Split and its citizens, we asked two of our team members who lived in Split to give us a second tour from the locals' perspective. They kindly agreed and this tour provided us with a deeper insight into the needs of the community in Split.

The next stage of our design process was a brainstorming session to identify some potentially interesting topics and areas of concern for tourists and locals. We used the information gained from the tours and the literature review as input into this idea-generating session, each member of the team writing down five ideas and attempted to categorize or discard them. This approach is similar to the techniques used in contextual inquiry [Beyer & Holtzblatt, 1998]. When we finished, several themes and communities-of-interest emerged. We then formulated questions to conduct interviews with local adults, local children and tourists. We decided to include children as a target group since our locals' tour had shown that children had been affected by some of the tourism-related decisions made by local politicians. because we discovered during our locals' tour that the children have been affected by some of the tourism-related decisions made by local politicians.

4.1 Findings from Interviews and Field Observations

By dividing the team into smaller groups we were, in a short amount of time, able to conduct interviews with 6 adult tourists, 4 local children/teenagers and 5 local adults. All adults were interviewed in English but the children were interviewed in Croatian. Each of the groups reported back on the results of their interviews and observations.

Our findings were a bit surprising. The tourists all commented that they were quite happy with the facilities already available in Split and that there were sufficient guide books and local tourist offices to help them if they had any questions or problems. The more interesting findings came from our discussions with the locals. In general, they seemed positive about tourism and thought that it brought a lot of good things to the city including jobs, money, and development. However, alongside these benefits there

were also a number of concerns. For example, the electricity supply and refuse management system were inadequate to meet the extra demands during the tourist season and often resulted in blackouts and garbage pile-ups. In addition, the local residents perceived a deeper issue of corruption involving local politicians who were allegedly selling and redeveloping public space without consulting their constituency. What became clear from these interviews was that the locals were not happy with how politicians made decisions about new planning developments. There seemed to be no mechanism for holding politicians accountable for their decisions and no easy way for locals to voice their opinion about local planning issues. Also, the planning process itself was seen as flawed and difficult, with one of the interviewees commenting that out of frustration with the bureaucracy, they had given up trying to get the requisite permits and just went ahead and built their house without formal authorization.

The notion of the locals' lack of political engagement and the absence of democratic forums for discussing political matters was mirrored in the observations made by our team. One notable experience was an evening when the town was out on the streets of Split celebrating the Croatian sporting heroes who had returned from the Olympic Games with gold-medals. Fire works were lit, music was played, and the athletes were cheered when they entered the stage. Suddenly, when local politicians entered the stage to offer their remarks, a collective "Boooooh" was heard from the audience.

Historically speaking, the Croatians have been a politically frustrated people. They have had foreign masters, endured a government led by people from another land and culture, and they have been part of larger federations. The Romans, the Venetians, and the Yugoslavia federation have all left their traces on the landscape as well as in the culture of Croatia. As a result, the Croatian people are politically aware, but have always had someone else to blame for their problems. This sentiment is often evident in some cultural expression and in the language [Gustavsson, 1977]. While in Split, the team observed the locals engaging in 'Splitski Djir", which loosely translates to"the Split way" or "what's up in Split right now." In Split the locals go out in the streets to have a coffee, to meet people and to talk. They rendevous at the beach for swimming and linger to enjoy the sun and camaraderie. .The political consciousness is not as strong, particularly amongst the young people; they are more concerned about Splitski Djir!

5. THE BIRTH OF A CONCEPT

After discussing our findings from the tours, our observations of the events that took place in the city centre, the results from our interviews and our research on previous politically-driven design, the team decided to focus on a concept that would enhance the socio-political environment of Split. What was needed most was a mechanism to open the communication channels between the locals, the local authorities and the politicians, particularly around the issues of city planning.

Since we were attempting to solve a real-world problem, we wanted our project to result in a working prototype that could be used to observe reactions and gather feedback from the citizens and their local context. The main goal for our prototype was to create an initial spark which would get people talking and interacting with the political machine. Initially, we drafted three possible solutions (See Figure 2) which were ultimately combined into one "uber" concept. Some of our concepts were inspired by previous research on cooperative and participatory design (mentioned in the previous section) which had been a success at enhancing the socio-political environment and using this to solve real design problems. We also wanted to include some notions from Interaction Design (i.e. that a design should be fun, engaging etc.), especially since we wanted to include children in the interaction.

We realized at this point, however, that we were still not 'locals' and that, despite all our efforts, we had only undertaken a very limited inquiry into the locale. We decided, therefore, to engage with three invited locals over dinner, asking them to listen to our plans and provide honest and critical feedback. The locals who attended the dinner embraced the concept proposal and provided positive feedback to the group.

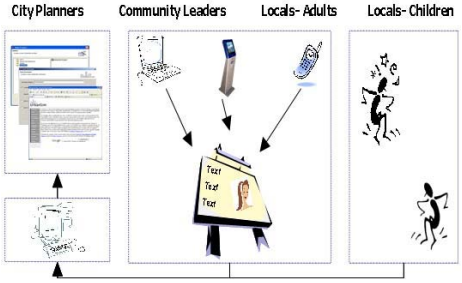

Figure 2: The Three concepts integrated into one.

A high tech prototype was favored over simpler forms since it would allow us to observe 'real' technology being used by 'real' people in a 'real world' setting. The design focused on building a single digital billboard that afforded different types of interaction and offered local people, of all ages, a platform to voice an opinion on a local issue. This design centred on a kiosk that was situated in a public space in the city, with people's opinions being projected onto a wall.

Although we wished to utilize a full participatory design approach during the prototype development, it was not possible due to lack of time. However, we were still keen to involve real citizens in the design of the prototype as it evolved. So, a compromise was reached through the involvement of a lecturer and students from the Arts University of Split. We discussed our prototype design with them and they provided an objective and local perspective that was informed by local issues and the needs of their own community. In an effort to make us fully understand the poor decisions that had been taken by city planners one of the lecturers took two of the group members to buildings and building sites which had been abandoned before completion due to poor city planning.

5.1 The Shape and Purpose of the Prototype

The final prototype that emerged was a three-sided kiosk coupled with a digital billboard. This kiosk served several functions (i) to provide information to locals about the project; (ii) to capture video clips of people responding to the question 'How well is planning and control organized in Split?'; and (iii) to provide a

physical and more playful interface that allowed children to voice an opinion on a related issue. Each of these functions was allocated a side in the kiosk design. In addition the kiosk contained some of the technology that was required and provided a platform for the projector. A web cam enclosed in one side of the kiosk allowed users to record 15-second clips by pressing a button and speaking into the camera. A mirror around the camera provided the users with visual feedback on what was being recorded.

The children's interface was intended to encourage a more physical and playful form of interaction. It was agreed that this was a more intuitive and natural way for children to express themselves. Also, other researchers have claimed that the use of traditional human computer interaction styles with input devices such as a keyboard, mouse, or game pad are not interactive enough and encourage poor levels of interaction. They propose that researchers should explore more physically engaging alternatives [Höysniemi, Hämäläinen, Turkki & Rouvi, 2005]. We were also concerned about how the children would engage with a political message and debate. We were also grappling with time constraints. Given all this information we decided to develop a 'low-tech' design that would prove to be, we hoped, physically engaging. Two illustrations were attached to one side of the kiosk, each a response to a single issue. Children were able to voice their opinion by simply throwing a soft ball into one of the baskets fixed below each illustration.

