User-Centered Design Goals for Motivating Participation in Socially Embedded Software Tools

Torben Wiedenhoefer
University of Siegen
57076 Siegen, Germany
torben.wiedenhoefer@uni-siegen.de

Dr. Fahri Yetim
University of Siegen
57076 Siegen, Germany
fahri.yetim@uni-siegen.de

Dr. Markus Rohde
University of Siegen
57076 Siegen, Germany
markus.rohde@uni-siegen.de

ABSTRACT
Encouraging users for participation in socially embedded software tools needs both the involvement of end users in the design process and in the consideration of some general design requirements. In this position paper we focus on general design requirements, i.e., design goals, to be considered in design the process, in order to design tools that encourage active participation. The design goals include Usability, Sociability, Human Value and Emotion and Enjoyment) and guidelines related to these goals. The guidelines are collected from the analysis of the relevant literature in the area of human-computer interaction.

Categories and Subject Descriptors
H.5.2 [**User Interfaces**]

Keywords
Participatory Design, Design, User Participation, Usability Engineering, Social Software, User Experience, Intrinsic Motivation

1. INTRODUCTION
Motivating users to active participation during the use of a system is a challenging research issue. Involving end users into the design process of socially embedded software systems plays a significant role to strengthen or support user motivation for active participation. In addition, it is necessary to consider some general design goals in the design of a system and to embed some features that can motivate the users. In our overall approach, we propose both, i.e., a participatory way for designing these tools and some relevant design goals. These goals include not only usability and sociability aspects, but also human values, emotion and enjoyment.

In this paper, we first present our general framework for motivation for participation, focusing on two general motivation mechanisms. Then, we briefly describe the general design goals and related guidelines and principles.

2. MOVATION FOR PARTICIPATION
Figure 1 shows our general framework. Simon (Simon, 1967) distinguishes between *external* and *internal* motivations to accomplish a task. External motivation mechanisms focus on supporting reinforcement i.e. additional salary, whereas internal or intrinsic motivation mechanisms focus on meeting individual needs. These two motivations can be supported in the design *process* (Process driven) and also in the design of a *product* (Product driven). To ensure the necessary affordance of socially embedded tools, users need to be directly integrated into the *process* of software development (participatory design) and in the development of appropriate organizational structures.

Figure 1: Motivation for Participation

Besides participation in the design process, there are also motivational strategies to be considered in the design of the *product*. Figure 1 shows specific user-centered design goals as general requirements, which we describe next.

3. Design Goals
The general design goals or requirements include the emotional, cognitive, social and ethical dimensions. They are not necessarily independent from each other, nor are they systematically distinct and complete. They represent some samples of requirements, which have been suggested by different HCI scholars in recent years. Our position is that these design goals can be used for both designing and evaluation.

Design for Usability
Usability is an important consideration in the design of products. Products need to provide suitable functionalities (usefulness) and an appropriate usage of these functionalities (**usability**). Meanwhile usability has emerged as an attribute of quality that ensures that the users of products are able to work effectively, efficiently and with satisfaction (ISO 9241-11) to fulfill their tasks.
There are a set of general principles and heuristics suggested to design usable systems, i.e. to achieve the aforementioned usability goals. In the following we provide some examples of well-accepted principles and heuristics. For more information we suggest the following references (Nielsen, 1994; Nielsen, Mack, 1994; Preece et al., 2002; Koyani et al., 2003;Te'eni et al., 2007;

Shneiderman, et al., 2009)

Jakob Nielsen's (Nielsen, 1994) heuristics are the best known usability heuristics for user interface design: Visibility of system status; Match between system and the real world; User control and freedom; Consistency and standards; Error prevention; Recognition rather than recall; Flexibility and efficiency of use; Aesthetic and minimalist design; Help users recognize, diagnose, and recover from errors; Help and documentation. The International Standardization Organization (ISO) presents a set of usability heuristics that applies to the interaction of people and information systems. The standard (ISO 9241 part 110) refers to this interaction as a *dialogue* and describes seven general *dialogue principles*: Suitability for the task; Self-descriptiveness; Controllability; Conformity with user expectations; Error tolerance; Suitability for individualization; Suitability for learning.

In addition to these general dialog principles, there are also guidelines for specific topics such as motivating reading, contributing or collaborating (Preece, Shneiderman, 2009).

For example, usability factors that may influence reading are:

- Interesting and relevant content presented in attractive, well-organized layouts.
- Frequently updated content with highlighting to encourage return visits.
- Support for newcomers through tutorials, animated demos, FAQs, help, mentors, contacts.
- Clear navigation paths so that users have a sense of mastery and control.
- Universal usability to support novice/expert, small/large display, slow/fast network, multilingual, and users with disabilities.
- Interface design features to support reading, browsing, searching, and sharing.

