

Investigating the Usefulness of Methods for Evaluating User Experience of Social Media Applications

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ABSTRACT

The usage and importance of social media or Web2.0 applications such as Youtube, Flickr, Facebook is rapidly increasing over the last years. They all build up on user communities, provide networking opportunities for their members, and are strongly related to audio-visual user-generated content (UGC). Providing the user a good experience is a central success factor for such applications. Apart from standard usability principles the much broader concept of user experience (UX), including aspects such as fun, enjoyment, emotion, sociability and other factors have become relevant in the design of interactive systems. However little has been known on the usefulness of different evaluation methods for UX in the context of social media applications. We need to understand what new requirements for applying UX evaluation methods on these applications evolve and how to choose which of the existing methods are suitable for capturing different aspects of UX. This paper reports results and lessons learned on the usefulness of seven UX evaluation methods that were applied for evaluating ten different applications supporting non-professional users in sharing and co-creating user-generated content. The results might be useful for practitioners and researchers developing social media applications when planning UX evaluation studies.

Categories and Subject Descriptors

H.5.1 [Multimedia Information Systems]: Evaluation/Methodology, H.5.2 [User Interfaces]: Evaluation/Methodology

General Terms

Human Factors

Keywords

User experience, Evaluation methods, Social media, Web 2.0, Communities, User generated content, Audio-Visual content

INTRODUCTION

For many applications, such as social media and social network sites, applications for sharing and co-creating

audio-visual content, and, for instance, games, it is important that people enjoy using them. Thereby, providing people a good experience and evaluating their UX is becoming more and more essential [24].

Hassenzahl [9] states 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, such as the usability of a system, is also contributing to a positive experience, but only through facilitating the pursuit of meaningful hedonic needs. The most important characteristics of UX are its normative nature (differentiating between a positive, desired experience and a negative, undesired experience that a user can have when interacting with an application) [10] as well as its dynamic nature [15].

Next to reach a common understanding on UX, there is still a lack of research on UX evaluation methods in general (see for instance an overview on UXEM in [30]) and on their usefulness in particular. Research papers and textbooks such as [4] provide surveys of different evaluation methods according to their appropriateness in different evaluation phases, their objectivity, reactivity and needed resources. However, little has been known about the usefulness of these methods for evaluating social media applications. This paper presents results and lessons learned of a case study we conducted to investigate the usefulness of both traditional and new methods for evaluating UX.

This work was carried out in the framework of the European research project CITIZEN MEDIA (<http://www.ist-citizenmedia.org/>) which aimed to develop social media applications supporting non-professional users in sharing and co-creating user-generated content (UGC). Several applications have been developed and evaluated at three testbeds, namely in Germany, Norway and Austria. The evaluation activities for all three testbeds were guided by a common evaluation framework consisting of pre-selected UX factors (e.g. fun/enjoyment, motivation, emotion, sociability, as well as usability) and a set of

evaluation methods considered as relevant for the context of the project (see [20]). Well known methods were combined or adapted in order to capture UX.

BACKGROUND

Over the years many usability evaluation methods have been proposed and evaluated. The research of Gray and Salzman [7], Hartson et al. [8], and Blandford et al. [1] established a basis for critical evaluation and selection of usability evaluation methods.

Blandford et al. [1] propose a comprehensive list of ten criteria for evaluating UEMs. *Reliability*, also called internal validity, is the extent to which different analyses of the same system, using the same UEM, yield the same insight. *External validity* is the ability to apply the findings in the real world context. *Thoroughness* is a proportion of real problems identified by a method. *Effectiveness* is the product of reliability and thoroughness. *Productivity* is the number of problems a UEM identifies. *The practicalities* criterion is concerned with what is needed to integrate a method within design practice. The *analyst activities* criterion describes what analysts do when applying a UEM. *Persuasive power* is concerned with the ability of an analyst working with a UEM to persuade developers to change the system. *Downstream utility* is usefulness of the findings in informing design. *Scope* describes what kind of problems a method is useful and not useful for finding. When comparing usability engineering methods, Holzinger [11] considers the following criteria: applicability in phase, required time, needed users, required evaluators, required equipment, required expertise, and intrusiveness.

