ISCRAM2015 Conference Proceedings

12th *International Conference on Information Systems for Crisis Response and Management*

Editors:
Leysia Palen
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The **University of Agder (UiA)** is situated on the southern tip of Norway and is located on two campuses, in Kristiansand and Grimstad.

The university has 11,000 students and 1,100 faculty and staff members. It is one of the youngest universities in Norway, but its history dates back to 1839 when the first teacher training institution in the region was established. It is a public university with state-of-the-art buildings on both campuses. Research is the foundation of all teaching activities at UiA and covers a wide variety of disciplines.

UiA offers 14 PhD specialisations, 33 master's programmes and 44 bachelor's programmes. Shorter study programmes, as well as lifelong learning courses, are also available. The university is big enough to offer variety and challenge, yet small enough for students and faculty to make their mark.

'Agder' means 'on the edge' and the name suits the university and the twin counties of Vest-Agder and Aust-Agder in the southern part of the country. As a young university, the University of Agder aims to be on the cutting edge of innovation, education and research. Being a driving force for societal and regional development, the University of Agder has close contact with industry, organisations and cultural institutions. It is an internationally oriented university in a region exposed to strong international competition.

The **Centre for Integrated Crisis Management (CIEM)** is a top priority research center at the University of Agder, involving more than 20 researchers within technology, management and social sciences.

CIEM conducts innovative research on technology support for future crisis and disaster management and resilient societies, integrating knowledge and expertise from a broad range of domains such as wireless networks, sensor-based data capture, artificial intelligence, social media, decision support, risk management, coordination and technology adoption.

CIEM cooperates with decision-makers and responders in governments, industry and NGOs, in the Agder region, nationally and internationally. The CIEM Lab provides a testing and training platform for cutting edge technologies, ranging from wearable devices to UAVs, fostering innovation and development.

CIEM is a partner in the Smart Mature Resilience project in the EU Horizon 2020 programme. This project aims to develop a basis for a general guideline on resilience assessment and implementation, and involves collaboration with 7 European cities.

More information on CIEM: ciem.uia.no

For updates, follow us on Twitter: CIEMUiA

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ISCRAM2015 BEST PAPER AWARDS

The Best Paper Award honors the author(s) of a paper of exceptional merit dealing with a subject related to the ISCRAM. We have three categories: best research, insight and student paper. Here we specify the criteria for eligibility in each category:

Long Research papers
- Significance of the paper to the field of ISCRAM.
- Contribution to ISCRAM academic community.
- Use of appropriate methodological rigor.
- Clarity of writing.

Long Insight papers
- Significance of the paper to the field of ISCRAM.
- Contribution to ISCRAM practitioners' community.
- Practical relevance and applicability.
- Clarity of writing.

Long Student papers (Research or Insight)
- Significance of the paper to the field of ISCRAM.
- Level of contribution of the student in the paper.
- Theoretical/Practical contribution to ISCRAM community.
- Use of appropriate methodological rigor.
- Clarity of writing.

Process
A first set of candidate papers in each category has been proposed by the attending to the reviewers/track chairs ratings and recommendations. This first selection of the candidate papers has been made by the Papers and Conference Chairs. Then, the ISCRAM Publication and Standards Committee (PASC) takes the lead and proposes a committee for each category. The committee is mostly drawn from PASC, with one Program Committee representative nominated by the Conference Chair and one practitioner representative nominated by the ISCRAM Practitioner Committee. After receiving their feedback, The Best Paper decides which paper will receive the Best Student Paper Award. The rest of the papers can be recognized as finalists both in the ISCRAM2015 Conference Program and Proceedings.

ISCRAM2015 Best Paper Committee Composition

Best Paper Competition
Chair: Víctor A. Bañuls

Research Papers Committee
- José H. Canos
- Ioannis Dokas
- Tina Comes

Insight Papers Committee
- Murray Turoff
- Bert Brugghemans
- Joao Porto

Best Student Paper Competition
Chair: Julie Dugdale
Student paper Committee
- Monika Büscher
- Radmila Juric
- Magiswary Dorasmy

ISCRAM2015 Best Paper Award Candidates

The Nominated papers in each category will be presented in plenary (Monday-Wednesday morning, 10-11 am). The award ceremonies will take place during these sessions.

