

# Co-design methods for designing with and for families

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## ABSTRACT

This paper describes co-operative design work regarding the development of IT artefacts to be used for communicating within families. It shows advantages of co-designing together with users. Thereby obtaining 'real life' experience, understanding and knowledge about their needs and desires.

Since there was no specific solution or technology in mind from the beginning, several different methods were used in combination to investigate what had meaning to the family members. Some of the methods used are: cultural probes, interviews, observations, workshops, video brainstorming, prototyping in the homes, technology probes and individual assignments.

The researchers represent different academic professions, mainly ethnography, industrial design, interaction design, computer science. To minimize the problem of 'handing over' information, researchers from at least two different backgrounds participate in all work done together with the families.

## KEYWORDS

Co-operative design, industrial design, families, domestic environment, process, methods, probes, workshops, IT, ethnography,

## INTRODUCTION

This paper describes co-operative design work regarding the development of IT artefacts in Sweden within

*Figure 1. "Mother seeking children. Come in and eat!!!" A photo describing some of the complexities of family life. It is taken by family members as a part of the probe method, see below.*

the interLiving project. interLiving is a three year project, 2001-2003, funded by the EU Future and Emerging Technologies, initiative the Disappearing Computer. The research is conducted both in Stockholm, Sweden and in Paris, France. The group of researchers are from many different disciplines, ethnography, psychology, computer science, industrial design, interaction design, etc.

One of interLiving's objectives is to develop artefacts that use information technology to facilitate intergenerational communication within families.

There was no specific problem, solution or technology in mind from the beginning. How could we find out what to do? How could we get hold of the design ideas that would be reasonable to develop?

Another of our objectives is to try out, modify and describe different methods for co-designing with persons in such a 'private' setting. We want to develop methods that let the family members participate and influence the design through out the whole process.

We use the concept of 'family' to describe close relations spread over generations. The three Swedish families we work with are distributed in three households each. The participants' ages varied between one and 75 years. We will work with the same 30 people throughout the three years.

The researchers in Paris also work with three families.

The focus in this paper is on the strategies and methods we use from an industrial design point of view.



## BACKGROUND

The last decade there has been a growing interest in technology used in a nonintrusive way. 1991 Mark Weiser coined the term 'ubiquitous computing' in an often referred article (Weiser, 1991). 1995 'The Vision of the Future project was initiated within Philips to explore how future products may be in ten years time.' (Lambourne, 1997: 494) This was an interesting project that had designers in the core team. One strength of Philips' project was the effort put into the visualisation of the ideas.

Other descriptions of this development is Donald Norman's *The invisible Computer* (Norman, 1998) and the EU *Disappearing Computer* research initiative.

In Sweden there is a strong tradition of participatory design both in the field of industrial design and in software development. The *Utopia* project from the beginning of the 1980's is an early seminal example (Bødker, et al. 1987, 2000) where the key ideas were developed. The company *Ergonomidesign* has designed products together with and for disabled people and for workers since the seventies.

There are of course big differences between how the participation is carried out in different areas and as within different projects. Work related aspects have been in focus although projects such as *KidStory* (Benford, et al, 2000) shows that the ideas also work in other settings, here with elementary school children.

The growing interest in IT technology for domestic environments and family contexts is shown in frequent workshops, e.g. *Equator 2001* and *CHI 2002*, to which we contributed.



*Figure 2 and 3. Two kitchens with different characters. Probe photos*

## OUR APPROACH

### DESIGN PERSPECTIVE

One of objectives is to design information technology artefacts that will be used for a length of time by the family members. From a design perspective it is natural to consider all the meanings the users put into an artefact in its changing future contexts. This is done from the very beginning of the development process.

Some disciplines tend to focus mostly to the operational aspects of artefacts, the 'task solving' and seem to describe artefacts as objects with a single predefined purpose. This would imply that a radio is 'used' for listening to audio broadcasts, a chair is 'used' for sitting.

