User eXperience in Service Design: Defining a common ground from different fields

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User eXperience in Service Design: Defining a common ground from different fields

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ABSTRACT

The emerging field of service design combines several methods mainly from the fields of product, software and interaction design, for designing the experience and interface to services. However, User eXperience design is not easy to understand because it is a new approach and covers many different fields (usability, psychology, marketing…). More often the design team members come from various domains with different cultural backgrounds such as engineers and marketing. Therefore, it is necessary to have a common definition to share the same understanding of this concept. In this paper, we investigate the main definitions proposed in the literature and the use of User eXperience in many disciplines other than computer science. The main goal of this paper is to find important ingredients from different fields allowing to defining and characterizing the User eXperience in service design. Thus we propose to extend an existing design tool (persona) in order to cover the whole of User eXperience components (hedonistic, aesthetic interaction, social factors...).

Keywords: User eXperience, Service design, Persona, Interaction design, Human Computer Interaction


1 INTRODUCTION

User eXperience has become a lighthouse subject for many practitioners and researchers from different disciplines. This trend is justified by the impact of this new concept on the success of the product or the interactive service. A great effort is made during the last decade to explain the concept of the User eXperience, its components with their influential factors and also its scope to the current disciplines of computer science (HCI, software engineering, etc.). However, the wide meaning given created some ambiguity and confusion about the semantic of that concept and its characterization for effective use in interactive service design. Therefore, to make effectively the User eXperience as a design tool in service development project remains a difficult task in mind of the design team to carry out. Thus we believe that a deep study of the concept of User eXperience as a design tool is required today. This is expected to understand the attributes of this experience and how to retrieve and use it in interactive service design. The understanding of the internal behavior and reactions of individuals through the experience was widely adopted in several areas before the field of computer science. The fields of sociology, psychology, Criminology, and marketing are good examples on the use of the concept of the human experience. A literature review will be presented in this article in order to show how practitioners from different disciplines address the subject of the experiment. There is an interest in particular to the main elements of the experience which are exploited.

Several frameworks have been proposed to explain the components of the experience that can positively influence the design of products, which leads to a totally positive experience. (Hassenzahl, 2003) provides a model to describe people’s goals and actions when interacting with a product. This model is mainly based on pragmatic attributes (e.g. Manipulation and usability) and hedonic attributes (e.g. Stimulation and evocation). On other hand, (Forlizzy and Battarbee, 2004) present a framework based on three types of user-product interactions (fluent, cognitive and expressive) for the design of the experience and three types of experience (experience, an experience and co-experience). In his dissertation, (Arhippainen, 2009) present the U²E-frame, a framework to planning and conducting tests by using User eXperience heuristics. Other frameworks were proposed to measuring and assessment the human experience in interactive system design; for example (Nacke, 2009) for media enjoyment (gameplay experience) and (Mahlke, 2008) to experiencing the portable audio players. Despite all these efforts, it remains that little work has put emphasis on the applicability of a model of the User eXperience in the design process phases. Among these works, we cited (Schaik and Ling, 2008) who presented an experiment tested and extended Hassenzahl’s model of aesthetic experience, and (Jääskeläinen, 2009) who presented a set of User eXperience tools for developers to help them solve some User eXperience problems, such as the gap between test and marketing and design phases, and lack of development tools for supporting User eXperience designed features. However, most of the related work was based only on the assessment of the experience when we have the finite product (or service). Therefore, the gap still exists between theoretical frameworks with practical design process like UCD

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(User-Centred Design). This can justify not only the subjectivity of experience components (Karapanos, 2010) but also the lack of precise definition (Hassenzahl, Diefenbach, and Göritz, 2010), and characterization of this concept.

In this paper, we investigate the main proposed definitions in literature and the use of User eXperience in many disciplines other than computer science. We also discuss about some design tools in order to characterize the User eXperience. In section 2 of this paper, we explore some UX definitions and propose our working definition. The role and position of UX in HCI and related fields will be discussed in section 3. Viewpoints from fields elsewhere and their use of User eXperience are presented in Section 4. The section 5 addresses some challenges and perspectives of the UX in services design.

