User Experience: Buzzword or New Paradigm?

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Abstract - This paper explores User Experience, a rather novel and popular view on human-computer interaction, through an extensive review of the literature. After introducing its polysemous nature, this paper describes the origins of User Experience, its scope, components and various definitions. Then, User Experience methods are surveyed, distinguishing processes, frameworks, and specific methods. The conclusion identifies a set of issues about the needs for increased User Experience maturity.

Keywords - User Experience, Usage, HCI, New Paradigm, Hedonic, Pragmatic, Methods.

I. INTRODUCTION

From the early days of ergonomics and HCI (Human-Computer Interaction), user experience really meant user characteristics in terms of knowledge, skills, know-how, "savoir faire" through learning and practice. Usual distinctions were made between expert and novice, between domain expertise and computer expertise, etc.

In recent years, the meaning of User Experience, also named by its acronym UX, has changed, particularly under the influence of consumer products and marketing strategies. In 2004, Philips modified its advertisement from "Let's make things better" to "Sense and Simplicity". In 2005, Apple used "Enjoy uncertainty" to advertise its iPod. In 2006, Nike started a "Joint Product eXperience" campaign.

UX has become very popular in industry followed later on by several scientific communities. A growing number of networks, shared blogs, and wikis, have been initiated, mainly for computer industry professionals [1]. New educational opportunities are opening, as well as new UX-related jobs: conferences employment boards, professional email lists, etc., show a large progression in job offers that include UX requirements [2], [3].

However, UX has several meanings, with a varying and complex coverage of topics and issues. What is really UX, where does it come from, what does it mean, is it really that new? It is the purpose of this paper to uncover the complexity and underlying mechanisms of UX, particularly from a conceptual and methodological point of view.

This paper presents the UX origins, scope, components and various definitions. Then, UX methods are surveyed, distinguishing processes, frameworks, and specific methods. The conclusion identifies a set of issues about the needs towards increased UX maturity.

II. UX ORIGINS

A good and humorous start is to look at Tom Stewart's (Chair of ISO TC 159/ SC4) company web site [4] (July 2009): "*The study of the relationship between people and technology has been called a variety of names over the years from computer ergonomics, human computer interaction and usability to, more recently, human-centred design and UX. The term user experience is now widely used, ... Personally, I do not really care what this area is called ... So I now use the term user experience to describe what I work on ...* "

Looking way back in terms of UX origin, an historical link can be established with [5]. This philosophical contribution about art contained already some of the UX pragmatic and holistic orientations of today**.**

In HCI, with the view that UX may just be another label, the origins of UX can be dated quite early, towards the start of Human Factors, during World War II, sometimes even earlier [6]. In the 80's-90's UX can be related to the rise of UCD (user-centered design) [7]. However the job of UX architect was then very limited in scope.

Indeed the question is: what is the difference between good old usability and UX, and what does it bring as new methods and results? This will be discussed in the definition Section IV, and in the methods Section V.

One of the first papers looking at UX with a very wide view can be found in [8]. At the time, based on several philosophical views, the author identified two types of experiences in user–product interactions: a satisfying experience, which is a process–driven act that is performed in a successful manner, and a rich experience, which has a sense of immersive continuity and interaction, and may be made up of a series of satisfying experiences.

Another line of thought regarding UX experience has been the "business view" [9], very much related to customer satisfaction and loyalty. A positive experience means a happy customer who returns again. Designers of software systems and web services have been digging deeply into how they might generate a positive UX. They are moving beyond anecdotes about excellent examples of UXs and are developing design principles

To sum up, the concept of UX is wide due to a holistic (preferably satisfying) experience and to the business point of view, i.e., the selling of products. Both points of view mean also that, unlike classical ergonomics, it concerns usability (which partly includes satisfaction, see ISO 9241-

Part 11) but a much stronger focus on non-work software, consumer products, and leisure applications.

III. UX BACKGROUND AND COMMUNITIES

What can at least be said about UX is that it corresponds definitely to the multi-disciplinary needs of industry [10]. Actually, a number of groups, communities and associations are listed in [11]. Some even talk about UX evangelism within organizations [12], where, at times, it is claimed that a well designed product should market itself, and that money is best spent on design and internal evangelism. However, collaboration between many different professional organizations might not be optimal [13].

Distinguishing circumstantial experience, long term experience, and co-experience, [14] identifies the issues and domains/ professions that concur to the various views of UX.

To sum up on the issue is what does UX covers, and to which communities does it belong, our view is that, as we will see later in the definitions and methods, the claim that it should be holistic and time dependant will require a much wider definition of UX (in terms of scientific backgrounds), as well as some return to the basics (to incorporate UX through time), and more efforts in defining new methods (and more importantly coordination between methods), as the coverage and novelty of UX specific methods seem currently quite limited.

