

Users@Home: Implications from studying iTV

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Abstract

In this paper, we present the results of two studies, one concerning usability issues and another concerning the analysis of the context of the home environment. We focus on the various methods used in these two studies and how interactive TV (iTV) design can be informed based on the results achieved by these methods. What we have learned is that the standard evaluation methods are well equipped for the user-centered design process, but they provide no insights about what is really going on in the home context. To overcome this limitation an ethnographic study was conducted using qualitative and self-reporting methods as well as cultural probes. This paper will discuss how cultural probes can be used as an appropriate method to investigate the context of use and user needs. When studying the home environment, an area of private activities and social relationships, we need to go beyond usability and extend it into the broad social context of the user. The concepts of sociability and social interaction are becoming more important and can be seen as core parameters when designing technologies for the home environment. Moreover, this paper will further explore emotional and social factors during a three month field study which will commence in March 2006. One of the goals of this study is to identify patterns and to support the design of user experience of iTV and domestic technologies in general.

Key words: home context, user-centered design, interactive television, human-computer interaction, cultural probes, methodology

1. Introduction

New information and communication technologies (ICTs) have a strong impact on home life and the way they are used in the home context (Silverstone, 1994; Hindus, 1999). The first general breakthrough of ICTs in the home was the telephone changing the regularity and manner of personal communication. Telephone companies did not believe that sociability was such an important use of their technology (Fischer, 1992). During the twentieth century many other forms of ICTs, often related to entertainment, were introduced, in particular the TV which became the main information and entertainment source for people (Vorderer, 2000). In the 1990s, the development took off when the personal computer and the Internet reached the people in their homes. Venkatesch (2003) describes today's homes as a center for shopping, communication, and information well as a learning center.

These developments of ICTs in the home environment have important implications for the field of Human-Computer Interaction (HCI). Particularly the question has to be addressed how methods used to understand work environments can be applied to investigate domestic environments (O'Brien et al., 1999). In the past, a variety of techniques and methods have been developed to support design for the workplace, but applied to the home, they appear to be inappropriate and had to be adapted to the characteristics of the home (Crabtree et al., 2002). Efficiency and effectiveness are main design criteria for the work environment. When designing for the home they have to be adjusted and extended with emotional and fun aspects.

One of the current challenges for HCI designers is to take into consideration fun and user experience factors. Despite an increasing focus on this issue (Blythe, 2004) there is still a lack of studies of the home environment and empirical data on users' domestic activities. To fill parts of this gap in research we have conducted user studies in the area of iTV. One study we have conducted focuses on the usability and acceptance of interactive services during a field trial and another focuses on the context of use of iTV. We wanted to explore how people value these technologies within their domestic activities. In the following section we address particularly the various methods used in these field studies. Finally, we describe how the lessons learned can inform the design of iTV and domestic technologies in general.

2. Related Research

2.1 Home-related research

The concept of home refers to a socially and emotionally established place of living and acting (Csikszentmihalyi and Rochberg-Halton, 1981). At home, activities and processes are not always decided by reason, efficiency or effectiveness. Emotions and satisfaction of desires rather than usefulness can be decisive for the general acceptance of new technologies when introduced into the home (Blythe, 2004). Venkatesh et al. (2003) conceptualizes the home as a living space in which he divides the home into three spaces: 1) social space, 2) physical space, and 3) technological space. The social space consists of the members of the household, the activities performed by them in the home, the time spent on those activities, and the interactions between household members. The physical space refers to the physical layout of the home and its constituent parts (kitchen, bedrooms, etc.). The technological space consists of the household technologies that are embedded in the physical space and that are used by the members of the family as part of the social space. These three spaces, or components, characterize how people carry on their everyday life at home, including emotional, social, and recreational needs of the household members (Venkatesh, 1996).

