First International Workshop on Usability and Accessibility focused Requirements Engineering (UsARE 2012) – Summary Report

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ABSTRACT

Usability and accessibility issues are common causes why software fails to meet user requirements. However, requirements engineers still focus on functional requirements and might ignore to also elicit system usability and accessibility requirements. This is a high risk which can lead to project and software failure. Improving the usability and accessibility of a system in a later development stage is costly and time consuming. Targeting these concerns, the workshop envisioned that research must address the proper integration of system usability and accessibility requirements into the requirements engineering process and also must focus on how to manage and control the evaluation of these requirements in a systematic way.

UsARE 2012 provided a platform for discussing issues which are relevant for both fields, the Requirements Engineering (RE) and the Human Computer Interaction (HCI). The workshop aim was to bring together people from these two communities (RE and HCI) to explore this integration. Researchers and practitioners were invited to submit contributions including problem statements, technical solutions, experience reports, planned work and vision papers. Envisioned results may help aligning RE and HCI processes in order to overcome open issues in these fields.

Categories and Subject Descriptors

General Terms
Design, Human Factors.

Keywords
Requirements engineering (RE), usability, accessibility, software development

1. INTRODUCTION

Lack of usability and accessibility are common causes for failed software products [1, 3, 4]. Usability is defined by the International Organization Standardization (ISO) as “the extent to which the product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” [2]. Sharp et al. [9] define usability as to achievement of six targeted goals: “effective to use (effectiveness), efficient to use (efficiency), safe to use (safety), having good utility (utility), easy to learn (learnability), and easy to remember how to use (memorability)”. The accessibility of a system is the capability of the system to be accessed by users with limited capabilities in the same manners as by the normal users. The ISO/IEC Guide 71 [6] defines accessible design as “design focused on principles of extending standard design to people with some type of performance limitation to maximize the number of potential customers who can readily use a product, building or service”.

During the requirements analysis phase, software development teams may mainly focus on functional requirements. They often ignore system usability and accessibility concerns, such as satisfaction, utility, learnability, memorability and visibility. An early analysis of usability and accessibility requirements can guide the analysis at design-time resulting in a specification that provides more effective criteria to evaluate the software-to-be. Including system usability and accessibility requirements later in the development stages can be very costly [5]. Moreover, ignoring them in early stages could lead to delays in product deployment and can enhance the risks of project and software failure.
The process of requirements collection and elicitation is itself iterative and involves the user representatives. The focus of system usability and accessibility requirements is to ensure that the system is in compliance with the intended properties which let the users to use the system more efficiently in order to achieve their desired goals. Although the Requirements Engineering (RE) field has started to cope with system usability and accessibility issues along other non-functional requirements, there are still a lot of problems and systems often do not provide good usability and accessibility features. Engineering software along the usability and accessibility requirements requires a deeper investigation along the RE process.

2. MOTIVATION AND RELEVANCE
Due to our work and research we realized that it is important to integrate properly the system usability and accessibility requirements into the requirements engineering process and then to maintain them along other system requirements throughout the product life-cycle. However, work on these issues is limited (e.g., [7, 8]) and we could not identify a suitable venue for discussions which focus particularly on the mentioned integration process and its effects on software development. In the following we would like to more deeply discuss motivations and lessons learned from our individual work leading to key research questions.

An important issue we identified is how to identify and elicit system usability and accessibility requirements alongside other system requirements during the requirement analysis phase and then to perform design with respect to these altogether. In iterative and incremental development approaches, the evaluation of system usability and accessibility is needed to be done alongside other functionality testing at the end of each iteration. Therefore, we envision that research on requirements engineering must address the proper integration of system usability and accessibility requirements into the RE process and focus on how to manage and control the evaluation effects on the set of requirements in a systematic way.

Moreover, as software systems are becoming more and more pervasive and require dynamic changes at run-time, usability and accessibility measurements becomes critical to success of such systems. To support changes at run-time in these systems, the involvement of end-users is needed. However, to have unobtrusive approach another challenge is that the evaluation of system usability and accessibility should be performed not only at design-time but also at run-time with respect to dynamic changes in the requirements.

Inspiring from the above motivations and our previous and ongoing work, the workshop aimed at creating awareness in the research and software development communities to start focusing on the following questions:

- How to incorporate system usability and accessibility requirements at early stages of RE;
- How to involve end users in the requirement phases in order to understand the usability and accessibility requirements more properly;
- How to maintain the system usability and accessibility requirements throughout the development alongside other system requirements;
- How to manage and control requirements changes by assessing system usability and accessibility at run-time;
- How usability can improve dynamic elicitation of requirements from the end-users; and
- How requirements for accessibility and usability can be analyzed and managed in case of self-adaptive systems.