Usability factors that may influence contributing are:

- Low threshold interfaces for easily making small contributions, e.g., no login.
- High ceiling interfaces that allow large and frequent contributions.
- Visibility for users' contributions and frequency of views; aggregated over time.
- Visibility of ratings and comments by community members.
- Tools to undo vandalism, limit malicious users, control pornography and libel.

Usability factors that may influence collaborating are:

- Ways to locate relevant and competent individuals to form collaborations.
- Tools to collaborate: communicate within groups, schedule projects, assign tasks, share work products, request assistance.
- Visible recognition and rewards for collaborators, e.g., authorship, citations, links, acknowledgements.
- Ways to resolve differences (e.g., voting), mediate disputes, and deal with unhelpful collaborators.

Design for Sociability

Besides general guidelines for usability, participation support and *sociability* design should be taken into account. As experiences from Web2.0 analyses and Open Source Software projects show, socializing in user communities can be enhanced by respecting some general principles or guidelines. Sociality refers to the tendency to associate with or form social groups. Sociality, not functionality, is viewed as the key concept in social software systems. Bouman et al. (Bouman et al., 2007) suggested a design framework which could help designers and developers to create social software that invites and supports its users to engage in social activities online as well as offline, to associate with or form social groups, ultimately leading to seeking or enjoying companionship. They argue that designers of social software have to address in one way or the other the following issues:

- Enabling practice, i.e., supporting practice that exists or could exist within the social group that is the intended audience of the social software system.
- Mimicking reality, i.e., finding or creating metaphors that relate to the real world.
- Building identity, i.e., providing the community with the mechanisms that allow for the development of an online identity.
- Actualizing self, i.e., creating mechanisms that allow users to tap into the collective wisdom and experience and use it for their own benefit, learning process and self-actualization.

According to Preece (Preece, 2000), communities with good sociability have social policies that support the community's purpose and are understandable, socially acceptable, and practical. Success of an online community requires a blend of well-designed software (i.e., usability) and carefully crafted social policies. According to Lazar and Preece (Lazar, Preece, 2002), the following three broad categories of issues are considered as important: Registration issues; Trust and Security issues; and Governance issues.

Other recommendations for the support of end user participation are listed by Preece and Shneiderman (Preece, Shneiderman, 2009) as follows:

- Reading: issues for the attraction/motivation of end users to visit web sites and applications, to use web services, to read provided information, to consume multimedia content, to "stay" on the web site, to come back and to visit again regularly.
- Contributing: design recommendations for the abstraction/motivation of end users to edit web content, produce/generate their own content, contribute to web communities and collective repositories, etc.
- Collaborating: issues for the attraction/motivation of end users to collaborate with others in a user community; to coordinate their contributions with other contributors and so on.

Design for Human Values

Human values and ethical considerations are fundamentally part of design practice. Values are at play in all phases of designing, developing, deploying, and appropriating information technology. In all these activities there exists the need for explicit consideration of values, value tensions, and value trade-offs. Value Sensitive Design offers one viable principled approach to systematically considering human values throughout the design and deployment of information and other technologies (Flanagan et al., 2005; Friedman, 1997; Friedman et al., 2006).

Methodologically, at the core of Value Sensitive Design lies an iterative process that integrates conceptual, empirical, and technical investigations. *Conceptual investigations address issues such as:* How does the philosophical literature conceptualize certain values (e.g. trust, privacy, ownership)? Who is affected? *Empirical investigations* focus on how stakeholders apprehend individual values in the interactive context. Technical investigations involve analyzing current technical mechanisms

and designs to assess how well they support particular values.

In several case studies Friedman et al. (Friedman et al., 2006) demonstrate the application of the Value Sensitive Design (VSD), exploring different values such as privacy, informed consent, trust and the democratization of the planning process. There are several techniques that can be employed to understand values in context, including value card techniques (Flanagan et al., 2005) or photo-elicitation technique (Le Dantec et al., 2009) as well as techniques for dealing with value tensions (Miller et al., 2007). In addition, current literature suggests specific guidelines for specific values such as trust or issues about web credibility or security (cf. (Fogg, 2002)). Finally, there are suggestions for discursive principles and mechanisms to be embedded in the interface of a system to enable critical reflections on values in use time (Yetim, 2010a/b)

Design for Emotion and Enjoyment

In addition to the abovementioned requirements, *hedonic* quality becomes more and more important in increasing good user experience. *Joy of Use* plays a significant role in the development of software tools. If the costumer experienced the product with joy and trust, he will most likely continue with the usage or use the product again. There it has been argued that, to maximize usage, the interfaces of the tools should be designed with focus on positive emotions in addition to usability, that is, the interface should be complemented with design features that create positive experiences, including *pleasure*, *enjoyment*, *fun*, which are to some extent related to user satisfaction (Agarwal, Karahanna, 2000; Tractinsky et al., 2000).