To show roughly where UX work is, Table 1 provides a geographical assignment based on the authors and labs. found in our literature survey.

TABLE I.

Areas	Countries	Nb. Individual Contributors	Nb. Research Teams
North America - 60 individuals - from 30 labs	USA	58	29
	Canada	2	1
Europe - 82 individuals - from 53 labs	UK	23	14
	Netherlands	15	6
	Finland	14	6
	Germany	12	7
	Sweden	7	3
	Iceland	2	2
	Switzerland	2	2
	France	2	2
	Italy	2	7
	Greece	1	3
Others - 5 individuals - from 3 labs	Australia	3	1
	Israel	1	1
	Algeria	1	1

One can observe a large concentration of UX groups and labs in Northern Europe and the US, but very few from elsewhere, but they may have been overlooked.

IV. UX DEFINITIONS

To better characterize UX, it is useful to look at some of most cited definitions in the literature among the many currently available ones.

A very official one comes from ISO: ISO 9241-210 (2010) "*person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service*" with explanatory notes saying " *User experience includes all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours and accomplishments that occur before, during and after use.*" and " *User experience is a consequence of brand image, presentation, functionality, system performance, interactive behaviour and assistive capabilities of the interactive system, the user's internal and physical state resulting from prior experiences, attitudes, skills and personality, and the context of use.*" and " *Usability, when interpreted from the perspective of the users' personal goals, can include the kind of perceptual and emotional aspects typically associated with user experience. Usability criteria can be used to assess aspects of user experience.*".

Another definition comes from UPA [15], with acronym UE instead of UX: "*Every aspect of the user's interaction with a product, service, or company that make up the user's perceptions of the whole. User experience design as a discipline is concerned with all the elements that together make up that interface, including layout, visual design, text, brand, sound, and interaction. UE works to coordinate these elements to allow for the best possible interaction by users.*"

For both UX and UE definitions, major criticisms concern its impreciseness and the wide gap between practitioners and academics in their understanding [16]. A widely accepted, shared understanding of UX is still lacking. While UX seems ubiquitous in industry, a closer look reveals that it is treated mainly as a synonym of usability and user-centred-design. Academics, however, emphasize the differences between traditional usability and UX.

UX is viewed as a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g., complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g., organizational/social setting, meaningfulness of the activity, voluntariness of use, etc.).

A survey [17] later showed that it was hard to gain a common agreement on the nature and scope of UX. However most respondents (275 researchers and practitioners from academia and industry) agree that UX is dynamic, context-dependent, and subjective, that UX is something individual (instead of social) that emerges from interacting with a product, system, service or an object. However, the issues of experiencing anticipated use and the object of UX are less consensual.

To sum up, while the concept of UX magnifies the issue of a subjective view, which does not restrict itself (unlike usability) to satisfaction of use, but to a much wider view on basic human needs, including aspects that are usually more related to marketing, art, communications, and organizational psychology.

While the focus is on issues such as perception, affects/ internal states, holistic, through time, it also does not just concern the product or service, but "interactions with the company", about the way it looks and is remembered [18].

In terms of scope, UX is obviously not restricted to work systems, as it concerns many subjective aspects beyond

performance. However, UX can still apply in work systems, with the view that it can motivate people and improve work practices [19], or support extrinsically motivated experiences complementary to intrinsically motivated experiences [20].

V. UX METHODS

After looking at scope and definitions, a number of questions arise: how UX is considered in the software process (including business oriented), what general UX design and evaluation frameworks are proposed, and what are some of the UX methods.

A. Software Process and Business

The software process, its lifecycle is usually an item that gets attention once the domain is mature enough, which might not be the case for UX yet. However a few heterogeneous contributions have arisen, from detailed methodology to simple case studies.

For UX in the process, the challenge is there, as mentioned in [21]. The question is how industry and manufacturers manage to successfully get a UX idea into and through the development cycle? That is, to develop and sell it in the market within the right timeframe and with the right content. Proposals are made through UTUM (UIQ Technology Usability Metrics).

The issue is weather or not a UX perspective changes the process: obviously yes if goals are to incorporate the issue of selling the right thing at the right time. This is illustrated in a study by [22] that describes the kind of UX measurements that are said to be useful in different parts of one particular organization. This email survey led to some distinctions between product pre-purchase, first use, and upgrade.

Of course, one should also consider the variations due to the purpose of the product/service: knowledge, buying off the shelf, comparing, design, redesign, establishing conformance, etc.

In terms of development process, using scrum, an agile programming methodology, a case study [23] led to a few recommendations about the workflow, roles and responsibilities of UX and cross-functional team in an hybrid agile environment.