2. DEFINING THE USER EXPERIENCE

In recent years, the term User eXperience (UX) was like ambiguous buzzwords in product or service design (Hassenzahl and Tranctinsky, 2006; Forlizzi and Battarbee, 2004). Defining the User eXperience term remains difficult because it has both dynamic and paradoxal nature (Arhippainen, 2009). Dynamic as people experience the product all times and also the changing of the experience over time. Paradoxal because the meaning of the experience can be at the same time subjective, i.e. personal perception, personal experiencing (Senders, 2000) and collective, i.e. sharing the experience, social experience as claimed by (Battarbee, 2004) work about co-experience. Moreover, some researchers tend to deduce a unique definition of User eXperience from literature review (Marcus, Ashley, and Knapheide, 2009; Law, Roto, and Hassenzahl et al., 2009). All this work aims to sharing a common definition between a large community of designers and practitioners of User eXperience.

2.1 Definitions review about User eXperience

(ISO 9241-210, 2009) describes User eXperience as a person's perceptions and responses that result from the use and/or anticipated use of a product, system or service. According to this definition, the User eXperience concept includes some attributes related to user’s emotions, beliefs, perception, behavior, physical and psychological responses that occur before and after of use. This standard definition claims that User eXperience is related to usage. (Nielsen and Norman, 2007) gave another definition where User eXperience encompasses all aspects of the end-user's interaction with the company, its services, and its products. The authors claim that an exemplary User eXperience is to meet the exact needs of the customer, without fuss, follow-up with simplicity and elegance that produce products that are a joy to own, a joy to use. For (Pabini Gabriel-Petit, 2008), User eXperience design takes a holistic, multidisciplinary approach to the design of user interfaces for digital products. It integrates interaction design, industrial design, information architecture, visual interface design, instructional design, and user-centered design, ensuring coherence and consistency across all of these design dimensions. They add
that the User eXperience design defines a product's form, behavior, and content. Whereas (Javahery, 2007) describe User eXperience as a generic term referring to a collection of information on user behavior, expectations, and perceptions influenced by user characteristics (knowledge, expertise, personality and demographics information ) and service characteristics (domain, content, visual design and interaction type).

According to (Hassenzahl and Tractinsky, 2006) UX can be a consequence of a user’s internal state (predispositions, expectations, motivation, mood, etc.), the characteristics of the designed system (e.g. usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organizational/social setting, meaningfulness of the activity, etc.). The three factors described by the authors (user’s internal state, system characteristics and context of use) affect directly the key elements of User eXperience such as usability, flow interaction, pleasure and hedonistic aspects of use. (Hassenzahl, 2008) propose another two parts UX definition which defines UX in itself and states how UX is made respectively. In the former, UX is defined as a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service. The later describes that a good UX is the consequence of fulfilling the human needs for autonomy, competency, stimulation (self-oriented), relatedness, and popularity (others-oriented) through interacting with the product or service (i.e., hedonic quality). Pragmatic quality facilitates the potential fulfillment of be-goal”.

In (Schulze and Kromer, 2010), a User eXperience is defined as the degree of positive or negative emotions that can be experienced by a specific user in a specific context during and after product use and that motivates for further usage. Moreover, the User eXperience can be also a result of a motivated action in a certain context. For example, (Väänänen, Vääntäjä, and Vainio, 2009) suggest that User eXperience promotes broader views of user’s emotional, contextual, and dynamically evolving needs, and the impact of user’ previous experiences on the new experiences. Finally; In his recent book, (Kuniavsky, 2010) stated that the User eXperience was the totality of end-users’ perceptions as they interact with a product or service. These perceptions include effectiveness (how good is the result?), efficiency (how fast or cheap is it?), emotional satisfaction (how good does it feel?), and the quality of the relationship with the entity that created the product or service (what expectations does it create for subsequent interactions?).

### 2.2 Our work definition

The main highlighted definitions, yielded some differences in purpose: evaluation (Hassenzahl and Tractinsky, 2006), company (Nielsen and Norman, 2007)), and also in how and when the experience occurs (during the interaction (Kuniavsky, 2010) or after (Hassenzahl, 2008)). Therefore, from our point of view, we can define the User eXperience as something felt by the user, or by a group of users, following the use of a product (or service), or during its interaction with the product (usability and aesthetics), or even a possible use (or purchase) of a product. The result of this experience expresses the judgment made
by the user (positive or negative) on all the moments experienced with the product (or service). We use the word "something" to refer to the broad meaning that covers the term experience (emotions, perceptions, reactions…). Moreover, we mention that the experience occurs within each individual or shared by a group of individuals and this not only during or after the interaction, but also can occur before the acquisition of the product through brand, his previous experiences and opinions of others. This definition takes into account four characteristics of a User eXperience (Figure 1): the information constituting an experiment: degrees of acceptance (Schulze and Kromer, 2010), pleasure and sensation (Hassenzahl, 2008); the influential factors of experience: characteristics of the product, context of use, social interaction and previous experiences; the physical existence of the product: exists (ownership) physically, virtually exists (online service) and psychological existence through the image of the product; the moments of experience (or lifecycle): before, during and after the interaction with the product or service.

