Collaborative Design Exploration: Envisioning Future Practices with Make Tools

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Abstract. We have seen a growing interest in user-centred approaches and methods to facilitate collaboration between different stakeholders and potential users in the design process. More discussion however is needed on the designer's role as facilitator and how co-design material can be transformed into design solutions. This paper describes how design opportunities for information and communication technologies were envisioned together with ageing workers in the midst of their work activities. 'Make Tools' were used to amplify ageing workers' creativity and to enable the enactment of use scenarios. The paper also discusses the designers' role in co-design and presents how generated ideas and scenarios were turned into design material in the project, named Active@work.

Categories and Subject Descriptors
A.0 [GENERAL]: Conference Proceedings
H.5.2: User interfaces, User-centered design

1 Introduction

This paper describes a study in which a user-centred design approach and co-design were used to gain a holistic understanding of ageing workers' wellbeing at work. In this project, called Active@work, a strong emphasis was placed on individuals' experiences, needs and dreams to gain inspiration and information for concept design. This means looking beyond cognitive and functional properties and considers user characteristics, use contexts and emotional aspects as well. Furthermore it highlights the importance of setting the stage for co-design. According to Brandt [1] facilitating participation is one of the cornerstones of designing and thus designers need frameworks and tools to support this.

Design games have been suggested as one way to support cross-disciplinary design teams and collaboration by improving communication and idea generation. The game format seems to be successful especially in framing common ground for collaborative design activities [1]. Johansson and Linde [8] introduce game playing with future users as a tool to create stories that can be used as design material in an open-ended design process.

Visual representations are typical tools to outline alternatives in design. Säde [12] has stated that design representations used in multidisciplinary design projects to provide a common language emphasize the designers' role as communicators. Ac-

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cording to Ehn and Kyng [6] design representations, such as mock-ups, can create 'hands-on-experiences' and support not only designers' idea generation but users' thinking as well. They also suggest that the strength of simple mock-ups is in their draft and unfinished nature, which distinguishes them from real objects and thus helps people understand their meaning as tools in ideation. The challenge according to Säde [12] is to find an optimal level of abstraction, since representations should be concrete enough to support communication but abstract enough to allow freedom for creativity. Brandt and Grunnet [2] also discuss this, and suggest that simple models seem to open up solution space whereas more detailed models narrow it.

Growing interest in understanding user experiences for design has also generated approaches that evoke the future through drama and props. Iacucci and Kuutti [7] propose creating scenarios with potential users during observations. They use a simple mock-up, 'a magic thing', to support thinking and acting. The magic thing is open in nature, and it has the ability to do anything the user can imagine. Many thoughts, needs and skills are bound to specific contexts and actions which can be difficult to verbalize. Iacucci and Kuutti [7] argue that the magic thing enables reflection in action. Scenarios created together with potential users aim to test ideas, gather new insights and create realistic snapshots from imagined use situations. Enacted scenarios also support the designer's work in creating use scenarios later in the design process.

Iacucci and Kuutti [7] stress the importance of the real context, unlike some studies where the stage for acting out has been built in workshops [15, 2]. Depending on the purpose 'actors' can be professional actors, design team members, potential users or combination of these. The idea is to use some tangible design representation to support participation and create a common understanding. The design representations enable improvising use situations and desired features. Westerlund et al [15] have noticed that when people act out possible situations with props they are required to think about the interaction and context in more detail than if they only describe it verbally. Similarly Sanders and Dandavate [10] believe that through making things with visual toolkits, such as Make Tools, people can express their ideas and feelings.

Research on explorative methods and playful approaches in co-design often concentrate on creating a common language and ground for design. Articles discuss the reasons for using these methods but only rarely describe a) the designer's designerly role in the process and b) how to transform material from the co-design sessions into design. This paper focuses on these points by examining designer–user interaction in collaborative design sessions and presenting how the gathered material was used in the actual concept design.

2 The Make Tools Study: Wellbeing and Mobile Technology

The aim of the Active@work project was to develop alternative concepts to improve ageing workers' (55+) sustainable wellbeing at work [9]. The project was EU-funded and included stakeholders in Finland, Germany and Italy. This paper focuses on the Finnish sub-project conducted at the University of Art and Design Helsinki in 2004-2006. The target organization was Palmia, which is owned by the city of Helsinki and operates in the fields of catering, security, cleaning and technical maintenance. The

project involved twelve ageing workers from the organization, six from the technical side and six from cleaning maintenance.