Further insights to help understand the home context can be gained from previous research on traditional television. Since the 1980s a number of studies of households were carried out, which centered upon the use of the media, particularly television, and communication technologies and the ways in which they were actively incorporated into everyday lives (e.g. Gauntlett, 1999; Morley, 2000, Vorderer, 2000; Silverstone, 1994). Furthermore, we can draw on previous ethnographic studies on routines in the office environment and in the field of computer supported cooperative work (Crabtree and Rodden, 2004; Harper, 2000; Hughes et al., 2000). All the major industrial players are also putting considerable effort into trying to understand the home context through ethnographic studies and field trials and some interesting concepts are emerging, like personalization, tangibility, aesthetics, engagement, and socializing (Monk, 2000).

Many of the concepts and methods used in the field of HCI were developed for the work context. For the home context a deep understanding of the area and appropriate methods is missing. In particular, we are lacking basic concepts equivalent to "ease of use" or "ease of learning" (Monk, 2000; Blythe, 2004). It is particularly important to focus on enjoyment and to design pleasurable user experiences. User experience is in its essence, most unique and subjective and the way in which experiences come to life can be described as a social phenomenon. Much of what people do is socially driven, and a large extent of our leisure activities involves socializing with friends and family. Thus, the concept of co-experience gives us insights both into the lives of people and to the experiences they find meaningful

(Batterbee, 2004). With regard to our research on iTV, we can already state that user experience issues are critical in future developments of interactive technologies for the home context. We need to go beyond usability and extend into the broad social context of the user. Sociability and social interaction are to become the core parameters when designing technologies and products for the home environment.

2.2 Research on interactive TV

Interactive TV provides people with a new TV viewing experience, not only because it enhances the audiovisual experience of the viewer, but it introduces interactivity (Livaditi et al., 2002; Eronen, 2003). This interactivity allows users to actively engage in front of the TV by selecting information from teletext style oriented services, by enjoying enhanced TV shows or by engaging in live interactive TV games. Interactivity in iTV can simply be defined by anything that takes the user beyond the passive experience of watching and that lets the user make choices and take actions (Gawlinski, 2003). The level of interactivity in iTV applications is limited by the potential of the technology, but it is not determined by it. It is the user who makes a program interactive, given that the technology allows an interactive use. The user decides how much interactivity she wishes to employ in a specific situation (Vorderer, 2000).

Previous HCI research about iTV was mainly focused on the design of the electronic program guide (EPG), and rarely considered the enhancement of the TV content. In particular, previous research approached iTV from a technological perspective, and did not consider the iTV user as a TV viewer (Chorianopoulos and Spinellis, 2003). Research on iTV can not be addressed without a clear understanding of the context of use (Hughes, 2000). It has to look at the background issues such as how the home differs from other environments, what motivates people to use domestic technologies, and how patterns of use differ between users. Additionally, the home exposes us to the demands of new user groups, including the elderly, which has to be considered in the design (Crabtree, 2004).

3. Methodology

A variety of research approaches are currently in use for studying the home, in particular ethnographic studies. They provide designers with a richer understanding of the home settings and the context of use. They offer ways to elicit user requirements that typical users can hardly articulate and help designers to understand the varied and complex interrelationships between individual users and different user groups. A main characteristic of ethnographic research is that it includes field work in natural settings over an extended period of time (Mateas et al., 1996; Simonsen, 1997). Spending several months in the field is one of the biggest challenges in the fast changing field of ICTs. Thus, researchers have looked for variants of traditional ethnographic methods and developed several rapid methods like interactive observations, activity walkthroughs, or contextual inquiries (Millen, 2000).

In addition, design based methods such as cultural probes have recently gained some prominence in interactive systems design. Cultural probes have been employed to explore the design space as technologies moved out of the workplace into the homes (Gaver et al., 1999). Probe packages normally consist of a camera, diaries, post cards, sometimes maps of the explored environments, and several other means to obtain as much data as possible from the participant. The purpose of such probe packages is to give the participant the possibility to document routines and actions as well as to support observing and expressing emotions, thoughts and needs related to different situations (Jääskö and Mattelmäki, 2003).

