Technical Program

Saturday, April 21		
Time	**Event**	**Location**
8:00 am - 5:00 pm	Sahana Workshop	SFU Harbour Centre Room 1325
Sunday, April 22		
Time	**Event**	**Location**
9:00 am - 11:00 am	Conference Registration	Main Atrium
10:00 am - 1:00 pm	"New Trends and Best Practices in Disaster Simulation" Workshop by Robert Walker and Darren Blackburn, Justice Institute of British Columbia	320 Strategy Room
9:00 am - 4:30 pm	Ph.D. Colloquium Chair: Julie Dugdale	370 HSBC Executive Meeting Room
2:00 pm - 5:00 pm	"Information Sharing in Coalitions" Tutorial by Prof. Tim Grant, Netherlands Defence Academy	320 Strategy Room
4:30 pm - 5:00 pm	Ph.D. Poster Session	370 HSBC Executive

		Meeting Room
5:00 pm - 7:30 pm	ISCRAM Board Meeting	Somervell Room 3rd Floor Delta Suites
4:00 pm - 6:00 pm	Conference Registration	Main Atrium
5:00 pm - 6:00 pm	Orientation for Student Volunteers	320 Strategy Room
7:00 pm - 9:00 pm	Social Sunday	Elephant & Castle

Monday, April 23		
Time	**Event**	**Location**
8:00 am - 4:00 pm	Conference Registration	Main Atrium
7:30 am - 8:45 am	Continental Breakfast	Concourse Level
8:45 am - 9:00 am	Opening Address: Bartel Van de Walle and Brian Fisher	Asia Pacific Hall
9:00 am - 10:00 am	Keynote: "Canada's Multi-Agency Situational Awareness System – Keeping it Simple" Jack Pagotto	Asia Pacific Hall
	Parallel Tracks	
10:15 am - 11:15 am	Human Experiences in the Design of Crisis Response and Management Services and Systems (SP[1]) Chairs: Jens Pottebaum; Ahmed Seffah; Therese Friberg; Karsten Nebe Scenario play workshops - Co-design of emergency response scenarios for information technology design in collaboration with emergency response personnel Lundberg, Jonas; Granlund, Rego; Fredäng, Annevi Enriching Disaster Control Management based on Human-Centered Design	370 HSBC Executive Meeting Room

[1] Short Papers

	Fischer, Holger; Klompmaker, Florian	
10:15 am - 11:15 am	Intelligent Systems (FP[2]) Chairs: Frank Fiedrich; Gerhard Wickler; Julie Dugdale; Serge Stinckwich Operational Emergency Response under Informational Uncertainty: A Fuzzy Optimization Model for Scheduling and Allocating Rescue Units Wex, Felix; Schryen, Guido; Neumann, Dirk Rapid Geotagging of Social Media Text via an Indexed Gazetteer Sultanik, Evan Andrew; Fink, Clayton	470 Hamber Foundation Room

[2] Full Papers

Monday, April 23		
Time	**Event**	**Location**
10:15 am - 11:15 am	Modeling and Simulation (FP) Chairs: Christopher Zobel; Gary Fetter; Mauro Falasca Modeling of Attacking and Defending Strategies in Situations with Intentional Threats Hu, Xiaofeng; Shen, Shifei; Wu, Jiansong An Agent-based Approach For Safety Analysis of Safety-Critical Organizations Sharpanskykh, Alexei	320 Strategy Room
10:15 am - 11:15 am	Inter-Organizational Exercises and Operations (SP) Chairs: Dennis Andersson; Magdalena Granåsen; Niklas Hallberg The Systems Thinking Approach of Beyond-Line-Of-Sight Command and Control Diptee, Darryl Dion; McKenzie, Scott A concept for inter-organizational crisis management exercises Rencrantz, Carin; Karlsson, Niclas; Olsson, Rolf Business _Not_ As Usual: Civil-Military Interaction from an e-Business Perspective Ooms, Dick M	420 Strategy Room
10:15 am - 11:15 am	Social Media and Collaborative Systems (SP) Chairs: Starr Roxanne Hiltz; Paloma Diaz; Leysia Palen; Linda Plotnick RAVEN: Using Smartphones For Collaborative Disaster Data Collection Palmer, Nicholas; Kemp, Roelof; Kielmann, Thilo; Bal, Henri	Asia Pacific Hall

	Exploring Cooperating Smart Spaces for Efficient Collaboration in Disaster Management Floch, Jacqueline; Angermann, Michael; Jennings, Edel; Roddy, Mark "Straight to the Information I Need": Assessing Collational Interfaces for Emergency Response Tucker, Simon; Lanfranchi, Vitaveska; Ireson, Neil; Burel, Gregoire; Sosa, Alfonso; Ciravegna, Fabio Social Media in Command & Control: An extended framework Jongejan, Peter Arnout; Grant, Timothy John	

Monday, April 23		
Time	**Event**	**Location**
11:15 am - 11:45 am	Morning Coffee Break	Concourse Level
11:45 am -1:15 pm	Inter-Organizational Exercises and Operations (FP) Chairs: Dennis Andersson; Magdalena Granåsen; Niklas Hallberg Supporting Observers in the Field to Perform Model Based Data Collection Thorstensson, Mirko Supporting Inter-organizational Situation Assessment in Crisis Management Wiedenhoefer, Torben; Ley, Benedikt; Reuter, Christian; Pipek, Volkmar Wireless Sensor Networks for Emergency Response Chairs: Ayşegül Tüysüz Erman; Berend Jan Van der Zwaag; Ramiro Martínez-de-Dios Advantages of an Integrated Open Framework for Immediate Emergency Response Bürkle, Axel; Segor, Florian; Müller, Sven; Tchouchenkov, Igor; Kollmann, Matthias	370 HSBC Executive Meeting Room
11:45 am -1:15 pm	Modeling and Simulation (FP) Chairs: Christopher Zobel; Gary Fetter; Mauro Falasca	470 Hamber Foundation Room

	Empirical Analysis of Passenger Trajectories within an Urban Transport Hub Heuer, Benjamin; Roßnagel, Heiko; Zibuschka, Jan; Maucher, Johannes Towards an ontology for an Epidemiological Monitoring System Camara, Gaoussou; Despres, Sylvie; Djedidi, Rim; Lo, Moussa	

Monday, April 23		
Time	**Event**	**Location**
11:45 am -1:15 pm	Intelligent Systems (SP) Chairs: Frank Fiedrich; Gerhard Wickler; Julie Dugdale; Serge Stinckwich Crisis Information Management in the Web 3.0 Age Schulz, Axel; Paulheim, Heiko; Probst, Florian Role-based Dynamic Coalitions of Multi-Tasked Rescue Robots Stinckwich, S.; Bouraqadi, N.; Doniec, A.; Le Van, T. STORMI: An Agent-Based Simulation Environment for Evaluating Responses to Major Incidents in the UK Hawe, G. I.; Wilson, D. T.; Coates, G.; Crouch, R. S. Ontology-based Modeling of Emergency Incidents and Crisis Management Shen, Huizhang; Hu, Jingwen; Zhao, Jidi Incidone: A Task-Oriented Incident Coordination Tool Lijnse, Bas; Jansen, Jan Martin; Plasmeijer, Rinus	320 Strategy Room
11:45 am -1:15 pm	Geographic Information Science and Technology (GIS&T) for Crisis Response and Management Chairs: Brian Tomaszewski; Massimo Mecella; Francisco Nobre Reducing workload by navigational support in dynamic situations Hellgren, Maria Charlotte V.; Johansson, Björn JE Leveraging Geospatially-Oriented Social Media Communications in Disaster Response McClendon, Susan; Robinson, Anthony C.	420 Strategy Room

	Utilizing the Potential of the Affected Population and Prevalent Mobile Technology during Disaster Response: Propositions from the Literature Gunawan, L. T.; Fitrianie, S.; Brinkman, W. P.; Neerincx, M. Geographical Information System Supporting Data Gathering and Fast Decision Making in Emergencies Situations Marino, T. B.; Nascimento, B. S.; Borges, M. R. S. When the Tsunami Comes to Town – Improving Evacuation Modeling by Integrating High-resolution Population Exposure Freire, S. C.; Aubrecht, C.; Wegscheider, S.	

Monday, April 23		
Time	**Event**	**Location**
11:45 am -1:15 pm	Social Media and Collaborative Systems (FP) Chairs: Starr Roxanne Hiltz; Paloma Diaz; Leysia Palen; Linda Plotnick Trusting Tweets: The Fukushima Disaster and Information Source Credibility on Twitter Thomson, Robert; Ito, Naoya; Suda, Hinako; Lin, Fangyu; Liu, Yafei; Hayasaka, Ryo; Isochi, Ryuzo; Wang, Zian Exploring the Design of Technological Platforms for Virtual Communities of Practices Herranz, Sergio; Díez, David; Díaz, Paloma; Hiltz, Starr Roxanne Learning from the Crowd: Collaborative Filtering Techniques for Identifying On-the-Ground Twitterers during Mass Disruptions Starbird, Kate; Muzny, Grace; Palen, Leysia	Asia Pacific Hall
1:15 pm - 2:30 pm	Lunch	Concourse Level
2:30 pm - 4:00 pm	Special Session: Mixed Methods, Community / Practitioner Engaged Research & Translation for the Crisis Context (FP) Chair: Christine Adler An Upstream-Downstream Approach for Disaster Management Information Systems Design Kuziemsky, Craig Edward; O'Sullivan, Tracey; Corneil, Wayne	370 HSBC Executive Meeting Room

	Rationale for the Development of Emergency Management Systems for Local Communities Hallberg, Niklas; Hallberg, Jonas; Granlund, Helena Maria; Woltjer, Rogier Community Engagement for Translational Disaster Research: Fostering Public, Private & Responder Group Partnerships [Invited Paper] Ahmed, Syed; Nelson, David A.; Biedrzycki, Paul A.; Sandy, Marie G.; Opel, Shannon; Franco, Zeno E.	

Monday, April 23		
Time	**Event**	**Location**
2:30 pm - 4:00 pm	Decision Support Methods for Complex Crises (SP) Chair: Tina Comes; Marcus Vogt; Niek Wijngaards Optimal Decision Maker Algorithm for Disaster Response Management with I2Sim Applications Wang, Kui; Bai, Ming; Marti, Jose; Srivastava, KD Rational Resource Allocation in Mass Casualty Incidents – Adaptivity and Efficiency Gabdulkhakova, Aygul; König-Ries, Birgitta; Rizvanov, Dmitry Ontological Reasoning as a Tool for Humanitarian Decision Making Shamoug, Aladdin; Juric, Radmila "Badge-Primed" Decision Making Drury, Jill L.; Anganes, Amanda; Byrne, Heather; Casipe, Maria C.; Dejean, Roger; Hill, Simone; Lewis, Tristan; Lucas, Jesse; McCann, Eric	470 Hamber Foundation Room
2:30 pm - 4:00 pm	Planning and Foresight (SP) Chairs: Murray Turoff; Victor A. Bañuls-Silvera Improving Epidemiology Research with Patient Registries Based on Advanced Web Technology Majchrzak, Tim A.; Schmitt, Oliver Fighting Agro-Terrorism in Cyberspace: Basics in Intention Detection Using Overt Electronic Data Sources Rohn, Eli; Erez, Gil	320 Strategy Room

	Risk Perception, Strategic Planning and Foresight Methodologies within the Romanian Emergency System Zulean, Marian; Prelipcean, Gabriela Risk Analysis for Critical Systems with Reliability Block Diagrams Weyns, Kim; Höst, Martin	

Monday, April 23		
Time	**Event**	**Location**
2:30 pm - 4:00 pm	Serious Games for Crisis Management (SP) Chairs: Veerle Van der Sluys; Theo van Ruijven Instructor Tools for Virtual Training Systems Field, Joris Nicholas; Rankin, Amy; Morin, Magnus; Lemmers, Arjan "Safety Villages": an educational game for raising children's awareness of risks Zarraonandia, Telmo; Ruíz Vargas, Mario Rafael;Díaz, Paloma; Aedo, Ignacio The other city – Designing a serious game for crisis training in close protection Lukosch, Heide; van Ruijven, Theo; Verbraeck, Alexander	420 Strategy Room
2:30 pm - 4:00 pm	Social Media and Collaborative Systems (FP) Chairs: Starr Roxanne Hiltz; Paloma Diaz; Leysia Palen; Linda Plotnick Trial by Fire: The Deployment of Trusted Digital Volunteers in the 2011 Shadow Lake Fire St. Denis, Lise; Hughes, Amanda Lee; Palen, Leysia Towards a realtime Twitter analysis during crises for operational crisis management Terpstra, Teun; de Vries, Arnout; Stronkman, Richard; Paradies, Geerte Peripheral response: Microblogging during the 22/7/2011 Norway attacks	Asia Pacific Hall

	Perng, Sung-Yueh; Büscher, Monika; Halvorsrud, Ragnhild; Wood, Lisa; Stiso, Michael; Ramirez, Leonardo; Al-Akkad, Amro	
4:00 pm - 4:30 pm	Afternoon Coffee Break	Concourse Level

Monday, April 23		
Time	**Event**	**Location**
4:30 pm - 6:00 pm	Special Session: Mixed Methods, Community / Practitioner Engaged Research & Translation for the Crisis Context (SP) Chair: Christine Adler Emergency response in rural areas: how new ways of organizing and supporting first responders can apply to crisis management Pilemalm, Sofie Eilsabeth; Stenberg, Rebecca; Andersson Granberg, Tobias; Axelsson, Anders Federal Disaster Requests for Tribal Land Inglis Steinfeld, Nathaniel Impacting Factors on Human Reactions to Alerts Kluckner, Sigmund; Sautter, Johannes; Max, Matthias; Engelbach, Wolf; Weber, Tina GABEK WinRelan – a Qualitative Method for Crisis Research Engaging Crisis Management Personnel Adler, Christine; Haus, Mirjam Mona; Jakob, Lisa; Erfurt, Lena; Krüsmann, Marion Building Resilience Through Crisis Mapping, Community Engagement and Recovery Planning in Sudan Puig Larrauri, Helena; Indreboe Alshaikh, Margunn	370 HSBC Executive Meeting Room
4:30 pm - 6:00 pm	Decision Support Methods for Complex Crises (SP) Chair: Tina Comes; Marcus Vogt; Niek Wijngaards Generic self-learning decision support system for	470 Hamber Foundation Room

	large-scale disasters Moehrle, Stella Estimating the Value of Casualty Health Information to Optimization-Based Decision Support in Response to Major Incidents Wilson, Duncan T.; Hawe, Glenn I.; Coates, Graham; Crouch, Roger S. Towards a Context-Aware Multi-Party Emergency Coordination System Framework Way, Steven Clifton; Yuan, Yufei	

Monday, April 23		
Time	**Event**	**Location**
4:30 pm - 6:00 pm	Planning and Foresight (SP) Chairs: Murray Turoff; Victor A. Bañuls-Silvera On Improving Emergency Preparedness and Management with Delphi Laakso, Kimmo Collaborative foresight as a means to face future risks - An innovative platform conception Markmann, Christoph Ulrich; von der Gracht, Heiko A.; Keller, Jonas; Kröhl, Rixa Multidisciplinary Challenges in an Integrated Emergency Management Approach Gonzalez, Jose J.; Granmo, Ole-Christoffer; Munkvold, Bjørn Erik; Yong Li, Frank; Dugdale, Julie Capturing communities' perceptions of risk through the eyes of their citizens: using mobile VGI networks to map tsunami risk awareness Nick Hedley	320 Strategy Room
4:30 pm - 6:00 pm	Command and Control Studies Chairs: Peter Berggren; Björn JE Johansson The role of Artefacts in Police Emergency Response sensemaking McMaster, Richard; Baber, Chris; Duffy, Tom The value of Different Modalities to Support Command and Control Situation Awareness Krupenia, Stas S; Aguero, Cécilia; Nieuwenhuis, Kees	420 Strategy Room

	C.H.M. Collaboration awareness – a necessity in crisis response coordination Treurniet, Willem; van Buul-Besseling, Kim; Wolbers, Jeroen Crisis Management Systems in Germany – a Status Report about the functions and developments of private and public crisis management systems in Germany Neuhaus, Christian; Giebel, Daniela; Färfers, Sabine; Hannappel, Mario A Taxonomy of Market Mechanisms for Information Sharing in Crisis Response Coalitions Grant, Tim; van der Wal, Arien	