At the beginning there was no explicit need, problem or technology to be addressed. The only frame for the design was to find alternative opportunities to improve ageing workers' wellbeing at work. The main objectives were to gain a holistic understanding of ageing workers' needs, attitudes, motivations and working practices and to develop concept proposals based on them. A user-centred design approach was used to search opportunities from individuals' experiences, joys, needs and preferences. Various methods from probes to collaborative workshops were used to narrow the "design space" [14]. Based on an iterative and participatory process the concept design activities focused on four areas: 1) working environment, 2) tools, 3) mobile technology and 4) individual education practices. [9] This paper describes how Make Tools were applied to envision how mobile technology could improve the situations ageing workers encountered at work.

We had researcher – designer double roles in the project. Hence, concept design was not a separate phase, but instead the process of data gathering and interpreting, communicating the findings as well as exploring and creating ideas and making the actual concept design solutions were rather intertwined. (Figure 1.)

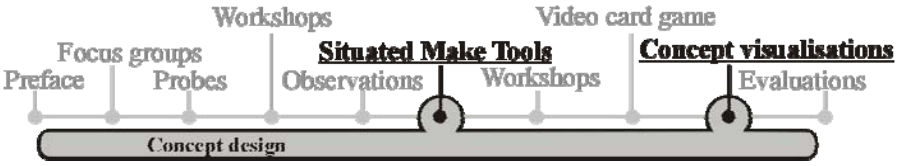


Fig. 1 The highlighted area is the part of the process described in this paper.

2.1 Situated Make Tools

Make Tools, as introduced by Liz Sanders [10], are one of the methods developed to amplify people's creativity and support design thinking. Make Tools can vary from visual collages to three-dimensional artifacts, but the basic idea is the same: to allow people to construct design representations through visual elements as expression of need. According to Sanders, these toolkits work as scaffolds for experiences that support the creativity of everyday people. The aim is to produce inspiration and new insights for the design team through these design representations. [10, 11]

In this paper the Make Tools are discussed as three-dimensional tangible artifacts, which can be easily reconfigured into new shapes by potential users. The Make Tools kit includes various shapes of blocks covered with fabric suitable for use with Velcro. The kit also contains various pieces, such as buttons and displays, with Velcro tape to enable easy attachment and configuration (Figure 2). Our intention was to give ageing workers a chance to explain how they would like to use technology and imagine how new features could improve their wellbeing at work. We went to observe their normal workday with the Make Tools kit and carried out exercises of thinking of future opportunities in the midst of their work. Thus we named this approach 'Situated Make Tools' [13].

Fig. 2 The Make Tools kit.

2.2 Challenges

The focus groups and probes study that had been carried out earlier in the project indicated that ageing workers had inconsistent attitudes towards modern technology at work. Computer-related tasks often evoked frustration since using the computer was slow and difficult. Instead, mobile phones were seen as convenient at work to pass information on and be in touch with workmates. Only a few of the ageing workers used the mobile phones' extra features such as the calendar. This posed questions such as what the ageing workers would like to do with mobile appliances at work and how they prefer to interact with it. Another question concerned how wellbeing, including physical aspects as well as social interaction at work, could be supported by mobile technology.

To explore these aspects, we conducted six Situated Make Tools studies. The aim was to a) gather diverse video material about the work context, tasks and tools, b) gain insights into the workers' needs, desires and attitudes relating to mobile technology, and c) create relevant-to-the-worker design ideas expressed in physical, narrative and acted-out formats. A further objective was to record ageing workers' practical 'wisdom' that can be seen in their practices.

Focusing on mobile technology raised several challenges. First, we were concerned if the ageing workers would be able to imagine how new technologies could support their work. Secondly, while the project had already uncovered some new opportunities for mobile appliances, it was uncertain how willingly the ageing workers would change their current practices. Thirdly, we hoped that the real context would trigger new ideas, but this was in no way certain. Thus, the challenge was to plan and facilitate the co-design in a way that created a relaxed and creative atmosphere and kept the focus on the given perspective.