3. TOPICS AND GOALS
The workshop was dedicated to observations, concepts, approaches, frameworks and practices that allow understanding, facilitating, and increasing the awareness of the role of system usability and accessibility requirements and their proper integration in the requirements engineering process. Topics of interest for paper submissions included, but were not limited to:

- Eliciting and negotiation of usability and accessibility requirements
- RE and usability/accessibility aspects in Software Development
- User-centered requirements engineering
- Usability and accessibility requirements management
- RE and accessibility at run-time
- Methodologies, frameworks, concepts, and tool support
- Testing/evaluation
- Case studies and best practices

The workshop aim was the achievement of following goals:

- Consolidate research and practices related to the system usability and accessibility requirements in the overall RE process as a research topic within the greater fields of RE, software engineering (SE), and human-computer interaction (HCI).
- Establishing a platform which will bring RE, SE and HCI people closer together and to discuss how to provide proper integrated approaches/methods to allow “usability and accessibility focused RE”.
- Grow the body of knowledge related to this “usability and accessibility focused RE”, and identifying challenges and future avenues for research relevant for both academia and industry.
- Provide to requirements engineers, HCI experts, business analysts, and software engineers a dedicated forum for exchanging ideas and best practices and thus foster industry- academia collaboration.

4. WORKSHOP SUMMARY

4.1 Organization Committee
- Tiziana Catarci, SAPIENZA University of Rome, Italy
- Anna Perini, Fondazione Bruno Kessler – IRST, Italy
- Norbert Seyff, University of Zurich, Switzerland
- Shah Rukh Humayoun, University of Kaiserslautern, Germany
- Nauman Ahmed Qureshi, National University of Sciences and Technology, Pakistan

4.2 Program Committee
- Margherita Antona, Foundation for Research and Technology - Hellas (FORTH), Greece
- Nelly Bancomo, INRIA – Paris, France
- Yael Dubinsky, IBM Research – Haifa Lab, Israel
- Achim Ebert, University of Kaiserslautern, Germany
- Silvia Gabrielli, Create-Net, Italy
- Ivan Jureta, University of Namur, Belgium
- Stephen Kimani, JKUAT, Kenya
- Sotirios Liaskos, York University, Canada
- Luisa Mich, University of Trento, Italy
- Barbara Paech, University of Heidelberg, Germany
- Saim Rasheed, King Abdul Aziz University, Saudi Arabia
- Giuseppe Santucci, SAPIENZA University of Rome, Italy
- Pete Sawyer, Lancaster University, UK
- Angelo Susi, FBK-IRST, Italy
- Giulianna Vitiello, University of Salerno, Italy
- Diana Yifan Xu, University of Central Lancashire, UK
- Massimo Zancanaro, FBK-IRST, Italy

4.3 Accepted Submissions
Researchers and practitioners were invited to submit contributions including problem statements, technical solutions, experience reports, planned work and vision papers. Each submission was reviewed by three program committee members, which lead to a total number of seven accepted papers in all categories. The workshop proceeding has been published online by the IEEE digital library [10]. Following is the list of presented papers in the workshop and their brief introduction:

- How Personas support Requirements Engineering
4.4 The Interactive Session

The workshop program was divided into three sessions for paper presentations and one interactive session where the participants got the chance to explore and share ideas and experiences about solved and unsolved problems. The objective of the interactive session was to highlight issues that software development teams face and the possible consequences on software development due to disjointed topics.

| Participants Divided: Two or Three Different Categories of Software Development |
|---------------------------------|---------------------------------|
| Requirements / Business Modeling: | Experience vs. Knowledge |
| Usability: | How user tasks can be used to communicate more efficiently |
| Analysis & Design: | What factors about the users do we need to consider for enhancing usability |
| Implementation: | What should be the format of “usability” / “user experience” requirements that could be useful during implementation? |

Interactive Session:

At the end of the interactive session, each group presented a short presentation to provide an overview of the issues highlighted through brainstorming. Following are lists of issues raised in each category.

- **Meta**
  - **Type of project:** How does the type of project (individual developed vs. product development) influence RE/HCI?
  - **RE/Usability expert:** How does this role model work in small/large companies?
  - **User experience (UX) and the AAC primary users:** Artifacts, models and relations (understanding the knowledge to be created during engineering).

- **Project Management**
  - How to involve end-users more effectively in continuous software evolution?
  - What are the ways to introduce UXD and usability into RE?
  - How to involve end-users more effectively in continuous software evolution?
  - How user tasks can be used to communicate more efficiently within project members?
  - Which user-centered techniques are more appropriate at different development levels?

- **Requirements / Business Modeling**
  - How to validate effectiveness of synchronization between Requirements Engineering (RE) and User Experience Design (UXD)?

- **Usability**
  - How can user-centered approaches be integrated in engineering-dominated projects?
  - How to involve end-users more effectively in continuous software evolution?
  - Which user-centered techniques are more appropriate at different development levels?

- **Analysis & Design**
  - How to define trust as a driver for usability?
  - How to take interview of experts for knowing the domain knowledge which the interviewer does not have?

- **Implementation**
  - What factors about the users do we need to consider for enhancing usability and if these factors vary from user to user then how we can compare them?
How to validate effectively user requirements?
How to automate properly the usability and accessibility requirements alongside testing other requirements?
How to validate/test UX requirements?

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REFERENCES