Monday, April 23		
Time	**Event**	**Location**
4:30 pm - 6:00 pm	Social Media and Collaborative Systems (SP) Chairs: Starr Roxanne Hiltz; Paloma Diaz; Leysia Palen; Linda Plotnick Towards an Ontology Broker to Improve Cross-agency Sharing in Emergency Response Duffy, Tom; Baber, Chris; McMaster, Richard; Houghton, Robert Social Media – Truly Viable For Crisis Response? Jennex, Murray Eugene Making use of New Media for pan-European Crisis Communication Nilsson, Susanna; Brynielsson, Joel; Granåsen, Magdalena; Hellgren, Charlotte; Lindquist, Sinna; Lundin, Mikael; Narganes Quijano, Maribel; Trnka, Jiri Multilingual Analysis of Twitter News in Support of Mass Emergency Events Zielinski, Andrea; Bügel, Ulrich	Asia Pacific Hall
6:00 pm - 8:00 pm	Welcome Reception	Innes Thompson Room 2nd Floor Delta Suites
Tuesday, April 24		
8:00 am - 4:00 pm	Conference Registration	Main Atrium
7:30 am - 9:00 am	Continental Breakfast	Concourse Level

9:00 am - 10:00 am	Keynote: "Integrative Visual Analytics for Effective Decision Making and Action" David Ebert	Asia Pacific Hall

Tuesday, April 24		
Time	**Event**	**Location**
	Parallel Tracks	
10:15 am - 11:15 am	Healthcare Crisis Management Systems (FP) Chair: Zeno Franco; Tony Norris; Christina Eldredge Using Document-Based Databases for Medical Information Systems in Unreliable Environments Schmitt, Oliver; Majchrzak, Tim A. Disaster Medical Education & Simulated Crisis Events: A Translational Approach Hayes, Antony Joshua; Franco, Zeno; Lancaster, Jessica; Kissack, Anne	370 HSBC Executive Meeting Room
10:15 am - 11:15 am	Humanitarian Challenges Chairs: Carleen Maitland; Bartel Van de Walle; Dewald van Niekerk Humanitarian Response in the Age of Mass Collaboration and Networked Intelligence Olafsson, Gisli Rafn Mapping Libyan Health Facilities - A Collaboration Between Crisis Mappers and the World Health Organization Chan, Jennifer Lisa; Colombo, Robert; Musani, Altaf	470 Hamber Foundation Room
10:15 am - 11:15 am	Human Experiences in the Design of Crisis Response and Management Services and Systems (FP)	320 Strategy Room

	Chairs: Jens Pottebaum; Ahmed Seffah; Therese Friberg; Karsten Nebe Complexity and Usability of Voice-enabled Alerting and Situational Reporting Decoupled Systems Waidyanatha, N.; Wilfred, T.; Perera, K.; Silva, M.; Burell, B. Sharing mission experience in tactical organizations Andersson, Dennis; Rankin, Amy	

Tuesday, April 24		
Time	**Event**	**Location**
10:15 am - 11:15 am	Decision Support Methods for Complex Crises (FP) Chair: Tina Comes; Marcus Vogt; Niek Wijngaards Efficient Scenario Updating in Emergency Management Comes, Tina; Wijngaards, Niek; Schultmann, Frank Establishing Collaborative Option Awareness during Crisis Management Drury, Jill Lynn; Pfaff, Mark S.; Klein, Gary L.; Entezari, Steven	Asia Pacific Hall
11:15 am - 11:45 am	Morning Coffee Break	Concourse Level
11:45 am- 1:15 pm	Healthcare Crisis Management Systems (SP) Chair: Zeno Franco; Tony Norris; Christina Eldredge A Scoping Study of R&D Needs in Emergency Planning in UK Healthcare Systems French, Simon; Boyd, Alan; Chambers, Naomi; King, Russell; Shaw, Duncan; Whitehead, Alison Challenge Patient Dispatching in Mass Casualty Incidents Donner, Anton; Greiner-Mai, Thomas; Adler, Christine ALARM: A Modular IT Solution to Support and Evaluate Mass Casualty Incident (MCI) Management Lawatscheck, Robert; Düsterwald, Stephan; Wirth, Carsten; Schröder, Torsten	370 HSBC Executive Meeting Room
11:45 am- 1:15	Modeling and Simulation (SP)	470 Hamber Foundation

pm	Chairs: Christopher Zobel; Gary Fetter; Mauro Falasca STAR-TRANS Modeling Language (STML) Modeling Risk in the STAR-TRANS Risk Assessment Framework for Interconnected Transportation Systems Zisiadis, D.; Thanos, G.; Kopsidas, S.; Leventakis, G.; Grizis, V.; Tassiulas, L. Characterizing Disaster Resistance and Recovery using Outlier Detection Zobel, C. W.; Melnyk, S. A.; Griffis, S. E.; Macdonald, J. R. Developing a Physics-based Model for Post-Earthquake Ignitions Yildiz, Selim Serhan; Karaman, Himmet	Room

Tuesday, April 24		
Time	**Event**	**Location**
11:45 am- 1:15 pm	Human Experiences in the Design of Crisis Response and Management Services and Systems (SP) Chairs: Jens Pottebaum; Ahmed Seffah; Therese Friberg; Karsten Nebe Electronic Checklist Support for Disaster Response Krüger, Uwe; Beckstein, Clemens; Wucholt, Fabian An Initial Usability Evaluation of the Secure Situation Awareness System Nurse, J.; Creese, S.; Goldsmith, M.; Craddock, R.; Jones, G. Instructor's Tasks in Crisis Management Training Rankin, Amy; Field, Joris; Kovordanyi, Rita; Eriksson, Henrik Survey: ICT-supported public participation in disasters Al-Akkad, Amro; Zimmermann, Andreas	320 Strategy Room
11:45 am- 1:15 pm	Planning and Foresight (FP) Chairs: Murray Turoff; Victor A. Bañuls-Silvera Design and initial validation of the Raster method for telecom service availability risk assessment Vriezekolk, Eelco; Wieringa, Roel; Etalle, Sandro SAGA: an Integrated Architecture for the Management of Advanced Emergency Plans Canós-Cerdá, J. H.; Gómez-Llana, A.; Penadés-Gramaje,M.C.; S. Borges, M. R.	420 Strategy Room

	Supporting Collaborative Scenario Analysis Through Cross-Impact Bañuls Silvera, V. A.; Turoff, M.; Hiltz, S. R.	
11:45 am- 1:15 pm	Social Media and Collaborative Systems (FP) Chairs: Starr Roxanne Hiltz; Paloma Diaz; Leysia Palen; Linda Plotnick Between a Rock and a Cell Phone: Communication and information use during the Egyptian uprising Kavanaugh,A.L; Sheetz, S.; Hassan, R.; Yang, S.; Elmongui, H. G.; Fox, E. A.; Magdy, M.; Elmongui, H. G.; Shoemaker, D.J. Connected Communications: Network Structures of Official Communications in Disaster Sutton, J.; Spiro, E.; Johnson, B.; Fitzhugh, S.; Greczek, M.; Butts, C. Crowd Sentiment Detection during Disasters and Crises Nagy, Ahmed; Stamberger, Jeannie	Asia Pacific Hall

Tuesday, April 24		
Time	**Event**	**Location**
1:15 pm - 2:30 pm	Lunch	Concourse Level
2:30 pm - 4:00 pm	Open Track (FP) Chair: Mark Haselkorn A Pragmatic Approach to Smart Workspaces for Crisis Management Botterell, Art; Griss, Martin A Concept for Interoperability of Security Systems in Public Transport Kurowski, S.; Zibuschka, J.; Roßnagel, H.; Engelbach, W. A Review of Common Tasks Supported by Information Communication Technology for Times of Emergency Aman, Hina; Irani, Pourang; Liang, Hai-Ning	370 HSBC Executive Meeting Room
2:30 pm - 4:00 pm	Event-Driven Techniques and Methods for Crisis Management Chairs: M. Lauras; A.M Barthe-Delanoe; N. Stojanovic; F. Benaben Coordination of Emergency Response Operations via Event-Based Awareness Mechanism Yu, Bo; Cai, Guoray Enriching an Intelligent Resource Management System with Automatic Event Recognition Stein, D.; Krausz, B.; Löffler, J.; Bardeli, R.; Schwenninger, J.; Usabaev, B.; Marterer, R. An architecture for distributed, event-driven systems to collect and analyze data in emergency	470 Hamber Foundation Room

	operations and training exercises Moi, Matthias; Marterer, Robin	
2:30 pm - 4:00 pm	Early Warning and Expert Systems for Disaster Management Chairs: Georges Allaert; Hussain Aziz Saleh Integrating national tsunami early warning systems – towards ocean-wide system-of-systems networks Lendholt, M.; Esbri Palomares, Miguel; Hammitzsch, Martin Evaluating SAVER: Measuring Shared & Team Situation Awareness of Emergency Decision Makers Javed, Yasir; Norris, Tony; Johnston, David For Whom the Siren Sounds: Public Perceptions of Outdoor Warning Sirens in Northeast Alabama Plotnick, Linda; Hiltz, Starr Roxanne; Burns, Matthew Workflows and Decision Tables for Flexible Early Warning Systems Riedel, Felix; Chaves, Fernando	320 Strategy Room

Tuesday, April 24		
Time	**Event**	**Location**
2:30 pm - 4:00 pm	Research Methods Chairs: Mark S. Pfaff; Bas Lijnse The Myth of Business Process Modeling for Emergency Management Planning Peinel, Gertraud; Rose, Thomas; Wollert, Alexander Formalization of crisis response coordination from a public inquiry report Passenier, David; Mollee, Julienka; Wolbers, Jeroen; Boersma, Kees; Groenewegen, Peter	420 Strategy Room
2:30 pm - 4:00 pm	Education and Training (SP) Chairs: Chris Hagar; Andrew Collins Towards Evidence Based Command Post Exercises in Disaster Response Heumüller, Erich; Richter, Sebastian; Ulrike Lechner, Ulrike Developing Realistic Crisis Management Training MacKinnon, Lachlan; Bacon, Liz Serious Gaming in Training for Crisis Response De Kleermaeker, Simone; Arentz, Loana eSEC Portal as a Tool for Improvement of Security Focused Studies Ristvej, Jozef; Kampova, Katarina; Lovecek, Tomas MIRROR: Improving coordination in multidisciplinary crisis management teams	Asia Pacific Hall

	de Koning, Lisette; Huis in 't Veld, Mirjam; van Buul, Kim; van Dongen, Kees; van Hemert, Dianne; Paulissen, Rosie	
4:00 pm - 5:00 pm	Poster/Demo Session & Coffee Break	Concourse Level
5:00 pm - 6:00 pm	ISCRAM General Assembly (ISCRAM Members only)	Asia Pacific Hall
7:00 pm – 9:30 pm	Conference Banquet, Awards Ceremony, Juergen Beyerer's "Technologies for Holistic Disaster Management"	Imperial Chinese Restaurant

Wednesday, April 25		
Time	**Event**	**Location**
8:00 am - 12:00 pm	Conference Registration	Main Atrium
7:30 am - 9:00 am	Continental Breakfast	Concourse Level
9:00 am - 10:00 am	Keynote: "Thoughts on the Growing Crisis in Disaster Response: Levels of Decision Making and Other Concerns" Howard Roy Williams	Asia Pacific Hall
	Parallel Tracks	
10:15 am -11:15 am	Open track (SP) Chair: Mark Haselkorn Interoperability for Public Urban Transport Security: The SECUR-ED Interoperability Notation Sautter, Johannes; Roßnagel, Heiko; Kurowski, Sebastian; Engelbach, Wolf; Zibuschka, Jan When Online is Off: Public Communications Following the February 2011 Christchurch, NZ Earthquake Sutton, Jeannette	370 HSBC Executive Meeting Room
10:15 am -11:15 am	Modeling and Simulation (SP) Chairs: Christopher Zobel; Gary Fetter; Mauro Falasca Monte Carlo And Decision Making Support In Crisis	470 Hamber Foundation Room

	Management Castillo, José Miguel; Hiltz, Starr Roxanne; Turoff, Murray Dynamic Planning of Fire and Rescue Services Gustafsson, Anna; Andersson Granberg, Tobias	

Wednesday, April 25		
Time	**Event**	**Location**
10:15 am -11:15 am	Wireless Connectivity Management (SP) Chair: Michael R. Bartolacci; Ivan G. Guardiola Enhancing Robustness of First Responder Communication in Urban Environments Panitzek, Kamill; Schweizer, Immanuel; Bönning, Tobias; Seipel, Gero; Schulz, Axel; Mühlhäuser, Max Simulation of wireless, self-organising and agent-based dynamic communication scenarios Schau, Volkmar; Hellfritzsch, Stefan; Scharf, Sebastian; Eichler, Gerald; Erfurth, Christian; Rossak, Wilhelm The Impact and Opportunities for Wireless Communications in Chinese Disaster Planning and Management Ozceylan, Dilek; Bartolacci, Michael R	420 Strategy Room
10:15 am - 11:15 am	Special Session: Improving Information Systems for Crisis Response and Management through Modeling and Analysis of Humanitarian Workflow Panel: Mark Haselkorn (Chair), Keith Butler, Robin Mays, Nick Macdonald, and Roy Williams	320 Strategy Room
10:15 am -11:15 am	Event-Driven Techniques and Methods for Crisis Management (SP) Chairs: Matthieu Lauras; Anne-Marie Barthe-Delanoe; Nenad Stojanovic; Frédérick Benaben Integration of Uncertainty into Emergency Procedures of Water Boards	Asia Pacific Hall

	Wojciechowska, Karolina; Vreugdenhil, Hanneke Event-Driven Agility of Crisis Management Collaborative Processes Barthe-Delanoë, Anne-Marie; Bénaben, Frédérick; Carbonnel, Sabine; Pingaud, Hervé Real-time Support for Exercise Managers' Situation Assessment and Decision Making Kovordanyi, Rita; Pelfrene, Jelle; Rankin, Amy; Schreiner, Rudolf; Jenvald, Johan; Morin, Magnus; Eriksson, Henrik	
11:15 am - 11:45 am	Morning Coffee Break	Concourse Level

Wednesday, April 25		
Time	**Event**	**Location**
11:45 am - 1:15 pm	Open track (SP) Chair: Mark Haselkorn Ontology-driven Multimodal Interface Design for an Emergency Response Application Tsiporkova, Elena; Tourwé, Tom; González-Deleito, Nicolás; Hristoskova, Anna Describing a Pipeline Emergency Response Communications System Using Situational Awareness Informational Requirements and an Informational Flow Analyses Groner, Norman; Jennings, Charles Developing a Framework For a Social Vulnerability and Consequence-Based Post-Disaster Behavior Analysis Methodology Unen, H. Can Technological adaptation in crisis response: A proposition of metrics Adrot, Anouck. V; Zhou, Wei; Meiller, Yannick; Bureau, Sylvain; Piramuthu, Selwyn X24 Mexico Jennex, Murray Eugene; Bressler, George; Frost, Eric	370 HSBC Executive Meeting Room
11:45 am - 1:15 pm	Special Panel: The Future of ISCRAM Simon French, Julie Dugdale, Murray Turoff, Jonas Landgren and Bartel Van de Walle. Moderator: Zeno Franco	Asia Pacific Hall

1:15 pm - 2:30 pm	Lunch	Concourse Level
2:30 pm - 3:30 pm	Closing Session: Concluding Remarks, ISCRAM-ASIA 2012, and introduction to ISCRAM 2013 by Wolfgang Raskob	Asia Pacific Hall

Technical Program – Saturday, April 21

Sahana Workshop

Saturday, April 21, 8:00 am – 5:00 pm
SFU Harbour Centre Room 1325

A free workshop is offered to ISCRAM members the day before the conference begins. This is an opportunity for students, faculty, and practitioners from the ISCRAM community to be active contributors to humanitarian efforts. This workshop will also demonstrate to faculty how integrating software development into real world disaster management systems provides the ultimate platform upon which to further teach students to develop code, integrating and building upon real world applications building a global workforce. Limit of 30 participants. Attendees should bring a laptop computer with them. No prior experience with Sahana software, knowledge or technical skills are required.

