

## **Looking beyond the product: design research in industrial and academic collaboration**

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### **Abstract**

This paper presents an example of design research work done in collaboration between university and corporate partners to develop new tools and practices for conducting user-centred design work. The presented case study, which focuses on mobile clinical collaboration, is one of the seven case studies in a project called Luotain – Design for User Experience - project, funded by Finnish technology agency TEKES and the participating companies. The paper explores the issues related to the facilitation of the inter-organisational design collaboration and involvement of users in product concept design. We discuss how the process, the collaboration practices and the applied tools supported a reflective team research process. We also discuss the close connection of strategic value and project success in such collaborations between academia and the industry.

Keywords: Design collaboration, user-centred product concept design.

### **Introduction**

Industrial companies are increasingly seeing the value of involving the users of their products in their design activities. At the same time the focus of these user-centred work practices is also shifting towards the 'fuzzy front-end' of design work, to the concept design stages. These early phases of design are where the major new opportunities can be found and where new innovations can be created. Concept design is an exercise in organisational creativity and learning and the resulting product concepts can be used to affect market expectations as well as the corporate image (Keinonen & Jääskö 2003).

As products are becoming increasingly complex the product development process is also evolving into a collaborative multidisciplinary team process. To develop useful, usable and desirable products that meet production requirements and user expectations companies need to incorporate user centred activities their product concept development process. The need for user research does not go away after the first few projects, because user cultures evolve and diversify, the technology landscape is constantly changing and new opportunities often are found in new domains. A characteristic feature of product concept design is the open point of departure where neither the product nor its intended users are yet known. The user research in concept design also begins with an open search for opportunities, and relevant and desirable user experiences. User experiences are formed in action and in relationship with contexts, including technological, cultural, physical and social

contexts. In concept design the user centered perspective thus looks broadly at people, the users, their habits, attitudes and routines to find new opportunities. It gives designers a freedom, which is not possible in fast-paced product development projects. It also requires the adoption of methods and processes from fields that observe people and culture to find ways to look beyond the current products and user groups.

Design processes need to support the expertise and collaboration of different disciplines as a team and help the team keep their aims in sight as well as refocus as needed (e.g. Brandt 2004). Projects need to define the project aims, target user groups, environments and activities, and in the light of increased understanding, reframe and refocus through the process. A part of the challenge is also in selecting and applying the methods for research. In the beginning there are too many possibilities and not enough information for evaluating proposals, which calls for iterations and reflexivity. Academic researchers can bring new experiences and insights to a company, but academics also benefit from applying their knowledge and responding to the challenges of the corporate design world. Industrial and academic networking can support a common interest promoting putting the user first in design and developing user centred design collaboration.

The Luotain project focuses on developing user centred design practices, which framed the subsequent negotiations of the case study foci. The contexts and experiences of future users were addressed also in the case study of Mobile Clinical Collaboration.

### **The Case: Mobile Clinical Collaboration**

The Mobile Clinical Collaboration case study was one of the seven studies conducted in Luotain - design for user experience. Luotain is a four-year research project at the University of Art and Design Helsinki, and belongs to the Design 2005 program of Finnish National Technology Agency TEKES. The studies were conducted by industrial and design partners to develop tools and processes for gathering, processing and applying user data in concept design. Mobile Clinical Collaboration belongs to the second round of projects, which applies lessons from the earlier projects. Project topics have included work on information support for a bank's call center (Ylirisku 2004), understanding the sport culture of free ride skiing (Jääskö et al 2003), lurking and membership in a kiteboarding community and developing concepts for modular furniture solutions for home offices (Virtanen et al 2004).

This Luotain case study on Mobile Clinical Collaboration continues the collaboration between the researchers at University of Art and Design Helsinki, Usability team at GE Healthcare Finland, a manufacturer of anaesthesia and critical care monitoring equipment, and ED-Design, a design consulting company. Technical assistance and support for the Mobile probes system, which was tested in the case, was provided by a design consultancy Nine Yards Design.