2.3 The Procedure

To overcome the challenges emphasis was placed on the working context and current work practices as triggers for new ideas. We also encouraged the ageing workers to look at their wellbeing at work with new eyes. The previous phases in the project, especially the probing, had also worked as a sensitizer for mapping wellbeing and ageing, but it did not focus on the possibilities of mobile technology. Thus, to sensitize ageing workers especially to the Make Tools session, they were asked to bring along a digital tool they nowadays utilize at work. This task was to direct imagination towards technological opportunities by pointing out features and uses these devices currently have.

The two-and-a-half-hour site visit began with a brief introduction to the agenda and a warm-up discussion on the digital device (usually a mobile phone) they had brought along. The Make Tools kit was then displayed, and the ageing worker was instructed to: "Build a tool that either helps you to work in a more focused way or to feel better at work." As the worker had built the mock-up, he or she was asked to carry it along and start working as normally as possible. We shadowed the worker silently until some opportunity for change was observed. We then interrupted the action for a short moment to reflect on how the situation could be changed with the envisioned tool. The aim was to support the worker's thinking by linking the Make Tool mock-up to the real activity. We asked questions such as, "Could you tell us what just happened?" "Could you image doing the activity in some other way with your tool?" "How would it work, if it could help in this situation?" The workers were asked to act out or describe the improved situation. After one and a half hours of observation, including 'thinking moments', we moved to the interview, which aimed at deepening understanding about the observed situations and worker's attitudes. [See more 13.]

3 Findings

The next section will focus on the main challenges and insights identified in the study. First, it is described how Make Tools increased the ageing workers' ability to envision the future and focused co-design. The role of the designers as facilitators is then described. The illustrations from the Situated Make Tools sessions are used to guide the discussion.

3.1 Focusing Design Thinking

The discussion on mobile technology's current use, instructions for building a dream device and the Make Tools kit focused thinking on mobile technology and its possibilities in ageing workers' work. They also formed a common ground for the co-designers. For instance, when explaining her current use of a mobile phone, a woman from cleaning maintenance reflected upon a recent phone call from a dissatisfied client who wanted to check that the contract had not changed. Solving the situation caused much extra work for the worker, which led her to imagine improvements e.g.

in the flow of information. Later when building the mock-up she used this memory to imagine desired features for the dream device.

When the workers were asked to build a mock-up, the tangibility of the make tools material helped them in two ways. First, handling and looking at various shapes inspired ideas related to issues and tasks from previous discussions. Second, it worked as 'something-to-think-with', triggering new ideas that had not been mentioned earlier. In Figure 3 the worker comes up new ideas through making the mock-up.

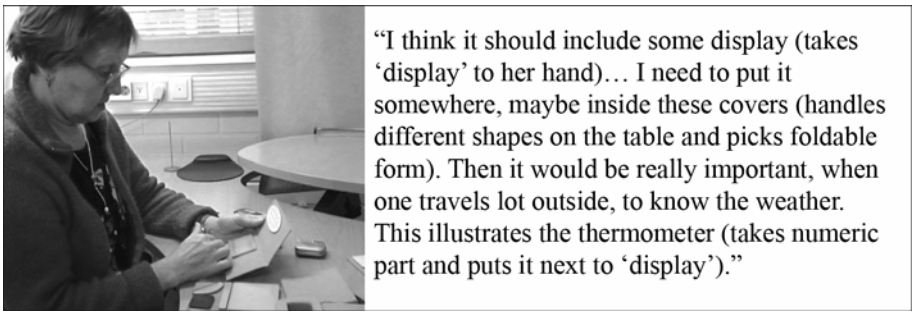


Fig. 3 The worker builds her dream device and thinks aloud as instructed.

When the ageing workers were given the make tools they were only generic shapes. After the ageing workers had attached certain pieces to illustrate specific functionalities, the generic shape changed into a 'mobile technological device'. The Make Tools enabled the workers to think of use scenarios and features as well as simulate the interaction with the envisioned tool in detail. The mock-ups they built emphasized functionalities, size and user interface rather than shape (Figure 4).