Technical Program – Sunday, April 22

Workshop: New Trends and Best Practices in Disaster Simulation

Robert Walker and Darren Blackburn from the Justice Institute of British Columbia
Sunday, April 22, from 10:00 a.m. to 1:00 p.m.
320 Strategy Room

For decades, tabletop exercises have looked pretty much the same: a facilitator reads out a narrative, paper inputs are handed to participants, and notes are recorded on flip charts. While effective, maintaining interest and buy-in for these exercises is becoming increasingly challenging. In the past few years, a number of new products have entered the market providing easy and inexpensive ways to make exercises more realistic, interactive and immersive. For learning to be effective it must be engaging, and this is where interactive, immersive simulations can be so effective. The ExPod simulation system at the JIBC brings critical incident decision making to life by providing individuals with experiences of real world situations within a safe training setting. While the primary focus is decision making, other benefits can include

practicing, testing and critiquing operational plans and procedures; assessing protocols; promoting inter-personal and inter-agency cooperation; and experiencing group dynamics. The presentation will provide an overview of emergency management exercise design and simulation technologies, and a demonstration of how immersive technology has been incorporated into public safety training at the JIBC. Participants will have the opportunity to interact with the ExPod system during the presentation. The workshop will focus on: Reviewing basic concepts in emergency management exercise design, Examining best practices in emergency management exercise design, Exploring new trends in emergency management exercise design and technology, and Demonstrating the ExPOD simulation system.

Ph.D. Colloquium

Chair: Julie Dugdale
Faculty: Tung Bui, Starr Roxanne Hiltz, Bas Lijnse, Murray Turoff, and Bartel van de Walle
Sunday, April 22, 9:00 am – 4:30 pm
370 HSBC Executive Meeting Room

The goals of the ISCRAM 2012 Ph.D. Colloquium are three-fold: (1) To develop and sustain a network of young scholars conducting high quality research in the area of Information Systems for Crisis Response and Management. (2) To support the next generation of crisis management researchers by addressing issues relevant to the progression of a research career. (3) To allow participants to discuss their research with leading specialists, scholars and peers in an international setting.
Accomplishment of these goals is supported through a one-day program that takes place immediately prior to the main ISCRAM conference. The colloquium is targeted at PhD students seeking careers as researchers in academic settings. Information systems for crisis response and management is an inherently multi-disciplinary domain and so PhD students from Computer Science, Information Systems, Organization Research, Management Science, Social Sciences and other related domains are eligible to apply. The colloquium will consist of discussions, presentations and shared activities centred on the following topics: the Ph.D. process,

building and utilizing your research community, advancing your career, opportunities for publishing your work and funding your future research.

Tutorial: Information sharing in coalitions: processes, information exchange requirements, architectures, social media, security regulations, and cultural norms.

Prof. Tim Grant

Sunday, April 22, 2:00 p.m. to 5:00 p.m.

320 Strategy Room

Coalitions are the rule in modern crisis management operations. They comprise multiple organizations from diverse disciplines and nationalities that wish to retain their own sovereignty. Their long-term goals may not be aligned, and their organizational cultures may even be antagonistic. The partners do not form part of a single organizational hierarchy, but constitute a temporary partnership for the duration of the operation. Nevertheless, they need to share information to find their place in the coalition, to prepare plans collaboratively, to synchronize their actions, to evaluate what they have achieved, and to negotiate changes in their relationships with other coalition partners. Today's lowest common denominator in information sharing is the telephone, email, and face-to-face meetings, but richer partnerships should be possible with social media and Web 2.0 technologies. The purpose of this tutorial is to look at what is known about information sharing in crisis management and military coalitions, taking a socio-technical systems viewpoint. Following the introduction, three broad aspects are reviewed: organizational, technical, and socio-cultural. Organizational aspects include the coalition structure, internal processes within partner organizations, the interactions between partners, and interoperability. Technical aspects include the information sharing and seeking processes, information exchange requirements and standards, communications media (especially social media and Web 2.0), and architectures (especially service-oriented). The socio-cultural aspects include information-sharing propensities at individual, team, and organizational levels, differences in culture, and the role of common ground in assimilating shared information. Finally, the tutorial concludes with an overview of where research is needed.

Technical Program – Abstracts of Presentations: Monday, April 23

Canada's Multi-Agency Situational Awareness System – Keeping it Simple!

Jack Pagotto

Monday, April 23, 9:00 am-10:00 am

Asia Pacific Hall

Jack Pagotto, Senior Scientist with Defence R&D Canada's Centre for Security Science will present recent work related to an ambitious national interoperability program he is leading for the emergency management community in Canada. The Canadian Multi-Agency Situational Awareness System (MASAS) is rapidly becoming Canada's national system for exchanging emergency management incident-relevant information amongst multiple agencies and jurisdictions. Through the use of structured information aligned with open standards, and a centrally managed open architecture, MASAS provides a trusted virtual community with the ability to seamlessly exchange emergency management information. MASAS offers an information exchange architecture that is based around a highly resilient system of data aggregation hubs that are easily accessible directly or through third party commercial tools by emergency management officials at all levels, from the smallest community in the most remote areas of Canada's north to key federal stakeholders such as the federal Government Operations Centre or the Canadian military. Jack will highlight some of the key design principles, experimental activities, and technology implementation strategies that are positioning MASAS as a Canadian success story in the making – from coast to coast to coast.

Track Human Experiences in the Design of Crisis Response and Management Services and Systems (Full Papers)

Monday, April 23, 10:15 am - 11:15 am

370 HSBC Executive Meeting Room

ID: 142 - Scenario play workshops - Co-design of emergency response scenarios for information technology design in collaboration with emergency response personnel

Jonas Lundberg, Rego Granlund, Annevi Fredäng

We describe a co-design method for emergency response scenario creation, to support the evaluation of new information technologies. The aim of our use of the method were to achieve scenarios that could be used in experiments or training sessions with professional emergency response personnel. We have analyzed how the method facilitated the design of scenarios (events, resource demands, communication between players), and the description of constraints in a resource management matrix. Our research indicates that the resource management matrix could be an important complement to function-centric analysis methods such as Functional Resonance Analysis Method (FRAM). We also illustrate how the interplay between play and situation description allowed us to simultaneously design and validate the scenarios with respect to playability versus resource demands. We discuss how the resource matrix can be used to adjust the validated scenarios after the design sessions.

ID: 283 - Enriching Disaster Control Management based on Human-Centered Design

Holger Fischer, Florian Klompmaker

Hurricanes or earthquakes reveal the increasing importance of the research in disaster control management, which is essential to coordinate the amount of rescue activities. The German Federal Agency for Technical Relief is responsible for tasks like coordination, high capacity pumping and infrastructure. To support them in their management process and to improve the efficiency and the effectiveness in their workflow, we built an interactive table and established a human-centered design process to understand the context of use and to create a system out of the users' perspective. In this paper we present further scenarios as a result of the second iteration in performing human-centered design methods together with experts in the domain. We show that methods like ethnography studies, task analyses or workshops

are suitable and essential in this context and arise in helpful tools that support the experts with additional information in case of decisions.

Track Intelligent Systems (Full Paper)

Monday, April 23, 10:15 am - 11:15 am

470 Hamber Foundation Room

ID: 152 - Operational Emergency Response under Informational Uncertainty: A Fuzzy Optimization Model for Scheduling and Allocating Rescue Units

Felix Wex, Guido Schryen, Dirk Neumann

Coordination deficiencies have been identified after the March 2011 earthquakes in Japan in terms of scheduling and allocation of resources, with time pressure, resource shortages, and especially informational uncertainty being main challenges. We suggest a decision support model that accounts for these challenges by drawing on fuzzy set theory and fuzzy optimization. Based on requirements from practice and the findings of our literature review, the decision model considers the following premises: incidents and rescue units are spatially distributed, rescue units possess specific capabilities, processing is non-preemptive, and informational uncertainty through linguistic assessments is predominant when on-site units vaguely report about incidents and their attributes, or system reports are not exact. We also suggest a Monte Carlo-based heuristic solution procedure and conduct a computational evaluation of different scenarios. We benchmark the results of our heuristic with results yielded through applying a greedy approach. Our results indicate that using our Monte Carlo simulation to solve the decision support model inspired by fuzzy set theory can substantially reduce the overall harm.

ID: 190 - Rapid Geotagging of Social Media Text via an Indexed Gazetteer

Evan Andrew Sultanik, Clayton Fink

Microblogging services like Twitter afford opportunities for real time situation awareness during crises as people report on information about events on the ground. An important component of the information included in a tweet are mentions of

place names. Methods for extracting these place names and determining the actual location being referenced are an essential part of the suite of tools required for automated extraction of situation awareness from tweets. Twitter presents challenges given the 140 character restriction on status and the informal, abbreviated language that are a norm. Named entity recognizers, which are dependent on labeled training data, may not be useful in this medium for extracting location mentions because the typical training domains for these taggers are absent the noise found in Twitter. We demonstrate a new technique, RapidGeo, for extracting and disambiguating place names from a location specific Twitter feed, using an unsupervised technique for tagging location mentions and relying on the known geographic context for disambiguation. Our technique performs much better than an off-the-shelf named entity recognizer and we achieve reasonable precision in disambiguating extracted place names. We argue that such fast, unsupervised approaches are needed when actionable information is required from noisy data sources like Twitter.

Track Modelling and Simulation (Full Papers)
Monday, April 23, 10:15 am - 11:15 am
320 Strategy Room

ID: 151 - Modeling of Attacking and Defending Strategies in Situations with Intentional Threats

Xiaofeng Hu, Shifei Shen, Jiansong Wu

Intentional threats including terrorism have become a worldwide catastrophe risk since recent years. To protect city from being attacked, the macro-level study of decision analysis should be given more considerations. In this paper, we proposed a model for describing the strategic game between attackers and defenders based on the methodology of matrix game. This model can be employed to determine which target would be selected by attackers and which attacking strategy and defending strategy would be chosen by attackers and defenders respectively. Furthermore, the defenders of the city can use this model to set priorities among their defending strategies. The importance of this work is to establish a reasonable framework for modeling the attacking and defending strategies rather than assessing the real risk of

urban targets, so the model is illustrated by using fictitious numbers. The model proposed in this paper can provide with scientific basis for macroscopic decision making in responding to intentional threats.

ID: 125 - An Agent-based Approach For Safety Analysis of Safety-Critical Organizations

Alexei Sharpanskykh

Modern safety-critical organizations are characterized by complex, nonlinear dynamics involving many interrelated actors and processes. Safety issues that emerge from these complex dynamics increasingly remain hidden, until an incident or even a serious accident occurs. Traditional safety analysis methods developed long ago for much simpler organizations cannot help identifying, explaining and predicting many safety-related properties of modern organizations. To address this issue, in the paper a formal approach is proposed to establish relations between local dynamics of actors of a complex safety-critical organization and global safety-related properties that emerge from these dynamics. In contrast to the traditional approaches, the organizational dynamics is specified by taking the agent perspective with an organizational layer. The application of the approach is illustrated by a simulation case study, in which spread of safety-critical information in an air navigation service provider is investigated.

Track Inter-Organizational Exercises and Operations (Full Paper)

Monday, April 23, 10:15 am - 11:15 am

420 Strategy Room

ID: 202 - The Systems Thinking Approach of Beyond-Line-Of-Sight Command and Control

Darryl Dion Diptee, Scott McKenzie

Effective command and control (C2) is necessary to achieve and maintain superiority in military engagements. C2 is well documented in the literature and is a major focus in the military arena; however, the conventional military network topology is

increasingly becoming a liability and ineffective in the new age of asymmetric warfare. The beyond-line-of-sight command and control (BLOS C2) concept is a radical shift towards a seamless joint network topology, which will dramatically increase tactical C2 across military service branches, equipment types, and geographical locations. Though BLOS C2 is still in its testing phase, this paper examines the systems thinking approach of BLOS C2 with respect to layered models, adaptation, and synergy. We also explore the implications of using a "tactical Wi-Fi" concept to achieve beyond-line-of-sight command and control.

ID: 265 - A concept for inter-organizational crisis management exercises

Carin Rencrantz, Niclas Karlsson, Rolf Olsson

A large inter-organizational Swedish crisis management exercise was carried out during two months in 2011. It was unique in the sense that it combined both short-term and long-term crisis management involving more than 60 organizations and 6000 participants. This has never been done before in this context and therefore required an elaborated and sophisticate exercise concept. The exercise was composed of three different phases each requiring different methods with respect to exercising and evaluating effective and efficient crisis management. The exercise enhanced the Swedish crisis management capability and also helped to identify no less than 150 areas for improvements, e.g. areas where knowledge or prerequisites for cooperation are weak. The results indicate that the exercise concept could be of great use in Sweden and other countries where emergencies call for cooperation between numerous distributed organizations.

ID: 271 - Business _Not_ As Usual: Civil-Military Interaction from an e-Business Perspective

Dick M. Ooms

In peace support operations, military and civil actors are often cooperating in international coalitions. In such operations, effective and efficient coordination and information sharing is a prerequisite for effective Civil-Military Interaction (CMI), but

literature shows that this still leaves much room for improvement. Most research in this area takes a behavioral science-approach. We argue that existing research could be complemented with a design-science approach, which is an Information Systems problem-solving paradigm with its roots in engineering. After developing a high level CMI information exchange model and identifying inhibitors for information exchange, this paper provides a comparison between CMI in peace support operations with the collaboration of commercial enterprises using the e-Business paradigm. Based on observed similarities, the paper argues that the enabling technology for e-Business could overcome current inhibitors for effective and efficient information exchange for CMI in peace support operations, and is complementary to other mechanisms for information exchange.

Track Social Media and Collaborative Systems (Full Paper)

Monday, April 23, 10:15 am - 11:15 am

Asia Pacific Hall

ID: 121 - RAVEN: Using Smartphones For Collaborative Disaster Data Collection

Nicholas Palmer, Roelof Kemp, Thilo Kielmann, Henri Bal

In this paper we describe RAVEN, a framework that makes it easy to build applications for collaborative editing of structured data on Android. RAVEN offers developers compile time tools, which use only the schema. RAVEN generates all database handling components, including those needed for data synchronization, significantly reducing development effort. In addition, RAVEN also offers users the ability to do the same, entirely at runtime, using only their smartphone. Thus users can generate data oriented applications on phone at any time. Users can share their applications simply by sharing the database and corresponding schema. Thus, RAVEN enables completely decentralized application creation, sharing, and data distribution, avoiding issues of connectivity to centralized resources. This solves deployment and development of new data oriented applications during a disaster.

We show that with RAVEN users are able to easily construct a new application and compare it with an equivalent custom built application. In addition we discuss how

the frameworks utility to both developers and users before disaster strikes ensures that users are already familiar with it before the need for it arises. Thus, our approach is able to avoid significant issues of disaster time development and deployment of purpose built disaster management applications.

ID: 159 - Exploring Cooperating Smart Spaces for Efficient Collaboration in Disaster Management

Jacqueline Floch, Michael Angermann, Edel Jennings, Mark Roddy

Pervasive computing is about the seamless and unobtrusive interaction between users and environments augmented with computational resources that provide information and services when and where desired. Until now the focus has been on the individual rather than communities of users, thus neglecting an important part of human behaviour: socializing. While social computing addresses this need by bringing people together online, there is no solution that integrates the two paradigms. In this paper we introduce the concept of Cooperating Smart Space that extends and combines pervasive and social computing to support smart community collaboration. We illustrate how that concept can be exploited in the assessment of a natural disaster in order to improve information management, collaboration between expert teams and cooperation with volunteers outside disaster areas. We present the results of an initial user evaluation and derive important implications for the design of a Cooperating Smart Space platform.

ID: 164 - “Straight to the Information I Need”: Assessing Collational Interfaces for Emergency Response

Simon Tucker, Vitaveska Lanfranchi, Neil Ireson, Gregoire Burel, Alfonso Sosa, Fabio Ciravegna

Collational interfaces gather information from a range of sources and present them to end users. Information overload is tackled by aggregating and processing information in the back-end and providing interactive means to filter and browse data in the interface. Such interfaces could have applications in emergency response – giving

users the right information in order to act effectively. In this paper we explore how collational interfaces enable users to build an understanding of emergency situations. We carry out a user study that compares a collational interface to a paper based interface and one which presents data without collating it. We demonstrate that collational interfaces allow users to build a picture of an emergency, but they do not necessarily build this picture in less time.

