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Abstract

We compare user involvement in the product innovation process of mobile applications for three very different target groups, namely horse aficionados at virtual stables, ice hockey fans, and the elderly. Our claim is that methods for user involvement need to be selected and tuned according to the specific characters of the user group in question. Different methods work best for different user groups. We present experiences from our three cases and discuss the aspects we have found important in method selection and tuning.

Introduction

When designing novel product concepts, the most difficult and crucial thing often is to find out which product characteristics best support the future users of the product. User involvement, or participation, has been used successfully for incorporating the "voice of the user" into the design process. By involving users in the process, the knowledge about actual and potential use can be communicated to the designers.

Mobile technology is evolving fast. New features and applications are constantly being taken into use. When designing a new mobile product it will most likely be used in situations that are not supported by the current technology. Therefore, the users' experience with old products does not give much information about the possibilities of future products. The methodology used should somehow guide the users towards their (future) needs and not just focus on their earlier experiences.

This paper reports experiences about user involvement we have gained in different case studies. We have studied the first two groups in separate case studies, and have planned a study with the third group. In the case studies, we have used several different methods for involving our users in the design group, some more successfully than the others.

Case 1: Virtual stables

Our first case study aimed at creating a novel mobile terminal concept that was targeted to teenage girls. We studied the needs of our target group by concentrating on girls that maintain or participate in the operation of virtual stables in the Internet.

Virtual stables are virtual communities centered on the concept of a horse stable. They use the Web as their platform. The community members are pre-teen and teenage girls who create and maintain virtual stables by themselves. Each stable has an owner or co-owners who is the creator and maintainer of the Web site. The virtual stable and horses are fully imaginary, but they are required to bear a strong resemblance to their real-world counterparts. Hence, the activities of a virtual stable are identical to the activities taking place at a real stable. There are stable owners, veterinarians, competition judges, horseback riders and others that take care of virtual horses, attend virtual riding lessons or training, buy and sell virtual horses etc.

We started this case study by analyzing the content of virtual stable Web sites and continued with the analysis on certain aspects with interviews, observations and Web-based storywriting.

When conducting the observations and interviews, we soon found out, that it was very difficult to achieve a natural and relaxed atmosphere for interaction between the pre-teen girls and our adult researchers. Our research group consisted of both male and female researcher in the age group of 30 to 40, and our target group consisted of girls from 10 to 16 years only. Clearly, we were not part of the community. We followed the ten contextual inquiry techniques for observing children presented by Druin et al. (1999): we dressed informally, the interactor did not make notes, etc. Even then, the girls avoided eye contact, strictly forbade taking photographs and tried to escape the research situation as soon as possible. They were generally not willing to attend voluntarily.

In the interview sessions, it was problematic to get in-depth answers. One major challenge was that if the question included any speculation or required further thinking, the interviewee just quickly responded, “I don’t know” without even considering the question. Peer pressure was noted in groups, as our subjects did not want to be different from their friends and seemed to avoid stating strong opinions in the fear that someone would disagree. The most typical answer to any question was either “It’s ok” or “That would be nice” and both answers could mean practically anything.

Some of these challenges might be lessened with ample prior notification, moving away from group situations, using more time and effort for negotiation of new power structure and familiarizing our target group with our design goals. However, some challenges would likely still remain due to target group’s age. Therefore, we concluded that instead of face-to-face research methods, we could better succeed in using methods not requiring face-to-face interaction between the researchers and our research subjects.

As a solution, we adopted a web-based storywriting environment where our target group is encouraged to create usage scenarios of a mobile terminal that would support their activities in a virtual community. The writing happens in an environment that is very similar to the virtual stables. In this environment the girls felt very comfortable and clearly enjoyed participating in the design process. We received lots of valuable input from the girls both in their stories and in the messages they left in the public guest book at our storywriting web site. (Isomursu et al. 2004)

Figure 1 shows the translated home page of the storywriting web site. Originally, the site was in Finnish. As with all virtual stables, our Horsenuts' Story Stable is also centered on the concept of a horse. We named the site to resemble a virtual stable, calling it "Horsenut's Story Stable" ("Hepohöpö Tarinatalli" in Finnish). We generated a few typos in the pages to make them look more "unofficial". When the virtual stable members were asked to name the most important thing in virtual stables, they unanimously replied "horses". One of the members of our research group happened to have a young foal, called Nemmastiina, at home. We decided to make her the centerpiece of our storywriting arena, providing lots of pictures of her. During the first phase of our research, we also had found out that one of the most difficult tasks in setting up a virtual stable is to find pictures of horses to occupy the stable. Therefore, we thought we could attract virtual stable owners to our web site and reward them for helping us by providing them with horse pictures they could use at their virtual stable.