We specifically chose an open space that was used transiently by the majority of Split residents to project the digital billboard. Research shows that large visual displays have often been used to augment the social space. In the main this has been done in the work place and at conferences [Churchill, et al., 2004] [Carter, et al., 2004]. This project allowed us to explore the efficacy of this technique in a more commonplace social setting. Another way in which our work differs from previous work in the HCI area on large displays was the target audience for the device. Our prototype was designed with the firm aim in mind that everyone should be able to interact with it and engage in the debate. More specifically, part of our prototype was aimed at children and aimed to include them in a political debate that would affect their future. This is something that the project team saw as important, as do others in the HCI area. For example, William Griswold, argued that shared physical spaces cannot be depoliticized in terms of communication. Therefore political considerations especially from an ecological perspective could have a positive impact on any visual or interactive design for these spaces [McCarthy, et al, 2004].

5.2 Pre-event Preparations

Preparing for the event involved addressing a number of practical issues. This included finding a suitable location and time for the event, getting permission from the local authorities to use a public space, and finding places where we could also get easy access to electricity. We visited a number of possible locations with local members of our group. All the locations were within the Diocletian Palace of Split and were familiar to the locals. We finally chose Fruit Square, a plaza in the center of the city that was surrounded by cafes and bars. This square was a popular place for people to socialize and also formed part of a throughway between the medieval city and the promenade. Based on the research highlighted earlier, that one of the most important things about the public domain is not only the physical space but also the temporal intersection points where informal exchanges can take place, we found the selected location even more appropriate. Lastly, we decided that we would run the event in the early evening, a time when families were out in the city enjoying Splitski Djir!

6. THE EVENT

Figure 3. The event in Fruit Square

The kiosk was placed in Fruit Square with the billboard content being projected onto one side of a medieval building, a seamless mix of new and old. People could record video clips of themselves or text their opinions to us. The projection combined information about the project together with captured video clips and text messages. New content was interspersed with random selections from previously captured content. A local, wireless network was set up between three laptops. Collectively these laptops captured, stored and projected people's opinions on to the wall. Technically the prototype combined both automated and 'Wizard of Oz' approaches. Whilst video capture and selection was automated the handling of text messages was more 'hands on'. This was a conscious decision that was made earlier in the design process. It was decided that given the public setting text messages should be checked before being projected. Consequently text messages were received, checked, edited if necessary, and then forwarded for projection.

7. CONCLUSIONS & REFLECTION

We felt that by undertaking this event we succeeded in provoking interest among the citizens and giving local children a voice. For example, the locals stopped and watched the projected images. We received live SMS messages (9) during the short time of the event; a small number of video messages were created (6). SMS did seem to be a more acceptable method of communication than video messaging. This is probably for two reasons. First, the fact that people are used to sending SMS messages to each other or to TV shows but are less comfortable with leaving a video message. Second, anonymity could also have been an important factor here.

We found that the children were the most interactive participants with the installation, possibly drawn to the simple physical interaction. The children voted in favor of banning dogs from the local parks (3 against the ban, 8 for)! The children were also keen to make video clips. In Figure 3 the girl is asking her father if he can lift her up so that she can make a video clip, providing a simple lesson for the interaction designers i.e. make your interaction device available to people of different heights! During the set-up of the kiosk and the preparations in the square, a large number of people came forward and started asking questions. Our prototype was built with the technology hidden so that it would

not “scare people off”. But surprisingly the computers, cables, and projectors, attracted attention and curiosity. We realized that in certain circumstances, particularly those that require interaction and engagement, making the underlying technology visible may be a method of attracting participants.

This finding goes against some common ideas in interaction design at the moment where the computer and the technology are supposed to “disappear”. We suggest that the presence/absence of technology should be carefully considered in each design, without pre-defined assumptions. Using a hi-tech technology prototype gave us the opportunity to observe how people engage with our idea in a `real life setting`. This understanding could not be achieved through paper or other low-tech prototypes.

In our post-event analysis we agreed that had time permitted we would have made a number of changes. For example, we would have increased the frequency and duration of the time exposure. That is, we would have had the kiosk out on the streets for a longer period of time e.g., a number of evenings in a row or consistently and repeatedly on a certain week day. That would have given us an iterative process of refining the concept, design and technology.

In the long term, it would be interesting to extend the concept by installing similar systems in other cities that have similar problems. This would enable people in different parts of the world to discuss these problems and provide a wider awareness of these important issues.

One can argue that the number of users involved in testing this prototype was insufficient. However, testing a prototype like this in a real setting is challenging. As, many things can go wrong e.g. poor weather conditions, power cuts (this is a common occurrence in the summer in Split), and the authorities might withhold permission for the use of the public space. It is also difficult to define how many citizens you have to involve in a test since all citizens are representative. The only solution to these matters would be to have more time for the testing, something we didn’t have.

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Paper D

Reflective practitioners in a reflective practice; co-operative design and delicate matters

Lindquist, S. & C. Bogdan. 2007. *Reflective practitioners in a reflective practice co-operative design and delicate matters.* [To be submitted to CHI2008]

Introduction

To do research in multi-disciplinary technology or systems development in participatory design tradition, often means triangulating different methods (ethnography, probes, interviews, observations, surveys, etc) to understand a specific field. These activities also mean triangulating participating researchers, as multi-disciplinary implies. Respective researchers will represent a scientific field along with its methods, as well as a personal focus and determination. All methods and people involved will bring different insights in, aspects of and perspectives on a field or a problem. That is why we believe that it is a successful approach.

To understand and create meaning with a context, we collect information about the users and other stakeholders, in order to make design decisions. The methods used can perhaps be traced back to the respective researchers scientific background. But how we perform them are perhaps due to other aspects of a researchers background or interest, that the scientific. So, how do we stage ourselves, how do we make our values, interests and skills clear to ourselves and to others in a project, and is that important?

Accordingly, sometimes methods used in multi-disciplinary cooperative design projects collect more or other data than required. So, what do you do with the insights you get from a field that is not addressing "ordinary" Human Computer Interaction, HCI, related topics? How do you deal with the fact that what you found is not part of your task and professional performance, but nevertheless are so important that you can't just leave it behind?

In one part of CoPland, a participatory design research project on communities of practice among nomadic teachers groups (Groth, Bogdan, Sandor, Lindquist, Räsänen & Sundblad 2006.), the analysed data showed severe work health problems on different level than for us to solve with new technology. The design process stopped, and we had to rethink what to do with this delicate information that the users have given us.

In this article there are two main topics we would like to address:
In multi-disciplinary groups, we triangulate use exploring methods to investigate the design space for making ultimate design decisions. But we don't investigate the researchers as participants, not as individuals - coming with their own backgrounds and perspectives, nor their project internal roles. (1) So, how can we know that design decisions are grounded on relevant data? Or rather, on what understanding and meaning is a design grounded? (2) What should be done with the "slag info" generated from these projects, the sometimes highly relevant data that might lead into another direction that technology development? I here refer to "slag" in its proper

sense, meaning useful waste, as in metallurgic processes such as production of iron the bi-product “slag” can be used in buildings or jewellery, for example.

The reasons for bringing theses questions up are mainly that the roles and backgrounds of the researchers within cooperative design projects are not explicitly defined, and when reporting on a project, there often seem to be a problem in giving a clear description on where and why a specific design was created.

Background

There are many names for system and technology development design processes where the user is in focus and user participation is the fundament. Participatory design (PD) as well as the Scandinavian tradition, Cooperative design, Collective Resource Approach and Critical Approach are different ways of dealing with “democracy and skill” (Bjerknes, Ehn & Kyng 1987:56) and user participation (Bansler 1989; Bjerknes, et al. 1987; Bjerknes & Bratteteig 1995; Bødker, Ehn, Sjögren, & Sundblad 2000; Suchman, Schuler & Namioka 1993). Today, they are all more or less known design approaches in HCI though it is difficult to single out clear definitions of the concepts (Suchman, et al.1993; Bødker, et al. 2000). Rather than to define the differences, a description of their common backgrounds and how they derived will be of greater help to communicate the ideas of the approaches. (Below, I will use the term cooperative design for either of the approaches, unless it is not important to notify of differences).

