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# Methods That Matter in Digital Design Research

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Theories and analytical perspectives are linked to methods. The discussion of the methods used to capture the complexities of practices with a focus on social, cultural and economic layers (Jordan and Henderson 1994; Wagner 1994; Sjöberg 1996; Newman 1998) represents an important resource for a discussion of designers' interpretative work with both traditional and new experimental methods. In previous chapters we have described our collaborative and multidisciplinary perspectives that are also mirrored in the methods we use in the exploration of practices. These practices are technical, organizational, knowledge-based and socio-cultural. Our aim is to explore and maintain the complexity in design as a mix of all of these.

The chapter is structured in two parts; the first is processual and the second experimental. The first part starts with a discussion of what social science and humanities can contribute, followed by thoughts on reflexivity and methodological sensibility in digital design research. Then we move to a brief introduction of ethnographic analysis and its use in design research. Ethnography in participatory design (PD) and some aspects of participatory design are described, followed by concrete examples. New social media raise methodological challenges and also consideration of ethical aspects that appear in virtual or digital encounters. Further, technology or the digital becomes a more obvious actor as the site of the research or, rather, where to do the research is more ambiguous or unstable than in offline settings. Guiding principles for virtual or digital ethnography are presented and also discussed with practical examples in mobile communications and design experiments for digital engagement in museums.

Methods employed in digital design research do not differ from design research in general, but in addition to this there is a need to develop new experimental methods. In the second part of the chapter we describe a set of experiments concerned with the design of physical and tangible digital systems, emphasizing the development of new practices. These experiments illustrate the use of creative and experimental methods that are playful and engaging: among them cultural probes and technology probes, as well as performative techniques for designing interactive installations. Finally, the importance of creating a rich design space and of 'having a sense of somewhere to go' (Heape 2007: 5) is addressed.

## Reflexive Approaches to Digital Design

How can knowledge, theories and methods from social sciences and humanities be integrated and made to support digital design research? What ontological and epistemological frames from these disciplines can be involved in design discussions and design work? What role does a researcher of informatics and humanities take when s/he is designing the object s/he is studying? These questions touch upon issues that are reminiscent of current problems discussed in conventionalist directions of social science and humanities concerning analysis of social groups, social practices and the researchers' role in their research (Bauman 1993; Foucault 1973; Rorty 1994).

In design research literature, reflexivity is discussed in relation to interpretative skills and its important influences on design. Harold Nelson and Erik Stolterman state that, even in the most objective and truth-focused approaches in design, there is still a need for interpretation:

Interpretation, as a part of the design process, serves the same purpose as evidence and proof does in science. Interpretation is part of our attempt to grasp the conditions and context that exist and will set the stage for our ideas and new design. (Nelson and Stolterman 2003: 154)

Nelson and Stolterman continue their argument where they also underscore a difference between interpretation in research – and interpretation in design. Research has developed tools for studying and describing an existing reality – while in design these tools do not fully support the work of creating new realities. They write:

Design is intentional; therefore design interpretations are also intentional. It is intention that predisposes us towards certain data and values. This means that interpretation cannot be done without an understanding of a direction – without desiderata. (Nelson and Stolterman 2003: 156)

The concept of interpretation with a direction lends a special character to the interpretations, translations and communications in a design process (Stuedahl 2004) and research process as well. Implementing a reflexive methodology in digital design means, therefore, to be aware of the intentionality that lies behind interpretations and translations in addition to the theoretical and methodological aspects that legitimate the design. In relation to establishing a reflexive methodology in design, the intentionality, stated by Nelson and Stolterman, makes it clear that to be reflexive in design research, we need a strong theoretical framework that captures the object, the process, and the use of the object.

We would like to add another aspect of interpretation that is of crucial importance for the researchers' judgement and creativity during both their fieldwork and their design work. That is, to be able to use intuition, judgement, and to be able to communicate with the research subjects and objects requires a certain sensibility in order to perceive and to be open to the unexpected and to contradictions. Following Law (2004), we call this 'methodological sensibility' (see also Stuedahl 2004; Mörtberg and Stuedahl 2005). Methodological sensibility directs the attention towards what researchers are hearing, listening, seeing, and understanding during

their fieldwork or design work, as well as what they are defining as relevant empirical material when they are doing their research in the field. Sensibility may for example result in that the invisible work becomes visible (Star and Strauss 1999) and one pays attention to the not articulated work (Stuedahl 2004). Methodological sensibility therefore introduces a specific focus on the communication or interaction that researchers establish with the research subjects and objects. In combination with Alvesson and Sköldbberg's (2000) concepts of reflexive interpretation, this focus can be a good theoretical and methodological grounding for digital design research (see also the discussion of reflexivity in Chapter 1 in this volume).

It is necessary for researchers and designers to integrate diverse theoretical aspects in their creative work, to be able to reflect upon not only activities in the design process, but also upon the multiple intentions and interpretations that build the analytical lens of the research or design project. In addition, the communication processes between designers and users involved in the multidisciplinary team calls for methodological reflections on a general level. The need for a methodology that addresses reflexivity as reflections upon reflection, integration of theoretical backgrounds, methods in use, and issues of multidisciplinary collaboration, is clear. In the following subsection we discuss ethnographic analysis in design research, in PD and in virtual or digital encounters.

## From Ethnography in PD to Digital Ethnography

Ethnography's origin was in the travels of anthropologists to study ethnic cultures and claimed to produce 'true' descriptions of cultures and communities – in particular remote native ethnic tribes (Malinowski 1961 [1922]); Mead 1973 [1928]). Today ethnography includes studies of organizational lives and contemporary cultures, and aims to stimulate conversation and broaden multidisciplinary communities (Jordan 1997). A definition of ethnography that includes most ethnographic studies is that of Hammersley and Atkinson:

In its most characteristic form it involves the ethnographer participating, overtly or covertly in people's daily lives for an extended period of time, watching what happens, listening to what is said, asking questions – in fact, collecting whatever data are available to throw light on the issues that are the focus of the research. (Hammersley and Atkinsons 1995: 1).

Ethnography has a long tradition in design as a method for understanding work practices and technological artefacts in use (Suchman and Wynn 1984; Suchman 1987; Orr 1996; Luff and Heath 1998), or it is used in technology design in order to include user perspectives (Ehn 1989; Blomberg et al. 1993; Beyer and Holtzblatt 1998; Greenbaum and Kyng 1991). Ethnographic methods have also been used in analysis of organizations, with the intention of immersing the participant observer in the naturally occurring activities that are explored (Ruhleder and Jordan 1997).

When the aim of the ethnographic study is to inform designers, the ethnographers do the observations, the analysis, write the ethnographic account and inform designers about their analysis. In more collaborative projects the ethnographers

facilitate conversations with users rather than collecting data (Blomberg et al. 1993), or work together with the designers (Bjerknes et al. 1985). Being part of a design project has implications for the role of the ethnographer, and also for the goal of ethnography-based research. Ethnographic methods become both a means to facilitate communication and a vehicle for producing information relevant for the design of new products. Users, designers, and ethnographers explore a practice together, contribute from their knowledge and perspective, and try to create a common ground in order to enable the design. In this case, ethnography has the potential of providing a context in which mutual understanding can evolve. This makes ethnography a tool for making relations in participatory design projects and raising the dialogical dimension.

Work practice includes work-arounds (Gasser 1986) and a lot of ‘non-work’ necessary for doing the primary work. Articulation work (Strauss 1985, see also Chapter 3) is normally not talked about, and it is not considered ‘real work’. Nurses for example often complain that they have no time for ‘real nursing’, that is, spending time at the bedside. If, however, you consider articulation work as work, the administration and coordination necessary for giving care to each and all patients is very much a nursing skill – and should be considered ‘real nursing’ (Bjerknes and Bratteteig 1987a, c). Theoretical concepts can help in making sense of what is observed and also to provide a critical distance – and outsider perspective – to the practice (Gregory 2000). Analytical sensibility is also needed to obtain understandings of invisible knowledge and experiences in order to find ways to integrate and articulate this in technology design (Karasti 2001, 2003; Elovaara et al. 2006). Whether it is possible or not for outsiders to capture embodied and situated knowledge or more tacit aspects of knowing and learning is a demanding methodological question in studies of practices.

Ethnography has been taken up in a range of studies and disciplines and it is used not only for studies of the social or professional life of a community as a whole, but, also for more limited aspects. The ethnographic approach has been integrated in technology and digital communication design in a number of ways. This has resulted in discussions of what ethnography is or how the approach is used (e.g. Shapiro 1994; Plowman et al. 1995). The evolution of CSCW moved the focus from design of technologies for individual support to design of technologies that support teamwork and cooperation. The shift to cooperation also had consequences for how to conduct fieldwork and the necessity of understanding group work (Blomberg et al. 1993). Ethnographic analysis focuses, then, on interactions, artefacts, and how they unfold in day-to-day activities in work practices in their implications in design. The examination also results in broader understandings of how well or badly technologies fit with people’s everyday lives (Brown et al. 2007).

Hughes et al. (1994) discuss four ways in which ethnographic studies may inform design: concurrent, quick and dirty, evaluative, and re-assessment of previous studies. Concurrent ethnography is a reiteration of field work, discussion with the designers, construction of prototype, and additional field work. The iterations end when saturation appears in terms of what one gains by more fieldwork. The second category, quick and dirty, already implies that the analysis is fast and limited

in time, taking risks in quality, for example, for gaining a proper understanding of the practice. The quality can be achieved in short time periods of field work, however, if the research is well organized and limited (Harper 2000). Evaluative ethnography involves an evaluation of design that has already been completed. There are similarities between the quick and dirty way and this way of using ethnography. The latter is more focused because the target is given. Ethnographic analysis focuses on the details of activities and is very valuable in evaluation. Re-assessment of previous studies is the fourth way to use ethnographic analysis (Hughes et al. 1994). In this process, the researcher re-uses previous studies of the work practice in question. The studies are not necessarily conducted by designers but by researchers, for example working life researchers; sociologists or anthropologists. These studies are valuable in life-cycle perspectives and give possibilities of reassessment of the impact of technologies that are already in use.

The extensive use of ethnography use also has resulted in a critique of how it is used. For example, Forsythe (1999) criticizes the software designers' common sense use of ethnography. There are risks that researchers with an epistemological background in natural sciences treat ethnographic methods in the same way as the positivist techniques they normally use. Although the approach is used for data collection, they may not pay attention to the philosophical foundation of the conceptual structures that are deeply intertwined with ethnographic techniques. Forsythe (1999: 138) writes: 'The resultant "insider ethnography" takes local meanings at face value, overlooking tacit assumptions rather than questioning them'. Interdisciplinary collaboration between ethnographers, designers and users are possible ways to build bridges between disciplines and to cross boundaries between disciplines and various foundational starting-points.

Within CSCW research there is an ongoing debate on the relationship between ethnography and design. At its core is what Grudin and Grinter (1995) have coined 'the ethnographer's dilemma' and points at the potentially problematic nature of a design endeavor grounded in work practices that may not be all that solid and may even be merely transitory. In the following, we describe some aspects of participatory design, their implications for methods, and some concrete examples.

## Ethnographic Studies in Participatory Design

Ethnographic studies and analyses have a long tradition in Scandinavian information systems research communities, in particular within participatory design research. Ethnography has been used as a means to study work practices, i.e. the studies have constituted the foundation for the design. The first participatory design projects all had multidisciplinary research teams – the Florence project (1983–1987) for example employed a full time anthropologist researcher. Scandinavian research included ethnographic studies of work and use of computers in work, in the work place (Thoresen 1981, 1999; Bermann 1983; Bjerknes and Bratteteig 1984, 1987a; Bermann and Thoresen 1988) have made connections to North American research

of use practice studies (Wynn 1979; Suchman and Wynn 1984; Suchman 1987). A range of collaborative and discussion methods are employed in PD, together with observations, interviews and document analyses (e.g., Bjercknes and Bratteteig 1987c; Greenbaum and Kyng 1991; Bødker et al. 2004).

