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Editorial of the Special Issue on Social Media in Crisis Management

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Social media is gaining more and more importance in crisis management: “Social media continue to evolve, and so does their use in emergency and crisis events” (Reuter, Hughes, & Kaufhold, 2018). Related research is sometimes called “crisis informatics” (Palen, Vieweg, Liu, & Hughes, 2009). This special issue was initiated based on the track “Social Media Studies” at previous ISCRAM (Information Systems for Crisis Response and Management) conferences. It is usually one of the tracks with the most submissions; however, we (successfully) aimed to also invite scholars from other venues to contribute.

The aim of this special issue is to showcase current research on how the use of social media can help in crisis management and response. We solicited papers that provide rich description and/or evaluation of the design and/or actual use of social media for collaboration and/or widespread participation in any phase of crisis management, from initial planning and preparedness, through detection, response, and recovery phases.

Example topics include:

- Studies of the use of social media in crises, either for information sharing that can provide useful information for managers and citizens, as a pull technology, or for dissemination of information to the public as a push technology. This includes identification of barriers to effective use of social media by emergency response agencies (Plotnick & Hiltz, 2016).
- Innovations in design or use of social media that solve potential problems such as issues of information overload, assessment of information trustworthiness, or ethical issues such as privacy (Tapia, Moore, & Johnson, 2013).
- Issues and techniques for mining and near-real-time processing of social media data to enable early decision-making (Imran, Castillo, Diaz, & Vieweg, 2015).
- Innovative human–computer interaction techniques and methodologies relevant to the design, analysis, and evaluation of applications useful for crisis management using social media (Reuter, Ludwig, Kaufhold, & Pipek, 2015).
- Studies of crowdsourcing and other new practices such as the use of “digital volunteers” that engage the public and connect communities (Hughes & Tapia, 2015; Starbird & Palen, 2011).

We received 15 submissions to the special issue. After two rounds of rigorous review, six articles were accepted for publication.

The first article *Social Media in Crisis Management: An Evaluation and Analysis of Crisis Informatics Research* by Christian Reuter (Technische Universität Darmstadt, Germany), Amanda Lee Hughes (Utah State University, USA) and Marc-André Kaufhold (Technische Universität Darmstadt, Germany) gives a comprehensive overview of the topic. The article notes that the use of social media in emergency and crisis events has greatly increased since the terrorist attacks of 9/11 and many studies have concentrated on the use of ICT and social media before, during, or after these events. This field of research is called *crisis informatics*. In this article, the authors evaluate and analyze crisis informatics research by looking at case studies of social media use in emergencies, outlining the types of research found in crisis informatics, and expounding upon the forms of interaction that have been researched. Finally, the achievements from an HCI perspective and trends and challenges for future research are analyzed.

The second article *The Crowd is the Territory: Assessing Quality in Peer-Produced Spatial Data During Disasters* by Jennings Anderson, Robert Soden, Brian Keegan, Leysia Palen, and Kenneth M. Anderson (University of Colorado Boulder, USA) focuses on the mobilization of digital volunteers in disaster events to meet the data needs of those on the ground. This peer produced spatial data creates the most up-to-date map of the affected region; maintaining the accuracy of these data is therefore a critical task. Accuracy is one aspect of data quality, a relative concept requiring standards to measure against. The field of Geographic Information Sciences has developed standards for this comparison, achieving widespread acceptance. However, the peer production model of spatial data presents new opportunities – and challenges – to traditional methods of quality assessment. Through analysis of the OpenStreetMap database, the authors show that temporal editing patterns and contributor characteristics can provide additional means of understanding spatial data quality. Drawing upon experiences from Wikipedia, they offer and evaluate three intrinsic quality metrics of peer-produced spatial data to assess the quality of contributions to OpenStreetMap for crisis response.

The third article *Processing Social Media Images by Combining Human and Machine Computing During Crises* by Firoj Alam, Ferda Ofli, and Muhammad Imran (Qatar Computing Research Institute) presents a complete social media image processing pipeline that performs two important tasks: (i) streaming and filtering of social media image content (i.e., real-time image streaming, de-duplication, and relevancy filtering) and (ii) actionable information extraction (i.e., damage assessment) as a core situational awareness task during a real-time crisis event. Results obtained from extensive experiments on real-world crisis datasets demonstrate the significance of the proposed pipeline for optimal utilization of both human and machine computing resources. Based on the experimental results and analyses, the authors believe that humanitarian organizations can rely on the proposed automatic image processing pipeline to assess the severity of damage from social media images in real-time.

