

## Tools and techniques

### Ways to engage telling, making and enacting

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Participatory Design is not one approach but a proliferating family of design practices that hosts many design agendas and comes with a varied set of toolboxes. In this chapter we will give examples of toolboxes with the ambition to show that there is a richness of tools and techniques available that may be combined, adapted and extended to form the basis for yet newer Participatory Design practices. The chapter shows how the making of things, the telling of stories and the enactment of possible futures together provide the basis for forming a temporary community in which the new can be envisioned.

The introduction frames tools and techniques within Participatory Design and describes Participatory Design as various practices of participation. The following sections give examples of how designers and non-designers participate in Participatory Design practices through activities focusing on telling, making and enacting. The final section reflects on present and future challenges.

We present a wide selection of tools and techniques for Participatory Design, describing how they support participants in making, telling and enacting aspects of future design. The aim is to stimulate further proliferation of formats and procedures that may bring Participatory Design to new design challenges and to new designer/user communities. Our claim is not that tools and techniques have to be applied rigorously. Instead, we suggest that sensitivity to the coherence of making, telling and enacting provides sufficient grounding for designers (and non-designers) to make the tools and techniques relevant for whatever participatory action they are involved in.

This includes being aware of what is accomplished as particular tools and techniques become part of specific Participatory Design practices, finding out how these in combination can create formats and procedures that can create engagement and a common image of the vision or Participatory Design development task, and last but not least, create ownership for the results.

#### Introduction

There has always been ambivalence among practitioners of Participatory Design concerning offering tools and techniques for a wider audience. On the one hand, participatory designers pioneered new approaches to designing with users, such as prototyping, future workshops and

design games that have become widely accepted and used in the design community at large. On the other hand, Participatory Design grew out of critique of mainstream design and technological R&D for not accommodating the multiple voices of future users. There is still a reluctance to have the contribution of the Participatory Design community reduced to stand-alone tools and techniques if these are not accompanied by what Sanders and Stappers have called a participatory mindset (Sanders and Stappers 2008).

Despite the ambivalence, the field of Participatory Design today continues to provide a vibrant environment for the discussion and dissemination of new tools and techniques. In the early years, tools and techniques of participation were seen as essential means to remedy a professional process of systems design. Today the tools and techniques are brought forward through practices of design participation in many other and very different fields, where they form constituent parts of the activities people are involved in.

The concepts of tools and techniques were still defined along the conventional lines of the systems design tradition in the MUST approach that provided a comprehensive guideline for systems design. Based on Andersen et al. (1990), technique is here defined as 'a specific direction for performing a certain activity. It may involve activities for data gathering, processing and presentation, or project management. Techniques may be used independently of how the design project is planned' (Bødker et al. 2004, p. 21). Correspondingly, representational tools are defined as 'suggestions for graphics, figures, and models to support the processing and presentation of knowledge contributed by a technique' (ibid., p. 21). In this terminology prototyping may be the technique and, for example, the 'maketools' suggested by Sanders may be the tools.

This way of conceiving of tools and techniques is in our opinion slightly deceptive. The reason is that it indicates that techniques and tools can be applied irrespectively of, for instance, the purpose and values of a specific project. Furthermore it seems that techniques and tools can be fitted into a larger set of methods more and less at will – precisely what the Participatory Design community wanted to caution against. For the skilled practitioner this problem is, however, hardly a real one as they have experience of appropriating different techniques and tools in various projects. Nevertheless, defining tools and techniques as done in the MUST approach ensures compliance with the conventional perspective on methods in systems design (see more on methods in Chapter 6).

As evidenced throughout this book, Participatory Design is today not one approach but a proliferating family of design practices that hosts many design agendas and comes with a varied set of toolboxes. In this chapter we will look into these toolboxes with the aim of showing that there is a richness of tools and techniques available, which may actually be combined, adapted and extended to form the basis for yet newer Participatory Design practices. What is essential is that tools and techniques are appropriated in a design practice concerned with the problems at hand. This means that the concern for choosing tools and adopting mindsets is less one of doing things right and more a question of being aware of what is accomplished as particular tools and techniques become part of design practices. The emphasis on practice, which we will develop in the following section, brings us well in line with what has been suggested by, for instance, Ehn (1993) and Löwgren and Stolterman (2004).

This chapter presents and reviews a wide selection of tools and techniques for Participatory Design, describing how they contribute to supporting participants in making, telling and enacting aspects of future design. By emphasising the contexts in which they have been used, the projects they have been part of and the design communities from where they originate, we hope to give the reader a sense of the lived practices in which they participate. This is not to invite replication, but to stimulate further proliferation of formats and procedures that may

bring design participation to new design challenges and to new communities of designers and users. Our claim is thus not that tools and techniques have to be applied rigorously and by the book. Instead, we suggest that sensitivity to the coherence of making, telling and enacting in design participation provides sufficient grounding for designers (and non-designers) to make the tools and techniques relevant for whatever participatory action they are involved in.

The chapter is structured as follows. In the next section we argue for the value of understanding Participatory Design as various practices of participation, and that these practices include techniques and tools for engaging people in telling, making and enacting. In the three following sections different techniques and tools are presented in relation to whether they primarily involve project participants in telling, making or enacting. Thus there is a section that focuses on telling, another on making, etc. This is a way of structuring the many different tools and techniques. Still, since our main point is that Participatory Design practices include all three activities together, we provide short case stories in the end of each section to illustrate how various tools and techniques have been combined in actual projects. Following the sections on telling, making and enacting is a section called 'From tools to games: bringing it all together'. The final section points to future directions and opportunities, and suggests a number of research areas that future PhD students in design might want to consider.

### Participatory Design is the practice of participation

The heart of Participatory Design is participation. Its origin is often associated with the groundbreaking work of American and Scandinavian researchers engaged with systems design and automation in the 1980s and 1990s (well reported in Schuler and Namioki 1993 and Greenbaum and Kyng 1991). What has been less frequently acknowledged is that the issue of design and participation had already been broadly voiced in the design communities in the 1960s and 1970s. For instance, at the second conference of the Design Research Society in 1971, design and participation was the overall conference theme (Cross 1971). Several scholars, including Cross and Müllert (see e.g. Cross 1971), who continue to be active in debates on design and design research today, at that time strongly argued for new approaches to design that could contribute to the inclusion and participation of citizens at large in design and societal planning. According to Wenger, participation in communities of practice may be understood as the 'complex process that combines doing, talking, thinking, feeling, and belonging. It involves our whole person including our bodies, minds, emotions, and social relations' (Wenger 1998, p. 56). More recently Binder et al. (2011) argue that two types of values can be seen to strategically guide participation in Participatory Design projects:

One is the social and rational idea of democracy as a value that leads to considerations for proper and legitimate user participation – the very making of things. The other value might be described as the idea of the importance of making participants' 'tacit knowledge' come into play in the design process, not only their formal and explicit competencies – skills as fundamental to the making of things as objects. We could also think about this as the value of being able to express and share 'aesthetic experiences' in the pragmatic sense of embodied experience enforced by emotion and reflection.

*(Binder et al. 2011, p. 163)*

The concept of practice figures prominently in the literature on Participatory Design. For instance, Ehn argues:

Through practice we produce the world, both the world of objects and our knowledge about this world. Practice is both action and reflection. But practice is also a social activity; it is produced in cooperation with others. However, this production of the world and our understanding of it takes place in an already existing world. The world is also a product of former practice. Hence, as part of practice, knowledge has to be understood socially – as producing or reproducing social processes and structures as well as being the product of them.

*(Ehn 1993, p. 63)*

We will argue that the everyday practices of users, whether at work or elsewhere, are explored and put on stage in co-design dialogues through various tools and techniques, but so are the practices of the other stakeholders participating in these dialogues. What is enacted in the participatory process is not only what Ehn has called 'a meeting of language games' (Ehn 1988). Practices of the participants come together to perform what may be envisioned through design, and in this coming together something new is formed, drawing upon but still distinctively different from the everyday practices the participants come from. Muller and Druin (2012) have talked about Participatory Design as the enactment of a 'third space' belonging neither to potential users nor to the system designers. This third space may literally be the space of the participatory workshop but it may as well be the social space encompassing the players of a design game or the collaborative construction of a prototype. Following Lave and Wenger (1991), we may think of this third space as in itself a community of practice in the making. According to Lave and Wenger, communities of practice are everywhere people are collaboratively engaging with an activity and the practice is kept together by a going back and forth between what Wenger calls 'participation and reification' (Binder 1996). Wenger and Lave originally coined the term 'communities of practice' to capture the dynamics of practices long lived and well established. Here they emphasized that tangible things such as decisions, procedures or tools were constantly examined and negotiated in a similar way to Orr's (1996) illuminating examples of how communities of technicians tell and retell 'war stories' of jobs well done and challenges overcome. This storytelling holds not only much of what is remembered but also clues to what should be done in the future. In a Participatory Design practice, the telling of the community goes hand in hand with the making of things that make the community imagine and rehearse what may be accomplished in the collaboration.

There are other sources to an elaboration of the concept of practice. With these brief hints to literature, which have provided an ongoing and valuable inspiration to the Participatory Design field, we also want to suggest that tools and techniques of Participatory Design must be appropriated by the temporary practices of participation.

In a particular design project, participatory tools and techniques can be seen as the scaffolding for the temporary community of practice in the making. They support collaborative enquiry into the intertwinement of the essential questions about 'what to achieve' and 'how to achieve it'. Bringing together a network of actors with different backgrounds, competencies, experiences and interests challenges participation. Susan Leigh Star (Star 1989; Star and Greismer 1989) has suggested the notion of boundary objects as key in maintaining coherence across various social worlds. Boundary objects are to be understood as objects that can give meaning to different participants even though that they have different professional practices and professional languages – different competences. Star and Greismer describe boundary objects as follows:

Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a

common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use. These objects may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognisable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds.

*(Star and Griesmer 1989, p. 393)*

Boundary objects can create continuity and homogeneity by incorporating different interest groups so that they can contribute to the design process. Thus they are important in creating a common language-game within the boundaries of the project.

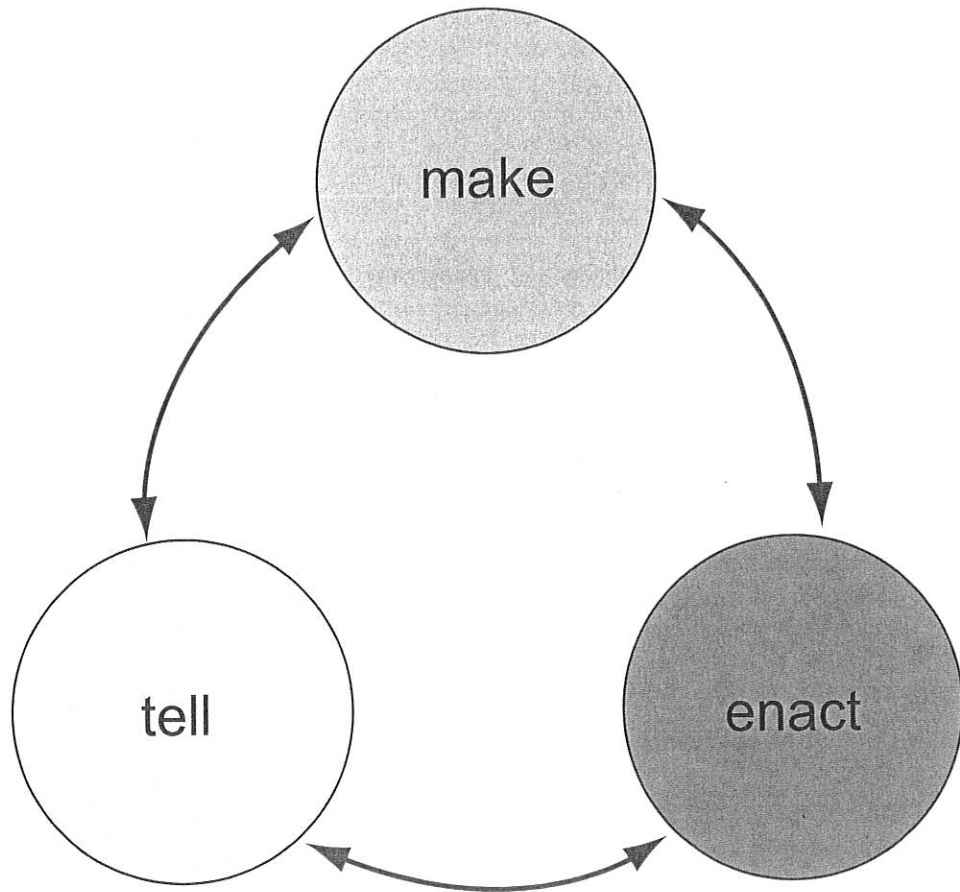
The successful participatory process is a community of practice in the making. Participants must be able to make things that give this practice a presence in the world. Similarly, the participatory practice must be told and enacted to become alive and generative also of that which is not yet experienced.