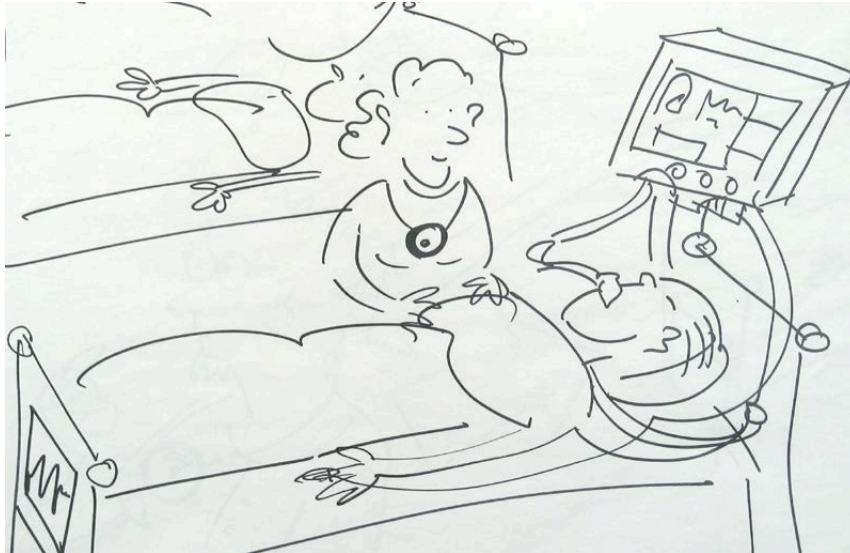


Figure 1. A design scenario sketch of mobile clinical collaboration (Milvi Soosalu)

The case study was formed around three key ideas. First, the project was planned to enable design collaboration and proceed to concept creation. This common convergence towards concepts provided a common aim for the otherwise distributed project. Secondly, for the project to be a success, it had to link with research interests as well as corporate interests and projects, which was achieved through workshop activities and the involvement of other stakeholders. Responsibilities were also shared between project partners to distribute effort and engagement. Thirdly, the study topic was approached with a broad, open focus to allow open-minded exploration of new development potential.

The Mobile Clinical Collaboration case study focused on the communication and collaboration between hospital staff in and around the operating theatre. The case study followed three main aims:

- A) To study phenomena related to mobile clinical collaboration including content of collaboration, actors and the networks, task sequences, patterns of interaction, artifacts, devices and environments and situation of use
- B) To look for opportunities for a future mobile communication system.
- C) Develop user-centred product concept design tools (the mobile probes tool), and processes (process workshop and techniques for data interpretation and sharing).

### **The process**

The case study began with meetings with the partners where the initial focus of the case study was created. The planning and execution of the design process was partly experimental and consisted of a chain of co-operative sessions with interim data collection and processing activities.

- Process workshop
- User study planning session
- Expert interviews

- Brainstorming of self documenting tasks
- Intermediate interpretation meeting
- Mobile probes study
- Probes interviews
- Final interpretation and ideation workshop
- Spinoff workshop: brainstorming for another application area

The process workshop is a day-long workshop in which the new project partners enact a fast forward version of a user study process in a couple of hours. It is designed to help in familiarising a multidisciplinary team with user-centred product concept design, the tools to be used and the focus of the project. The workshop gave the participants a chance to work in close interaction with a multidisciplinary team of experts (caregivers, designers, researchers), which is often not the case in their everyday work. This also walked the project participants through the stages of a user centered research process, preparing them for the project ahead both by trying out methods and by sharing domain knowledge.



Figure 2. Scenario acting of a typical situation with a real anaesthesiologist and an intensive care nurse.

The workshop was followed by co-planning the user study process, deciding on the first issues to be addressed and by planning which tools and methods could be applied to which questions. The project plan outlined the objectives, methods, outcomes and responsibilities. Following the first preparation step a brainstorming session was organised to identify the questions for the self-documentation study. The aim of the collaborative session was to identify issues that need further study and which are interesting for the industrial partner. The discussions also focused on the tools and methods to be used and on strategies how to involve and engage the participants of the study.

The user study phase began with two expert interviews, which were carried out to map the context of the case. The interviews were between the research partners and two professional members of hospital staff. Also, a self-documenting pilot study was conducted to evaluate the proposed questions. The self documentation tool, a mobile phone running a java application which brought questions and tasks to the phone user was also tested in the process (for more, see Hulkko et al. 2004).

The results of the expert interviews as well as the mobile probe pilot experiment were brought to a collaborative interpretation session. Teams shared their interpretations and thoughts of the data and resulting documents were also distributed via the intranet. The self-documentation questions for the mobile probes were fine tuned to better focus on specific issues and more detail for the actual study, and researchers continued to develop the interpretation themes for the next session.

Two workshops to interpret the data and create concept ideas were organised after the user data gathering had been completed – one was the official last workshop and the other a spin-off invited by other stakeholders inside the partner company. The collected reports, photographs, summaries and interpretation examples were made available before the workshop. To encourage this, participants received tasks that required them to study some of the data with the provided interpretation theme.



Figure 3. Demonstrating a product concept idea at the ideation workshop

The workshops included participants from different disciplines: design, r&d, caregiving, marketing and research. The anesthesia and ICU nurses provided their expertise in matters of interpretation and also on the appropriateness of proposed solutions. In addition, outside participants, including a product manager and a technology manager, took part in ensuring the correctness of certain interpretations and were able to direct ideation towards relevant directions. The assignment themes helped people in evaluating the results and in taking part in the discussion. Finally, the data was interpreted into design drivers and concept ideas, which were later collaboratively constructed into an animated story.

