

Making Experience-Centered Design Operable

Youn-Kyung Lim

School of Informatics
Indiana University
901 E. 10th St.
Bloomington, IN 47408 USA
younlim@indiana.edu

Sidharth Saxena

System Management Products
Oracle
500 Oracle Parkway
Redwood Shores, CA 94061 USA
E-mail: sidharth.saxena@oracle.com

Introduction

Why experience matters in designing an interactive product? People have realized that considering only the usability aspect of design cannot really satisfy users.

Before the concept of usability was first emerged, there was even no consciousness about end-users because computing systems in those days were supposed to be used by the experts who created those systems and the people who must use those systems for their jobs. People did not even need to consider how to make those systems easy-to-use. After computers were introduced to ordinary people as a personal product in the early 1980's, making them usable becomes the first issue that was raised. The most easily recognizable problem was the issue of usability. Norman's critical eyes on this issue [5] opened up the possibility for connecting design and software engineering, which has been successfully achieved so far. However, many researchers including Norman in the HCI area have started to recognize the problems of focusing only on usability issues when we try to achieve really successful design.

The attempts in *experience-centered design* in HCI are one of the most active research movements that appreciate the importance of viewing the various user-related aspects of design in a more holistic way. Many researchers in HCI have helped us consider user experience in design by providing either philosophically informed [10] or practically constructed [3] frameworks. These frameworks guide our design to incorporate critical aspects of user experience. This level of knowledge sets up the key elements designers must keep in their mind while they design a product. Another level of knowledge that is necessary is a set of operational methods and tools that enable designers to actually collect and analyze the data for understanding and evaluating user experience.

In this research, we focus on this operational level of attempts on supporting *experience-centered design*. These operational methods and tools can be developed, informed by the currently established frameworks of user experience. The goal of our research is twofold: 1) to provide a rubric to create a map of methods and techniques involved in studying user experience, which is one of the key objectives of this workshop, and 2) to make experience-centered design executable and operable in the actual design practice.

In order to achieve these goals, we first propose a framework, namely *experience-centered design method framework*. This framework identifies what types of design methods should be considered for doing experience-centered design. We then provide a guide to operationalize the experience-centered design by adapting existing operable techniques for user studies and usability evaluation such as usability study techniques, observation techniques, interview techniques, and other user study related techniques, based on the framework we proposed. Because these existing techniques are already well-established and operable in various user study activities for design, what we need now for experience-centered design is to figure out what techniques are more appropriate than others for understanding or evaluating which aspects of user experience. In order to figure this out, we identified key aspects of user experience based on the inspirations from what current researchers have proposed and identified.

Experience-centered Design Method Framework

As we briefly mentioned, we address the issue of operationalizing the holistic understanding and evaluation of user experience in design. In order to enable this, we first propose an *experience-centered design method framework* which can guide designers to plan, conduct, and analyze user experience studies for their design purposes. We mean by an *experience-centered design method framework* a framework that defines critical purposes of using methods for studying users in design and critical activities involved in utilizing those methods in design. Figure 1 shows how our framework is structured.

The purposes of using the methods for studying users in design include *understanding* users and their experience in order to create design ideas, and *evaluating* the proposed design ideas in terms of the experience of using the proposed ideas. One of the fundamental differences between usability and user experience is that it is very difficult

to generate a completely new product ideas by only knowing about usability problems although redesigning of existing products may be possible. However, if we understand issues in user experience related to certain activity domain or product domain, we can create completely new product concepts. In this regard, experience-centered design requires not only evaluating user experience after creating the concepts but also understanding user experience before creating design concepts.

The activities involved in utilizing the methods for studying users include *collecting* and *analyzing* the data gathered from different methods. The reasons why we emphasize these two aspects of the activities are threefold. 1) Collecting appropriate data from appropriate methods is critical in order to understand relevant aspects of user experience. It avoids us to use inappropriate methods for collecting user experience data at the first time. 2) Different types of data require different analysis approaches. 3) Different types of analysis inform design differently.