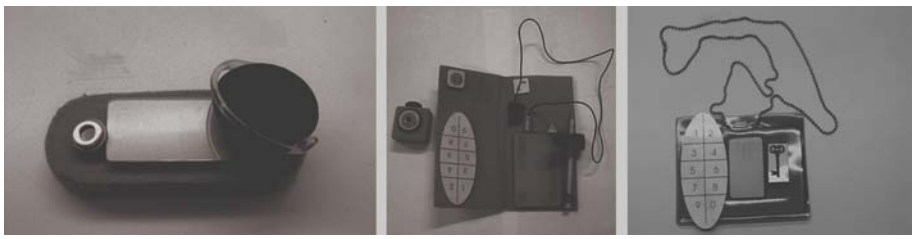


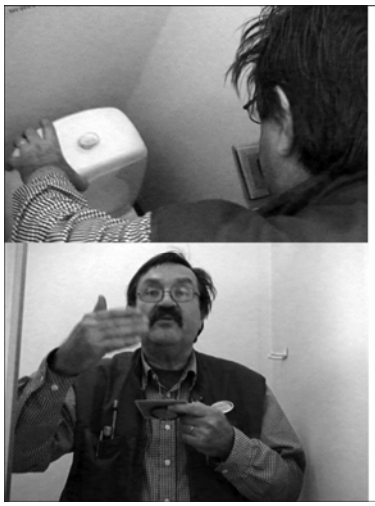
Fig. 4 Mock-ups made by the workers.

It should be remembered that the Make Tools kit is limited, and thus focus the discussion and thinking towards a certain direction. Although having an open character the shapes, buttons and other material in the Make Tools kit were built and gathered based on earlier expectations of alternative design opportunities. This can help to focus the collaborative thinking and ideation but also limit the solution space. For instance, one of the workers invented an idea for a smart vest. As in the Make Tools kit there was nothing particularly suitable, he had to think other ways to illustrate the idea. He thus chose two components: one in the pocket and one around his arm. This likely influenced his idea on how to use the device (Figure 6).

3.2 Ideas Evolve Through Acting

The observations reveal typically current practices and interactions. Having the Make Tools in the context enabled envisioning future possibilities as well. The mock-up was not restricted to certain technology or features; instead the workers dynamically changed its functions to match new purposes during the 'moments of reflection'. Since the workers had the Make Tools mock-up illustrating an envisioned mobile device it was logical to ask them to act out how the tool would be used in certain situations. Through acting out the use scenario they developed new ideas especially for useful features in the particular situation but also for future interfaces. The example in Figure 5 illustrates how a worker acted out a scenario and how 'the play' moved on and introduced new properties for the tool.

As described earlier the Make Tools mock-up was designed based on the worker's previous experiences. Together with the diverse make tools kit they were able to build a mock-up with certain envisioned functionalities including a display and some buttons. Later when they acted out the use situations they often used the mock-up in a different way from imagined at first. The technical maintenance man, for instance, pressed a part of the mock-up with no particular mark of button and spoke into it, neglecting the fact that he had not specified a microphone functionality and forgetting to use the camera that had been identified (Figure 5).



W: "Oh, Arabia's toilet container which are leaking. Ok. (Pretends to calling somewhere) Can I get a contact to the Putkivuorio, the supplier, please? The school attendant from the Snelman's elementary school, hello. The 4th floor's toilet's water container is broken. I don't know the model but it is roundish not angular. Can I have a new container for that? It's at Albert's side of the school building and girls toilet. Ok, thank you. As soon as possible, please."
W: "Then I press this button to save the conversation and another button to convert it into text mode and at the same it turns it to an order."

Fig. 5 The ageing worker acts out an envisioned future situation.

The context and its situation-sensitive experiences as well as people's 'practical wisdom' can be challenging to explain due to their embodied nature. The interaction between people and objects are moreover tied to particular situations and investigating them can be difficult. However, these can raise new insights for interaction design and thus be valuable to designers. In this case it was realized that the Situated Make Tools provided a means to make visible these particular latent aspects. This occurred when the workers enacted envisioned use situations. As seen in Figure 6, for exam-

ple, the workers took advantage of bodily movement when describing how the envisioned tool should work.