Recently there has been growing interest in UX evaluation methods [30]. Several workshops have been organised to focus on the methods, techniques, and tools for evaluating UX such as CHI 2008 [28], CHI 2009 [19], INTERACT 2009 [25] and COST294-MAUSE workshops ([16][29]) and special issues of HCI journals (e.g. [10][17]). Väänänen-Vainio-Mattila et al. [29] identified a set of requirements for practical UX evaluation methods. Requirements for UX evaluation in an industrial context have been identified by Ketola et al. [12]. Roto and colleagues investigated 30 UX evaluation methods during a SIG session at the CHI'09 conference ([25][26]). They found differences in requirements on UX evaluation methods in academia and industry. Industry needs methods that are lightweight, fast, and relatively simple to use. Academia emphasizes the importance of scientific rigor in the methods. Common requirements for industry and academia are: including experimental aspects and allowing repeatable and comparative studies in an iterative manner.

Although a majority of UX evaluation methods originates from usability [26], knowledge on UEMs is not completely transferable on UX. A clear understanding of the differences between usability and UX evaluation methods

and measurement models is still missing. There is a need for systematic knowledge on UX methods. Furthermore, there is a need for UX evaluation methods targeting community oriented applications [3].

By investigating usefulness of seven methods used for evaluation of user experience in the context of applications for sharing and co-creating user-generated content, this paper aims to increase our knowledge on UX methods.

UX EVALUATION FRAMEWORK APPLIED WITHIN THE PROJECT

We have developed a common framework for evaluating and addressing users' experiences. Based on the previous work and the needs of the project we have identified eight central factors considered as relevant for investigating users' experiences with audio-visual networked applications. UX is investigated from an individual perspective, and is further influenced by the social context [15] of the evaluated applications [22]. Thus, we included co-experience (UX6) and sociability (UX7) as relevant factors addressing these social influences on the individual experience in our UX evaluation framework [20]. The co-experience approach [1] was considered as relevant for the testbeds – urban and rural communities – within the CITIZEN MEDIA project, as it focuses on the sharing of an experience and provides the basis for building relationships. From a methodological point of view we tried to investigate UX as social by applying group-based evaluation methods, which still need to be extended in the future [3]. Table 1 lists these factors together with the main questions (further sub-questions were defined) they address. These UX factors were applied to collect user feedback from all three testbeds and to detect common UX problems or demands (see resulted UX patterns in [18]).

Table 1. UX Factors used as a Starting Point within the CITIZEN MEDIA Project

UX Factor	Question
UX1 Fun/enjoyment	To what extent do users enjoy the applications in real usage?
UX2 Emotion	Which emotions arise from the usage of the developed applications?
UX3 Motivation	Why are users motivated to participate, contribute and co-create networked audiovisual content?
UX4 User engagement	Who are the users with the highest interest in user-generated media?
UX5 User involvement	How does user involvement increase over time?
UX6 Co-experience	How do the developed applications support co-experience?
UX7 Sociability	How do the developed applications support human-human interaction?
UX8 Usability	To what extent are the users satisfied with the usability of the developed applications?

Table 2 briefly describes the usage of the evaluation methods within the project. For each method we give a brief description of the type and maturity of the application

that was evaluated. A detailed description of the UX factors and evaluation methods we used can be found in [20].

Table 2. Used Evaluation Methods within the CITIZEN MEDIA Project:
Well known methods were combined or adapted in order to investigate UX in Germany, Norway, and Austria.