All theses approaches stem from an interest of bringing in the users (their skills and know-how, their needs and desires), as well as other stakeholders, into the design process, to make useful and meaningful design. Also, there was a power related issue, connected to a political agenda, to make a change in perspective from the traditional systems and technology development and a shift from being management oriented towards a user (read: worker) oriented process. “Historically the starting point for user participation in system development was the discussion about the relationship between work and democratic values in Scandinavia around 1960” (Bjerknes 1995:75). So, the Scandinavian tradition and the Cooperative design approach have arisen from a political stance. One fundament for its origin is the concepts developed in SIMULA in 1967. SIMULA was an object-orientated language, not developed as a programming language but as a mechanism to communicate complex systems to users in their own words (Nygaard 1990). This might be an explanation created in later times to make the story better. Nevertheless, inspired by this approach the work performed at Centre for Working Life (Arbetslivscentrum, Sweden), illustrated by the DEMOS (Democratic Planning and Control in Working Life On Computers, Industrial Democracy and Trade Unions) project, was one approach to develop the concept further (Ehn 1989). Another fundament for the project was that the co-determination laws were being enacted in Sweden. In the DEMOS project working groups were formed with local unions, and the academic researchers acted as resources. The starting point of the investigations was always from the workers' perspective. The method developed was called work-oriented action research. The democratization of the workplace was brought about by employee influence through unions and collaboration with management in some Scandinavian countries. Another project was The Norwegian Iron and Metal Workers Union (NJMF) project where the so-called ‘collective resource approach’ developed strategies for workers to influence design (Ehn & Kyng 1987). The Utopia project (Utbildning, Teknik och Produkt I

Arbetskvalitetsperspektiv) in 1981, the major achievements were the experience-based design methods, developed through the focus on hands-on experiences (Bødker et al., 1987, Ehn, 1988). The 1990s led to a number of projects including The AT project (where AT stands for Arbejdstilsynet, the Danish national labour inspection service) (Bødker, Christiansen, Ehn, Markussen, Mogensen, & Trigg 1993), and the EureCoop/EuroCode projects (Grønbæk, Kyng & Mogensen 1995).

In recent years, it has been a major challenge to PD to embrace the fact that much technology development no longer happens as design of isolated systems in well-defined communities of work (Beck, 2002). At the dawn of the 21st century, we use technology at work, at home, in school, and while on the move.

In the early 1980's the cooperative design projects focused on the skills of the worker and how these could be used as leverage to push computer system design more towards a user's perspective. An example of this was the UTOPIA project (Bødker, Ehn, Kammersgaard, Kyng, & Sundblad 1987). The researchers ran into several difficulties in trying to apply the tools and techniques of traditional systems development. Instead the project made use of low-tech prototypes, mock-ups and sketches, and borrowed techniques and methods from industrial design and invented new ones, to alleviate this problem.

In the early 1990's researchers called for cooperative design to strive towards involving users more fully in the design process (Greenbaum & Kyng 1991; Bødker et al. 2000). This meant full participation in the design process and not just nominal or symbolic representation in meetings or on committees. The assumption in cooperative design projects is that a joint understanding and solving of a problem is better than a more traditional hierarchic decision making structure grounded on expertise knowledge and values (Lantz, Räsänen & Forstorp 2005).

Many groups and projects throughout Scandinavia apply cooperative design research methods on a regular basis, and, hence, are part of the development and appropriation of the methods, as well as of disseminating the methods to industrial practice. Among the more prominent has been the Centre for User-oriented IT-Design, CID (competence centre, 1995-2005) at the Royal Institute of Technology, KTH in Stockholm. At CID, cooperative design was the core for all research, both in terms of finding new methods for bringing in the users into the design process but also in terms of collaborating across disciplines.

Multi facetted research groups and triangulation of methods

There are many different ways to go about doing cooperative design research and no approach can guarantee success. Little is actually known about design processes and about the tracing of design decisions, about the where, why, when and how ideas that lead to successful solutions, are generated (Davis & R Talbot 1987) Still, there is not much research about the design discourse (Krippendorff 2006).

Based on research and successful design projects, the cooperative design process includes work in multi-disciplinary research groups where respective researcher represents a scientific fields as well as a variety of methods. People with backgrounds in psychology, industrial design, graphical design, interaction design, art, engineering, programming, computer science, ethnography, anthropology or ergonomics take part

in all or different stages of the process. That multi-disciplinary representation is a means to get as many views on the researchable area as possible and to work with the best methods to define the design space, as shown in the Interliving project for exemple (Lindquist, Westerlund, Mackay & Sundblad 2006).

Triangulation in qualitative studies, where multiple sources of information yields clearer and deeper knowledge, can be of various sorts; theory, methodological, observer, data and interdisciplinary triangulation (Padgett 1998). In user centred design, using a variety of methods that brings a collection of data showing the users needs have proven to be a good approach, (Mackay & Fayard 1997). Also, the researchers with their respective backgrounds, along with methods used, are triangulated during a project in order to broaden the understanding of a field, its assets and drawbacks, and to open up the design space. Moreover, through the years, several cooperative design techniques have been adopted and developed. Some of the most prominent are scenarios, early prototyping/mock-ups, cooperative design workshops, contextual design and contextual inquiry, ethnographic field methods, probes, and informal interviews.

Through triangulation the problem/issue/context is approached from different angles with the aim that respective method used will give relevant data that verify (or falsify) respective finding or result. This approach in cooperative design gives a lot of qualitative data to draw conclusions and design ideas from (drawings, photos, diaries, notes, films, artefacts, etc.). The drawback is the big amount of data that is both vast and diverse, which makes the analysing process time consuming and somewhat complicated (Lindquist & Westerlund 2004).

The role of the researcher, the goal of a project

The role of the researcher in cooperative design in academia is not necessarily clear, or perhaps one should say not distinct and stable. Some cooperative design researchers claim they are doing design, others technology development or simply research. The actors' roles change with each project but also due to the phases of the research process. I am not talking about the administrative roles, like project manager, researcher or PhD student, roles that work as labels for different responsibilities, in planning and reporting for example. Rather, I am pointing at the internal roles and the individual goals, such as who is actually getting their way through a process, who's values are really at stake, and what that means within the design process.

There are many variables giving input to the ways one can view the roles and their relations; multi-disciplinary, development, technology and methodology research, improvement or explorative projects, design, research, etc. The roles also change according to who is looking at the actors, but also depending on the expected outcome of the project (Lantz, Räsänen & Forstorp 2005; Lindquist 2005). Even though there are research on the participant's roles in cooperative design projects and also research on how to define cooperative design, if it's design oriented research or research oriented design, (Fällman 2003), the perspective of looking at cooperative design processes "from-the-outside" is scarce. To my experience, there is not one cooperative design project where an external researcher, ethnographer or other, have been contacted to make a study on the cooperative design project itself, in order to inform the cooperative design research community. Often, cooperative design project reaches a point when questions like "how do we actually work" is raised. The

experiences told are usually then from an individual or a group of individuals who have been deeply involved in the very same process as they are reflecting upon (Lindquist 2006; Räsänen & Lindquist 2005). It means that the analysis of the project can be a matter of negotiating viewpoints, shortcomings and achievements, in accordance to relations within project team.