But even a simple artefact like a key chain has great symbolic value and we have different strategies for using one or several in order to sculpt the boundaries between home and work (Nippert-Eng, 1995: 48).

A chair also has a wider purpose than its operational aspects. It has meanings even when it is empty. It has presence in the room that interacts with other objects and people. It shows or affords us the possibility to sit down in it. Although a chair could be purchased for its sitting qualities it is most certainly chosen either for its appearance and/or price. Planning and rearranging furniture at home is a design activity that almost everybody is involved in sometimes (Heskett, 2002).

It is not possible to generalise and please 'everybody' with one artefact. People put meaning into artefacts in manners that are very personal. (Csikszentmihalyi, 1991) The following quote from a recent Computer-





Figure 5 (above). The vases were described as ‘nice vases’ by Hanna. She had got them as a birthday present from her sisters and parents. Her husband Thomas did not like them. Probe photo.

Figure 4 (left). ‘Thomas had bought a whole body mirror cheap at one of “our” antique dealers on “our” street. Just the kind I wanted to have – Really nice I thought! 50’s. I’ll take a picture.’ Probe photo and translated text from diary.

Human Interaction paper reveals the common misunderstanding that there is an absolute measurement of beauty. They miss that peoples preferences depend on factors like: class, cultural background, economic background, ethnicity, gender, age, neighbourhood, occupation, etc.

‘The visualization should be aesthetically pleasing, a typical home decoration.’ (Mynatt, et al. 2001: 336)

Figure 2 and 3 are photos of two different kitchens. The different owners have expressed that they have a nice kitchen. The artefacts are presumably chosen and arranged with great care. The pictures show that the styles and characters (Janlert, et al, 1997) differ between the kitchens. The owners would probably not agree to switch any single artefact between the kitchens.

Many of the artefacts that we choose to surround ourselves with function as signs. The mirror shown in figure 4 might signal that the people living here are conscious of style and interested in design.

The way people relate to artefacts is constantly changing. Time and context give artefacts their value. Used things get thrown away and may end up in an antique store or at a flea market as a valuable artefact.

Within a family there are always objects that have different roles and meaning to different members. This adds more complexity.

This implies that there are more aspects than solving the task to consider while designing for domestic envi-

ronments. In this context the users seem to regard aesthetics as very meaningful.

Many of the methods normally used for Human Computer Interaction related research have been developed for studying working environments and are therefore mainly task oriented and focused on productivity. The interLiving project needs to develop an approach that used methods that helped us understand what has meaning to people in their complex situation and context.

### MEANING, NEED AND DESIRE

In everyday speech the concepts ‘use’ and ‘function’ are often related to activity. You would not normally say that you use a painting that you have hanging on the wall. The concept of function has a wider meaning to designers, letting it cover all meanings an artefact has to its users. That means covering social, cultural and operational meanings. The method ‘functional analysis’ is used to describe all the needed and desired aspects of an artefact. (Löwgren, 1999. Westerlund, 2002) This meaning of function is similar to Donald Norman’s (and Gibson’s) use of the term ‘affordance’.

... ‘affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used’ (Norman 1988: 9)

(For an extended discussion about ‘affordance’ see Norman (1988) and Gibson (1982). Read Heskett (2002:

36ff) and Westerlund (2002) for further discussions on the concept of 'function' in this context.)

We had to find a way of setting our design problem together with the families. Although problem setting is a natural part of design, the amount of freedom or uncertainty in interLiving was extreme. Our roughly outlined design space was to use information technology to facilitate intergenerational communication within families. The problem setting that usually is done during a design process goes hand in hand with problem solving as a way of learning about aspects of the future situation of use. Problem setting is discussed by Schön 1993: 18.