(UX) Evaluation Methods	Method Description
Lab based user study	(1) User study with think-aloud and eye tracking [13]; IPTV (Internet Protocol TV); early prototype (2) User study with bio-physiological measurements; IPTV; working product (after 3 months of usage)
Focus group	Group interviews with a facilitator [14]: (1) Less structured than usual focus groups; combined with a short questionnaire; IPTV; early in the process [22]. (2) Focus group with free exploration session integrated into a workshop; two web-based applications; during the design phase
Experience sampling (ESM)	ESM implemented as a part of the application [21]; answering by clicking on smiley-faces; web-based application for collaborative story telling; non-public alpha version of the application
Online survey	Web-based survey with closed questions [13]. Web based application for sharing User Generated Content (video); shortly after the application went online; use case (content based communication); both early and later in the evaluation
Group-based expert walkthrough	(1) Scenario based usability inspection method [5]; web based application for sharing User Generated Content (video); after the application went online (2) A variation of the method combining elements from focus groups and usability evaluation [6]; also used in combination with focus group elements; web-based application for sharing music; prior to redesign; in combination with focus group elements used for evaluation of beta-version (3) Group-based expert walkthrough in combination with focus groups elements; hands-on sessions also included; web-based application for collaborative story telling; non-public alpha version of the application (4) In combination with discussion and free exploration; unified Electronic Program Guide [23].
Extended heuristic evaluation	Extended heuristic evaluation was a variation of the standard heuristic evaluation where the test leader moderated the evaluation and provided additional explanations; web-based application for sharing UGC (photos and texts) on a city map; evaluation of the paper prototype
Interview	Interviews with application domain experts preceded by hands-on sessions [5]; web based application for sharing User Generated Content (video); ready product

OUR APPROACH

As a step towards building and consolidating knowledge on UX methods, we wanted to explore the usefulness of the UX methods in a real-life context from the perspective of the researchers and developers working in the project. We thus focused our research on the scope and downstream utility. In the context of this research, scope describes what kind of user experience factors a method is good and not good in finding. Both downstream utility and scope are subjectively evaluated by the researchers in the project. To collect the data we developed two open-ended questionnaires. The questionnaire evolved through several

iterations for optimal clarity and accuracy. We sent the survey to eight researchers involved in the evaluation activities. Six of the researchers were experts in HCI and usability, and two were master students focusing their studies on HCI and user experience research. All of them had relevant methodological expertise and were provided training if needed.

The first questionnaire collected the following information about the evaluation method: description of the method, the resources used on data collection and analysis, description of the amount and the type of the collected data, and the rationale for using this method. The second questionnaire

collected background information about a researcher, the researcher’s general opinion on the method, the researcher’s experience with the method in this project, including usefulness and drawbacks of the method and lessons learned. The analysis was done by one researcher. To reduce the threat to validity that might introduced by this, and to facilitate analysis of the qualitative data we used the coding process described by Seaman [27]. The collected answers were categorized according to the above described criteria. .

USEFULNESS OF THE EVALUATION METHODS AND RECOMMANDATIONS

This section both reports our findings on the usefulness of the used evaluation methods for capturing UX, and provides relevant recommendations. Table 3 gives an overview of the methods we used for capturing UX factors. When describing the usefulness of a method for capturing different UX factors, the researchers also reflected on the cost/benefits of a method.

Table 3. Scope of the used Evaluation Methods with regard to the UX Factors addressed within the project

UX Factor	(UX) Evaluation Method
UX1 Fun/enjoyment	Lab based user study, focus group, ESM, group-based expert walkthrough
UX2 Emotion	User test, focus group, ESM, online survey, group-based expert walkthrough
UX3 Motivation	Focus group, online survey, group-based expert walkthrough, interview
UX4 User engagement	Focus group, online survey, group-based expert walkthrough
UX5 User involvement	Online survey, group-based expert walkthrough, interview
UX6 Co-experience	Group-based expert walkthrough
UX7 Sociability	Focus group, ESM, online survey, group-based expert walkthrough, interview
UX8 Usability	User test, focus group, ESM, group-based expert walkthrough, extended heuristic evaluation, interview

