Observing and Probing

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ABSTRACT

In this paper, we discuss and compare two user centred methods applied in concept design: observation and probes. The comparison is based on findings from two case studies. In these studies, user data was first inquired and then interpreted by a multidisciplinary design team, in order to support early user centered concept creation phase. The gathered user data and the current understanding of user experience served as a base for this reflection. In order to compare the findings, a framework of user experience qualities was generated from the point of view of concept design.

Categories and Subject Descriptors

A.0 [**General**]: *Conference proceedings*

General Terms

Design, Human Factors, Theory

Keywords

Concept design, user-centered design, user experience, observation, Contextual Design, cultural probes, empathic design.

1. INTRODUCTION

Luotain - Design for user experience is an ongoing research project at the University of Art and Design Helsinki UIAH (http://smart.uiah.fi/luotain). The first objective of the project is to develop methodological tools to support user centred concept design in the context of product design. The second objective is to provide practical knowledge to broaden concept design activities in manufacturing companies as well as in industrial design concultancies.

Since last years, there has been a remarkable expansion in user centered design methodology. Only few years back, observation was regarded as the only technique to gather user information for empathic design [3]. We can witness now a variety of different approaches in techniques and methods, which have widened the whole notion of user experience. In order to develop methodology

for user-centred concept design, a holistic picture of the issues related user experience has to be drawn.own material.

There are several models related to user experience [see 5, 6, 11, 12, 13, 14, 15, 17] However, these models seem to be on such a general level, that comparing them does not reveal practical, concept design oriented issues.

Our interest is to gain information about the differences of alternative user centered concept design techniques and compare how they are able to illustrate the qualities of user experience. In this paper we present a study in which a new framework of user experience qualities is used to compare two case studies with different user-centred design (UCD) approaches. The first case, which related to hospital laboratories, used observation [see 2] and the second case, which related to hospitals and patient transportation, applied the probes approach [8,15]. Our experience of applying the used methods are discussed and the first findings of the research project are introduces.

2. USER EXPERIENCE

User experience consists of a variety of aspects. In the following we go through relevant issues related to this phenomenon.

Desmet [5] talks about the role of a concern and its affect to product appraisal. "There are different types of concerns. Some are universal, such as concern for safety, for love or for self-esteem, some are abstract, such as concern for righteousness, some more concrete, such as the concern of being home before dark". Concerns can be very personal, related to previous experiences or future preferences. All these have affect on the evoked emotion in person-product relationship.

Sanders [17,18] states that the moment when experience takes place is always woven into past memories, but also tightly coupled to the dreams of our imagination. She points out that these aspects which can be difficult to articulate verbally can be expressed through visual communication with tools such as collages.

In Battarbee`s and Mattelmäki´s [1] research, storytelling was regarded as a medium to reveal qualities of human product relationships that have developed over a long time span. In their stories people reveal many overlapping, life situation related and emotional meanings in their relationships with the products. Also, Forlizzi and Ford [6] point out the narrative character of meaningful user experience. Experience is dynamic. It changes and develops depending on time and context.

More directly industrial design and form giving related product qualities such as aesthetics and ergonomics have an impact on

how user experience is formed. Also, usability forms one solid and useful framework when trying to understand the whole nature of user experience.

Jordan [13] has studied the experience of pleasure and how it influences product design. A product can reflect pleasure in relation to the users' or owners' self-image, social grouping, personal ideology and senses.

Consumer behaviour has a strong affect on new product development. Gabriel & Lang [7] point out consumer´s role as a seeker in choosing the right product based on personal motives. Product appraisal is always based on available product offer and the product novelty is regarded as a remarkable aspect when choosing the product.

Nieminen-Sundell [16] has conducted several years ongoing studies of how new technology penetrates and finds its place in the household. The products seem to fight their place in the home environment similar to flora and fauna in the nature. This phenomenon is relevant when concepting new product categories, which are replacing old technology or overlapping with current products in features and benefit they provide.