Nominations for Best Student Papers

Title: *Hybrid community participation in crowdsourced early warning systems*
Authors: Nicolas LaLone; Andrea Tapia, Nathan Case, Elizabeth MacDonald, Michelle Hall and Matthew Heavner

Title: *A Scenario-based approach for analyzing complex cascading effects in Operational Risk Management*
Authors: Miguel Ramirez de la Huerga, Victor Bañuls and Murray Turoff

Title: *The Polyvocality of Resilience:Discovering a Research Agenda through Interdisciplinary Investigation & Community Engagement*
Authors: Robert Soden, Leysia Palen; Claire Chase, Derya Deniz, Erin Arneson, Leah Sprain, Bruce Goldstein; Abbie Liel; Amy Javernick-Will and Shideh Dashti

Nominations for Best Insight Papers

Title: *Introspect Model: Competency Assessment in the Virtual World*
Authors: Katherine Lamb, Martijn Boosman and Jim Davies

Title: *The Role of Information Quality and Efficacy Beliefs in Predicting Chinese People's Information Seeking about Air Pollution Risk. The Role of Information Quality and Efficacy Beliefs in Predicting Chinese People's Information Seeking about Air Pollution Risk*
Authors: Yiwei Li, Yu Guo and Naoya Ito

Nominations for Best Research Papers

Title: *Spatiotemporal Distribution of Automobile Users: Estimation Method and Applications to Disaster Mitigation Planning*
Author: Toshihiro Osaragi

Title: *Visualizing Risk: making sense of collaborative disaster mapping*
Author: Katrina Petersen

Title: *Beyond Saving Lives: Assessing the Economic Benefits of Early Warning Apps for Companies in the Context of Hydrological Hazards*
Authors: Simone Wurster, Michael Klafft and Marcel Kühn

Title: *Automated Analysis and Adaptation of Disaster Response Processes with Place-Related Restrictions*
Authors: Marlen Hofmann, Hans Betke and Stefan Sackmann

ISCRAM2015 Posters

Poster Title	Authors
Automatic Assessment of Personal Coping Strategies from the social media: An Aid for Crisis Communication with the Public	Leykin, Dmitry; Lahad, Mooli; Aharonson-Daniel, Limor
Resilience of emergency responders under extreme flooding scenarios in the City of Leicester, UK.	Green, Daniel., Yu, Dapeng., Yang, Lili., Pattison, Ian. Wilby, Robert., Bosher, Lee. & Ryley, Ti.
Personal Data Protection in the Design and Certification of Security Products	Irene Kamara (Vrije Universiteit Brussel-FP7 CRISP Project)
Survey on how people reacted for emergency response at the Great East Japan Earthquake and Tsunami	Yuko Murayama, Jun Sasaki, Dai Nishioka, Masanori Takagi, Yusuke Goto, Seiji Usami, Satoshi Inoue and Satoshi Iwata (Iwate Prefectural University)
Online collaboration between formal and volunteer responders during the 2014 Ebola outbreak - analyze of chats as a tool	Per Aarvik, Standby Task Force
False Hope: The Story of One Rumor During the "Brother's Keeper" Military Operation	Tomer Simon, Avishay Goldberg, Bruria Adini
Findings from a literature review on agility and C2 agility in relation to crisis response and emergency management	Berggren, Peter; Johansson, Björn JE; Trnka, Jiri (FOI, Sweden)
Reducing Wide-area Evacuation Difficulty in Densely Built-up Wooden Residential Areas: Effects of Adding New Evacuation Routes	Takuya Oki and Toshihiro Osaragi (Tokyo Institute of Technology, Japan and CREST)
Information Collection of Street Blockage after a Large Earthquake for Reducing Access Time of Firefighters	Noriaki Hirokawa, Toshihiro Osaragi and Takuya Oki (Tokyo Institute of Technology, Japan and CREST)
SWIFT: Simulations With Intelligence for Fire Training	Carole Adam, Elise Beck and Julie Dugdale (University Grenoble Alpes, University of Agder, CIEM, Grenoble Informatics Laboratory, PACTE lab.)
Boundary work and boundary awareness: case study of an emergency exercise with blue light students	Annika Andersson (University West, Sweden)
Ontology-Based Retrieval for Case-Based Decision Support in Nuclear Emergency Management	Möhrle, Stella; Schoknecht, Andreas; Raskob, Wolfgang; Oberweis, Andreas (Karlsruhe Institute of Technology)
Model-Based Data Integration for Emergency Management	Vimala Nunavath, Andreas Prinz, Tina Comes (University of Agder)

