Situated Make Tools for envisioning ICTs with ageing workers

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Abstract

In this paper we describe an approach to base the design of ICTs profoundly on the actual practice of ageing workers. The core challenge of the presented case study is to appropriately facilitate co-design activities with ageing workers, who have had no previous experience with the development of ICTs. The aim of the presented project was to enable the ageing workers to express their needs in a manner that would result in ideas highly relevant to them in their work. It was assumed that the workers, who engage in physical work such as cleaning and technical maintenance, would find it difficult to imagine novel ICTs and their possibilities. However, it was revealed that the ageing workers could understand new technical opportunities for them, and also envision new technologies that support their well-being and efficiency at work. The approach, which is based on the use of Sander's Make Tools, also helped to reveal the variegated attitudes that ageing workers have towards modern technologies.

Introduction

The working population of all highly developed countries is ageing, and there is currently a need to find ways to keep experienced employees working longer. Enabling a longer working life, however, is a complex matter due to substantial changes that occur in the personal capabilities of an ageing person. These capabilities range from physical to mental and include changes in attitude and work motivation. Developing and encouraging conditions that support a longer work lifespan must take into account the variety of such changes and, furthermore, must be sensitive to individual differences between people. According to Harrington & Harrington (2000) the differences between individuals increase as people become older. Therefore design for ageing people should increasingly emphasise individual persons rather than "averages".

The presented case study was part of a project named Konkari, which aimed to create new solutions for ageing workers' sustainable well-being at work (discussed in more detail in Mattelmäki et al., 2007). The project was conducted at the University of Art and Design Helsinki, and the ageing workers were employees of Palmia, a company owned by the city of Helsinki. Palmia provides catering, security, cleaning, and technical maintenance services. Our study focused on the last two of these. The employees participating in this study are all over the age of 50. The study utilised a participatory design process that included tools such

as Design Probes (Gaver et al., 1999; Mattelmäki, 2006), interviews, video observation, a video card game (Buur & Soendergaard, 2000) and Make Tools (Sanders & Dandavate, 1999).

Recent developments in user-focused design have emphasised the use of inclusive methods, such as cross-disciplinary workshops, performances, games and Make Tools, to facilitate the design process and learn about users and the context of use (see e.g. Iacucci et al, 2000; Brandt, 2006). There is an increasing number of studies that exploit the use of physical configurable mock-ups, or "things-to-think-with" (Brandt, 2006). The real context, in conjunction with simple mock-ups, has been seen as an important aspect that supports users' ideation when constructing future use scenarios (Jacucci and Kuutti, 2002; Brandt and Messeter, 2004). When aiming to design with users and other stakeholders, the first challenge is to find ways to enable the process. People with different backgrounds may find it difficult to understand the 'language' that the others are using. For example, ageing workers may not fully understand the terminology related to the development of ICTs. Hence, methods that enable their understanding and thereafter their contribution to the design process are crucial in facilitating the process.

The Make Tools method

The idea of Make Tools is to enable everyday people to express their latent needs and dreams through reconfigurable mock-ups provided to them. According to Sanders and Dandavate (1999) the content of a message can differ greatly according to differing means of expression. For example, methods that rely on what people *say* will reveal only things that they are aware of and can verbalise. On the other hand, methods that are based on the observation of what people *do* may uncover issues that remain beyond people's verbal expression. These issues include such things as automated routine activities and details of their activities. According to Sanders, the deepest level of expression is achieved through methods that are based on enabling people to express their ideas through *making* things. Making things thus facilitates a much deeper expressiveness, of thoughts, feelings and dreams, than observation and interviews alone. (Sanders & Dandavate, 1999)

Although Sanders does not explicitly state it, according to the discussion she had with the authors of this paper, she had not utilised the method within real working situations. Participation in creating the Make Tools had rather taken place in meetings that were distinct from the participants' actual activities. We considered this a central limitation of the approach. Such an approach, while giving new opportunities for people to express their ideas, at any rate drastically limits the capacity of the people to reflect on the designs in relation to their own activities and environments. This may be crucial to ideating new, useful and delightful features for ICT products.

Situated Make Tools

The improved method presented here aims to foster the "discourse with the materials of a situation", as Donald Schön (1983) insightfully characterised what design is about. It is based

on the assumption that by enabling people to design things in the midst of their activities it will help them to build highly relevant ideas. The Situated Make Tools method aims to integrate aspects of other methods: those that are based on acting out situations and those that utilise lending configurable materials to the 'users'. The method contextualises the birth of ideas to an extreme: the ideas are created by real users, in their real environment, during their real activities.