Concerning the links between UX and business, a case study [24] reported some experience (website, standards, training) in creating a UX culture, focusing on distributed design teams, and interactions with vendors and business processing outsourcing efforts.

Other views of that nature can be found in [25] about organizational views specific to one company and in [26] about shared intelligence.

While mainly on usability, another study [27] offers a view joining task impact and business impact. A similar distinction is made in [28] between Strategic usability measures (business) and Operational usability measures (user performance).

B. UX design and evaluation frameworks

The intent to separate design and evaluation studies seems unpractical as most studies do not make such distinctions, even though it seems there are more design aspects in UX studies than in usability studies.

In [29], a theoretical design framework is introduced as "Product Ecology" and offers means of selecting relevant research methods. The methods are not really new (observation, log-files, diaries, group interactions, as well as participatory design, cultural probes, etc.) but include explicitly social aspects.

In [30], a similar view stresses that experience goes beyond the artifact and actual use; it is a momentum and has a timeframe. It also points out that it is not possible to design an experience, but rather to design for experience. On the practical side, they report results on a television portal survey exploring motivation and expectations, findings and willingness to tell others, as well as emotions and attractiveness.

In [31], the focus is on ways to encourage UX designer participation. It describes CodePlex, a community website that hosts open source projects. The main four design concepts on which the tool is built are: foster ways to build trust, provide opportunities for merit, tools to support crossover of work activities, and UX workspace commensurate with best practices.

Other contributions, such as [32] propose basically to extend most usability methods selection criteria to UX.

As for most new endeavors, new domains of investigation, many other proposals remain theoretical, or ad hoc, and rarely provide assessments from users, or clients. Also, they usually are in the form of opinions, rather that empirical evidence (in use, or re-use, or simply purchase).

In addition, it is worth mentioning that some biases have been already identified. For instance, in [33], two experimental studies support the idea of a framing effect, showing that the same information can lead to different judgments and decisions according to whether it is presented in a positive or in a negative frame. In addition, as external sources of judgment may infer (reputation, recommendations), it seems useful to investigate further social networks in their usage.

C. Specific UX methods

This section gathers the contributions that deal explicitly with individual UX methods (i.e., not methodologies), with a few UX dimensions or methods comparisons. Also two areas that have inspired UX work are mentioned: software for games and children.

1) Individual UX dimensions and methods:

Concerning **aesthetics** measures, reference work can be found in [34], and [35]. Most measures are based on classical psychological or social methods, but include also physiological measurements, such as heart rate, galvanic skin response, pupilometry and eye tracking.

Concerning **emotions,** work on measuring emotions can be found in [36], [37], [38]. However, the link between theory and practice is yet weak, as pointed out in [39], and it has the additional constraint to include the multidimensional nature of emotions (behavior, feelings), and it continuous nature, which implies lengthy and multiple measures.

Concerning **UX recording/ observing,** a system was built for the UX team at a major Internet company [40]. It simply states that the ability to watch high-definition study videos live from anywhere on the network led to a dramatic increase in the number of observers who directly experience their end users, but there are useful hints for recording and observation.

Concerning **Questionnaires,** the literature is richer. For instance, a questionnaire in [41] contains nine items to measure the occurrence of three core human needs taken from Self-Determination Theory: autonomy, competence and relatedness. Many others do exist (many ad hoc, internal, not tested) that stimulated the need for selecting an appropriate scale for UX in [42]. The main difficulty seems to be the lack of explicit and transparent descriptions of psychometric scale development. Also, specific to the domain of emotions [43], a list of 10 emotion words, five positive and five negative was extracted from a cluster analysis of resulting data obtained in a research prompting users in an evaluation of 6 websites.

Concerning **Heuristics,** an attempt was made in [44] to built and discuss how well heuristics covered the positive and negative service UX evaluation findings, and how the heuristics and the expert evaluation approach of UX should be developed further. As for usability heuristics, standard principles, or ergonomics criteria, it may need a while to be fully developed and assessed, together with the increased knowledge of UX and associated recommendations based on sound scientific grounds.

2) Comparison of UX dimensions and methods:

A comparison of pragmatic vs. hedonic in [45] showed that in a promotion focus (concern for safety and the avoidance of negative outcomes) participants rated an hedonic mp3-player as more appealing and chose it more frequently compared to individuals in a prevention focus (concern for personal growth and the attainment of positive outcomes). Reverse results, albeit not as strong, were found for the evaluation and choice of a pragmatic mp3-player. This supports the idea that the perceived quality of interactive products can be roughly divided into instrumental, task-related, pragmatic attributes (e.g., usefulness, usability) and non-instrumental, self-referential, hedonic attributes (e.g., novelty, beauty). Along the same lines, a study [46] showed again relationships between type of tasks and types of measures, i.e., more or less hedonic value depending on the task, confirming that pragmatic issues get high scores for a task-oriented software.