'And the activity of problem setting becomes an inquiry into this purpose, in order to understand what it is. Thus also the task of problem setting makes a contribution to the designer's understanding.' (Gedenryd, 1998: 83)

What should we try to find in our studies? It could be a 'problem', it could be 'need', i.e. trying to find something that is lacking or something that is important and which can be improved. But since we also realize that family life is not only a unit for physical survival we also tried to look for potential and actual 'desires'. Needs and desires are concepts that often are used as goals for artefacts. They can both be regarded as meaningful. From a product semantic point of view it is natural to look for 'meaning'. Klaus Krippendorff writes:

'Design concerns itself with the meanings artifacts can acquire by their users.' (Krippendorff, 1995: 153)

The concept of 'meaning' seems to work well even in this project and definitely better than 'use'. It is an important distinction that the meanings an artefact has, are constructed by its user(s). This fits well with our approach of working closely together with families. From an industrial design aspect we realize that if something is to be regarded as meaningful it has to be designed and consciously shaped in order to have an expression and character that will both ease the operation and also fit into the existing environments. Therefore it will be crucial to get inspiration from as real and concrete situations and environments as possible.

It is important to keep in mind that these different concepts let us describe and reflect on the world seen through different models. Models are used for emphasizing some aspects and suppressing others. This is very useful and revealing, but we must be careful because they do not describe all of the real life situation.

## **METHODS**

There are of course many different ways to go about and no approach can guarantee success. Little is actually known about where, why and when the ideas that lead to successful solutions appear. We know that it is difficult for users to be innovative by just talking about what technology they want in the future. But on the other hand people can be very innovative when they are given the right tools and circumstances.

Our approach is to use several different methods in trying to get to know the family members different needs and desires. This approach is called triangulation. (Mackay, 1997) We calculate that what does not show in one method will be revealed in another. And strong aspects would have impact on the findings from the use of several different methods. We decided to use cultural probes, workshops, observations and interviews. Of course prototyping will be included as well. The workshops include the use of several different methods, which is described more below. After some time we also developed Technology Probes which are complementing Cultural Probes, see interLiving deliverable 1.2 & 2.2, 2002, Brown, et al, 2001 and Hutchinson, et al, 2003. These are scaled down, feature slimmed applications that are on their way to become disappearing computers in the sense that 'we [are] freed to use them without thinking and so to focus beyond them on new goals' (Weiser, 1991: 933). They give us interesting information about the families use of technology.

### **Process**

Since understanding from different aspects is a necessary ingredient we need to work with researchers from several different academic professions together in all events. The probes were discussed and analysed this way. The interviews are done by an ethnographer and an industrial designer together. And the prototyping work done in the families homes is conducted by these two and a computer scientist. We work closely together and minimize the usual sequential way where one person hands over the results to the people in charge of the 'next step'. The result of this was a greater depth of the investigated aspects and also in a better, and mutual, understanding. We work together even during other phases, planning, workshops, etc. This gives us all the "same" experience about the three diverse families. We make a common ground to work together from in the development.

There were several sources of inspiration for this, partly experience from our own practice and horror stories about the lack of results from the 'waterfall' or 'toss it over the wall' way of working. We were also inspired by Henrik Gedenryd who stresses that 'design cannot be separated into stages.' (Gedenryd, 1998: 69)



Figure 6. A probe photo of 'nice' stuff.

### Probes

Cultural Probes is a new method used in research developed by Bill Gaver and some of his colleagues at the Royal College of Arts during the Presence project. (Gaver, et al, 1999)

The main idea behind Cultural Probes is to get inspired and informed. A probe or kit of probes is handed to the person(s) that you want to learn about. After they have completed them, they send the results to the researchers.

In our use of the Probes it is central to involve the users also by discussing the feedback from them to find out more about their situation, desires and needs.

We designed and produced kits of probes. Each of our households got one kit. The kits were produced so that all the contents would have an integrated appearance. It was important that they gave the users a notion of importance and respect. The 'questions' and tasks were very open-ended and we hoped that there would be some unexpected results. We tried to make the probes so that all family members, from one to 73 years old, could contribute. There were plastic pockets to encourage and make it easier for people to collect and send us things.