Mutual learning is important when different categories of people participate in the design process, and the learning typically deals with knowledge about the application area and the work that the future digital artefact or system is supposed to support, as well as technology itself and possible applications of new technology. Understanding a practice builds the body for recognizing people's skills, their logics, and their rationale in design projects. The more collaborative approaches of ethnography (Blomberg et al. 1993) have contributed to the mutual learning i.e. in developing an environment where both users and designers learn from each other.

Mutual learning involves learning in two ways, and the most widespread approach is to have designers do ethnographic fieldwork; basically observations and interviews, in the use setting. Normally, fieldwork involves studies of artefacts, and documents, organizational routines and structures and a lot of other elements in the use setting. The designers' ability to empathize with the users and recognize their expertise as well as their logic comes from experiencing the use practice as it unfolds when users do what they normally do. Knowledge about the use practice enables you to see and listen, but does not guarantee that you are willing to take the users' views seriously. There are still negotiations about whose knowledge counts; who has the preferential right to talk and interpret the situation.

Observation of practices is one method for starting the process of mutual learning. In the beginning, observations always give a very chaotic first impression (Bjercknes et al. 1985; Bjercknes and Bratteteig 1987a). It is difficult to 'see what you see': it is actually very difficult to notice actions and operations that you do not understand (Bratteteig 2004). Here is Tone Bratteteig's story from the Florence project that still has relevance:

I was observing nurses at the Cardiology ward disguised as a trainee in a white coat, with a notebook and pen. After the morning meeting, the nurses and doctors go for a morning round to see all the patients. The first time I was part of the morning round it made a strong impression on me, and I noticed how the professional communication varied when the doctors and nurses talked with the different patients and with each other. They sat down at each bed and showed that they cared and were open to talking with each of the patients – even if the round was quite quickly over. Later that day, one of the nurses explained about heart diseases and mentioned that an indicator of the heart not functioning well is that your ankles get swollen. On my next morning round I suddenly became aware of how the nurse lifted the blanket by the feet of a patient, and patted the feet when greeting him and asking him how he was doing that day. I could see that she observed his ankles and that what she saw affected how she talked with him. What I had considered to be a warm and personal greeting on my first round turned out to be a professional activity intended to add information to the evaluation of the patient. It was obvious to me that you need time to get enough knowledge about the use practices to appreciate it.

Doing observations may seem like an impossible task: what should you observe? Where should you start? A good way to start is by following a person around for

some time (e.g. a work shift), trying to get her/his perspective on the practices. Adding observations from following other people around – similar and different – will give you a richer picture of the work practices that make up the use setting. Other perspectives can also be used, e.g. being in a particular place (a particular room) or following a particular object (paper, medical journal, lab test, equipment, see Bratteteig 1997), or trying to get a sense of the social culture by mingling in the lunch room (Jordan 1997). Applying a particular perspective on the observations, e.g., information flow or cooperation, also represents a way of focusing your observations while being aware of what is not in focus (Bjerknes and Bratteteig 1987b). Interviews are necessary to get closer to the tacit knowledge involved in the professional practice.

Observations and interviews with nurses in work revealed that there are interesting differences between the formal routines and what the nurses actually do in order to get the work done (Bjerknes and Bratteteig 1987a) – a finding that can be confirmed by many other researchers (e.g. Suchman and Wynn 1984; Suchman 1987; Gregory 2000). Some routines are just very cumbersome, and everyday work practices include short cuts. A good example is that of rigid security procedures aimed at securing client data, but end up not being used because they take too much time and energy and mean that the terminals remain logged on and less secure than before (Kaasbøll et al. 1992). Social rules, like hierarchy, influence how people communicate and can create problems in situations where the more powerful have less knowledge than their subordinates (Bratteteig 2004).

The second – and most characteristic – part of mutual learning is the ambition to teach the users enough about the technological possibilities to enable them to imagine future design results. The challenge is a pedagogical one: to teach the users about technology while maintaining their professional basis for assessing that same technology (Bratteteig 2004). To teach someone something new and still want them to think for him/herself is difficult, but possible. However, it takes time. The process of teaching users about technology should not involve making them technologists – rather, the aim is to provide knowledge about technological possibilities and limitations. User's increased technological skills together with ethnographic analyses may contribute to extended understandings that have implications for the design and also in finding out how poorly or well the suggested system goes with people's day-to-day activities.

## **Prototyping as a Method to Involve Users**

Prototypes or presentations of possible design solutions are methods used in PD together with ethnographic studies. These methods may help to evaluate design suggestions and hopefully improve them. System presentations (Bjerg and Nielsen 1978) are presentations of systems and system models (e.g. prototypes Floyd 1984; Budde et al. 1992). We include excursions and demonstrations of systems in this method category. Excursions, typically, are visits to other similar organizations that



**Fig. 4.1** Mutual learning in the Florence project: system presentation (*left, middle*) and system description: wallgraphs (*right*) (Bratteteig 2004: 28)

use relevant information systems. The excursions aim at giving the users concrete knowledge about a variety of systems, and of a variety of use practices.

Specific system demonstrations – prototypes – are useful for getting ideas about concrete system solutions as well as for discussing technical possibilities. System presentations can be used to:

- Demonstrate alternative designs of the same application. We particularly recommend versions with errors and an unfinished appearance in order to demonstrate to the users that their knowledge is needed for designing a usable system, see Fig. 4.1.
- Give hands-on practice: to lend out new types of ICTs in the work place for a couple of weeks for the users to get hands-on experience with simple applications. Be aware that the users’ imagination will be heavily influenced by their technology experiences.
- Create discussions about computers in work: prototypes and pilot systems should be used as bases for discussions about how users would be using computers in work. Users’ critical evaluation of prototypes is valuable, especially for how their assessments are explained (Bjerknes and Bratteteig 1987a, b).

System description is a basic method in design of software when analysing and specifying a system. However, they can also be used for discussing computers in work at different organizational levels, engaging users and designers in discussing which aspect of work could use computer support (Bjerknes and Bratteteig 1987c; Munk-Madsen 1978). Systems design typically involves descriptions and drawings. Formal system descriptions encourage a particular perspective on the world (like information processing), which can also be used to juggle insider and outsider views on work and thus enabling professional and organizational views to be discussed. Figure 4.1 shows examples of ‘Wall graphs’ made by nurses, doctors and computer scientists depicting information processes in a hospital. With very simple means: slightly miniaturized copies of actual forms and different colour pens, information flows are drawn and discussed – the simplicity of the method also allows for ‘home-made’ symbols, like running feet (Bjerknes et al. 1985). Lively discussions about information, work and work organization add to the concrete discussions about the work toll from the prototyping sessions.

These discussions complete the mutual learning phase – the participants should have learnt enough to create visions for the future and negotiate which one to realize.

There are obvious problems concerned with determining when there is ‘enough knowledge’ – and sometimes you cannot tell that you do not know enough until you fail (Bratteteig 2004). This fact should be considered when planning the mutual learning process.

Ending the mutual learning process is the design decision – the problem setting and solving. This process can be carried out in many ways: like informal discussions with all involved or, more formally, as two parties making suggestions and negotiating the final result (Bjerknes and Bratteteig 1988a). The most difficult part of this process is to give the logic of the users the same power as the design logic, when deciding on the design. Normally designers have the power to decide – and the responsibility for their design result. Sharing the power to decide is therefore also sharing responsibility: neither giving away nor accepting power is not easy (Bratteteig 1997).

Design is the responsibility of the designers, as they have the technical know-how: they are responsible for the technical quality of the artefact – and without technical quality there is no use quality (Bjerknes et al. 1991). Technical quality of an information system, for example, is concerned with things like stability, reliability, durability, and maintainability; characteristics that are of limited interest to users in the moment of design. Giving away parts of the power to design means giving priority to aspects other than the technical, or even giving lower priority to technical aspects. The choice is professionally difficult, even if several of the technical issues mentioned depend on users’ commitment and knowledge: durability increases if the system is based on the stability afforded by professional knowledge; reliability depends on the users’ ability to operate and trust the system, as well as to maintain and use the information in the system. The decision to have the users decide on the design is not easy, but possible in a research project like the Florence project (Bjerknes and Bratteteig 1988a, b).

Ethnography in PD combines interviews, observations, document analysis, prototypes and other collaborative techniques in order to extend the views and to create rich pictures of the practices, people and artefacts, in and of the design process.

## **‘I, My Workplace and My Work’ – Carthographies**

Visions or intentions to give the users the right to participate in design decisions or the vision of participation on equal terms have also resulted in the development of collaborative methods and techniques (Bødker et al. 2004). We describe other examples in the following, with a particular focus on what we termed ‘the cartographic exercise’ (see also Fig. 4.1 where another kind of ‘cartography’ was used). The Swedish public sector is in transformation; something not unique to Sweden as similar changes are taking place in many other countries. Information technology is a means to transform the sector to an e-service society. The overall notion for the transformation process is e-government. Terms such as rationalization, efficiency, effectiveness, and e-services are entangled in dominating discourse. This discourse is, however, silent about the employees’ participation in the design of the e-service

society. One purpose in the research project *From Government to e-Government: gender, skills, learning and technology*<sup>1</sup> has been to explore how the skills and experiences of the employees can be integrated in, and provide valuable knowledge for, the design of the e-service society. Civil servants in four local authorities in the county of Blekinge in the south east of Sweden participated in the project. In the autumn of 2005, working groups of 2–3 people were established in each authority. The methods employed have been inspired by the use of ethnography in PD projects and its methods and techniques (see e.g. Bødker et al. 2004). We have, however, elaborated and adapted them to the particular context, setting and participants. Feminist technoscience (Haraway 1997) influenced our methodological considerations, and feminist pedagogy as well (hook 2000). A guiding principle has been not only to explore ‘what is’ but also ‘what could be’ (Madison 2005: 5). Three workshops were held between 2005 and 2007, with informal interviews in between.

Methods used were a cartographic exercise, scenarios, walking through with disposable cameras, in situ interviews, informal interviews (individual and group), and Digital Story telling. The aim was to create understandings of civil servants’ day-to-day work in order to give space to the employees, their agency, and participation in the design of Swedish e-service society (see also Chapter 9, Mörtberg and Elovaara 2010). The participants were not expected to do any preparation in advance. The researcher however made preparations: pleasurable work browsing magazines and catalogues, cutting a range of images representing persons and artefacts to be used in the mapping, going to the supermarket to buy pens, tape, post-it notes, scissors, woollen yarn, pens, crayons, white sheets, and other craft material – just simple and cheap materials. All the material was packed into two paper bags. A number of scenarios were also created in advance; illustrated in form of cartoons.

The cartographic exercise was used in the first workshop. We were welcomed with coffee and cakes, which created a positive atmosphere when we introduced ourselves to each other. Then the research project, its aim and the method were presented. ‘I, my workplace, and my work’ were the guidelines for the participant’s cartographic exercise. The exercise was a way for the participants to talk about their work at the same time as they created the maps. In-situ interviews were also conducted, depending on how the mapping unfolded; sometimes in order to clarify things, other times to complement their maps. The participants also included the most important relationship with their closest colleagues, other employees at the local authority, politicians, citizens, IT-systems, phones, faxes, wastebaskets, web pages and so forth. How the mapping unfolded is illustrated in Fig. 4.2: to the left we can see the blank white sheet without any images, in the next some subjects and objects are pasted on the sheet, and to the right, subjects, objects, and the relations (lines) between subjects and objects are included.

