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DESIGNER EXPERIENCE - DESIGNING IN EXPERIENCE

Mika P. Nieminen and Mikael Runonen
Aalto University School of Science
mika.nieminen@aalto.fi, mikael.runonen@aalto.fi

ABSTRACT

In this paper, we introduce a new paradigm for performing user-centered product or service design on an experiential level. We call this approach Designer Experience, meaning design activity that takes place within an experiential system similar to the one that the eventual product or service will be used in. After a brief discussion of the inadequacies of user-centred design and experience in general, we explore the various aspects of Designer Experience and the ways to invoke it. A case study regarding the representation of users' contextual systems to designers is presented. Our experiences with the UCD Holodeck system acted as an inspiration for the definition of Designer Experience and as a validation in order to illustrate one potential path towards Designer Experience.

Keywords: User-Centred Design, user experience, designer experience.

INTRODUCTION

User-Centered Design (UCD) has proven itself suitable for the creation of solutions that meet users' needs and wishes, with well-established integration into the technical, competence and even legal requirements gathering processes.

For the majority of UCD methods, there is an assumption that reliable information about users can be collected. The nature of this information is rational, meaning that there are clear reasons for users' behaviors and needs. This is also an assumption that a user can directly or indirectly explain her actions and attitudes or that this information can be found through user studies. This confines the most important UCD stakeholders, both the user and the designer, to the domain of predictability.

The current effort to move beyond this deductive predictability has strengthened the adoption of user experience (UX) as the new defining aspect of product and service design. UX provides room for solutions that touch the emotional, experiential world of the user.

More design-oriented approaches, such as generative tools, emotional design and cultural probes aim to externalize the users' hidden needs by allowing them to participate in the creative process alongside the designers. The major drawback is that the knowledge gained from the users is often fragmented: facts, insights and interpretations provided by the users. Next, this user-generated input must be re-interpreted by the designer in order to build the rationale for design. Wouldn't it be better for the designers to perform their design work directly within the users' experiential system, without these layers of double or triple interpretation? In this paper we outline a new paradigm called Designer Experience (DX), a way to perform design in experience, not for experience.

BEYOND PREDICTABILITY

There is an unconditional necessity for prediction in almost all product development. For complex systems, development cycles may stretch out for years, and over such a time period, user attitudes, use contexts and even some user needs may change. This forces designers and decision-makers to make educated guesses about forthcoming conditions.

Fortunately, there are different approaches to the alleviation of the problem.

In Participatory Design (Schuler & Namioka 1993), potential or future users are included in the development activities, and the problem-solving and innovating effort is shifted from the designer towards the users. This shift is beneficial because the users are much more competent than the designer in evaluating needs and use contexts. However, the designer, at least in most cases, holds much more technological knowledge and information about future possibilities than the users. In short, the designer brings to the table her design skills and knowledge about the possibilities for the future, whereas the users provide their domain expertise. Still, this approach ties domain knowledge very firmly to the present.

According to von Hippel (1986), current users who are familiar with a product or product category perform poorly when trying to evaluate their needs for future products. Redström (2005) criticizes the whole concept of the user - a person is not a user before he or she starts using a product. Further, he argues that current users cannot be handled as future users, but only as potential users or users who will use the forthcoming product. Von Hippel (1986) proposes lead users as a partial solution to the problem of current users. He describes lead users as users who have knowledge of future conditions and strong needs that will be realized by other users as well in the future. By utilizing lead users, designers gain insight into future user needs and possibly even product ideas.

For designing more complex systems, such as Information and Communication Technology systems, the lead user approach is, however, problematic because lead users who understand the technology, future possibilities and user needs can be very hard to find. With complex systems, the situation is different from what von Hippel (2005, 73-76) describes as solution information from other fields. If the components of the system(s) are dependent on other components, making changes can have negative effects the lead users cannot anticipate. Also, there is no guarantee that the needs of the lead users are the same as those of ordinary users and that the lead users are knowledgeable of state-of-the-art technology (Intrachooto, 2004). The needed information regarding innovation may also be distributed (von Hippel, 2009). For complex systems, the lead user method may become resource-intensive and thus be unattractive.