### **Facilitating reflexivity and sharing**



A user centred research process with an open starting point requires the ability to reflect on the activities at hand and to evaluate the appropriateness of tools, processes and research questions. Reflection was supported by the workshop style of working and occasional video reviews of past activities, and sharing was made possible with technology solutions.

In this project reflection was achieved by arranging interpretation and reflection workshops, where the partners together engaged in the interpretation and evaluation of their work. For example, instant video reporting was used to reflect upon the activities of the process workshop as well as to facilitate the planning after the workshop. Having the video document made it possible to return back to the initial discussion about the design theme and question the arguments. The video also gave the participants an overall picture of of the work done in the other groups as well. This same technique was used later in the project to create visual recaps of past activities. This also helped those who had joined the project later. Data and document sharing was also made possible through the project intranet site, which gave summaries and an overview of the work so far.



Figure 4. Preparing a scenario at the process workshop with a hospital toy set.

Based on experiences from previous cases more attention was paid to a systematic sharing and sorting of the data. Contextual design (Beyer and Holzblatt 1998) uses templates for systematic user data analyses, which provided the inspiration for the thematic interpretations used in the interpretation workshops. The themes – events, information etc. – helped the participants in drilling into the large amounts of data and extracting useful insights by comparing views and interpretations. To gain detailed understanding of different themes requires focused perspectives and also consideration of the professional or personal interests i.e. an industrial designer focused on the material environment while a usability specialist concentrated on the content of the collaboration. However, as each theme looks at the data from different

angles and they needed to be linked together. Stories and situation descriptions, including people, places, feelings and problems, were collected and presented and aimed at bridging those perspectives into a more holistic view. The project strived to make raw data available, produce interpretations of the data, document and review interpretation and decision making stages and the overall process to assist in managing the many levels of focus and goal of the project.

The project also had a separate agenda to develop new kinds of tools to support collecting qualitative user data to supplement and support the interviews and observations. These tools are probes self-documentation toolkits, which had been applied in paper based media in the previous case study (see publications Jääskö and Mattelmäki 2003 and Mattelmäki 2005). Commonly probes kits have included diaries, work books, disposable cameras with picture taking assignments and a range of visual material to support expressing emotions and experiences. However, although both designers and users were happy with the paper based kits, they had some shortcomings. The process was slow and relied on physical artefacts, which makes sharing over long distances in such a networked project difficult.

This case study featured an experiment to use mobile technology for self-documentation studies, to facilitate a more flexible and real time capture and collection of self-documentation data. The Mobile Probes tool was an application running on a multimedia mobile phone that allowed users to receive questions and assignments and to reply with messages including text and digital photographs, which were uploaded to a server (Hulkko et al. 2004). The data was immediately viewable on the server and allowed researches to keep track of progress, spot technical difficulties early and get glimpses and snippets of data to create a better orientation for the following interview.

### **Research success and strategic value**

The Luotain project was an opportunity to utilize a wider variety of resources than would normally be possible – it is not typical that an industrial project would hire design researchers from the university. The design partner was involved mainly because the industrial partner was their long standing design client and they aimed at developing this collaboration and also partly because of the research interest and previous research collaborations with the research partner. The design consultancy gathered experience and know-how of user research methods although the designers stated that the workshop methods are about the only part of the process they can apply to their current work. Being involved in the project also improves the design partner's position by offering new kinds of domain expertise the field of the client. With these kinds of tools and practices designers can develop ways to better engage their clients in concept development.

The examination of experiences in the Luotain project and the presented case suggests that the collaborative concept design project allows time to think about things differently, look beyond products and users from many perspectives. It also makes space for errors, iterative steps for refocusing, sessions to have dialogues and share insights with users and other disciplines, and finally, spaces for developing new ideas and tools. In a collaboration like this there are several levels on which the research project and the work conducted in it contribute to strategic advantages for industrial

partners. Firstly, the project produces data that can be applied in commercial project in the company. Second, the management of such a project creates alliances and ties between experts within and between companies. Third, the participating people build expertise in the field, appealing also to personal motivations. Fourth, participation can increase the status and expertise of a group within a company. Workshops were good places for reserving time from other work activities for sharing knowledge and collaborating with a team of experts from in and outside the organisation. Furthermore, in this case, the industrial partner used the project as a way to strengthen its ties to a client in times of change.

The project provided an opportunity for experimenting with methods and developing ways of collaboration while also gaining knowledge of the design context that goes beyond the product-centric focus of everyday industrial work. This is not only the result of a setting good research questions, but rather embedded in ways of working that are more open, engaging and reflective than usual, providing new experiences and opportunities for the project partners.

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