In concept design, the designers need to comprehend previously unfamiliar or complex phenomena of human activity. This can be achieved by utilizing variety of complimentary methods, and drawing an overview before going into more detailed aspects. To give an example, in the ELDER project, reported by Hirsch et al. [9], the purpose was to understand the experiences of elders and their caregivers in order to identify new product and technology opportunities. Since the brief was open and aim was to create a rich description of the eldercare experience, different research techniques were applied. These included techniques revealing general user information; e.g. literature reviews about cultural and social issues and qualitative techniques such as lifestyle interviews, self-documentation and observations.

Based on activity theory, Kankainen [14] has pointed out two principally different levels of user need: the motivation level and the action level. This remark is particularly relevant in new product concept development, when it is crucial to understand what the user would possibly do with a new system and what would be the driving motivation. In other words you have to first be able to recognize the issues that are relevant to the intended user and that affect on identifying the appropriate attributes and qualities for the product concept. After that it is possible to get deeper into the functional and interactional level of the concept development. Kankainen sees a clear difference between techniques, which reveal aspects on motivation and action level.

As the presented issues show, the notion of user experience is wide and can be examined from many different angles. There are different layers of experiences, which may be studied and measured directly such as usability or ergonomics. More tacit and hidden aspects such as product meaning or personal motivation have influence in the user experience but are not that easily recognized or communicated to design, or even directly affected by design. Some areas are traditionally covered by different disciplines, such as product design (e.g. appearance and aesthetics), user interface design (product functionality and interactivity) or engineering and marketing (e.g. product definition and positioning in the market).

3. FRAMEWORK OF USER EXPERIENCE

The notion of user experience is essential in user centredness and needs more clarification. Since the objectives of the Luotain research project are rather practical, we feel that the available models or frameworks, such as in the research areas presented earlier, are not alone useful enough. They enlighten the issue in a general level or focus only on some aspects of the user experience.

In our framework of qualities of user experience, presented below (figure 1), we have combined most of the relevant aspects that have an impact on the human-product relationship in product concept design.
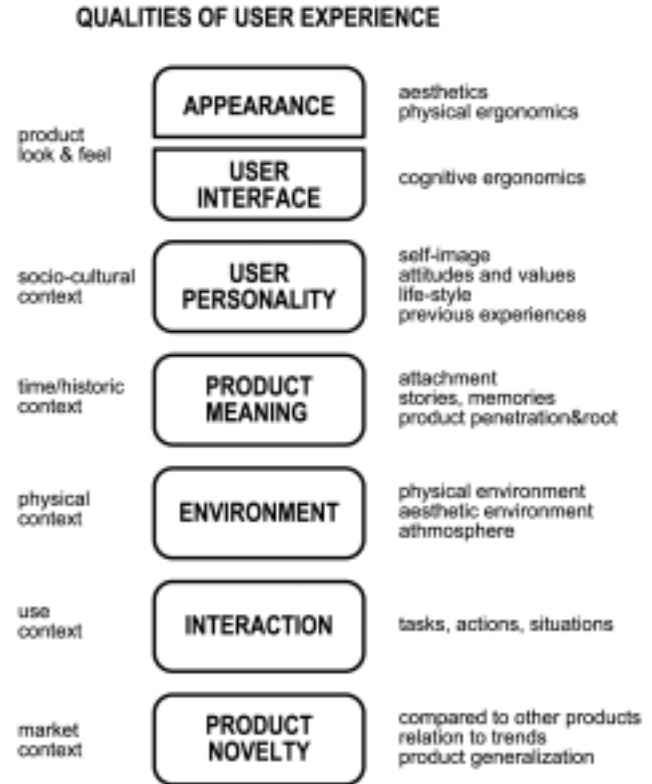

Figure 1. Framework of qualities related to user experience.

The qualities are divided into two groups; directly product related qualities (appearance, user interface) and different contextual qualities, which have an affect on the human-product relationship. We see that the framework can be used for several purposes. First of all, it is useful in understanding and articulating the different aspects of the phenomenon as a whole. Secondly, it can be used as a tool to make sense of what type of user data exists and to compare what type of data different techniques can reveal. For instance, the framework indicates that contextual information is in an important role when totally new concepts are developed. This is useful information, when a design concultancy is developing their user centred design services.