Lab based user studies with bio-physiological measurements were reported to be useful for capturing fun, emotions, and usability, particularly when reaching the users in a real life environment was difficult. However, the method is complex in terms of data collection and analysis. Hands-on sessions preceded interviews, were integrated in workshops with focus groups, and used in an adapted version of group-based expert walkthrough. The importance of these sessions for capturing UX was emphasised by all researchers. Common experience in exploring applications made it easier for the participants to talk about non-functional aspects of the applications, particularly about enjoyment, emotions, motivation, co-experience and sociability. One could compare enjoyment and emotions of users when using different functions of the

old and the new version of an application. When evaluating another application, the participants worked together on a common collaborative task (writing a story together). This common experience made it easier to discuss feelings related to use of these applications such as emotional response when a co-author has deleted a paragraph. A common task has been very useful for initiating discussions on sociability and co-experience.

Recommendation 1: Encourage collaboration.

Investigating motivation, user engagement, user involvement, co-experience and sociability at the level of communities and families is essential for applications aiming to support sharing and co-creation of UGC. Both tasks and evaluation methods should reflect this priority. Extending well known methods such as interviews, focus groups, and group-based expert walkthroughs with **hands-on sessions** and usage of **collaborative tasks** has been very useful for capturing these factors.

The researchers also reflected on the importance of different UX factors in the different project phases and in the relation to the availability of other UX evaluation methods. For example, a researcher said: *Especially in this early phase in the evaluation process, issues concerning motivation need to be investigated in detail. The online questionnaire was valuable in doing so.... Since no logging data was available at this point of time in the evaluation process, it was good to receive any information about the usage of the platform.*

Recommendation 2: Start to evaluate UX as early as possible.

Early feedback is very valuable to the developers. In particular, feedback on motivation, emotions, and anticipated engagement is valuable. However, one should adapt both the methods and the measurement to the evaluation phase. As the project progresses, one can move towards finer granularity evaluation. For example, one can measure the emotions related to a general idea of a tool for collaborative writing early in a project and emotions related to a particular function of the tool later in the project.

Not surprisingly, usability was easiest to measure, as it is the most standardized factor. When describing the usefulness of a method for capturing usability, our respondents used the term “very useful” without exception. On the other hand, fun, emotions and co-experience were reported as difficult to measure. Furthermore, they pointed out the centrality of usability and its effects on other user experience factors: *In my opinion, a usability test is an essential part of a user experience evaluation, because if the usability of an application is bad, this has further effects on other UX factors like motivation or user engagement among the users.*

Recommendation 3: Evaluate usability and its influence on UX. Evaluating usability together with other UX factors is beneficial particularly early in the project. Other factors often might be affected by usability (e.g. motivation). Capturing several factors together thus makes it easier to understand the results and to organise the studies. On the other hand, one should not explore too many factors in the same study.

A summary of downstream utility (Table 4) is based on self-reported usage of the evaluation results for the further design and the development of the application. All the methods have been reported as useful for the subsequent project phases. When describing the usefulness of the UX feedback collected by a method, the researchers always related usefulness to the complexity of the analysis (simple analysis was appreciated), the phase of the project (early feedback was appreciated), and the necessary effort. For example, feedback from expert interviews was directly used to inform design, but the researcher reported that a lot of interviews were needed in order to capture feedback from different stakeholders.