The simple tell-make-enact diagram illustrated in Figure 7.1 should remind us that tools and techniques do not operate in isolation. The tools and techniques we engage with and the things we enact must form a coherent Participatory Design practice in order to keep alive what is gained of insights and what is won in imagined possibilities. In what follows we will lay out in more details what this means, with the important point that the triad of making-telling-enacting opens a myriad of possibilities for participation in design projects.

### Telling activities as drivers for participation

In the 1980s both systems designers and workers' unions raised the question of participation and democracy at work. Computer scientists asked why office workers were not included in specifying what would be productive new work procedures. They organised study circles where union members could tell about and participate in discussions on how computer systems were best used in the office (Kensing in Greenbaum and Kyng 1991). Other researchers turned to traditional skilled work of, for example, the print shop, and invited workers to mock-up new computer-based tools that extended the skills of the workers instead of replacing them (Sandberg and Ehn, in Greenbaum and Kyng 1991). Method was a pivotal issue. However, contrary to the aspirations of the methods movement that assumed that transparency of methods would facilitate participation (e.g. Jones 1992), the new generation of participatory designers argued that the design process had to be reworked to accommodate ongoing prototyping (Floyd 1984; Grønbaek 1988) and designing-through-the-interface (Bodker 1990).

The rethinking of systems design as an iterative and cooperative process involving both professional systems designers and equally professional skilled workers from early on raised the issue of knowledge. Participants were obviously equally knowledgeable, but bringing the knowledge of computer systems and knowledge of skilled print production into productive dialogue with one another called for tools and techniques that could span the gap between separate knowledge domains. Ehn and Sjögren, who were also drawing on earlier work on urban and rural planning, suggested game-like formats and tangible representations of design artefacts that could make sense for both the programmer and the typographer (Ehn and Sjögren 1991) and similar tools and techniques targeting white-collar workers were developed by, for example, Muller (1991, 1993). Many of these games use visual material to assist the participants in telling about experiences and dreams by, for instance, building up their own everyday setting or illustrating the flow of activities in a simplified way. The games invite discussion about problems and



*Figure 7.1* A Participatory Design practice entails tools and techniques that combine telling, making and enacting. The tell–make–enact diagram is circular with double-headed arrows to illustrate how the actions are connected, and to indicate that design process iterations go both ways round in the circle.

opportunities and provide a context that keeps the discussion grounded in everyday experiences. Still, the games typically produce an ‘outcome’ that visually can form the starting point for a diagramming of present and future practices that may translate into the world of systems design. See Figure 7.2.

Even though the Scandinavian tradition emphasised that design should be cooperative with an equal importance and responsibility for all stakeholders, the knowledge of system designers and, for example, skilled practitioners seemed to be of a different kind. Kensing and Munk-Madsen (1993) suggested distinguishing between abstract and concrete knowledge to draw attention to how the knowledge of practitioners was often embedded in the everyday work practice and how the transition from the present day to an envisioned future is not necessarily straightforward. Such considerations created what turned out to be a very productive link to mainly North American scholars and practitioners interested in the limits of Artificial Intelligence and the resurrection of practical knowledge (see, for example, Winograd and Flores 1986).

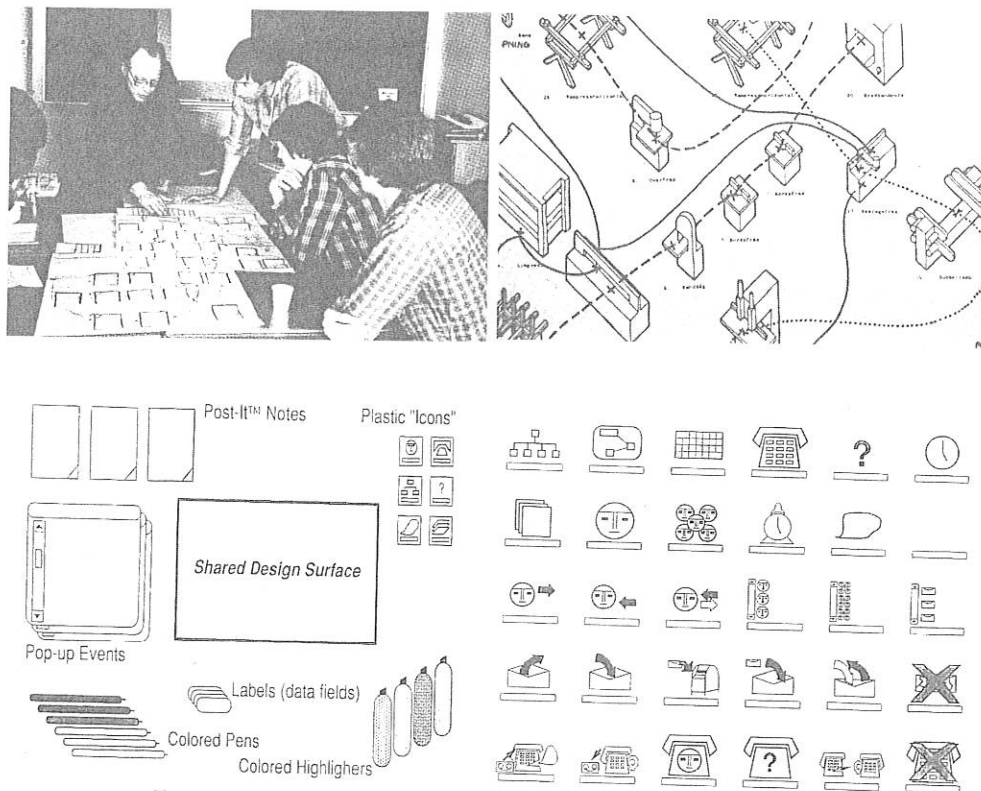


Figure 7.2 Top left: In the UTOPIA project, people involved in newspaper production played the Organisational Kit Game; a simple board game with sketches and text on small pieces of paper illustrating various tools. Top right: Production design using the Layout Kit Game (Ehn and Sjögren 1991). Bottom left: The PICTIVE design game. The design objects facilitate articulation of how the participants would like the systems interface to look. Bottom right: The PICTIVE plastic icons help the participants articulate how they imagine the new software system to work (Muller 1993).

### *Investigating existing (work) practices*

A consequence of these insights was a growing interest in integrating ethnographically inspired fieldwork into the Participatory Design process (Kensing and Blomberg 1998). Bodker and Pedersen early suggested how to investigate workplace cultures by looking at artefacts, symbols and practice (Bodker and Pedersen 1991). Blomberg and colleagues explained the emphasis on the 'natives' point-of-view, holism and natural settings when conducting fieldwork, how to document the visits, and what to be aware of when interviewing (Blomberg et al. 1993). The purpose was, however, not to produce distant accounts of work practice, but rather to find ways for the system designer to engage in dialogues with the skilled people at work.

Julian Orr is one of the first anthropologists to make ethnography for the sake of design (Orr 1986, 1996). Orr's accounts of the role of community storytelling among office machine repair workers showed that these workers were not only highly competent, but also fully capable of innovating work procedures in order to deal with new technology. Orr finds that important 'aspects of the technicians' culture are their fondness for war stories and the eagerness with

which they talk about machines (Orr 1986, p. 63). He draws the conclusion that the diagnostic process for copiers is essentially narrative, and that the diagnostic narrative is both a collection of various pieces of narration and the evolution of an understanding of the machine through talking.

Charlotte Linde (2001) has investigated the role of oral narratives in the expression and transmission of social knowledge at workplaces. She argues that stories not only recount past events but also convey the speaker's moral attitude towards these events. One of her main points is that work processes often are difficult to convey into stories. Instead, narratives are 'well suited to transmit the part of social knowledge that concerns history, values and identity' (p. 163). Linde concludes in line with Orr that the stories told at workplaces remain within the specific community of practice. They do not usually reach the communities of designers.

Several authors have suggested tools and techniques that bring the impulse from ethnography directly back into a participatory setting. For example Johansson suggests what he calls a participatory enquiry in which potential users together with designers create and produce accounts of ethnographic material from the practice of use (Johansson 2005). Together with Linde, Johansson reports on a game, which was designed to facilitate telling stories about imaginary situations that complement reflective understanding of everyday practice. The game materials are based on ethnographic video snippets from the users' everyday environments (Johansson and Linde 2005). Ylirisku and Buur (2007) give several examples of how the production of ethnographic video accounts could be done on site with a direct involvement in authoring and editing by the people studied.

### *Introducing change perspectives that cast new light on the well known*

In a different direction other researchers have sought to enhance and expand the dialogue of participation between designers and users through introducing a change perspective casting a new light on the well known. In the 1970s Jungk and Müllert (1987) had already introduced the future workshop as an efficient technique for engaging citizens in change processes. The future workshop is a robust and relatively simple technique. At first a group of people, in a brainstorm-like format, list points of critique to their present-day situation. The list is produced collaboratively but without discussion or objections to critiques raised. In the next phase the critique is transformed to its positive opposite. In this part of the future workshop, more discussion takes place, and the participants are given the opportunity to develop a utopian perspective. The rule is still that criticism of the realism of the proposals is not allowed. In the last phase of the future workshop, the utopian vision forms the base for a plan for action, where participants discuss what can be done to move towards the vision, given the present-day circumstances.

Compared to other tools and techniques in Participatory Design, the future workshops do not engage representations or formats that point to the everyday contexts of the participants. The success of the future workshop is dependent on the participant's ability to state critique and utopian vision in a common language. Several authors within the Participatory Design tradition have used the future workshop as a structuring element in co-design dialogues, yet have added tools and techniques that facilitate a reflection on the everyday practice of participants. Kensing and Madsen (1991) have suggested introducing apparently foreign metaphors to participants, suggesting, for example, that a group of librarians evaluate their present-day work context through the lens of a factory metaphor or a storage metaphor, the point being that seeing the library as a factory or a storage facility enables the participants to become aware of how the well-known workplace is unique and different from other kinds of workplaces.



One can say that the introduction of metaphors and the rules of the future workshop share the employment of a 'what if' that produces a kind of estrangement of the familiar and that makes it easier for participants to talk about everyday experiences in a way that is also comprehensible for others. Halse et al. (Johansson et al. 2005; Halse et al. 2010) have pointed to the way this process of estrangement is relevant in both directions in the dialogue between designers and future users. The difficulty for people in a workplace or another everyday setting to describe their practice in a way that is communicative and inspirational for outsiders is not so different from the difficulties experienced by designers when attempting to open up a design space for mutual exploration. Mogensen (1992) suggested that designers might gain from making 'provotypes' rather than prototypes to prompt the dialogue with potential users but also to make designers reflect upon the design as more than a simple solution to a problem. The engagement of the 'provotype' has a clear resonance with the suggestions from Gaver, Dunne and Pacenti (1999) to learn from the art tradition of the situationists by playfully exploring and distorting images of present and future in the dialogue between designers and users.