The scenarios were enacted as role-plays, where the researchers acted as citizens who made personal visits, phone calls, used e-mail, or web inquiries etc., in order to

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<sup>1</sup> Pirjo Elovaara and Christina Mörtberg conducted the research.



Fig. 4.2 Stages of the cartographic exercise

get in touch with the local authority. In addition to the map exercise, the participants walked through their offices with disposable cameras with the aim of being able to include additional illustrations, details and activities in their descriptions of their day.

The method worked well; it was collective and involved many hands (Haraway 1994). The maps consisted of, and were filled with, diffractive stories or cartographies with many layers. It also became apparent how the civil servants communicated with many people, both inside and outside the local authority, and how various technologies were used in that communication, such as telephone, sms, e-mails, fax, ordinary mail, and so forth. The maps also showed how the civil-servants intra-acted in material-discursive practices. Turnball (2007: 143) writes that '[t]elling a story and following a path are cognate activities, telling a story is ordering events and actions in space and time – it is a form of knowledge making'. Hence mapping is a way to produce knowledge where subjects, objects and connections emerge out of the enactment.

One resulting experience was that the make-up of the group mattered. The story-telling with the creation of maps was carried out together with the participants and the researchers. The interplay in the groups differed: some worked very well together and in other groups it went rather slowly because the people were more shy. The workshops, however, were full of joy and laughter when the participants conducted the mapping. Another experience was that it is only possible to capture partial or diffractive stories of a complex and varying business. Using a variety of methods and techniques, however, allows researchers to pay attention to various aspects of the day-to-day activities. The method was simple and the participants were familiar with the material, thus it was very easy to spark off their accounts. Topographic maps consist of elevations in order to visualize the landscape. The cartographies in combination with the recordings, the photos, scenarios and stories told in interviews and during the digital story-telling workshop, made the elevations figuratively visible. The cartographic workshop was only recorded aurally. In retrospect this seems strange, since the method of visualization was used but it was perhaps a consequence of an over dominant focus on simplicity.

Ethnography together with methods and techniques for participatory design have been used many times, in many other participatory-oriented projects. The *Sisom* project (see Chapter 2) also applied several of the participatory techniques in order to engage children in discussions about the design in question. Ethnographic

studies and participatory techniques have also been used as part of a large health information systems development project in developing countries (Puri et al. 2000; Elovaara et al. 2006).

## Digital Ethnography

Explorations of mobile communication and online communication, networking and community building are new application areas where digital or virtual ethnography is used. New social media and virtual ethnography ‘provide an opportunity for interrogating and understanding our methodological commitments’ (Hine 2005: 9). But how to interact with the subject in virtual settings and how do you conduct digital or virtual ethnography? Hine (2005) argues that new forms of communication also have methodological implications, but that it is important not to exaggerate the differences between the virtual and other settings. Further, virtual ethnography asks for adaptations that raises specific methodological issues. (Hine 2000). Hine uses the notion of ‘virtual’ in her discussion of ethnographic challenges of digital communication, above all related to the Internet. We use ‘digital’ to capture mixed reality and new ways of communication, social networking, and community building.

In virtual or digital ethnography, the Internet or new social media are explored in their use and (re)interpretation. New social media and their uses are not considered as potentially problematic, but as cultural artefacts and expressions that are integrated in people’s everyday lives. Another question relevant for virtual or digital ethnography is where to go to conduct the research. Hence, an obvious difference between online and face-to-face ethnography is where the researcher is located when s/he collects data. In offline sites s/he mostly collects data in the field, outside the office, but online ethnographers mostly collect their data in their offices, or in combination with both on- and offline data-gatherings (Rutter and Smith 2005). Even if the field site is taken account of, the virtual or digital is not separated from face-to-face or physical interactions but is interwoven with people’s day-to-day activities and how they unfold. While the body is always located somewhere, the site where the interaction takes place may be mobile rather than located in a particular place. This implies that neither culture nor community have to be located in one place – they are multi-locational. Consequently, location and boundary can be replaced with flow and connectivity as organizing principles for the field site. Nevertheless, virtual ethnography has to examine boundary-making and connectivity, particularly between the physical and the digital because they also are in the making, through and in the interaction and the exploration.

Both spatiality and temporality are dislocated in virtual settings or when social media are used. Digital interactions or social networking with the use of digital media are interspersed with other kinds of interactions. The research encounters take place in between other activities, whereby the immersion is irregularly achieved. Rutter and Smith (2005) argue, based on their experiences of online ethnography,

that immersion is also indispensable in an online setting. The ethnographer and the research subject/object 'have to find ways of immersing themselves in life as it is lived online, and as it connects through into offline social spheres' (Hine 2005: 18). Further, Hine (2000: 65) explains that a virtual ethnography can only be partial, and she argues that '[t]he notion of pre-existing, isolable and describable, locales and cultures are set aside'. It is true that the sites one explores do not always pre-exist, but the question is whether or not all ethnographic accounts are partial due to the fact that knowledge is not comprehensive but partial, local and situated (Haraway 1997).

Presence and absence are also methodological issues that one has to deal with in explorations of online communications or social media. Both the informant and the ethnographer are occasionally present in the virtual setting. An unstable setting is another issue, in that neither the researcher nor the informant can see when the other is online. In addition, new people enrol and some leave the community. On the other hand, this also happens in offline explorations, for example, in work places, some people leave and others begin. Communication and community building is enabled through digital media in the way ethnographers have to interact with the technology, and it is through the technology that the ethnographer and the research subjects meet, Hines (2000: 65) writes: 'The shaping of the ethnographic object as it is made possible by the available technologies *is* the ethnography. This is ethnography *in, of* and *through* the virtual.' This too, we argue, is part of the discursive material practices of performance of digital ethnography.

Trust and how to create trust between researchers and the research subjects is an issue that becomes obvious in virtual settings and digital media. Although it is important in all settings, the conditions differ when the encounters are online and not always face-to-face. When on- and offline encounters are combined, researchers may use similar techniques as in face-to-face interactions in order to create informed consent and trust. However, how researchers create trust in face-to-face interactions or offline settings does not always work in online settings (Sanders 2005). Hence it is still a challenge and something researchers have to deal with and to explain to those involved in the research. Sometimes the informants help the researchers in the process. Rutter and Smith (2005) examined sociability in newsgroups through both online and offline data collection. In their research, the face-to-face interaction resulted in some participants posting messages to tell other newsgroup members that the researchers were also trustworthy. Further methodological challenges will be elaborated in the later sections.

## **Mobile Communication, Methodological Implications and Ethical Aspects**

The mobile phone has become the possession of almost all, independently of where one is located. Mobiles are also used in areas without the electricity to charge the phones batteries. The extensive use of mobile phones has changed people's way of

communication. Research has reported how the mobile phone enabled and facilitated the coordination of day-to-day activities in families (Berg et al. 2005, Ling 2008). The coordination has mostly dealt with the immediate surroundings (sometimes on longer distances). Horst's (2006) ethnographic study focuses, however, on transnational settings and on long-term absence from parents or partners. Mobile phones have enabled Jamaican children and adults to facilitate and maintain their contact with parents, partners, and relatives outside Jamaica. In 2004, the number of mobile subscribers exceeded 2 million, out of a population of 2.6 million in Jamaica: an extensive improved access compared to the limited access to landlines (7.2% of the households) (Horst 2006). Horst describes the new situation as the blessings and burdens of communication. She also points to cultured practices; for example, to how the address book reflects practices of naming, sharing, hiding contacts a partner should not be aware of, and so forth.

Research has also reported how existing norms have been contested by the creation of new social practices among young people's use of mobiles in Japan (Ito and Okabe 2005); of young people's performances of gender and sexuality in mobile practices in Norway (Prøitz 2007); or how the mobile phone has become a social prosthetic (Berg et al. 2005). The last was an outcome of a research project on mobile services. The researchers<sup>2</sup> used participant observations, interviews and a web-based questionnaire. Interviews were carried out both in working lives (care assistants and middle managers in a social services department, property maintenance workers, and with designers of mobile services in Sweden) and private lives (people aged 25–70 years). The observations in the project actually followed the practice of lurking (listening to a person's mobile calls without the person's consent), because the informants were people in the researchers' immediate surroundings – located in public spaces, such as on buses, in shops, in restaurants, in the lounge at airports, and so forth. Most of the conversations were short private calls but some also dealt with business matters e.g. one person who, during approximately 15 min, made four calls to various people and, in the last one, stated that everything was in place so a contract should be faxed. The most common calls were, for instance, to inform relatives that the plane had just landed and s/he will be home within a certain time; to make appointments; or to get information about meetings.

The new communication practices and mobile technology also raise questions on how to study them. A re-reading of this project with Hine's principles for virtual ethnography shows that the boundaries between the public and the private were in the making, on one hand by the fact that people making telephone calls in public space involve others in their private lives, whether they want to be or not; they are not asked. The boundaries were, on the other hand, also created through the researcher's lurking, her listening and documentation of a person's calls. The physical body is entangled with the mobile phone, software and hardware, and the person s/he calls. If the actors do not make phone calls or do not answer the calls, the lurking

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<sup>2</sup>Elisabeth Berg, Maria Jansson and Christina Mörtberg.

or observations do not result in any data; the researcher has to find a new setting. Thus, the field site can be both temporary and unstable, despite the fact that mobile calls are conducted almost everywhere and in no particular room or space. Further, the partial became apparent because it was only part of the conversation the researcher was able to listen to.

Three researchers were involved in the research, but it was only one who was successful in the lurking. Two failed because they felt that to listen to others' calls created an awkward situation that offended the person, although the calls were conducted in public spaces and were impossible not to overhear. In any case, lurking raises a range of ethical questions (see also Rutter and Smith 2005; Sanders 2005): how public is talk that takes place in public spaces? How do you create trust in explorations of new social media? How do you create informed consent? Ethnography is emerging in virtual or digital settings with a range of methodological challenges. In the following we describe the use of blogs for design of digital engagement.

## Using Blogs for Digital Engagement

Digital media represents new spaces and virtual environments that invite us to study users' virtual activities with ethnographic observations. Virtual environments, such as blogs and wikis, can be used as tools in virtual ethnographies, but it poses several questions related to the information that is gathered and the type of empirical material that blog transcripts represent (Stuedahl and Smørdal 2010). This will be illustrated with an experiment conducted within the RENAME project.<sup>3</sup> Two different design settings were set up in order to explore youth's engagement in relation to cultural heritage (see also Chapters 2 and 9 in this volume). Mobile telephones were used in one setting and weblogs in the other. The experiment was set up in a real museum context, the Viking Ship museum in Oslo, in collaboration with a school class of 25 13-year-old pupils from a nearby school, familiar with the museum content. Nine mobile phones were given to the pupils so that they had to collaborate in groups of two and three during the visit. They were asked to take pictures and then to upload their pictures to a museum visitors' blog, accessible in an experimental mobile media centre in the museum. (see Fig. 4.3). The blog was set up on the project's website with a new blog entry for each group. In this way the group was made visible as a collective and could report and share their experiences from their visit.

The visitor's blog was temporary and accessible in a mobile media centre in a gallery; a quieter part of the museum. This, in a museum with no infrastructure for digital technologies, became a real design challenge. The aim of establishing design spaces in which inquiry could happen was based on the overall purpose of focusing

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<sup>3</sup>Dagny Stuedahl, Ine Fahle, Live Roaldset and Morten Vøyvik.

on engagement as activity in digital spaces (Heape 2007). The experiment had a particular focus on how the visitors created their own narratives in the activities through taking pictures and sharing the experience with others. Hence engagement was understood as activity in relation to the content and the artefacts presented in the museum. Museum research and interaction research related to museum design have so far paid little attention to engagement in terms of activity.