ID: 275 - Social Media in Command & Control: An extended framework

Peter Arnout Jongejan, Timothy John Grant

Our research is aimed at investigating whether social media has a role to play in military Command & Control. Since social media is peer-to-peer, it could facilitate Network-Enabled Capabilities. A useful theoretical development is Reuter, Marx, and Pipek's (2011) proposal of a two-by-two matrix for social software infrastructure. Their framework assumes one-way communication and monolithic organizations. However, to operate in a real-time, dynamic environment, crisis management organizations must close the decision-making loop. Moreover, they must be structured into an action part that handles the crisis on-site, and a control part that monitors and directs operations in real time. The purpose of this work-in-progress paper is to present our extension of Reuter et al's framework. The paper reviews the relevant literature, briefly outlines how public domain organizations manage crises, describes our refinement of Reuter et al's (2011) framework, and outlines the further research needed.

Track Inter-Organizational Exercises and Operations (Full Paper - 2)

Monday, April 23, 11:45 am -1:15 pm

370 HSBC Executive Meeting Room

ID: 175 - Supporting Observers in the Field to Perform Model Based Data Collection

Mirko Thorstensson

Computerized support systems enhancing taskforce performance are being increasingly used in different organizations in the emergency response, crisis management and military fields. Organizational demands for improved mission capabilities and reduced budgets impose new requirements on system performance and data content. More information needs to be provided by humans in the field, reporting observations from the evolving course of events in order to enhance possibilities for operational analyses and continuous development of organizational abilities. In this paper, we introduce model-based data collection (MBDC) and describe a method that can improve human data-collection abilities and data quality when using human observers as data collecting sensors in distributed tactical operations. We introduce a tool that can support observers in the field. The network-based observer tool (NBOT) can support human observers in determining what to report, and how and when to report the observation. We present results and findings from three different use cases.

ID: 186 - Supporting Inter-organizational Situation Assessment in Crisis Management

Torben Wiedenhoefer, Benedikt Ley, Christian Reuter, Volkmar Pipek

To assess current situation properly is crucial for effective decision-making in crisis management. However, gaining accurate information from incidence scenes and providing appropriate support for assessment practices got faced by several challenges. The uniqueness of each crisis situation, information availability or even inter- organizational information exchange issues, for instance, are important factors, which need to be considered in designing ICT. In this contribution we present results from an empirical study about decision-making practices in scenarios of medium to large power outages in Germany. Our focus are inter-organizational cooperation practices, thus we examined the cooperation of fire departments, police, public administration, electricity infrastructure operators and citizens. Our empirical material describes conditions and challenges in current situation assessment practices. We provide concrete design implementations, by presenting ISAC (Inter- organizational Situation Assessment Client), which aim to support aggregation and visualization of

information, individualization of information compositions, collaborative situation assessment and accessibility of information resources.

Track Wireless Sensor Networks for Emergency Response (Full Papers)

Monday, April 23, 11:45 am -1:15 pm

370 HSBC Executive Meeting Room

ID: 173 - Advantages of an Integrated Open Framework for Immediate Emergency Response

Axel Bürkle, Florian Segor, Sven Müller, Igor Tchouchenkov, Matthias Kollmann

Recent disasters have shown that wireless sensors and unmanned systems are increasingly becoming a valuable aid for first responders. Depending on the kind of incident and its extent, different assets are to be used. The more diverse these assets are, the more complex their simultaneous use and coordination. Therefore, integrated solutions are needed which comprise all necessary components such as power supply, communication infrastructure, data acquisition and processing, decision support and information dissemination. In this paper, an architecture for an open framework is proposed and its advantages over dedicated solutions are discussed. The flexibility of the universal control station presented here is demonstrated using the example of integrating a smartphone as an additional mobile sensor.

Track Modelling and Simulation (Full Papers - 2)

Monday, April 23, 11:45 am -1:15 pm

470 Hamber Foundation Room

ID: 170 - Empirical Analysis of Passenger Trajectories within an Urban Transport Hub

Benjamin Heuer, Heiko Roßnagel, Jan Zibuschka, Johannes Maucher

In this contribution we present an analysis of passenger trajectories in an urban transportation hub. We collected an extensive amount of empirical data consisting of

both gate and individual stalking observation in the central station of Cologne. Three different data mining algorithms are used to analyze this data, producing both data that may be used as input for simulation frameworks, and, as an aside, visualizations of passenger movements that could be of high interest to transport and emergency managers.

ID: 188 - Towards an ontology for an Epidemiological Monitoring System

Gaoussou Camara, Sylvie Despres, Rim Djedidi, Moussa Lo

Epidemiological monitoring systems are used to control evolution of disease-spreading and to suggest action plans to prevent identified risks. In this domain, risk prediction is based on quantitative approaches that are hardly usable when data collection is not possible. In this paper, a qualitative approach based on an epidemiological monitoring ontology is proposed.

Track Intelligent Systems (2)

Monday, April 23, 11:45 am -1:15 pm

320 Strategy Room

ID: 160 - Crisis Information Management in the Web 3.0 Age

Axel Schulz, Heiko Paulheim, Florian Probst

The effectiveness of emergency response largely depends on having a precise, up-to-date situational picture. With the World Wide Web having evolved from a small read-only text collection to a large-scale collection of socially created data accessible both to machines and humans alike, with the advent of social media and ubiquitous mobile applications, new sources of information are available. Currently, that potentially valuable information remains mostly unused by the command staff, mainly because the sheer amount of information cannot be handled efficiently.

In this paper, we show an approach for making citizen-generated content directly usable for the command staff. We leverage Linked Open Data and crowdsourcing for processing data from social media, and we show how the combination of human

intelligence in the crowd and automatic approaches for enhancing the situational picture with Linked Open Data will lead to a Web 3.0 approach for more efficient handling information in crisis management.

ID: 205 - Role-based Dynamic Coalitions of Multi-Tasked Rescue Robots

Serge Stinckwich, Noury Bouraqadi, Arnaud Doniec, Tuan Le Van

Organizations allow the structuring and coordination of the activities of robots participating in a multi-robot system (MRS). Within a given organization, each robot is assigned to a role that governs its behavior and its interactions with the other members of the MRS. In this paper, we investigate a class of problems where role allocation must be done dynamically. This applies, for example in the context of rescue robotic applications where neither the number of robots nor characteristics are unknown. Furthermore, tasks to be performed are not necessarily all known or at least a portion of the information remains to be discovered (e.g. locations of victims). Finally, some robots may temporarily leave the MRS (battery recharging) or permanently due to failure or breakage. We propose a solution that can dynamically allocate roles to robots and revise the allocation. This revision takes place in case of failure of agents or in case of discovery of a new task. This allocation allows agents to participate in several tasks.

ID: 218 - STORMI: An Agent-Based Simulation Environment for Evaluating Responses to Major Incidents in the UK

Glenn I. Hawe, Duncan T. Wilson, Graham Coates, Roger S. Crouch

This paper describes work-in-progress regarding STORMI, an agent-based simulation environment for evaluating the response by the emergency services to hypothetical major incidents in the UK. At present, STORMI consists of two main components: a Scenario Designer and a Simulator. The Scenario Designer enables the setting up of a hypothetical multi-site mass casualty incident anywhere in the UK, along with the resources which may be considered for responding to it. This provides input to the Simulator, which through its Multiple Program Multiple Data architecture, models the

agents and their environment at a higher level of detail inside incident sites than it does outside, thus focusing attention on the areas of most interest. Furthermore, the multiple programs of the Simulator execute concurrently, thus targeting multi-core processors.

ID: 253 - Ontology-based Modeling of Emergency Incidents and Crisis Management

Huizhang Shen, Jingwen Hu, Jidi Zhao

With the frequent occurrence of emergency incidents in recent years, developing intelligent and effective decision support systems for emergency response and management is getting crucial to the government and public administration. Prior research has made many efforts in constructing crisis databases over the decades. However, existing emergency management systems built on top of these databases provide limited decision support capabilities and are short of information processing and reasoning. Furthermore, ontology based on logic description and rules has more semantics description capability compared to traditional relational database. Aiming to extend existing studies and considering ontology's re-usability, this paper presents an approach to build ontology-based DSSs for crisis response and management.

ID: 276 - Incidone: A Task-Oriented Incident Coordination Tool

Bas Lijnse, Jan Martin Jansen, Rinus Plasmeijer

Coordinating rescue operations for incidents at sea can be a complex task. In this paper we present an ongoing project that aims to develop an incident coordination tool to support it. This tool, Incidone, is based on the specification outlined by Lijnse et al in "Capturing the Netherlands Coast Guard SAR Workflow with iTasks" and is therefore modeled after, but not necessarily limited to, the workflow of the Netherlands Coast Guard. The unique feature of Incidone is that it is the first tool of its kind developed using the Task-Oriented Programming paradigm. Therefore, we present the tool both from the perspective of its intended end-users as well as from the perspective of a software developer. The primary goal of the Incidone project is

to provide an example of this method to developers of similar crisis management applications.

Track Geographic Information Science and Technology (GIS&T) for Crisis Response and Management (Full paper)

Monday, April 23, 11:45 am -1:15 pm

420 Strategy Room

ID: 129 - Reducing workload by navigational support in dynamic situations

Maria Charlotte Victoria Hellgren, Björn JE Johansson

By presenting continuously updated heading and distance information on a small head-mounted display (HMD), as a supplement to a GPS-receiver, we examined if workload could be reduced and performance increased, when navigating in a demanding situation. The purpose was to present as limited but sufficient information as possible to facilitate navigation. The technique was tested on ground troops, but could also be used by rescue services and police in situations that require navigation in unknown environments. The main findings were that the workload was reduced in one aspect (during navigation) but increased in another (looking for foot placement). There were no clear differences in performance, except that participants stopped fewer times to look at the GPS-receiver if they had updated heading and distance information. This suggests that a supplement with minimal information could be useful when navigating with a GPS-receiver in an unknown environment.

ID: 136 - Leveraging Geospatially-Oriented Social Media Communications in Disaster Response

Susan McClendon, Anthony C. Robinson

Geospatially-oriented social media communications have emerged as a common information resource to support crisis management. Our research compares the capabilities of two popular systems used to collect and visualize such information - Project Epic's Tweak the Tweet (TtT) and Ushahidi. Our research uses geospatially-oriented social media gathered by both projects during recent disasters to compare

and contrast the frequency, content, and location components of contributed information to both systems. We compare how data was gathered and filtered, how spatial information was extracted and mapped, and the mechanisms by which the resulting synthesized information was shared with response and recovery organizations. In addition, we categorize the degree to which each platform in each disaster led to actions by first responders and emergency managers. Based on the results of our comparisons we identify key design considerations for future social media mapping tools to support crisis management.

ID: 206- Utilizing the Potential of the Affected Population and Prevalent Mobile Technology during Disaster Response: Propositions from the Literature

Lucy Trianawaty Gunawan, Siska Fitrianie, Willem-Paul Brinkman, Mark A. Neerincx

Despite the growing awareness of the untapped potential of the affected population in a disaster situation, their inclusion in a disaster management is extremely limited. This study aims to examine the literature to see whether utilizing the affected people and prevalent mobile technology can be used during disaster response. By providing the affected with a way to lead themselves to safety and empowering them to serve as distributed active sources of information, those people will reach safety by themselves, while at the same time helping to construct a clear image of the disaster situation without burdening the already overwhelmed emergency services. This study examines knowledge derived from disaster sociology, draws on experience from recent disasters, and extrapolates current technological solutions. By establishing that such a solution is feasible, it offers a basis for empirical studies on the design and implementation of the proposed system to be used during disaster response.

ID: 251 - Geographical Information System Supporting Data Gathering and Fast Decision Making in Emergencies Situations

Tiago Badre Marino, Bruno Santos Nascimento, Marcos R. S. Borges

This proposal rises from the National Center for Disasters Scientific Support experience among eleven years supporting over a hundred disasters in Latin America.

It also presents a case study applied to landslides assessments in Teresópolis (Brazil) city, when all field-generated knowledge were still registered in paper and later, at the base station, uploaded to database and finally available for managers evaluation and decision. The proposed methodology creates a platform which allows online registration from different field agents during their evaluations enabling data upload combining mobile devices and telecommunication network (or Wi-Fi) technologies. Teams can also customizable forms for different information classes (i.e. landslide assessment, rescued person, blocked road) and still possibility to attach images, videos and other files related to each inspection. All incoming data are stored into a web database available for a real-time coordinators evaluation wherever they are (sometimes over a thousand of miles away from disaster area).

ID: 299 - When the Tsunami Comes to Town – Improving Evacuation Modeling by Integrating High-resolution Population Exposure

Sergio C. Freire, Christoph Aubrecht, Stephanie Wegscheider

Tsunamis are a major risk for Lisbon (Portugal) coastal areas whose impacts can be extremely high, as confirmed by the past occurrence of major events. For correct risk assessment and awareness and for implementing mitigation measures, detailed simulation of exposure and evacuation is essential. This work uses a spatial modeling approach for estimating residential population distribution and exposure to tsunami flooding by individual building, and for simulating their evacuation travel time considering horizontal and vertical displacement. Results include finer evaluation of exposure to, and evacuation from, a potential tsunami, considering the specific inundation depth and building's height. This more detailed and accurate modeling of exposure to and evacuation from a potential tsunami can benefit risk assessment and contribute to more efficient Crisis Response and Management.

Track Social Media and Collaborative Systems (Full Paper - 2)

Monday, April 23, 11:45 am -1:15 pm

Asia Pacific Hall

ID: 112 - Trusting Tweets: The Fukushima Disaster and Information Source Credibility on Twitter

Robert Thomson, Naoya Ito, Hinako Suda, Fangyu Lin, Yafei Liu, Ryo Hayasaka, Ryuzo Isochi, Zian Wang

This paper focuses on the micro-blogging service Twitter, looking at source credibility for information shared in relation to the Fukushima Daiichi nuclear power plant disaster in Japan. We look at the sources, credibility, and between-language differences in information shared in the month following the disaster. Messages were categorized by user, location, language, type, and credibility of information source. Tweets with reference to third-party information made up the bulk of messages sent, and it was also found that a majority of those sources were highly credible, including established institutions, traditional media outlets, and highly credible individuals. In general, profile anonymity proved to be correlated with a higher propensity to share information from low credibility sources. However, Japanese-language tweeters, while more likely to have anonymous profiles, referenced low-credibility sources less often than non-Japanese tweeters, suggesting proximity to the disaster mediating the degree of credibility of shared content.

ID: 130- Exploring the Design of Technological Platforms for Virtual Communities of Practices

Sergio Herranz, David Díez, Paloma Díaz, Starr Roxanne Hiltz

Virtual Communities of Practice (VCoP) refers to groups of people who share a concern about a specific domain or topic and use a virtual environment to share and increase their knowledge and expertise about such domain. This kind of social structure has intrinsic features suitable to support emergency management communities. Nevertheless, the design of specific technological platforms that support both the activity and the practice of the community is not a trivial task, especially in critical domains such as the emergency management. This paper presents the inquiry process carried out over one and a half years for the purpose of generating insights about the application of VCoPs within the emergency management context. Based on a case study, a set of findings is presented about the guidelines that should be

followed in order to develop suitable technological platforms that support the labor of VCoPs in the emergency management context.