The kit also contained a diary that they should write in during a period of two weeks and repackaged, disposable cameras with questions printed on them. We framed the photo probe with three assignments:

'Take photos of:  
places where you leave messages to the others,  
things that remind you of the others in your family and  
things that you find pretty or ugly in your home.'

The purpose of the probe photos was to encourage family members to take pictures of their home environment, emphasizing communication places, artefacts and aesthetics. We want them to reveal to us where



Figure 7. Probe photo of 'ugly' stuff.

and how they find a communication through an artefact meaningful and start a dialogue about aesthetics.

We wanted spontaneous reactions but we also wanted the people to reflect afterwards on the photos and why they took them. Therefore we had arranged so that the developed photos were sent back to the families for annotating. And after doing that the families sent them to us.

The probe photos that were sent to us from the different households had some similarities. Most of the photos of things that were considered 'nice' were simply interiors in their homes.

People have a hard time making technology fit into their life. Most other things in a household are there because they are experienced as meaningful.

### Probe diaries

Our probe diaries were interesting for several reasons. We often got several views on the same situation. One Friday Hanna reflected over calling her mother Barbro. But she decided to call the next day instead because she wanted to talk for a long time. In Barbro's diary she wrote that she had thought of calling Hanna the same Friday but decided to wait until Saturday. The reason for this was that she felt that they had a lot to talk about.

The diary probe is a good tool for revealing stories like the one above. This information would be hard to get with other methods. Since it is about non-communication.

The probes gave us insight into the families, but mostly from a few peoples view. Head of family = head of probe! We needed a better way of letting everyone express themselves. To the smallest children, 3,5 and 1,5 years old, we made the probes as easy as possible to handle and relate to. We gave them a Polaroid camera and asked them to take pictures of things they want



Figure 8. Fighting brothers. These probes focused on making them visible in the process. From the children's video assignments.

to show to someone in their family. The photos were put into a photo album and their parents annotated them with the children's stories.

The older children, 9 to 14 years old, were lent a simple digital video camera with the assignment to: Describe everyday activities to somebody from outer space that understands your language.

The grandparents Calle and Marianne made a video describing how they used their collections of photos. Photos of grandchildren and events are important in their home.

This way we achieved both more interest in the project and a better understanding of the children's everyday life.

It is clear that the probes have revealed a lot of information about the complexity and the context seen from the users perspective. The probes also help expanding design space.

### Interviews

A couple of weeks after the probe kits were handed out, the probe photos and diaries started to arrive back to us. We also got a couple of postcards and a few other artefacts the families had collected. After studying the photos and reading the diaries we made interviews in each household. The idea was to get more information about matters that were presented through the probes.

One woman explained how important she thought it was for her to have really nice looking technical artefacts, like an iMac on her desk at home and a neat mobile phone in her handbag. She very seldom used the mobile phone in public. Just knowing it was there and nice looking was good enough for her.

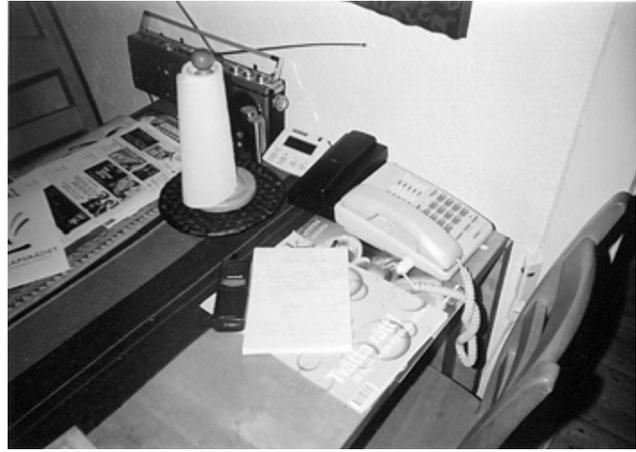


Figure 9. The green grandparents kitchen table with portable phone and other devices. Probe photo.