Improving early recovery decision making by including communities in the information gathering and decision making process (PhD Colloquium)	Kenny Meesters; Bartel Van de Walle (Tilburg University)
SCOPANUM : Strategies of Communication during the Post-Accident phase of a Nuclear disaster through social Media (PhD Colloquium)	Antonin Segault (Franche-Comté University, France)
Does belonging to a Virtual Community of Practice improve city's resilience? (PhD Colloquium)	Raquel Gimenez (Tecnun, University of Navarra)
Semantic Resource Allocation in Humanitarian Response to Crises (PhD Colloquium)	Aladdin Shamoug (University of Westminster)
Self-Directed Learning and Students Level of Competencies: A quantitative analysis of higher technical institutions in Nepal (PhD Colloquium)	Hari Prasad Nepal (Kathmandu University)
Developing a risk and crisis management platform	Thomas Martin, Fabrice Trillaud, Fabrice Lainard (SYSTEL SA)
GIS incorporation of Structure-from-Motion models utilizing disaster response related imagery	Dean Walton (University of Oregon)
Applying knowledge management technology to support civil-military interaction in complex emergencies	Dick Ooms, Willem-Jan van den Heuvel, Bartel Van de Walle (Tilburg University)
Improving the coordination and decision making process in humanitarian relief operations through integrated distribution plans	Hossein Baharmand (University of Agder)
Decentralized Crisis Management: Principles of Civic Engagement in the Social Media Age	John Sabou (Centre for Terrorism & Counterterrorism, Leiden University)
Design Principles of Technological Tools that Support the Integration of Citizen Participation in Emergency Preparedness (PhD Colloquium)	Mariuxi MontesChunga (Universidad Carlos III de Madrid)
Gamification for Data Gathering in Emergency Response Exercises	Kenny Meesters (Tilburg University), Aaron Ruhe. Marvin Soetanto (University of Amsterdam)
Integrating social media in crisis response: learning from a realistic crisis exercise	Kenny Meesters, Lars van Beek (Tilburg University)
Towards an Information Framework for Community Based Comprehensive Recovery	Leo Galway), Martin Haran (University of Ulster), Martijn Neef (TNO), Conor Woods (Spatialest)

An Automated Helping Hand: How
Automated Agents Can Assist Humans in
Crisis Decision-Making

Bianca M. Zongrone, Douglas C. Derrick,
Praveen Kumar (University of Nebraska)

Book of Papers

Inspiring Research and Practice:
Message from the ISCRAM2015 Papers and Conference Chairs

"The ISCRAM Association's primary mission is to foster a community dedicated to promoting research and development, exchange of knowledge and deployment of information systems for crisis management"
(ISCRAM Constitution)

Inspired by this aim of fostering communication across communities, our objective for ISCRAM2015 was to increase participation among researchers, practitioners, policymakers, advanced professionals and students to promote lively discussion and broaden cross-disciplinary learning, while at the same time creating opportunities for the conference to be home to archival research products that drive basic science.

Managing the crises and disasters of future will require systems that are designed to cross boundaries and that help overcoming barriers between the local population, responders and experts from various domains, between command-and-control systems and participatory approaches, between business and humanitarian operations, between day-to-day planning and strategic management, between developed and developing countries, between technical solutions and possibilities and the actual needs of the users. Therefore, in ISCRAM2015 we have fostered communication across the disciplines and tracks, by offering more room for discussions in plenary.

To better understand the emerging and dynamic character of crises and disasters, the leitmotiv of ISCRAM2015 is "Getting Ready for the Unexpected"

Most paper submissions are dedicated to the questions how to collect, process and share data and how to transform it quickly into understandable, reliable and useful information and how to update this information as the situation unfolds The topics covered in this year's conference reflect vibrant long-term and emergent debates in the field, clustering around Network Theory, Analytical Modelling and Simulation, Planning, Foresight and Risk Analysis, Ethical, Legal and Social Issues, Geospatial Data and GIS, Command and Control Studies, Community Engagement, Decision Support Systems, Practitioner Cases and Practitioner Centred Research, Methodologies and Serious Gaming. The power of interdisciplinary collaboration is palpable as ethnographic studies speak to algorithms, automations, models and simulations, participatory monitoring, ethical and legal investigations, and economic evaluations. It is our hope that the range of research meets an energetic and committed, inspiring group of researchers, designers and practitioners.

To facilitate discussion and learning, we re-defined the Short and Long Paper categories and created additional distinct venues for Posters, Workshops, Demos, Panels and Tutorials. A word count rather than page count limit allows those with map- and image-heavy papers to showcase their contributions, and the programme provides ample opportunity for dialog.