Interactive TV can offer new experiences, but therefore the inherent qualities of television itself need to be better understood. Ethnographic methods and cultural probes highlight the need to be sensitive to a broader set of cultural values within the home and provide another piece of the overall puzzle of understanding the home context. In our research we build on this methods and approaches. We conducted user studies, among them an ethnographic-inspired study to gain insights in the daily usage of TV and iTV.

4. Implications from iTV

Based on the results of our studies concerning the usability of iTV services and another concerning the analysis of the home context we will give an overview of the methods used, their advantages and limitations. During an iTV field trial from December 2004 to March 2005 in Salzburg we used heuristic evaluation, paper prototypes and mock-ups as well as usability testing within the user-centered design process. We conducted questionnaires and telephone interviews as well as semi-structured home interviews during the four month field trial (Figure 1 shows some screenshots from the tested iTV applications). We used database logging for all iTV services to protocol their usage by the participating households.



Figure 1: Field trial – some of the tested iTV applications (iTV portal, news, email & sms).

The standard evaluation methods like heuristic evaluation and the usage of paper prototypes supported the user-centered design process of the iTV services. Design flaws and problems with the navigational concept and labelling could be easily identified. Using these methods in user-centered design processes has been shown to be effective several times. Interviews and questionnaires gave insight of what users want to see and were they have troubles while using the iTV services.

What we have learned is that standard evaluation methods are well equipped for the user-centered design process, but we do not get any insights about what is really going on in the home. To overcome this limitation we conducted a user study using ethnographically oriented methods as well as cultural probes. The emphasis in this study, conducted during summer 2005, was to get a deeper understanding of particular household types and of their daily routines and activities. The used methods and main findings of this study are presented in the following section.

4.1 Methods

We combined ethnographic-inspired techniques like diaries with home visits, in-depth interviews and cultural probes, along with subsequent quantitative and demographic analyses. To design the diary, the questionnaire and the interview guidelines we used the three-space model of Venkatesh et al. (2003) and split it up for a more detailed description of the context of use. The following context components guided our study:

- Spatial context (TV in the living room; multifunctional in all rooms; individual rooms)
- Temporal context (TV viewing during the day; week and weekend)
- Social context (TV used alone; in company; in both contexts; social structure of the household, e.g. adults, children, older people)
- Personal context (demographic data; prior experience with other technologies; hobbies and interests; TV preferences)
- Technological context (household equipment; technologies used at home)

4.2 Main Findings

In the pre-ethnographic study conducted for the upcoming iTV field trial, (scheduled for March 2006) a total of 12 households had participated with a total of 30 household members; 16 of which were selected to fill out a daily diary.

Questionnaire

The questionnaire addressed areas like the household structure in general, the household equipment and TV viewing behaviour as well as their leisure and home based activities. Some of the main characteristics of the participating households are listed below:

- The people participating in the diary study ranged from 19 to 76 years of age, with an average age of 40.9 years (9 male, 7 female).
- Most of the participants had a very good education (high school or university), but not all of them were experienced internet or PC users, especially not the elderly ones.
- The average technical equipment of the households was high. 9 of 12 households were equipped with a computer and a video recorder. Ca. 50% had a digital camera, a DVD player and a notebook. 10 out of 12 had Internet access. 3 households had a game console.
- Almost all members of the households had a mobile phone. Even all children within the households (from 3 to 16 years of age) had a mobile phone.

The main purpose of the questionnaire was to have quantitative data, which we can compare with the qualitative data gained through the diary study and the interviews.

Daily diary

In a first informal talk, every participant has received a pack with seven pre-printed and semi-structured diary forms and a disposable under request of returning it back to us seven days later. Figure 2 shows the probes material and a photo of a participant watching TV.

The diary had six categories, such as “time”, “activity”, “location”, “used ICTs” and a right wish column for iTV service. The participants were also asked to make photos of their home (places, technology, people, and situations), so we could discuss them in the post-interview. The usefulness of visual material, such as photos, is that the household members taking a more active part in the study and the researcher discussing the findings benefit from them (Jääskö and Mattelmäki, 2003).