The doubts regarding the framework are related to our future research- how it can be applied to indicate the dynamics of user experience and weather it is, again, too general or theoretical to be applied in product design contexts. For instance, in reality the

qualities of user experience are mixed and not that clearly distinguished as presented in the framework.

4. THE CASE STUDIES AND APPLIED UCD METHODS

The case studies carried out in laboratory and hospital environment were related, at least indirectly, to new product concept development cases, where our role was to introduce and observe the utilization of different user-centered concept design methods. This study focuses on the first phases of each cases including the user information gathering and the data interpretation phases, where the gathered user data was transformed into a useful format such as interpreted observation notes, work models and user descriptions.

The starting points of the two cases were partly different but the context was considered similar enough for a relevant comparison. In both, the context of the work in hospital and laboratory environment is quite similar. The users are professionals who handle rather complex technical devices at work. The work requires concentration and carefulness, since it can have severe effects on the patients´ treatment. Because the equipment is not personal the aspects of user experience, which are relevant in consumer products such as purchasing and owning, are not so visible. In the hospital case, the aim of the data gathering was more open than in the laboratory case, where observations were mainly targeted around the existing product. Also, the applied methods, observation and probes were thought to reveal different spectrums of the user experience.

5. CASE: CONTEXTUAL DESIGN IN LABORATORY EQUIPMENT CONCEPT DEVELOPMENT

Thermo Clinical Labsystems develops, manufactures and markets systems for laboratory automation and clinical chemistry analyzers for routine and special testing in hospitals and private laboratories. The company had no previous experience in systematic user research activity. Nevertheless, the company has been able to create successful products with good usability and award-winning industrial design. User information has been collected informally through visits to and in collaboration with laboratories, and through marketing, maintenance and educational channels of the company.

The company and their industrial design consultancy joined the research project when their next generation analyzer development was under planning phase. The purpose was to gather in-depth data. Contextual Design, later CD [2] was chosen as the methodological approach. It relies on user observation and has been reported to be a successful method in system development projects, similar to our case. Five observation sessions where organized in hospital laboratories of different sizes and operational focuses in Helsinki region.

Observations were conducted by the product development team, which was responsible for the concept creation. The team consisted of a software engineer, a software designer, mechanical and electrical engineers, marketing personnel and an industrial designer. The field interviews were carried out in groups of two to five persons. The gathered data was interpreted in sessions held after the field interviews. In the interparetation sessions the gathered data was transformed to work models and written notees, as described in CD.

5.1 Findings

In CD, it is required that the gathered data is based on actual, observed work. This makes the data precise and valid. However, some aspects of user experience can be difficult to reach through observation. During the inquiry, observation occasionally turned into an interview, because we could not see all types of work we were expecting to see. For instance, the number of laboratory tests during a particular day was less than average, certain expected procedures did not occur, etc. Since the limited time available for the project, optional arrangements concerning these missed issues were not carried out.

Issues such as comfort, personal opinions about work, equipment as well as satisfaction, learning, organizational pressure and policies were discussed. Aspects related to the laboratory quality system, one of the major aspects documented into the cultural model, could be fully understood only after conversations with laboratory personnel.

Some of the work models seemed to be easier to adapt and use. The flow and physical models were easily understood and easily created. The idea of the cultural model was regarded slightly vague. It was also felt that sufficent data for that model was possibly not collected during the inquiry. However, also this model was created in interpretation sessions, although not as described in CD. Also, the sequence models were created but not as articulated as in CD. Artifacts were photographed and walked through in the sessions but not developed to models, as described in CD.

In order to create as detailed models as described in CD, the participants have to be quite familiar with them. However, models were regarded very useful. Through different model building the gathered data was interpreted with different perspectives. Through this type of processing, highly articulated information of different qualities of user experience can be revealed.

The available time for an interpretation session seems to be a critical factor. Half a day was reserved for one interpretation session. Performing all the steps, including interview walkthrough, work model building and notes creation, is an exhausting and time consuming task. Some of the "difficult" models were not finalized simply because of time and the group energy running out.