The competitive and achievable Long Papers serve as the central focus in the programme. Nominated Long Papers in the Regular, Student and Insight categories will be presented in plenary at the conference to broaden cross-disciplinary discussion of the community's work. Also in plenary there will be three keynote talks and three panels on cross cutting topics such ISCRAM Research or the Practitioners Panel and current topics such as the Ebola Crisis, or Crisis Management in the Global South – including the debates about the refugee disaster in the Mediterranean or the earthquake in Nepal. Alongside, parallel sessions in smaller groups will foster in-depth exploration of critical opportunities and challenges in the 'informationalization' of crisis management and response.

For the Long Papers, the acceptance rate has been more competitive than in the years past, which reflects the increased expected rigor of those contributions, while the Short Paper category was designed to invite more risky, just-in-time and in progress contributions, with a deadline that was

closer to the conference dates. Thanks to a record-breaking number of submissions, you will see a wide range of work in this category, which reflects a growing interdisciplinary mix. Posters add to this in an even more agile manner, encouraging participation across a broad range of topics and disciplinary backgrounds. We hope this category will continue to grow in years to come.

In terms of evaluation and acceptance, the process strove to be thorough via a combined decentralized and centralized process. Track chairs were responsible for finding appropriate reviewers for each paper. The Track Chairs of each track then evaluated the reviews and the associated paper, and provided a meta-review. The Track Chairs evaluated their own pools of papers, and then made a recommendation to the Papers Committee. The Papers Committee calibrated across all tracks to account for naturally-arising differences between reviewer scoring across a range of reviewers. The Papers Committee and Track Chairs then did one more cycle of feedback to reach consensus on decisions.

In terms of numbers, ISCRAM 2015 saw a drop in Long Paper submissions but a dramatic spike in Short Paper submissions. The number of Long Papers was 66, the lowest since 2009 when submission numbers were first recorded, while the Short Papers had 159 submissions, a 49% increase over the previous record-breaking Short Paper year of 2013. Though the reasons for these changes might be multiple, we encourage ISCRAM to continue this experiment to see if these modifications to protocol achieve the goals of providing both an archival program of basic research through the Long Paper program, and an idea- and community-building program through its Short Paper program.

- The acceptance rate for Long Research Papers this year is 40%.
- The acceptance rate for Long Insight Papers is 64%.
- The acceptance rate for Short Papers is 70%.

Then, responding to enthusiasm around particular themes, we have for the first time in ISCRAM's history introduced paper-based workshops that complement the Sunday tutorials and the Doctoral Colloquium. The workshops are a forum to nurture emerging topics, develop joint publications, and foster a community on dedicated issues. Workshop organizers were free to set the paper format, deadlines, reviewing schemes of their choice. Summaries of each workshop are archived in the proceedings.

ISCRAM 2015 also hosts the first Project Symposium, bringing together 21 European Research projects in a networking event dedicated to exploring potential synergies and opportunities for collaboration, and to discuss the most important trends and developments in ISCRAM research and funding.

We hope that you enjoy what we expect to be a lively conference!

Leysia Palen (Program Chair and Papers Co-Chair), Monika Büscher (Papers Co-Chair), Amanda Hughes (Papers Co-Chair), Tina Comes (Conference Co-Chair) and Bjørn Erik Munkvold (Conference Co-Chair)

Keynote I
Informing and Deciding in a Context of Uncertainty, Risk and Crisis
Valérie November
Directrice de recherche/ Research Professor CNRS
Laboratoire Techniques, Territoires, Sociéteés (UMR CNRS 8134 LATTS)
Monday, May 25th, 2015

As described in its presentation, this conference is placed under the sign of *un*-ness: *un*expected, *un*certainty, *un*known, etc. This is a relevant and timely choice because concepts used in the field of risk and crises management were deeply revisited in recent decades to the point that uncertainty now seems to be a main marker of all fields of research and actions. It is therefore necessary to clarify this evolution.

Information is known to play a crucial role in risk management and in reducing uncertainties. It's a subject to which numerous studies have been devoted, mainly under the label of "Risk Communication". Yet despite the importance of such researches, traditional views of risk as well as of information must be questioned.

Risk studies have primarily focused on prevention and on crisis or disaster. But too little has been focused on the relationship between these two moments which actually require different forms of action, involve different actors and whose tilting point is crucial in crisis management. In reality actors are faced with a wide variety of situations that extend from one to another, and even that mix, without any sharp division between two temporalities. For example prevention data are often essential at the heart of a crisis situation.

My talk will focus on the concepts of risk, uncertainty, disasters and degraded situation and will attempt to clarify and define them in relation to each other. Each one covers specific procedures, information needs and action procedures.

Having specified these elements, the second part will focus on the consequences in terms of understanding the information and propose a complementary vision to the usual definitions. We shall see that producing and disseminating information does not mean that the information is seized, understood and usable. Production, circulation and reception of information will be analyzed through several case studies, including the work of the Operational Strategic Health Room at WHO, crisis management in Madagascar and the events following the January 2015 terrorist attacks in Paris.