The Situated Make Tools method in this study focused on exploring the issues related to enhancing work with mobile appliances. The study aimed to:

1) Create concrete and relevant-to-the-worker design ideas expressed in physical, narrative and acted-out formats;
2) Explore how the real-action context triggers and serves to ground inspiration for concept design;
3) Gain experience in how Make Tools function when used in the midst of everyday activities with ageing workers;
4) Develop insights into the workers' needs, desires and attitudes relating to digital information and communication technologies (ICTs).

In addition, the study aimed to learn the workers' personal views on the activities and to record the experienced individuals' practical ’wisdom’.

The study was followed by four workshops, where the material was utilised and processed further. These were a Video Card Game workshop (Buur & Soendergaard, 2000), and ideation, evaluation, and dissemination workshops. The study provided diverse visual material that supported all these activities. It is not within the scope of this paper to fully chronicle all activities; however, the application of a 'Persona' approach during these events will be further described here.

The study procedure

At the beginning of the study, we expected that the ageing workers would find it difficult to conceive how new technologies could support their work. Their work would focus on physical action, such as wiping floors or changing ventilators, which requires rather different knowledge and skills compared to designing new ICTs. Moreover, we expected that the workers would have a reluctant or even opposing attitude towards bringing new technologies into their job, and that they would prefer their existing practice. This would be the case despite the project having already uncovered several new ICT opportunities.

The Situated Make Tools study was primed by six observation studies, each lasting approximately two hours. The studies began with a brief introduction and continued with a 1.5-hour 'video shadowing'. This is a method where the researchers follow the active worker with a video camera recording at all times. The video shadowing was followed by a half-hour interview. The observation study focused on creating a detailed picture of the work in action and on describing the ways the workers are engaged with their work practice. The observation was complemented by interviews after the 1.5-hour observation. During these interviews we aimed to discern the workers' personal views on their practice and record their comments on the situations that we encountered during the observation. For depicting the situations in

detail, we used still photographs of the activities, captured by the still-photo functionality of the video camera (these still pictures were taken during the video shadowing, in addition to the continuous video recording).

After six video observations, we began the Situated Make Tools study. It, like the observation study, was conducted with six site workers: three female cleaners and three technical maintenance men. Prior to entering the field, we created a Make Tools Kit (Figure 1). It consisted of blocks covered with fabric suitable for use with Velcro. The kit also contained various pieces with Velcro tape to enable the easy attachment of the pieces.

Figure 1.The Make Tools Kit.

After a pilot test we contacted the study participants. They were asked to bring a digital tool that they normally utilise in their work to the study event. The decision on the time for the study was left to the workers to decide.

At the workers' site

The site visits began with introducing the agenda of the day. This enabled the workers to adjust their work tasks to suit the tool creation, observation, and interview stages. At the beginning of the Make Tool creation session, the workers were asked to think of possible situations where they would normally utilise their own digital tool. This tool was usually their mobile phone. The exercise aimed to provoke thinking towards opportunities with new technologies and towards the kinds of features and uses these devices currently have. The workers explained the ways they use their digital products and told stories about their recent experiences with their tools.


Figure 2. Designing the 'tool' with the Make Tools kit.

This discussion and reflection lasted for half an hour. We then introduced the Make Tools kit. We gave the workers the following instruction for building the tool: "Design a tool that helps you to work more focused, or that helps you to feel better at work." The worker began to examine the shapes in order to determine possible combinations that would suit him or her (Figure 2).

We also gave the worker an additional instruction to explain the purpose of each piece that was included in the tool. We asked the worker to relate the purpose of each new feature in relation to a specific situation. We repeatedly asked the worker to think of existing situations and tasks where the tool might be helpful. We proceeded very slowly in this phase. This was to allow the worker to take the time needed to think about the work from this given perspective. Here, we considered it very important to enable the worker to relate the design to the real-life situations and to the needs in these situations to make the ideas relevant.

Before the observation started, we instructed the worker to conduct the work as usual for 1.5 hours. We explained that we would follow the worker with a video camera continuously, recording the activity like proverbial 'flies on the wall'. Occasionally we would interrupt the work, if we perceived potential for using the tool that the worker had designed. We called this intervention the 'thinking bubble'. This moment was aimed to relate the idea of the tool to the activity. Moreover, it aimed to help envision how the situation could be changed with the tool. We also explained that we would intervene if no need emerged after a long working period. The workers were instructed to use the tool in their work, if they found it appropriate. We then began the observation.