One household took a photo of their portable phone and wrote that it was 'ugly'. (Figure 9) In the interview they explained that it had sloppy forms and did not fit into the character of their house. They had several Bang & Olufsen products. At an interview a year after, they told us that they had convinced themselves that the sound was not good enough and had bought a new portable phone. When they described their shopping it was clear that they had a holistic view of the artefact. They reflected on sound quality, aesthetics, battery life and the character at the same time.

Questions about specific events that were written in the diaries often led to discussions about the asymmetries in communications. Often one of the people speaking have more time and is more interested in a longer conversation, while the other party just wants to exchange a few words. The following comparison with the situation when you are in the same room was made.

'You can tell by the way a person is reading the newspaper if it is OK to open a conversation or not. Perhaps a glance over the top of the paper says: "Sure, go ahead".'

Overall, technology was primarily seen as a means for facilitating seeing each other in person. Meals with the whole family were really desirable.

### Workshops

Most of the big workshops are held in our lab where we have a large room that gives place for the around 30 people that participated. They are hands-on design exercises in four to five steps. The workshops are carried out on weekends and last around five hours including lunch.

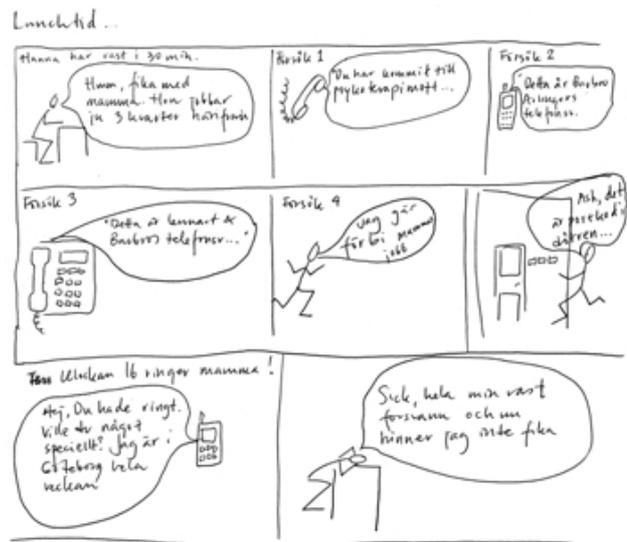
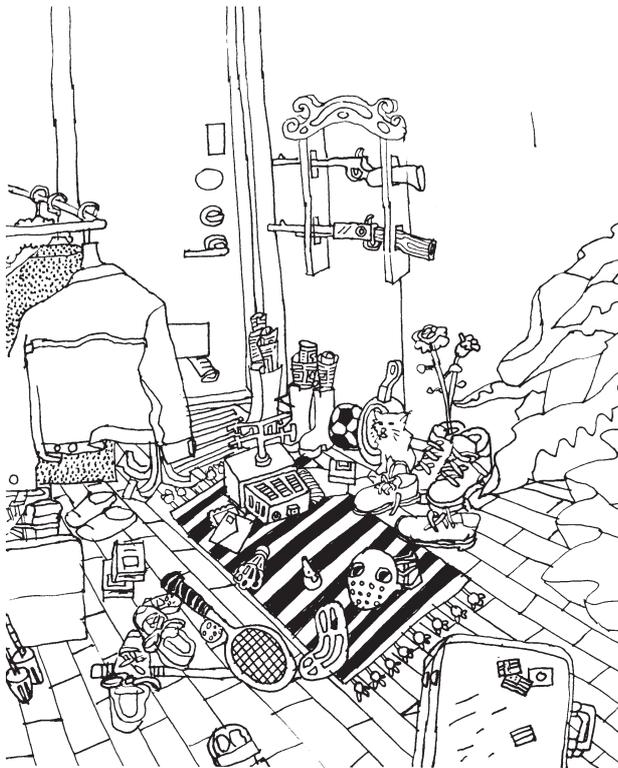


Figure 11 (above). A storyboard showing problems getting in touch for lunch. From workshop.