Generative techniques (Sanders, 2000) aim to provide designers with a platform for information and inspiration through the latent needs of people and their tacit knowledge. These techniques strive to go deeper than what can be expressed or observed and delve into dreams and experiences. We acknowledge that, with generative techniques, people may be able to access experiential domains and to some extent their latent needs as well. According to Sleeswijk Visser et al. (2005) this information serves to inform designers and acts as a source for inspiration. Regardless of the methods of communication, this information is very difficult to mediate, and it is highly questionable whether all the nuances can be adopted by the designers. Even if we assume that the information can be mediated, this doesn’t represent an ideal condition. The information is bound to experiences with current or past products and does not take into account changes that a new product may introduce. Therefore, these people do not represent users of a future product, i.e. future users, if they are not able to comprehend the technological framework and future possibilities as the above-mentioned ideal lead users might. Even if we assume that they can, the decisions about the future product are made by the designers. The decisions that influence the future product also inevitably influence the experiential domain of the future user.

The problem of combining future users, future products and future experiences is largely unsolved by the current approaches. In one hand, the knowledge of future conditions can be handled by designers. Designers are also responsible for introducing changes to those future conditions. On the other hand, the best knowledge about context, experience and usage is that of current users and possible future users, but they are seldom able to have the final say in design decisions. There is a need for a party that would simultaneously hold the knowledge of possibilities, be able to influence decisions and deeply understand the context of use of the future users and the changes that a future product will introduce to it.

NEW PARADIGM: DESIGNER EXPERIENCE

Designer Experience (DX) reverses the concept of designing for experience and changes it into designing in experience. Instead of trying to guess the experience a product causes for a user, DX immerses the designer in the user's experiences, compelling him to create the best possible design. It is a holistic approach to enable design activity in order to leverage deep user understanding and proactive problem-solving with an iterative switching of the designer and user roles by means of an explicit experiential approach. It takes into consideration the past works on design for experience (e.g. Sanders & Dandavate, 1999) and experience-centred design (Wright et al., 2006). According to Woo (2007), in experience-based design, a designer recalls his memories and imagines ideas based on his experiences and knowledge. We agree with the above claims, but call for a more concrete model to support the fluid designer-user role-play and its sculpting effects on the experiences of the future users. Furthermore, design decisions based on the designer's experiences require a better justification for the entirety of the design process from needfinding and inspiration to design and use. DX allows designers to be exposed to the users' true and accurate experiences invoked by the various aspects of the experiential system in which they reside.

ASPECTS OF DESIGNER EXPERIENCE

When a person interacts with a product (use event) and becomes a user, she acts in an environment that is both intrinsic and extrinsic to her. We call this environment an Experiential System (ES), which is a collection of different aspects that contribute to the formation of experiences when a user is interacting with products (see Figure 1). Agreeing with Wright et al. (2006), the aspects of an experience are not independent of one other, and these different aspects should not be considered separately. In the context of Designer Experience, we consider an ES to include at least the following five multifaceted aspects: physical context, social context, culture, cognitive processing and psychological concerns.

