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Handling Security, Usability, User Experience and Reliability in User-Centered Development Processes

IFIP WG 13.2 & WG 13.5 Workshop at INTERACT 2019

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Abstract. Human-Computer Interaction (HCI) research has been focusing on properties such as usability, accessibility, inclusive design, user experience. As new security risks are emerging with the continuous increase of Internet interconnections and the development of the Internet of Things, more recently security, trust and resilience have also become important for the development of interactive systems. Since users have been identified as one of the major security weaknesses in today's technologies, HCI becomes a fundamental pillar for designing more secure (but still usable) systems. However, interactive system properties might overlap and sometimes create conflicts in user-centered development processes. For example, security could reduce system usability by placing a burden on users when they have to deal with passwords. The HCI research has provided several tools and techniques that can support designers in making decisions, but there are no "cookbooks". This workshop promotes sharing of experiences in managing and resolving conflicts of multiple interactive system properties within the context of a user-centered design process. We are concerned by theories, methods and approaches for dealing with interactive system properties, managing potential conflicts and trade-offs. This workshop is organized by the IFIP WG 13.2 on Methodology for User-Centered System Design and the IFIP WG 13.5 on Human Error, Resilience, Reliability and Safety in System Development.

Keywords: User-centered design process, User interfaces properties, Usability, UX, Security, Privacy, Resilience, Reliability.

1 Overview and goals

User-centered design has proven to be a key factor for leading towards the development of successful interactive systems [1]. Identifying user needs and requirements as well as desired system properties is a crucial phase, as poor or inadequate requirement specifications can lead to interaction difficulties and (more globally) usability problems. The requirements conflict-resolution process is essential in the user-centered development of interactive systems that, traditionally, has been focusing on properties such as *usability*, *accessibility* or *user experience (UX)*. A user property might complement or enlarge the scope of another. For example, whilst accessibility addresses the needs of impaired users to accomplish their tasks with the system [2], UX goes beyond the pragmatic aspect of usability by taking into account dimensions such as emotion, aesthetics or visual appearance, identification, stimulation, meaning/value or even fun, enjoyment, pleasure or flow [3]. In some situations, a user interface property might influence another one, positively or negatively. For example, an interactive software featuring poor *reliability* can jeopardize usability evaluation by showing unexpected or undesired behaviors [4]. On the opposite, increasing usability (for instance by providing undo mechanisms to users) will decrease reliability as the system will be more complex and more difficult to test. Moreover, there is evidence that properties can trade off against each other as it is the case for *usability* and *security* [5]. For example, requiring users to change their passwords periodically may improve security, but may reduce usability as it represents a burden for users to frequently create and remember passwords. It will also increase the likelihood of errors and decrease in performance. Therefore, users might be keen to setup workarounds such as taking hard notes of hard-to-remember passwords imposed by security administrators' policies.

The HCI research has provided several principles and guidelines that can drive the designers in taking their decisions. For example, conflicting user interface properties often appear in recommendations for user interface design [6], but there are no “cookbooks” for resolving them. The resolution of conflicts between user interface properties is a daunting and demanding task that might require taking into account the trade-offs associated with alternative designs and rationalizing design decisions. It is interesting to notice that when the conflict between properties is understood, the effects of conflicts can be mitigated/reduced by innovative and appropriate designs. Examples of designs handling conflict resolution between *usability*, *privacy* and *security* can be, for instance, found at the SOUPS (Symposium on Usable Privacy and Security) conference (<https://cups.cs.cmu.edu/soups/>).

In this workshop, we aim to broaden the scope of this research domain and promote the study of the interplay of multiple user interface properties in a user-centered design process. Our aim is to cover a large set of user interface properties and try to reveal their inner dependencies. The long-term perspective of this workshop is to foster the development of theories, methods, tools and approaches for dealing with multiple properties that should be taken into account when developing interactive systems.

This workshop is a follow up of the successful workshop organized at INTERACT 2017 in Mumbai [7].

2 Target audience and expected outcomes

This workshop is open to everyone who is interested in multiple user interface properties while designing and building interactive systems. We expect a high participation of IFIP working group 13.2 and 13.5 members. We invite participants to present position papers describing real-life case studies that illustrate the trade-offs between two or more properties of interactive systems. Any property related to user interface design is welcome, but two or more properties should be addressed in the same contribution. We are also interested in methods, theories and tools for managing multiple user interface properties. Position papers are published in INTERACT 2019 adjunct conference proceedings. We also expect to discuss at the workshop how to disseminate individual contributions to the community in a special issue in an HCI journal.

3 Structure of the workshop

This proposal encompasses a full-day workshop organized around presentation of position papers and working activities in small groups. From the set of contributions, a subset of selected case studies is invited to be presented at the beginning of the workshop and is used to support the discussion that follows. The morning sessions are dedicated to welcoming participants and presenting case studies. Participants are invited to comment the case studies and to report similar experiences. The afternoon sessions are devoted to interactive sessions, where participants are engaged to work in small groups on and propose solutions to the problems of the case studies seen in the morning. Proposed solutions are compiled and compared. Based on the lessons learned, participants draft an agenda of future work that can be accomplished.

4 Workshop organizers

Carmelo Ardito is Assistant Professor at the University of Bari Aldo Moro, Italy. His research interests are in Human-Computer Interaction. He is member of the Interaction, Visualization, Usability & UX (IVU) Lab, where he coordinates the research on "Novel Interaction Techniques and Pervasive Systems". Since 2001 he has been involved in various research projects sponsored by EU and Italian organizations. He has been visiting researcher/professor at several international research laboratories. He has been member of the scientific organization committee of several International Conferences. He is Expert Member of IFIP TC13 (International Federation for Information Processing Technical Committee on Human-Computer Interaction); member of the IFIP IoT Domain Committee; vice-chair of the IFIP TC13 Working Group 13.2; member of ACM SIGCHI Italy.

Regina Bernhaupt is a Full Professor at the Eindhoven University of Technology, Department of Industrial Design. Her research interest is on how to measure the impact of technology on large-scale real-life systems including changes on a societal level. Regina Bernhaupt is chair of the IFIP TC 13 Working Group 13.2, representative for TC 13 for the Netherlands and has been a long standing active member of WG 13.2. In her spare time, Regina is also the head of research for Austrian Remote Control Producer Ruwido.

Philippe Palanque is Professor in Computer Science at University of Toulouse 3, where he leads the Interactive Critical Systems research group. Since the late 1980s he has been working on the development and application of formal description techniques for interactive systems. He has worked on research projects at the Centre National d'Études Spatiales (CNES) for more than 10 years and on software architectures and user interface modeling for interactive cockpits in large civil aircraft (funded by Airbus). The main driver of Philippe's research over the last 20 years has been to address in an even way usability, safety and dependability in order to build trustable safety-critical interactive systems. As for conferences he was paper co-chair of INTERACT 2015 and is ACM CHI steering committee chair. He is a member of CHI academy, chair of the IFIP TC 13 committee on Human-Computer Interaction, and secretary of IFIP WG 13.5.

Stefan Sauer is Senior Researcher at Paderborn University, Germany and Managing Director of SICP – Software Innovation Campus Paderborn, a joint research and innovation initiative of the university and technology companies. He is furthermore manager of the center of competence for software engineering there. Stefan Sauer's main research areas are the integration of software engineering and usability engineering methods, model-based and model-driven software development, and situational method engineering. He has been involved in the organization of numerous conferences and workshops, for example as General Chair of HCSE 2014 and Technical Program Chair of HCSE+HESSD 2016. He is member and secretary of the IFIP TC13 Working Group 13.2.

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