Our storywriting experiment was well received among the target group. In the stories that the girls sent they successfully created new usage patterns and functionalities for the device we were designing. (Ijäs et al. 2003)

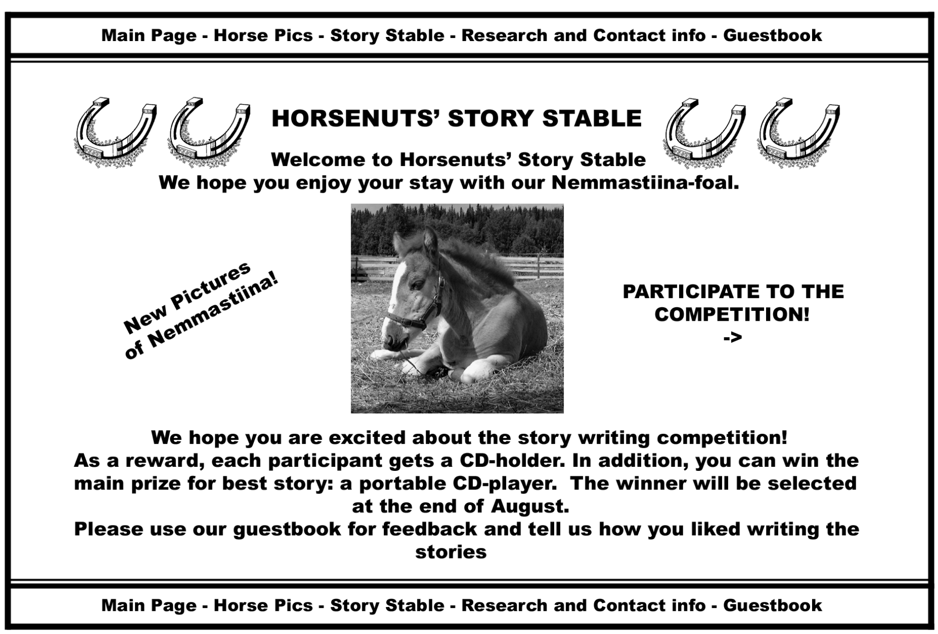

Figure 1. Translated home page of the storywriting web site.
(Original in Finnish. Note: typos are intentional.)

Case 2: Ice-hockey Fans

Our second case study aimed at identifying needs for mobile services that could be useful in a sport event such as an ice-hockey game. We examined fans of Oulun Kärpät, one of the most successful ice-hockey teams in Finland. Located in Oulu in Northern Finland they have e.g. won the Finnish Championship in 2004 and 2005.

Ice-hockey fan communities are connected with a devoted support for a specific team. The community is a typical example of a 'fan-based' community that spring up around books, films, music and sports. The feeling of the community is established mainly in the ice-hockey game, when the supporters cheer their team. However, the community members use technology when supporting the communication taking place in the real world. Ice-hockey teams maintain their Web sites that provide versatile information about the games and the players in order to get more people to go to the games, and more commonly, to buy merchandise and services related to the ice-hockey team. The Web pages of the ice-hockey team are extremely effective in distributing information related to the team and the games. Even in the small city of Oulu (pop. 120 000) the hits per day on the Web site can reach 50 000. Not all the fans are citizens of the team's hometown. Some of them may live around the country and even abroad. In spring 2004 the community site provider provided the community members with advanced mobile services allowing mobile access to versatile game and team related content, including video clips of ongoing games, game information, player information and statistics.

This user group is more heterogeneous than our first case study group. Although a vast majority of the ice-hockey fans are male, the age range is rather wide, and the percentage of female fans is significant.

We started this case study by analyzing the Web site of the ice-hockey team, and continued with contextual inquiry, where we attended an ice-hockey game and observed the fans. We complemented this by performing two separate questionnaires in the Web and personally discussing with some fans the possibilities of mobile technology.

As many ice hockey fans are communicative male adults that are not afraid of new technologies, traditional participatory methods were much more efficient with them than with horse aficionados. In addition, informal discussions on new ideas proved to be very fruitful, both when we were the ones to introduce new application ideas for them to comment and when they voluntarily told about new ideas they had in mind.

Observations proved to be rather difficult to arrange, as the ice hockey hall is crowded during the game, and the noise level is high. It is difficult to see what the users are doing during the game, and discussing is close to impossible. Additionally, the game requires lots of concentration from the audience, so discussions with the researcher were not what our target group members wished to do during the game. Pen-based diaries and other recording methods during the game also derived attention from the game, and the seating arrangements did not favor writing. Therefore, our success with the methods where data was collected during the game was weak. The best method proved to be pre-arranged observations where the researcher had bought a seat next to the observed person and briefly discussed with him also before and after the game.