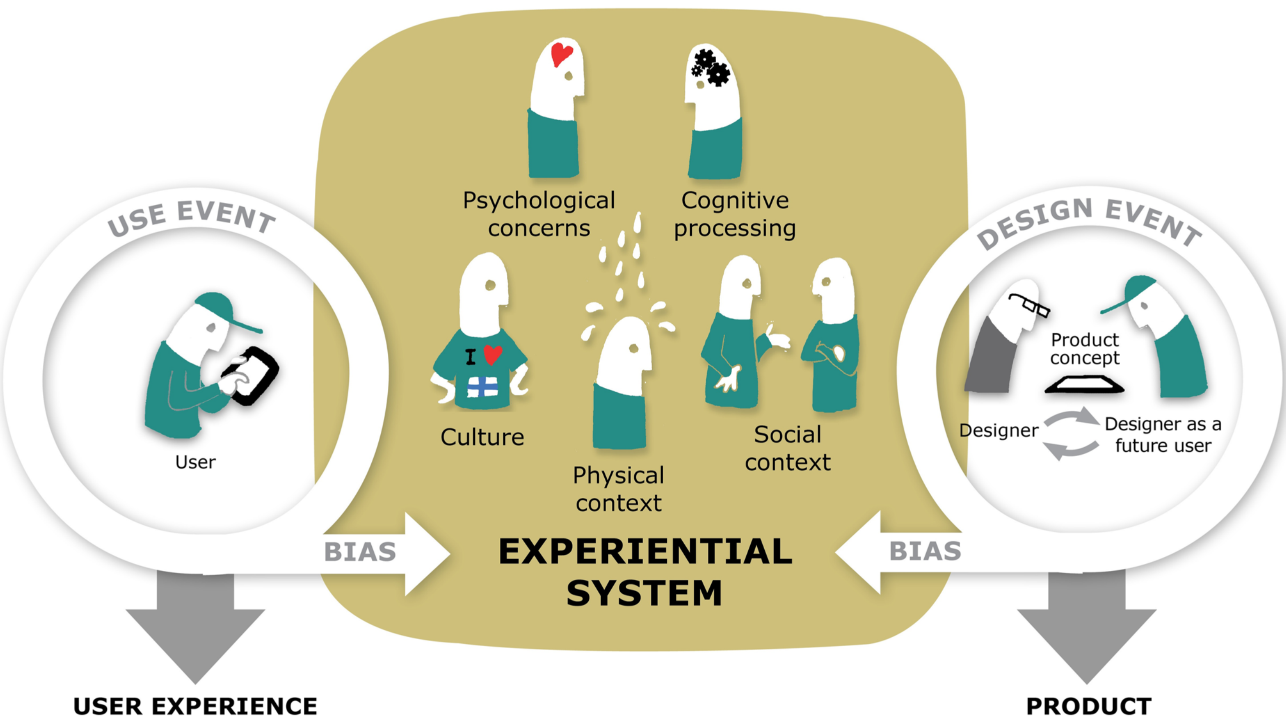

Figure 1. An Experiential System is a collection of different aspects that contribute to the formation of experiences when a user is interacting with products. A designer can utilize the same Experiential System to invoke Designer Experience.

Physical context describes the user's physical environment at large in which the activity (use) takes place. It includes the physically present or virtually represented user herself, spatial factors, environmental conditions and artifacts. Specifically in regards to Designer Experience, the physical context includes also the designer's tools and accessories for his work.

Social context describes the interactions between all relevant stakeholders, whether they are physically present or represented by some means. The designer may merely observe and absorb the social behavior or be an active actor in the social context, e.g. participatory design or co-design (Sleeswijk Visser et al., 2005).

Culture describes the rules of conduct within social contexts and the proper means of communication on a larger scale. Shared norms and values steer shared activities, and shared language and symbols enable communication between different stakeholders. Culture often reflects physical, geographical and social contexts.

Cognitive processing describes the user's perceptive and cognitive abilities and limitations. Generalizable human characteristics, such as senses, information processing, memory, mental models and attention, traditionally form the baseline for interaction design.

Psychological concerns are both the conscious and subconscious interpretations that a user creates because of the other aspects. The concerns can be divided into two main categories: firstly, the user's needs, attitudes and desires, which can be expressed and studied, and secondly, the user's dreams, fears, emotions, personal values and motivations, which are more difficult to describe and observe, for instance the psychological needs described by Sheldon et al. (2001).

The different aspects of an ES are dynamic. They change in different situations and over time. Every use event introduces a use bias. At minimum, using a product alters the user's perceptions of the product (and thus the whole ES). For each user and each situation, some aspects may have a much larger contribution to the experience than other aspects. It is also possible that one aspect is totally irrelevant to the experience or that only one aspect is responsible for most of the experience. Each iteration of the use event creates a unique user experience (UX).