Table 4. Downstream Utility

(UX) Method	Evaluation	Downstream Utility
Lab based user study		Useful; usability problems identified; complex
Focus group		Useful; list of suggestions provided; can explore only limited number of UX factors in a session
Experience sampling		Useful; simple analysis
Online questionnaire		Very useful; UX trends captured early; past behaviour and opinions; simple analysis
Group-based expert walkthrough		Useful; specially for exploring common community experience
Extended heuristic evaluation		Useful; new solutions provided
Expert interview		Useful; demands a lot of effort

Collected feedback influenced design by capturing users' past behaviour and trends, identifying specific problems, identifying solutions, providing better user experience, providing new solutions or ideas for improvements, and providing rationale and ideas for complete redesign. In one case, a negative user experience collected by an expert group walkthrough led to a complete redesign of the application. In particular, feedback on motivation and emotions had a great persuasive effect on the design team. The participants stated clearly that they could not see the purpose of an application for collaborative writing and that

writing is something very private for them. For evaluating the next version of the same application, ESM was used together with group-based expert walkthrough for collecting feedback on enjoyment, emotions, and sociability. The feedback was very positive, and only some minor changes of the applications were proposed.

Recommendation 4: Evaluation should be playful and provide added value for the participants. One cannot overemphasize the importance of providing a safe, comfortable and playful evaluation environment, and giving 'something extra' to the study participants. The opportunity to learn and try something completely new and to affect the development of new applications is not only very stimulating and rewarding for the communities of users and experts participating in the evaluation, but also positively affects usefulness of the evaluation methods. When working with communities it is very important to build a trustful relationship for ensuring a successful long term relationship.

Although they are a commonplace in usability evaluation, simple recommendations such as "Conduct evaluation in nice and familiar environment", "Prepare playful tasks", "Use original and playful ways for studies promotion", were repeatedly reported by the researchers as very important for the usefulness of the methods used.

Recommendation 5: Prepare for diversity. In depth knowledge of your communities—the different groups of users and non-users—is essential for successful data collection. Different versions of questionnaires and focus group guidelines should be prepared for different user groups (e.g., professional cabaret artists, amateur artists, and theatres) and evaluators/moderators should be able to speak 'different languages' (e.g., to talk to children, teenagers, and elderly people) at the same time.

When describing the usefulness of the evaluation results, researchers emphasised importance of good knowledge of communities and relationships among them. Questionnaires tailored to different communities have been more useful than general ones. The researchers also reported that good collaboration with designers and developers teams was important for uptake of the evaluation results. Good knowledge of the application including the ideas of the designers that might be not yet implemented or presented at a paper prototype was very useful, as well as the ability to clearly and quickly report the results on user experience. Quotations being typical for users' emotions and motivations were highly appreciated by the designers and developers.

Recommendation 6: Be best friends with the developer. Good knowledge of the application under development is very important for the success of the evaluation. Evaluators/moderators should be able to

explain ideas behind paper prototypes and screenshots. Communicating the results of the evaluation clearly and in formats understandable to the developers is extremely important for uptake of the evaluation results.

CONCLUSIONS AND FUTURE WORK

We conducted a survey among the researchers involved in the evaluation activities of the CITIZEN MEDIA research project that developed a plethora of applications supporting non-professional users in sharing and co-creating user-generated content. Combinations of well known evaluation methods and their home-grown adaptations were used (as there were no clear defined UX evaluation methods available yet, fitting the needs of the project). Our results indicate that group based evaluation methods (group-based expert walkthrough and focus groups) were useful for measuring a broad spectrum of the pre-defined UX factors. Some factors such as emotions, fun, and co-experience were difficult to measure and there is an urgent need for development of such methods. Furthermore methods for sharing individual experience have to be extended to capture shared experience of community of users. Collaborative playful methods and collaborative tasks supported well move from individual user evaluation methods to community evaluation methods (e.g. [3][23]).

Within this paper, we summarized our results and lessons learned from the evaluation activities in several recommendations, which might be useful for practitioners working in the area of UX in general, and UX of social media applications in particular. Furthermore, our experience might be a useful input for the ongoing discussions on UX evaluation methods and measurement within the HCI research community, which special attention on how to support the design and development process of new applications, software, or systems.

