

## GUEST EDITORIAL PREFACE

# Special Issue on Human Computer Interaction in Critical Systems II: Authorities and Industry

*Christian Reuter, Institute for Information Systems, University of Siegen, Siegen, Germany*

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## ABSTRACT

*Human computer interaction in security and time-critical systems is an interdisciplinary challenge at the seams of human factors, engineering, information systems and computer science. Application fields include control systems, critical infrastructures, vehicle and traffic management, production technology, business continuity management, medical technology, crisis management and civil protection. Nowadays in many areas mobile and ubiquitous computing as well as social media and collaborative technologies also plays an important role. The specific challenges require the discussion and development of new methods and approaches in order to design information systems. These are going to be addressed in this special issue with a particular focus on technologies for critical practices for authorities and industry.*

## 1. EDITORIAL

Authorities as well as industry are confronted with many critical practices, they have to deal with. This special issue tries to address these. It is based on the 2015 workshop on „Human Computer Interaction and Social Computing in Critical Systems“ (Reuter et al., 2015), however also other articles have been considered for submission. Fortunately we received a large number of submissions which have been reviewed by at least two independent experts as well as by the guest editor. After up to two rounds of major and minor revisions the following five articles will be presented in this issue:

Henrik Berndt, Tilo Mentler and Michael Herczeg (Institute for Multimedia and Interactive Systems, University of Luebeck) address in their article “*Optical Head-Mounted Displays in Mass Casualty Incidents*” the research questions, whether optical head-mounted displays could support members of emergency medical services and civil protection units in challenging medical crises and how human-computer interaction has to be designed with respect to the time- and safety-critical context of use. The human-centered design and evaluation of applications for determining the priority of patients’ treatments (triage) and for identifying hazardous materials

with the aid of Google Glass are described. Results indicate that optical head-mounted displays are a promising technological approach but designing safe and efficient human-computer interaction for wearable systems augmenting reality remains a major challenge.

Johannes Sautter (Fraunhofer IAO), Denis Havlik (Austrian Institute of Technology AIT), Lars Böspflug (Fraunhofer IAO), Matthias Max (German Red Cross), Kalev Rannat (Tallinn Technical University), Marc Erlich (Artelia Group) and Wolf Engelbach (Fraunhofer IAO) describe in their paper “*Simulation and Analysis of Mass Casualty Mission Tactics*” an interaction concept allowing a simulation-based analysis of mass casualty mission tactics to leading personnel of emergency medical services. Addressing the needs of the medical civil protection domain, beside the interaction concept they describe large-scale emergency scenarios, the context of use and a performed Think-Aloud evaluation.

Kristian Rother, Inga Karl and Simon Nestler (Hochschule Hamm-Lippstadt) outline in their article “*Towards Virtual Reality Crisis Simulation as a Tool for Usability Testing of Crisis Related Interactive Systems*” the general motivation for the development of a virtual reality crisis simulation (VRCS) prototype for usability testing. The VRCS serves as a means to solve the identified problem of taking the crisis context into account in a less resource intensive way than relying solely on real crisis simulations. The paper defines objectives for a solution of this identified problem and identifies the sub-problem that injecting an interactive system that will be tested (testee) into the VRCS could influence the realism of the VRCS. To answer the research question “Does the injection of a testee into a VRCS influence the realism of that VRCS?” equivalence tests with regards to the realism of the VRCS are conducted. The tests show that the VRCS with and without the testee are equivalent with regards to *scene realism*, *audience behavior*, *sound realism* and *realism of the VR-application*. The article concludes with an outlook of future research directions.

Thomas Ludwig, Christoph Kotthaus and Volkmar Pipek (University of Siegen) present in their article “*Should I try turning it off and on again? Outlining HCI Challenges for Cyber-Physical Production Systems*” the adaption of the concept of sociable technologies, as hardware-centered appropriation infrastructures, to cyber-physical production systems (CPPS). CPPS are complex and automated manufacturing systems that usually pose enormous challenges to the machine operator. With regard to understanding CPPS’ “behavior” and technical controllability, sociable technologies can help machine operators to appropriate their machines. Within this article, the authors outline and discuss several design implications from a HCI perspective.

Christian Reuter (University of Siegen) focuses in his article “*Towards Efficient Security - Business Continuity Management in Small and Medium Enterprises*” on the use of Business Continuity Management (BCM) in Small and Medium Enterprises (SME). According to the ISO 22301 (2014) BCM is defined as a holistic management process which identifies potential threats to an organization and the impacts those threats might have on business operations. The paper presents a literature research on the use of BCM in SME and discusses research findings concerning this matter. Based on this a matrix for possible impacts vs. quality of the crisis management for different actors is derived. The article concludes with the presentation of lightweight und easy to handle BCM security solutions in form of Smart Services, as a possible solution for the increasingly IT relying industry 4.0.

The human computer interaction in critical systems will continue to play a major role. With this special issue we want to contribute to help shape this development in a meaningful way.

*Christian Reuter*  
*Guest Editor*  
*IJISCRAM*

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## REFERENCES

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*Christian Reuter studied Information Systems at the University of Siegen, Germany and the École Supérieure de Commerce de Dijon, France (Dipl.-Wirt.Inf.; M.Sc.) and received a PhD for his work on (inter-)organizational collaboration technology design for crisis management (Dr. rer. pol.) with summa cum laude. He has worked as a web developer, consultant and researcher and has published more than 60 scientific articles. He is voluntary founding spokesman of the section “human computer interaction in security relevant systems” of the German Informatics Society.*