3) Inspiring areas: UX in games and for children:

Regarding digital games, a study [47] explored the variety of experiences (i.e., positive and negative) that are received from playing. The results suggested that UXs are versatile in nature but they consist of four major constructs: cognition, motivation, emotion and focused attention. It also pointed out the role of gender. From the methodological side, it suggests that current technologies are not advanced enough to reveal the vast and rich amount of details in experiences. This is a reason for the unavoidable need to still approach individuals' experiences by using traditional methods such as interviews and questionnaires. Another study [48] reviews the different elements of the gaming experience and their relation to other concepts within HCI. One advice, focusing on ownership, is that normal applications should learn from games, i.e., to pay attention to what the user is trying to do, and help the user make the tool his own.

Regarding **children**, a paper [49] showed how studying children's drawings can be an evaluation tool for capturing their experiences of different novel interfaces. Usability and UX factors: Fun (F), Goal Fit (GF) and Tangible Magic (TM) were included in the coding scheme. An interesting outcome is a correlation betweeen usability and UX. Another paper [50] in an experiment using a Smileyometer from a Fun Toolkit, supported the idea of a difference between expectations and actual experience with children.

VI. CONCLUSION

In the market place, UX has become a major component particularly for new computer devices, mobiles and internet.

The literature on UX is quite variable in its nature. Not all contributions gathered in our literature survey have been retained, the reasons being: vague statements, redundancies, magazine-like articles, even sometimes advertisement-like articles, and very few studies with empirical findings.

One area in which there is a lot of debate is who owns the domain and how can it be promoted. This is a usual characteristic of multidisciplinary domains in the making. This is interesting as it offers lots of opportunities for collaborative research to shape up the future.

An obvious need is some converging, non-polysemous, agreed upon definitions of UX that cover the various domains and territories that are involved. An effort to distinguish the concepts of quality in use, actual usability and user experience is proposed in [51].

An even more important need if the improvement of UX processes, methods, and tools. Of course, a large part of existing usability, accessibility, and marketing methods can be applied, or rather should be applied with the view that UX encompasses all aspects of user interactions with products and services. Several contributions, in terms of research and practice, can be found in [52].

Some methods (e.g., questionnaires, interviews, etc.) need just extension to more subjective areas of emotions, branding, etc. However, the nature of UX being very subjective, context-, and time-dependant, not all current processes, methods, and tools apply well, and many areas of UX involvement are not covered, whether positive or negative.

Even though, UX is still sometimes just viewed as an extension of usability, its future may really correspond to a paradigm evolution rather than simply a buzz word. The evolution is not drastic, but it adds complexity by considering more user areas than traditional usability.

In addition, UX aims at all venues of everyday life, at products and services, not only at work situations. In all cases UX attempts to include both pragmatic and hedonic goals, viewing the user from many angles: political, social,

marketing, art, as well as physiology, psychology, anthropology, etc.

Indeed, UX lead to new keywords: from "ergonomics" to "marketing" and "art", from "safety, efficiency" to "pleasure, enjoyment, engagement", from "design" to "innovation", from "lab & field studies" to "living labs", from "user centered" to "co-design".

The important issue is that for data gathering, it is changing as well: from speed, task goals achievement ratio, number of errors, etc., to perceived quality, goodness, engagement, seriousness/fun, etc. It is very important for well grounded UX future that the nature of data categories to gather is well defined, structured, and coordinated, together with improved methods.

The last question is to better understand the relationship between UX and usage. This question, even though not specific to UX, is particularly important as UX involves time. This has to do with predictive vs. actual use. Our view is that a distinction should be made within UX between:

- UX as a concept covering widely all the aspects described above (including cognitive perception and representation by the users).
- UX as a result or state, predicted from theory or knowledge-based methods, or even actually measured at a specific time, in a particular context (for instance in an experiment).
- UX as usage, i.e., the actual use as it can be monitored, surveyed, assessed. This corresponds to actual operations, actions and perceptions of the users through time (directly observable or not).

This question will be debated within various domains and communities, including the emerging experiential research and innovation of Living Labs aimed at leading user communities towards group cognition and collective intelligence based on accumulated experience knowledge that enriches technology platforms. Indeed, today, users/citizens are rather considered as potential co-creators and experimenters that generate new ideas, play with them, feel, sense and interact within real scenarios and prototyped products/services [53], [54].

To end as started, on another humorous note: "Usability wants us to die rich. UX wants us to die happy" [55].

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