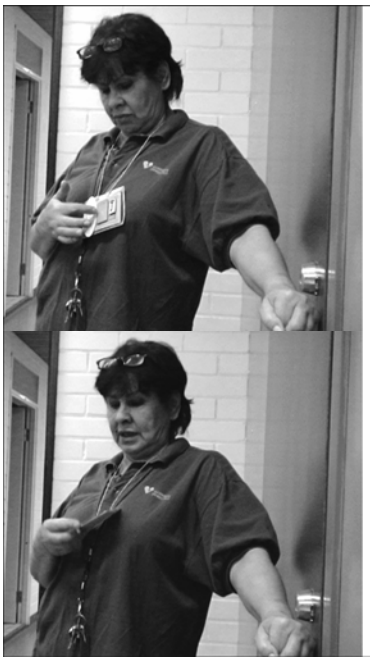
Fig. 6 The worker describes the user interface in a hand gesture: “If I raised my hand like this [raises his right hand] it would go into standby mode.”

3.3 The Role of Designer as Facilitator

As the term co-design suggests, ideas are not generated by the users alone, or by the designers, but in the designer–user interaction. The make tools approach supported a designerly way of conducting idea generation through simple mock-ups.

As expected some workers had difficulties imagining how mobile technology could help them at work, and therefore they found it troublesome to start building their dream device. In these situations we had to support them by advising the workers to think of one of the situations that had come up in the discussion and to consider how the dream device could help in that situation. Hence the facilitators had to keep their eyes open: to be watchful for change opportunities and to remain sensitive in order to take advantage of the opportunities in later phases.

When the mock-up was built, it was simple to maintain focus in future mobile technology, throughout the Situated Make Tools session. In addition the mock-up assisted in starting the discussion during the observations. E.g. in the case where no particular need for the mobile tool was revealed by the observed activities, we asked the person to explain possible reasons why the envisioned tool could 'beep' now. The example in Figure 7 (in the transcript W=Worker; F1, F2=Facilitators) presents how the questions guided the workers towards considering opportunities through recent accidents.



D1: "If you would now receive a message, what could be the situation?"
W: "Some emergency situation."
D1: "What kind of emergency situation?"
W: "Well, e.g. once and a while small children poo into the swimming pool."
D1: "How the tool would work?"
W: "It would peep."
D1: "Let's imagine that now is that situation."
W: "I could receive e.g. the number, then I could contact."
D1: "You had the earphone in your tool…"
W: "Yes, it could also come to that, as a call."
D2: "How it happens now?"
W: "Typically they say through loudspeakers that 'cleaner come to cash desk'….They doesn't say the reasons through loudspeakers so that customers won't hear it… The call could come right to me…Then I wouldn't need to go only for checking the situation."

Fig. 7 The ageing worker describes her ideas.

During the sessions it was noticed that the workers never initiated the 'moments of reflection' themselves though they were advised to do so. This emphasized the designers' role as the one who seeks opportunities in the midst of the action. For designers who continue developing the ideas afterwards it was important to have detailed descriptions of the reasons and functionalities behind the ideas. This meant that we had to push the ideas further by asking the workers specific questions. Through this dialogue the needs behind the user's ideas became visible and more understandable, as the previous example illustrates. As designers we had an idea of what could be essential material from design perspective and thereafter concentrated on it.

Although the ageing workers needed someone to stop the action and start the 'moment of reflection', they ultimately held the power. The main reason for not providing readymade mock-ups but allowing the ageing workers to create them was to enable them to describe functionalities they found valuable and let them lead the idea generation from the beginning. In addition, the scenarios they acted out were based on their work and experiences which let them be the experts, actors and directors simultaneously. They did not need to be taught how to use the mock-up because they were the 'designers'.

Being in the context prompted new ideas for the designer-researchers as well, and these were tested immediately with the workers. At times the designers would discover an idea while watching the worker improvising a use scenario. E.g. in the scenario of the broken toilet cistern (Figure 5), the designer asked after 'the play' if the camera would have been useful in the situation. The worker in turn replied, "Yes, but it didn't occur to me since I have been taking the pictures so seldom lately."