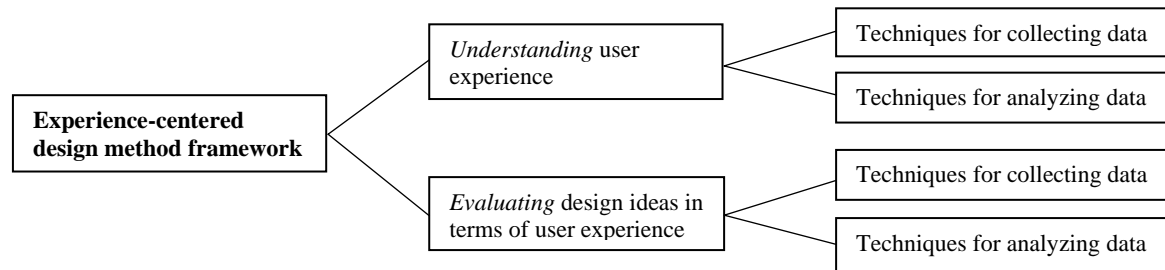


Figure 1: Experience-centered design method framework

Operable Experience-centered Design

In order to provide a guide for operable planning and execution of key user study techniques for experience-centered design, we identified key aspects of user experience which were informed by several conceptual frameworks for understanding user experience. There are two categories of the aspects of user experience. One is the *types of experience*, and the other is *qualities of a product* that affect user experience.

The *types of experience* are to *understand* user experience. Understanding user experience is essential for generating design concepts that directly address what users need for their activities. Identifying the key types of experience helps us to consider people’s experience with products in a more holistic and complete way. Norman [6]’s and Wright and McCarthy [10]’s explanations about key aspects of user experience inspired us to extract the key types of experience we present in Table 1. In addition to their notions of understanding user experience, our study is also influenced by the key concepts in activity theory [2] regarding the different level of human activities which lead to explaining different types of experiences.

The qualities of a product that affect user experience are to evaluate the product which is the new design, regarding the experience involved in the use of the product. After we come up with product ideas, we should be able to make sure our ideas affect user experience in a positive way. This is one critical part of the evaluation of new product ideas. In order to make this work, we should be able to tell which qualities of the product affect user experience and how they affect it. Identifying the qualities of a product that affect user experience helps us to make sure that we evaluate all the critical qualities of the product in order to create a good user experience of using this product. Jääskö and Mattelmäki’s work [3] influenced our list of the key qualities of a product shown in Table 1.

Based on these key aspects of user experience, we identified which techniques are more appropriate for analyzing which aspects of user experience according to the *experience-centered design method framework*. Table 1 shows the key aspects of user experience for those two categories we mentioned, and appropriate user study techniques that can be used for analyzing the corresponding aspects of user experience.

Table 1: Operable experience-centered design

Categories of aspects of user experience	Aspects of user experience	Corresponding user study techniques
<i>Types of experience: for understanding user experience</i>	Sensory-based experience: It is to understand how people are engaged with a situation through what they sense. It is related to direct feelings toward certain things. (e.g. Soft texture gives warmer	<u>For the collection of data:</u> - Observation/experiment: observing how people feel about what they sensed in a certain situation or a condition. - Questionnaire: asking questions with semantic differential scales [7] to quickly check their reactions. <u>For the analysis of data:</u> - Categories of senses: categorizing different senses based on how they