We will end this section with a short case illustrating a specific Participatory Design practice. Tools and techniques for telling are often thought of as means for solely investigating existing practice. In contrast, in the following case, researchers from Århus University, Denmark, have combined using a fictional narrative as a telling activity in a participatory setting, together with making and enacting in order to spur innovation. It is a good example of how in new ways they have taken up and worked practically with the tension between tradition and transcendence, which Ehn pointed to as one of the core themes in Participatory Design (Ehn 1988). According to Ehn (1993), tradition and transcendence form the dialectical foundation of design in the sense that every design project has to find a balance between 'what is' and 'what could be'.

#### *Short case: challenging tradition and transcendence through fictional narratives*

Dindler, Brodersen and colleagues suggest using telling in the form of a fictional narrative as the overall frame for co-creation. The fictional enquiry technique builds on invoking a sense of suspended disbelief to fuel imagination in participatory prototyping (Brodersen et al. 2008; Dindler 2010). For instance, when collaborating with the Kattegat Marine Centre on creating new types of engaging experiences for their visitors, the authors used a fictional narrative that was inspired by the tale of the lost city of Atlantis (Iversen and Dindler 2008). A prototyping session that involved a family with two children also took place within the Centre. The first part of the fictional story related to the present. Employees at the Marine Centre had 'been noticing a strange phenomenon. In the morning, the employees would find wet footprints leading back and forth from the aquaria. A few days ago, the centre had received a message in a bottle' (ibid., p. 142). They gave the message from the bottle to the family. The letter in the bottle was from the King of Atlantis. He starts by saying that the people of Atlantis have been forgotten by humans for many years. He explains that what provides energy and life to the whole of Atlantis is stories, adventures and fantastic experiences. For years they have lived happily on the experiences at the Kattegat Marine Centre, but now it seems that the fantastic experiences are fewer and fewer. The King of Atlantis asks for help. In order to survive they need new fantastic experiences at the Kattegat Marine Centre, and they have sent a box of magic tools that can be used in whatever way the family members would like (ibid.; see Figure 7.3).

The aim of the fictional narrative was to establish a 'new universe where the normal structures of meaning and expectations are bypassed'. The narrative also includes a plot that sets the stage for action. The magic tools are meant both to inspire ideation and to be used as props for enactment. The box contained, for example, a mirror, a flute, an apple and a magnifying glass. Each family

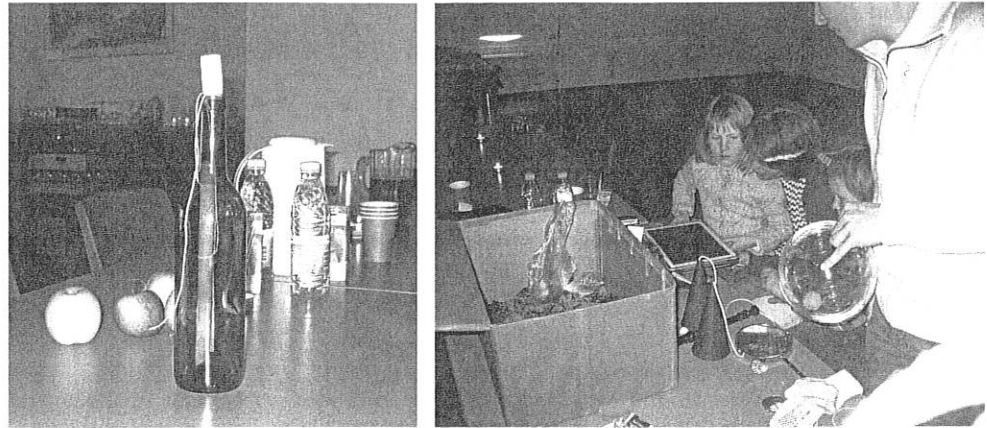


Figure 7.3 Left: The message in the bottle was written as a letter from the King of Atlantis. In order for the people of Atlantis to survive, fantastic experiences need to take place at the Kattegat Marine Centre. Right: In the message the King of Atlantis writes that he has sent a box of magic tools. He encourages the humans to use the magic tools to create experiences that they would like to have at the Kattegat Centre (photos © Dindler).

member picked one or more magic tools and then found specific places at the Kattegat Marine Centre where they used the tools for further enquiry (see examples in Figure 7.4). As the final part in this prototyping session, scenarios of new experiences at the Kattegat Marine Centre were acted out in situ, with the family members imagining how the magic props would work. The ideas presented resulted in the functioning prototypes of the Fish Generator and the Digital Hydroscope (see Figure 7.4).

The fictional enquiry technique has a participatory prototyping design practice in the centre. The main activities in the prototyping session at the Kattagat Marine Centre are based on telling and enacting. The authors argue for using fictional narratives as the springboard and stage for change when involving people in imagining how different technologies can be designed and used for various purposes. However, in their work they stress that it has been important not to abandon existing use practices but to find ways of arranging constraints and possibilities in order

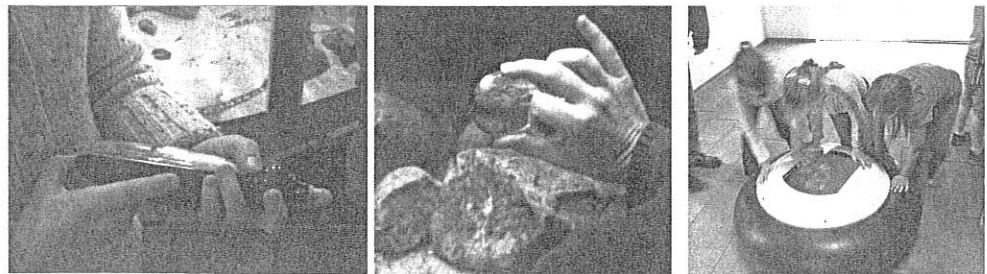


Figure 7.4 Left: The daughter of the family enacts her idea of a treasure finder to be used for finding hidden treasures beneath the floor. Middle: The mother enacts her idea of using a magnifying glass to zoom in on the details of various species. Right: Visitors explore the virtual ocean with the functioning Digital Hydroscope prototype later in the design process (Iversen and Dindler 2008).

to envision and stage a radical new place for co-creation for designers and users. They distinguish between anchoring elements that maintain a reference to current practice versus elements of transcendence. The prototyping session took place at the Kattegat Marine Centre, which anchored the participatory prototyping in the theme of the centre, and in the physical layout of the exhibition. The fictional narrative, the letter in the bottle from the King of Atlantis and the box with 'magic' items acted as concrete transcendent elements. The authors do not go into detail about the process of making the prototypes. Instead they briefly present two of the final functioning prototypes, which indicated that making is also an important part of their Participatory Design practice (for an elaboration of fictional spaces in Participatory Design see Dindler 2010).

### The making of things as a means of design participation

Tools for making give people, both designers and non-designers, the ability to make 'things'. When making we use our hands for externalising and embodying thoughts and ideas in the form of (physical) artefacts. Such artefacts might describe future objects or provide views on future ways of living.

Three distinct approaches for making activities have evolved over time: participatory prototyping, probes and generative tools. Participatory prototyping has the longest history, having been introduced in the early 1980s (e.g. Bodker et al. 1987; Ehn 1988). Probes and generative tools were introduced in the same year (Gaver et al. 1999; Sanders 1999). The three approaches are distinct yet are not mutually exclusive, as the short cases at the end of this section will show.

Participatory prototyping using mock-ups and other low fidelity models is most often used in the early stages of the established design process. Making as prototyping presupposes that you have already identified the object of the design, e.g. you are designing a product or a device or an environment, etc. Thus, in the traditional design spaces, the focus has been on using prototypes to create representations of future objects to give shape to the future, i.e. to *help us see* what it could be.

In the emerging design spaces on the front end of the process, on the other hand, the focus is on using making activities to help us *make sense of the future*. In the early front end of design, making activities are used as vehicles for collectively exploring, expressing and testing hypotheses about future ways of living. Probes refers to a design-led approach that invites people to reflect on and express their experiences, feelings and attitudes in forms and formats that provide inspiration for designers (Gaver et al. 1999). Later applications of the probes concept provide information for designers, as a means for participation and for dialogue (Mattelmäki 2005). Generative tools are used in the front end of design to help non-designers to imagine and express their own ideas about how they want to live, work and play in the future (Sanders and Stappers 2008).

#### *Participatory prototyping techniques*

Making activities have a long history in Participatory Design practices where the creation of mock-ups has been an important tool in establishing a shared (concrete) language across disciplines. One of the most well-known projects from the 1980s that used prototyping is the UTOPIA project (Ehn 1993). It was a collaboration between the Nordic Graphic Workers' Union and researchers in Sweden. The goal was to introduce new computer technology into the newspaper industry. An important lesson was that when introducing and using mock-ups and other prototypes, the skilled workers could suddenly actively participate in the design process by actually doing, for instance, page make-up (Ehn 1993). Bodker and Grønbaek (1991) describe the approach taken in the UTOPIA project as one of 'cooperative prototyping'.

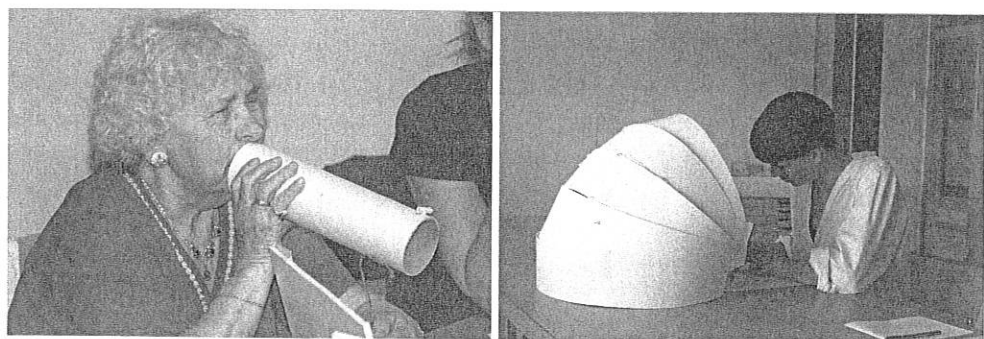
Christiane Floyd (1984) early stressed that the notions of prototypes and prototyping are difficult to define. The use of the terminology differs, as well as the purposes and application-oriented strategies. Floyd argues that within software development, prototypes are primarily a learning vehicle. She suggests three broad classes of prototyping: prototyping for exploration, where the emphasis is on clarifying requirements and desirable features of the system; prototyping for experimentation, where the focus is on determining the adequacy of a proposed solution; and prototyping for evolution, where emphasis is on adapting the system gradually to changing requirements (Floyd 1984).

Some more recent examples of projects that have made effective use of participatory prototyping follow. The examples have been chosen to show how broad the range of applications has become, from designing for computer-supported workplaces to city planning and architecture, to user interface design, to product design, etc. See Figure 7.5.

Within the Human-Computer Interaction (HCI) field, paper prototypes that use annotated sheets of paper to represent the screens are used to visualise user interface designs (Benyon et al. 2005). The value of 'paper-prototyping' and the use of Post-it notes as a means to quickly mock-up information architecture are now well-known design tools in the interactive domain (see e.g. Snyder 2003).

Joon-Sang Baek and Kun-Pyo Lee (2008) used two Participatory Design toolkits, Info Block and Info Tree, to explore how children would build information architectures for software services. They found that the information architectures built by the children (ages 8 to 12) differed in a number of ways from the architectures built by adults. They proposed, based on their findings, that software information architectures should be driven by the cognitive development of the children rather than the designers when children are the primary audience (for more on designing with children see, e.g., Druin 1989).

Henry Sanoff (2010) has been using participatory prototypes for many years in his work in the US on community planning and architecture. He provides participants with small-scale, paper-based representations of physical components (e.g., trees, water, existing buildings, etc.) to allow people to explore physical design options for exterior sites and internal environments.