3.4 Comparing Observations and Situated Make Tools

Since the project's objective was wider than the creation of concepts for future mobile technology, video recordings of work contexts and practices were also made. Six video observations were conducted followed by six Situated Make Tools sessions that all aimed at recording current situations. The procedure was somewhat similar in all observations, with the exception that in the Situated Make Tools sessions more time was used at the beginning and for the 'moments of reflection'. In addition the Situated Make Tools sessions took 40 minutes longer on-site and converting the video into clips took two-and-half hours more per session. Each new situation was converted into one video clip. When comparing the number of the clips, however, it is apparent that there was no notable effect on how many different situations were seen, even though the Situated Make Tools included 'moments of reflections'. Since the shadowing phase was conducted identically the quality of the clips remained equal.

When comparing the more traditional observations with the Situated Make Tools sessions the major difference was that during the observations new ideas were not emerged. To the contrary, the observations with the make tools stimulated dozens of new ideas during the sessions.

4 Transforming the Material into Design

Existing literature rarely concentrates on illustrating how user studies actually affect design, even though it is one of the key issues in convincing companies to apply user-centred design methods. The ability to show the process of triggering an idea and developing it may moreover help to focus the process, plan the resources and guide the decision-making. The next section will discuss how video clips, still photos and ideas grounded to the real work context were fruitful in developing design ideas in a number of ways. In addition, further concept development was also supported by the designers' experiences in the real context.

4.1 Turning Video Material into Printed Visualizations

Each site visit yielded video recordings which were broken down into 'activity maps'. These were presented in an A3 paper format to allow easy sharing and handling (Figure 8). These maps also maintained links to the video clips. Displaying all the activity maps at the same time on the table helped the designers to understand the variety of work activities and environments as well as to compare them. While the co-design emphasized individual needs and desires these activity maps concentrated on physical aspects. E.g. a man from technical maintenance began outdoor tasks before sunrise, which had an effect on his working conditions. Working with caps and gloves on in the darkness is certainly an issue to be considered in the design.

Directly after every site visit we reviewed what had happened during the observation, focusing on the 'moments of reflection'. We then drew every acted or described scenario and generated idea on A4 papers. These summarized the situations including both users' and designers' ideas (Figure 8). Together the activity maps and idea draw-

ings clarified the link between ideas, tasks and contexts. These kinds of representations enabled to proceed faster into the next phase, since we were able to go through the results of the visit without having to refer back to the original video material.

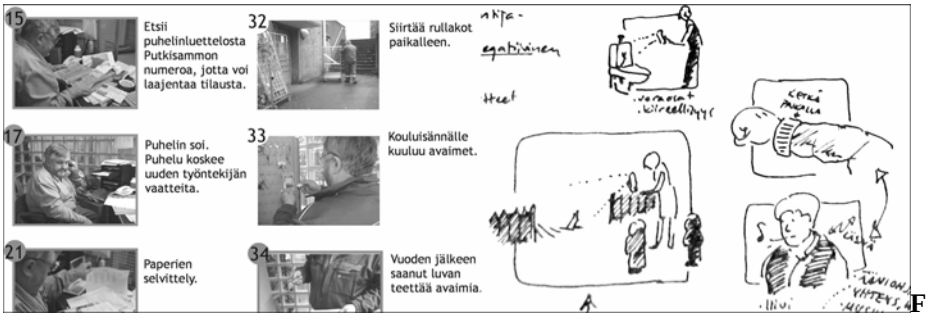


Fig. 8 Parts of the activity map and sketches of the ideas.

4.2 Searching for Design Drivers Through Personas

To further develop the ideas for the mobile technology concepts a workshop within the design team was organized. In this session we wanted to review and develop all the ideas and material from the whole project. The ideas expressed by the ageing workers during Situated Make Tools formed a ground upon which the concepts were constructed. Despite the fragmented nature of the results it was possible to find similarities as well as distinctions which helped to develop the ideas further. The persona characteristics, which had been created earlier in the process, helped to consider alternative interaction styles and individual motivations for using mobile devices, and to formulate design drivers accordingly. E.g. the application for one of the personas, Irene Inspirer, has to support her two main motivations at work: work planning and coordination. Alternatively, the application for Cherry Cheerful, another persona, should create more pleasurable ways to interact and communicate with workmates. Ultimately five different concept solutions were created and customized for the personas.