Web-based storywriting was not as successful as in our first case study, probably because storywriting was not a part of the normal activities in the ice hockey team's Web site and the users were not used to it. The quality of the stories was much lower, even though the number of the stories was considerably higher due to the high number of fans visiting the Web site daily. Stories did not reveal much from the users.

The most successful method for this user group was a combined use diary and deep interview of long-term users. We recruited a group of users that attended the games regularly, and asked them to participate in our study for a period of six ice-hockey games. After the games, they were asked to fill in a structured diary that had pre-defined questions about their actions and wishes during the game. When the data was collected, our researcher also interviewed the users in order to get more detailed information to support the diary entries. (Still et al. 2004)

Case 3: The Elderly

Our third target group, i.e. the elderly, is a growing group both in total numbers and in technology use. It has been calculated that one in four Europeans will be over 65 by 2020. This makes wellcare a critical social and economic component of modern economics. Information systems and technologies are expected to play an important role in enabling the ageing to live well and independently in their own homes. It is important to get the elderly and their caretakers involved with the development process of new technology. In proportion to the importance of the topic, there are very few studies available of the successful involvement of the elderly.

It should be noted that the elderly are by no means just one homogeneous target group. Old people are even more diverse in their abilities than the younger population and this diversity exists even within individuals: an individual's abilities can vary and fluctuate widely through time. (Gregor et al. 2002)

We are about to start a case study that examines the needs and possibilities of technology for supporting the elderly in their everyday life. In preparation for the study, we have conducted a literature survey on experiences and methodology in involving the elderly in the design process of new (technical) applications and services. We discuss our findings below.

In their paper, Eisma et al. (2003) introduce the concept of mutual inspiration. The cultural and experiential gap between the (typically young) designers and the target group is especially large when developing new technology for the elderly. To overcome this gap, Eisma et al. seek for the state of 'Mutual inspiration' where the designers inspire the elderly to give answers to questions they are not asking, and to ask the designers for solutions and functionality they had not thought of. This in turn would inspire the designers to develop innovative products that really can be used by the elderly and that would provide them high value. The prerequisites for Mutual inspiration include early involvement of all the stakeholders and that a common ground is established where both partners understand some of the other's field, and where dialog can take place. To inspire the elderly, they suggest the following approaches:

- Introduction to new technologies in a variety of ways, including hands-on sessions,
- Discussing possibilities,
- Encouraging them to think about their current use of newer & older technology,
- Providing time for social interaction.

Hirsch et al. (2000) argue that the developers of eldercare technologies should not concentrate only on functionality but should also address social, emotional, and environmental factors. Assuming that the elderly will use an assistive technology simply because they need it is misguided: if a technical device fulfills a functional need but is socially or emotionally unacceptable, it may not be used even if it would be of great help. Furthermore, the elderly often lose confidence in their abilities but in the same time they refuse to use assistive technology because they feel ashamed.

Hirsch et al. used ethnographic research methods to conduct broad-based qualitative research intended to identify elder people and caregivers' perceptions and attitudes. Their research focus was to understand behaviors, attitudes and routines of ageing people, the tools and artefacts they use, and how they think about them. Their research techniques include the following:

- A literature review,
- Lifestyle interviews,
- Self-documentations with camera and log-book,
- Observations.

Hirsch et al. (2000) also point out an important economical issue: products that are produced in small quantities for special markets tend to be expensive. If these products are specialty products and thus highlight the users' disabilities and contribute to social stigma associated with disability, it hinders the adoption of them. Therefore, whenever possible, the device should be designed so that it would be acceptable also in a wider market. The design should emphasize the empowerment, and not the disabilities, of the user.

Oulasvirta et al. (2003) emphasize the importance of being physically present in the original (or similar) context during the design session. They call their method 'Bodystorming'. Also Tiitta (2003) has captured knowledge from the elderly using the same method. Eisma et al. (2004) used in-home observations and interviews to allow designers and researchers become familiar with user context.

There are also studies of focus group method to discover users needs (Lines and Hone 2002; Oulasvirta 2004). Several studies (e.g. Lines and Hone 2004 and Eisma et al. 2004) report difficulties in keeping the focus group of elderly focused on the subject of discussion. In conclusion they noticed that the most functional focus group is when it comprises at most three elderly people (a number also recommended by Inglis et al. 2002) and is structured so that the elderly are able to pay attention on the main task while in-depth information is available.