ID: 148 - Learning from the Crowd: Collaborative Filtering Techniques for Identifying On-the-Ground Twitterers during Mass Disruptions

Kate Starbird, Grace Muzny, Leysia Palen

Social media tools, including the microblogging platform Twitter, have been appropriated during mass disruption events by those affected as well as the digitally-convergent crowd. Though tweets sent by those local to an event could be a resource both for responders and those affected, most Twitter activity during mass disruption events is generated by the remote crowd. Though tweets from the remote crowd can be seen as noise that must be filtered, another perspective considers crowd activity as a filtering and recommendation mechanism. This paper tests the hypothesis that crowd behavior can serve as a collaborative filter for identifying people tweeting from the ground during a mass disruption event. We test two models for classifying on-the-ground Twitterers, finding that machine learning techniques using a Support Vector Machine with asymmetric soft margins can be effective in identifying those likely to be on the ground during a mass disruption event

Special Session Mixed Methods, Community/Practitioner Engaged Research & Translation for the Crisis Context (Full Papers)

Monday, April 23, 2:30 pm -4:00 pm

370 HSBC Executive Meeting Room

ID: 138 - An Upstream-Downstream Approach for Disaster Management Information Systems Design

Craig Edward Kuziemsky, Tracey O'Sullivan, Wayne Corneil

Information is an essential part of disaster management. Information systems are a key means of providing the right information at the right time to support response to a disaster, and fostering collaborative outcomes such as situation awareness, common

ground and communities of practice. However for these collaborative outcomes to support 'downstream events' (i.e. disaster response) they need to emerge and be grown from 'upstream' activities such as user engagement. Subsequently IS design requirements for disaster response are embedded in the community where a system will be used and it is from the community users and their needs that IS requirements must emerge. This paper presents an upstream-downstream approach for disaster management IS design. We describe the four phases of the approach and provide a case study of this approach in action to design an information system to enhance community resilience

ID: 168 - Rationale for the Development of Emergency Management Systems for Local Communities

Niklas Hallberg, Jonas Hallberg, Helena Maria Granlund, Rogier Woltjer

Information systems have great potential to support emergency management. However, development of such systems is difficult, due to the complexity of emergency management. The ability to be able to reveal the needs for support is essential for successful developments. The emergency responders at the local community level are the main actors when it comes to emergency management. The objective of this paper is to explore the rationale for the development of emergency management systems to be used at the local community level. This is done by an extensive needs assessment based on 12 interviews with representatives for the local emergency organizations and 49 governing documents. The result of the study is ten areas where emergency management systems can enhance local communities ability to emergency management.

ID: 247 - Community Engagement for Translational Disaster Research: Fostering Public, Private & Responder Group Partnerships

Syed Ahmed, David A. Nelson, Paul A. Biedrzycki, Marie G. Sandy, Shannon Opel, Zeno E. Franco

Vulnerable communities are disproportionately impacted by major disasters. Information scientists working to improve disaster planning and mitigation efforts in these communities often involve first responder (practitioner) groups in collaborative design; however, less emphasis has been placed on developing long-term, sustainable crisis informatics partnerships at the population level. Community-based participatory research approaches are gaining attention in the US as an important element in translational science efforts designed to move innovations "from the bench to the curbside." Community Engagement in Research (CEnR) is a community research approach adopted US National Institutes of Health (NIH) to improve public health intervention. CEnR has implications for improving the generalizability of ISCRAM research, may provide a roadmap for Public/Private/Community disaster research partnerships, and suggests modifications to training for information scientists working in this arena. The CEnR approach also recognizes conflicts that can occur in community/government partnerships, emphasizing the importance of predicting and preventing these situations.

Track Decision Support Methods for Complex Crises (Full Papers)

Monday, April 23, 2:30 pm -4:00 pm
470 Hamber Foundation Room

ID: 149 - Optimal Decision Maker Algorithm for Disaster Response Management with I2Sim Applications

Kui Wang, Ming Bai, Jose Marti, KD Srivastava

Disaster response management has become an important area of research in recent years, with authorities spending more resources in the area. After a disaster occurs, it could cost the economy billions of dollars in losses and as well as human casualties. Infrastructure resource interdependencies are key vulnerable points for a system to operate optimally. After a disaster occurs, infrastructures would have sustained certain degrees of damage, and how to maximize the number of treated patients is one of the top priorities. The I2Sim (Infrastructures Interdependencies Simulator) research group at the University of BC has developed a software simulation toolbox to help

authorities with disaster scenarios. This paper presents an optimization algorithm based on Lagrange multipliers, which provides the theoretical basis for I2Sim software decision maker layer. There is a simulation scenario of three hospitals constructed with I2Sim toolbox.

ID: 183- Rational Resource Allocation in Mass Casualty Incidents – Adaptivity and Efficiency

Aygul Gabdulkhakova, Birgitta König-Ries, Dmitry Rizvanov

Mass casualty incidents (MCI) are highly dynamic situations. In order to minimize potential losses associated primarily with human lives, it is particularly important to quickly and efficiently allocate the available limited resources. In this paper, we suggest considerable extensions to a decision support prototype based on semantic services and a multi-agent system for rational resource allocation that we presented in earlier work. The new version of the prototype addresses two major challenges: First, the need to balance real-world resource usage and second, the need to adapt to changing situations. Additionally, a theoretical evaluation of the efficiency of the suggested approach is described.

ID: 204 - Ontological Reasoning as a Tool for Humanitarian Decision Making

Aladdin Shamoug, Radmila Juric

In this paper we propose an OWL/SWRL ontological reasoning model which supports a framework for reporting and decision making in HC. The framework is based on 6Ws: WHO, WHAT, WHERE. WHEN, WHY and HOW, which has been known in research, journalism and police investigations (Sibun, 1997) as the basic way of information gathering. In our earlier works (Shamoug and Juric, 2011) we have used 3Ws which have been in operation since 2003 as a framework for the UN reporting in Afghanistan (UNOCHA, 2001). It has spread across humanitarian world and extended to 4Ws by the UNDP in Sudan (UNDP, 2009). Our idea to extend the framework fully towards 6Ws was introduced in (SDPS, 2011) and modeled as concepts of OWL

ontologies, which were in turn used in reasoning at any level of reporting and decision making.

ID: 236 - "Badge-Primed" Decision Making

Jill Lynn Drury, Amanda Anganes, Heather Byrne, Maria Cleo Casipe, Roger Dejean, Simone Hill, Tristan Lewis, Jesse Lucas, Eric McCann

We have been investigating new decision support methods for emergency responders. Most recently, we have added to our decision support prototype the concept of "badges": symbols that cue decision makers to the top-ranked option(s) that are the recommended alternatives for a particular decision. This paper provides rationale for badges, a description of the initial implementation, results from our first experiment with badges, and a discussion of next steps. As a report on work-in-progress, this paper's primary contribution is the description of the concept of badges and its proposed use for emergency response decision making.

Track Planning and Foresight

Monday, April 23, 2:30 pm -4:00 pm

320 Strategy Room

ID: 134 - Improving Epidemiology Research with Patient Registries Based on Advanced Web Technology

Tim A. Majchrzak, Oliver Schmitt

To store patients' medical histories and to exchange them between physicians, patient registries are used. Regis-tries contain detailed data on patients and their treatments, and may comprise additional documents. This makes them very valuable for epidemiological research due to the amount of information contained; much of it is not acquirable in any other way. Providing data for research requires anonymization and pseudonymization to ad-dress privacy laws and security concerns. To be able to give feedback to physicians e.g. about discovered treat-ment possibilities, advanced pseudonymization has to be used. We present progress in the development of pa-

tient registries and the required functionality to support research. Backed on a thorough study, usability, expli-cability, and performance requirements are addressed by incorporating modern Web technology. Our findings include ways to develop patient registries as well as the description of mechanisms built into them. Additionally, we present ways of applying them to other fields.

ID: 261 - Fighting Agro-Terrorism in Cyberspace: Basics in Intention Detection Using Overt Electronic Data Sources

Eli Rohn, Gil Erez

Agro Terrorism is "a hostile attack, towards an agricultural environment, including infrastructures and processes, in order to significantly damage national and international political interests". This special session within the early warning track is aimed at reducing agro-terrorism related risks by either means of prevention (intelligence gathering using data mining and chatter mining, for example) or means to response to such an attack by early detection of exotic/foreign pathogenic agents, early prediction of disease dispersion patterns, implementation of biosecurity measures, and the development of future methodologies and techniques related to food defense and post-event response. This paper focuses on intention detection using overt data sources on the World Wide Web as they relate to agro-terrorism threats. The paper focuses on early detection that can lead to prevention of such acts, yet a variety of the techniques presented here are also useful for helping in post-event perpetrators detection.

ID: 268 - Strategic Planning and Foresight Methodologies: Institutions and Practice within the Romanian Emergency System

Marian Zulean, Gabriela Prelipcean

The aim of this paper is to describe the exposure of the Romanian territory the extreme events and to present the institutions and functionality of emergency system in Romania. While the first part of the paper addresses the the main challenges of transforming the Romanian Emergency System the second part investigated the

perception of the local leaders of ES regarding the most probable risks, the uses and utility of long term strategic planning and foresight methodologies, using Delphi technique. The lessons drawn from Romanian transition would be an interesting case for other new emerging countries.

ID: 239 - Risk Analysis for Critical Systems with Reliability Block Diagrams

Kim Weyns, Martin Höst

Governmental organisations are becoming more critically dependant on IT systems such as communication systems or patient data systems, both for their everyday tasks and their role in crisis relief activities. Therefore it is important for the organisation to analyse the reliability of these systems as part of the organisation's risk and safety analysis process. This paper presents a practical risk analysis method for critical, large-scale IT systems in an organisation. The method is based on reliability block diagram modelling and was adapted to fit the requirements of governmental organisations. The paper first explicitly lists the requirements that such a risk analysis method must fulfil, then presents the proposed risk analysis method and finally outlines the planned evaluation of this method.

Track Serious Games for Crisis Management (Short Papers)

Monday, April 23, 2:30 pm -4:00 pm

420 Strategy Room

ID: 262 - Instructor Tools for Virtual Training Systems

Joris Nicholas Field, Amy Rankin, Magnus Morin, Arjan Lemmers

Crisis management exercises require a lot of preparation and planning to ensure that they meet the required training objectives. This is often a time consuming and expensive process and can be a major barrier to setting up frequent crisis management training sessions. The introduction of virtual training environments to supplement the live exercises enables the development of tools to support the

instructors in their planning, management, observation and analysis of training exercises. This can simplify the planning process, and give instructors control over the configuration of the exercises to tailor them to the needs of individual trainees. In this paper we present are presenting a tool that supports instructors in the planning of virtual exercises, and can be used to provide templates for live exercises. This tool has been developed closely with feedback from instructors and crisis management personnel and forms part of a crisis management virtual training system.

ID: 272 - "Safety Villages": an educational game for raising children's awareness of risks

Telmo Zarraonandia, Mario Rafael Ruíz Vargas, Paloma Díaz, Ignacio Aedo

Computer games have proved to be a valuable educational resource in many different areas from medicine to military training as well as specific training in emergency responses. Their motivational benefits also make them especially suitable for training children. However, in order to enjoy the benefits that the use of computer games may report, it is necessary that the games resemble those which children play for fun, and that it offers an appropriate balance between its educational and entertainment purposes. In this paper we present an educational game called "Safety Villages" of the mini-game genre which aims to help raise children´s awareness of emergencies and domestic risks. The design and implementation of the game has been carried out following strategies and integrating components usually present in games for entertainment. A preliminary evaluation of the game has shown a positive response in children, indicating that they can both learn and enjoy themselves while playing the game.

ID: 277 - The other city – Designing a serious game for crisis training in close protection

Heide Lukosch, Theo van Ruijven, Alexander Verbraeck

Effective training methods are key to successful crisis management in close protection. This paper discusses the outcomes of a project on the development of a serious game, a virtual training environment for close protection. The aims of the game are to improve situational awareness and communications skills at the

individual and team level. Two game designs, developed with two different game engines, are presented and discussed in relation to the project's objectives. Comparison of the two designs shows that several trade-offs are encountered when developing a training game with currently available technology. Technological features of the game engines, and differences in time invested in the development of different aspects of the games, make that the two designs meet different project objectives. Simultaneously reaching all project objectives in a single design seems impossible with the two game engines. This paper discusses the different trade-offs that were encountered in the project and presents the major challenges that lie ahead.

Track Social Media and Collaborative Systems (Full Papers - 3)

Monday, April 23, 2:30 pm -4:00 pm

Asia Pacific Hall

ID: 150 - Trial by Fire: The Deployment of Trusted Digital Volunteers in the 2011 Shadow Lake Fire

Lise St. Denis, Amanda Lee Hughes, Leysia Palen

We report on the use of a team of trusted digital volunteers during the Shadow Lake Fire to extend the social media capacity of a Type I Wildfire team. In this case study we outline the tools and processes used by this virtual trusted team to coordinate their activities, monitor social media communication and to establish communications with the public around the event. Finally, we discuss the potential merits and limitations of implementing a team of trusted volunteers and explore how this idea could be incorporated into emergency management organizations.

ID: 172 - Towards a realtime Twitter analysis during crises for operational crisis management

Teun Terpstra, Arnout de Vries, Richard Stronkman, Geerte Paradies

Today's crises attract great attention on social media, from local and distant citizens as well as from news media. This study investigates the possibilities of real-time and automated analysis of Twitter messages during crises. The analysis was performed through application of an information extraction tool to nearly 97,000 tweets that were published shortly before, during and after a storm hit the Pukkelpop 2011 festival in Belgium. As soon as the storm hit the festival tweet activity increased exponentially, peaking at 576 tweets per minute. The extraction tool enabled analyzing tweets through predefined (geo)graphical displays, message content filters (damage, casualties) and tweet type filters (e.g., retweets). Important topics that emerged were 'early warning tweets', 'rumors' and the 'self-organization of disaster relief' on Twitter. Results indicate that automated filtering of information provides valuable information for operational response and crisis communication. Steps for further research are discussed.

ID: 179 - Peripheral response: Microblogging during the 22/7/2011 Norway attacks

Sung-Yueh Perng, Monika Büscher, Ragnhild Halvorsrud, Lisa Wood, Michael Stiso, Leonardo Ramirez, Amro Al-Akkad

This paper explores how the public has used microblogging to contribute to resource mobilization in emergencies. It focuses on the 2011 Norway attacks that occurred on 22 July, during which a single person first detonated a bomb in downtown Oslo and then killed 69 young people on the island of Utøya. By tracing how tweets were circulated during that time and reconstructing the moments of requesting resources, the notion of peripheral response is developed. Peripheral response is the practice initiated by users of social media who are in socially or physically distant positions to mobilize resources as a way of responding to crises. Through the case study of the attacks in Norway, the paper develops a deeper understanding of the potential and challenges of social media participation in resource mobilization and argues for a wider consideration of the consequences of microblogging crises.

Special Session Mixed Methods, Community/Practitioner Engaged Research & Translation for the Crisis Context (FP - SP)

Monday, April 23, 4:30 pm - 6:00 pm

370 HSBC Executive Meeting Room

ID: 132 - Emergency response in rural areas - how new ways of organizing and supporting first responders can apply to crisis management

Sofie Eilsabeth Pilemalm, Rebecca Stenberg, Tobias Andersson Granberg, Anders Axelsson

In this study, security and safety in rural parts of Sweden is investigated. New ways of organizing for efficient response can be found in the extended cooperation between societal sectors and in utilizing the local social capital. New categories of first responders and their requirements are identified and we propose non-technical and technical solutions as support. The latter include e.g. mobile applications and a technical infrastructure making it possible for volunteers to obtain information about events requiring emergency response. Emergency management in rural areas shows several similarities to large-scale crises, in terms of insufficient infrastructure available and the need to use local resources in the immediate aftermath of the event. Therefore, the results of the study are transferable to large-scale crises.

ID: 191 - Federal Disaster Requests for Tribal Land

Nathaniel Inglis Steinfeld

When disaster strikes a U.S.-recognized Indian tribe, a unique set of response questions arise. Indian tribes have a special relationship with both their land and the federal government, dating back to the initial establishment of the United States. The Stafford Act, which authorizes federal disaster aid, treats tribes as local governments and gives little weight to the historic relationships. The tribes must first submit a disaster request to state officials, who then have discretion in forwarding the request to the federal government.

The current law subordinates tribes beneath states and, practically, forces additional procedural steps before tribes can receive federal resources. When disasters force Indian law principles to intersect with federal emergency procedures, the local, state, and federal responders are left with an inefficient system. This paper examines how the law functions in action and proposes a change to the Stafford Act definitions in order to improve communication channels and promote respect for tribal sovereignty.