We took the Make Tools kit (i.e. all the pieces) along to enable recasting the shape of the tool, if desired. We stopped the activity by saying, "Ok, let's stop for a little discussion," and by raising a yellow paper to indicate that we were now in the 'thinking bubble'. We then asked questions, such as, "Could you tell me what just happened?", "Could you image doing the activity in some other way with your tool?", and, "How would it work, if it could help in this situation?"


Figure 3. Video shadowing of a technical maintenance worker in action, and having a moment in the 'thinking bubble' with a cleaner.

After this interactive shadowing we conducted an interview, which lasted for half an hour. We used the same questions and the same still photograph technique that was used in the earlier Observation Studies.

A site visit with the Situated Make Tools approach took approximately 2.5 hours per user. This was some 40 minutes longer than the observation visits. The Situated Make Tools also required 2.5 hours more video work for logging the material onto a hard disk. The planning and designing of the tool kit took five working days. The Make Tools kit may also be applicable in other projects that focus on mobile ICTs, whereby the time needed for creating an appropriate kit is likely to decrease in subsequent studies. Both methods, Observation Studies and Situated Make Tools, required two people to conduct the study.

Lessons learned

The site visits provided different grounds for new ideas. We found that such grounding points were 1) the working activity, 2) the 'Make Tool', 3) the current tools of the worker, and 4) observed traces of what had already happened. All these helped us to discover new uses, or needs, for ICTs.

The informational needs evident in the work varied greatly between working sites and tasks. In situations where the activity did not underline a need for ICTs, such as during a lengthy mopping of a large floor space, we asked the person to explain some possible reasons why the device could 'beep' at the moment. Here, the artefact that the person had designed served as a point to access past experiences with the imagined use in mind. This helped to generate meaningful use scenarios for the tool. To the contrary, on sites where we perceived an opportunity for ICTs, we seized on the work activity and entered the 'thinking bubble' to go through what had just happened. After discovering a new need for ICTs, we asked the worker to enact the scenario regarding the situation as it would proceed with the new tool. These scenarios helped to explicate the design opportunities through the verbal and bodily expression of the worker. For example, one of the workers expressed his need for social interaction at work through acting (Figure 4):

Figure 4. "It should be fast. It should be prepared to listen to my commands when I raised my hand like this."

The worker's current tools, such as the artefacts on his or her table, also helped to discover new needs for ICTs. Based on these, we discussed if similar functionality would be helpful in the tool. If so, we asked the worker to imagine what the functionality would be in the 'Make Tool', and to act out possible use scenarios with it. An additional resource for new ideas was the observation of 'a tail' of an activity. During one of the visits we observed the writing of an order for the repair of a toilet cistern. We asked the worker to act out the situation anew, using a real toilet context, and to imagine how he would use his new tool (Figure 5).

While the Situated Make Tool method enabled the ageing workers to create relevant ideas for new ICTs, the workers had some difficulties in conceiving opportunities and perceiving new uses of technology. For example, a schoolhouse caretaker had a camera in his tool, but he did not recognise its usefulness in a situation that apparently required pictorial communication. In this case the worker explained the shape of an object to another person during a "phone" call. When the worker was asked after the enactment if a camera could have helped in this incident, the worker replied, "Yes, definitely. I have just sent pictures with these devices so seldom that it didn't occur to me."

Figure 5. A worker acting out a scenario with the Make Tool in a toilet. The scenario acting provided material for concept scenarios, which were drawn later in the process.

Brandt and Messeter (2004) promote the importance of opening up the scope of the ideas from the individual workers and their situations, and propose the utilisation of multiple stakeholders in the process. In addition to involving people from various disciplines, such as work educators, design researchers and physiotherapists, we used Persona descriptions (Cooper, 1999, Grudin & Pruitt, 2002) for this purpose. We created eight persona descriptions based on an earlier Probes study with the twelve workers. These descriptions helped to condense the approximately 150 ideas into eight concepts. The Personas facilitated the evaluation of the ideas especially because they explicitly presented people's characteristics and motivations. Thus, the personas also synthesised designs at the same time as they, in a sense, 'synthesised' people.

Synthesising, abstracting, and generalising help to focus on determining the essential functions of a product. However, it is not enough to focus on function. In addition to supporting the design of the rational performance of a product the study also needs to provoke empathy (Koskinen et al., 2003). Aspects pertaining to subjective meaning and pleasure are increasingly important in the design of ICTs, as technology is turning into a 'design material' (Hallnäs & Redström, 2006). Addressing also experiential aspects calls for methods that appreciate specificity, ambiguity, subjectivity and concrete detail.

The Persona descriptions served both of these purposes (gaining rational understanding and evoking empathy) by displaying the characteristics and motivations of the people as well as presenting their social networks, tools, routines and work tasks.