The Copland project

CoPLand, 2003-2006, is the project though which I will exemplify the issues raised above. Copland aimed to facilitate knowledge handling by means of novel design and usage of information technology within teacher communities affected to various degrees by a fragmentation of work processes due to e.g. physical distance, mobility, etc. This fragmentation, which we call *nomadicity* is regarded as an increasingly important aspect in relation to technology use. Partners in the project were KTH (through CID, the Centre for user-oriented IT Design, now part of the HCI Group within the School for Computer Science and Communication), Metamatrix Development and Consulting AB, and the Agency for School Development (MSU).

Three teachers groups were defined and ready to work within the project; Swedish teachers in universities all over the world, teachers distributed on different islands of the Stockholm archipelago and, most important for this article, teachers of native language, Modersmålslärare, here after referred to as MML, teaching pupils their origin tongue, at schools in Stockholm.

CoPLand was a multidisciplinary user-centred and participatory design project. The aim was to triangulate methods from all respective disciplines in order to get as much and as valid information as possible about the users' social and work context, as well as on inviting them to participate in the design of technology artefacts, as experts in their own work situation.

All in all, we were 6 participating researchers, representing computer science, interaction design, CSCW (computer supported collaborative work), ethnography and cultural studies. Each of us contributing with what our respective background offers of experience, method and theory. In different phases of the project, we could contribute with different things, all related to how much time we had in the project. Our respective professional commonly known backgrounds served as the knowledge base for what to do.

MML study

The first year of work with MML was dedicated to understanding the MML work from the angles of institutional organization, work specifics, especially how the presupposed nomadicity affects MML work, community and learning and finally, existing IT support for knowledge handling, evaluation and possibilities for further development.

Except for searching back ground information such as authorities' assignments on mother tongue teaching, two main methods were employed to investigate the work of MML-teachers; qualitative ethnographic field observations and a quantitative questionnaire. The methods were discussed upon in the research group and planned jointly. The field studies were performed by Cristian Bogdan, who has a background

in computer science as well as doing ethnographic studies in technology development research projects.

Ethnography assumes a long time presence of the researcher in the setting examined, and the writing of an account of what has been observed in the field. Here, the goal was to get insights into MML work situations, and then, perhaps with other methods, investigate some relevant issues further. An estimated total of nine working days were spent in the field by one of the researchers, and three semi-monthly meetings were observed. To strengthen the value of the data gathered in the field observations, the questionnaire was spread to 300 MML in Stockholm. 168 were returned. Details of these field observations, the questionnaire and the methodological issues associated are published in MML-report.

MML organisation

MML is a world-unique occupation. Sweden is among few countries in the world that provide it, almost certainly to the largest extent of language diversity and national coverage in the world. MML are generally employed by their municipality or directly by the schools. To be employed as an MML, you need to speak good Swedish, know the Swedish school system and have Swedish of foreign teacher education.

The aim for this service to all pupils at school that speak any foreign tongue, is to provide for a better integration into the Swedish society. One main thought is that if you have good knowledge of your own (and you parents) language and culture, you will find an easier way into the Swedish society. About 15% of all pupils in Stockholm are either born in another country, or their parents are.

MML are in general employed by the municipality or directly by the schools. The communities have specialized bodies, in Stockholm there is Språkcentrum (hereafter referred to as SPC), part of the of Stockholm's education department (Utbildningsförvaltningen), that is in charge for organizing this educational programme. MML in Stockholm seem to have a unique situation, as SPC gathers 400 teachers (280 permanent employees, others year-employed) in 60 languages teaching 14.100 pupils. SPC is self-financed by selling teacher-hours to the schools where parents request that their children should get such education, (Stockholm 2007-03-09). SPC takes care of MML competence development (including the area of IT). A conference for this purpose is organized during autumn vacation.

Development of teaching material is one of the SPC responsibilities, encouraging people to cooperate but not feel inferior if they don't. Material from respective countries is used where possible. For example, it is impossible to use heavily politicized material from Taliban Afghanistan or communist China. To ensure the creation and maintenance of WWW-accessible electronic material (Temaplats) the nation wide TMML (Tema modersmål) has a structure that encourages sharing and informing between teachers, for some of the MM (modersmål).

A MML typically goes to 3-10 schools each week, where they stay minimum 90 min, 17-19 hours a week in total. The rest of working hours up to 35 are dedicated to development, meetings, lecture preparation, etc. The time and travel costs to and between schools are not reimbursed. Teachers are supposed to be in continuous contact with the class leaders in respective school and with the parents.

Travelling all the time between schools, MML don't get to see their peers very often. In Stockholm there are semi-monthly meetings for teachers of the same language, or language group (smaller languages do not have their own group but a number of languages are coupled together). A quite important number of complementary activities are promoted within the language groups, be it generic, didactical or free time activities (health, sports, painting courses, etc) or language-group-specific (organized e.g. by embassies of the countries where the language is spoken).

MML gives several types of language lessons where mother tongue is the most common (70% in Stockholm). Children learn about their home language and culture. The lessons are held in the afternoon or late afternoon when many children are tired. Also the lessons compete with other after school activities, such as sports and music. The late hour also affects access to IT, as the person responsible for localities (vaktis) including computer rooms may have left the school by that time already.

MML also gives guidance to other subjects (studiehandledning, 30% in Stockholm). For children who recently arrived to Sweden and can't follow lessons in Swedish, the pupils will get the necessary explanations in the subjects. Teaching children with special needs follows the institutional structures of such teaching in Swedish (grundsär, yrkesträning, träningsklass, etc). This, of course, is the least common kind of teaching.

MM teaching is praised when talked in international comparison (e.g. Netherlands and Norway have cut funds), yet the resources seem to be going down. Both the decreasing budget and organizational as well as structural changes have affected the MML work.

Results from the study

In the report of the MML study, three conceptual fields were described to show the specifics and qualities of the teachers' work situation; adoption and creativity, outsiders/loneliness and lack of accountability and feedback. Within these fields there are both positive and negative aspects.

Adoption and creativity

Adoption and creativity goes hand in hand and might be seen together as the most important aspects of their work. Adoption and creativeness is part of everything that they do, something that makes their work work.

There are teaching plans created by SPC that are to be seen as help for the MML to plan their work. But the teachers have to adopt their teaching in respect to realities; the group of pupils that could vary in age and language level, to the respective schools and their work plan, to the classrooms and other facilities that are provided, or not, by respective school, and even to the specific circumstances of the day. They need to adopt their teaching material and methodology to respective pupil as well as to the groups of pupils.

To adopt they need to be creative and feel comfortable with improvising. Rooms might change in relation to ordinary schedule because of some special school activity. It often happens that the MML doesn't know that until they are standing outside the

ordinary room. Some pupils need to be fetched, either from school related activities or just because they forgot or they don't feel like going. The MM education is agreed upon between the parents and the school, but the education is not obligatory, as the ordinary school is. Also, teachers have to change material and teaching in accordance to the pupils showing up.

Teaching material they use is often dependant to their creativity. Usually they have both ordinary official schoolbooks, but just as often they use bits and pieces from other books and brochures they find on trips to their home country for example. Sometimes, their material is a playful combination of texts and items, like a toolbox for teaching.