The following walkthrough illustrates the mechanisms by which an ES invokes DX:

1) User experience is an outcome of a use event engaged in by a user in her ES, which is changed by the use bias.
2) The designer immerses himself in the user's ES.
3) Designer Experience is an outcome of a design event by the designer in a user's ES, which is changed by the design bias.
4) The designer assumes the role of a future user to validate the product concept. This use event further molds the ES and transforms the original user's ES into the future user's ES.
5) The designer assumes the role of a designer to rationalize the changes to the ES due to earlier design events and performs the next design event, which may either change the product concept and/or force a design bias onto the ES.
6) The designer again assumes the role of a future user to validate the new product concept. If the future user's user experience is satisfactory, the design is ready and the iteration ends. Otherwise, the designer returns to step 5.

While in the role of the future user, the designer may assess appropriation. During the iterations, Designer Experience begins to more precisely resemble the user experience of the future user. At the end of the iteration, both experiences match as closely as possible, taking into consideration the different personae in the roles of the designer and the future user. A product suitable for the future user has emerged. A simplified version of this process is shown in Figure 2.

Invoking Designer Experience is conditional on the ability to present the user's ES to the designer. This is possible either by entering the user's ES and

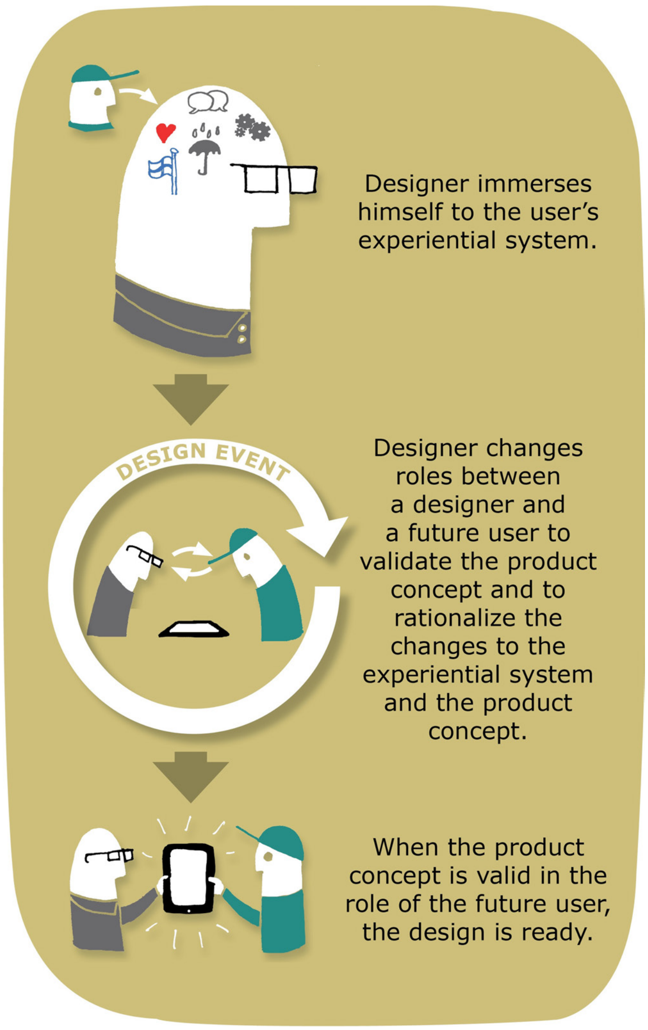

Figure 2. User's Experiential System invokes Designer Experience.

performing design events in it, or by reproducing an ES that is sufficiently similar to the actual user's ES. Working in a true ES sets limitations on the design activities, as changes to the ES by design events may confuse the users, or if it is not possible to implement changes, this can shatter the emergence of DX. On the other hand, the modeling and reproduction of an ES places a high demand on the veracity of the user's ES, which translates into very strict requirements for user studies and the representation (simulation) of the fabricated ES to the designer.

In the following chapter, we present our past experiments on representing an ES by means of a technology-augmented group work facility. Its goal was to capture and transfer aspects of DX to a team of designers, especially emphasizing the physical and social contexts.