As pointed out by Blandford et al. [1], comparison of evaluation methods is very complex and cannot be done by one study. Although our study covers a broad range of evaluation methods, UX factors and social media applications, it does not draw on a large data collection from numerous subjects with different background, experiences, and contexts. Furthermore, usefulness was subjectively evaluated by the researchers in the project while the development process was still in progress. We plan to extend our work by mail-based interviews of the developers investigating down-stream utility in more details and with objective evaluation of usefulness based on the inspection of the project's documentation and tracing of actual design changes. We also encourage other researchers to validate and complement our recommendations by further studies.

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REFERENCES

- [1] Battarbee, K. Defining co-experience. In *Proceedings of the 2003 international Conference on Designing Pleasurable Products and interfaces* (Pittsburgh, PA, USA, June 23 - 26, 2003). DPPI '03. ACM, NY, 2003, 109-113.
- [2] Blandford, A.E., et al., Scoping Analytical Usability Evaluation Methods: A Case Study Human-Computer Interaction, 2008. 23(3): p. 278-327.
- [3] Brandtzæg, P.B., Følstad, A., Obrist, M., Geerts, D. & Berg, R. (2009). Innovation in online communities - Towards community-centric design. In *Proceedings of the First International Conference, UCMedia 2009*, Venice, Italy, December 9-11, 2009. In P. Daras Ibarra and O. Mayora (Eds.), LNICST, Springer, Vol. 40, pp. 50-57.
- [4] Dix A., et al., Human-Computer Interaction. 3rd ed. 2003: Prentice Hal.
- [5] Følstad, A. Group-based Expert Walkthrough. in R3UEMs: Review, Report and Refine Usability Evaluation Methods, COST924-MAUSE 3rd International Workshop. 2007. Athens, Greece.
- [6] Følstad, A., Work-Domain Experts as Evaluators: Usability Inspection of Domain-Specific Work-Support Systems. *International Journal of Human-Computer Interaction*, 2007. 22(3): p. 217-245.
- [7] Gray, W.D. and M.C. Salzman, Damaged merchandise? A review of experiments that compare usability evaluation methods. *Human-Computer Interaction*, 1998. 13(3): p. 203-261.
- [8] Hartson, H.R., T.S. Andre, and R.C. Willings, Criteria for evaluating usability evaluation methods *International Journal of Human-Computer Interaction* 2001. 13(4): p. 373-410.
- [9] Hassenzahl, M. User experience (ux): towards an experiential perspective on product quality. In IHM'08: Proc. of the 20th International Conference of the Association Francophone d'Interaction Homme-Machine, pages 11-15, New York, NY, USA, 2008. ACM.
- [10] Hassenzahl, M. and M. Tractinsky, User experience – a research agenda *Behaviour & Information Technology, Empirical Studies of the User Experience*, 2006. 25(2): p. 91-97.