ID: 209 - Impacting Factors on Human Reactions to Alerts

Sigmund Kluckner, Johannes Sautter, Matthias Max, Wolf Engelbach, Tina Weber

Crisis response authorities have to deal with the unpredictability of their population's behavior. One of the complex challenges is the people's reaction after an official alert in a crisis situation has been issued. This paper elaborates a knowledge base to describe and understand human behavior in alarming situations in Europe and Germany especially. It therefore structures and illustrates factors that are impacting the human reactions after alerts issued by authorities in crisis situations by following two interrelated methodical tracks: A literature review in the theme of human behavior after warnings, and a series of interviews in German-speaking countries that collect opinions, estimations and experiences from operational crisis management practitioners. The outcome of the interview series is matched and evaluated against results from the literature review, phrased as factors impacting human reaction. This knowledge base shall as well support crisis management practitioners in the elaboration of alerting strategies as allow researchers to systematically structure human behavior aspects for the purpose of modeling and alert effect simulations.

ID: 254 - GABEK WinRelan – a Qualitative Method for Crisis Research Engaging Crisis Management Personnel

Christine Adler, Mirjam Mona Haus, Lisa Jakob, Lena Erfurt, Marion Krüsmann

Qualitative research methods like GABEK WinRelan are advantageous tools to analyze and thereby improve crisis management planning and communication systems by interrogating crisis management personnel. Contrary to quantitative methods they

help to identify, explore, and structure new important aspects in this field and to formulate more specific research questions. This paper describes the usage and advantages of the qualitative method GABEK WinRelan within crisis management research, particularly within the e-Triage project which aims at the development of an electronic registration system of affected persons in mass casualty incidents. Furthermore it addresses different corresponding research fields like personal attitudes towards the usage of new technological devices, user requirements, stress and related cognitive limitations within emergency missions, status quo analyses of crisis management concepts, and the role GABEK WinRelan could play in examining these research fields.

ID: 301 - Building Resilience Through Crisis Mapping, Community Engagement and Recovery Planning in Sudan

Helena Puig Larrauri, Margunn Indreboe Alshaikh

Through two of its flagship projects, UNDP Sudan has been exploring innovative methods for community engagement to enable participatory recovery planning and response. These methods use a combination of participatory data collection methods, GIS-based technologies and qualitative analysis to provide an evidence-base generated at the grassroots. Participatory data collection methods help communities to share their perceptions on a number of threats and risks to their livelihoods. These community perceptions are then categorized and mapped to enable qualitative analysis and identification of priorities and interventions for recovery and peacebuilding.

The motivation for this work in UNDP Sudan has been to foster community engagement for recovery in a post-conflict setting. However, the methods and tools developed in these projects are directly applicable to a post-disaster setting, as suggested by three parallels between post-disaster and post-conflict settings: weakness of the evidence-base, presence of conflicting priorities and a need to re-build community ties. This paper outlines the work of UNDP Sudan and proposes its application to post-disaster recovery planning.

Track Decision Support Methods for Complex Crises - Work in Progress (Short Papers)

Monday, April 23, 4:30 pm - 6:00 pm

470 Hamber Foundation Room

ID: 260 - Generic self-learning decision support system for large-scale disasters

Stella Moehrle

Large-scale disasters, particularly failures of critical infrastructures, are exceptional situations which cannot be solved with standard countermeasures. The crises are complex and the decision makers face acute time pressure to respond to the disaster. IT based decision support systems provide potential solutions and assist the decision making process. Many decision support systems in emergency response and management concentrate on one kind of disaster. Moreover, complex structures are modeled and recommendations are made rule-based. This work in progress paper describes the first steps towards the development of a generic and self-learning decision support system. The methodology used is case-based reasoning. The paper concludes with a sample emergency decision process.

ID: 287 - Estimating the Value of Casualty Health Information to Optimization-Based Decision Support in Response to Major Incidents

Duncan T. Wilson, Glenn I. Hawe, Graham Coates, Roger S. Crouch

In this paper we describe a work-in-progress decision support program designed for use in the response to major incidents in the UK. In contrast to related work focusing on the optimization of a discrete series of "snapshots" of the response problem, the proposed decision support program is designed for use in a continuous fashion, where the updating of its model, the search for solutions to the model through an optimization algorithm, and the issuing of these solutions are carried out concurrently. The potential of such an approach to deliver high-quality response plans within the dynamic and uncertain environment is evaluated through focusing on the case of casualty health information. Computational experiments show the value of regularly updating this information.

ID: 296 - Towards a Context-Aware Multi-Party Emergency Coordination System Framework

Steven Clifton Way, Yufei Yuan

In this work-in-progress paper we propose a framework for an emergency response system which is an extension of but significantly different from traditional group support systems or distributed group support systems. The framework considers the environmental, organizational, and activity-based issues of emergency response for responders and decision makers. These issues are addressed by incorporating context-aware, multi-agency relationship management, and multiparty coordination components into the framework for a context-aware multiparty coordination system.

Track Planning and Foresight - Work in Progress (Short Papers)

Monday, April 23, 4:30 pm - 6:00 pm

320 Strategy Room

ID: 250 - On Improving Emergency Preparedness and Management with Delphi

Kimmo Laakso

An emergency brings together a group of individuals who often represent different organizations, resources, and roles. In order to be able to make the right decisions, individuals need to understand each other although they may be from different lines of business. In our research the target is to stress the importance of a common language in emergency management. Our plan is to gather a group representing the authorities, i.e. public sector actors, and a group representing companies, i.e. private sector actors, to communicate with the Delphi method on possible differences in the language used in different lines of business. The aim of this paper is to discuss the possibilities of using the Delphi method to make improvements to emergency management and to evaluate which kinds of organizations should be represented in our Delphi panel. This paper forms a part of a larger research study, the results of

which will be useful, for example when improving the interoperability of management and communications systems.

ID: 286 - Collaborative foresight as a means to face future risks - An innovative platform conception

Christoph Ulrich Markmann, Heiko A. von der Gracht, Jonas Keller, Rixa Kröhl

Increasing market volatility and disruptions imply risks for companies and governments and have become therefore focus topics. Adequate tools to identify, assess and manage future developments are key to survive in a turbulent environment. In our paper, we present the systematic development process of an innovative, web-based foresight platform, which is a joint research project funded by the German Federal Government and aims to improve the robustness in decision making by collaborative foresight. Its four interlinked applications have the purpose to enable their users a collaborative generation, discussion, evaluation and development of future-oriented knowledge. Thereby, a special emphasis is on the relevance and the timeliness of the provided information. Within the multi-stage requirement analysis of the tool platform we analyzed existing concepts in order to identify strengths and weaknesses and conducted brainstorming sessions and interviews with professionals of 130 companies and organizations to account for different backgrounds, perspectives and intentions.

ID: 307 - Multidisciplinary Challenges in an Integrated Emergency Management Approach

Jose J. Gonzalez, Ole-Christoffer Granmo, Bjørn Erik Munkvold, Frank Yong Li, Julie Dugdale

The University of Agder, Norway, has recently founded a Centre for Communication and Information Systems Technology in Emergency Management (CISTEM). The center brings together a highly multi-disciplinary group of local and international researchers in technology and the social sciences. This paper presents an interdisciplinary vision for Integrated Emergency Management that has been inspired by the transition from

platform centric to Integrated Operations in the oil and gas fields, which uses remote emergency control centers collaborating virtually with local responders. The paper discusses some of the most salient research challenges for Integrated Emergency Management.

Capturing communities' perceptions of risk through the eyes of their citizens: using mobile VGI networks to map tsunami risk awareness

Nick Hedley

This paper describes research in progress exploring the use of mobile device technology and citizen sensors, as tools for emergency managers and planners to quickly to gather and map citizen perceptions of risk in communities exposed to tsunami hazards. VAPoR is an agile, deployable system developed at the Spatial Interface Research Lab that does this. It is currently being field tested on the West Coast of Vancouver Island, British Columbia. This evaluation assesses these technologies and methods, and their potential to help emergency planners mitigate risk in coastal communities.

Track Command and Control Studies (Full Papers)

Monday, April 23, 4:30 pm - 6:00 pm

420 Strategy Room

ID: 128 - The role of Artefacts in Police Emergency Response sensemaking

Richard McMaster, Chris Baber, Tom Duffy

This paper presents a study of the role of artefacts in sensemaking during emergency response. A qualitative study was conducted with two UK Police Forces, with a particular focus on the role of artefacts in the creation and modification of sensemaking frames. This research demonstrates that sensemaking is a key component of emergency response Command and Control and that this activity is distributed across the individuals within the system. Collaborative sensemaking is coordinated via social and organisational means, supported by a range of private

(informal) and shared (formal) artefacts, which function as resources for action – cueing frame seeking and frame-defined data collection. The study also reveals the role of narrative in bridging the gap between these two parallel sensemaking processes and raises implications for the further digitisation of the emergency response environment, demonstrating the importance of balancing social and technical factors in the design of ICT for emergency response.

ID: 234 - The value of Different Modalities to Support Command and Control Situation Awareness

Stas S Krupenia, Cécilia Aguero, Kees C.H.M. Nieuwenhuis

We investigated the value of different modalities of information (Photo, Video, Audio) to support the situational awareness of a Command and Control (C2) officer monitoring three simultaneous military operations. Twenty-one Polish soldier participants individually monitored the real-time battlefield information collected by three (virtual, scripted) platoons and sent to C2. Twice during the monitoring tasks participants were presented a series of Situation Awareness (SA) probes (Endsley, 1995). Additionally, at the end of the task participants were given a series of meta-SA probes and user preference questions. We found that although participants preferred receiving Video information, level three SA (projection) was best supported by Audio. An explanation for this is that audio better captured the rationale for collecting and sending data compared to Photo and Video. In general, we suggest that to support Command and Control SA it is important that when data is captured and sent to C2 the rationale for data collection be included.

ID: 248 - Collaboration awareness – a necessity in crisis response coordination

Willem Treurniet, Kim van Buul - Besseling, Jeroen J. Wolbers

In crisis management involvement of a large number of organizations is required. Not only the first responders need to take action, but also organizations and entities like civil authorities, public utility and crisis teams are responsible for critical infrastructures as well as the community. A key element for effective collaboration is

situation awareness; having a common operational picture. Lots of research has focused on situation awareness. However, several incidents show that situation awareness alone is not sufficient for reaching effective collaboration among the organizations involved. Collaboration awareness is a second key element. Knowing the needs, goals, expectations, culture, capabilities and procedures of the crisis management partners makes collaboration more effective. In this paper we elaborate our research focusing on what organizations need to know about each other in order to collaborate effectively. Finally, we describe the possible measures for increasing the collaboration awareness.

ID: 282 - Crisis Management Systems in Germany – a Status Report about the functions and developments of private and public crisis management systems in Germany

Christian Neuhaus, Daniela Giebel, Sabine Färfers, Mario Hannappel

Crisis management systems play a critical role in supporting responders and decision makers in their crisis- and emergency-management functions. Even though these systems have been broadly adopted in private and public organizations, very few quantitative studies, benchmarks or statistics can be found on their functions, user groups, targeted stakeholders, their technological requirements and their scope of services. The present study gives an outline of our project and a first insight in the results of a three-year study of crisis management systems in Germany. The study will therefore outline the methods we used for our analysis and will present some results from the analysis of over the 170 analyzed systems from over 70 vendor/developers. It will then give a conclusion of the results and outline open and future questions.

ID: 288 - A Taxonomy of Market Mechanisms for Information Sharing in Crisis Response Coalitions

Tim Grant, Arien van der Wal

Information sharing is crucial in responding to and managing crises. A great variety of organizations respond to crises, ranging from international organizations, through non-governmental organizations, commercial suppliers, government ministries, and

the media, to individual volunteers. At best, they collaborate to combine their respective strengths in creating synergy. At worst, they deconflict their operations so that the one does not get in the way of the other. In either case, the organizations must communicate with one another. Previous research has shown that this communication takes the form of an information market. This paper considers the possible mechanisms for information markets in humanitarian and military coalitions. While there has been work on market mechanisms in the economics literature, this needs to be adapted for the exchange of information and information services instead of physical goods and services. This paper proposes a taxonomy of market mechanisms that are both tailored to information markets and specialized for information sharing within coalitions.

Track Social Media and Collaborative Systems (Short Papers)
Monday, April 23, 4:30 pm - 6:00 pm
Asia Pacific Hall

ID: 193 - Towards an Ontology Broker to Improve Cross-agency Sharing in Emergency Response
Tom Duffy, Chris Baber, Richard McMaster, Robert Houghton

Official reports on the response to the London Bombings of 7th July 2005 showed that, despite the best efforts of the emergency services, there were problems in inter-agency communication. Taking this event as a starting point, we adapt the concept of Communities of Practice to explore the ways in which the process of sense-making is performed within each agency and the challenges of sharing Situation Awareness arising from such processes. It is argued that common themes could emerge in the collaboration around sense-making within and between agencies, and that having some means of tracking these themes could provide a useful meta-process for managing communications. The tracking of themes has been proposed as an important aspect of crowd-sourcing and the approach reported in this paper extends the approach to communications in the emergency services (as well as to responses

from members of the public). In order to track themes appropriately, it is proposed that an underlying knowledge-structure (termed a Dynamic Crisis Ontology) can be used to both facilitate the sharing of information and to manage to Requests for Information for new material. A simple instantiation of this concept is presented to illustrate the use of such an approach.

ID: 200 - Social Media – Truly Viable For Crisis Response?

Murray Eugene Jennex

On September 8, 2011 the Great San Diego/Southwest Blackout occurred. Approximately 5 million people were affected by this blackout. This paper explores the reliability of social media as a crisis response tool following such a crisis event. Contrary to expectations, the cell phone system did not have the expected reliability and as a result, users had a difficult time using social media to status/contact family and friends. This paper presents a survey exploring the use and reliability of social media during the Great San Diego/Southwest Blackout event.

ID: 207 - Making use of New Media for pan-European Crisis Communication

Susanna Nilsson, Joel Brynielsson, Magdalena Granåsen, Charlotte Hellgren, Sinna Lindquist, Mikael Lundin, Maribel Narganes Quijano, Jiri Trnka

Social or new media have over the past years become an integrated part of human communication, both as a means to establish and maintain social relationships, but also as a means of sharing and co-creating information. New media comes with an array of possibilities for individuals as well as organisations, corporations and authorities. Within the field of crisis communication new media possibilities, such as online sharing and social networking, has had an impact on the way crisis information is disseminated and updated. This paper addresses the issues related to using new media as a means of communicating crisis information and broadcasting alerting messages to the general population, and also discusses the role of new media in future pan-European alerting. It focuses on current and on-going research on social media for crisis communication. An extensive systematic literature review was done to

identify factors that affect the use of social media for alerting and warning. These factors were mirrored in experiences, collected through interviews, in crisis communication organisations in three European regions (Sweden, Czech Republic and Spain). The factors finally form the basis for suggestions regarding the design of technological tools for both communication and information collection as part of a pan-European alerting system.

ID: 249 - Multilingual Analysis of Twitter News in Support of Mass Emergency Events

Andrea Zielinski, Ulrich Bügel

Social media are increasingly becoming a source for event-based early warning systems that can detect natural disasters and support crisis management during or after disasters.

In this work-in-progress paper we study the problem of analyzing multilingual twitter feeds for emergency events with a focus on under-resourced Mediterranean languages in endangered zones, particularly Turkey, Greece, and Romania. We investigated ten earthquake events and defined four language-specific classifiers that can be used to detect earthquakes by filtering out irrelevant messages that do not relate to the event. The final goal is to extend this work to more Mediterranean languages and to classify and extract relevant information from tweets, translating the main keywords into English.

Preliminary results indicate that such a filter has the potential to support earthquake detection and could be integrated into seismographic sensor networks. One hindrance in our study is the lack of geolocated data to observe correlations of events across languages.

We also plan to use twitter analysis for Crisis Management. To this end, a multilingual corpus of Twitter messages related to crises is being assembled, and domain-specific language resources like multilingual terminology lists or language-specific Natural Language Processing (NLP) tools are built up to cross the language barrier.

Integrative Visual Analytics for Effective Decision Making and Action (Much More Than Big Data Analytics with Visualization Added)

David S. Ebert

Tuesday, April 23, 9:00 am-10:00 am

Asia Pacific Hall

Recently, big data analytics has become the buzz in international news and corporate campaigns as the technology to change the future. However, while necessary in our modern data deluge of over one zetabyte of digital data, the common big data analytics approach tends to utilize only computational power and algorithms to turn data into information and then knowledge and provide an answer to the responder or decision maker using the system. In contrast, visual analytics capitalizes on the best and complimentary abilities of both components of the human-computer decision-making process through iterative, interactive visual interfaces to leverage and supplement the cognitive capabilities of the human user.