*Figure 7.5* Left: An example where the simple mock-up (the maxi-messenger) is made too large to be perceived as an actual technological product. The simple mock-ups worked as props for investigating different kind of functionalities and media for creating networks between senior people. The maxi-messenger illustrated some kind of communication device (Foverskov and Binder 2011). Right: This rough cardboard mock-up is made in a size close to what the student had in mind for creating a private space within a semi-public space (photo © Christina Lundsgaard).

Similarly Liz Sanders has been exploring the use of three-dimensional participatory prototypes in hospital planning and architecture as shown in Figure 7.6.

Sofia Hussain (Hussain and Sanders 2012) is using participatory prototyping with children and prosthetists in Cambodia to explore the design development of new prosthetic feet for the children. The children used toolkits that contained paper dolls, clothing and prosthetic options to express their ideas about the form and aesthetics of the prosthetic foot they would like to use (see Figure 7.7). The prosthetists later used a variety of materials such as wood, clay, rope and plastic wrap to create rough concepts of new prosthetic feet for the children.



Figure 7.6 This three-dimensional 'dollhouse' toolkit has been used by health care practitioners to explore future opportunities in patient room design for new hospitals. (photo © Elizabeth B.-N. Sanders).

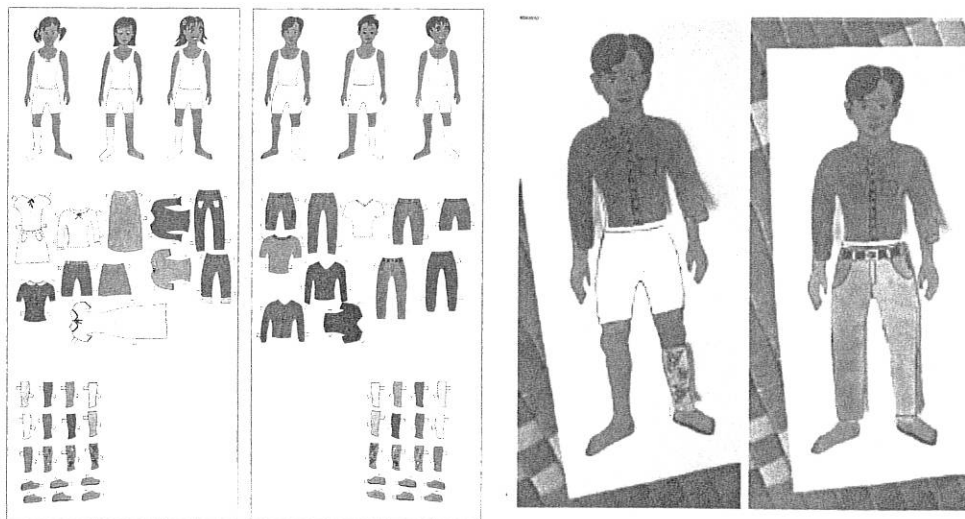


Figure 7.7 Left: These paper doll toolkits were designed to seek a deeper understanding of children's aesthetic concerns and needs related to the type of prosthetic foot they were currently using. Right: One of the children shows how he would prefer to be dressed at home and in public (Hussain and Sanders 2012).

### *Probes as a means of exploring experience*

In parallel with the extension and diffusion of participatory tools and techniques into design and innovation research at large, we also see an influx of approaches and techniques of a different origin. Gaver and his colleagues have been highly influential with their work on cultural probes (Gaver et al. 1999). Transforming questionnaires into delicately designed instruments for data collection that both expose the design agenda of the researchers and invite ambiguous and emotional responses from the informants, Gaver and his group opened a new realm for exchange and dialogue. Emphasizing the deliberately playful and insisting that what is collected is inspirational rather than factual, the cultural probes added a genuinely design-oriented approach to user research.

The use of probing kits in endless variations of Gaver's original postcards, diary book and instant cameras (see Figure 7.8) has spread rapidly in design research, and even though some of the adaptations, according to Boehner et al. (2007), may have missed the point of inviting ambiguity, the transgression of the boundaries between research and design has been strongly promoted by this work. This becomes even more obvious in the work on critical or speculative design coming out of the same research environment. Here the pioneering work of Dunne (2006) and Dunne and Raby (2001) brought design work into design research as a critical exploration of the mundane. In their Design Noir series, Dunne and Raby deliberately designed furniture that in one way or another made the user aware of the omnipresence of electromagnetic radiation, whether this was done by offering a Faraday cage couch or a table with in-built magnetic compasses.

Mazé et al. picked up on the work on critical design in their projects on awareness of energy consumption. Here they produced a number of conceptual prototypes that, like the energy curtain, collected sunlight for solar panels generating electricity for indoor lighting, but only when they were actually keeping out daylight (see Figure 7.9). This and similar prototypes were also evaluated by potential users in an everyday setting, providing new insights into how energy consumption and sustainability were reflected by people living with the prototypes (Mazé and Redström 2008).

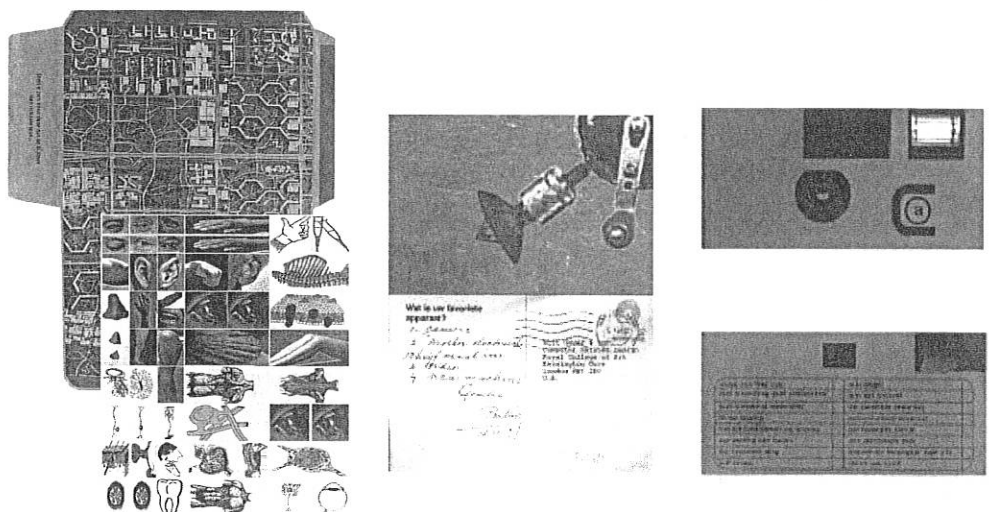


Figure 7.8 Cultural probe kits were sent home to people as a means for self-documentation. The probe kit was designed to address people's emotional, aesthetic and experiential reactions to their environments. It contained several maps and stickers to be glued on the maps, postcards with questions and a disposable camera with a list of requests for what to photograph (Gaver et al. 1999) (photo © Interaction Research Studio).

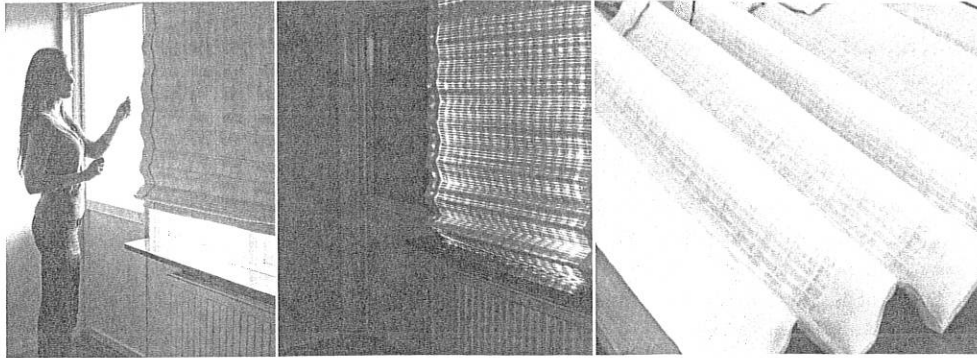


Figure 7.9 Static! Energy Curtain. The prototype from the Interactive Institute's research project 'STATIC!'. It is a window shade woven from a combination of textile, solar-collection and light-emitting materials. During the day the shade can be drawn to collect sunlight, and during the evening the collected energy is expressed as a glowing pattern on the inside of the shade (Mazé and Redström 2008) (photos © Interactive Institute, Johan Redström).

The move from research-led to design-led approaches engaging freely a broad array of tools and techniques is evident in the work reported by Westerlund. Reflecting on a decade of work of Participatory Design, Westerlund shows how probing for new technological possibilities with what he calls technology probes blends with evocative techniques of creativity to form a smooth intermingling of enquiry into ongoing practices and the prototyping of what is new (Westerlund 2009). Mattelmäki (2006), relating to what she calls empathic design (Koskinen et al. 2003), similarly explores new professional design practices as she reports on how different probing techniques and participatory workshops are brought together in innovation projects targeting public service innovation.

### *Generative tools for co-designing*

The origin of generative tools is transdisciplinary, emerging from the intersection of design practice, applied psychology and psycholinguistics theory. The idea emerged while watching practising industrial designers communicate with each other through 'component volumetrics' (3D forms that represented core internal components of the product). Similarly, graphic designers communicated with each other through 'mood boards' containing 2D components such as photographs and other images. These observations sparked the idea to create sets of 3D and 2D visual components that non-designers could use to express their feelings, ideas and dreams about future scenarios of use.

An understanding of projective techniques (Lilienfeld et al. 2000) was useful in guiding the choice of components of the generative design language. Like projective techniques, generative tools rely on ambiguity. A good set of generative tools provides ambiguity to non-designers in order to evoke and provoke thoughts and feelings that they do not commonly talk about. Chomsky's theory of transformative generative grammar (Chomsky 1965) provided another source of inspiration. Generative grammars provide for the possibility of creating an infinite set of meaningful statements from a finite number of components. A good set of generative tools provides a limited set of components that, when used in combination, has the potential for an infinite variety of expressions about future ways of living. Today the generative tools describe a design language ideally suited for use by non-designers. It is a full palette of predominantly visual components that enable participants to explore and express playful landscapes of past, present

and future experiences. These tools can be used to encourage and challenge people to express their tacit and latent needs, aspirations and dreams (Sanders 2000).

Sanders and William (2001) describe the underlying theoretical basis for the application of generative tools, Koestler's theory of creativity (Koestler 1964), and describe how to set the expression of creative ideas by non-designers in motion. They also provide descriptions and photos of some of the more commonly used generative tools and techniques, including: immersion workbooks, diaries, the day-in-the-life exercise, send-a-camera home, image collaging, cognitive mapping and Velcro-modelling. There is an overlap between some of the tools and techniques of design probes and generative tools (e.g. diaries, workbooks and cameras sent to participants). In the case of the cultural probes, these tools and techniques are the probes. In the case of the generative tools, these tools and techniques are used in priming activities to ensure that the participant is prepared for the creativity that is inherent in the subsequent generative session. See Figure 7.10.

Froukje Sleeswijk Visser et al. (2005) present a more detailed account of how to set up and conduct generative tools sessions from the initial immersion period to the session itself and then to the analysis of the data. They also describe the various ways that findings from generative research sessions can be communicated to audiences interested in the results and the insights.

Within the Participatory Design community we see a change in aim and scope for the application of participatory tools and techniques in the front end of the design process. Buur and his colleagues, who have for long been taking Participatory Design into corporate R&D, have in recent years shown that business models may also be prototyped with participatory techniques (Buur and Mitchell 2011). They provided participants with toolkits containing materials such as plastic tubes, balls, string, pulleys and toy trains and tracks for collaboratively making tangible business models. This work is still in the exploratory phases. Meanwhile, LEGO has made a business out of its LEGO Serious Play offer, which also offers a generative toolkit for business modelling (Statler et al. 2009).