The topic of design for fun goes back to early studies of games, such as the work of Malone (Malone, 1982) on educational games. He summarized the design heuristics for enjoyable interfaces with these criteria: challenge, curiosity, and fantasy (which he tied to emotion and metaphor). The interest in pleasure and fun in relation to IT is now beginning to grow (Monk, Hassenzahl, 2002; Karat, Karat, 2003; Nielsen, 2003; Shneiderman, 2004).

Jordan (Jordan, 1999) constructs an explanatory framework and discusses four different types of pleasures: *Physio-pleasure* (derived from the sensory organs, such as quality materials to the touch); Socio-pleasure (derived from the product and how it affects their social identity or relationships with others); Psycho-pleasure (which pertains to people's cognitive and emotional reactions, for example, when things are completed in a satisfying way); *Ideo-pleasure* (derived from people's values, such as artistic quality in a design, or ecologically sound products.). These are derived from more general types of pleasure. Yet, they may well be used as a support in designing tests and analyzing data.

Hassenzahl (Hassenzahl, 2003) identified three needs people desire to fulfill. First, stimulation: Mankind has the inherent need to develop and move forward. Novel, interesting, and stimulation functions, contents, and interaction- and presentation-styles can attract interest or reduce motivation problems. Second, identification: People tend to use objects to express themselves. Products can help users to communicate their desired identity. Third, evocation: Products may able to provoke memories. Products can represent past situations or impressions, which are important for the user.

Based on this model Hassenzahl (Hassenzahl, 2003) introduced an instrument in order to proove these qualities. The AttrakDiff-Questionnaire helps test users to indicate their perception of the product by using pairs of opposite adjectives. The Questionnaire is built on the following four constructs: Pragmatic Quality (PG): The perceived ability to fulfill a desired task; Hedonic Quality – Stimulation (HQS): To what extent the product can support my personal development?; Hedonic Quality – Identity (HGI): To what extent the product allows me to identify with it?; and Attractiveness (ATT): What is the general quality perception?

In addition, Norman (Norman, 2004) distinguishes between visceral, behavioral and reflective levels of processing that are stimulated by appearance, effectiveness in use, and self-image respectively. Norman shows that the design of most objects is perceived on all three levels (dimensions). Therefore, a good design should address all three levels.

Shneiderman (Shneiderman, 2004) argues that designers must address three almost equally important goals that contribute to fun: (1) provide the right functions so that users can accomplish their goals, (2) offer usability plus reliability to prevent frustration from undermining the fun and (3) engage users with fun- features. For the third goal, designers are now beginning to develop theories of user engagement through fun-features: alluring metaphors, compelling content, attractive graphics, appealing animations, and satisfying sounds. Getting this right is difficult; too many designers go too far in using excessively bold colors, distracting animations, and annoying sounds.

Designing for enjoyment is particularly relevant for games. How can one create enjoyment in games? The psychologist M. Csikszentmihalyi (Csikszentmihalyi, 1996) talks about the flow experience where a person's ability and the challenge he or she is undertaking are perfectly balanced. When people are in the flow state they suspend their fears, put aside their anxieties, and engage fully in the experience of the moment. The implications of *flow* are that challenges must be constantly moderated in order to match the individuals increasing ability. According to Chris Crawford, stalwart game theorist, the point of play is the challenge - not just the goal. Some categories of challenges to be considered are: *Cerbellar challenge; Sensorimotor challenges; Pattern Recognition; Sequential Reasoning; Resource Management; Social Reasoning*.

4. CONCLUSION

In this position paper we outlined some general design goals (usability, sociabilty, human values, and emotions and enjoyment) that can be relevant for encouraging end users to contribute actively in user-centered tools. We assumed that a solution aimed at satisfying emotional, cognitive, social and ethical needs will influence the internal motivation of users to engage in participation. In our overall approach, participatory design methods as well as the described design goals constitute a general framework that can be used by designers to analyze a real case study, define a set of requirements and develop a very effective solution. Neither the design goals are complete, nor are the goals systematically distinct. In our future research we will extend and refine these requirements.

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