	feeling than hard texture when their surface temperatures are same.)	affect people’s feelings toward using certain things or environments. - Visualization of patterns: diagramming or charting the measured results from experiments or questionnaires.
	Unconscious/reactive experience: It is to understand how people immediately react toward certain situations without deep thinking. (e.g. We put any heavy object on the corner of a book to make the middle of the book page stably open.)	<u>For the collection of data:</u> - Observation: observing people’s <i>thoughtless</i> [8] reactions toward certain situations in a natural environment. <u>For the analysis of data:</u> - Collection of annotated pictures: collecting the moments of unconscious experiences observed. - Categories of unconscious experiences: categorizing what types of unconsciously reacted experiences exist. - Implications of unconscious experiences in design: discussing how various unconscious experience situations can inform our design.
	Spatial-temporal experience (see also [10]): It is to understand how people perceive and use <i>time</i> and <i>space</i> . These two factors are some of the most important external factors that affect people’s experience and emotions. (e.g. When people feel busy, even a same kind of activities can be completely differently experienced if we compare it with the relaxed situation.)	<u>For the collection of data:</u> - Observation: observing how people use time and space, and how they react on situations when they have different conditions of time and space. - Interview: asking people how they manage time, how they feel about time, how different spaces and locations influence their experience on a certain situation. <u>For the analysis of data:</u> - Visualization of spatial experience: different types of experiences or actions can be visualized along with a spatial layout of an environment where those experiences and actions were taken. - Visualization of time experience: different types of experiences or actions can be visualized along with a timeline with indications of critical time-points such as deadlines, or event-points such as starting times.
	Action-based experience: It is to understand how people achieve their immediate goals through various actions toward things or environments in their daily activities. (e.g. In order to send a short text message to a friend, we turn on the phone, go to a text messaging menu, type in a message, select the phone address, and send it, etc.)	<u>For the collection of data:</u> - Contextual inquiry: when we are not familiar with users’ routine work, and try to get to know about it as well as their needs and goals, contextual inquiry [1] is one of the best techniques we can use. <u>For the analysis of data:</u> - Visualization of different types of actions based on different goals (task analysis): task analysis approaches are useful for structuring actions and corresponding goals to those actions. Visualization of these structures of actions and goals help understanding users’ action-based experience. - Categories of actions: we also need to understand what the major types of actions are involved in users’ work domain which we are interested in. Identifying the categories of the actions captured from contextual inquiry will be useful for extracting this information. - Video analysis of actions: it is also critical to analyze details of actions that can be well-captured by reviewing video data of users’ actions.
	Social/cultural experience: It is to understand how people are engaged with and influenced by other people around the practice they are involved in. (e.g. A group of Korean college girls chat with their friends in a coffee shop by sharing their personal products such as a wallet, a digital camera, an mp3 player, etc.)	<u>For the collection of data:</u> - Focus group: this technique helps us to effectively compare different point-of-views on certain things. It will be useful for understanding what kinds of values different users have [4], which can be related to social and cultural values. - Contextual inquiry: not only for understanding work structures, this technique is also useful for understanding social organizational aspects of users’ work domain as well as cultural norms embedded in the organization. - Interview: especially for social and cultural experiences, they are hard to be captured by short-term observations. For practical matters, interviewing experts and stakeholders can be useful technique to capture key ideas in these aspects of user experience. <u>For the analysis of data:</u> - Contextual modeling: some of the diagramming techniques introduced in Contextual Design [1] will be effective for understanding this aspect of user experience such as consolidated cultural model and flow model.

Qualities of a product that affect user experience: for <i>evaluating</i> a product in terms of user experience	Appearance: It is about product's look-and-feel qualities.	<u>For the collection of data:</u> Prototyping, heuristics, and questionnaires can be used to collect the data about how people feel about product's appearance. <u>For the analysis of data:</u> Categorization and comparison of collected data can help evaluating what ideas of look-and-feel are more effective than others.
	Product image: It is about product's cultural meanings, personal meanings, and novelty.	<u>For the collection of data:</u> Interview and focus group are appropriate techniques to collect the data about what image of the product people perceive in terms of its cultural and social contexts. <u>For the analysis of data:</u> Many approaches for the analysis would be possible. Illustration like visualizations of representative product images and categorization of key types of product images are possible analysis techniques.
	Use environment: It is about how well the product fits into people's use environment.	<u>For the collection of data:</u> Field-based usability testing and interview techniques can be used to evaluate whether the product idea fits into users' use environments. <u>For the analysis of data:</u> Visualization of the relationships between environment and actions using various diagramming techniques can help analyzing the data for this.
	Interaction: It is about how ergonomic the product is in terms of people's interaction with it both cognitively and physically, and also about how well it supports people's goals.	<u>For the collection of data:</u> Interactive prototyping, formal usability testing, and cognitive walkthrough [9] techniques can help evaluating interactivity qualities of the product. <u>For the analysis of data:</u> Chart-like visualizations for representing measurement-based data analysis and some descriptive statistics can be useful information.

Future studies

In this research, we propose a systematic and operable approach for experience-centered design. We hope that our initial proposal can contribute to further build more sophisticated discussions and approaches for experience-centered design. In addition to what we focus on in this research, some other important issues still remain to be further discussed, which include: 1) building an integrated understanding of the different aspects of user experience and 2) collecting actual practices for demonstrating different approaches for understanding user experience and evaluating products in terms of user experience.

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