**Fig. 4.3** The school class of 13-year olds used mobile phones to collect interesting photos in the exhibition. In the media centre these photos was shared on a visitor blog

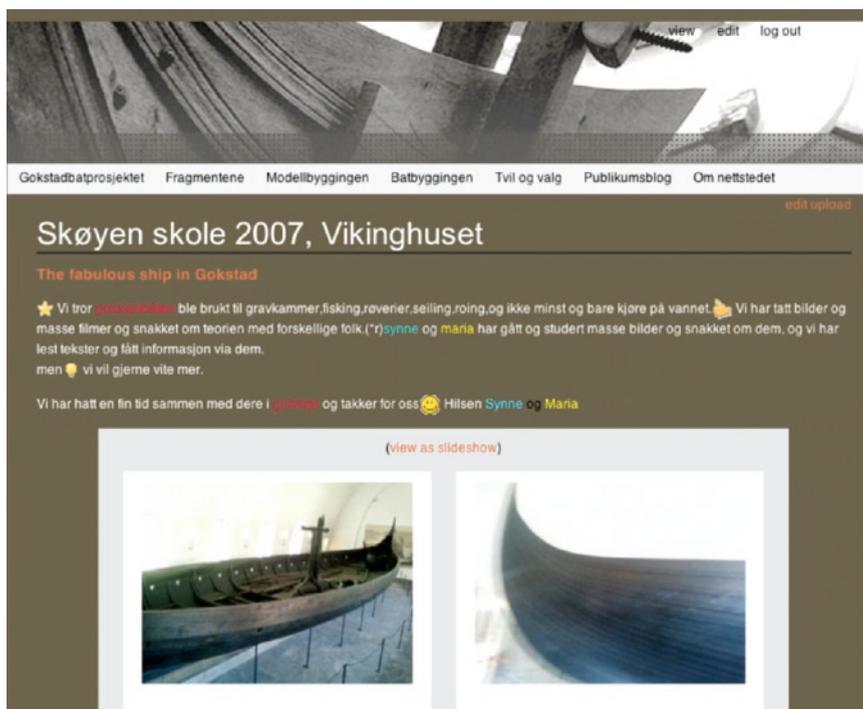
The design experiment was planned as a museum visit. An ethnologist opened it with a talk about his research into the reconstruction of Viking boats. The pupils were asked to use both the camera and the video on the mobile phones to collect clues and arguments related to one of the ships during their visit. They were also given two tasks to choose between. The latter gave them an opportunity to explore different levels of the existing exhibition in the museum. The pupils had 30 min to explore the museum’s permanent exhibitions, and collect clues, photos and video recordings related to the tasks. Then they went to the media centre and uploaded their recordings by making a blog entry and writing some comments related to the visual material.

The pupils had a day off from school, although their teacher joined them. The experiment was defined as leisure time by the teacher because it was not connected to planned learning activities in the class, but being with school mates instead of with friends might have had a bearing on the activities the pupils were asked to do in the museum.

The material the pupils collected consisted of mainly video recordings made up of small video documentaries of the museum exhibition. Video recordings were uploaded to the blog in the media centre with the use of Bluetooth – which in fact represented a major technical hindrance, since, with Bluetooth, this took a very long time.

One of the major methodical findings of the experiment was that too many activities in a design setup can make the empirical outcome chaotic and fragmented. The museum visit was planned to last for 2 hours and it included a talk, introduction of new mobile telephones, collection of pictures and recordings, uploading of the collected

material, and blogging. It seemed to be too tight. Also, the fact that the pupils had not made any preparations about reconstructions of Viking times in advance was a challenge for the outcome of their museum visit and their understanding of the message of cultural heritage built on interpretative work. The major outcome of the experiment was, therefore, not related to the technical limits of Bluetooth-uploading time, but to the limits of building a design set-up based on blog entries and camera photos without having enough time to conduct more than one iteration. The group was familiar with *Facebook* communication, as well as *MSN* communication, but blogging was a challenge, also to find out how to make blog entries on the visitor blog, as well as to find ways to publish the documentation they had made with the mobile telephones. Apart from these challenges, it seemed that the use of the mobile telephones as tools for exploring the museum exhibits was successful. This supports findings from other studies of museum communication with mobile telephones (Walker 2007) (Fig. 4.4).



**Fig. 4.4** The weblog communicates the museum visitors' engagement with specific artefacts and information exhibited

Limitations in terms of time had implications for how the weblogs were used as a source for the collection of virtual ethnographies. The pupils did not have enough time to concentrate on the articulation of their visits with the blog

entries. They probably communicated in a similar way with the blog entries to how they do with MSN, hence, with many visual tags, smiley's and use of colours but with little focus on the photos they had uploaded and with even less effort on the written text.

The design experiment with blog entries mirrored the digital competencies that the 13-year-old group possessed. It also gave an impression of the youth's engagement and motivation to explore the museum exhibits with the use of mobile telephones and social media. However, the experiment gave less information about the experience gained from the museum exhibit and the understanding of cultural heritage reconstruction and research. The example brought up questions related to the design set-up, the number of activities, and technologies or new social media. Along with methodological challenges in digital design, new experiential methods are also needed to envision the direction of digital design research.

## New Creative Experiential Methods

PD has always worked with users in imaginative ways. We can also observe how the interest in embodied interactions, tangible, personal and gestural interfaces, ambient media and the like, has spurred the use of creative and experimental approaches to design. Many of these methods have a playful component; engaging users and designers in joint explorations of the design space, and helping designers to better understand user needs. Techniques range from open-ended interventions in real life to envisioning change in a simulated environment. While some of the envisioning methods use high-tech representations of a design/context (e.g. Bardram et al. 2002), others work with simple mock-ups, with 'props' or miniature environments (e.g. a dolls house).

Some creative and experimental design projects make use of provocation as a method. An example (Lundberg et al. 2002) is the 'Snatcher-Catcher', a prototype of a refrigerator that keeps track of who took what and when (using a surveillance camera), with participants being invited to act as thieves and owners, in this way probing people's reactions to surveillance in situations of everyday life. Designers have used 'un-useless objects' or 'Placebo objects' (Dunne and Raby 2002) to elicit stories, both factual and imagined, about objects and places. Provocation as a technique, they argue, brings the otherwise hidden aspects of peoples' relationships to their environment to the fore; it provides inspirational material for designers to use in their work.

Connected to these techniques is the idea that ambiguity is an important resource for design, as it 'allows the designer's point of view to be expressed while enabling users of different sociocultural backgrounds to find their own interpretation' (Gaver et al. 2003: 233). Ambiguous situations may provoke participation in meaning-making. Ambiguity may reside in the object – a famous example is Marcel Duchamp's 'Fountain' (1917) which is a piece of art but also mass manufactured, ready-made, and an urinal; in the information – which may be blurred or frag-

mented; or in the personal relationship of the viewer with the piece – as in Van Lieshout's 'Love Carvan', where a simple container has been furnished with a functionally decadent, elegant interior, provoking reflection about conditions and standards of living, aesthetic values, etc. (Gaver et al. 2003).

Working with 'cultural probes' – carefully designed packages of postcards (with images and questions), maps (for identifying relevant places), disposable cameras with listed requests for pictures, photo albums (for a story in pictures), media diaries, and other material (Gaver et al. 1999) – is a method for provoking inspirational responses from large numbers of people. They make sense where the aim is to understand local cultures, bridge distance, identify diversity and differences. This method is inspired by the Situationists and the Fluxus movement who worked with the concept of psycho-geographical maps of cities as representations of the topology of people's longings, fears, isolation, sociality, etc.

Another group of creative design methods makes use of games, theatre, and performance as a means for stimulating participation and creating and performing 'scenarios of use'. The spectrum reaches from scripted plays/games to ad-hoc improvisation. Design games are widely used in urban planning, with miniature environments helping participants to understand the design of a place, identify problems, and talk about future developments. While some of these environments are pre-designed and 'realistic', others are more abstract, encouraging people to envision and act out their own ideas.

'Props' have an important role in these playful explorations. They not only represent design ideas, but also help evoke futures and serve as 'dream tools'. While abstract objects give space to imagination, expanding the solution space for a design, more concrete objects help focus and narrow down. 'Pivots' (Urnes et al. 2002), for example, are partly abstract, partly concrete material-symbolic representations of devices or contexts that allow participants to move between imagined and real worlds. Participants may have to imagine 'a day in their life', solving a particular problem with the help of a 'pivot' which may stand for a particular technical solution. In general, props stand for places, objects, themes (e.g. mobility), and roles; they may be used as part of a scripted play or of ad-hoc improvisations in users' environment, with users creating realistic and authentic scenarios (Jacucci and Kuutti 2002). Often, videos are produced as part of these explorations, with users enacting their ideas. This video material can in turn be used by participants to engage in different forms of interactive story-telling.

'Drama' and 'theatre' as design methods open up a wide range of possibilities of engaging participation in a context of digital design. They allow people to learn in an experiential way, involving all their senses and emotions. Alternative actions can be explored in a safe environment. Designers have a chance to develop empathy for situations, people, and cultural differences; and they benefit from people's expertise concerning their own environment. Design often involves strong narrative elements. Participants may use multimedia material – diagrammatic sketches, video clips, sound, etc. – for expressing their stories.

In the following, we describe some practical examples of using creative-experiential design methods as part of developing digital designs, discussing their potential.

## Working with Cultural Probes

Cultural probes are a widespread technique, but there are few discussions of the problems related to developing evocative probes on the one hand and analysing and translating them into meaningful interventions or design ideas on the other. Here are some examples of probes that students at Vienna University of Technology designed as part of their year project, in which they collaborate in small groups with the aim to research a topic and develop a design. The project involves a series of activities: setting up a design space and elaborating the theme; research – video observation and expert interviews; the use of creative design methods (e.g. cultural probes, drama and props, design games) with the aim of generating 2–3 design ideas; selection of a design idea and development and presentation of an interactive prototype with a tangible user interface. This is a complex learning situation. The students’ background is purely technical and this project is the first (and only) time when they are confronted with a participatory and creative design approach, which here is about ‘living with disabilities’.

This was the first time these students were confronted with this technique and the probes they designed were of varying quality and not all of them successful. What is interesting to see is that students quickly learned what was working and what was not. Through the probes that they returned (or failed to return), participants provided immediate feedback on what they thought of as being evocative.

One of the student groups<sup>4</sup> that had chosen people in wheelchairs for their design project produced a series of pictures of places that may be difficult to access, letting different people identify spots they thought of being hard to reach, and provide an explanation. For example the phone box in Fig. 4.5 (left) has been marked with six arrows. The yellow arrows point to the slot for inserting coins (too high),



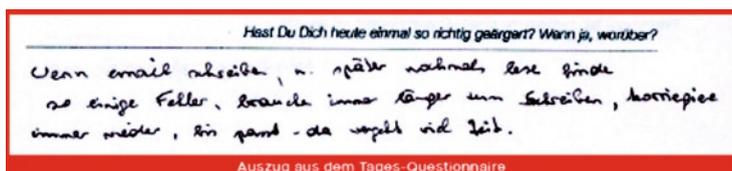
Fig. 4.5 Marking accessibility problems for people in wheelchairs

<sup>4</sup>Patrick Kastner, Helmut Chlebecsek, Clemens Czermak, Andreas Regner, Wolfgang Spreicer.

the position of the receiver (also too high); one the green arrows highlights a threshold (an obstacle for people in wheelchairs). In the picture to the right, showing a place in a supermarket for checking in film rolls, respondents have marked the table and computer screen, as well as the upper shelves, as too high and the whole construction with its pink drawers as difficult to access.