Interviews and observations that are conducted in a relaxed setting at the homes of the elderly have been reported to be successful by Eisma et al. (2004), although they are clearly unfeasible in large-scale studies. Interviews done at homes also evoked storytelling that revealed lots of additional qualitative data about the use of technology in the everyday life of elderly people. Eisma et al. (2004) also report that most successful questionnaire surveys were done when the researchers aided the elderly in fulfilling the questionnaires, again presenting challenges for large-scale studies. They report that elderly have a high tendency of using "I don't know" option of the questionnaire, and they need to have high threshold levels of certainty when they answer questionnaires.

Eisma et al. (2004) have also used a sort of technology helpdesk for collecting information about technology related problems of elderly people. The technique proved to be beneficial for both the elderly and the researchers: the user had her technical problem solved and the researcher got detailed knowledge about the problems the elderly have with technology. Again, this represents another method that requires lots of time, effort and resources from the researchers.

Conclusions & future work

Our case studies show that the involvement of the users early in the design process is highly recommended and valuable, as the designers seldom represent the user group themselves and they cannot thoroughly understand the needs and requirements of the future users. User involvement is needed for "hearing the voice of the user" through the design process. However, the fact that the designers often are not "inside members" of the user group often creates challenges in selecting the appropriate and feasible methods for user involvement. The method needs to support the overcoming of problems caused by language difference, power structure imbalance, difficulties in understanding each other's attitudes and values, etc.

Our next case study will examine the needs of the elderly for mobile technology in wellcare. It will be conducted in the Kainuu province of Finland in late 2005-2006. Kainuu is in the center of mainland Finland. It is a sparsely inhabited large area (86, 573 people in 24, 452 km^2) with two towns and eight municipalities. The unemployment rate is high, and the younger generations are migrating to find work elsewhere. The number of the elderly is increasing. To cope with the situation, there is a strong need to develop and find new supporting technologies for the existing services e.g. in health care, social and educational services as well as in culture and day care. As the area is sparsely inhabited and many of the elderly wish to live in their own homes as long as possible, mobile services and applications appear very promising.

Identifying the pros and cons of various methods in involving the elderly in the design process helps us get the most out of the knowledge and ideas of the elderly that are involved in our study. To overcome the cultural and experiential gap that Eisma et al. (2003) identify between the designers and the elderly we plan to include an elderly lady in our research team. She is from the Kainuu province where our target group lives, and is the mother of one of the PhD students in the project. Having her visit and interview elderly people at their homes should provide excellent ground for mutual inspiration. According to Eisma et al. (2004), the elderly who belong to different kinds of clubs are often active and innovative. Due to this fact, Eisma et al. have good experiences of using different elderly groups. Following their example, in our next case we will recruit volunteers from a senior citizens' club in Ristijärvi (called Seniorpolis).

Our studies have shown that younger people are more familiar and open-minded with new technology whereas the elderly do not know all the possibilities of and are not as amenable to new technologies. This can severely limit their willingness and ability to contribute actively to a discussion of their needs and requirements. To ease this problem, we believe that in our upcoming study we should focus on the active elderly, those who live independently at their home and the so-called seniors who are still at work but close to their retirement. Also, caregivers and relatives who closely follow the everyday life of the elderly have a lot of knowledge that is remarkable for the design process of the new applications and services.

Following the ideas of Hirsch et al. (2000) on the empowerment of the user and the expansion of the target group, any potential application or service that will be found should be considered for wider use than just for the elderly.

In all groups, being in context (i.e. in a horse-centered Web site, ice-hockey game or the homes of the elder) clearly helps the solicitation of information from and the involvement of the target group. It is important for the researcher to think how to lighten up the atmosphere (e.g. smalltalk and coffee or refreshments in the start of a session). This sets requirements not only on the academic competence of the researcher but on her social skills as well.

Overall, in our upcoming study, a wide-enough palette of research methods should be used so that our case study would give both qualitative as well as quantitative insight to the needs of the elderly. We will take care that the following criteria for the new applications and services will be considered:

- *Effectiveness:* the technology should cause a clear improvement to current practice,
- *Efficiency:* the technology should be easy and fast to use,
- *Timing:* availability exactly when needed (& where needed),
- *Security:* the need for trust is emphasized when the elderly are the user group,
- *Customer centered:* ease of use and social acceptability are some of these criteria,
- *Fairness:* the technology should be accessible to the disabled,
- *Generality:* (where applicable) the technology should be accessible also to others than the elderly,
- *Aesthetics:* the design should not emphasize the users' possible disabilities.

Incorporating users in the early phases of the design process is valuable yet not simple. However, as technology will penetrate the life of very different users it is a process that needs to be understood better.

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