Outsiders/loneliness

The MML are school related actors as teachers, but still considered outsiders. The pupils and their parents, sees them as part of the general school system. Organisation wise, they are part of the school system in that they educate pupils in the same localities as the children go to normally. Therefore, it happens that the planning is inconvenient for the MML that they have to go to the same school twice one day, and need to visit another school in between. As any other teacher, they are funded by tax money but through other organisational channels than the other teachers at school. Therefore, are they rather seen as a service that the schools pay for their pupils. However, MML are not part of the schools' planning of the term, nor are they informed about changes. Some changes are announced on the schools' websites, but usually they are not. More common is to announce changes on a notice board in the staffs' localities.

Both the fact of MML coming from outside, from another organisation, and them being of immigrant origin, with sometimes other social norms and customs towards their pupils, than what is given in Swedish schools, give emphasise to the role of the outsider. That, together with the nomadicity of their work, gives a feeling of loneliness, too. They work far from their peers, far from their employers and are much of the time on the move.

Though, the condition for their work, the nomadicity itself, gives them a feeling of not really belonging to any place or any organisation. There is not one workspace to go to where they can meet their colleagues and they may not have access to the same technical aids either.

MML also expresses good things about their solitary work. They can always plan their classes from their own head and experience, and they can develop their own teaching material. They feel in charge of the teaching situation. It is a creative work where the pupil's feedback and results are what counts'.

Accountability and feedback

On the other hand, the lack of accountability and feedback from other than the pupils is problematic. The MML know that the work as teachers give good results on an individual level for respective child. They also do, what the MML call, voluntary work, such as culture mediating and psychology counselling, for children living in bilingual/cultural marriages for example. Their work is supported from research about language learning, from the politicians in the government (Skolverket Publications,

2003), from the city, from the schools and the parents. However, that is seldom acknowledged. In fact, many express a feeling of being opposed and discriminated in their every day work.

Many of the MML are women over 50 and many find it hard to cope with the pace for this kind of work. That many MML find their work situation complex and complicated is shown in the figures of MML on medical leave. Notably, in one big language group there were severe health problems.

Analysing of data

The hours of observations and the quotes confirming the MML considered them selves doing a good and important job were numerous. Still, the feeling of being trapped in a confusing and frustrating situation where there is not one goal but many, not one employer or superior organizer, who define what to do and how, but many, not one workspace but many, is overwhelming. The MML reflection of not being able to affect political decisions concerning their work conditions enforced that feeling. Also, their important assignment that was somehow contradicted by the limited supportive activities and scarce accountability was devastating.

All this related to the high rate of people at medical leave along with other health issues, such as alarming suicide rates in one language group made us slow down in the design process and rethink the situation. We were all upset on behalf of the MML, agreeing upon that theses people and their problems had to be taken seriously. This group has almost never been seen in any research, so their problematic work situation has so far been invisible. And now, they had supported us in our research, given us input, told us stories, answered our questions.

This raised several issues that are interrelated. Firstly, what else could we do than to show this data respect and take some actions upon it? We are researchers in cooperative design, taking the users and the workers party, seeing to that the weakest group of all stakeholders in a technology development process get their voice heard. We believe that we, through our methods and research, can empower users and help improving their work environment. We strongly feel, as a group and probably as individuals, that when we find something that is entirely wrong, we should and must do something about it. But what can we do?

Secondly, this data didn't lead us any closer to any kind of technology development. It rather stopped the design process. We became aware that the MML work situation is a matter of political, organisational and power related aspects. We are not social scientist and we didn't get funding for doing research on organisation. We got funding for doing technology development and design. They might need technological tools for improving their daily work routines, like a mobile phone and a small lightweight laptop, all off-the-shelf technologies, paid by the SPC, but our insights into their situation gave other more important issues that had to be dealt with.

Discussion

So, going back to the questions I put in the introduction: (1) On what understanding and meaning is a design grounded and how do we know that the collected data is the 'right' data? and (2) What should be done with the "slag info" generated through our

triangulating of methods and people in these cooperative design projects? I will try to answer the questions below.

The process broke down and we didn't do any design. The reason for that was the overwhelming feeling of this important data that we, as technology developers couldn't do much about within the frames of a technology development project. The data somehow got in our way.

Why couldn't we see beyond our own underlying principle of equality and justice and just get down to doing design? Why didn't we change direction and use another method for gathering other data? Could it be that we haven't reflected enough about ourselves as researchers, we who often know very much the other party of a cooperative design process, namely the users? Could it be that we sometimes aren't sure what drives us in our research?

We relate to the cooperative design origin without thinking. The word cooperative, meaning jointly and together on equal terms, is a politically powerful concept striving towards equality. The cooperative design process has itself derived out of critical views on how design is conducted and how the users could be taken into account. In that respect, cooperative design has been *the* critical view, whereas values, power relations and gender for example, have been invisible and suppressed, deliberately or not.

The methods we used, the triangulation, gave us something else, or perhaps more, than we expected. Is there something wrong with our methods, or do we interpret data incorrectly? Or is it that we just haven't reflected upon the process and the methods and what they might bring us? The matter is complicated because both the gathering and the analysis of such qualitative material, as the MML data, is reflecting the researchers interests and goals, but we don't have any good tools to deliberately and straight forward, bring this into the design, even though that is what happens every time. Although certain researchers act as representatives for the scientific field and the methods used, a focus on the role of people, as instigators and active agents within systems, is often ignored.

So, the answer to the first question is that we don't know if the data is 'right' or relevant. But to get it more accurate, we should try to find methods to reflect it in ourselves as researchers with our goals and research agendas. Then, maybe, we can see why, as in this case, a design process brakes down, or why a certain design decisions are made.

So, what to do with the "slag info", that nutritious waste that comes along with the, in respect to technology development, useful data? There are many stakeholders in cooperative design research, for example the research team with responsibility to themselves to do design research, the funding committee who want the specific design and research delivered for the money they have spent, and the users in a specific context, who provide the process with their lived experiences. Theses groups of stakeholders aren't in the design process on equal terms. The researchers' ethical values need to be highlighted and discussed. To whom do we as cooperative design researchers have responsibilities? Where does our responsibilities end? To whom

should we report what? So, I don't know what to do with the "slag info", more that to start talking about it, even before it is found.

What I want to stress is that we need to be critical and sometimes examine ourselves in the design processes. We need to have a higher awareness of the methods used, not just to examine the expected success of a project, but just as well to highlight the shortcomings and difficulties, and to be aware of the "slag info" that might come along with the rest. Also important is that all participating individuals, not just the users are recognised as such. The reason for investigating any design process from a critical stance is that of awareness of design decisions and why they are made. I believe that cooperative design needs to be examined with its own methods to get a more thorough understanding of how, where and why design decisions are made, so that we can reach even further in doing design.

What happened then?
After joint discussions about what to do with this material, where we decided to take some actions and write papers about it and try to feed it into other research communities that the HCI community. Time and a joint understanding of our internal standpoints was what we needed. Then we continued our design process with a workshop with 12 MML. The workshop was based on our knowledge of their work situation, but with a focus on them as part of a larger organisation where schools, teachers, politicians, the Stockholm community, SPC, internet and intranet infrastructure, etc are present.

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Paper E

The researcher's role at stake –

The meeting between the objective researcher and the subjective individual.

Lindquist, S. 2005. *The researcher's role at stake – The meeting between the objective researcher and the subjective individual*. CID-307 Technical report CID/KTH, Stockholm: KTH. (Swedish short version: Forskarrollen sätts på prov-möte mellan den objektiva forskarrollen och den subjektiva människan i forskning om teknik, in Book of abstracts, Genuskonferensen Teori möter verklighet, Malmö 2005.)

Abstract

In this paper, written for a course in Human Computer Interaction about ethnography informing design, I will through the empirical material from a field study, share reflections on technology development research. Specifically, I will look upon the self-reflection the researcher has to make when entering the field. That in return rise questions about the more general issue of the gendered researcher's role in technology development research and in cooperative design.