Figure 1: Probes pack (diary form; Nemo camera for households with children). Watching TV on the PC.

The participants described in the diaries their own activities, viewing habits and routines. They did provide us with insights on the routine nature of their daily life.

- The TV is an important medium for information and entertainment within the households. Whereas older people tend to be more interested in information, younger people tend to use the TV more for entertainment and recreation.
- The TV is a collective medium typically used in company and at regular times during the week (normally in the evening) and irregularly at the weekend, depending on external factors like weather, events, etc.
- PC, Internet, mobile phones, radio/music are used more often by younger participants than by elderly, which use more traditional media, like the daily newspapers.
- Younger people and teenagers tend to watch TV/Video on the PC in their own room.

When we collected the diaries, some participants were telling us, that they were surprised by the fact that their daily activities are so extremely routine oriented.

Interviews

The post-study structured interview delivered additional qualitative data about users TV usage, changes over the time, and expectations regarding interactive services. Based on their photos – made during the week – and our prepared scenarios for iTV (e.g. video on demand, personalized TV) we discussed possible usages of interactive services in the households.

- Some participants noticed changes in their motivation for viewing TV. When other leisure activities (e.g. sport activities) are becoming more important, the TV viewing time decreases and becomes more focused.
- The results indicate that information oriented iTV services are positive valued by elderly people without PC-Internet access compared to younger people.
- Elderly people mentioned that the burden to access the Internet through the TV is lower than buying and learning to interact with a computer.
- Younger people are more interested in accessing information using the Internet. The Internet fits their expectations of a focused and fast access to information. Interestingly, communication, like instant messaging access via iTV is seen as potentially interesting.

Based on the data obtained, especially through the post-interview, we categorized four different user groups: 1) elderly people; 2) couples (no children); 3) families (with children) and 4) younger people. The categorization was based on the age of the participants, the household structure and similar TV usage behaviours and preferences for interactive services. The analysis of the data showed that the discussed iTV services, like personalised information, participative services or communication services were not equally attractive for all user groups. Whether a certain service is desired or not, is connected closely with the current life circumstances and the context factors listed at the beginning of this chapter. These differences need to be taken into account when designing iTV services for the home.

The success of iTV services will depend on the ability of the provider to meet the demands and requirements of the different user groups. A further user group, which was not investigated in our study, are children and teenager. Their television use is totally different from the previous ones. It is more unplanned and emotional stimulated. They would be an interesting target group for iTV, but requires further investigations.

5. Discussion and conclusion

The home offers new challenges that moves design beyond the current focus on work environments and exposes us to the demands of new user groups, including the elderly. A key research problem in designing for the home is to understand the context of use, what people do at home and what meaning technologies have within their domestic activities. The two studies in the field of interactive TV showed that only a combination of several methods is useful to successfully support user-centered design and to learn about the real usage of products in the home environment. The challenge is the careful selection of the methods. Heuristic evaluation, paper prototyping and usability tests are useful in the user-centered design process for interactive TV services, but are very limited to gain further insights into current trends, challenges and usages of technologies in the home. We thus emphasise a combination of several methods when doing studies in the context of home.

The ethnographic study helped us to understand how technologies are socially and routinely used in the home environment and allowed us to carefully select user groups and their possible interest in special kinds of iTV services. The results from this study show that the use of new technologies does not only affect domestic activities such as family entertainment, it is overall affected by social factors such as by other family members. The results also indicate that iTV is a social experience in the sense of co-experience (Battarbee, 2004) and should be further engaged. User experience issues are critical in future developments of interactive technologies for the home context. We need to go beyond usability and extend into the broad social context of the user. Sociability and social interaction are to become the core parameters when designing for the home environment. Therefore we will foster the use of self-reporting and collaborative techniques as well as cultural probes in future home related research.

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