![User eXperience Lifecycle](image)

Figure 1 User eXperience Characterization

### 2.3 Abuse of UX

During this last decade, a lot of works on UX has tried to adapt this new concept of design compared to the already existing techniques and disciplines, in particular in usability and interaction design. Thus, some authors define and exploit the UX term depending on the flavor of the day, which leads to abuses on the use of User eXperience term, especially in HCI field. The concept of the user’s experience is still being developed by many researchers from different areas of knowledge. Many times, the term experience is used as a synonym of pleasure or emotion. Other times, like in Garrett studies, it may be used to describe the result of the usability of a product, not considering emotional factors (Garrett, 2003). In fact, the User eXperience is beyond the satisfaction of basic needs. Thus, it is something related to positive experiences and to the enjoyment of life. Garrett offers a model for information design that connects structuring the User eXperience of hypertext and interface with creating the interface for a website. The design of experience happens on five levels: strategy, scope, structure, skeleton and surface. However, this model of User eXperience for information design fails to include sensory qualities of experience, which can be included as an elaboration of Garrett’s model towards all kinds of online experiences. Borrowing Norman’s view that UX pertains to all
aspects of the user's interaction with the product, how it is perceived, learned, and used (Nielsen and Norman, 07). UX, therefore, includes usability and perceptions of utility, but it goes further to consider emotional responses.

3. USER EXPERIENCE IN HCI AND SERVICE DESIGN

Over the last decade, many methods, practices and designs have been developed in human-computer interaction (HCI) to cover the full range of User Experience. The relationship between HCI and UX is even complex to define because two fields share some aspects. On one hand, HCI addresses the topics such as the aesthetics of interaction, affective computing, and ludic engagement (Wright and McCarthy, 2008). On the other hand, customer relationship management and marketing play a large role in actual day-to-day experiences with products and services. Therefore, designing the User Experience for interactive systems is even more complex, particularly when conducted by a team of multidisciplinary experts (Forlizzi and Battarbee, 2004). Thus, several frameworks have been proposed to take into account the whole User Experience in interactive system design and their user interfaces. In the remainder of this section, we explore a set of frameworks aiming to improving the User Experience in interactive system design. (Hassenzahl, 2003) propose a model which views User Experience from a designer and a user perspective making a distinction between the intended and apparent character of a product (figure 2). But he claims that there is no guarantee for designers to ensure their products are used or perceived as intended. The emotional personal response to a product is based on the situational context.

![Figure 2 Key elements of Hassenzahl’s model of User Experience](attachment:image)

In this model, product can have pragmatic (e.g., utilitarian value) and hedonic (e.g., knowledge/skill stimulation, communication of identity, memory evocation) attributes. On other hand, the experience is formed from the iconic value and prior memories the product triggers. (Wright, Wallace, and McCarthy, 2008) elaborate conceptualized framework for aesthetics experience of human-computer interaction and interaction design This framework used to critically reflect on research into the
aesthetics of interaction and to suggest sensibilities for designing aesthetic interaction. (Forlizzi and Battarbee, 2004) present a framework for designing experience for interactive system with three types of user-product interactions (fluent, cognitive and expressive), and three types of experience (experience, an experience and co-experience).

The usability term is often confused with User eXperience. In fact, there is similarity between these two concepts in evaluation measures, but the difference in concerns of such discipline during development (Bevan, 2009). In one hand, the usability aims to designing for evaluating overall effectiveness, efficiency and user comfort and satisfaction. In other hand, the concerns of User eXperience include understanding and designing the user’s experience with a product and also maximizing the achievement of the hedonic goals of stimulation, identification and evocation and associated emotional responses. Nowadays, it has been understood that even a product with good usability can cause negative experience or dissatisfaction (Jokola, 2004). It is thus imperative to study all the factors that can positively influence the experience outcome by focusing on the perception and the user’s emotional responses in addition to the usability aspects. Therefore, the interactive product design has crossed the step of the usability toward aspects to assess the comprehensiveness of UX, such as pleasure, intellectual stimulation, pride and affection (figure 3).

