Using a Method Mix to Overcome Limitations in Studies of Technology Usage in the Home

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ABSTRACT
A variety of methods has already been presented to investigate the user's technology usage around interactive television and to capture the user's experiences in different usage contexts. The selection of the appropriate method(s) to be used is dependent on various factors like research goals and perspectives, hypotheses available, decisions whether qualitative or quantitative data should be gained, understanding of methods and the insights that thus can be gained, and a clear research framework. Additionally, the application of the method is influenced by factors like the context in which the evaluation takes place and the application domain. In this position paper we argue that the limitations set by various methods can be overcome by using a method-mix and a triangulation of methods.

Categories and Subject Descriptors
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Measurement, Experimentation, Human Factors, Theory

Keywords
Home study, qualitative method, quantitative method, field study, lab study, limitation, method-mix.

1. INTRODUCTION
Studying technology usage in the home has become an emergent field in the area of human-computer interaction. The ongoing change from analog to digital TV and the continuous growth of IPTV offers almost all over the world were two of the major driving forces for the increase in technology usage studies. A wide variety of methods and methodological approaches was used to understand what users might want to use, what they are interested to use and – from a commercial viewpoint – what technologies and services they would be willing to pay for. Investigations on technology usage today reach far beyond a simple understanding of who is using what and when, but do focus on a variety of software quality aspects like usability, security, privacy, trust and, more recently, on the general user experience.

What we have learned in the last 20 years of studies in the home was the general need to adopt (social science) methods to help investigate the home context. First methodological adoptions have been presented in the late 1990ies, using ethnographical inspired methodologies to understand users' technology usage.

About 10 years later, the usage of ethnographic methods and adoptions has become standard to investigate media usage and to gain insights into everyday user behavior. To fully understand current technology usage and the possible take up of new forms of IPTV (Internet Protocol Television) offers, researchers used field studies (using prototypes or real systems) combined with observations and interviews; furthermore, a variety of usability evaluation methods was used including empirical or experimental methods, observational methods, query methods and even the use of physiological monitoring.

From a researchers perspective we currently have to face the following problems: (1) Using (ethnographic) methods that have been adopted to investigate the home context, how can we be sure that we are able to understand, investigate and gather all aspects of technology usage? (2) How can we understand the limitation of these methods and (3) is there a way to overcome these limitations?

In order to investigate these three questions, we will present a brief overview on methods currently used to investigate interactive TV and IPTV within the home context in the following. We then present the problem description in more detail and propose a methodological solution for the problem described.

2. STATE OF THE ART
Understanding technology usage and especially investigating usability and user experience as important factors of technology usage has been performed using a variety of different approaches, ranging from focus group sessions, collaborative and participative design, online surveys and questionnaires to the logging of data, usability evaluations and field trials.

One way to gather qualitative data about users is to use an ethnographic approach, in which researchers must become "immersed" in the everyday world of their research subjects in order to reach a "qualitative understanding" of what happens in the social setting [7]. This approach can be enhanced by several methods to gain additional insights and material, like video ethnography [7] or the cultural probing approach with different variations of it like the creative or playful probing approach to support the self-observation of the participants with some pre-structured material and include also children [2].

Rice and Alm [6] used two kinds of usability methodologies for their design of innovative user interfaces for elderly television viewers: interactive theatre and wizard of oz testing. Harboe et al. evaluated their various devices for social television in field trials [5], and also focus groups [4]. For long term media changes in-depth interviews are used (e.g. [1]).

3. PROBLEM DESCRIPTION

The variety of methods used to investigate technology usage shows how difficult it is to select the right kind of question. When choosing a method we have to take into account the following aspects:

First, the *research perspective*: We have to differentiate between: (1) research that focuses on exploring a new area, with the goal to build a theory based on the gathered data, and (2) research that tries to answer a given research question (hypothesis) with an already well formulated theory.

Second, the *research question*: Depending on the research questions and research goals we have to choose a different method or more likely a set of methods. A possible strategy to improve the validity of the methods is to use a set of methods to answer the same research question (thus different methods should have the same results, and therefore allow improving the validity of the data). Especially for applied research it is important that the actual research problem defines the choice of the method. What we have seen in our practical work with industry is that sometimes the knowledge on how to conduct a method is the selection criteria.

4. APPROACH CHOSEN

To understand the impact of the method choice, the current limitations of methods and how to overcome these limitations, we have started to set up a method classification system on Usability and User Experience Evaluation in Non-Traditional Environments (USENTE) [3]. USENTE should allow us to summarize the different contextual factors that can influence the application of a method.

The USENTE Framework proposed to classify the choice of a method taking into account research perspective and research question. The research question could be typically categorized by:

(1) Domain defined by either the physical context (e.g. home or mobile) or defined by special attributes of the system (e.g. multimodal interaction for safety-critical applications).

(2) Usage Aspects (typically user centered factors like usability and user experience, but today also in combination with other factors like trust, security, privacy)

(3) Influences on the user (if the technology is for example tiring the user or if the software is intended to entertain the user on a long term)

(4) Variety of user groups.

While this framework is not subject of this position paper, we want to demonstrate how such a classification can help to select a good set of methods for a research problem.

Keeping in mind the framework, and focusing on our research goal, which is to investigate and understand which new forms of multimodal interaction in the living room would be helpful to support new IPTV based entertainment services, the following factors have to be addressed:

(1) Research perspective: is there a theory about multimodal interaction or are we interested in understanding current usages to build a theory on these insights and observations?

(2) Our research question is to gain insights on how privacy, security and trust is influencing the usage of multimodal input devices – what factors do we have to take into account when choosing our set of methods?

Selecting the evaluation method, we have to take into account:

(1) The domain: In the home domain it is difficult to have researchers participating in everyday life. Evaluation methods will be based on self-observation or observation by technical equipment (cameras).

(2) Usage Aspects: we are interested in a multitude of factors, thus a method mix is necessary to address all these factors. The self-observation approach should be complemented by interviews and questionnaires.

(3) Influences of the user: to understand possible different contextual influences on the user, it would be helpful to investigate these aspects in user studies in the field.

(4) Variety of user groups: to reach a broad variety of user groups, the self-observation method must be performed in a broad variety of households, with at least 10 members representing each evaluated user group.

5. SUMMARY

To sufficiently research the topic of iTV technology, including emerging mobile services and different context and target groups, a method mix of quantitative as well as qualitative methods seems appropriate, taking into account and appropriately addressing both the research perspective and research questions. Classifications, as briefly shown with our framework, can help to select a good set of methods to properly address a research problem. Additionally, combinations of laboratory and field studies could provide (different) insights about performance in a controlled laboratory situation, as well as the usage in the actual everyday life.

6. REFERENCES

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