With these probes, students used people (mostly their friends) for increasing their own awareness of barriers in different urban places for people in wheelchairs. The probes proved very useful as they documented a series of concrete situations to pay attention to when creating design ideas.

Another group<sup>5</sup> had decided to work with non-hearing people. As, in their first naïve approach, the students thought of communication between non-hearing and the hearing as being ‘impeded’, they designed probes that required written input, such as a diary and a story. The students were disturbed to experience that non-hearing people may have considerable difficulty in expressing themselves in writing (see the returned probe Fig. 4.6). They learned that, up to very recently, BSL (the sign language) was not properly taught in Austrian schools to non-hearing people, and this made it very difficult to learn read and write in German (which from the point of view of non-hearing could be considered a second language).



**Fig. 4.6** Probe with question: ‘Do you remember having been really angry? Why was it so?’ – ‘When I write an email and read it later I usually find mistakes, writing always takes time, I correct until it fits, and this takes a lot of time’

The students also designed a small box that participants were supposed to fill with small relevant objects that told of events of their day (Fig. 4.7). The students cleverly introduced the constraints of box size and small opening so as to limit the input to ‘small, ideally foldable objects such as old theatre tickets or notes but also newspaper clippings or wrappings from sweets’. Also important was the impossibility of opening the box, having placed something in it. What they found in the boxes were, for example, an uncooked noodle (for what the person had been cooking), a used pen (reminding of the difficulties of non-hearing students to follow a university course), a turquoise ribbon (standing for the official recognition of BSL, but also for ‘deaf power’), and a print-out of an email informing the recipient that a particular course was being translated into sign language. The messages embedded in these boxes were very personal and did not necessarily lend themselves to a

<sup>5</sup> Florian Grashäfl, Bernhard Holzer, Albert Kavelar, Peter Smejkal, Criselda Tasico.

**Fig. 4.7** Small box with carefully designed constraints



straightforward analysis. They rather helped students establish a relationship with the people they worked with, sensitizing them to some aspects of their lives. The content of the boxes could not be turned directly into design materials.

## Technology Probes

The notion of ‘probes’ can be extended to simple objects or prototypes of a design, which are placed in person’s environment to find out about their habits, patterns of communication, and so forth: ‘A probe is an instrument that is deployed to find out about the unknown – to hopefully return with useful or interesting data’ (Hutchinson et al. 2003:18). The technology probes that were installed in people’s homes as part of the *Interliving Project* were supposed to be open-ended and co-adaptive, encouraging people to use them in unexpected ways. The technologies were also used to collect data about their own use. They were simple but functioning: a writable LCD tablet and pen placed in a high traffic area of the family home; a video probe and customized remote control for sharing impromptu images among family members.

Looking at first, rough implementations of a design idea as ‘probes’ is intriguing, as it helps developers focus on the concept rather than on a specific technical implementation. We (see Chapter 2) worked with this approach while developing mixed reality tools in support of participation in urban renewal (Maquil et al. 2007, 2008). Very early on in the project, we brought what we termed ‘technology probes’ to a psychiatric hospital in Paris to engage in first conversations with users – architects engaged in designing interventions, some hospital staff including two senior professors of psychiatry at the Sorbonne, as well as some additional urban planners – about our idea of collaborative envisioning.

We considered these ‘technology probes’ as design concepts rather than early prototypes, and our interest was in a conceptual discussion of issues around collaborative envisioning. We had at this stage developed a rough notion of a tangible user interface, consisting of a tabletop, on which colour objects could be placed, representing different kinds of content. We used a simple colour tracking mechanism and a barcode interface.



**Fig. 4.8** A probe of a tangible user interface and mixed-reality scene

Workshop participants quickly learned to create visual scenes, with a background image and virtual objects that can be manipulated (turned, sized up and down) by moving the colour objects with which they are associated. The functionalities we had provided were very limited and the resulting visual scenes crude (as compared with architects’ representational techniques, see Fig. 4.8) but they spurred participants, imagination and a lively debate about which way to go.

A major topic of this discussion was how to change perspective. Participants wanted to be able to see an object from different points of view, or to have the impression of moving around, to be able to turn the head and get another perspective. This discussion sparked the idea of building a rotating table and to experiment with a static and/or a video panorama. The positioning of objects was experienced as difficult. There was a lack of depth, and exact sizing and placement were near to impossible. The idea took shape to project the map of the area onto the table to facilitate the positioning of objects in the scene relative to each other. Controlling the size of virtual objects by combining several shapes also produced some problems. As the tracking system was not sufficiently precise, the virtual objects seemed to ‘jump’ because the ‘noise’ of tracking made them change their size.

Another issue connected to tracking was that users partly overlapped the shapes when touching them with their hands. This pointed to the need for a different design of the colour objects that would invite users to grasp them from the side instead of touching them from above. Another problem was that users were not able to recognize immediately which content the objects they were manipulating represented

and they sometimes disagreed about which colour was linked to what content (see Maquil et al. 2008).

These and other observations sparked a hectic phase of re-design. Our intuition had worked. Participants immediately captured the conceptual issues we were interested in and contributed to them. ‘Technology probes’ are sketchy implementations of concepts and it requires some imagination on the users’ part to understand the concept and how a fully developed mixed reality tool could help them in their work. Still, as others have also argued, the ‘hands-on’ experience within a real context supports this imagining and extending the possibilities of the probes.

## Setting Up a Design Space

Observations of design practice point to the importance, in particular at the beginning of a project, of mobilizing a wide array of resources that help designers to expand their problem and solution space. An essential part of creative-experimental design, therefore, consists in what we call ‘setting up a design space’ (Fig. 4.9). We have seen that the material-physical presence of these resources is supportive of designers ‘seeing things differently’.

When we enter an architectural studio, we will see that it is used as a design space. Most of the desks are covered with various artefacts: plans, sketches, notes, photographs, faxes, books, samples. On shelves are large collections of binders for each of the current projects; in the entrance area a collection of scale models is on display, and on the walls are 3D visualizations, sketches, photographs, and newspaper clippings from previous and current work. The walls close to the architects’ work-spaces, too, are used as an exhibition space and decorated with materials from current work. These materials do not only make work visible: they are reminders of ideas, design principles, ways of working, and so forth. Visitors are implicitly invited to



**Fig. 4.9** Design spaces: an architectural office (*left, middle*), experimental design course in Oslo (*right*)

look, ask and comment. Some of the material can be termed, ‘inspirational’. We know that designers take inspiration from many different aesthetic and scientific discourses – from the fine arts and the theatre to biology and mathematics. Some designers use pictorial material for generating and expressing their ideas, others prefer poetry, metaphorical text, music, ‘data’.

This can be illustrated using the example of an experimental design course at the University of Oslo, where the task was to create a tangible user interface in relation to skiing. The small group started with the creation of a design space in the studio. Low-tech prototype materials, like coloured sheets of paper, modelling clay, pencils, scissors, tapes etc., were provided. The participants were asked to bring an object (a probe) associated with skiing and a second one with no association to skiing. Furthermore, the participants collected images, created a story, and filled the design space with visual associations and texts in relation to skiing. The design material was pasted onto the wall in order to inspire the creation of ideas and suggestions. The material illustrated the participants’ experiences of skiing through the images of equipment needed for skiing, feeling for snow, what one carries along (food, chocolate to drink, sweets), pleasure and fun. The illustrations helped bringing small-talk and laughter about cross-country skiing as a Norwegian phenomenon to the multi-cultural group. The aim with the visual representations was also to stimulate ideas related to the theme instead of moving directly to solutions (see also Mörtberg and Stuedahl 2005).

A richly populated design space serves several purposes: it helps designers to break away from premature problem definitions and ready-made, conventional approaches – because design problems are not ‘given’, design work is about defining and framing problems rather than working with predefined solutions; it supports ‘openness’ – that decisions about possible design trajectories are not made too quickly and it requires that the different actors present their work in a form that is open to the possibility of change.

## Performative Development

The renewed interest in the body in design has introduced opportunities to include performance in design – and design as performance. The performative spans the spatial, the temporal and the enactive, and engages people’s bodies in the creation of the new. The performative aspects are found in both, process and result.

A number of methods for envisioning make use of performance as a means for multi-sensory and processual understanding and experience. Playing out a scenario for a new work situation, a new organization of work, or a new action gives both, designers and users, a ‘feeling for’ the envisioned result. In many experience design projects performance as a method is used to enact user experiences thereby making them better understandable to designers (e.g. Buchenau and Suri 2000). Drawing on knowledge about performance and theatre adds to the design of the design process with concepts of dramaturgy, choreography, and narration, in particular exploring the non-textual sides of the design.

Performance as part of the design result draws on knowledge about performativity to a much larger extent. As a design result, the performance is locally situated, it is ephemeral, unique, and personal as well as cultural, historical and social. A simple form of performance is a computer system where performance of bodily movements is the input (e.g. games like Wii Sports). The system can make for improved performance (Larssen, forthcoming). Staged performances engage the spectator bodily, allowing her/him to turn into a co-player (Sunderburg 2000). Interactive installations used to objectify, present, and discuss design projects are inherently different from the performance.

Performative events have an important role for the collective creativity of designers. We had the opportunity to observe this in another research project where we observed architectural students in their work and provided them at the start with rather simple technologies for animating their designs (barcode and sensors). One of the students – she participated in a semester project studying stadiums – presented her design ideas for an ‘extreme stadium’ (one of the design tasks), which she imagined in the heart of Vienna, occupying the area between Vienna’s Fine Arts and Natural History Museums (Jacucci et al. 2005). The student had prepared a football field and two slide shows, with one screen displaying cultural aspects of football (images, sound, video) and the second screen displaying her design ideas in the making. The slide show was operated through a sensor that had been fixed underneath the football field (Fig. 4.10). The presentation itself was designed as a football game, with the building sites being the teams – stadium versus museums – and the design ideas being the team-tactics, and herself as the referee, with a yellow card and a whistle signalling a ‘bad idea’ and a goal as a ‘good idea’. In the words of the performer, ‘it was the idea to have soccer-games or soccer tools like the ball, yellow card as sensor tools. Also the architectural project used soccer terminology instead of common architecture words’.

The performative arts engage the full bodily spectrum to create user experiences that involve all senses and – in particular – emotions in the user as spectator or co-



**Fig. 4.10** A miniature football field as an interface to guide the presentation

actor (e.g. Morrison et al. 2010). Games are designed to be used by co-actors, while theatre normally leaves the user as a spectator. Digital design has the option to design for a larger range of user roles, with a more complex mix of arts and utilities to create user experiences. The performative is a central strand in understanding and creating emerging aspects of digital design.

## Manipulate Media: A Workshop on Performative Development

One of the contexts that experimented with techniques from improvisation theatre for designing interactive installations was the CONVIVIO Workshop ‘Manipulate Media’, which was held in July 2005 at the Centre of Contemporary Art in Glasgow. ([www.convivionetwork.net](http://www.convivionetwork.net)).<sup>6</sup> The aims of this workshop, which attracted participants from systems design, web design, performative arts, and digital arts, were to:

- Experiment with applications of tangible interfaces to media production (e.g. participative media), media literacy and learning.
- Discover how selected practices and approaches from performance art may inspire interaction design.
- Explore a combination of (tangible) interaction design and media design (genres, formats, etc.).
- Observe and try out interactions with a mixed media installation in a public exhibition as a common base for discussion and reflection.
- Participate in the emergence of a new area: performative development of ubiquitous multimedia.