Figure 3 The evolution of system interactive design

In his thesis, (Arhippainen, 2009) presents a novel framework called U2E-Frame for planning and conducting User eXperience test. It depicts that when a user is using some product, there are several influencing factors in all parties. It elicits what factors have an impact on User eXperience in a user-product interaction.

3.1 User eXperience in Service Design

A service design is a multidisciplinary approach to creating useful, effective, and efficient services (Seffah, Kolski, and Idoughi, 2009). It tends to develop better ways for people to access the services they need. Today, most products are combined with services, thus it is the overall experience that counts and that is finally judged by customers. The emerging field of service design combines some design methods mainly from product, software and interaction design, for designing the experience and interface to services. In addition, emergence of the internet arise a several new possibilities for services and experiences.
In this section, we discuss the consideration of User eXperience in service design. In Internet services experience, (Chen and Chang, 2003) have identified three components in the online shopping experience: interactivity, transaction and fulfillment. Recently, (Väänänen, Vääätäjä, and Vainio, 2009) presented the affecting factors specific to service User eXperience (SUX) and their corresponding key elements which are: the composite nature of services that affect the trust and coherence of service interaction; the presence of social environment that affect a social navigation and interaction; the dynamically changing of user interface affecting the temporal nature of SUX, the intangibility of interaction effects lead to nonphysical interaction and the multidevice access devices affect the styles of multiple interaction.

4. USER EXPERIENCE ELSEWHERE

The concept of experience was widely used by different practitioners from other areas, and this well before the advent of User eXperience concept in the design of new technologies (services, digital product, etc.). We cited below some works that focused in human experience to achieve their goals (costumer attraction, profiling of population, criminal profiling, etc.). We address UX in marketing and branding, UX in sociology and psychology and UX in criminology.

Branding is a broad ideal which encompasses a multitude of elements (identity, usability, customer service, delivery, desirability, follow-through, etc.). (Rondeau, 2005) explores in his work the relationship between branding and mobile development applications. He claims that brand is experienced indirectly when others tell us about the product or service, and the best way to establish a brand is to create a positive direct experience that can only be achieved through the design of the application. In marketing field, marketers spend often more and more money trying to influence consumers, especially in Internet services. (Dahlen, 2002) discuss how Internet users change their behaviors and responses to marketing with increasing experience. Several factors were cited when experienced users change their behaviors such as automaticity and changing advertising context effects (i.e., involvement and pleasure). All this effects should influence user behavior that come from increasing Internet experience. A user profiling is another subject which interested marketers to improving a consumer knowledge management. (Vertommen, Janssens, and Moor, 2008) describe an algorithm to automatically construct expertise profiles for company employees, based on documents authored and read by them. They suggest that a good user profile should represent user expertise at different levels.

(Forest and Arhippainen, 2005) describe a methodology called sociology of User eXperience to observing and anticipating cultural aspects in society. (Battarbee, 2004) has also elaborated the concept of User eXperience by situating it in social interaction called co-experience. Whereas, in psychology, (Mandryk, Inkpen and Calvert, 2006) describe two experiments designed to test the efficacy of physiological and psychological measures as evaluators of User eXperience with
entertainment technologies. They suggest that by using physiological and psychological responses lead to objectively evaluate a user’s experience with entertainment technology.

(Turvey, 2000) describes criminal profiling as any process elucidating notions about a sought-after criminal. He differentiates between two kinds of criminal profiling: inductive and deductive. The former involves broad generalizations and/or statistical reasoning (subjective approach). However, a deductive method of criminal profiling (objective approach), in which the criminal profiler possesses an open mind; questions all assumptions, premises, and opinions put forth. According to (McCord, 2002) criminal profiling offers a paradigm of understanding crime through offenders’ behavior and personality characteristics. Furthermore, (Rogers, 2003) discuss the role that profiling can and should play in the computer forensics process. His says that although the nature of evidence may be evolving we need not totally abandon traditional investigative approaches, but merely allow them to evolve.

5. DISCUSSION

By studying closely the presented works previously, there is the importance of understanding experienced users behavior and causes leading to such behavior.

Personality, social and cultural environment, different physical and psychological individual situations are crucial for, not only the assessment of the quality of the resulting experience (purchase of a new product, adaptation of the people in a new society, operating modes used by criminals, etc.), but also in the prediction of this experience and its consequences before even its trigger. We believe that the techniques used in these areas (measure of the influence of branding on the consumer, construction of hierarchy for a population, profiling of criminals) can enrich positively the exact understanding of the components of the User eXperience, their interactions and also their involvement in the construction of the designs exciting a good User eXperience.