TOWARDS DESIGNER EXPERIENCE - THE UCD HOLODECK

As a starting point in invoking Designer Experience, we constructed a technology-augmented group work facility called the UCD Holodeck (Nieminen et al., 2010). It is an arrangement for immersing the designers into rich media regarding the users and their context of use. The initial design drivers were to support design teams of three to six people, represent the users and their context of use via rich multimedia accurately and memorably and thus enable product ideation and design within the users' experiential system.

The UCD Holodeck was constructed from five separate PCs with various input and output devices. These included two 57" wall-mounted displays, a front-projected SMART board, a Diamondtouch touch table and an audio system, for video and contextual ambient sounds. The system had a crude distributed control protocol implemented in Python so that all supported media contents, i.e. video files, picture slideshows, web pages or an ambient sound track, could be played at any of the five locations with the most suitable output options. We encouraged the users to use the SMART board for web contents for easy annotations, the large displays for pictures and videos and the desktop PC for ambient sound, while the touch table was reserved for the UCD Holodeck controller Flash application. The layout of the UCD Holodeck facility is depicted in Figure 3. Additional tools included a flip chart, paper and pens, Post-IT notes and flexible seating with chairs and two sofas.

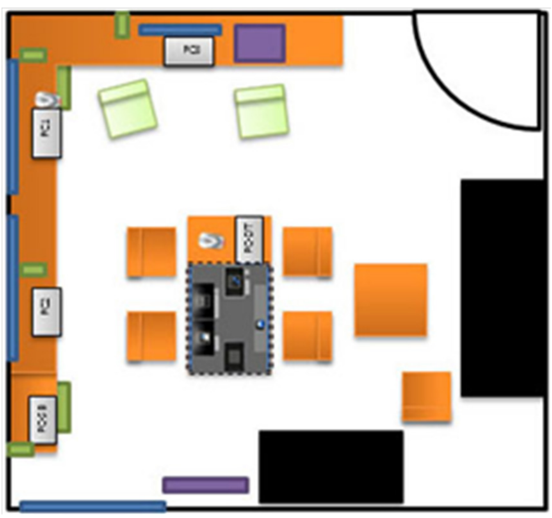

Figure 3. Holodeck layout, touch table controller in the middle.

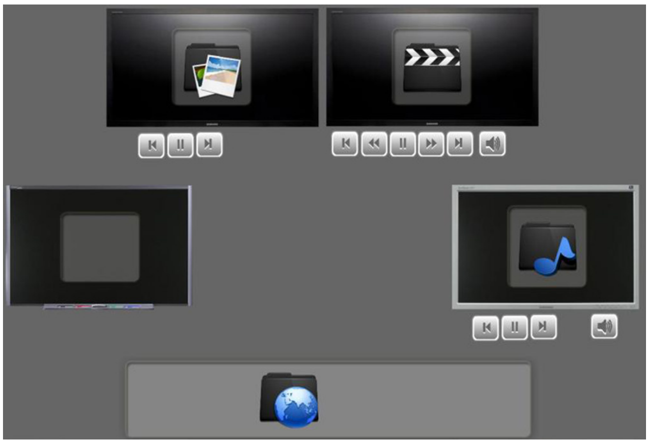

Figure 4. UCD Holodeck controller user interface.

The controller's user interface and the available outputs shown in their relative positions to it are depicted in Figure 4.

TEST SETUP

To test the UCD Holodeck with a real design challenge, we captured a suitable context in pictures and videos. The selected target for design was the Media Pole installation in Gangdam street, Seoul, the Republic of Korea. Our own user research materials were augmented with user generated contents from Youtube and Flickr. Materials from Korean tourism authorities were used to compose a brief synopsis of the country as well as its people and culture in web format. In total, there were 12 minutes of video clips, 35 pictures, a three minute looping ambient sound track and a web information backgrounder.

The first set of tests were run during the spring of 2010, with six ideation sessions to validate the usefulness of the UCD Holodeck concept and, during the spring of 2011, five sessions to deepen our understanding of the experience the UCD Holodeck invoked for the designers.