The fourth article *Social Positions and Collective Sense-making in Crisis Communication* by Stefan Stieglitz, and Milad Mirbabaie, Maximilian Milde (University of Duisburg-Essen, Germany) addresses how uncertainties during crisis situations evolve over time and how social positions dynamically affect the collective sense-making process in social media crisis communication. The authors carried out two case studies on Twitter: 1) the Brussels attacks (2016) with 4,390,784 tweets and 2) the Munich rampage (2016) with 1,258,227 tweets. By applying computed regression-based time-series analyses, the authors revealed the underlying tweet behavior. As next steps, a machine learning algorithm was trained to identify tweets that express uncertainty and the authors conducted social network analyses to determine the most influential actors and their social positions. The results reveal that tweet behavior in early crisis stages is dominated by information distribution and guided by content that is characterized by a high percentage of tweets expressing uncertainty. Based on these results, two forms of collective sense-making were identified: (1) acute and guided collective sense-making and (2) evaluative and retrospective collective sense-making.

The fifth article *Understanding Chinese WeChat Users' Behavior of Sharing Social Crisis Information* by Yang Chen (Harbin Institute of Technology, Shenzhen, Guangdong, China) explores the motivations of people sharing social crisis information through WeChat, one of the world's most popular social media platforms, and identifies the motivating factors that influence their sharing behavior. A research model based on the theory of planned behavior, the theory of use and gratification, and the theory of prosocial behavior was designed and used to better analyze and understand the WeChat users' social crisis information sharing behavior. To test this model, the authors developed a study using a sample of 365 surveys collected from WeChat users. This article presents a new conceptual model to explain WeChat users' sharing behavior with regards to social crisis information and illustrates multiple variables that affect their motivations. The findings of this article contribute overall to a better understanding of WeChat users' social crisis information sharing behavior and provide important practical implications for the scientific and reasonable management of crisis information dissemination.

The sixth article *Software Innovations to Support the Use of Social Media by Emergency Managers* by Linda Plotnick (Lafayette College, USA) and Starr Roxanne Hiltz (New Jersey Institute of Technology, USA) is based on 477 responses to an online survey of U.S. country-level emergency managers. The motivation of this article is that although social media can be very useful for emergency managers, especially for providing situational awareness in the early stages of a disaster, many do not use it. The survey results suggest that the two most important barriers to the use of social media for collecting information are lack of staff and fear of information overload. A number of potential software enhancements that could help overcome the limitations of social media for emergency managers were all rated as highly useful. Factor analyses were successfully performed on the sets of questions about barriers and about software enhancements. The barrier of trustworthiness of social media data was a significant predictor of usefulness of some of the enhancement factors. Differences related to characteristics of the respondents and their agencies are explored, and open-ended comments that help to explain the findings are summarized.

In summary, our special issue includes a comprehensive review (first article), technical findings for quality assessment (second article), and image processing (third article). The issue then present results from case studies to elaborate theories around sense making (fourth article) and sharing behavior (fifth article). Lastly, the issue provides results from quantitative surveys on perceived barriers for social media use by emergency managers (sixth article).

We would like to thank the editor-in-chief of IJHCI, Gavriel Salvendy, for giving us the opportunity to edit this special issue and all of the reviewers for their contributions to make this special issue possible.

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About the Authors

Christian Reuter, PhD, is a professor for “Science and Technology for Peace and Security” (PEASEC) at Technische Universität Darmstadt and supervisor of the research group KontiKat at the University of Siegen, Germany. His research focuses on interactive and collaborative technologies such as social media in safety-critical environments, conflicts, crises, and emergencies.

Amanda Lee Hughes, PhD, is an assistant professor in the Computer Science Department at Utah State University. Her research interests span human-computer interaction, computer-supported cooperative work, social computing, software engineering, and disaster studies. Her current work investigates the use of ICT during crises and mass emergencies with particular attention to how social media affect emergency response organizations.

Starr Roxanne Hiltz, PhD, is distinguished professor Emerita, College of Computing Sciences, New Jersey Institute of Technology. Since “retiring” she has had many visiting research and/or teaching appointments. Research interests currently include virtual teams and online communities, online learning, Emergency Response Information Systems, and social computing.

Muhammad Imran, PhD, is a research scientist at the Qatar Computing Research Institute (QCRI) where he leads the Crisis Computing team under the Social Computing group from both science and engineering directions.

Linda Plotnick, PhD, is a visiting Assistant Professor at Lafayette College, PA in the Computer Science department. Her research focuses on social informatics with emphasis on use of Social Media in crisis. She has also studied partially distributed teams and is currently looking at “fake news”.