Figure 2. Observation and interpretation

Bossen [4] has reported similar findings related to the CD process in practice, especially related to need of flexibility in the method tool-kit. In the case he describes, the company had hired a person familiar with the observed work domain. By describing the central concept of the observed phenomenon and listing the related acts

prior the interview supported the interviewers in focusing on the relevant aspects. It was helpful to have an overview on the issues that should be covered. Walkthroughs of previous information, models or lists of the laboratory procedures could have helped us also to more clearly focus on the relevant topics, already from the start.

6. CASE: PROBES IN HOSPITALS

Instrumentarium Corp. Datex-Ohmeda division develops and manufactures patient monitoring instruments for hospitals. The context of use is challenging for user studies. UCD methods such as usability testing and observations in hospitals are an established part of the company's product development process.

The starting points for the case were the need to develop the concept design process, learn new tools and the need to create a new, more subjective layer to the present user understanding. The user study was not directly connected to a design project. The main interests of the case were:

- To gain empathic understanding, pictures and narratives of nurses and their work, different work situations, environments, experiences, social aspects, personal values and expectations

- To gather data documented and interpreted by nurses to seek opportunities and problems related to patient transportation.

- To get experience on probes approach in professional work context

Datex-Ohmeda applied the probes approach for the first time in this study [See 8,15]. It was chosen because of its expected suitability in a project where the design focus was open and the aim was to gather inspirational, visual and empathic data for new concept creation. The idea was to get data from "sensitive settings" [Hemmings], situations and places where designers have no access or the access can only be temporary.

As probes had previously been used in home and leisure context but not before in professional settings, there were some doubts. The playfulness, openness and inspirational quality of the probes were regarded as risks. Also, hospital administrators were not sure how self-documenting in hospitals would affect the nurses ability to concentrate on the care of their patients.

The probes packages included diaries, cameras and illustrated cards with open questions and tasks. They were developed in collaboration with UIAH, Datex-Ohmeda and their design consultant. The purpose of these packages was to document routines and actions as well as to support observing and expressing thoughts, expectations and needs related to different situations.

Figure 3. A probes task and interpretations in an interview

Six nurses were given a probes package for approximately five workdays. After accomplishing the documenting period, the nurses were invited to an interview where the probes material was discussed. Finally, they were asked to make a collage of an ideal transportation experience from pre-cut pictures and words, and explain it.

6.1 Findings

In this case, the diaries illuminated fragments of experiences during the shifts, such as interaction with patient's relatives, tiredness at nights, therapy with co-workers over a cup of coffee and surgeon's radio channel preferences. They did not provide as much material about transportation as expected, because during action the nurses were not able to make notes. They described, however, in the diaries or in the interviews, their own actions and feelings in some of those situations.

The answers in the question cards provided opinions and short narratives. All the nurses did not accomplish the projective tasks in the probes package, e.g. choose pictures that illustrate hospital atmosphere. The ones who did, made a visual narrative of the asked themes. The self-documenting tasks in the probes packages should allow different means of personal expression.

The interviews complemented the self-documenting by providing a possibility to discuss some issues more deeply and to document the nurses' own interpretations to some of the probes assignments such as photos. The collages with their explanations illustrated the transportation process in a visual and humorous way and also suggested some possible guidelines for future designs.

The photos visualized the hospital context, co-workers, the equipment from nurses' point of view and illustrate places and situations where possibilities for designers' presence are limited. However, the scenes to the contexts were quite shallow without having explanations of the meanings of the photos.

After the user study phase, the data was categorized into groups including individual motivations, teamwork and transportation. Discussing the interpretations brought analogies and insights, such as the nurses' underlined attitude of separating "work and life". These categories did not bring as many new views as was hoped for, possibly because the categorizing people had been involved in some stages of the user study and were too familiar with the data.

In probes approach, although most of the documenting is done by the users, time and resources are required for e.g. designing the probes packages, recruiting users (and in hospital context, getting them permissions to participate), pre-analyzing, organizing personal interviews, transcribing the interviews, categorizing, sorting and communicating the results. Time is often a critical factor in company context. In that sense, the approach requires guidelines for streamlining.