This paper has two parallel tracks. First, how can observation field studies inform the design? Here, the study made the research team understand something about small craftsmen enterprises. Second, taking a phenomenological stance to the observation, the track is about the researchers own reflections upon her self, her fellow researchers and the situation as a whole.

The study didn't give any specific or narrowed down input to the technology development project, as planned. But instead, this particular observation study at this small family enterprise, show the problematic matters that is always part of field observations. Looking at it from a wider perspective it reflect issues in cooperative design and the researcher role.

Background

It is not very often that you do observations in a field that you do not know much about and where you do not know what to look for. Most of the time, you have a hunch of where you are heading and you have questions to the context you are about to meet. In research technology development projects the focus in field observations are usually quite clear. In short, either you observe how people use technology in order to improve it, or you look for obstacles in the field that could be eliminated with technology.

This field study I am about to tell you about was conducted within the technology development project Daphne. The aim of the study was to find design ideas.

Cooperative design project Daphne

The field study was conducted within a research technology development project, Daphne. It is a three-year multidisciplinary project with a wide scope of interest. "The vision of DAPHNE is that of integration of devices into a universe constructed of a

tapestry of different regions each offering different digital capabilities" (Daphne 2007-07-22).

The research objectives are:
- To develop new theories and concepts to understand how interaction can be supported across a wide range of physical settings each offering different levels of digital support.
- To generate new design and evaluation methods appropriate to these technologies based on a combination of approaches from cognitive science, social science, and art and design.
- To create new devices to establish new relationships between users, activities and devices across a broad set of physical environments.
- To develop new forms of adaptive infrastructure to support heterogeneous environments offering different levels of support and enabling different classes of device as they move between varied locales.

The project aimed to work in a cooperative design tradition. Here I will give you a brief background to cooperative design. The cooperative design approach has arisen from a democratic stance, namely to bring in the users, the target group, the stakeholders, into the process of development. One fundament for its origin is the concepts developed in SIMULA in 1967. SIMULA was an object-orientated language. Looking at it retrospectively, SIMULA was perhaps not developed as a programming language but as a mechanism to communicate complex systems to users in their own words (Nygaard, 1990). Inspired by this approach the work performed at Centre for Working Life (Arbetslivscentrum) in Sweden, illustrated by the DEMOS (Democratic Planning and Control in Working Life On Computers, Industrial Democracy and Trade Unions) project, was a one approach to develop the concept further (Ehn, 1989).

These projects were starting at about the same time that co-determination laws were being enacted in Sweden. The method was called *work-orientated action research,* and in the DEMOS project working groups were formed with local unions, and the academic researchers acted as resources. The starting point of the investigations was always from the workers' perspective.

The democratisation of the workplace was brought about by employee influence through unions and collaboration with management in some Scandinavian countries. In the early 1980s the cooperative design projects focused on the skills of the worker and how these could be used as leverage to push computer system design more towards a user's perspective. The theoretical starting point was Braverman's (1974) assertion that the act of dividing labour and deskilling workers is dehumanising. Thus, the issues of quality of work and workers skill were put at the foreground of the system design projects. An example of this was the UTOPIA project (Bødker et al 1987).

Today the cooperative design approach is much about bringing in different work skills into the design process. Much work is done in multidisciplinary teams with ethnographers, industrial and graphical designers, computer scientists, psychologists, sociologists, artists etc. in order to provide for that as many perspectives as possible is being covered, to define the design space and to bring in the best (for every user, occasion and context) method to inform the design (Gaver et al, 1999, Westerlund et al, 2003, Sundblad et al, 2004).

Field study preparations

The purpose for doing observational studies within the early stage of Daphne was to investigate which users to work with in which context. This identification of users and context was to fulfil some of the objectives of Daphne. The observations in this sense were open ended. But there were also the other underlying agenda of finding design ideas that could be fed right into the project. In a contradictory way, the observations were open-ended in terms of what to look for, but work related problems like logistics or communicational problems and technology was in focus.

The project decided to visit a work place that was noisy and dirty and that did not belong to the frequently studied work place areas in CSCW (Computer Supported Collaborative Work), like hospitals, offices etc. In order to generate as many design ideas as possible, we believed that the constraints in the physical context would be of help in defining and narrowing the design space. The choice of work place fell on a bakery that my work partner knew of, a family enterprise situated in Stockholm's near surroundings.

The study was conducted by two researchers; me the writer, with a disciplinary background in ethnology, and my fellow work partner D, with a background in industrial design. The decision of doing team based field studies derives form previous project work where we have found it unbeatable to share the same experience across disciplinary boundaries (Westerlund, Lindqvist & Sundblad. 2003, Sundblad (ed.) 2004).

In a pre-decided context, in this case the observation at the bakery, it is of utter importance that you reflect upon those matters to be able to understand what you observe and what relevance it has (Agar, 1980, Hammersely, 1995). We did not need to make any special preparations for this study in terms of clothing, language etc. But of course, one can not ignore the fact that before you enter a new situation, a new context (every context!?), you prepare yourself (Crabtree, 2003). You ask yourself on both a conscious and an unconscious level: What will I meet? How do I enter this field? Who am I? How will I be perceived and understood? You put yourself in relation to what you think you will see. And you act and behave in relation to that pre-understanding.

The bakery study

Below are the refined notes form the observation. I have kept them as complete as possible, to form a whole story, from which I can highlight some issues.

> It was a beautiful, though a bit chilly, Monday morning in the end of August. My work partner D and I met early, 7.45 a m at Stockholm Train Central to go to Hökarängen tube station and from there, walk to the bakery. We had to be that early because bakers start work very early in the morning, around 3 am. (That means that they stop work early too, at around 11 am.)
>
> D had got a hand drawn map from Nils, the bakery owner, of where the bakery was situated. We walked from the modern shopping center area into an older more quiet living area with blocks of flats. Most of the blocks had

business localities at the ground floors, some used for various enterprises, some seemed just to be closed down. Walking towards the address for the bakery, I really had no idea of what to expect. Was the bakery small or big? What do they bake? How do they bake? What people work there? Are bakers a certain kind?

We see the bakery through the fairly dirty big windows at ground level at the end of the street. The bakery occupies the whole bottom floor. One small airing-window is open and we can hear the noise from the work blended with the sound from a radio and the lovely smell of newly baked "whatever". We have to go round to the back of the house to enter the bakery.

The door to a hall like room is open and inside there is a man standing at some sort of counter, with his back towards the entrance. There are also three tall carriages with piles of baking sheets on them. D and I enter and the small room becomes crowded. D is saying that we should come and visit them today. From the rather confused looks upon the man's face, D continues with saying that he talked to Nils the other day and he said that it would be ok if we arrived at about eight or nine. The man, still a bit confused, says ok, welcome. Two small birds try to get into the bakery the same way we arrived. They picked some crumbs from the floor before the man shooed them away.

We enter the bakery from the small entrance room. The air is thick of lovely sweetness. You can almost taste it. There are four people working with baking, a small old man, a tall young man, the man from the entrance and a young woman. Nils hasn't arrived yet. He is out making deliveries, someone tells us. We stand quite close to the door. We don't know what we are looking for. The sound in the bakery is not very high. There is buzzing pulsing sound from the dough machine working in the back of the room, close to the windows. The tall young man is watching the dough and working with something at a fairly long and stable wooden working table. There are three other tables, one very long, stretching through the whole room. The legs of the table are made of metal and they look as if they can be changed in height. That doesn't seem to be done too often, though.

