Is User Involvement Harmful or Useful in the Early Stages of Product Development?

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ABSTRACT
Not much empirical evidence has been presented to evaluate the usefulness of user studies or the optimal amount of resources to allocate to them. This study is an initial step to understand the costs and benefits of user studies in the early stages of product development. In a case study a psychologist, who was not a designer, performed a user study and developed design propositions. The results were compared to a baseline design process with usability tests. The results show that the user study was useful although the investment of 46 person hours was modest. The design propositions based on the user study results made the product more usable and desirable to the users.

Keywords
User-centered design, user study methods, user involvement, consumer products

INTRODUCTION
The literature suggests that customer—developer mutual understanding and user participation are important factors in the successful development of systems. For example, Keil and Carmel [4] found that more successful software development projects employed more direct links to users and customers. It is often argued that user involvement is particularly important in the early stages of product development, but not much empirical evidence is available to support it. On the contrary, the work of Heinbokel et al. [3] suggests that high user participation and even user orientation correlates negatively with team effectiveness and quality of team interaction.

An approach to overcoming negative effects of user participation is to gain direct user contacts by designer controled user studies. For example, users can be observed at work or they can be interviewed in order to gather user needs. Many experiences have been gathered, and user study techniques and user-centered processes have been produced and reported [1,2,5,6,7]. While such case studies and experiences are useful, we also need empirical evidence to estimate what is an efficient investment to gain reasonable results from user studies - that is, how to *optimize* user studies.

This study is an initial step towards understanding the costs and benefits of user studies in the early stages of product development. We try to evaluate the utility of the user studies in a case study. A psychologist, who was not a designer, performed a user study and made design propositions with the help of the results. The utility of the results was compared with a baseline process, which included usability tests.

CASE STUDY
The user study was conducted for a large Finnish company. The study was focused on a set of functions of a portable communications device aimed at supporting mobile users. The set of functions and their interface were already designed in the baseline design process, and now the functions were redesigned independently and without knowledge of the earlier design.

The user study method was a combination of a contextual type semi-structured interview technique and a modified version of the think aloud method. By combining the different techniques it was possible to gather efficiently different kinds of information: detailed non-verbal information, domain specific knowledge, and an overall picture of the user world.

One psychologist performed the user study and developed design propositions. She interviewed six representative users in their work places. The interviewer asked first some general questions about the use of the product and then she asked questions about each prescribed topic. Every time a user mentioned a problem or a device function, the modified think aloud method was used. The user was asked to show with his or her own product, how he or she dealt with the problem or did a task. While conducting the studies, the psychologist also videotaped its progress, and made notes.

The psychologist analyzed and documented the interviews. She used the results to synthesize a new set of functions and their labels intended to support users.

The results of the user study included general descriptions of users, their typical ways of use, frequencies of functions they used, their wishes and needs, and one summarized

sequence diagram depicting the optimal overall usage. Some usability problems of their present product were also identified. Eight new functions were created to meet the user requirements. Three out of the eight functions were already available in the original model in some form, but one of these baseline functions seemed not to work in an optimal way from the users' point of view. The new design proposition included partly different functionality and partly different labels for the functions.

The results of the user study were validated by three comparisons to the baseline process, in which the original functions had been developed. The process was very iterative and rapid prototyping was used. The user target segment was defined by product marketing, but it was not based on market research or a user study. The user interface team included a marketing representative, but the only direct link to users was through usability tests. The prototypes were usability tested four times in different phases of the design. Only the prototype tested latest included the functions under consideration entirely, because the requirements changed during the design process.

RESULTS

The total time spent on the user study was 46 hours. These hours include 10 hours spent on reporting and creating the design propositions. The baseline product was designed inside the large company, and the design team could not offer any estimation of the time spent on design. Thus, the benefits of the user study were estimated by comparing them with other characteristics of the baseline design process.

Comparison 1

Three designers who had participated in the baseline design process were interviewed to find out what kind of knowledge they had applied when they created the original functions during the baseline design process. The interview showed that the designers incorrectly expected the users to have similar ways of usage to themselves.

Many of the needs and wishes of users were already recognized, but designers had found it difficult to distinguish the essential ones. The designers found the results of the user study to be useful for understanding the priorities of the users, their use contexts, and their specific ways of use.

Comparison 2

The analysis of the usability test results of the baseline process showed clearly that the user study results predicted most of the problems that had surfaced in the usability tests and the overall reactions of the users. In particular, all conceptual problems could be predicted by user studies.

Even while the baseline functions did offer solutions to real user problems, their structure and names did not match the natural use situations. Therefore, users had difficulties in conceptually understanding the functions.

Comparison 3

The usability of the concrete design propositions created in the case study process was compared with the usability of the baseline functions. The comparative usability test supported the usefulness of the user studies. Six users out of eight selected the new functions with new names for their use, and also the other two preferred some of the new names. In particular, the users thought that the new names matched their use better than the baseline ones. Altogether the four experienced users of the baseline product spent slightly more time performing the tasks than the four novices using the new names. Two experienced users had already learned to use the functions, but two other experienced users had as many problems (nine) as the novices (eight) did together.

CONCLUSION

Our results show that the user study was useful although the investment was modest. All three comparisons made with the baseline design process and its results suggest that the benefits of the user study outweigh the costs. The results of the user study helped the inexperienced psychologist to design a better product that was designed in the design team of the large company with the help of usability tests. The results suggest that user studies can provide useful information for product development. Further work should investigate the pros and cons of user studies in teamwork. Further, whether designers are able to do effective user studies themselves should be studied. Interviewing requires social skills, and the costs of the interviewing training needed are unclear.

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