4.3 Creating Scenarios

These experiences are in line with notion that enacted scenarios help designers to create relevant use scenarios later in the design process [7]. The possibility to use pictures of real people and contexts as a background when drawing future scenarios was one key benefit of the field material from the designers' perspective. Scenarios aimed to illustrate how designed concepts would affect the work and wellbeing of the ageing workers. When describing something that does not exist one has to carefully consider how to communicate the idea. Here the ideas generated during the Situated Make Tools formed the link between the need in a certain situation and the concept solution. Since persona descriptions were used to frame the concepts, the scenarios were also presented from the personas' point of view. Communicating the concept

ideas by using the persona, with whom the team was already familiar, supported discussion and evaluation of the concepts.

Fig. 9 The photos behind the drawn scenarios strengthened the process and added credibility.

4.4 Emphasizing Rich Interaction in Concept Design

In addition to the ideas that directed the development there were design constraints and visions that we wished to implement in the final concept solution. We wanted to consider both ageing workers' and Palmia's wishes as well as our own insights as designers. The final concept proposal emphasized two aspects identified as relevant and desirable to ageing people. The first is the personalization of the properties based on skills and needs and the second is a user interface that supports rich interaction. Based on these experiences, inspiration from literature, and findings from the user study, the interpretation was that a pleasurable user experience for ageing workers can be achieved when the device is intuitive and fun to use, and meets personal needs. To support these aspects a tangible and colourful user interface was created as opposed to the more display-oriented interfaces of current mobile appliances. (Figure 10).

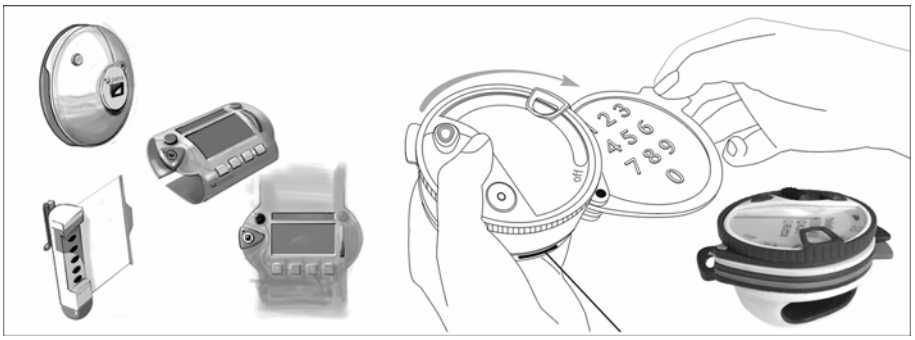


Fig. 10 The sketches of earlier concepts and the final concept solution.

5 Lessons learnt

Based on the experiences gained from the project and especially the Situated Make Tools approach the findings which should be considered in future work are summarized in the next section.

Focusing design thinking. Discussion on current uses of mobile appliances sensitized participants to the topic and created common ground and focus for co-design. The issues that emerged supported the move towards the idea generation phase by reflecting ageing workers' mobile-technology-related needs and desires. The Make Tools were abstract enough to be understood as 'design language', not as real objects, but were concrete enough for the workers to offer insight on mobile technology. Brand & Grunnet [2] discuss how design representations can be either props to evoke new design possibilities or illustrations of designers' ideas. Make Tools combined both of these aspects since the designers' insights were used to frame the topic but the ageing workers were the ones who gave meaning to it.

Ideas evolve through acting. Situated Make Tools enabled simulating future situations for a device that did not yet exist. In addition the workers were able to use 'embodied knowledge' when acting out interaction with the envisioned device. Through acting out the possible use scenarios the workers proposed new ideas about desired features and interaction styles. The meaning of the details in the mock-up diminished during the acting. A detailed make tools kit was needed to start the ideation, but later, when the workers were already in a creative mood, the ideas evolved through acting and were not based on the earlier proposed features.