Conclusions

The experiences gained during the project show that with appropriate facilitation, ageing workers whose expertise is not the field of design are capable of envisioning new ICTs. The Situated Make Tools enabled the participants to enter the living, everyday situations and to ground new ideas to these circumstances in a multilayered manner. The ideas created in the Situated Make Tools were concrete, specific and easy to justify with contextual support. The 'tool', which was an intervention in the normal practice of the workers, enabled them to see their work from the point of view of mobile technology. This provided new spaces for learning for both the workers and designers, and provided the workers with an informed way to present their attitude towards new technologies.

It seems that the effectiveness of the Situated Make Tools approach stems from three aspects. First, the abstract, rough, and open forms of the tools foster exploration of new ideas and provide a 'licence' to play at the workplace. The toy-like appearance of the tool kit may at times be even too inviting, and attention must be paid to preventing the worker from playing around with the tool kit before receiving the instructions. Second, the availability of the concrete, tangible, and accessible tool in a working situation gives a clear focus to explore realistic ideas. Third, the framing of the aims of the project during the site visit directs the ideation towards the goals of the project. Hence, a Situated Make Tools study provides a balanced means to fuel free imagination and to divert the ideas into a relevant direction.

The Situated Make Tools help to trigger designers' thinking in context. In addition to the workers' ideas, it is possible to introduce new ideas by the designers and test these immediately with the workers. This promotes a designerly approach to studying people's practices with an 'eye to change'. When comparing the Observation Studies with the 'eye to explore', the character of the design enquiry differed completely. After the Situated Make Tools study we, the researchers-designers, were 'full of ideas'. Thus, it seems that when the study participants actively seek the potential for change in every situation that they encounter, they immediately have many ideas from which to proceed as they return from the user site.

Discussion

Based on our study it seems that Sanders' framework of say, do and make needs some reconsideration. For example, the presented study does not support the idea that through making things (meaning the 'tools' the workers created) it would be possible to understand the people's thoughts, feelings and dreams on a deeper level. To the contrary, the deepest understanding considering the workers' personal relationship with the work was gained during the interviews after the Observation Studies through their verbal accounts. Moreover, we accumulated much shallow and superficial information through the making of the Make Tool. It seems that the application of Sander's model calls for an appropriate understanding of what 'making' means. Clearly, it is not the making of 'things' that is meant by making. The study procedure in its entirety and the contextual construction of new ideas is fundamentally a process of making, which poses yet a stronger critique of Sander's model. It seems that more essential than the apparent means of expression ('say', 'do', 'make') is the means of building up the moments of reflection. The 'depth' in the method might be fruitful to be understood as relating to the depth of reflection both on the 'user's' and on the 'interpreter's' side.

The workers in the Observation Studies displayed more readiness to talk about their own 'deeper' thoughts (when 'depth' is evaluated merely from the 'user's' point of view). This was a surprise, since we had intentionally appointed the Make Tools studies to the workers that we believed were more reflective, or verbally expressive, about their work. However, they had great difficulties in the interview after the interventive observation to express their relationship with their current work.

An interesting finding in the study was that none of the workers took the initiative to spontaneously use the tool in their work despite being explicitly instructed to use the new tool at work. While working the workers also put the new 'tool' aside, to prevent it from disturbing the work. Only when we interrupted and questioned would the worker act out a possible new use. This may be explained by the following reasons: 1) The workers did not find the non-functioning tool useful, or meaningful, for their work, because they acted towards accomplishing the work rather than playing around with the new tool. 2) The workers were driven by their routine to the extent that they did not perceive the opportunity to change it. 3) The workers were so immersed in the work that they did not remember the task to use the tool, before they were asked to do so. 4) The workers felt that the act of 'spontaneous' playing with the tool would make them look ridiculous, or they perhaps feared 'failing' or playing with the tool 'inappropriately'. However, the fact that the tool was passive between interventions

underlines the need for *facilitation* in exploring the design opportunities during the work activity.

Many of the ideas that arose during the study were such that they would probably not have emerged in a design studio. People's activities are dependent on and meaningful only in the context in which they take place. Thus, it is important to understand these conditions for creating new ideas. The study also shows that the interventive approach provided a more efficient source for new ideas than mere observation (when efficiency is measured by the time from observation to ideas). The study also provided the designers with somewhat similar material to the Observation Studies. Hence, the interventive approach to studying the workers' reality would be our preference in subsequent studies. We also found that such a study supports design reflection on multiple levels. The videotapes and sketches created during the visits or immediately upon returning from the site helped later reflection and facilitated the development of new ideas afterwards at the design studio.

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