The workshop started with a demonstration of techniques from improvisation theatre. The idea was to show participants how to exploit the role of constraints that can be imposed (designed) within collective activities. Two actors (under the direction of Carlo Jacucci) improvised scenes working with different types of constraints:

- *Imposing Verbal Constraints* – e.g. limiting the number of words actors are allowed to utter.
- *Composing with Different (Conflicting) Wills or Tasks* – e.g. embodying a character in a scene and playing the ‘tale game’ at the same time.
- *De-Composing the Actor* – e.g. decomposing hands and body; decomposing bodies and voices.
- *Playing with Time* – e.g. repeating a scene within different timeframes.

The researchers prepared three installations, all set up within one large room. Each installation was used by two different groups during the practical sessions. In the first practical session, the task was to construct a narrative using one of the three

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<sup>6</sup>Carlo Jacucci, Giulio Jacucci, Thomas Psik, Ina Wagner, and Mira Wagner.

installations and working with two self-defined constraints (to physical action and time) and to present the narrative collaboratively. The task for the second practical session was to perform without speaking, and to find interesting new constraints.

*Cubes on Glass Surface:* This installation had been designed to support the editing and montage of digital material (Fig. 4.11). It allowed the composition of video clips using small cubes, the faces of which were covered with visual markers, which were detected by a camera placed underneath a glass table. Stills from video clips or drawings represented the content. The audio files were covered with white cardboard, because we were interested in the annotations the users would create to represent and remember a certain sound. This approach was not successful, because they found other ways of ordering the cubes without marking them.

The glass surface was relatively small so that only three cubes could be aligned joining each other. The space was divided into two areas: the upper rectangle was dedicated to recognizing video files, and the lower one for audio files. A separate marker was used to activate the reading of the installation. When playing the installation, the last image played always stayed as a projection, until a new arrangement was activated. The size of the gaps between the cubes represented time and could also be used as a compositional element. We decided to use segments of very different video clips and audio material for content.



Fig. 4.11 The cube installation

Participants soon realized that there were random time-space gaps between the activated images. The rhythm of their performance came from the engagement with the interface. Participants picked up cubes, positioned them telling a piece of a story, which was picked up by someone else. It turned out that the initial technical instability of the system enriched the story-telling process.

What we learned in particular from users' performances with this installation was how to come to terms with the physical limitations of the interface and what determines the rhythm of a performance – the role of physical action (picking up cubes) and of a technology-based time lag.

*Staging Experience:* The concept of the second installation was to experiment with the relationships between actor, space and action, using tagged figurative objects (Fig. 4.12). Participants could associate the props with video clips, stills, and sound.

One group selected a person who orchestrated the story-telling through words, images and sound, thereby setting a time constraint, giving structure and rhythm to

the group. Participants took turns in picking up a prop for creating their part of the story. The second group (which was not allowed to use words) used the props as puppets. They introduced them as shadow actors into the setting of the projected clips, skilfully merging the shadows with the images to transform the scene, or using the image as background in which smaller events could take place. In this way they could re-contextualize the content and create a space around the projections, making a stage in which the images became three-dimensional. The puppets represented the element of control, with which they tried to structure the randomly appearing images and sounds.

**Fig. 4.12** Story-telling using tagged objects



We found that the constraints forced participants to generate a grammar similar to that of improvisation theatre. The props had several functions – their digital content was used to trigger the installation and their physical form served to widen the space for interpretation.

*Space and Bodies:* The initial version of this installation was created for two users, and the space was associated with the metaphor of an elevator. Our scenario was that two people meet in a confined space, wearing/picking up optical markers, each of which is associated with a still image. The unfolding conversation is between these two people facing the wall, and cross-projected sets of images. The images (all but four taken from an advertisement) focused on facial expressions, small gestures, the light situation, props, and the space, the idea being that different combinations of images would lend themselves to differing interpretations.

The constraints in this example were the physical space (a square representing the elevator and the necessity to face the wall – the camera) as well as time and rhythm. The instability of images and difficulties in controlling their creation posed an additional, technology-based constraint.

This installation was used in completely unexpected ways (Fig. 4.13). Participants did not have the patience to relate to the images, so they found other ways of using

the tools to expand the possibilities of interaction. For example, one single performer plastered himself with markers and tried to create a specific rhythm by repeating a sequence of motions that would reveal the various markers to the camera. Two performers, each holding 2 or 3 markers, performed rhythmic movements in front of the camera, creating repetitions, delays, and intervals.



Fig. 4.13 Unexpected uses

In this case we decided to re-design the installation (Fig. 4.14). We split the images into thirds so that three markers are required to recreate a complete image. We also made size and format of the image parts dependent on the distance between camera and marker so that users' positions and their distance from each other directly influence the projected collages they create. Furthermore, we played with the time lag between the reading of the image and its projection so that it became possible to overlay two images in the same place. Playing with the time lag also resulted in a rhythmical use of image making along with the possibility of holding onto an image.

In this workshop we used performance as an approach to development, with the performative events generating new insights for participants. The steps are as follows: set up a (public) installation, invite people to perform with it; set constraints, change them, play with them; evaluate and re-design.

The performative uses of installations, such as the simple examples we prepared for the Manipulate Media workshop, reveal aspects of a design that would otherwise not become so evident. For example, we could observe:

- Actors collaboratively composing (in some cases using an 'orchestrator' or 'conductor').
- The use of props – e.g. for triggering action, playing media.
- The use of bodies – expressive gesturing, mimicking, dancing, synchronizing movement.
- The use of media – e.g. as background, as narrative element.

We also learned how to distribute and coordinate tasks, action and gestures and how people move in space collectively, in a compositional way.

An important element of this method is the borrowing of practical wisdom from improvisation theatre. Traditions of work in the performing arts are powerful means to learn about all aspects of life. But we cannot rely solely upon theories and conceptual accounts of those traditions. We need to learn from artists who have found their own personal ways of carrying forward an approach through practical attempts. This is why a special interest is in the personal style and wisdom which directors and actors have in their work. For example, we can devise collective authoring practices through editing, montage and assemblage in mixed media relying on the ways in which collective creation is carried out in the performing arts. Here we can look at this in particular from five specific angles: *creativity and constraints*, *contiguity*, *sensitivity*, *masks*, and *narratives*. By these consideration we found sources for *inspiration*, other than methods to train and devise practical designing work (Jacucci et al. 2005).

**Fig. 4.14** The re-designed installation



## ***Oikos* as Concept for Digital Environments**

Designing experiments for communicative digital environments may focus on the relations between several media, tangible or intangible interfaces, movements of the actors as well as narratives that, in a composition, accumulate in the communication with the user – and which, in the end, are part of the engagement and experience of the user. From a media point of view, the concept of a communicative environment involves several different types of media, all communicating with the user in different modalities that all give diverging experiences to the isolated user – but that give an additional experience to users in an assembly. The concept of mixed media only partly describes the experience and the role of the user in these digital environments, as it focuses on the media and less on the relation between mediating artefacts and the narratives involved. Further, important issues for the

building of narratives and of the experience of narrative, such as a narrator perspective and the narrator's identity, can quickly be translated into valuable issues of a complex design concept for the digital environment. This forms a challenge for a media-related perspective on communication design for digital environments.

In the search for a design concept that can integrate the assembly of influences in digital environments, as well as with a focus on the users' activities to communicate with this assembly, the Greek concept *oikos* is suitable. Aristotle used *oikos* to describe the state of being content with the things you build yourself, as the process is the goal. The political life in Aristotle's meaning was the dynamic in itself, between collections of parts that cannot exist without the other. *Oikos* has several translations and meanings, related to the belonging and familiarities that humans are born with. In this sense, it conceptualizes complex issues of relations, such as between a place and its social frameworks, between shared values, norms, goals and the experiences of these. Being the seed of the polis, *oikos* both describes the physical place of societal activities as well as it describes strategies and meanings related to this place. In this sense, *oikos* represents the opposite of public spaces, as it involves the community and the identities that are part of place. In feminist discourses, the concept has implied a focus on good functions combined with good care, as *oikos* also worked as protection of the Greek societal structure and family relations.

With this focus on place and the relation between parts, *oikos* seemed to be an interesting concept for a design experiment based on an ecological understanding of digital environments. In a design case related to designing narrative spaces in mixed media environments, the goal was to engage users in communication with diverging media and narrative forms. The design goal was to establish a concert between digital material, digital media, narratives and the activities of actors in exhibits. The leading concept of a digital environment was the notion of *oikos* as a place with both a specific ecology, with a diversity of materials and with a certain topography that is related to this. Using *oikos* as a design concept for the experiment placed attention on the diverging relations involved in communication, where both the spatial and the temporal were of major influence, as well as the actors' procedural activities.

The *oikos* helped realize a design space for the designers involved in the project, as well as it represented a narrative space and a place for engaging in activities related to the narratives. The concept opened up for possibilities of focusing on the relation between the different elements of the environment; the media, the content, the visual effects, the embodiments of the narratives, the types of activities invited for, as well as the visitors activities in the space.

In this installation, a large design studio was fitted with several exhibition boards, replicas, objects and other physical things well-known from exhibition contexts. The exhibition-prototype was organized in relation to the concept of *oikos*, where the digital media and the digital content were understood as a relationship between the visitor's engagement, activities and exploration of the exhibition space. The tangible media were supported by digital media communicating digital recordings of the project that were to be communicated in the exhibition.

The project was about the reconstruction of a Norwegian Viking boat, from the translations of archaeological fragments to building a model, and then to the building of the wooden boat in a full scale version. It was a goal in the design project to prevent the communication of the reconstruction process as a linear narrative, and to take as a starting point the stages of the reconstruction that were visible and tangible. The aim was to provide a link between the digital documentation of the reconstruction process, and the tangible outcome of the reconstruction – with the interactions of the visitor. The exhibition was structured with the use of four stands: (a) an introduction; (b) a station for telling the story about the fragments and the work of interpretation; (c) translation of archaeological fragments to building a model as an understanding of a boat, and; (d) building the wooden boat and sailing the reconstructed interpretation (Fig. 4.15).



**Fig. 4.15** Children exploring the digital environment of an exhibition

A class of 10-year-old pupils was invited to explore the exhibition in groups of two and three. Each group was given a mobile phone and had 1 hour to explore the exhibition. They had to register their mobile phones as users in the Bluetooth system in order to get access to the digital video clips and audio files that were uploaded on their mobile phones as they moved close to the stations. In addition, the children were encouraged to build their own version of the cardboard model, in that they could puzzle out part of the boat as a paper puzzle and attach it to an interactive

model. They were asked to document each station of activities and information, and send it to the social space— where their material was projected on a wall in the exhibition.<sup>7</sup>

Understanding the digital environment as a relational ecology between diverse digital media, diverse media as well as diverse narratives from audio and video to photo, as well as tangible replicas in cardboard and wood, is a design challenge. The challenges as may focus on these relations without any understandings of the variety of relations experienced by the user. This is especially the case where the relations that were built by ubiquitous technologies, in the Bluetooth-based system for nearfield downloads and uploads, offering a system for making relations between visitors, their mobile phones and a visitor WIKI on the project website – as well as a social space projected on a wall in the exhibition. The complexity challenged the concept of relation in the planning of the environment, and one tool for this was the concept of relevance drawn from the *oikos*. *Oikos*, understood as an environment, where function and care of the inhabitant’s activities, did, to a certain degree, guide the set up of the design space to make it ready for the users to explore. Still, it needs to be further explored in relation to the understanding of the narrative relations that are also essential for the experience and meaning making of participants in digital environments.