I feel just a little bit uncomfortable. I have the sense I am being in the way for their work. The girl starts talking to us as she is making cakes with fruit and jelly, on a table close to the entrance where we stand. She wonders where we are from, and I tell her what we are working at KTH (Royal Institute of Technology, Stockholm) and that we are working in a technology development project about human and computer interaction. She continues talking and tells us that she has worked here form November, and at her last workplace, a bakery in Sollentuna, they had computers to be able to print out marzipan with pictures on. She said that they always had problems with the scanner and the printer and the colors. "We don't have these kinds of problems here." She tells me that they do not even have a computer at this place. Not even a fax machine. Just telephones.

Among the first things the old man says, nodding to D, was,: "It is good when they are not too big. They are much easier to handle when they are smaller". He was referring to me. I can't remember in what context he said it. I think both D and I were a bit affected and surprised. I was just smiling

and D commented that he didn't thought it had to do with size. The whole thing just felt embarrassing.

The old man has put a sheet with some brown chocolate dough on and one sheet with grated coconut. He is talking to D and me. He says that it is strange that if you call the chocolate balls *negerbollar*, you will increase the sale. (Direct translation of *negerbollar* form Swedish to English is *negro balls*, a fairly old concept and I would guess not very politically correct even when it arouse.) The old man continues that this is so probably because someone reported a baker to the police for using that word. According to the girl, there was a person from Stockholm, who made a report to the police that a bakery in Sjöbo, a small community known for its anti-immigrant attitude, used the word *negerbollar* on a sign in the bakery window. Anyway, the selling of chocolate balls has increased it said in the paper. D comments that that is probably just in Sjöbo. And yes, everyone agrees. You can't call them *negerbollar* in Stockholm. The old man says that it is strange because they have always been called *negerbollar*. He thinks this fuzz is just rubbish. The girl agrees.

Some time later, the old man was working with a part of the dough that was ready in the dough machine. He was going to do twists and was preparing the dough in lumps. "A dough is like a woman. It makes resistance in the beginning". D comments, mostly to me, that "the jokes here are a bit old fashion". No one seemed to hear his comment.

I notice that there are a lot of naked ladies on the walls. There is a billboard with photos of nude Asian girls and some postcards. Of course, one post card looks like a cinnamon bun, but the rest are of more or less naked women. On one photo there is a small Asian woman or girl, hard to tell, sitting in a big western man's lap. I found it difficult to examine the pictures thoroughly.

There are at least five calendars on another wall. Only one seems to work as a calendar. That is the one closest to the "office", the calendar with dates on. The other ones is showing bikini-girls. The dates have expired a long time ago.

The "office" is a table overloaded with papers and telephones and other stuff. There is a calculator in a plastic bag and pens and notes everywhere. Lars, the man we first met in the entrance, is sitting at the office most of the time talking in the phone, sometimes to customers and sometimes the conversation seem to concern more private matters. All of a sudden, he could say:

"Ok Ida, (the girl) do you think you can make some *prinsesstårta* (princess cake)?".
Ida: "Is it urgent?"
Lars: "No"
Ida: "Ok!"

Then she starts working together with the young tall man. He is taking care of the other part of the big dough, the part that is not going to be twists. He is cutting them up in pieces and put them on a scale. He weigh them and then throw them onto the longest table in the middle of the room, where the old man grabs them, kneads them, rolls the pieces out, puts them on red

plastic plates with small bumps in, puts the plates, one by one, with the dough in a bun rolling machine for 10 seconds, takes the plates out and throw the buns onto another table. He does that with all the lumps until he almost had a whole table with buns. He rolls them long and then let them ferment under a big cloth.

Lars rolls them out and takes five rolled dough lumps at a time to the rolling machine and let the dough roll through thee times, if I remember correctly. The machines looks like a light metal mangle. Every time he lowers the cylindrical roller. The dough gets bigger and bigger and the thinner and thinner. He doesn't have to stop the machine when he grabs the dough. D and I are fascinated that the dough never seems to stick anywhere. Lars can hold five lumps at the same time and put them on top of each other and they never stick together. He puts the rolled dough onto the long table and puts different kinds of paste onto the dough and then Ida takes care of them and rolls them out them on trays. When a tray is full, five pieces on each, she takes a scissors and cut each piece in one cm slices but only half way through the roll. She bends the first slice backwards to the right, the second backwards to the left and the third backwards and in the middle. The last bit she bends under the flat bun. She presses the whole flat bun so the slices are a bit more as a whole. I can see that she has done this many times before. It strikes me that they are talking quite a lot to each other during their work, but almost never about work.

Every tray is put into the freezer until tomorrow morning. Then the fermentation takes place. Nils, the owner is arrived, and he shows us that they actually have a computer that is the freezer and that can be programmed for fermentation. There is a bit of dough over and Nils does cinnamon buns and puts them in another freezer, because the programmable freezer is full. I can tell that Nils have done quite a lot of buns in his days. He makes them real fast while he talks and laughs continuously to us and to the others.

Analysis

I see two interesting paths to walk through this very long story I have put forward here; the technology development path and the path that leads to me, the observer. The technology path was tread up for Daphne reasons. The other path comes from the strong feelings of prejudice and ignorance I was overwhelmed by and could not reject reflecting upon despite the preparations and my own experience. These paths are referring back to and heading towards the same information and understanding. This is an attempt to analyze the story with a phenomenological approach.

Phenomenology

Phenomenon means *to appear, to show*. With a phenomenology alignment, research starts off with the 'thing itself'. Edmund Husserl (1859-1938) meant that we can not capture a description of the real phenomenon, but merely the individuals experience of it. We all experience the world through the phenomenon, through the 'thing' as it shows. If we want to know anything, we will have to go back to the phenomenon. Husserl meant that you cannot put your own pre-understanding aside, that phenomenology is a theory about the conscious. (Stanford Encyclopaedia of Philosophy, 2007-07-22)

Maurice Merleau-Ponty (1908-1961) who has taken the phenomenology further, meant that to capture the phenomenon we must see beyond the understanding of the world as objective, and instead experience a 'lived world', He turned strongly against the Cartesian division of mind and body (Merleau-Ponty, 1997). There is no objective mind, no pure conscious, and no free *subject*. It is through the undividable body that we perceive the world. I will use the phenomenological viewpoint to investigate the meaning, the sense making, of what I experienced.

Reflection

To be reflexive is central in any research, or at least should be. In the meeting with the other (informant, research object) the researcher's self is there all the time (Ehn & Klein, 1994, Wolcott, 2001). Ehn and Klein shows through the anthropologist Bronislaw Malinowski's (1884-1942) own private diary from the Trobriands, how the researcher Malinowski differs from the person Malinowski. In his own diary he calls the informants "bloody niggers" while in his scientific writing he portray theirs lives impartial (Malinowski, 1967). He thinks like two different persons, the racist white man and the broad-minded researcher. In his personal diary, the two roles can meet and talk more freely about the things that in a scientific work would have been impossible. Today, the reflectiveness is part of the ethnographic scientific work. I think of reflexivity as the thinking of my own thinking, which is part of the creation of understanding, part of creating meaning (Babcock, 1980).

Body

There is a body's dilemma. We can think of the objective body, but that is merely the idea of the body. The body itself is not an object or a thing that is just there. Nor is it the subject, the free mind. The body is what we have to be in the world and perceive it. But I, my body, is also an object. I can think of myself and reflect upon what I believe is the world's understanding of me.

It is so easy to see the gendered body and make our understanding grounded upon that. According to our knowledge of what the sex is and to the connotations of female and male, we predict and understand a body. The sex (together with age, race etc) is what we use to divide and understand people. The visual aspects of the body very often it gets in front of the understanding of the individual.