Time and engagement is, however, needed for creating a personal dialogue with the users and an empathic, user centred attitude. This attitude and the ambiguity of the probes material make an objective interpretation difficult, even though, the focus of the probes approach is not in objective results.

The probes packages with the complementing interviews provides authentic environment descriptions, user profiles and use scenarios with wealth of visual material that makes the descriptions more memorable. The results consist of fragmented

illustrations and narratives. To fill in the missing information requires either skills in storytelling and imagining or more focused approaches depending of the aims of the project.

7. RESULTS

Gathered user data of the case projects was reviewed according to the developed user experience framework (Figure 4).
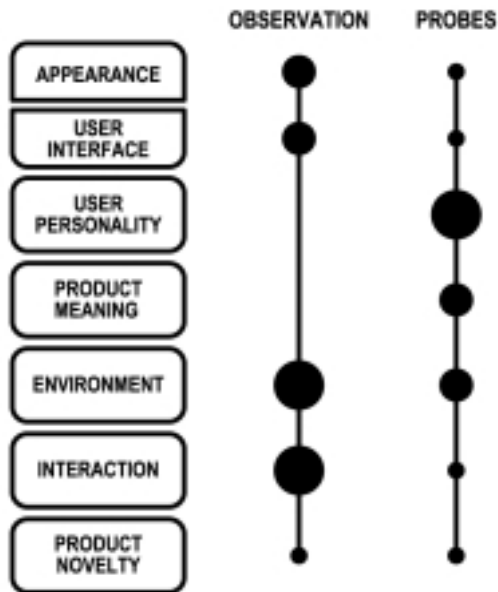

Figure 4. Qualities of user experiences reached in two case studies. The size of the circle refers to the amount of data gathered.

The reviewed data, in case of observation, included the interpreted work models and affinity diagram. In Probes case, the reviewed data included probes packages, transcribed interviews and collages.

Observation is a useful technique in tracking different contextual data such as work flows, sequences of actions, the physical environment, ergonomic and usability issues as well as interaction between persons and products. A review of the notes and models created during the CD interpretation sessions showed that the most of the data was related to issues such as users´actions, the steps of the procedures, functional issues related to product handling and interactions with the analyzer. Issues related to the personal aspects of users where barely revealed. They were discussed during the inquiry, but for some reason they were not noted. It also seems that the work models in which data is interpreted do not encourage this type of examination.

This does not mean that observation is not a useful technique when studying issues related to personal aspects or market context, which were not present in the data either. According to our findings, the focus of the user study determines very much what type of data will be gathered. Also, as the CD case indicates, the manner in which the data is interpreted (e.g. through specific work models) has a strong affect on what type of results will be achieved. For instance, models revealing issues of users' personality in socio-cultural context, as well as models related to product placement from market point of view, could be developed in order to widen the perspective.

The probes and the observation techniques can be regarded as complimentary methods in the user centered design process. The probes approach covers various aspects of user experience. It may bring out issues that cannot be seen or revealed through observation or in an interview setup.

"Discovering what people know helps us to communicate with them. Understanding what they feel gives us the ability to empathize with them." [17] Probes could be used as a technique to draw the big picture before setting the focus for the more detailed observations. This interpretation was shared with a member of the Datex-Ohmeda project team, who had previous experience of observations. To gain detail level data from observation, you have to be familiar with the studied phenomenon.

The probes material was useful when nurses' subjective thoughts, motivations and feelings related to work situations were reviewed and discussed. Processing that material further into the textual categorization did not bring as many new insights as expected. On the contrary, it seemed to flatten the vividness of the user data. The probes packages, complemented with quotes from the interviews, communicate user data quite well. While in observations the collected raw data has to be further processed to make sense. In the probes approach, the presented framework or the models used in CD could facilitate a more structured interpretation of the rich data.

Usefulness of the visual material, such as illustrations, photos and collages, is evident. Both the persons taking part of the user study and the researchers interpreting the findings benefit from them. This supports the idea that multisensory stimuli, which allow analogies, associations and multiple interpretations can enhance the results.

8. ACKNOWLEDGMENTS

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