### *Short case: improving wellbeing at work*

The consequences of demographic development are one of the global challenges receiving more and more attention in this century. Growing populations and longer life expectancies provide

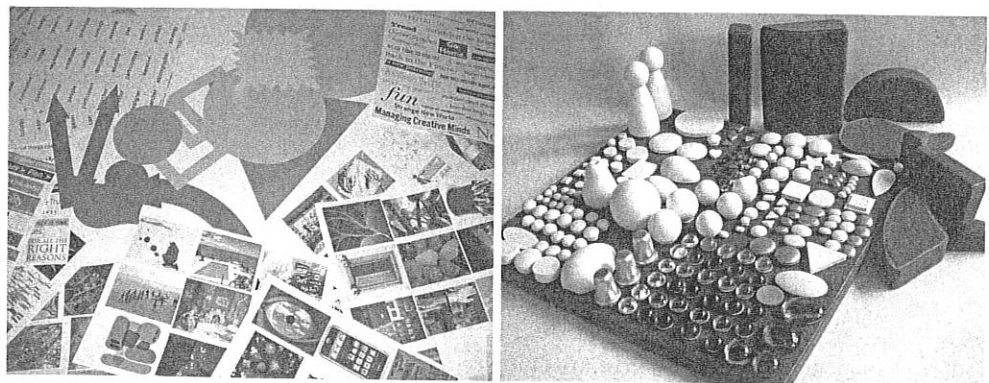


Figure 7.10 Examples of generative toolkits. Left: Image collaging toolkits such as this one can be used for helping non-designers to imagine and express their desires for future scenarios of use. Right: Velcro-modelling is a generative design language and toolkit that provokes imaginative explorations and embodiments of future scenarios of use (photos © Elizabeth B.-N. Sanders).



significant challenges for society and welfare. Thus, in recent years many Participatory Design projects around the world have focused on designing new ICT systems, services and/or devices to improve health care. The following short case from Helsinki addresses the challenge of keeping people in employment as long as possible so they can contribute to society.

The Aging@Work project started out from a very open design brief. The overall idea was to identify features and design technology that could improve work and wellbeing at work, with the hope that this would result in aging workers staying longer in the labour market. Tuuli Mattelmäki and colleagues write that they had no prior knowledge about the phenomenon of aging at work (Vaajakallio and Mattelmäki 2007). Thus, the first activity that the aging workers took part in combined telling and making. The researchers made probing kits that invited the workers to map and probe into their present everyday experiences. The probe kit included a map, a timetable, a task book and postcards.

The make activity that followed used a Velcro-modelling toolkit. Each study focused on one worker and took place at this person's workplace. First the workers were instructed to build (using the Velcro-modelling toolkit) a 'dream device', a tool that could help them either to work in a more focused way or to feel better while at work (see example in Figure 7.11).

After having 'completed' the making activity, the aging workers were asked to return to their usual work with the dream tool and work as normally as possible. When they thought the dream tool could change their work practice into a more desirable one, they enacted the activity using the dream tool as a prop and pretending that it worked (see example in Figure 7.12). The dream tool served as a probe to elicit future scenarios of use.

This short case shows how tell, make and enact activities in Participatory Design practices often are intertwined and take place simultaneously. Unlike the short case in the previous section, where the users at the museum used existing objects when enacting scenarios, central in the Aging@Work project is that the aging workers use the Velcro-modelling toolkit for prototyping their own personal devices. It is the participatory prototyping activity which is in the centre of this Participatory Design practice.

In the next short case, the prototype is also at the centre of the design practice, but here the users are not directly involved in the making and remaking of the prototype. It is the programmers that do this work. The case takes place during the design development of an interactive prototype. In the Nnub project, members of a community interact with an evolving prototype as their experiences with it are tracked. These data, combined with various tell activities, are the means upon which the interactive prototype develops.

### *Short case: applying longitudinal studies to design social technologies*

Most Participatory Design projects are carried out within a relatively short timeframe, which often means that it is impossible for researchers to take part in (the final) detailed design and implementation and to follow what Dourish has called appropriation (Dourish 2003) during everyday use. Important challenges in many projects are therefore to find ways to secure that what is designed is found relevant and realistic and fits into the everyday practices of the people for whom the new design is intended. A related issue is finding ways to get knowledge beyond novelty usage.

In this example, Margot Brereton and colleagues from Queensland University of Technology present a longitudinal Participatory Design practice that addresses these challenges when designing social technologies. For some years, people in a suburb of Brisbane in Australia have used and suggested changes to a digital community noticeboard (called Nnub) located in the general store. The idea is that the gist of the neighbourhood is captured in text and images uploaded by local people to the community digital noticeboard (Redhead and Brereton 2008; Heyer and Brereton 2010). See Figure 7.13.

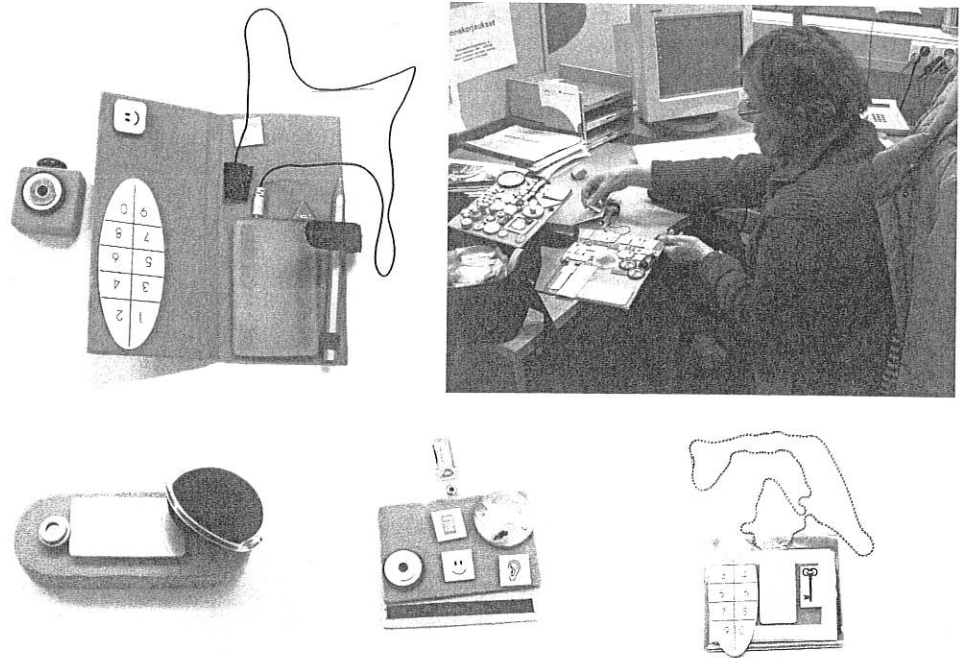


Figure 7.11 Top right: The worker builds her dream device using a Velcro-modelling toolkit. While building it she is encouraged to think aloud so the researchers can hear her thoughts. Top left: The resulting dream device made by the woman in the image. Bottom row: Examples of dream devices made by other aging workers using a similar Velcro-modelling toolkit (photos: © Vaajakallio and Mattelmäki 2007).

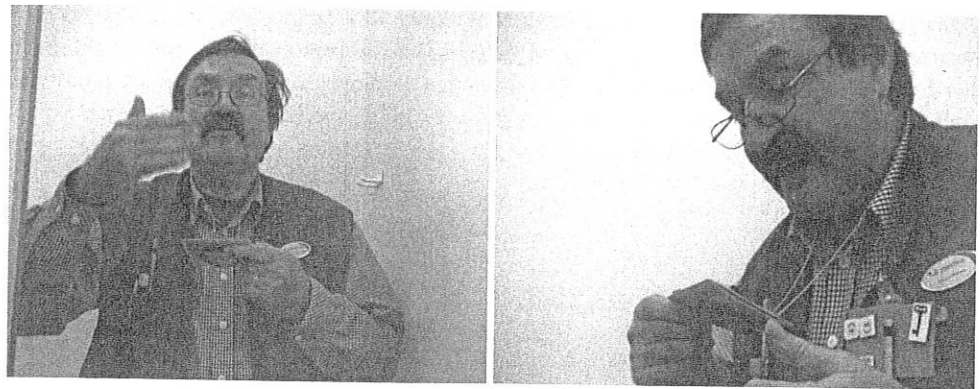


Figure 7.12 The aging worker acts out an envisioned future situation using the dream devices he has made (Vaajakallio and Mattelmäki 2007).

The main characteristic of their design practice is to integrate working exploratory prototypes into particular everyday environments and to have people interact with these in situ. In relation to the tell–make–enact framework, the main emphasis is on make and enact, with various telling activities that were set up to capture the make and the enact. They suggest a Reflective Agile Iterative Design framework to support the design process, where form and functionality of the prototype is shaped over time in response to immediate use. Thus making an initial

exploratory prototype is used as a means to invite participation and inspire new design iterations. The process is active and responsive and driven by local citizens enacting with the evolving prototype (Redhead and Brereton 2009). Reflecting on people enacting with the exploratory prototype is the primary means for learning. See Figure 7.14.

Heyer and Brereton suggest several tools and techniques to collect responses from using the Nnub, upon which the reflection and new iterations of redesigning the prototype are based. The various 'tell-techniques' included:

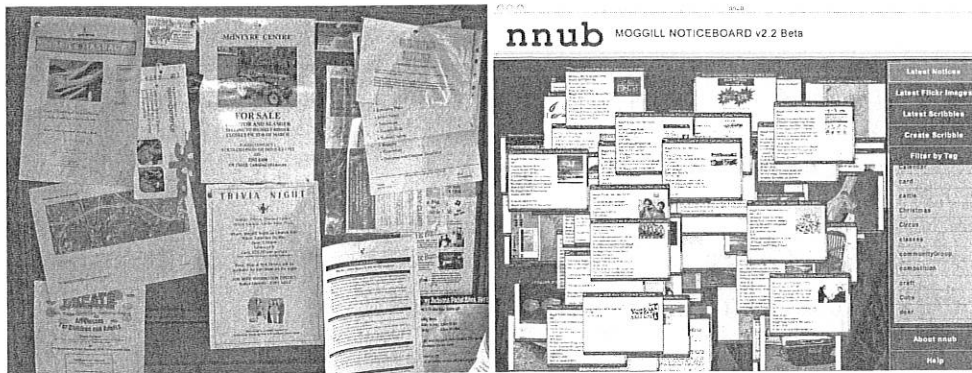


Figure 7.13 Left: Outside the Moggil general store there is a traditional noticeboard. Together with the people living in the suburb of Brisbane, the researchers considered the relation between the traditional and the digital noticeboard. Right: The functionality of the working prototype was gradually developed through making based on people's responses to immediate use. For example, in the beginning it was only possible to make notices and post photos separately. Later these could be combined. Then it was possible to add scribbles, which the children were very fond of. Then it became possible to tag the various contributions. Later multi-site capability changed the Nnub from being a stand-alone screen in a specific shop to a community noticeboard which could be reached from anywhere with Internet access (photos © Margot Brereton and Fiona Redhead).



This layout helps to convey variation of content too which was mentioned in an earlier post (see [annb2.a2publicdisplay-poster](#) rather than notices/photos and variations of content).

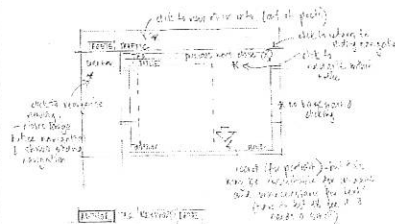


Figure 3:

This sketch is really arching back to an earlier sketch although since then we have worked out the side navigation which allows better drilling down (see [annb2.a2publicdisplay-category-navigation](#)). This idea is layering the scrolling thumbnails with the large post to allow the best use of the screen real estate. The large post is viewable

Figure 7.14 Left: Boy using the digital noticeboard in the shop. Right: hand sketch from the 'change log' that monitors the evolving design – here thoughts about the screen layout. (images © Fiona Redhead).

