User experience – A research agenda

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User experience – a research agenda

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Over the last decade, 'user experience' (UX) became a buzzword in the field of human–computer interaction (HCI) and interaction design. As technology matured, interactive products became not only more useful and usable, but also fashionable, fascinating things to desire. Driven by the impression that a narrow focus on interactive products as tools does not capture the variety and emerging aspects of technology use, practitioners and researchers alike, seem to readily embrace the notion of UX as a viable alternative to traditional HCI. And, indeed, the term promises change and a fresh look, without being too specific about its definite meaning. The present introduction to the special issue on 'Empirical studies of the user experience' attempts to give a provisional answer to the question of what *is* meant by 'the user experience'. It provides a cursory sketch of UX and how we think UX research will look like in the future. It is not so much meant as a forecast of the future, but as a proposal – a stimulus for further UX research.

1. Introduction

User experience (UX) is a strange phenomenon: readily adopted by the human–computer interaction (HCI) community–practitioners and researchers alike–and at the same time critiqued repeatedly for being vague, elusive, ephemeral. The term 'user experience' is associated with a wide variety of meanings (Forlizzi and Battarbee 2004), ranging from traditional usability to beauty, hedonic, affective or experiential aspects of technology use.

UX has gained momentum in recent years, mostly as a countermovement to the dominant, task- and work-related 'usability' paradigm. Ideas represented by UX are important, but by no means original. Early writings on usability already expressed the notion that manifestations of usability such as productivity or learnability are not primary. Primary is the person's experience at the moment experienced (Whiteside and Wixon 1987). Or consider Carroll and Thomas (1988), who close their article on 'fun' with:

'We realize that many people will read this article as a joke. To this extent, we are the victims of our own analysis: there are risks in being serious about fun. Still though, we continue to see, without humor, the prospect of a decade of research analysis possibly failing to provide the leverage it could on designing systems people will really want to use by ignoring what could be a very potent determinant of subjective judgments of usability – fun' (p. 23).

It indeed took the field about a decade to absorb those ideas. Consequently, first writings on aspects of UX were mainly programmatic (e.g. Alben 1996, Hassenzahl *et al.* 2001, Overbeeke *et al.* 2002), aimed at convincing the HCI community to take issues beyond the task-related more seriously. Gradually, this literature has been replaced by more conceptual papers (e.g. Hassenzahl 2003, Wright *et al.* 2003; see Forlizzi and Battarbee 2004, for a recent overview). These papers tried to establish a common ground, a shared view of what constitutes a 'good' user experience. But even now, while UX is well discussed on conferences and symposia, it only rarely enters the relevant academic journals. We believe that the lack of empirical research is one of the reasons for this. The absence of empirical research – whether qualitative or

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quantitative – impedes theoretical advancement and restricts our understanding of UX as concept and its further development.

The present special issue on 'Empirical studies of the user experience' is meant as a contribution to the limited body of empirical work on UX. Our objective was to collect a series of original, high-quality empirical papers on various (mainly positive) aspects that go beyond the purely cognitive and task-oriented. This request was well received by the community. All in all, 28 manuscripts were submitted for review. Thirty-nine expert reviewers assessed the manuscripts. Our emphasis as editors was not only on the quality of the papers, but also on the diversity of the resulting collection. We set out to demonstrate the richness of UX research, the diversity of topics, approaches and results.

The final issue contains seven papers. Kil-Soo Suh and Sunjhe Chang (this issue) demonstrate how a technology (i.e. virtual reality) leads to a particular experience (i.e. telepresence), which mediates knowledge, attitudes, purchase intentions and perceptions of product risk. In the paper 'Attention web designers: You have 50 milliseconds to make a good first impression!' (this issue), Gitte Lindgaard, Gary Fernandez, Cathy Dudek and Judy Brown show how fast impressions of the visual appeal of a website are formed and how stable they are. Mark Blythe, Josephine Reid, Peter Wright and Erik Geelhoed (this issue) take an interdisciplinary approach to the empirical study of UX. Their analysis of Riot!, a location-sensitive interactive play, not only gives interesting insights into the mechanics, problems and benefits of such a new technology, it also reveals the way different conceptual and methodological approaches lead to different perspectives, which strongly benefit from each other. This article also demonstrates the potential mismatch between designers' intentions and users' actual experiences. A group of papers emphasises methods and tools: Regan Mandryk, Kori Inkpen and Thomas Calvert (this issue) focus on using physiological measures to study the UX with entertainment technologies. With 'affectemes and allaffects', Lesley Axelrod and Kate Hone (this issue) suggest and test a novel approach to coding emotional expression during experiences with technology. Ann Light (this issue) focuses on interviewing techniques to gather insights into the experiential. Finally, Marian Petre, Shaily Minocha and Dave Roberts (this issue) transfer UX to the field and demonstrate how a more holistic understanding of quality in the context of business-to-consumer extends or alters established tools and techniques.