Figure 10 (left). One of 17 drawings that were used to inspire and frame the work in one of the family workshops. Henrik Färilin made them.

One objective with the workshops is to help the family members generate and develop design ideas that they experience as meaningful. We start the workshop activities by introducing something that frames or focuses the work. This is not done so much verbally as visually, like showing video clips from interviews with the households.

One workshop started with a stack of 17 drawings. One is shown in figure 10. Each drawing was inspired by a list of quotes from what the family members had spoken about earlier in the project. The drawings can actually be seen as a form of analysis and syntheses of these quotes. These drawings framed the work into these areas but also opened up for reinterpretations.

This feedback gives all participants the opportunity to correct or verify our descriptions. This also gives the different families understandings of the other participating families.

After this introduction the workshops usually continue with a “use scenario”. This is often developed with the help of critical incident technique where the participants express something real and recent that has had some meaning to them. (figure 11) It could have been something problematic, a breakdown or it could be something nice that had happened to them. Usually this should have to do with some type of communication with others. All this helps keeping the work relevant to and reflecting their real life, expressing real needs and desires.

The third step concerns the generation of ideas. Normally a shorter brainstorming is followed by everybody sharing their ideas.

The fourth and longest part is where the groups use one or more of the design ideas to change the use scenario into a better working scenario, a design scenario. Here they do design work, make decisions and contracting the design space.

It is important that they show us how they want things to work, how they interact with the artefact and in what context. Therefore we asked the groups to build simple low-tech prototypes of material that we supply. The members of the group may act out the scenario with the help of the prototype. Sometimes this step is presented as a video prototype, the acting out is recorded on video, (Mackay, 2000) other times as a series of photos.

Of course a lot of exchange of ideas takes place in language. This is inevitable. But for several reasons we try to move the discussions into artefacts of some kind. This makes it easier to involve people of all ages. And developing ‘beyond’ spoken language forces the ideas to be more precisely described. When a course of events is shown, all the necessary interaction also has to be figured out and the scenarios contain more details. Both the design idea and the contexts are described better.

Finally all groups present their design scenarios and we all reflect on them. At one of the early workshops The



Figure 12. A low tech prototype shown in relevant contexts with the help of Polaroid photos. From workshop.

fathers and mothers were the most active and suggested family wide control systems. One of the boys build a model of a teleporting device, the BongoFax (figure 13), that could be regarded as an escape machine. The control that the parents found meaningful to have over their children's location and homework status had no correspondence in the children's world.

#### Prototyping (low-tech)

The future use of the eventual artefacts is in focus during most of the work but we also work directly with prototypes in the families homes. We install low-tech prototypes that are 'used' for some weeks. Following that we have workshops in the homes reflecting on the result. This step naturally gives us a lot of specific information about the use and context.

'The practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings which have been implicit in his behaviour. He carries out an experiment which serves to generate both a new understanding of the phenomenon and a change in the situation.' (Schön 1983: 68)

#### FUTURE WORK

When the prototypes have evolved so that they work well in the specific contexts in the households we want them to be used for at least six months in order to get a deeper understanding of how the meanings the different people find in them change. We will then widen the group of users to investigate how general the meanings are.

The real validation of this work will be done in use.



Figure 13. The Bongo fax. From workshop.

## CONCLUSIONS

Our intention in the beginning of the project was to get design ideas from the families through the probe and workshop artefacts. But it turned out to be more of a continuous process where we gradually developed an understanding of what was meaningful to the different people. That helped us frame the subsequent activities into exploring this further and eventually narrowing design space into a couple of design ideas.

The ideas that have been generated in cooperation with the family members concern coordination and playful interaction. These will be developed further by prototyping together with them to assure that they continue to have meaning to them.

We have also learned the importance of the non symmetric aspects in communication.

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## NOTES

The names of the family members are not their real and we are glad to have everybody's permission to publish the research.



Figure 14. Low-tech prototypes of rings for staying in touch through puffs of air. From workshop.

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