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## Introduction to the minitrack on Disaster Information, Technology, and Resilience in Digital Government

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The 21st Century has been termed “the century of disasters.” Worldwide there were twice as many disasters and catastrophes in the first decade of this century as in the last decade of the 20th Century. All continents are affected, both directly and indirectly. And the trend continues, fuelled by climate change, demographic changes and social dynamics. The serious challenges facing government in cities, regions and nations of the world relate to acute shocks (such as forest fires, floods, earthquakes, tsunamis, pandemics and terrorist attacks) and chronic stresses (such as high unemployment, religious extremism, inefficient public transport systems, endemic violence, chronic shortages of food and water).

Information is among the key life-supporting essentials in a disaster response, as well as water and basic foods which are vital to sustain lives. It is information technology these days that gives us access to most of this information. We rely greatly on it. In this sense, information management with effective use of information systems should be conducted and evaluated among disaster relief agencies. Successful information management will result in making higher situational awareness in a field that is crucial for a disaster response. It also guides us to build a disaster-resilient community which can adapt the society to those unexpected events. These issues should be tackled at each level of the governance (international, national, regional, local, etc.), and with regards to all relevant dimensions (social, technological, interoperability, agility, etc.). This minitrack features government and disaster information management, including the development of disaster resilience communities/societies.

Five papers have been selected that deal with any aspect of the analysis, design, development, deployment, implementation, integration, operation, use or evaluation of ICT for discussing government roles for disaster responses, disaster information management, and resilience communities. In addition, we support innovative and break-through visions regarding “disaster information, technology and resilience.”

### 1. Framing Crisis Information Systems: The Case of WIS

*Ted Saarikko, Urban Nuldén, Pär Meiling, Kalevi Pessi*

Relief efforts for natural and societal crises require a multitude of agencies to effectively and efficiently share information and coordinate their efforts. In 2009, The Swedish Civil Contingencies Agency launched a Web-based Information System (WIS) for Information sharing in crisis management. The system has undergone two major revisions and is applied nationwide with the intent of aiding inter-agency coordination. The study draws upon Orlikowski and Gash’s notion of technological frames to contrast the perspectives of technology users and technology promoters. The study revealed that both stakeholder groups agree on the potential benefits of the system, but differ in their view on the system itself as well as its application in practice. Furthermore, the study highlights the limitations of dedicated ICT for crisis management as users perceive WIS to be useful in coordinating slow-moving events that involve many different societal actors, yet unwieldy to deploy in a sudden crisis.

### 2. The Behavior of Spontaneous Volunteers: A Discrete Choice Experiment on the Decision to Help

*Sebastian Lindner, Christoph Herrmann*

Modern communication technology has enabled new ways to exchange information and is one of the main drivers for citizens’ participation in disaster response. During the last decades, so-called spontaneous volunteers have become an important resource in coping with disasters. However, their unpredictable behavior has also led to several problems. Disaster managers urgently need insights

into volunteers' behavior to effectively use the offered potential. To gain and provide these insights into explaining what drives the decision to help, we performed a discrete choice experiment based on previously identified behavior-affecting attributes. Our results indicate that attributes like the scale of the disaster and the media coverage are among the most important factors in the decision to help. The model correctly predicts volunteers' scenario-specific decisions with an accuracy of 65%. Hence, the experiment offers valuable insights into volunteers' behaviors for disaster research and is a sound foundation for decision support for disaster management.

### **3. The Structure of Citizen Bystander Offering Behaviors Immediately After the Boston Marathon Bombing**

*Nicolas LaLone, Z Toups, Andrea Tapia*

In April of 2013, two pressure cooker bombs detonated near the finish line of the Boston Marathon. The resulting crowdsourced criminal investigation has been subject to intense scrutiny. What has not been discussed are the offering behaviors of Twitter users immediately following the detonations. The hashtag #BostonHelp offers a case study of what emergent, computer-mediated groups offer victims of a crisis event. Through creative appropriation of at-hand technologies (CAAT), this emergent group organized online offering and information about tangible resources on the ground. In this case, #BostonHelp participants harnessed blogs, social media, Google Forms, and pre-existing services to organize help for those in need. The resulting structure stabilized and became a symbol of the response itself. This case study offers an analysis of the structure created by computer-mediated crowds. We conclude with a discussion of trying to design, or even detect these behaviors at the start of a crisis response.

### **4. A Physics-Based Theory to Navigate Across Risks and Opportunities in the Performance Space: Application to Crisis Management**

*Frederick Benaben, Benoit Montreuil, Louis Faugere, Matthieu Lauras, Juanqiong Gou, Wenxin Mu*

This article presents an original theory for system management, based on physics principles. That theory considers that risks and opportunity can be seen as forces pushing or pulling a system with regards to its objective and its KPIs. Based on that proposal, this article presents the theory, based on (i) identification of susceptibility of systems to internal and external characteristics (danger, favorable conditions), thus creating forces (risks and opportunities), and (ii) evaluation of the sensibility of systems to these forces, thus creating consequences (damages or benefits). This article also presents the practical vision of that theory by detailing the way to observe the force-induced trajectory of the considered system with regards to its KPIs. An illustrative example and discussions about the perspectives conclude the article.

### **5. Refugee Camp Population Estimates Using Automated Feature Extraction**

*Brandon Green, Justine Blanford*

Throughout 2018, approximately 68.5 million people were forcibly displaced due to armed conflict, generalized violence, or human rights violations around the world; of those, 40 million were internally displaced persons (IDP), 25.4 million refugees, and 3.1 million asylum-seekers. Effective management of refugee and IDP camps rely on accurate, up-to-date, and comprehensive population estimates. However, obtaining this information is not always easy. Thus, the purpose of this study was to develop a methodology and custom toolset that estimates populations based on dwellings derived from automated feature extraction of high-resolution, multi-spectral orthorectified imagery. Estimates were determined for five Rohingya refugee camp populations and compared with United Nations High Commissioner for Human Rights (UNHCR) baseline data to determine accuracy.