A Value-based UX Evaluation

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Abstract
The shift in HCI towards emotions, values, needs etc. reflects the new understanding of interactions between users and technology and brings along many research efforts on e.g., user experience or value-centered design. In order to evaluate prototypes, which aim at fostering elderly's social interactions, we tried to find an approach that accounts for user experience, acceptance and usability factors, as well as values users have.

Keywords
User-Centered Design, Value-Centered Design, Value Sensitive Design, Usability, UX, UA

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
User Experience (UX), as a central term in the third-wave HCI, is considered as an emerging movement in research, which constitutes a new paradigm by focusing on non-instrumental needs and experiences in a complex sense [1]. The terms first-wave, second-wave, and third-wave HCI describe the constantly changing research focus in HCI, which is affected by the quick technological progress as well as the societal possibilities and requirements. According to Bødker [3] the first-wave was characterized by guidelines, formal methods, and systematic testing, focusing on the technology to make it more usable. The second-wave

changed the focus of research towards user-centered design in work environments, discovering additional methods like participatory design or contextual inquiry [3]. The current third-wave further shifts the focus of HCI from work settings to leisure, arts and the home, by addressing emotions (e.g., affective computing), experiences (e.g., social user experience), or values (e.g., value-centered design).

There is a vast variety of concepts and models, which are describing the interactions between humans and computers regarding user experience (UX), user acceptance (UA) and usability (U). However, there are overlaps between different concepts and models (e.g., factors like fun/enjoyment are used in one model to explain UX [10] and in others to explain UA [16]).

In two Ambient Assisted Living (AAL) projects we were confronted with these issues. In one of the projects a tele-presence system is developed, which aims at socially connecting elderly with their families, caregivers and peers. The second project aims at developing intergenerational online activities for geographically distant grandparents and grandchildren. For evaluating the prototypes, we were interested in evaluating those aspects of the technology, which account for the users' values. These can be related to how usable the technology is, but also to how the users experience the interactions with and via the technology, as well as the acceptance of the technology.

The aim of this paper is to illustrate an attempt to combine the technological, user and emotional aspects. Therefore, the usefulness and applicability of the theory of consumption values (TCV) [12] will be illustrated. In this sense values are defined as what a user considers important in life [7]. Being more precise, our understanding is that values are centered in people and refer to the properties of the desired objects (e.g., technologies).

Our Approach

During a literature review on values, U, UX and UA, we encountered the theory of consumption values (TCV) [12], which was used by Hedman and Gimpel [8] to explain the adoption of a hyped technology, i.e. the iPhone. The most salient finding was that it encompassed aspects of usability, user experience and user acceptance aspects per se.

The functional value, which is defined as the perceived utility for achieving a specific task or a practical goal, refers directly to the UX factor perceived sociability (e.g., [11]), to the UA factor perceived ease of use and perceived usefulness (e.g., [6]), as well as indirectly to many usability factors, e.g., efficiency and effectiveness (e.g., [4]). The epistemic value, which is related to experiencing new products, captures the UX (and also UA) factors curiosity and learning (e.g., [13]). The conditional value referring to products being tied to specific contexts is similar to the situational context, like Grill and Tscheligi [8] understand it. The social value, as the symbolic importance of the artifact for conveying social image, can be linked to the UX factors social image (e.g., [5]) or self-expression (e.g., [13]). Finally, the emotional value is the potential of the product to arouse emotions, which are believed to accompany the use of a product. Taking UX factors like fun/perceived enjoyment (e.g., [15]) or computer anxiety (e.g., [15]) into account, the factor captures all of these content-wise.

In this way we assigned many U, UX and UA factors, which we identified in literature, to the values as long as they were relevant in our project context. However, in the end some factors were remaining, as they did not fit a value so far, like the UX factors social presence (e.g., [2]) and social connectedness (e.g., [14]). Therefore, we added the 'interpersonal' value, which refers to the experiences while an interaction between humans via a technology, but not for the purpose of self-presentation. The difference to the social value, which might at the first glance have also been appropriate for the above-mentioned factors, is its goal, as the social value refers to the social image, i.e. representing oneself in a certain group of people. The following table illustrates the six values and the related U, UX and UA factors:

Value	**Definition**	**Related factors**
Functional Value	The perceived utility for achieving a specific task or a practical goal [8]	Perceived ease of use Perceived usefulness Perceived adaptivity Perceived sociability Effectiveness Efficiency Memorability Reliability Learnability Accessibility Satisfaction
Social Value	The symbolic importance of the technology for conveying social image [8]	Self-expression Social Image
Emotional Value	The potential of the product to arouse emotions, which are believed to accompany the use of a technology [8]	Fun/perceived enjoyment Engagement Computer Anxiety
Epistemic Value	Experiencing new technologies [8]	Computer playfulness Learning Curiosity
Conditional Value	Technologies being tied to a specific context [8]	Situational context
Interpersonal Value	Experiencing others via the technology	Social Connectedness Social Presence Reciprocity Co-experience

Table 1: Values and related factors

Although the functional value consists of many different factors, all values are equally important in the beginning. After having identified the values and related factors we were able to prioritize them for the evaluation. The most salient results from the requirements analysis revealed that e.g., the interpersonal value, the functional value and the emotional value are of special importance for our user group, whereas the social value is not decisive, as the potential of the online platform to enhance the social image did not matter for the users. The emphasis in the evaluation is thus not defined by the amount of related factors, but by the results of the requirements analysis.

Outlook

We considered the above-mentioned values as being a starting point for an approach to evaluate different technologies. Applying the TCV allowed us to combine usability, user experience and user acceptance factors. The main advantage of our approach is the potential to assign many different U, UX and UA factors content-wise to values and consider them in the evaluation.

The aim of the presented approach was initially the evaluation of technologies. However, it could also be used for the design of technologies. After having identified the users' requirements, those can be represented in terms of the above-mentioned values.

Thus, the design is informed by first-hand user data, the values are quickly comprehensible for the designers, and the technology can be evaluated on basis of the values. The overall goal is to develop a stable framework, which is appropriate for different projects, user groups, technologies, etc.

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