## Closing Comments

We have described a range of methods; some are familiar and have been used many times; others new, creative and experimental methods that open up for new opportunities but pose new challenges. We addressed ethnography and its relationship with design, as well as ethnography as part of PD pointing at new challenges posed by digital or virtual settings. New social media opens up for new ways of communication that also have methodological implications. We have discussed implications with Hine and her arguments that new technologies allow for de- and re-construction of commitments made in non-digital practices. Some of these examples of de- and re-constructions are, e.g. where to do the research, how to create trust in online interactions, how to create informed consent, ethical issues related to ‘lurking’ as a method, and also new demands related to the design set up. Digital design research will also benefit from the development of creative and experimental methods. We have provided examples of how to use cultural and technology probes, and the use of narrativity and performances as methods that

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<sup>7</sup>The exhibition experiment was based on a collaboration between the two research projects RENAME at Department of Media and Communication and ENCODE 01, InterMedia University of Oslo December 2007 and February 2008. An important part of the practical development of the exhibition space was offered by the staff at InterMedia Lab; Ole Smørdal, Live Roaldset, Idunn Sem, Jeremy Toussaint, Thomas Drevon, Per Christian Larsen, Knut Quale, Marcus Marsilius Gjems Theie as well as the master students Morten Vøyvik and Ine Fahle.

enable the creation of new design ideas and application areas but also produce new problems to be considered.

We started with a discussion about reflexivity, pointing out that reflexivity goes beyond understandings of how assumptions intersect in research. The extension from reflections to reflexivity was made to move away from the risk that almost the same story is told again depending on that the individual researcher turns back to her/his interpretation. Also with reflexivity there is a risk that it (a similar understanding) ‘only displaces the same elsewhere’ (Haraway 1997: 16). However, our analytical perspectives are multidisciplinary and most of the methods described in this chapter are collaborative and use multidisciplinary perspectives whereby it is possible first to juxtapose the different perspectives and then to compare. Multiple approaches may contribute to multiple understandings and views. The individual chapters in Part II may serve as additional discussions on this issue.

## References

- Alvesson M., & Sköldberg K. (2000). *Reflexive methodology: New vistas for qualitative research*. London: Sage.
- Bardram, J., Bossen, C., Lykke-Olesen, A., Nielsen, R., & Halskov-Madsen, K. (2002). Virtual video prototyping of pervasive healthcare systems. In B. Verplank, A. Sutcliffe, W. Mackay, J. Amowitz & W. Gaver (Eds.), *Proceedings of the 4th conference on Designing interactive systems: processes, practices, methods, and techniques (DIS '02)*, London, England (pp. 167–177). New York: ACM press.
- Bauman Z. (1993). *Postmodern ethics*. Oxford: Blackwell
- Berg, E., Mörberg, C., & Jansson, M. (2005) Emphasizing technology: Sociotechnical implications. *Information Technology and People*, 18(4), 343–358.
- Bermann, T. (1983): *Ansattes kunnskap og læring under innføring av EDB, med bibliotek som eksempel* (In Norwegian: Employees’ knowledge and learning when introducing EDP, exemplified with libraries). LOFIB Læringsorienterte forsøk i bibliotek Report series. Oslo: Work Research Institute.
- Bermann, T., & Thoresen, K. (1988). Can networks make an organization? In I. Greif (Ed.), *Proceedings of the 1988 ACM conference on Computer-supported cooperative work (CSCW '88)*, Portland, Oregon, United States (pp. 152–166). New York: ACM press.
- Beyer, H., & Holtzblatt, K. (1998). *Contextual design: Defining customer-centered designs*. San Francisco, Calif.: Morgan Kaufmann.
- Bjerg, L., & Nielsen, L. Verner (1978). *Edb-systemer inden for avisproduktion*. Master’s thesis. Århus: DAIMI, University of Århus.
- Bjerknes, G., & Bratteteig, T. (1984). The application perspective: An other way of conceiving edp-based systems and systems development. In M. Sääksjärvi (Ed), *Report of the seventh Scandinavian research seminar on systemeering* Helsinki School of Economics, Studies B-75 (pp. 204–225). Helsinki: Helsinki School of Economics.
- Bjerknes, G., & Bratteteig, T. (1987a). Florence in wonderland. System development with Nurses. In G. Bjerknes, P. Ehn, M. Kyng (Eds.), *Computers and democracy. A Scandinavian challenge* (pp. 279–296). Aldershot: Avebury.
- Bjerknes, G., & Bratteteig, T. (1987b). Perspectives on description tools and techniques in system development. In P. Docherty, K. Fuchs-Kittowski, P. Kolm & L. Mathiassen (Eds.), *System design for human development and productivity: Participation and beyond* (pp. 319–330). Amsterdam: North-Holland.
- Bjerknes, G., & Bratteteig, T. (1987c). *Å implementere en idé. Samarbeid og konstruksjon i Florence-prosjektet* (Florence report no 3). (In Norwegian: To implement an idea. Collaboration

- and construction in the Florence project). Oslo: Department of Informatics, University of Oslo.
- Bjerknes, G., & Bratteteig, T. (1988a). The memoirs of two survivors— or evaluation of a computer system for cooperative work. In I. Greif (Ed.), *Proceedings of the 1988 ACM conference on Computer-supported cooperative work (CSCW '88)*, Portland, Oregon, USA (pp. 167–177). New York: ACM press.
- Bjerknes, G., & Bratteteig, T. (1988b). Computers—utensils or epaulets? The application perspective revisited. *AI & Society*, 2(3), 258–266.
- Bjerknes, G., Bratteteig, T., & Espeseth, T. (1991). Evolution of finished computer systems: the dilemma of enhancement. *Scandinavian Journal of Information Systems* 3(1), 25–46.
- Bjerknes, G., Bratteteig, T., Kaasbøll, J., Sannes, I., & Sinding-Larsen, H. (1985). *Gjensidig læring* (Florence report no 1). Oslo: Department of Informatics, University of Oslo.
- Blomberg, J., Giacomi, J., Mosher, A., & Swenton-Wall, P. (1993). Ethnographic field methods and their relation to design. In D. Schuler and A. Namioka (Eds.), *Participatory design: Principles and practices* (pp.123–156). Hillsdale, NJ: Lawrence Erlbaum Assoc.
- Bratteteig, T. (1997). Mutual learning. Enabling cooperation in systems design. In K. Braa & E. Monteiro (Eds.), *Proceedings of IRIS'20*, Oslo: Department of Informatics, University of Oslo.
- Bratteteig, T. (2004). *Making change. Dealing with relations between design and use*. Diss. Oslo: Department of Informatics, Faculty of Mathematics and Natural Sciences, University of Oslo.
- Brown, B, Lundin, J., Rost, M., Lymer, G., & Holmquist, L-E. (2007). Seeing ethnographically: Teaching ethnography as part of CSCW. In L. Bannon, I. Wagner, C. Gutwin, R. Harper, and K. Schmidt (Eds.), *Proceedings of the 10th European Conference on Computer-Supported Cooperative Work (ECSCW'07)*, Limerick, Ireland (pp. 411–430). London: Springer.
- Buchenau, M., & Suri, J.F. (2000). Experience prototyping. In D. Boyarski & W. A. Kellogg (Eds.), *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques (DIS'00)*, New York City, New York, United States (pp. 424–433). New York: ACM press.
- Budde, R., Kautz, K., Kuhlenkamp, K., & Züllighoven, H. (1992). *Prototyping: An approach to evolutionary systems development*. Berlin: Springer.
- Bødker, K., Kensing, F., & Simonsen, J. (2004). *Participatory IT Design. Designing for Business and Workplace Realities*. Cambridge, Massachusetts, London, England: MIT Press.
- Dunne, A., & Raby, F. (2002). The placebo project. In B. Verplank, A. Sutcliffe, W. Mackay, J. Amowitz & W. Gaver (Eds.), *Proceedings of the 4th conference on Designing interactive systems: processes, practices, methods, and techniques (DIS '02)*, London, England (pp. 9–12). New York: ACM press.
- Ehn, P. (1989). *Work-oriented design of computer artifacts*. Hillsdale, N. J.: Lawrence Erlbaum Associates.
- Elovaara, P., Iqira, F., & Mörtberg, C. (2006). Whose Participation? Whose Knowledge? – Exploring PD in Tanzania-Zanzibar and Sweden. In I. Wagner, J. Blomberg, G. Jacucci & F. Kensing (Eds.), *Proceedings of the ninth conference on Participatory design: Expanding boundaries in design - Volume 1*, Trento, Italy (pp. 105–114). New York: ACM Press.
- Floyd, C. (1984). A systematic look at prototyping. In R. Budde, K. Kuhlenkamp, L. Mathiassen & H. Züllighoven (Eds.), *Approaches to prototyping* (pp. 1–18). Berlin: Springer.
- Forsythe, D. E. (1999). ‘It’s just a matter of common sense’: Ethnography as invisible work. *Computer Supported Collaborative Work*, 8(1–2), 127–145.
- Foucault M. (1973). *The birth of the clinic: An archaeology of medical perception*. [Original 1963]. London: Tavistock Publications, Ltd.
- Gasser, L. (1986). The integration of computing and routine work. *ACM Transactions on Office Information*, 4(3), 205–225.
- Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: cultural probes. *Interactions*, 6(1), 21–29.

- Gaver, W. W., Beaver, J., & Benford, S. (2003). Ambiguity as a resource for design. In G. Cockton & P. Korhonen (Eds.), *Proceedings of the SIGCHI conference on Human factors in computing systems (CHI '03)*, Ft. Lauderdale, Florida, USA (pp. 233–240). New York: ACM press.
- Greenbaum, J., & Kyng, M. (Eds.). (1991). *Design at work: Cooperative design of computer systems*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Gregory, J. (2000). *Sorcerer's Apprentice: Creating the Electronic Health Record, Re-inventing Medical Records and Patient Care*. Diss. San Diego: Department of Communication, University of California-San Diego.
- Grudin, J., & Grinter, R. E. (1995). Ethnography and design, *Computer Supported Cooperative Work*, 3(1), 55–59.
- Hammersley, M., & Atkinson, P. (1995). *Ethnography: Principles in practice*. London: Routledge.
- Haraway, D. J. (1994). A game of cat's cradle: science studies, feminist theory, cultural studies. *Configurations*, 2(1), 59–71.
- Haraway, D. J. (1997). *Modest\_witness@second\_millennium. Female man©\_meets\_oncomouse™: Feminism and technoscience*. New York and London: Routledge.
- Harper, R. H. R. (2000). The organisation in ethnography: a discussion of ethnographic fieldwork programs in CSCW. *Computer Supported Cooperative Work*, 9(2), 239–264.
- Heape, C. R. A. (2007) *The Design Space: the design process as the construction, exploration and expansion of a conceptual space*. Diss. Sønderborg: Mads Clausen Institute Syddansk Universitet.
- Hine, C. (2000). *Virtual ethnography*. London, Thousand Oaks, New Delhi: SAGE Publications.
- Hine, C. (Ed.). (2005). *Virtual methods issues in social research on the Internet*. Oxford, New York: BERG.
- hook, b. (2000). *Feminism is for everybody: Passionate politics*. Cambridge MA: South End Press.
- Horst, H. (2006). The blessing and burdens of communication: cell phones in Jamaican transnational social fields. *Global Networks* 6(2), 143–159.
- Hughes, J., King, V., Rodden, T., & Andersen, H. (1994). Moving out of the control Room: ethnography in system design. In J. B. Smith, F. D. Smith & T. W. Malone (Eds.), *Proceedings of the 1994 ACM conference on Computer supported cooperative work (CSCW '94)*, Chapel Hill, North Carolina, United States. (pp. 429–439). New York: ACM press.
- Hutchinson, H., Mackay, W., Westerlund, B., Benderson, B. B., Druin, A., Plaisant, C., et al. (2003). Technology probes: inspiring design for and with families. In G. Cockton & P. Korhonen (Eds.), *Proceedings of the SIGCHI conference on Human factors in computing systems (CHI '03)*, Ft. Lauderdale, Florida, USA (pp. 17–24). New York: ACM press.
- Ito, Mizuko and Okabe, D Daisuke (2005). Technosocial situations: Emergent structuring of mobile e-mail use. In M. Ito, D. Okabe & M. Matsude (Eds.), *Personal, Portable, Pedestrian: Mobile Phones in Japanese Life* (pp. 257–273). Cambridge, MA: MIT Press.
- Jacucci, C., Jacucci, G., Wagner, I., & Psik, T. (2005). A manifesto for the performative development of ubiquitous media. In O. W. Bertelsen, N. O. Bouvin, P. G. Krogh & M. Kyng (Eds.), *Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility*, Aarhus, Denmark (pp. 19–28). New York: ACM Press.
- Jacucci G., & Kuutti, K. (2002). Everyday life as a stage in creating and performing scenarios for wireless devices. *Personal and Ubiquitous Computing*, 6(4), 299–306.
- Jacucci, G., & Wagner, I. (2005). Performative uses of space in mixed media environments. In Davenport, E., & Turner P. (Eds.), *Spaces, spatiality and technologies* (pp. 191–216). London: Springer.
- Jordan, B. (1997). Transforming ethnography: reinventing research. *CAM, Cultural Anthropology Methods Journal*, 9(3), 12–17.
- Jordan, B., & Henderson, K. (1994). Interaction analysis: foundations and practice. *The Journal of the Learning Sciences* 4(1), 39–103.
- Karasti H. (2001). *Increasing sensitivity towards everyday work practice in systems design*. Diss. Oulu: The Faculty of Science.
- Karasti H. (2003). Can film developers be(come) technology developers? Reflections on gendered expertise and participation in system design. In C. Mörtberg, P. Elovaara, & A. Lundgren