- A *question log* that tells the designers about the use of the system which is used to help them to prioritise and focus design efforts. The system logs usage data automatically.
- A *notebook* that is placed in the shop for people to leave feedback.
- A *change log* monitors the evolving design and thereby tells the design team 'when bugs were fixed or features added, removed or modified'.
- A *reflective journal* is used to record reflections on observed use, and results of data analysis' (Heyer and Brereton 2010, p. 284). The latter is yet another example of a tell-technique used to continuously inform the people involved about the project's progression.

Designing social technology that can be used by everyone in a local community is challenging, not least because it has to accommodate many different interests and various experiences with ICT technologies. The design process evolved around iterations of the making and remaking of the prototype, based on how it was being used in situ. Unlike most other Participatory Design projects, workshops were not the primary technique for participation and communication between users and designers. Instead the researchers have combined an interesting series of tools and techniques for 'telling' to support the make and enact activities.

### Participation through enacting possible futures

New designs change the environments and practices of people. Essential design challenges are both to generate design proposals that create desirable changes, and to explore how possible new designs affect experiences, behaviours, rhythms, etc., in the future. The best way to find out is by working with approaches, methods, tools and techniques focusing on enacting.

With enacting we refer to activities where one or more people imagine and act out possible futures by trying things out (by use of the body) in settings that either resemble or are where future activities are likely to take place. What is enacted in the situation can, for instance, be something like a scene in a play based on a script, story or scenario made (partly) beforehand. Enacting can also be solely based on improvisation and experimentation in the situation. Thus, through enacting one can present or develop and explore ideas through embodiment, but ideas can also be evoked through acting and hence experimenting through improvisation. Even though enacting techniques can be used as a way to present a finished design, what we will focus on here is giving examples of the tools and techniques related to enacting as part of work-in-progress.

#### *Inspiration from improvisational theatre techniques*

Many Participatory Design practitioners have found inspiration from the world of drama, for instance by transforming specific drama techniques like Forum Theatre (Boal 1974) into techniques for enacting in Participatory Design sessions. In Forum Theatre actors perform a skit to which the audience members are asked to suggest changes. Based on the suggestions, the actors improvise changes to the situation at play. Thus the people in the audience are not passive spectators but are invited to take the role as authors and directors, and they can keep making changes to the play until they are satisfied with the outcome. Early on within the Participatory Design field, Ehn and Kyng (1991) and Ehn and Sjögren (1991) made informal use of this enacting technique. Brandt and Grunnet (2000) have worked with a more formal use of the Forum Theatre technique (see Figure 7.15). As a related technique, Brandt and Grunnet suggest using the technique of 'frozen images'. The frozen images are made by suddenly stopping in the middle of an action. These incidents are analysed and discussed on the spot, upon which new suggestions for enacting are made.

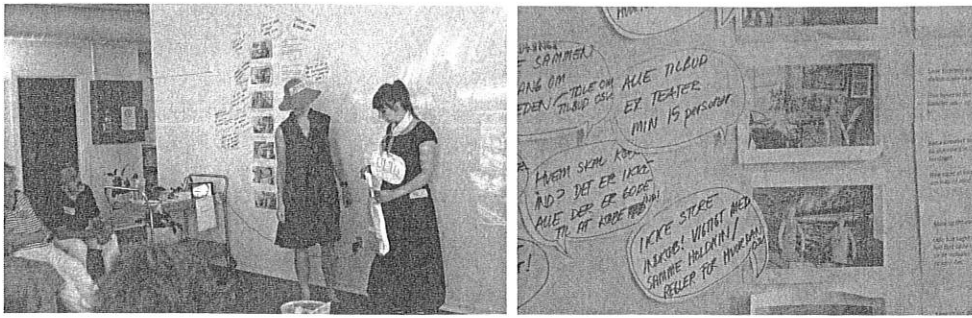


Figure 7.15 In the Senior Interaction Project the project team enacted scenarios using the Forum Theatre technique. Senior people and other stakeholders acted both as spectators and directors suggesting changes to the play. Suggestions were both acted out on the spot and documented on paper on the wall. Projections on the wall helped to give a sense of where the situations took place.

Another example from the world of drama is moving the ‘magic if’ acting technique by Stanislavskij (1940) into framing co-design activities. In drama the ‘magic if’ technique is used in order to create empathy for the role to be played. In Participatory Design, questions such as ‘what if the user was in this or that situation?’ can easily be used to enact and explore future use situations. Burns et al. (1997) were among the first to argue that by adopting the role-play technique it is possible to bridge the conceptual leap between ‘what is’ and ‘what might be’ (Burns 1994; Burns et al. 1997).

The acting-out techniques have been used to create empathy for potential users and to get to know use situations through bodily experiences. The (bodily) knowledge gained by the design team has been argued as an essential basis for generating ideas and making proposals for change (see e.g. Brandt and Grunnet 2000).

Others use professional actors to enact scenarios. For example, in the Focus Troupe approach (Sato and Salvador 1999), live performers enact scenarios that include product concepts as part of expanding traditional focus group sessions. Sato and Salvador report that live theatre as part of focus groups can create strong shared contexts with focus on interaction, and that this way of exploring seems less literal than presenting scenarios on video or presenting physical prototypes.

In the same vein Howard et al. (2002) have developed a scenario-based design approach to increase stakeholders’ sense of immersion. They use professional actors for acting out scenarios with props, sometimes together with candidate users. The scenarios are staged in design contexts as well as real contexts of use. Garabet et al. (2002) have in an interesting and more experimental style done performances where they have presented wearable computing artwork in public and recorded people’s reactions.

Others invite users, clients or other stakeholders to take the lead in improvising and enacting possible new future practices. We will give examples of this later in this section. The point here is that even though techniques for enacting today are widely used in Participatory Design practices, there is no consensus about who should be the ones to enact. The choices made depend on the aim of the enactment but also on the mindset that influences which activities users and other stakeholders should be part of in Participatory Design projects.

### *Scenarios are stories about people*

Enacting is closely related to scenarios. John Carroll writes: ‘Scenarios are stories – stories about people and their activities’ (Carroll 2000, p. 46). Stories about the future are often conveyed

through scenarios where one imagines or enacts how activities and experiences in the future could be different from today. The scenario technique has for long been recognised as a powerful means in designing. Scenarios are powerful for envisioning and simulating various future use situations. Simultaneously they are valuable means for (common) reflection and learning (see e.g., Kyng 1995; Carroll 2000). In particular, scenarios have been widely used in Participatory Design practices within Human-Computer Interaction, Computer Supported Cooperative Work and system design projects for many years. Based on Clausen (1993) and the book edited by Carroll (1995), Keld Bodker and colleagues describe the scenario technique thus:

Developing scenarios is a technique that supports building coherent visions and thus helps in anchoring these visions. Scenarios visualize the practical application of a proposed IT system, that is, the potential effects of implementing it. Scenarios are prose-style representations exemplifying a work practice under future use of the system. Scenarios may illustrate application of the system as viewed from the different users' perspectives. Thus, they may also refer to a design sketch or prototype of a proposed system. Scenarios are based on the users' conceptualizations of their work context.

(Bodker et al. 2004, p. 216)

In their book *Participatory IT Design: Designing for Business and Workplace Realities*, Bodker et al. (2004) give an example of a scenario from a project at a radio station. In pure text the scenario describes how the design team imagines that the editorial unit uses the new system during one week from overall planning through daily programming and broadcasting.

John Carroll's book *Making Use: Scenario-Based Design of Human-Computer Interactions* is very informative on, for instance, scenario characteristics, various aspects to consider and challenges that are involved in scenario-based design (Carroll 2000). For instance, Carroll explains that scenarios

mention or presuppose a *setting* ... Scenarios include *agents* or *actors* ... each typically with *goals* and *objectives* ... Scenarios have a plot; they include sequences of *actions* and *events* ... Representing the use of a system or application with a set of interaction scenarios makes the *use* explicit.

(*ibid.*, p. 47)

Carroll argues that scenario-based techniques

seek to *exploit* the complexity and fluidity of design by trying to learn more about the structure and dynamics of the problem domain, trying to see the situation in many different ways, and interacting intimately with the concrete elements of the situation.

(*ibid.*, p. 45)

An important strength is that scenarios are at once concrete and flexible.

They are concrete in the sense that they simultaneously fix an interpretation of the design situation and offer a specific solution ... At the same time, scenarios are flexible in the sense that they are deliberately incomplete and easily revised or elaborated.

(*ibid.*, p. 54)

Several researchers have found that stories about people and their activities are easier envisioned and more realistic when developed and explored through enacting. As an example, from the field

mainly their hands and voices in a puppet theatre fashion. In the latter, puppets and the scenery within which they are moving are important tools (see e.g. Ylirisku and Buur 2007; Foverskov and Binder 2011).

Reflecting back to the tell–make–enact diagram in Figure 7.1, the primary action involved in creating scenarios includes (story)telling. The stories are often built upon a traditional narrative structure with a clear beginning, middle and end. As exemplified, scenarios can be written as pure text but the story can also be ‘told’ by use of sketches, photographs or video. The activity of enacting is also closely related to scenarios. The human body is used not only to illustrate actions but also as a means for exploration through trying and acting out. Thus, through enacting, bodily and perhaps tacit knowledge is set in motion which can generate and evoke useful new knowledge about what is to be designed. Combining telling and enacting through enacting scenarios is very powerful for imagining and exploring new and possible futures.

### *Staging performances with props, mock-ups and/or prototypes*

Enacting scenarios by interacting with props or prototypes makes future use situations explicit and hereby subject for enquiry, reflection and learning. Still, enacting needs staging. Enacting needs both to take place at a site or within a setting, and to involve various artefacts that constitute the situation. ‘Constitute’ is borrowed from Westerlund (2009), who recently argued that we should refrain from describing future activities and artefacts as representing the future, as they do not yet exist. Depending on where one is in the design process, the ‘things’ to be designed and interacted with are most often described as props and mock-ups, early and later prototypes. When the purpose is to enact use situations in Participatory Design, for instance, Bødker and Buur (2002) stress the importance of using tangible prototypes as one can interact with them and get hands-on experiences, and the prototypes can be held, placed, pointed at, etc.

Buchenau and Fulton Suri write: ‘Increasingly, as designers of interactive systems (spaces, processes and products for people), we find ourselves stretching the limits of prototyping tools to explore and communicate what it will be like to interact with the things we design’ (Buchenau and Fulton Suri 2000). They suggest ‘Experience Prototyping’ as a fruitful approach, when the subjective experience of interacting with a product, space or system is emphasised. Explorative experiments are carried out by enacting with mock-ups, prototypes or existing products. They give examples of how they prepared the enacting in situ by cutting the story up into scenes, with each scene introduced on a card explaining the goal, the rules to be followed and the roles of the players and audience. Informance or bodystorming is a technique where designers are actors and ‘bodystorm’ as users using simple mock-ups or prototypes. The informal improvisations are used to act out and explore design alternatives in a setting that is constructed to capture the essence of the real-use context. Another example of bodystorming is presented by Oulasvirta et al. (2003), and examples of staging-use contexts and exploring design alternatives are provided by Nilsson et al. (2000), for instance.

### *Enacting scenarios in real-use contexts*

Having users improvising and enacting scenarios in their own environment brings the experiences as close as possible to exploring how the everyday activities could be different. With the use of very simple mock-ups, Binder shows how video-recording of enacted scenarios becomes a new and valuable common language in Participatory Design (Binder 1999). This work was followed up, for instance, by Iacucci and Kuutti (2002). In the SPES approach (Situated and Participative Enactment of Scenarios) a member of the user group is provided with a simple

mock-up of a future device (the magic thing) to help imagination (Iacucci and Kuutti 2002). The designer follows the user through her daily activities and the mock-up is used to envision ideas of services and features of the product being designed (see examples in Figure 7.17).

As in the two previous sections, we will end this section with a short case that illustrates how various telling, making and enacting activities are combined into a design practice of participation.

