Use in the Oven – Product Development in HCI Research

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ABSTRACT
We report on a collaboration project between a small manufacturer of ovens and a group of researchers. The project ensured, through field studies and prototyping, that a new generation of the products were usable, but it was also a learning experience for the manufacturer. The project is a fruitful model for future collaboration between industry and academia.

INTRODUCTION
Over the last year we have been engaged in a development and research project together with Hounø A/S, a local manufacturer of ovens. The cooperation was initiated by the manufacturer, motivated by the fact that their existing line of interfaces suffered from being overcrowded with functions added over the years, and not having a modern appearance (fig. 1). Previous efforts to redesign the interface had not been successful; therefore they decided to team up with an external partner to complete the redesign. The overall design dilemma was to make an interface that supports programmability and other advanced features, and at the same time looks like an oven. Thus, not alienating the majority of the users who were not at all confident with the idea of using a computer-like device in the kitchen.

Our motivation, as researchers, was that the project provided a real-world context for studying (fairly uncomplicated) pervasive computing technology in use, and that it provided an opportunity to commit our knowledge production closely to design. Right from the beginning, project time lines were tight, and several basic decisions regarding the new interface had already been made. Most importantly, the use of a colour LCD display and two rows of soft keys in an ATM like layout. This limited the design space, but at the same time made it more likely for the manufacturer to have a new product ready on time. We saw these limitations as an interesting challenge.

PROJECT ACTIVITIES
Among the different things we did in the project, two types of activities proved to be particularly fruitful. Firstly, we conducted field studies of the use of the present production model line as well as the use of competitor products. Secondly, we developed a prototype reflecting the changing design specification, and we tested it with users both in the lab, and on site.

Disregarding the fact that a new design had already been developed our first activity was a general study of ovens in use. The aim of this was to find out what kind of device an oven is, to transcend the narrow idea of the oven as an assemblage of functionality. We conducted observations in three types of settings defined by the manufacturers product line: the bake-off oven for bread baking in small shops, the combi steamer oven for institutional kitchens like hospitals, and ovens for À la Carte restaurants and catering services. As part of the development project, studying ovens in use was important as a way to establish a pool of reference points in the further construction process.

The other main activity was the continuous construction of a prototype reflecting the evolving state of the manufacturers specification. Normally in a user centred design project, we would have based the first prototype on insights from field studies and other interaction with users. However, in this project we started out by a straight implementation of a specification developed by experienced electrical engineers with the manufacturer in cooperation with a graphics designer. In parallel, various design drafts were produced aiming to highlight and solve the major issues found in the field studies. The first versions of the prototype were operated with a mouse on an ordinary desktop computer. In the next round we build a mock-up of an oven front with real keys, and a laptop computer hidden behind the front only showing the part of the screen corresponding to the area of the LCD screen planned for in the new oven. This mock-up was brought into the field and tested with ordinary users in their own context (fig 2).

Through prototype testing in the field more issues were identified. In short an iterative process took form in which the initial field studies, the original design specification, the insights from implementing the
specification and the field test results were interacting in the refinement of the evolving interface.

The current status of product development is that the oven will go into production in the first half of 2003. The interface still needs a few more iterations, but everybody in the project group and in the company are confident that the new interface is eventually to be brought to market.

**DISCUSSION**

As our cooperation with the oven manufacturer is both a development project and a research activity, we have to discuss it in these two distinct perspectives.

**The project as a development activity**

The manufacturer gained insights into the potential use of the new design. This enabled them to judge the new design based on a realistic basis rather than opinion. Thus, radically reducing the risk of introducing a completely new interface on their products.

The field studies became an efficient infusion of concrete use into the design loop. In several situations “design by pure reason and long experience” was corrected by observations of what people actually did with their oven. The most prominent example of this was the way we solved the seemingly un-solvable issue of cramming more information onto the display than there seemed to be room for. By referring to observations of use and the testing of earlier versions of the prototype it was possible to make decisions that from the point of view of “pure reason” would be illogical and inconsistent, but from the point of view of actual use proved to be consistent.

Building the prototype proved, not surprisingly to be an effective reality check, bringing the design team away from mere speculation and logical reasoning. We experienced over and over again that building an idea into the prototype yields much more basis for assessing it than we could get from reviewing a careful specification of it.

To a large extend the project became a learning experience for the manufacturer. They learned that users’ reactions to a new product are fundamentally impossible to predict, and that engineers therefore should not design alone, but also take time to involve real users as a resource. They learned that it is possible to do testing in context and get useful and representative information, and they learned enough practical tricks to start doing testing themselves.

They experienced that testing in the field could reveal surprising features of the interface, things they believed to be easy to understand proved to be very hard for the users to grasp and aspects they expected users to have a hard time dealing with appeared to be easy and straightforward for the users. Finally, they learned that instead of patching new functionality onto the interface, technically meaningful extensions should be backed up by ongoing studies of the ovens in use, possibly engaging sales and customer support actively in maintaining continued contact with costumers as use evolves.

**The project as a research activity**

From the point of view of research the project is far from finished; we are just now about to begin the analysis of the oven in use. This analysis will draw on both the initial field studies and the prototype testing. For this analysis, the insights into the specifics of the technical substance of an oven, has already proved to be valuable. We might have been able to make a field study of ovens in use without cooperating with the manufacturer, but we would not as easily have been able to get an understanding of the technical substance.

These insights should be weighted against the resources spend on developing the evolving prototype. However, from the point of view of the research project that has been almost free in the sense that it was build as part of a master thesis project and partly paid by the manufacturer. Apart from the concrete implementation, we believe that the effort put into the development activities consistently have contributed to the construction of an understanding of the oven as mundane pervasive computing.

We believe that the project is a good model for future cooperation with small manufacturers of equipment with an increasing amount of computing power. And we hope to be able to use the project as a pilot experiment for a much larger engagement with and handful of manufactures of different types of equipment.

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