The role of designer as facilitator. Situated Make Tools supported a designerly way of doing user studies and co-design. The challenge was to adopt three roles concurrently: 1) a facilitator who provides the Make Tools material and organizes the session, 2) the designer who creates ideas together with ageing workers, and 3) the researcher who performs the video observations and interviews. The dynamic nature of this approach suited well for designers since it emphasized two aspects that can be considered typical to designers' work: experiments with mock-ups and the aim to change current systems and practices. Moreover, designers could in situ guide the discussion and push the ideas to reach the desired level of detail to benefit actual design. The designers were not merely an audience, even though the emphasis was on the ageing worker's ideas. The real context triggered ideas and revealed certain aspects for design that would have been difficult to identify in a design studio. The real context maintained the link between the envisioned situation and the current situation, as Buur et al [5] have also claimed. This helped to understand and truly clarify the goal of the envisioned functionality.

Comparing observations and Situated Make Tools. The presented study argues that it is possible to study people's normal practice in parallel with making a design intervention. New information was produced in the real context, and it was grounded to those people's interpretations in whom we were interested. Before the Situated Make Tools six traditional video shadowing with similar contexts were recorded. Both approaches share video shadowing activities but only one included co-design, and a comparison of the two shows that the same number of work activities was recorded regardless of the approach. When idea generation was added to shadowing it evoked design possibilities and insights into the future within the same timeframe. When observing with 'eyes open for change' instead of 'eyes for exploring' the real context evoked new ideas and opportunities.

Transforming the material into design. Diverse visual and narrative material helped the designers to create visualizations to describe the physical environment as well as the needs behind the concept solutions. Personas gave a framework to com-

bine single ideas into more holistic concepts, which underlined individual personas' motivations and needs at work. To construct the drawn scenarios the photos and enacted use scenarios proved to be useful. Since designers were involved throughout the user study it was possible to consider ageing workers', Palmia's and designers' perspectives and transform them into a concept solution that emphasized personalization and rich interaction. In the evaluation phase the feedback indicated that the mobile concepts were considered relevant and desirable.

6 Discussion and Conclusions

Based on the experiences gained from the Active@work project it seems that designer–user collaboration and tangible design representations can be valuable when envisioning future practices. The design interventions during observation stimulated ideas which were able to be transformed into mobile concept design. The scenarios provided a language to express design ideas not only for the designers, as Brandt and Messeter [3] claim, but for the users as well. These experiences highlight three aspects: 1) both designers and potential users should play an active role in generating new ideas; 2) together the real context and Make Tools trigger and focus ideas; and 3) the playful approach combines serious activity and fun, which supports creativity.

Brandt and Messeter [3] suggest that enacted scenario construction can be seen as an exploratory design game. It includes gamely elements such as playing with props, setting the stage for acting and time limitations. Thus the Situated Make Tools can be seen as an exploratory design game. However, the setting was exceptionally dynamic and unpredictable and therefore difficult to rule. The 'moments of reflection' and enacted scenarios took place in various locations, outdoors and indoors, inside one building or between many buildings. Since the context created the framework for ideation the designers had to keep their eyes open and sensitive to oncoming situations. This stresses the importance of careful consideration concerning where to organize the collaborative ideation. The improvisational character of Situated Make Tools also raises a question on how much it can be planned beforehand without losing sensitivity. Is it actually the sensitivity to finding design opportunities which also creates space for ideas? And if done routinely, is there a danger of losing it?

The designers' roles as facilitators were important in order to gain more detailed ideas as well as finding opportunities for change in the midst of working activities. In line with many others such as Iacucci et al [7], Pedersen and Buur [4], the experiences described here emphasize the importance of the real 'use' context: grounding ideas to reality to make them more concrete. When the people responsible for later concept design are confronted with the users' stories and experiences it a) creates design empathy and commitment, and b) the designers can focus on interesting issues from the viewpoint of concept design specifically. This emphasizes a new role for designers, as Sanders [11] has proposed: besides their own creativity designers have to amplify the creativity of others.

While the Situated Make Tools benefit concept design this experience presents that it could also be one way to speed up the UCD process and push it towards more design-oriented activity. One implication of this is that it could provide user-research methods tempting for designers in practicing projects. However, to verify this more

studies in varied project contexts together with multiple partners are needed. Another question for future research is to consider whether Make Tools, as described in this paper, can be used to generate ideas for something other than (interactive) devices. What, e.g. would a Make Tools kit that aims to gain ideas for process planning contain?

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