In table 1 we summarized the roles and benefits of some elements coming from different fields in service User eXperience design. This can bring new related service design opportunities and challenges.

<table>
<thead>
<tr>
<th>Contributing fields</th>
<th>Relevant models and techniques</th>
<th>Related service User eXperience design opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology, anthropology and psychology</td>
<td>Co-experience framework: collaborative User eXperience (Batterbee, 2004) Pragmatic/Hedonic model (Hassenzahl, 2003)</td>
<td>Social navigation and interaction: improve participant design (Mahlke, 2008); Co-creation of services by users and service designers</td>
</tr>
<tr>
<td>Field</td>
<td>Concept/Methodology</td>
<td>Description</td>
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<tr>
<td>------------------------------</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Marketing and branding</td>
<td>Consumer clustering (Vertommen, Janssens, and Moor, 2008)</td>
<td>Trust and coherence of services interaction: trust created using an open communication with users communities; cooperation between users and trust service providers.</td>
</tr>
<tr>
<td></td>
<td>Persona (Idoughi, Seffah, and Kolski, 2011)</td>
<td></td>
</tr>
<tr>
<td>Criminology and profiling</td>
<td>Hierarchical criminal profiling (McCord, 2002)</td>
<td>Social navigation and interaction; Create coherent design compared to dynamic (or temporality) of the experience (Karapanos, 2010).</td>
</tr>
<tr>
<td></td>
<td>Operating modes (Turvey, 2000).</td>
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</tr>
</tbody>
</table>

Table 1 Related service User eXperience design opportunities with different research fields elements

6. NEW CHALLENGES AND PERSPECTIVES FOR UX DESIGN

Researchers in HCI fields have understood that the user has to be taken into account in design as a comprehensive person, not just a user of product or service. However, there have been critical discussions on whether designing experience is even possible. According to (Sherman, 2007), the designer can only try to influence the User eXperience. (Sanders, 2001; Roto, 2006) were also arguing that designing User eXperience is impossible because experiencing is in people and we cannot know how user will actually perceive and appreciate the product. However in recent studies in UX, some researchers focalize in UX modeling that take account some existing models, as pragmatic/hedonic model (Hassenzah, 2003), or (Schain and Ling, 2008) UX model with web sites. Recently (Zhou, Jiao, and Xu, et al., 2011) propose a systematic approach to UX modeling for product ecosystem design, by using fuzzy reasoning petri net (FRPN). Others works tend providing a set of design tools for capturing and modeling User eXperience. For example, TUX Modeler (Wolff and Seffah, 2011) is proposed to model the User eXperience using persona and design patterns methods. We cite also a Design tool for UXD proposed in (Yamazaki and Furuta, 2010) that focused on lifecycle, environment and user viewpoints. For all those works, it demonstrates that UX design is possible when we give an appropriate formalism to overall variables that form UX.
6.1 Capturing User eXperience by persona for service design

A persona is a fictional and typical characterization of a user created to represent a user group (Seffah, Kolski, and Idoughi, 2009). Persona often include a name, photo, likes and dislikes, habits, background and other information collecting from real users, and using many techniques (by observing interviewing, focus group, etc.) (Idoughi, Seffah, and Kolski, 2011).

In User eXperience design, the persona can be a helpful technique, with many resulting benefits, in closing the gap between service design tool’s functionalities and the intend users’ tasks and also their experiences.

In our context, the persona as HCI design tool, can not only communicate and share user’s needs, but also depicts the elements that creating a good User eXperience. For example, the degrees of pleasure, mood and joy when using some functionalities of interactive service. The psychophysiological responses of users about the brand of services’ owners can also be integrated to the persona description. Thus, using persona to support a service design has great benefit to evaluate new features and to help make pertinent design decision.

7. CONCLUSION

The academic research in User eXperience design field is very recent and the definitions and frameworks are still being designed. Thus, value should be given not only to theoretical researches, but also to create a common ground between all related User eXperience fields, which aim to build solid knowledge about service experience design. This study intends to give some purpose to improve this knowledge. We have tried to give in first our work definition about User eXperience after reviewing the main existing definitions of this concept. Moreover, we have presented some work from other areas (psychology, sociology, Criminology, etc.) to take some relevant practices to apply in the service design. Finally, we have presented a persona technique that can be extended for capturing the most important information about User eXperience and to sharing them between members of multi-disciplinary design team. Through this work, we hope to provide some answers about the scope of the User eXperience in different scientific fields and that can greatly enrich the service design.

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