In this talk, I'll introduce integrated, predictive, interactive advanced analytical and visualization environments and show the potential of visual analytics to dramatically transform risk-based decision making, public health, emergency response, and safety. I'll describe several example systems showing the power and capabilities of visual analytics for emergency management, law-enforcement, and crisis response, as well as the importance of end-user engagement in the design, development, refinement, and deployment of these technologies. I'll also introduce the Visual Analytics for Command Control and Interoperability Environments (VACCINE) Center and describe the structure and approach of our international network of researchers to develop tools to increase the effectiveness of first-responders, decision makers, and crisis managers.

Track Healthcare Crisis Management Systems (Full Papers)

Tuesday, April 24, 10:15 am - 11:15 am

ID: 119 - Using Document-Based Databases for Medical Information Systems in Unreliable Environments

Oliver Schmitt, Tim A. Majchrzak

Healthcare and Crisis Management are pervaded by the usage of Information Systems (IS). Virtually all IS rely on data storage. Despite the document-oriented nature of medical datasets, the prevailing kind of database used are relational (RDBMS) ones. In order to find a more adequate solution in a development project for a patient-registry, we evaluated a document-based database and incorporated it into the data storage layer of our system. To foster the understanding of this technology, we present the background of form-originated data storage in healthcare, introduce document-based databases, and describe our scenario. Based on our findings, we generalize the results with a focus on crisis management. We found that document-based databases such as CouchDB are well-suited for IS in medical contexts and might be a feasible option for the future implementation of systems in various fields of healthcare, crisis response, and medical research.

ID: 145 - Disaster Medical Education & Simulated Crisis Events: A Translational Approach

Antony Joshua Hayes, Zeno Franco, Jessica Lancaster, Anne Kissack

This review addresses current educational and research efforts in disaster medical education (DME) in the United States. Since the events of 9/11, DME has received greater attention. However substantial problems remain in terms of ensuring that large numbers of medical students are exposed to high quality DME – not just those specializing in Emergency Medicine. These include lack of performance metrics, disagreement on specific tasks, and a lack of emphasis on leadership. Further, such efforts must ensure retention of key information over periods that are disaster free; utilize objective training metrics that will allow for an evidence base to form; and develop low cost, scalable training approaches that offer greater fidelity to the

disaster environment than classroom based instruction. DME research is translational because it is the application of science to improve the clinical performance of healthcare workers, which affects individual patients, communities, and policy. Mid-fidelity, team-in-the-loop simulations developed for disaster manager training may provide an avenue toward improved DME by exposing medical students to scenarios that fundamental challenge their assumptions in real-time game play. This can be accomplished with lower costs and greater scalability than live exercise or mock-up training approaches.

Track Humanitarian Challenges - Work in Progress (short paper)

Tuesday, April 24, 10:15 am - 11:15 am

470 Hamber Foundation Room

ID: 155 - Humanitarian Response in the Age of Mass Collaboration and Networked Intelligence

Gisli Rafn Olafsson

The current humanitarian system is based on institutions created during the Industrial Age. It was built when connectivity was a very scarce resource and information sharing was something that only happened during meetings. The increased resiliency of mobile communication networks and the proliferation of satellite based network connectivity have lead to information being much easier to share. At the same time the rise of social networks and the explosive growth of mobile ownership amongst the affected communities has lead to a new way of communicating. Furthermore the large institutional humanitarian response organizations are no longer the only responders, with multiple smaller organizations responding. This paper looks at the opportunities new technologies have provided in rethinking the humanitarian response system and how new approaches may address some of the key issues faced in large-scale disasters in recent years.

ID: 298 - Mapping Libyan Health Facilities - A Collaboration Between Crisis Mappers and the World Health Organization

Jennifer Lisa Chan, Robert Colombo, Altaf Musani

This practitioner report describes a recent example of the growing opportunities between humanitarian health organizations and the crisis mapping community. The World Health Organization (WHO) partnered with volunteer crisis mappers to quickly collect information and map over 600 Libyan health facilities after the 2011 Libya Crisis. This new collaboration between WHO staff, volunteers, technologists, GIS specialists, health cluster partners and a researcher helped provide health and geographic information to assist the planning phases of an in-depth country-wide health facility assessment. Outcomes of this collaboration will aid recovery and reconstructions efforts for the Libyan health system.

Track Human Experiences in the Design of Crisis Response and Management Services and Systems (Full Papers - 2)

Tuesday, April 24, 10:15 am - 11:15 am

320 Strategy Room

ID: 153 - Complexity and Usability of Voice-enabled Alerting and Situational Reporting Decoupled Systems

Nuwan Waidyanatha, Tharaka Wilfred, Kasun Perera, Manoj Silva, Brenda Burell

Telephone calls are the predominant telecommunication mode in Sri Lanka. Leveraging voice-based applications for disaster communication would be acceptable and sustainable. The findings in this paper are from an experiment concerning interactive voice for connecting community-based emergency field operatives with their central coordination hub. Challenge was in interchanging the Freedom Fone (FF) Interactive Voice Response (IVR) generated, Sinhala and Tamil language, speech data with the text-based 'Sahana' disaster management system for analysis and decision support. Emergency Data Exchange Language (EDXL) interoperable content standard was adopted for mediation. Low quality voice data resulting in incomplete information was a barrier to automating transformations between text and speech. Replacing those processes with human procedure significantly degrades the reliability. Moreover, human interaction with decoupled software systems, to accomplish the

sequence of tasks, points to instabilities. This paper discusses the complexities and usability shortcomings discovered through controlled-exercises in Sri Lanka.

ID: 182 - Sharing mission experience in tactical organizations

Dennis Andersson, Amy Rankin

A tactical organisation can be seen as an adhocracy designed to perform missions in uncertain, ambiguous and complex environments. Flexibility, adaptability, resilience, innovation, creativity and improvisation have all been identified as key skills for successful outcome of these missions. To learn skills associated with such abilities previous research has shown that knowledge acquired through experience plays an important role. It is important that organisations share and learn from experiences to improve their ability to cope with novel situations. In literature there is a lack of consistency in how these abilities are discussed, we therefore propose the FAIRIC model. By unravelling some of the similarities and differences we create a common vocabulary to discuss knowledge gained from experience. This can help classify different experiences and provide a systematic way of gathering and modelling knowledge on situational factors to enable sharing of mission experience over boundaries of time and space.

Track Decision Support Methods for Complex Crises (Full Papers - 2)

Tuesday, April 24, 10:15 am - 11:15 am

Asia Pacific Hall

ID: 167 - Efficient Scenario Updating in Emergency Management

Tina Comes, Niek Wijngaards, Frank Schultmann

Emergency managers need to assess, combine and process large volumes of information with varying degrees of (un)certainty. To keep track of the uncertainties and to facilitate gaining an understanding of the situation, the information is combined into scenarios: stories about the situation and its development. As the

situation evolves, typically more information becomes available and already acknowledged information is changed or revised. Meanwhile, decision-makers need to keep track of the scenarios including an assessment whether the infor¬mation constituting the scenario is still valid and relevant for their purposes. Standard techniques to support sce¬nario updating usually involve complete scenario re-construction. This is far too time-consuming in emergency management. Our approach uses a graph theoretical scenario formalisation to enable efficient scenario updating. MCDA techniques are employed to decide whether information changes are sufficiently important to warrant scenario updating. A brief analysis of the use-case demonstrates a large gain in efficiency.

ID: 189 - Establishing Collaborative Option Awareness during Crisis Management

Jill Lynn Drury, Mark S. Pfaff, Gary L. Klein, Steven O. Entezari

This paper presents empirical results of the use of a novel decision support prototype for emergency response situations, which was designed to enhance understanding of the relative desirability of one potential course of action versus another. We have termed this understanding "option awareness." In particular, this paper describes the process employed by pairs of experiment participants while performing emergency responder roles using different types of "decision space" visualizations to help them collaborate on decisions. We examined the decision making process via a detailed analysis of the communication between the cooperating team members. The results yield implications for design approaches for visualizing option awareness.

Track Healthcare Crisis Management Systems - Work in Progress (short paper)

Tuesday, April 24, 11:45 am - 1:15 pm

370 HSBC Executive Meeting Room

ID: 222 - A Scoping Study of R&D Needs in Emergency Planning in UK Healthcare Systems

Simon French, Alan Boyd, Naomi Chambers, Russell King, Duncan Shaw, Alison Whitehead

Driven by events such as terrorist outrages and pandemics, the 21st century has seen substantial changes in how countries plan for and manage emergencies across health care systems. Aside from changes in the pattern, type and scale of emergency, emergency preparedness must respond to developments in medical knowledge and treatment, and in information and communication technologies. This report describes a scoping study of research and development (R&D) needs with regard to emergency planning in health care undertaken by the authors in the UK. We discuss the design of the study, difficulties in its conduct and, via a reference to the published final report, indicate its conclusions.

ID: 303 - Challenge Patient Dispatching in Mass Casualty Incidents

Anton Donner, Thomas Greiner-Mai, Christine Adler

Efficient management of mass casualty incidents is complex, since regular emergency medical services structures have to be switched to a temporary "disaster mode" involving additional operational and tactical structures. Most of the relevant decisions have to be taken on-site in a provisional and chaotic environment. Data gathering about affected persons is one side of the coin; the other side is on-site patient dispatching requiring information exchange with the regular emergency call center and destination hospitals. In this paper we extend a previous conference contribution about the research project e-Triage to the aspect of patient data and on-site patient dispatching. Our considerations reflect the situation in Germany, which deserves from our point of view substantial harmonization.

ID: 309 - ALARM: A Modular IT Solution to Support and Evaluate Mass Casualty Incident (MCI) Management

Robert Lawatscheck, Stephan Düsterwald, Carsten Wirth, Torsten Schröder

ALARM is a modular IT-solution to support emergency medical service (EMS) providers and rescue staff in mass casualty incident response and training. Seven modules were implemented covering the entire process from pre-triage, treatment

support and resource management to tactical information and registration. Communication technology is used to close information and documentation gaps. The system uses medical algorithms and telemedicine to improve patient treatment. The ALARM system enables the user to create structured reports for missions and drills. This allows an objective analysis and comparison of missions and opens a new approach to evidence based MCI management and training.

Track Modelling and Simulation

Tuesday, April 24, 11:45 am - 1:15 pm

470 Hamber Foundation Room

ID: 120 - STAR-TRANS Modeling Language (STML) Modeling Risk in the STAR-TRANS Risk Assessment Framework for Interconnected Transportation Systems

Dimitris Zisiadis, George Thanos, Spyros Kopsidas, George Leventakis, Vassilis Grizis, Leandros Tassiulas

The present paper introduces a high level modeling language, capable of expressing the concepts and processes of the Strategic Risk Assessment and Contingency Planning in Interconnected Transportation Networks (STAR-TRANS) framework. STAR-TRANS is a comprehensive transportation security risk assessment framework for assessing related risks that provides cohered contingency management procedures for interconnected, interdependent and heterogeneous transport networks. STAR-TRANS modeling Language (STML) is a domain specific language combining language simplicity with a very clear syntax, providing all the necessary elements (assets, threats, incidents, consequences etc.) to model the STAR-TRANS risk assessment framework.

ID: 235 - Characterizing Disaster Resistance and Recovery using Outlier Detection

Christopher W. Zobel, Steven A. Melnyk, Stanley E. Griffis, John R. Macdonald

Most definitions of disaster resilience incorporate both the capacity to resist the initial impact of a disaster and the ability to recover after it occurs. Being able to characterize and analyze resilient behavior can lead to improved understanding not

only of the capabilities of a given system, but also of the effectiveness of different strategies for improving its resiliency. This paper presents an approach for quantifying the transient behavior resulting from a disaster event in a way that allows researchers to not only describe the transient response but also assess the impact of various factors (both main and interaction effects) on this response. This new approach combines simulation modeling, time series analysis, and statistical outlier detection to differentiate between disaster resistance and disaster recovery. Following the introduction of the approach, the paper provides a preliminary look at its relationship to the existing concept of predicted disaster resilience.

ID: 223 - Developing a Physics-based Model for Post-Earthquake Ignitions

Selim Serhan Yildiz, Himmet Karaman

Earthquakes not only cause damages by shaking, but secondary disasters like fire following earthquake (FFE), tsunami, liquefaction, land slide etc. also cause large-scale losses. In some cases, FFEs result in losses more than shaking do as shown in the 1906 San Francisco earthquake and the 1923 Kanto earthquake. FFEs are generally caused by strong ground shakings. Strong shakings damage the structures and infrastructures. As a consequence of earthquake, many ignitions can occur due to gas systems, electrical systems, overturning of electrical appliances, heating equipments or flammable materials in structures. In addition to interior structure ignitions, damaged infrastructure elements such as gas mains and pipelines and damaged electric transmission lines can also cause ignitions. Some of these ignitions spread due to amount of fuel load (combustible materials), construction material, direction and speed of wind etc. in environment and they can turn into large urban conflagrations. This paper proposes a physics-based post-earthquake fire ignition model in order to estimate number and location of ignitions in urban areas.

Track Human Experiences in the Design of Crisis Response and Management Services and Systems (Full Papers - 3)

Tuesday, April 24, 11:45 am - 1:15 pm

320 Strategy Room

ID: 192 - Electronic Checklist Support for Disaster Response

Uwe Krüger, Fabian Wucholt, Clemens Beckstein

Requirements analysis of IT-support for rescue management showed that electronic checklist support is a vital function of any IT-based assistance system. Although checklists are a simple approach, their successful imple-mentation and use depends on many factors. We nevertheless believe that Intelligent Electronic Checklist Sup-port Systems (IECSS) are especially helpful for the (inter-) organizational cooperation in disaster scenarios like mass casualty incidents (MCIs). In this paper we describe why, when, and how electronic checklists can be used to coordinate the work of the geographically dispersed rescue forces. For this purpose we will have a look at safety-critical and complex tasks in aviation and medicine where checklists already are successfully used and try to profit from this experience for the MCI domain.

ID: 240 - An Initial Usability Evaluation of the Secure Situation Awareness System

Jason Nurse, Sadie Creese, Michael Goldsmith, Rachel Craddock, Glyn Jones

The importance of situation awareness systems in crisis-management scenarios cannot be emphasised enough. These systems enable entire disaster situations to be mapped out in a real-time fashion thereby aiding significantly in human decision-making and the necessary positioning, management and deployment of resources. As a result of the core role these systems play in responding to crises, it is vital that they are highly usable and optimized for human cognition and experience. In this paper we consider this reality in the context of an initial evaluation of the visualisation interface of a situation-awareness tool called Secure Situation Awareness (SSA). Our evaluation seeks to gather useful feedback from potential end-users on the usability of the tool's interface to feed into the design and development of interfaces for similar systems.

ID: 273 - Instructor's Tasks in Crisis Management Training

Amy Rankin, Joris Field, Rita Kovordanyi, Henrik Eriksson

In crisis management exercises the instructor's performance is critical to the success of the training. It is their responsibility to monitor and evaluate the exercise, as well as appropriately adjust and adapt the scenario to the unfolding events. Despite the importance of the instructor's skills in crisis management training little has been documented regarding successful methods or common pitfalls. The study presented in this paper is exploratory and aimed at investigating how instructors monitor and control large scale crisis management exercises. The results are intended to be used as a basis for further investigation on how instructors can be supported in virtual reality training systems. A summary of results from interviews is presented and followed by observations reports from two live exercises. Finally, key areas for instructor support in virtual-reality training systems are identified.

ID: 157 - Survey: ICT-supported public participation in disasters

Amro Al-Akkad, Andreas Zimmermann

In an increasingly networked society citizens at disaster sites utilize information and communication technology (ICT) to communicate needs or to share information. In order to understand better emergent possibilities and implications of applying ICT for supporting public participation in disasters, we surveyed 57 respondents regarding several key user aspects as perceived usefulness, socially related issues, or deployment. Surprisingly, our results show a clear tendency to use a disaster specific application instead of using everyday services as facebook or Twitter. However, such application poses the risk to loose its focus fading slowly away after once downloading it. Further study is needed to understand if these results are representative regarding public society.