We hope the present issue will encourage scientists and practitioners to engage in empirical UX research and by that to advance our understanding of UX. It is meant as another starting point for rich research practices. But what are promising topics to study beyond those already addressed? Is there a 'research agenda' for UX? In the remainder of this editorial, we attempt to provide a cursory sketch of how *we* think UX research will look like in the future. Our view is not meant to be an accurate forecast. Rather, we intend it to be a proposal – a stimulus for further UX research.

A glance at the literature on UX, such as the 'Design and Emotion' conferences (e.g. McDonagh *et al.* 2003), the 'Funology' workshops and publications (Blythe 2003, Blythe *et al.* 2004), Helander and Tham's (2003) special issue on 'Hedonomics', the emerging literature on 'Aesthetics' (e.g. Tractinsky in press), or the work of Pat Jordan (e.g. Jordan 2000) and – recently – Don Norman (2004a), reveals three major perspectives. One thread predominantly deals with addressing human needs beyond the instrumental; a second thread stresses affective and emotional aspects of the interaction; and a third thread deals with the nature of experience. Let us briefly discuss each perspective (see Hassenzahl in press, for a further overview) and the most interesting related research questions.

2. Beyond the instrumental

Since its early days, HCI research focused almost exclusively on the achievement of behavioural goals in work settings. The *task* became the pivotal point of user-centred analysis and evaluation techniques (e.g. usability testing). To ensure the interactive product's instrumental value became the major endeavour of the field.

However, this narrow focus on the instrumental was repeatedly challenged. In an early attempt to define UX, Alben (1996), for example, identified beauty (i.e. aesthetics) as an important quality aspect of technology (see Hassenzahl 2004b, Lavie and Tractinsky 2004). Beauty clearly goes beyond the instrumental. It becomes important because of its intrinsic value (Postrel 2002), which echoes the fact that beauty satisfies a general human need (Maslow 1954). Beauty is an end rather than a means.

Gaver and Martin (2000) argued for the importance of a whole range of specific non-instrumental needs, such as surprise, diversion, or intimacy, to be addressed by technology. These ideas begin to disseminate into HCI research practice, as demonstrated by *faMiliar* (Mandic and Kerne 2005), an addition to email, which visualizes 'rhythms in social engagements' (p. 1617). It builds on *intimacy* as a core construct (see also Vetere *et al.* 2005).

Drawing upon the concept of emotional usability (Logan *et al.* 1994), Hassenzahl (2003) argued that future HCI must be concerned about the pragmatic aspects of interactive products (i.e. its fit to behavioural goals) as well as about hedonic aspect, such as stimulation (i.e. personal growth, an increase of knowledge and skills), identification (i.e. self-expression, interaction with relevant others) and evocation (i.e. self-maintenance, memories).

This multidimensional model explicitly links product attributes with needs and values. A product's novelty and the challenges it provides, for example, contribute to its hedonic quality, which is relevant because it promises fulfilment of an underlying human need – a need for being stimulated, to perfect one's skills and knowledge, to grow. Such means-end chains (e.g. Gutman 1997) provide insights into the 'meaning' of products and by that, a better understanding of how to address those meanings by design.

Albeit different in detail, all of these approaches have a common goal: to enrich current models of product quality with non-instrumental aspects to create a more complete, holistic HCI.