This presentation will conclude that there is no generic information *per se*, that would be *ipso facto* relevant for all situations. If one does not take into account the context in which the information evolves information become thus an additional factor of uncertainty.

Keynote II
The Critical Role of Functioning Information Infrastructures in Disaster Response

Prof. Hans Jochen Scholl, PhD, MBA
University of Washington, The Information School
Tuesday, May 26th, 2015

Public administrations have been using advanced ICTs in all areas of government business to increase agility and flexibility, redesign and streamline process flows, improve the quality and scope of service, and strengthen overall safety and security. Like in other public-sector areas these so-called "Electronic Government" practices, or, taking the more recently used term "Smart Government" practices, have also greatly increased governments' emergency and disaster response and recovery capabilities. In more general terms, information and communication technologies (ICTs) are playing increasingly important roles in all phases of disaster and catastrophe management.

In this vein, higher agility and resiliency in disaster response and recovery are needed more than ever, since around the world the frequency, scale, and impacts of natural and man-made disasters have markedly increased over the past decades. When a catastrophe strikes, local responders and communities are regularly vastly overwhelmed by the impact. In early incident response, accurate and reliable information is the scarcest resource, and the larger the disaster, the longer it can take until the extent of the impact is completely identified. Understanding the scale and scope of the impact, gaining situational awareness, and forming a common operating picture are the foremost tasks of any response, so that action can be taken in the most informed and targeted fashion.

While advanced ICTs have greatly increased response capabilities, they have, however, also introduced new vulnerabilities. In major catastrophes an over-reliance on the smooth functioning of advanced ICT capabilities might prove costly and dangerous, since critical information infrastructures might be compromised, or even completely damaged.

Disasters of the magnitude of the 2013 Tohoku catastrophe in East Japan, for example, have demonstrated that responders can be drastically diminished in their capacity to communicate with each other and the public, once critical infrastructures such as the electric power grid, computer networks, and wireless networks have been knocked over.

Building and maintaining resilient information infrastructures for all phases of disaster management and for managing all hazards appear as the most important undertakings for coping with the far greater frequencies of catastrophes observed in recent decades. Responders need to maintain proficiency in operating with a wide range of instruments from low-tech and manual cardboard-based systems with no need for electric power to highly sophisticated and networked information and communication systems that provide most accurate, timely, and actionable information to incident managers and other decision makers.

The talk looks at select recent cases and discusses the complexities of response efforts, the range and capabilities of technologies in support of response management and summarizes some lessons learned.

The talk finally raises and discusses the question to which extent disasters and catastrophes are truly natural, and which ones might be rather man-made.

Keynote III
Wag the Dog – Information management and decision making in the humanitarian sector

Lars Peter Nissen,
Director of ACAPS
Wednesday, May 27, 2015

Strengthening the humanitarian sector's ability to assess the impact of crisis has been high on the humanitarian policy agenda for several years now. At first glance, it seems like progress has been made: the IASC has developed and endorsed new and stronger methodologies, such as the Multi-Cluster Initial Rapid Assessment (MIRA); a number of new programmes specialise in the gathering and analysis of data; and in several recent operations, innovative ways of assessing crisis have been tested. In parallel with the efforts of the traditional humanitarian agencies, a creative and vibrant community of new actors has emerged, including Crisismappers and the Digital Humanitarian Network (DHN).

However, all these efforts share an almost exclusive focus on the "supply" side of the equation: how to collect, analyse, and visualise data quicker and better. Only very limited attention has been given to the "demand" side: what do decision-makers need to make better decisions?

Very little is known about how decisions are made. It is not clear what role evidence plays, meaning it is an open question whether efforts to collect more data and produce more information are having the desired impact, and making a real difference to operations. This in itself is problematic, but it is even more disturbing that there does not seem to be much of an appetite for tackling this unknown. The humanitarian information management community seems to be satisfied with only an embryonic understanding of decision-making.

The lack of enthusiasm for exploring decision-making may be found in its political nature. Improving analysis is primarily a technical problem. Examining decision-making forces us to recognise that decisions are political. It makes us ask what may be influencing decisions, other than the needs on the ground. This is a hard question, but it is vital that we ask it, if we are to improve our capacity.

The keynote will explore the consequences of our lack of understanding of decision-making from a practitioner's point of view. Working from concrete operational examples, it will offer suggestions on how we can deepen our understanding of humanitarian decision-making, and from there, move forward and make it more accountable.