The role of the researcher

Mostly based on my own experience, but also on studies within the field of technology research and specifically within cooperative design, the role of the gendered researcher is not discussed (Fritz, 1999, Berner, 2004, Ilstedt, 2004). Breaking down and/or visualise power relations is one of the supporting thoughts for cooperative design. Bringing in users in the design process, taking 'the little man's' party is fundamental. Somehow, gender issue is forgotten when it comes to investigating and understanding power relations in theses kinds of projects in a cooperative design tradition.

When it comes to the researchers role in cooperative design, there are no discussions about the ruling norm what so ever. The parole is that we are all equal, but some more than others! To me, this study rose both theoretical and methodological questions about the role of the researcher and reflection about gender. How do we perceive the

role of the researcher? What connotations is the role carrying with it in this field of technology research? How can researchers within this research field examine themselves from a gender perspective? How can we prepare not to be surprised by our own prejudice and pre-understanding?

Change of focus

"It is good when they are not too big. They are much easier to handle when they are smaller".

The first joke the old baker said nodding to my partner made me very aware of me being a woman and my partner being a man. Of course I know that, but that is not how I see us when we work. Of course, there are other more important qualities that we have and that I see in a work relation. My and my partner's bodies were in the way for the baker to understand us as researchers with bodies without gender. Perhaps he didn't know, perhaps he didn't care.

That joke was also the starting point for my change of focus, deliberately or not I don't know. I started to look at the bakers representing their sex and age. My eyes were drawn to the pictures on the bulletin board, the tiny Asian girl in the lap. I was aware that they had several calendars at which the dates had expired. They were only left on the walls for the pictures.

At later discussions with D, he told me he had not noticed the pictures on the bulletin board or that the dates of the calendars had expired. He had instead observed the technology they use, all the equipment the use for bookings and book-keeping etc. I don't know whether he was disturbed by the joke or not, but his observations were focused on work and technology. He noticed the things we were after, communication and technology.

Instead of just being the observer, I had, through the old mans comments, become the object for observation. I was transformed from a *researcher* in a technology development project into a *woman*. Suddenly I was not the working professional anymore, but merely myself. The two views clashed and I became aware, even at site, that I registered other things, other signs, than I had set my mind to do, and that also made me look the baker as just a dirty old man, rather than a skilled baker.

The language we use to conceptualize the world to make it understandable, also show how it reflects back on us (Barthes, 1997). In our bodies we incorporate the connotations that is related to concepts we are surrounded by. When I am going out on a site to do field work I will of course reflect upon who I am and what I might appear as in the eyes of the other. That is part of my job as a field-working ethnologist. But one connotation to *researcher* is sexless or a body without a sex. That is I how I conceive the concept and being a body without a sex is part of myself in the researching situation.

The old mans jokes, coming out of now where, took me by surprise. I was disturbed and also a bit offended perhaps. The jokes were addressed the two bodies with a sex and a gender, to my male work partner and to me. It made me realise that we seldom

talk about sex or gender issues at work, and we never discuss it in relation to our own research groups and cooperative design.

Prejudice
I felt I could be indulgent with the old man. Nevertheless, all his summed up comments made me very sensitive to certain traces in the bakery. I do not think I would have paid much attention to the story about the *negro balls*, if it hadn't been for the first sexist joke. The change of focus was not just from communication and technology to gender related aspects, but also towards the bakers as well as my own prejudice. The old man set the prejudice agenda and the others didn't really agree nor disagree with his jokes or comments.

And I was wondering what the baker girl thought of it? Did she care? Did any of the other bakers care? Who had put the pictures on the wall? Did all of them agree on letting them stay there? If so, is it just in my world that I find calendar girls on the wall a bit old fashion, belonging to a time of hard working men in male environments?

Ida had only been working in the bakery for about 6 months or so, she was the newest employee so she was not the one who had put the calendars on the wall. My own prejudice tells me that that it is something that men do, preferably older ignorant men.

Any results for the Daphne project?
So, could this bakery environment be helped with new "devices to establish new relationships between users, activities and devices" or with "new forms of adaptive infrastructure to support heterogeneous environments"?

The bakers' skill and their craftsmanship was most certainly the hub around which everything else in the bakery turned, the technology as well as the economy and logistics. Their skill is not just the making of pastry and bread but also knowing when to do things, how fast and how many. Their skill is also concerned with the fact that they know each other and have different positions within the team. The owner and his son were more concerned with economy and logistics, while the other three could concentrate on the baking.

Ida tells us that at her last workplace, a bakery in Sollentuna, they had computers to be able to print out marzipan with pictures on. She said that they always had problems with the scanner and the printer and the colors. "We don't have these kinds of problems here." She tells me that they do not even have a computer at this place. Not even a fax machine. Just telephones. I think that she means computers as in screen, keyboard and hard disc, because I can see the big oven with digital figures and buttons on and I suppose that it is computable. The bakery had a computerized baking oven and a combined computerized freezer and fermentation room. The computerization is for timing things, like when the freezer turns from freezing to fermenting, or timing the buns in the oven.

When we leave the place, I and D discusses on the way back that a small place like this is better off without technology like ICT and computers that will complicate the work. They use the telephone to communicate with each other and with costumers. They are such a small work place and all of them, except for the old baker, works

every day. Nils have had it for eight years and his son and the old man has worked together ever since. They all know what they all have to do and help each other with.

This environment doesn't need a lot of information help since the bakers know exactly what has to be done at all times. They don't have to negotiate every task. They just know because they have done this so many times, even if what has to be done shifts according to season and payment day. If they don't know what has to be done, they can just ask each other. The only time someone didn't knew what to do, like Ida when the telephone call came about the princess cakes, it had to do with planning. How urgent is something compared to something else? How they will do something is never negotiated.

D and I discusses it would be more interesting from a communication technology point of view to study a bigger bakery with about 20 employees and also a huge bakery industry. There is probably other staff at such places that takes care of orders and wages and so on.

Summary

I have been trying to describe two ways of looking at the empirical material gathered within the frames for the Daphne project. Through a phenomenological stance I have described how the observational study of a bakery, with the purpose of defining a design space, can change direction from work and technology to an observation on gender, body and the reflective self.

The researcher, the observer, is always making an entrance in to the context. The physical appearance, such as gender, ethnical heritage, height, weight, clothes etc, will always make a difference. It is through our bodies that we perceive the world and it is through our bodies that we present us to the world. What I perceived in my observation, my experience, is shaped of who I am and what I am at the moment for the study. I can just observe what my body can live. In return, the story of the observation will be yet another matter. That is the story of me the researcher, trying to observe the organization of work and labor, but ending up being unmasked as an offended woman.

This rose questions, rather than answers, about the researchers role in technology development research projects in general and in cooperative design particular. The male norm is so strong that it is not even discussed, even though we all know that there are differences in how we perceive the researcher depending on the sex. I was so sure in my role as a researcher that I had not reflected upon theses matters myself. I guess I am socialized into this world of plain researchers, without a gendered body, without a sex, that I could not do my work properly. It took a field observation to wake me up.

What about the results for the Daphne project? In fact, we couldn't use this study in a sufficient way. The supposition made about how the constraints in the physical environments (heat, cold, dirt, noise etc) would help us find an interesting design space for communication or information technology failed because of the nature of the work in such a small enterprise. To look at a bigger company with more people could have helped us, or to go really deep into the skill of baking, to see if there are

any technology that could help the bakers in their daily baking activities. But to find that out, that would take more than a just a one day of observation.

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