What are the challenges of this perspective for future research? Above all, non-instrumental needs must be better understood, defined and operationalised. How do they translate into product quality? Which product attributes are linked to which needs? Based on a better understanding, their interplay and importance can be studied. Perhaps the most intriguing question is how the overall quality or the 'goodness' of an interactive product is formed, given pragmatic and hedonic aspects and underlying needs (Hassenzahl 2004b, Norman 2004b). Are instrumental and non-instrumental quality perceptions related to each other, as for example demonstrated for beauty and usability by Tractinsky *et al.* (2000), or independent of each other, as shown by Hassenzahl (2002) for hedonic and pragmatic quality aspects? Are needs equally important, do they form a hierarchy (as suggested by Jordan 2000) or rather a particular, context-dependent prioritisation (Sheldon *et al.* 2001), which may change with specific usage situations, personal tastes or both? Can we create dynamic quality models, which are able to prescribe an adequate weighting of quality aspects (and the related needs) for a given product and context of use? How do we design for particular needs? And finally: What is the impact of embedding non-instrumental needs into products in terms of acceptance, valuation and choice? Tractinsky and Zmiri (in press), for example, showed the choice of personalised user interfaces ('skins') to be driven by aesthetic and symbolic considerations. Is this finding generalisable or does it depend on product 'genre' (e.g. 'leisure' versus 'work') and usage situation (e.g. 'social' versus 'time pressure')?

3. Emotion and affect

Current research emphasises the importance of the affective system for a wide range of central processes, such as human decision-making (e.g. Loewenstein and Lerner 2003) or subjective wellbeing (Suh *et al.* 1996). The 'Affective Computing' project was one of the pioneering attempts to address affect by HCI (Picard 1997). It called attention to the importance of affect and emotions. However, affective computing takes a 'computer' perspective. It predominantly deals with questions such as how computers can sense user affect, adapt to it, or even express its own affective response (see Picard and Klein 2002, Hudlicka 2003). In addition, humans interacting with technology are depicted as having mostly negative emotions. Consequently, affective computing deals with mechanisms that detect and undo negative emotions – a substitute for human and social care and friendship, close to an automated version of anger management. For example, *Interacting with Computers*' Special Issue on Affective Computing (Cockton 2002) is dominated by illustrations of how interactive systems can aid irritated users, manage their frustrations or prevent other negative emotions. In this paradigm, the researchers envision computerised toys that are 'capable of soothing a crying child or of perhaps artificially preventing strong feelings of loneliness, sadness, frustration, and a host of other strong, negative emotions' (Picard and Klein 2002, p. 23).

Although UX research shares Affective Computing's recognition of affect and emotions, it is rather concerned with affective consequences on the human side than with technology, which is able to have affect (see Hollnagel 2003, for a critique of Affective Computing). UX takes a 'human' perspective. It is interested in understanding the role of affect as an antecedent, a consequence and a mediator of technology use. In addition, it is rather focused on positive emotions. To prevent frustration and dissatisfaction had always been a core objective even of the most cognitively driven perspective on HCI. What is new in UX research is a focus on *positive* emotional outcomes such as joy, fun and pride.

A design example that actually seeks to foster positive emotional experiences is *Gustbowl* (van der Hoog *et al.* 2004), a communication tool designed to connect children and parents. Analyses revealed children – parent communication to be predominantly emotional and built on affective rituals. Both aspects are not supported by the occasional phone-call, which makes the communication sometimes awkward and slightly unpleasant, although children and parents want the contact. *Gustbowl* is an actual bowl, maybe placed in the hallway, which transmits pictures of things thrown into it to its counterpart. The other bowl acknowledges receipt with a wobble and an image of the sender bowl's content. *Gustbowl* exploits the ritual of coming home. A father may have the habit of depositing his keys, without much thinking, into the bowl when coming home. A daughter living apart would receive a slight wobble and a picture of the keys reminding her of home, without the need for an explicit act of communication. *Gustbowl* enables the sending of affective messages in an implicit, unobtrusive, effortless and continuous way, which blends into day-to-day life.

A second example for an affective requirement addressed by a technology comes from Millard *et al.*'s (1999)

motivational user interface for call-centre software. Call-centre agents expressed the need to have an instant overview of the quality of interaction they had so far with their customers. Negative interactions tend to get more weight in retrospective assessments. Thus, a single negative interaction can have a significant negative impact on an agent's wellbeing, with no regard whether in fact the majority of interactions had been positive. A common way to avoid this type of bias is the use of diaries. Based on this general idea, Millard and colleagues designed *moodies*, a function that allowed collecting an electronic token for each call, which represents the quality of the interaction with the customer. This collection enables an agent to produce an instant, unbiased image of the overall quality of customer interaction during his shift.