The 2010 validation tests included a background interview, an introduction to the UCD Holodeck, an assignment description, a 25 minute ideation session and an end interview. The 2011 experience test set had an introduction to the UCD Holodeck, an assignment description, a 25 minute ideation session and a 20 point experience questionnaire. The first fifteen questions asked the designers to compare the UCD Holodeck on a scale from 1 to 5 to a more traditional written user research report, which was

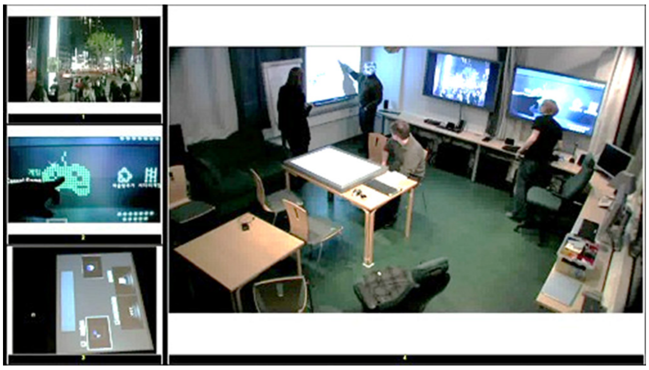

Figure 5. Ideation in the UCD Holodeck.

given a relative value of 3. The last five questions allowed the participants to rate their subjective experience on a scale of 1 to 6.

In both test sets, the participants were students from our user-centred concept design course, fluent in the necessary ideation and UCD methodology. The course is one of the last ones in the students' Master's studies or part of their post-graduate studies. Thus, we argue that the participants were sufficiently skilled and comparable to junior designers in the early years of their careers. This was also validated by the first set of tests' background interviews.

The assignment was to spend 25 minutes in the UCD Holodeck and "produce as many product or service ideas as possible for the depicted Media Pole that are well-suited to its context and users". The groups were instructed to say the ideas aloud as they emerged and use any available equipment to aid their task. The tests were recorded from four video sources and three microphones via a multiviewer that captured the contents of the two large displays, an overview of the whole facility and a ceiling camera that provided a closer look at the controller interactions. An example screenshot is shown in Figure 5.

ANALYSIS

The 2010 validation test recordings were transcribed for analysis. A separate list of 236 improvements for the UCD Holodeck was drawn from the data, which is not covered in this paper. The created ideas were counted and categorized. During the original analysis (Karvonen, 2010), the ideas were sorted into three groups: context-driven ideas that could be directly linked to media and materials displayed within the UCD Holodeck, follow-up ideas that elaborated on ideas stated earlier and open ideas that arose from the users themselves or from other unidentified sources. The source media types for context-driven ideas were also counted.

The 2011 tests' experience questionnaire was analyzed using IBM SPSS Statistics 19. A Chi-square test was used to determine statistical significance and a Pearson Correlation was used to illustrate the dependencies between variables. The small sample size caused several cells to have expected frequencies of five or less in the Chi-square test, so the fact that statistical significance was achieved for 17 of the 20 questions must be considered inconclusive.

RESULTS

Six groups, 24 persons in all, participated the 2010 validation tests. A total of 170 ideas were extracted from the recordings, with some duplicates among groups. For this paper, the ideas were recategorized to differentiate the follow-up ideas that originated from the context-driven or open ideas, so that a better picture of the UCD Holodeck's effectiveness could be drawn. This new distribution of the ideas by sources is shown in Table 1. 46% of the follow-up ideas were second-tier, context-driven ideas, i.e. they were derived from the presented media or materials.

Context-driven ideas	Follow-up ideas for context-driven	Follow-up ideas for open ideas	Open ideas	Total
40 (24%)	26 (15%)	30 (18%)	74(44%)	170(100%)

Table 1. Distribution of ideas by source.

Video	Pictures	Web	Ambient sound	Total
44 (67%)	9 (14%)	10 (15%)	3 (5%)	66 (100%)

Table 2. Breakdown of the context-driven and the follow-up ideas created thereof by source media.