- [11] Holzinger, A., Usability engineering methods for software developers Communications of the ACM, 2005. 48(1): p. 71-75.
- [12] Ketola, P. and V. Roto, On User Experience Measurement Needs - Case Nokia. International Journal on Technology and Human Interaction (IJTHI), 2009. 5(3).
- [13] Kuniavsky, M., Observing the user experience a practitioner's guide to user research. 2003, San Francisco, USA: Morgan Kaufmann
- [14] Krueger, R.A. and M.A. Casey, Focus Groups: A Practical Guide for Applied Research. 2000, Thousand Oaks, Calif: Sage Publications Inc, Thousand Oaks, Calif
- [15] Law, E. L.-C., Roto, V., Hassenzahl, M., Vermeeren, A. P. and Kort, J. Understanding, scoping and defining user experience: a survey approach. In CHI'09: Proc. of the 27th international conference on Human factors in computing systems, pages 719–728, New York, NY, USA, 2009. ACM.
- [16] Law, E.L.-C., E.T. Hvannberg, and M. Hassenzahl. COST294-MAUSE Workshop on User Experience - Towards a Unified View. Workshop at NordiCHI'06 conference. 2006; Available from: http://nordichi.net.dynamicweb.dk/Workshops/W2-User-Experience_.aspx.
- [17] Law, E.L.-C. and v. Schaik, Modelling UX – an agenda for research and practice. Interacting with Computers., 2010. 22(5): p. 313-438.
- [18] Obrist, M., Wurhofer, D., Beck, E., Karahasanovic, A., and Tscheligi, M. (2010). User Experience (UX) Patterns for Audio-Visual Networked Applications: Inspirations for Design. Accepted full paper to NordiCHI2010.
- [19] Obrist, M., V. Roto, and K. Väänänen-Vainio-Mattila. User experience evaluation: do you know which method to use? CHI Extended Abstracts 2009: 2763-2766. in SIG session at CHI 2009, available in CHI Extended Abstracts. 2009. Boston, USA: ACM.
- [20] Obrist, M., Weiss, A., and Tscheligi, M. Evaluating user-generated content creation across contexts and cultures. In IAMCR2007: Proceedings of the 50th Anniversary Conferneces of the International Association for Media and Communication Research (Paris, July 2007).
- [21] Obrist, M., Meschtscherjakov, A., and Tscheligi, M. User experience evaluation in the mobile context. In Aaron, Marcus, Cereijo Roibás, Anxo, and Sala, Riccardo (Eds). Mobile TV: Customizing Content and Experience. Human-Computer Interaction Series, Springer London, 2010.
- [22] Obrist, M., Miletich, M., Holocher, T., Beck, E., Kepplinger, S., Muzak, P., Bernhaupt, R., and Tscheligi, M. Local communities and IPTV: Lessons learned in an early design and development phase. In Computers in Entertainment 7, 3 (Sep. 2009), 1-21.
- [23] Obrist, M., Moser, C., Alliez, D., Holocher, T., and Tscheligi, M. Connecting TV & PC: An In-Situ Field Evaluation of an Unified Electronic Program Guide Concept. In EuroITV2009: Proceedings of 7th European Conference on Interactive Television (New York, NY, USA, 2009), ACM, 91–100.
- [24] Preece, J., Y. Rogers, and H. Sharp, Interaction design: beyond human-computer interaction. New York: John Wiley & Sons. 2002, New York: John Wiley & Sons.
- [25] Roto, V., et al. User Experience Evaluation Methods in Product Development (UXEM'09), Workshop at INTERACT 2009; Available from: <http://wiki.research.nokia.com/index.php/UXEM09>.
- [26] Roto V., Obrist M., and K. Väänänen-Vainio-Mattila, User experience evaluation methods in academic and industrial contexts, in Workshop on User Experience Evaluation Methods, in conjunction with Interact'09 conference. 2009: Uppsala, Sweden.
- [27] Seaman, C., Qualitative Methods in Empirical Studies of Software Engineering. IEEE Transactions on Software Engineering, 1999. 25, No. 4(July/August 1999): p. 557–572.
- [28] Väänänen-Vainio-Mattila, K., V. Roto, and M. Hassenzahl. Now let's do it in practise: User eXperience Evaluation Methods in product development (UXEM). CHI 2008 Workshop; Available from: http://www.cs.tut.fi/ihte/CHI08_workshop/.
- [29] Väänänen-Vainio-Mattila, K., V. Roto, and M. Hassenzahl. COST294-MAUSE Workshop on Meaningful Measures: Valid Useful User Experience Measurement (VUUM). in Proceedings of the COST294-MAUSE, 18th June, 2008, Reykjavik, Iceland.
- [30] Vermeeren, A.P.O.S. , Law, E.L.-C., Roto, V., Obrist, M., Hoonhout, J., and Väänänen-Vainio-Mattila, K. (2010). User Experience Evaluation Methods: Current State and Development Needs. NordiCHI2010, Reykjavik, Iceland