Desmet *et al.* (2001) demonstrated, how affect could become a design goal. They tried to fit a mobile phone to the user's preferred affective response. While all users – naturally – required a positive response, some preferred an exciting phone (i.e. high psychological arousal) while others preferred a calming phone (i.e. low psychological arousal). In a gradual process, Desmet and colleagues designed two mobile phone prototypes, which indeed fitted the affective requirements of the two different groups.

A slightly different line of research has it roots in the Technology Acceptance literature. It studies the interplay and causal links between user perceptions (e.g. perceived usability) and intention to use or actual behaviour. Zhang and Li (2004), for example, found the perceived affective quality of a course management system to be an antecedent of its perceived usability, usefulness and the intention to use. This is in line with previous research (Davis *et al.* 1992, Igbaria *et al.* 1994), which reported an impact of perceived enjoyment on technology acceptance.

Generally speaking, there are two basic ways in dealing with emotions in UX (Hassenzahl in press): One line of research stresses the importance of emotions as consequences of product use (e.g. Kim and Moon 1998, Desmet and Hekkert 2002, Hassenzahl 2003, Tractinsky and Zmiri in press). The other line concentrates on their importance as antecedents of product use and evaluative judgments (e.g. Singh and Dalal 1999, *visceral level* in Norman 2004a).

What are the challenges of this perspective for future research? Obviously, individuals do have affective requirements. They must, for example, regulate their moods. This is especially relevant for emotion work (Hochschild 1990), where the display of affect (e.g. being friendly, being in a good mood) becomes a central part of the job description (e.g. flight attendant, hotel receptionist, call-centre agent). A central question is, how resulting affective requirements can be collected and translated into concrete products or functions as shown by *Gustbowl* or the motivational interface? Should technology be a vehicle for affect maintenance and regulation? Another interesting question

concerns emotions as design goals. Is it possible to design emotions? Or are emotions too ephemeral (see Hassenzahl 2004a)? In other words, if emotions are a product of many different situational aspects, designers may not have the ability to exert the amount of control needed for creating particular emotions. Using an interactive product may not be comparable to watching a movie in a cinema or visiting a theme park. Thus, designers may settle for establishing the *context* for an emotion rather than the emotion itself. And further: What are the effects of addressing affect and creating affective responses on judgements (e.g. liking, willingness-to-pay) and behaviour (e.g. money or time spent on product, performance). For example, is it possible to trace the way beauty creates emotions and, more generally, the way those emotions influence judgement and decision-making, both immediately (Lindgaard *et al.* this issue) and reflectively?

4. The experiential

The experiential perspective on UX emphasizes two aspects of technology use: its situatedness and its temporality. In this view, an experience is a unique combination of various elements, such as the product and internal states of the user (e.g. mood, expectations, active goals), which extends over time with a definitive beginning and end. The experiential assumes all these elements to be interrelated – to interact and modify each other. The outcome of this process is the actual experience. For example, consider the difference between 'a tomato in one's fridge' versus 'the taste of a marvelous tomato sauce on homemade gnocchi' or 'a mystery thriller on one's bookshelf' versus 'being awake all night because of the thrilling story, which unfolds while reading'. The product (a tomato, a thriller) is used in a particular situation, which then forms an experience.

Experiences have advantages. In contrast to material outcomes (e.g. 'to experience a concert of one's favourite pop star' versus 'a new watch'), experiential outcomes have a more positive impact on one's wellbeing (van Boven and Gilovich 2003). They possess affective quality and help to transform and regulate affective states. It seems, thus, a good idea to emphasise the experiential in interactive products rather than the material.

Forlizzi and Batterbee (2004, p. 263) go a step further and distinguish between 'An Experience', which 'can be articulated or named, has a beginning and end, [and] inspires behavioural and emotional change' and 'Experience' as 'a constant stream of "self-talk" that happens when we interact with products'. The former acknowledges the experiential as complex, unique and thus, outstanding and hard to repeat. The latter view underlines the temporal aspects of experiences, their subjectivity and dynamics.