- (Eds.), *How do we make a difference: information technology, transnational democracy and gender* (pp. 29–49). Luleå: Printing Office Luleå University of Technology.
- Kaasbøll, J., Braa, K., & Bratteteig, T. (1992). User problems concerning functional integration in thirteen organizations. In Avison, Kendall & DeGross (Eds.), *Human, Organizational, and Social Dimensions of Information Systems Development, Proceedings of the IFIP WG 8.2 Working Conference*, Noordwijkerhout (pp 61–81). Amsterdam: North-Holland.
- Larssen, A.T. (forthcoming). 'How it feels, not just how it looks': Kinaesthetic experience as an experiential quality for technology design and the study of technology use. Diss. Sydney, Australia: Department of Computer Systems, Faculty of Information Technology.
- Law, J. (2004). *After method: Mess in social science research*. London, New York: Routledge.
- Ling, R. (2008). *New tech, new ties: how mobile communication is reshaping social cohesion*. Cambridge, Mass.: MIT Press.
- Luff, P., & Heath, C. (1998). Mobility in collaboration. In S. Poltrock & J. Grudin (Eds.), *Proceedings of the Conference on Computer-Supported Cooperative Work (CSCW '98)*, Seattle, WA (pp. 305–314). New York: ACM Press.
- Lundberg, J., Ibrahim, A., Jönsson, D., Lindquist, S., & Qvarfordt, P. (2002). 'The snatcher catcher': an interactive refrigerator. In O. W. Bertelsen (Ed.), *Proceedings of the second Nordic conference on Human-computer interaction (NordicCHI '02)*, Aarhus, Denmark (pp. 209–212). New York: ACM Press.
- Malinowski, B. (1961[1922]). *Argonauts of the Western Pacific: an account of native enterprise and adventure in the archipelagoes of Melanesian New Guinea*. New York: E.P.Dutton & Co, Inc.
- Madison, D. Soyini (2005). *Critical ethnography. Thousand Oaks: methods, ethics, and performance*. London; New Delhi: Sage Publications.
- Maquil, V., Psik, T., Wagner, I., & Wagner, M. (2007). Expressive Interactions Supporting Collaboration in Urban Design. In T. Gross & K. Inkpen (Eds.), *Proceedings of the 2007 international ACM conference on Supporting group work (Group 2007)*, Sanibel Island, Florida, USA (pp. 69–78). New York: ACM press.
- Maquil, V., Psik, T., & Wagner, I. (2008). The colortable: a design story. In A. Schmidt, H. Gellersen, E. Van den Hoven, A. Mazalek, P. Hollies & N. Villar (Eds.), *Proceedings of the 2nd international conference on Tangible and Embedded Interaction (TEI'08)* Bonn, Germany (pp. 97–104). New York: ACM Press.
- Mead, M. (1973[1928]). *Coming of age in Samoa: A psychological study of primitive youth for western civilisation*. Magnolia: Peter Smith.
- Morrison, A., Sem, I. & Havnør, M. (2010). Behind the wallpaper: performativity in mixed reality arts. In A. Morrison (Ed.), *Inside multimodal composition*. Cresskill, NJ: Hampton Press.
- Munk-Madsen, A. (1978). *Systembeskrivelse med brugere* (In Danish: System description with users). Masters thesis, Århus: DAIMI, University of Aarhus.
- Mörtberg, C., & Stuedahl, D. (2005). Silences and Sensibilities - increasing participation in IT design. In O. W. Bertelsen, N. O. Bouvin, P. G. Krogh & M. Kyng (Eds.), *Critical Computing-Between Sense and Sensibility Proceedings of The Fourth Decennial Aarhus Conference* (pp. 141–144). Aarhus, Denmark: ACM Press.
- Mörtberg, C., & Elovaara, P. (2010). Attaching People and Technology – between e and government. In S. Booth, S. Goodman S & G. Kirkup (Eds.), *Gender Issues in Learning and Working with Information Technology: Social Constructs and Cultural Context* (pp. 83–98). Hershey, USA: IG Global.
- Nelson, H. G., & Stolterman, E. (2003). *The design way: Intentional change in an unpredictable world foundations and fundamentals of design competence*. Englewood Cliffs, N.J.: Educational technology publ.
- Newman, S. (1998). Here, There, and Nowhere at All: Distribution, Negotiation, and Virtuality in Postmodern Ethnography and Engineering. *Knowledge and Society*, 11, 235–267.
- Orr, J. E. (1996) *Talking about machines: An ethnography of a modern job*. Ithaca, NY: ILR Press.
- Plowman, L., Rogers, Y., & Ramage, M. (1995). What are workplace studies for?, In H. Marmolin, Y. Sundblad & K. Schmidt (Eds.), *Proceedings of the fourth conference on European*

- Conference on Computer-Supported Cooperative Work (ECSCW '95)* (309-324). Dordrecht: Kluwer Academic Publishers.
- Puri, S., Byrne, E., Nhampossa, J.L., & Quraishi Z.B. (2000). Contextuality of participation in IS design: a developing country perspective. In A. Clement & P. van den Besselar (Eds.), *Proceedings of the eighth conference on participatory design: Artful integration: interweaving media, materials and practices – Volume 1*, Toronto, Ontario, Canada (pp. 42–52). New York: ACM Press.
- Prøitz, L. (2007). *The mobile phone turn. A study of gender, sexuality and subjectivity in young people's mobile phone practices*. Diss. Oslo: Department of Media & Communication, Faculty of Humanities, University of Oslo.
- Rorty R (1994). Method, social science and social hope. In S. Seidman (Ed.), *The postmodern turn: New perspectives in social theory* (pp. 46–64). New York: Cambridge University Press.
- Ruhleder, K., & Jordan, B. (1997). Capturing complex distributed activities: Video-based interaction analysis as a component of workplace ethnography. In A. S. Lee, J. Liebenauer & J. I. DeGross (Eds.), *Proceedings of the IFIP TC8 WG 8.2 International Conference on Information Systems and Qualitative Research* (pp. 246–275). London UK: Chapman & Hall, Ltd.
- Rutter, J., & Smith G. W. H. (2005). Ethnographic presence in a nebulous setting. In C. Hine (Ed.), *Virtual methods issues in social research on the Internet* (pp. 81–92). Oxford, New York: BERG.
- Sander, T. (2005). Researching the online sex work community. In C. Hine (Ed), *Virtual methods issues in social research on the Internet* (pp. 51–66). Oxford, New York: BERG.
- Shapiro, D. (1994). The limits of ethnography. In J. B. Smith, F. D. Smith & T. W. Malone (Eds.), *Proceedings of the 1994 ACM conference on Computer supported cooperative work (CSCW '94)*, Chapel Hill, North Carolina, United States. (pp. 417–428). New York: ACM Press.
- Sjöberg, C. (1996). *Activities, voices and arenas: Participatory design in practice*. Diss. Linköping: University of Linköping.
- Star, S. L., & Strauss, A. (1999). Layers of silence, arenas of voice: the ecology of visible and invisible work. *Computer Supported Cooperative Work*, 8(1–2), 9–30.
- Strauss, A. (1985). Work and the division of labor. *The Sociological Quarterly*, 26(1), 1–19.
- Stuedahl, D. (2004). *Forhandlinger og overtalelser. Kunnskapsbygging på ivers av kunnskapstradisjoner i brukermedvirkende design av ny IKT (Negotiations and persuasions. Knowledge building crossing knowledge traditions in user participation in design of new ICT, in Norwegian)*. Diss. Oslo: InterMedia, Faculty of Education, University of Oslo.
- Stuedahl, D. & Smørðal, O. (2010) Design alignment of modalities. In A. Morrisson (Ed.), *Inside multimodal composition*. Cresshill N.J.: Hampton Press.
- Stuedahl, D., Smørðal, O., Dindler, Petersen, C. P. D. (2007). Use of blogs for studying users engagement with mobile telephones in museum environments. Short paper for the *10th European Conference on Computer Supported Cooperative Work (ESCW '07) Workshop Techniques and Methodologies for Studying Technology Use 'In the Wild'*, Limerick, 24–28 September 2007.
- Suchman, L. A. (1987). *Plans and situated actions. The problem of human-machine communication*. Cambridge: Cambridge University Press.
- Suchman, L., & Wynn, E. (1984). Procedures and problems in the office. *Office Technology and People*, 2(2), 133–154.
- Sunderburg, E. (Ed.). (2000). *Space, site, intervention: Situating installation art*. Minneapolis: University of Minnesota Press.
- Thoresen, K. (1981). *Terminalarbeidsplasser* [Computer Screen Work Places]. Oslo: Tanum-Norli.
- Thoresen, K. (1999). *Computer use*. Diss. Oslo: Department of Informatics, Faculty of Mathematics and Natural Sciences, University of Oslo.
- Turnball, D. (2007). Maps narratives and trails: performativity, hodology and distributed knowledges in complex adaptive systems: an approach to emergent mapping, *Geographical Research*, June 2007, 45(2), 140–149.

## EXPLORING DIGITAL DESIGN

- Urnes, T., Weltzien, Å., Zanussi, A., Engbakk, S., & Kleppen Rafn, J. (2002). Pivots and Structured Play: stimulating creative user input in concept development. In O. W. Bertelsen (Ed.), *Proceedings of the second Nordic conference on Human-computer interaction (NordiCHI '02)*, Aarhus, Denmark (pp. 187–196). New York: ACM Press.
- Wagner, I. (1994). Connecting communities of practice: feminism, science and technology. *Women Studies International Forum*, 17 (2/3), 257–265.
- Walker, K. (2007). Visitor-constructed personalized learning trails. In *proceedings from Museums and the web 2007, the international conference for culture and heritage online*, 11–14 April 2007, San Francisco, California.
- Wynn, E. (1979). *Office conversation as an information medium*. Diss. Berkeley: University of California, Berkeley.