The media and materials presented in the UCD Holodeck as well as the source media types for these ideas are shown in Table 2. Assuming that the combined context-driven and follow-up ideas created thereof are an outcome of the DX's physical context, and if additionally, if we count the follow-up ideas originating from open ideas as mainly an outcome of the social context of Designer Experience, we show that 96 or 56% of all created ideas were inspired by the UCD Holodeck. Some of the ideas were categorized as open, even though their origins were available in the UCD Holodeck, because they could not be directly linked to an observed instance at the time the idea was presented. Our analysis only backtracked few minutes from the announcement of an idea.

Unsurprisingly, most of the ideas attributed to UCD Holodeck originated from video materials. This can be explained by the attention-demanding qualities of this richest of available media types.

The 2011 experience tests highlighted the strengths and challenges of the UCD Holodeck. In the first part, when comparing the UCD Holodeck to a written report on a scale of 1 to 5, the lowest scores were given to functions often found in written user research reports: representation of diversity among the users (2,67 $p=.055$), representation of demographic information about the users and user groups (2,52 $p=.006$), understanding the users' values and appreciations (2,57 $p=.014$) and depicting the users' wishes and desires (2,52 $p=.020$). This kind of information is almost always embedded in textual user profiles or personas and contains specific facts, interpretations and numbers unavailable in rich media. The highest scores were given to the representation of the physical context (3,90 $p=.002$), depiction of the possibilities of the technology platform, i.e. the target for design (3,95 $p=.002$), experiencing users' cognitive limitations and interruptions (3,76 $p<.001$) and the UCD Holodeck's ability to invoke or generate emotions for designers (4,10 $p<.001$).

Claim	Mean (sig.)
The UCD Holodeck gave me useful information about the users	4,24 (p=.001)
The UCD Holodeck enabled me to understand the users' needs	3,19 (p=.037)
The UCD Holodeck enabled me to think like the users	4,24 (p=.009)
The UCD Holodeck made me share experiences with/feel like the users	4,05 (p=.088)
The UCD Holodeck was able to create memorable experiences	4,62 (p=.037)

Table 3. Designers' subjective experience on using UCD Holodeck.

These results validated our hypothesis that the UCD Holodeck sufficiently mediates the users' context of use and elicits an emotional response, although the designers' ability to relate to the users' emotional state was given a slightly lower value (3,43 p=.017). The Pearson Correlation validated the expected correlation between the mediation of users' emotions and relating to users' emotions (p=.004), and understanding the motivation for users' actions and understanding the users' values and appreciations (p<.001).

In the second part, the designers evaluated their subjective experience with the UCD Holodeck on a scale of 1 (false) to 6 (true). The results are depicted in Table 3.

The Pearson Correlation showed a very significant correlation between understanding users' needs and thinking like the users (p=.001) and thinking like the users and sharing experiences with or feeling like the users (p<.001).

CONCLUSIONS

Design that takes into account experiences is a field that has created more questions than it has been able to answer. Only recently have terms like experience-centred design, design for experience or Designer Experience come into focus for the design community.

In this paper, we have introduced a new paradigm for design that provides a more systematic way to design products that are truthful for future users. Ideally, Designer Experience will be able to better predict how new products will affect future users' lives and shed light on how they will be experienced.

The subject of Designer Experience is complex and multidimensional, even philosophical, and we have only managed to scratch its surface. The future uses and practical means to invoke DX are topics that offer various research questions. For this reason, we have launched a two-year research initiative to continue our work.

We have incompletely tested the possibilities of reproducing users' contexts of use and their Experiential Systems. We created a setting that knowingly emphasized only a few of the aspects that we see as the core factors of Designer Experience. Our results show promise, but have also made the challenges of understanding the true meaning of human experiences painfully clear.

Eventually, even if we were able to reach ideal conditions for product or service design through Designer Experience, we may still never predict all the possible ways future users might interact with future products. DX may be able to capture appropriation partially, but issues such as creative misuse or hacking might very well be unattainable for Designer Experience.

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