Both perspectives raise many challenges and interesting questions. How can we cope with the seeming complexity

of experience? Similar to the question about our ability to design for certain emotions, it is not clear whether we can 'design' an experience. Can designers exert enough control over all relevant elements in a way that a positive experience becomes certain? Or do we rather 'design *for* an experience', that is, to take experiential aspects into account while designing, without being able to guarantee a particular experience. Another perspective would acknowledge the ubiquity of experiences and rather ask how we could design products in a way that positive experiences, successes, joy are attributed to the quality of the product rather than to other situational aspects? This perspective may require UX to break one of the fundamental assumptions of traditional HCI: interactive products must step back, be transparent and blend into the context. A good product is one that performs without being recognised. But is it not the aspiration of all designers to gain recognition for the positive experiences caused by their products?

Another question arises from the 'experience as stream of self-talk' – perspective. How is this stream transformed into retrospective summary assessments (e.g. Ariely and Carmon 2003)? Such assessments *represent* an experience. They have an impact on future experiences. Moreover, they form the basis for communicating about experiences. Hassenzahl and Sandweg (2004), for example, showed summary assessments of software's usability to depend heavily on problems encountered at the *end* of a usage episode. This end-effect highlights the difference between an experience and retrospective judgements about experiences (see Kahneman 1999, for a thorough discussion of this idea in the context of wellbeing). Judgements about experiences and the experiences themselves are related, but not identical.

5. Summary and conclusion

So, what is UX? We took a brief look at three prominent perspectives. Each perspective contributes a facet to our understanding of users' interactions with technology, while sharing some ideas and arguments with the other perspectives (see figure 1).

Thus, none of these perspectives fully captures UX. UX is about technology that fulfils more than just instrumental needs in a way that acknowledges its use as a subjective, situated, complex and dynamic encounter. UX is 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. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.). Obviously, this creates innumerable design and experience opportunities.
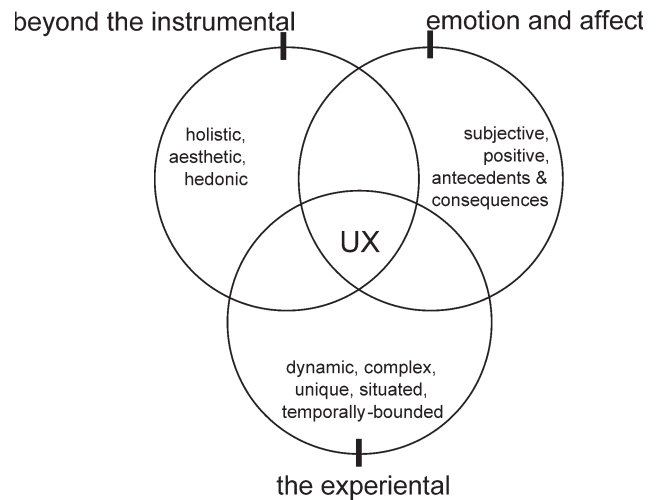

Figure 1. Facets of UX.

The current strong interest in UX, which encompasses both practice and research, is not accidental. Many interactive products found their way into our daily lives. State-of-the-art machinery (graphics, sound, networks, miniaturisation, etc.) allows for more than mere functionality. At the same time, the growing and changing base of users shifts the parameters of demand for interactive products. The UX perspective takes this shift seriously. Its focus on aspects beyond the functional, on the positive, the experiential and emotional is no coincidence. It is driven by commercial vendors, who are sensitive to the changes in business climate, by designers who appreciate new design opportunities, and by a scientific community that shows renewed interest in the affective system and its interplay with cognition.

Especially the focus on the positive aspects of technology use mirrors a trend in psychology, where Seligman and Csikszentmihalyi (2000) argued for a new millennium psychology to be *positive*, i.e. to deal with human strengths and the promotion of wellbeing rather than with human weaknesses and healing alone (see also Kahneman *et al.* 1999). UX in the sense of a *positive* HCI would, thus, focus on how to create outstanding quality experiences rather than merely preventing usability problems. Again, this will question another implicit assumption of traditional HCI, one that equates high quality with the absence of problems. This may be analogous to the notion that absence of illness equals health. But just as there is much more to wellbeing than the absence of malady, so must there be more to UX than the absence of problems. From our perspective, one of HCI's main objectives in the future is to contribute to our quality of life by designing for pleasure rather than for absence of pain. UX is all about this idea.

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