### *Short case: rehearsing new roles and relations*

Taking care of major societal issues often involves several stakeholders with different expertise and responsibilities. Scaling up the complexity of the development task calls for Participatory Design practices. Still, creating innovation across organisational boundaries where roles and responsibilities are often quite fixed and simultaneously involving users is challenging. In the following short case from Denmark, researchers found that it was valuable to stage Participatory Design processes that included both prototyping of future design concepts and the possibility for stakeholders to try out new roles, relationships and practices that follow with a new design.

In the DAIM project on recycling and reduction of waste, the client was a large incinerator plant owned by 19 municipalities (Halse et al. 2010). The stakeholders were both those from within various parts of the waste system and users of the system, for instance, citizens and shop owners. In the beginning the focus was on telling activities. A number of field studies were carried out. For instance, waste collectors and people operating recycling stations were followed for one day at work, and citizens were visited in their homes in order to learn about motivations and practices around recycling and waste handling. The many stories were transformed into tangible materials and formed the basis for a workshop where the participants collaboratively created dream projects about how the future could be different. The dream projects were physically gestalted (see example in Figure 7.18) and presented through storytelling. Thus the workshop combined tell and make activities. The 'new relations' design game, a simple star diagram, was used to identify different stakeholders and enquire into possible new roles and relationships in relation to specific dream situations.

Later, new roles and relations were very concretely explored through imagining and elaborating on tentative 'what if' situations identified during the previous activities. For instance: 'What if waste collectors were heroes of recycling?' 'What if shopping centres were hubs for recycling?' The stories were first created as improvised doll scenarios, where the participants staged and acted out their visions using dolls (Halse et al. 2010; see example in Figure 7.18). As part of staging, the participants made their own backdrops based on photographs from the fieldwork. Creating doll scenarios



*Figure 7.17* Left: Sergey, who experiments on wood samples, uses the 'magic thing' to record details about the experiments (Iacucci et al. 2000). Middle: Matteo wanted the 'magic thing' to be hooked on the bike and to be able to check friends in the cafeteria while passing by (Iacucci and Kuutti 2002). Right: Diana, a tourist in Helsinki, uses the 'magic thing' as a shopping assistant to keep track of the type and price of trousers in different shops. The shopping assistant also remembers the location of the shops (Iacucci and Kuutti 2002).



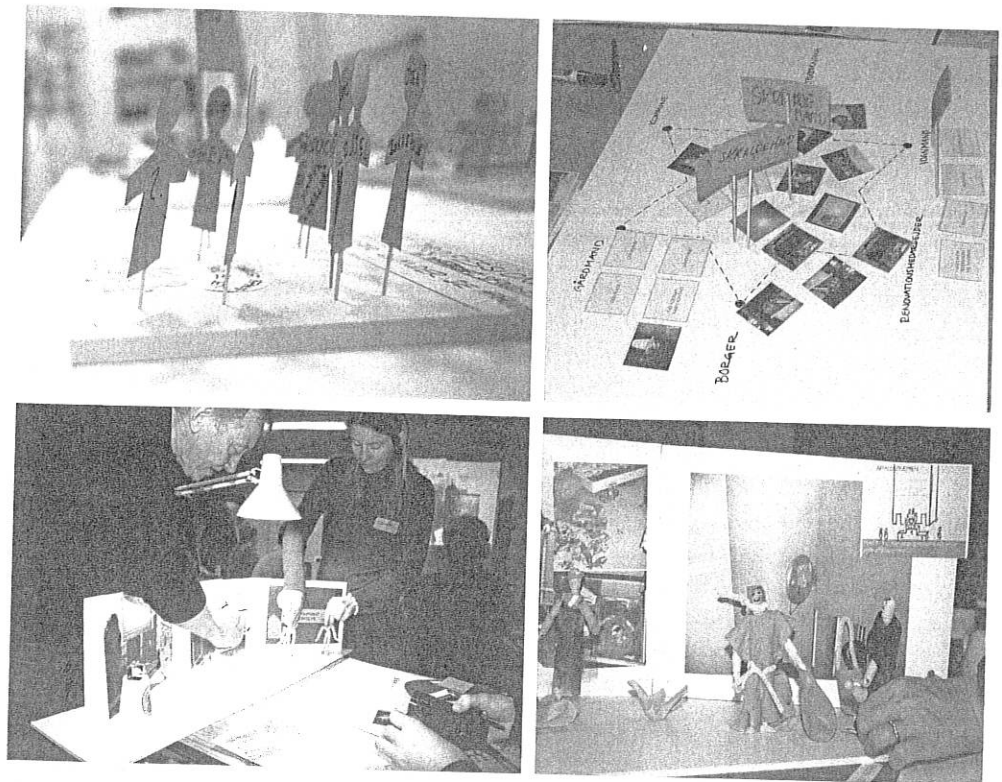


Figure 7.18 The DAIM project. Top left: The stakeholders create a large number of dream projects using toolkits with, e.g., cardboard silhouettes. Top right: A simple star diagram was used in the 'new relations' design game to identify different stakeholders and enquire into possible new roles and relationships. Bottom: The workshop participants built a stage with photographs as backdrops and played out doll scenarios where new roles and relationships were explored through improvising actions and dialogue in front of the video camera (Halse et al. 2010).

included telling, making and enacting. Based on the doll scenarios the participants later played themselves in full-scale video scenarios in situ, where they improvised and acted out situations using simple props to illustrate and explore future possibilities (ibid.; see examples in Figure 7.19).

As in the other short case stories, the Participatory Design practice described here also includes tell, make and enact activities – often in combination. In this case the centre of gravity seems to be on storytelling and enacting. Still, one should not neglect the importance of making. It is just as much the collaborative making of the dream projects on the boards that creates a joint focus of attention, negotiation of experiences and interests, inspires new ways of understanding the system, and jointly creates a vision for the future. This said, the experiences also show that it is of vital importance in innovation projects involving many different stakeholders that new roles and relations can be explored as part of generating concepts for new directions and future scenarios of use.

### From tools to games: bringing it all together

Throughout this chapter we have pointed to the way tools and techniques in Participatory Design amalgamate into very particular design practices of telling, making and enacting. Across differences,



Figure 7.19 The DAIM project. The shop owner, Allan, and the resident, Lillian, enact scenarios in situ assisted by the design team. Through improvisation they collaboratively explore how recycling can be combined with shopping. For instance, they develop a concept for recycling of batteries that gives a refund when buying things in the shop (Halse et al. 2010).

researchers and practitioners are concerned with the staging of a 'third space' of collaborative enquiry where different stakeholders may come together to rehearse 'the possible'. This coming together is not just an accumulation of insights, nor is it solely a negotiation of interests; rather, it is, as Ehn has called it, 'a meeting of language games'. What this entails for the emerging practice of participation is captured neither by a reference to tools and techniques as simple means of participation nor through a concern for the (often conflicting) objectives of the collaborative process. What sets Participatory Design aside from political negotiations in established political forums or from instrumental processes of achieving well-defined organisational or institutional goals is precisely the entanglement of the questions of what to achieve and how to achieve it. Design is not decision-making in a well-known space of opportunities but an exploration of what may be envisioned through the coming together of a network of actors. In this coming together, means are tentatively tried out and goals are provisionally put into play. As the exploration evolves, participants are playfully participating in a new practice that brings together means and ends in what one could call a new game of possible futures.

The notion of design games, first coined with direct reference to Wittgenstein's concept of language games by Habraken and Gross (1987) has been influential in the discussion of participation since it was first brought up by Ehn and Sjögren (1991). The basic idea of design games put forward by Habraken and Gross is that design can be modelled as a dialogical engagement with materials guided by a set of rules and taken forward through turn-taking among a number of game players. Habraken and Gross used the particular concept of design games to study different aspects of the design process, but over the years the concept of design games has attracted interest both as a metaphor for the overall process of design participation and, more importantly, as a particular way of formatting the participatory process. We will end this chapter by briefly discussing why the design game format has gained widespread attention, and how the concept of design games makes it possible to overcome the separation between tools and techniques, on the one side, and the participatory mindset, on the other side, that have so often led newcomers to misinterpret what is accomplished in Participatory Design practices.

### *The design game as a particular framing of design participation*

At the very beginning of this chapter we discussed how early definitions of tools and techniques for participation deliberately sought to comply with the instrumental ethos of systems design, by

emphasising the need to supplement conventional methodologies with a toolbox for participation. This made sense in a rhetorical dispute with the mainstream of systems design on the neglect of many stakeholders but, as we have also pointed out, it left out a concern for the playfulness and willingness to suspend conventional wisdom that is mandatory in the participatory process. Instrumentality implies a clear separation between means and ends, and as Ehn and his colleagues argue in the book *Design Things* (A. Telier 2011), design in general revolves around the making of things, where each 'thing' is at the same time an artefact and the assembly of a network of actors (much like the archaic notion of a thing as a gathering of community members to resolve issues of controversies). Without going deeply into this argument we can see that the framing of participation proposed by Ehn and others is a performative one, emphasising the openness of both process and outcome through an attention to procedure. The authors go on to suggest that design practices perform participative entangled design games on at least three levels. First, the numerous everyday interactions among users and designers in and around every design project can be seen as design games, in the sense that the meeting of language games or practices gives rise to new language games (whether this is acknowledged or not). Second, the particular staging of the design process, broadly speaking, sets the rules for design games in the sense that it provides the participants with roles and materials that in themselves define a game of interaction. Third, each particular engagement or device of what we in this chapter have called tools and techniques involves a design game, providing possibilities to tell, make and enact 'the new' in a dialogue scripted by the particular characteristics of the engagement (*ibid.*).

If we look back at the four cases of Participatory Design practices that we have presented in the previous sections of this chapter and compare them to the three levels of entangled design games presented above, we may see how the framing of participation as design games may help us to capture the interplay between telling, making and enacting involved in any participatory practice.

In the first case, concerning challenging tradition and transcendence through fictional narratives, we see a group of design researchers inviting museum visitors to explore a fairytale universe with magical tools in a deliberately playful manner, yet still maintaining that their participation is anchored in their specific visit to the museum. Here it is very obvious that particular rules of interaction are proposed, but still the participants are invited to wholeheartedly engage in much more than a psychological experiment. The starting point is the telling of a story, but the visitors are given means to add to and alter the story and to take part in making the universe tangible and bringing it to life through their playing out of new experiences. What is taking place is thus both a casual everyday interaction among the family members and the design researchers, a staging of the process of participation and a set of very particular engagements that gives direction to the visitors' exploration of the museum experience. The staging of the Atlantis narrative and the explicit rules of participation enable the participants not only to explore and comment but also to express and contribute to the evolving universe of new museum experiences. We can still consider the individual tools and techniques employed, but the design games perspective adds a concern for the fullness of the Participatory Design practice.

The two short cases in the section on making represent two rather different stagings of the participatory encounter. In the first case about improving wellbeing at work, the design researchers and caretakers are performing a carefully scripted set of events where the caretakers are first invited to make a dream tool for their work and immediately afterwards encouraged to act out an everyday situation with the dream tool in their well-known working environment. Already the notion of dream tool indicates that the event involves a playful exploration of imagined new technology, and the game perspective may again help us to ask if this is really a design game where all involved have the opportunity to take turns and propose and enact tools

that makes sense in their everyday practice. The site of the event being the actual workplace of the caretakers similarly implies a negotiation of the 'the rules of the game' that are crucial for the maketools to make sense. Again, to ask what the design games are here makes it evident that what the participants make must be linked to what they are able to tell and experience through acting, and this must be catered for in the participatory process even though what is in the foreground are particular tools and techniques for making. The second short case in the making section, concerning applying longitudinal studies to design social technologies, reports on a Participatory Design practice evolving over a longer period of time and almost fully embedded in the everyday life of a small suburban community. Researchers are providing an infrastructure for social technologies and perform occasional interventions to have participants tell about their involvement with the technology. This does not seem much like a design game at first, but again, referring to Ehn and colleagues' three levels, the design game perspective may encourage us to look at the everyday interactions as language games and we may ask how these interactions enable turn-taking and the negotiation of rules. On the detailed level of researcher-user interaction, we may also ask how the question log, change log or reflective journal reported in the case contributes to the evolving design dialogue, for example by facilitating an interplay between emerging insights and the making of new design proposals.

In the last short case, concerning rehearsing new roles and relationships, we have an example of a Participatory Design practice that very directly addresses the second-level design games of staging the collaborative process. Here the tools and techniques of participation are brought together to mobilize stakeholders and to prompt the open negotiation of the rules and roles of participation among participants. The researchers themselves talk about the interactions as design games; for example, in the 'new relations' game the exploration of networks is governed by a strict game format. With a broader framing of the participatory practice as entangled participative design games, we may also be encouraged to consider in this case how the project draws upon and fuels the everyday meeting of language games outside the staged events of participation.

With this revisiting of the cases, we have proposed that the notion of design games both as a metaphor and as a concrete formatting of the participatory practice may give us a sensitivity to the way tools and techniques of telling, making and enacting must be brought together in a participatory mindset. We will end this section by giving a final short case in which the design researchers have deliberately pursued the design game perspective to show how it may also guide practitioners of Participatory Design to bring together tools of telling, making and enacting on a practical level.

### *Short case: designing (with) design games*

In the mobile phone industry, successful new concept design has to be worked out with close attention to the business networks formed by service providers, telecom companies and hardware manufacturers. At the same time the need for engaging with future users is paramount, yet often difficult to establish through secrecy and internal power struggles within the business networks. At the Interactive Institute in Malmö, Sweden, a group of Participatory Design researchers were approached by a major mobile phone company and asked to propose a compact design project in which both the business network and potential future users could be engaged in concept design. The researchers chose to stage the design project through the preparation of closely linked design games that were to be played over workshops, with preparatory dialogues in between. The resulting four games combined a set of different tools and techniques ranging from creating personas (see also Grudin and Pruitt 2002), making prototypes to enacting scenarios. See Figure 7.20.

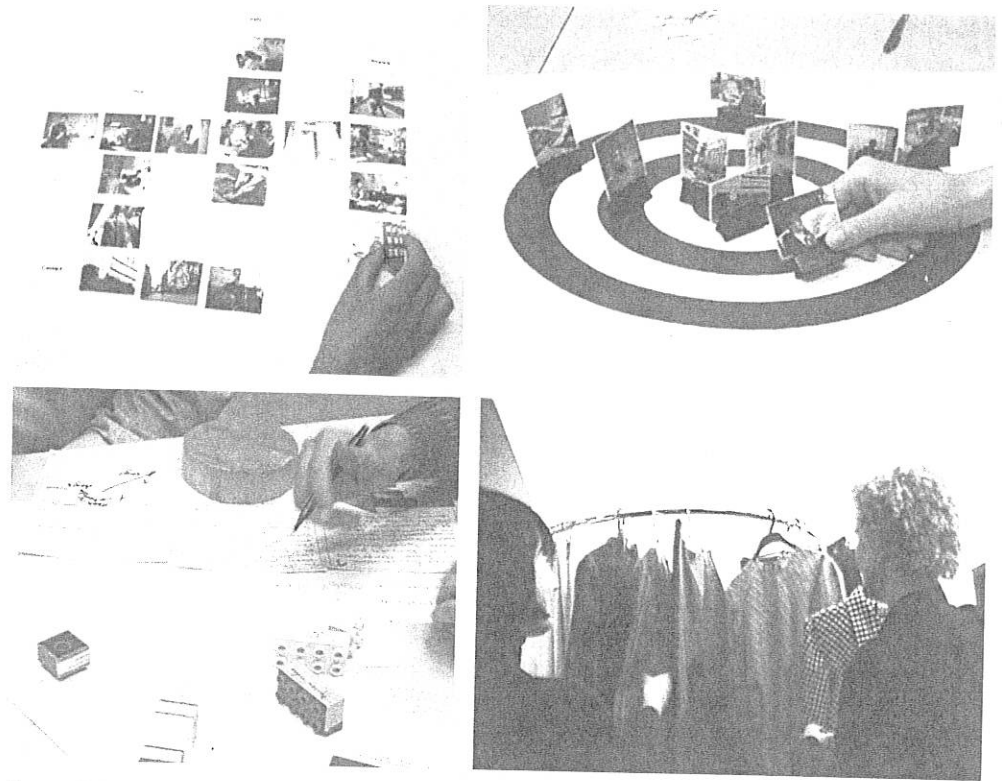


Figure 7.20 The COMIT project from the Interactive Institute was event-driven. The industrial partners and potential users participated in four workshops. Each of these was framed and organised as a design game. Top left: the User Game. Top right: the Landscape Game. Bottom left: the Technology Game. Bottom right: the Scenario Game (Brandt and Messeter 2004).

In the User Game, the aim was to create stories about people as prospective users. Through game playing the intention was to help the stakeholders develop a shared image of intended users which was firmly grounded in field data. The game material was based on video recordings from ethnographically inspired field studies. Video snippets were watched and game pieces with images from the field studies were used to create a web of interrelated stories about one (potential) user. Each story was labelled with a game piece with words on it (Brandt and Messeter 2004). The intention with the Landscape Game was to create context for the people portrayed in the User Game. This means that the focus shifted from developing stories about a person, his or her interests and relations to involving the physical surroundings. In this game it was important to identify what elements in the person's surroundings augmented various activities in that person's everyday life. The game materials included game boards and game pieces, like images illustrating parts of the environment in the field studies. The Technology Game was for projects that either aimed at developing technology or projects where technology played an important role in the activities and environments for the intended design. The intention with the game was to both introduce and investigate various technologies and the 'form factor'. The game pieces illustrated technologies or various functionalities, depending on the level of detail that was needed. Other game pieces illustrated the physical form factor and

evoked discussions about shape, size, etc. The intention with the Enacted Scenario Game was that experiences from the previous games were condensed into scenarios involving persons, context, activities and, if convenient, the technology to be designed. An important feature was that these scenarios were created and acted out in situ (ibid.). In the light of the previous discussion of the different levels of design games, one may see these four games as examples of concrete engagements and devices shaped as games, but one may also see the package of games as an attempt to shape the overall project through the game metaphor (as discussed also in Brandt et al. 2008; and Brandt 2011).

### Future directions and opportunities

The tools and techniques for making, telling and enacting provide a very wide range of ways for involving relevant stakeholders at points all along the design process. These tools and techniques for Participatory Design have been growing rapidly in both quantity and range in the last five to ten years. The tell-make-enact framework helps us to collect, organise and put into action all this variety. The framework also helps to reveal that opportunities for future applications of the tools and techniques can be described at three levels:

- the continued exploration and application of specific tools and techniques for participatory designing,
- investigation of the relationships between making, telling and enacting, and
- further exploration, application and refinement of the framework.

#### *The continued exploration and application of specific tools and techniques*

The number of possible tools, techniques and applications for making, telling and enacting is limitless. The challenge is to determine which tools and techniques are most effective in what types of situations and for what types of stakeholders. Successful application of specific tools and techniques demands an in-depth understanding of the design process and the ability to provide the materials, tools and techniques that are appropriate for each phase in the process. Some of the areas in need of further development at the first level are described below.

We need more research to develop a better understanding of how to apply the tools and techniques of participatory designing. For example, here are the types of questions that students and beginners pose about the specific tools and techniques of making, telling and enacting:

- How do you prepare the participants for engaging in activities of making, telling and/or enacting?
- How can you anticipate how long it will take people to engage in these activities?
- Are some types of tools and techniques better suited for people from different backgrounds/ages/gender/etc.?
- How can you improve the efficiency and effectiveness of the specific tools and toolkits?
- How do you analyse the data that is generated by making, telling and enacting activities?

Application of the probes and the generative tools is particularly challenging, since they appear easier to execute than they actually are. It takes some time and experience to master these domains. For example, the creation of a generative toolkit of components that has enough ambiguity to spark previously unconnected ideas, yet one that is not so large as to be overwhelming, is an ability that grows with practice. The best way to learn how to apply the making

tools and techniques is by doing, i.e. by making, in as many different situations as possible.

In terms of new applications of the existing tools and techniques, practice is leading academia. However, the new applications in industry are rarely published. They may be described on blogs or shared through photos but rarely are the details shared, owing to confidentiality concerns. The new application of existing tools and techniques is an area ripe for design and research discovery. It is especially important that the exploration of and reflection on the use of the new tools and techniques be situated at all the phases of the design and development process. It is also important that the results of these explorations be published.

### *Investigation of the relationships between making, telling and enacting*

Design participation is an evolving practice of making, telling and enacting. The iterative flow of events between these activities is essential, not only for participation to occur naturally, but for participation to occur with ease and with joy. When we can fully engage people's minds, hearts and bodies in imagining and expressing future situations of use, we can be assured that they have an opportunity to influence future ways of living, learning and being.

We need far more research to develop a full understanding of the relationships between the practice of making, telling and enacting. For example, here are some of the questions that students and beginners ask about the connections and relationships between making, telling and enacting:

- What are the best entry points into the iterative processes of participatory designing?
- How do you decide in what order to conduct the activities? Is it better to have participants do the making activities before enacting? Or vice versa?
- Should the participants or the researchers lead in deciding how the activities play out over time?
- Do the relationships between making, telling and enacting change at different phases of the design process? If so, how?
- Do the artefacts of the Participatory Design process change across the different stages of the design process? If so, how?

### *Further exploration, application and refinement of the framework*

The framework for design participation is also in need of further exploration, application and refinement. For example, how can we optimise the journey among and between making, telling and enacting from the perspective of the participants? How can the game metaphor help us to better plan these journeys? What other metaphors beyond games will we find useful in the future?

The analysis and interpretation of the data that comes from design participation through making, telling and enacting poses quite another set of challenges. Each artefact that is created and the story or the enactment that goes along with it will be unique. Analysis can focus on the artefact, the story, the enactment and/or the interplay between artefact, story and enactment. The focus of the analysis also differs at different points along the design process. Analysis in the pre-design phase is more likely to focus on the story or enactment, since the artefact is a physical instantiation of a desired experience. Analysis of participatory prototyping activities that take place later in the design process is more likely to focus on the artefact itself.

There is an immediate need for publication and dissemination to keep the tools and techniques of Participatory Design open to all. The tools for making are particularly colourful and tangible. The experience of being a participant in making activities is immersive, engaging and fun and the practices of making can be done either individually or collectively. All of this is

being recognised at a time when the business community is busy discovering and disseminating its own versions of what 'co-creation' and design thinking might mean. Although the business perspective on co-creation today tends to view the phenomenon from the marketing, sales and distribution end, it is only a matter of time before the business community will recognise that co-creation is even more relevant at the early front end of the design development process, where probes and generative toolkits best operate (Sanders and Simons 2009). It is important that research and practice with the tools and techniques for making be published and shared widely so that they will be open for all to use in the future. Froukje Sleeswijk Visser's dissertation (2009) is one effort that moves in this direction. But with the new tools and techniques that are emerging, this effort needs to be continually updated.

In light of all the open issues and challenges described above, it is not hard to imagine future research areas for PhD students:

- An ethnography of the design participation framework in action. How does it play out in industry versus in industry-sponsored academic projects versus in academic settings?
- How is it best to teach or to set up learning environments for the design participation framework? What is the role of theory? What is the role of hands-on learning and apprenticeships?
- What is the impact of cultural differences? How does the design participation framework work in other cultures? With hard-to-reach people?
- Can the design participation framework be used to frame and to facilitate large-scale assignments in complex social arenas where the definition is not given but part of the challenge? If so, how?

We have in this chapter proposed that a rethinking of how tools and techniques are embedded in particular design practices may be needed to ensure that tools and techniques are not used without a participatory mindset. We have suggested that the concept of design games may be of use to keep both practitioners and researchers alert regarding how the game of participation is staged and acted out. There may be other directions to go, but in any case there is today a rich repertoire of participatory toolboxes that can only gain in strength as more people become involved in design collaborations.

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