Track Planning and Foresight (Full Papers)

Tuesday, April 24, 11:45 am - 1:15 pm

420 Strategy Room

ID: 117 - Design and initial validation of the Raster method for telecom service availability risk assessment

Eelco Vriezekolk, Roel Wieringa, Sandro Etalle

Crisis organisations depend on telecommunication services; unavailability of these services reduces the effectiveness of crisis response. Crisis organisations should therefore be aware of availability risks, and need a suitable risk assessment method. Such a method needs to be aware of the exceptional circumstances in which crisis organisations operate, and of the commercial structure of modern telecom services. We found that existing risk assessment methods are unsuitable for this problem domain. Hence, crisis organisations do not perform any risk assessment, trust their supplier, or rely on service level agreements, which are not meaningful during crisis situations. We have therefore developed a new risk assessment method, which we call Raster. We have tested Raster using a case study at the crisis organisation of a government agency, and improved the method based on the analysis of case results. Our initial validation suggests that the method can yield practical results.

ID: 154 - SAGA: an Integrated Architecture for the Management of Advanced Emergency Plans

José H. Canós-Cerdá, Abel Gómez-Llana, M. Carmen Penadés-Gramaje, Marcos R. S. Borges

Despite the significant advances that software and hardware technologies have brought to the emergency management field, some islands remain where innovation has had little impact. Among them, emergency plan management is of particular relevance due to their key role in the direction of teams during responses. Aspects like coordination, collaboration, and others are spread in plain text sentences, impeding automatic tool support to improve team performance. Moreover, administrative management of plans becomes a mere document management activity. In this paper, we present SAGA, an architecture that supports the full lifecycle of advanced emergency plan management. By advanced we mean plans that include

new types of interaction such as hypermedia and advanced process definition languages to provide precise specification of response procedures. SAGA provides all the actors involved in plan management a number of tools supporting all the stages of the plan lifecycle, from its creation to its use in training drills or actual responses. It is intended to be instantiated in systems promoted by civil defense agencies, providing administrative support to plan management; additionally, editing tools for plan designers and tools for analysis and improvement of such plans by organizations are provided. Plan enactment facilities in emergency response are also integrated. To our knowledge, it is the very first proposal that covers all the aspects of plan management.

ID: 196 - Supporting Collaborative Scenario Analysis Through Cross-Impact

Víctor Amadeo Bañuls Silvera, Murray Turoff, Starr Roxanne Hiltz

Scenarios can enhance the understanding of emergency teams about the factors, which are involved in the definition of an emergency plan and how different actors participate in it. Cross-Impact Analysis aims at contributing to this goal through allowing the collaborative development of scenarios out of large event sets, and this ultimately reduces the complexity for estimating a working model. In this paper we analyze how to apply Cross-Impact Analysis for developing collaborative scenarios in Emergency Preparedness. In order to illustrate this research effort hypothetical results of a dirty bomb attack scenario exercise are presented. The purpose of this exercise is to demonstrate the ability of a group to create a working model of the scenario that may be used to examine the consequences of various assumptions about preparedness, plans, and the actions taken during the event. The method may be used as either a planning tool and/or a training tool.

Track Social Media and Collaborative Systems (Full Paper - 4)

Tuesday, April 24, 11:45 am - 1:15 pm

Asia Pacific Hall

ID: 185 - Between a Rock and a Cell Phone: Communication and information use during the Egyptian uprising

Andrea Lee Kavanaugh, Steven Sheetz, Riham Hassan, Seungwon Yang, Edward A. Fox, Mohamed Magdy, Hicham G. Elmongui

In this paper we seek to explain the role social media, especially the use of Twitter in Egypt, during the mass political demonstrations from January through March 2011, by putting it into a larger social and technical perspective. We argue these media could have had an impact beyond their low adoption rates due to other factors, specifically, age distribution of the population, concentration of Internet and social media use among young people, and strong social networks. We supplement our social media data analysis with survey data we collected in June 2011 from an opportunity sample of Egyptian youth. We compare usage with methods and findings from other studies and our own observations on the use of social media during protests in Tunisia and Iran. We conclude that in addition to the contextual factors noted above, according to our Twitter analyses, survey data and other studies of Twitter use, the individuals within Egypt who used Twitter during the uprising have the characteristics of opinion leaders. This finding supports the idea that their use of Twitter could have a disproportionally larger social impact than their low adoption rates would otherwise suggest.

ID: 208 - Connected Communications: Network Structures of Official Communications in Disaster

Jeannette Sutton, Emma Spiro, Britta Johnson, Sean Fitzhugh, Matt Greczek, Carter Butts

Informal online communication channels are being utilized for official communications in disaster contexts. Channels such as networked microblogging enable public officials to broadcast messages as well as engage in direct communication exchange with individuals. Here we investigate online information exchange behaviors of a set of state and federal organizations during the Deepwater Horizon 2010 oil spill disaster. Using a subscription (i.e. follower) network from the popular microblogging service Twitter, we relate features of organizations' structural position within this network to

their information exchange behavior. We analyze the roles individual organizations play in the dissemination of information to the general public online and look specifically at conversation dynamics of directed communications to individuals. Results suggest that an organization's propensity to share oil spill related content is associated with centrality in the Twitter follower network. This research provides insight into the use of networked communications during an event of heightened public concern.

ID: 197 - Crowd Sentiment Detection during Disasters and Crises

Ahmed Nagy, Jeannie Stamberger

Short messages are an opportunity for scavenging critical information such as sentiment. This information can be used to detect rapidly the sentiment of the crowd towards crises or disasters. The nature of short messages such as tweets expressed by a message-sharing social network during a disaster response requires special handling since the context is not obvious in the message. This paper describes sentiment detection expressed in 3698 tweets, collected during the September 2010, San Bruno, California gas explosion and resulting fires. We describe a systematic approach to identifying the sentiment in these tweets. We start by using SentiWordNet 3.0 to detect the basic sentiment of each tweet. We complement that technique by adding a comprehensive list of emoticons, a sentiment based dictionary and a list of out-of-vocabulary (OOV) words that are popular in brief, online text communications such as lol, wow, etc. In the data set analyzed, the absence of information is correlated with more negative sentiment while the presence of information is correlated with more positive sentiment levels. Our technique gives better results than using Bayesian networks. The technique performs better than bayesian networks alone by 18%. Using our technique with Bayesian networks resulted in an increase in accuracy of approximately 27%.

Track Open track (Full Paper)

Tuesday, April 24, 2:30 pm - 4:00 pm

370 HSBC Executive Meeting Room

ID: 126 - A Pragmatic Approach to Smart Workspaces for Crisis Management

Art Botterell, Martin Griss

We explore the nature and benefits of smart spaces from the perspective of the emergency management user, propose a design vocabulary and reference architecture for constructing feasible, robust and flexible smart spaces for crisis management, and offer some examples of how smart-space approaches might support crisis management.

ID: 171 - A Concept for Interoperability of Security Systems in Public Transport

Sebastian Kurowski, Jan Zibuschka, Heiko Roßnagel, Wolf Engelbach

In the field of public transport operators and first responders collaborate in the prevention of and reaction to security issues. In order to optimise their specific daily operational business needs, heterogeneous information and communication systems are used. In case of an incident, however, it is crucial that the various involved parties exchange relevant information to get a shared understanding and act in a coordinated way. Yet, heterogeneous communication and information system infrastructures often hinder this crucial flow of information. This paper describes a conceptual model to construct system-of-systems environments while taking into account information dependent systems in the domain of security in public transport. By building on the results of several European research projects this concept offers a starting point for modelling and general description of systems inside a system-of-systems architecture. A modelling approach is presented, offering capabilities of representing information systems, interfaces, roles and intermediaries while describing them with building blocks distilled from earlier research projects.

ID: 210 - A Review of Common Tasks Supported by Information Communication Technology for Times of Emergency

Hina Aman, Pourang Irani, Hai-Ning Liang

Research in emergency response systems has produced significant literature in a very short span of time. We review a corpus of published works on how Information Communication Technology (ICT) is being utilized and the type of tasks ICT supports in the event of a crisis arising from disasters, whether natural or man-made. In our research, we have been able to distinguish eight categories reflecting the tasks supported by technology during a disaster. We list some of these technologies used by the public, practitioners and researchers to illustrate the current trends of technology usage. We also identify gaps and technology needs that require our attention. Given the increasing frequency of severe disasters, this research is timely as it: (i) contributes to our understanding of the trends of development and technology use during times of crises, and (ii) identifies potential areas for future work to improve ICT's role during times of emergency.

Track Event-Driven Techniques and Methods for Crisis Management (Full Papers)
Tuesday, April 24, 2:30 pm - 4:00 pm
470 Hamber Foundation Room

ID: 194 - Coordination of Emergency Response Operations via Event-Based Awareness Mechanism
Bo Yu, Guoray Cai

Emergency response involves collaboration among search and rescue workers, medical staff, transportation coordinators, and others to save human lives and minimize damages. While carrying out local activities, members of the teams must also attend to new events happening elsewhere that may affect their work, and be prepared to adjust their activities accordingly. This paper describes a computer supported coordination system, DACE (Dependency-based Awareness and Coordination Environment), which offers a scalable solution to coordination in emergency response. The system serves as a cognitive aid to human actors in both maintaining a group mental model of the overall collaborative activities and their dependencies, and determining the effects of events as they propagate through the web of dependencies. We demonstrate the principles and utility of the DACE system

through a hypothetical scenario of search and rescue exercise. This work contributes to the goal of scaling up awareness-based coordination in emergency response activities.

ID: 140 - Enriching an Intelligent Resource Management System with Automatic Event Recognition

Daniel Stein, Barbara Krausz, Jobst Löffler, Rolf Bardeli, Jochen Schwenninger, Bela Usabaev, Robin Marterer

Event recognition systems have high potential to support crisis management and emergency response. Given the vast amount of possible input channels, automatic processing of raw data is crucial. In this paper, we describe several components integrated in an overall intelligent resource management, namely abnormal event detection in audio and video material, as well as automatic speech recognition within a public safety network. We elaborate on the challenges expected from real life data and the solutions that we applied. The overall system, based on Event-Driven Service-Oriented Architecture, has been implemented and partly integrated into the end users' infrastructures. The system is continuously running since almost two years, collecting data for research purposes.

ID: 215 - An architecture for distributed, event-driven systems to collect and analyze data in emergency operations and training exercises

Matthias Moi, Robin Marterer

In order to perform serious research on reliable data from emergency operations and trainings, technological support is essential. Therefore we present an architecture for distributed, event-driven systems for the collection and analysis of data in emergency operations and trainings. The logical as well as the technical architecture will be presented. Most important design decisions, e.g. regarding extensibility, will be described. The architecture has been implemented as a system, which is composed out of a core server and distributed sensors sending data. The system is running since two years in two big European cities.

Track Early Warning and Expert Systems for Disaster Management (Full Papers)

Tuesday, April 24, 2:30 pm - 4:00 pm

320 Strategy Room

ID: 123 - Integrating national tsunami early warning systems – towards ocean-wide system-of-systems networks

Matthias Lendholt, Miguel Angel Esbri Palomares, Martin Hammitzsch

For the integration of national tsunami warning systems to large scale, ocean-wide warning infrastructures a specific protocol has been developed enabling system communication in a system-of-system environment. The proposed communication model incorporates requirements of UNESCO Intergovernmental Oceanic Commission tsunami programme to interlink national tsunami early warning systems. The model designed to be robust simple is based on existing interoperability standards. It uses the Common Alerting Protocol (CAP) for the exchange of official tsunami warning bulletins. Sensor measurements are communicated via markup languages of the Sensor Web Enablement (SWE) suite. Both communication products are embedded into an envelope carrying address information based on the Emergency Data Exchange Language Distribution Element (EDXL-DE). The research took place within the context of two European research projects. The reference implementation of the presented results was tested independently in deployments at two early warning centers.

ID: 195 - Evaluating SAVER: Measuring Shared & Team Situation Awareness of Emergency Decision Makers

Yasir Javed, Tony Norris, David Johnston

Large scale emergencies are usually operated by a team or number of sub teams for its safety and efficiency. Team cooperation and coordination failures can cause some serious damage. Therefore, team coordination research has attracted lot interest from human factors and ergonomics. Shared Situation Awareness (SSA) and Team Situation Awareness (TSA) of team are at the core of team coordination. A System was

designed and developed on the basis of SSA and TSA oriented information system design. To validate and evaluate the proposed design and system SSA and TSA measuring technique based on most widely used accepted method was used. Results show that performance of SAVER users during the experiment was quite higher than the non-SAVER users.

ID: 109 - For Whom the Siren Sounds: Public Perceptions of Outdoor Warning Sirens in Northeast Alabama

Linda Plotnick, Starr Roxanne Hiltz, Matthew Burns

Alabama is prone to tornadoes. Outdoor emergency sirens are used as a major component of the Emergency Management Agency's Emergency Alert and Notification System. However there have been no studies to date of the effectiveness of these sirens in Calhoun County. In April 2011 a major tornado swept through northeast Alabama leaving in its wake over 300 fatalities and massive destruction. This study examines public perceptions and reactions to the sirens for notification of tornadoes. Faculty and students of a mid-sized university in Calhoun County, Alabama were surveyed before and after the devastating 2011 tornado. Although the respondents find the sirens helpful, they have difficulty understanding the tones and spoken messages emitted by the sirens. In general, concerns about tornadoes did not increase after the 2011 tornado. However, those who did experience an increase in concern were likely to change their behavior in preparations and response to tornadoes.

ID: 241 - Workflows and Decision Tables for Flexible Early Warning Systems

Felix Riedel, Fernando Chaves

Today's decision support systems for crisis management are mostly designed to support a fixed process that integrates a given set of information sources. This means policies that govern the crisis management process are tightly integrated with the implementation, which makes it hard to adapt the system to changing requirements. Modern systems are expected to be adaptable and need to evolve along with the

availability of new information sources and changing business processes. Previous work suggested using workflow systems to manage crisis management processes. Current approaches that use workflow systems are not end-user friendly or not flexible enough. In this paper we present our approach that combines workflows and decision tables for creating more flexible decision support systems. While workflows are used to orchestrate services and implement information logistics in the decision support processes, embedded rule sets are used to provide flexibility and adaptability of workflows. The rule sets are authored using decision tables which are an easy-to-use representation that allows end-users to express rules in an intuitive way.

Track Research Methods (Full Paper)
Tuesday, April 24, 2:30 pm - 4:00 pm
420 Strategy Room

ID: 162 - The Myth of Business Process Modelling for Emergency Management Planning
Gertraud Peinel, Thomas Rose, Alexander Wollert

Over the last two decades a significant number of projects tried to bring the concept of business process man-agement and workflow support to the domain of emergency management. Most of these approaches sought a partial automation for the execution of standard operating procedures, while others strived for the support of information management and data streams in command centres during a crisis. This paper focuses on the plan-ning for disasters for reasons of better preparedness. It discusses whether emergency management organisations can use off-the-shelf business process modelling tools to prepare for disasters, and whether the concepts of pro-cess modelling can be mapped to standard operating procedures and vice versa. Moreover, it investigates whether such tools can efficiently support a collaborative preparation of police, fire departments, and rescue organizations. This paper will demonstrate why conventional business process means are inapplicable as planning tool in this domain. And it will also give an outlook to so called smart checklists that might be better suited both for the planning and for the execution phase of disasters.

ID: 244 - Formalization of crisis response coordination from a public inquiry report

David Passenier, Julienka Mollee, Jeroen Wolbers, Kees Boersma, Peter Groenewegen

We assess the usability of public inquiry report data to build a formal trace that can be used in later stages to create an agent model simulating crisis response coordination. The case taken is a train tunnel fire near the underground train station at Amsterdam Airport Schiphol that turned out to be harmless. However the incident illustrated key weaknesses in inter-organizational coordination causing a slower response than required in case of a more serious fire. We present a taxonomy of data problems resulting from our attempt to reconstruct a logical series of events. These highlight gaps or ambiguities in data pertaining to coordination practices, communication networks, situational properties and information and communication systems. Our formal trace cannot support all the report's claims that explain the failures in coordination. The report data show some critical problems but can still serve as a basis for an information network model of the crisis.

Track Education and Training (Full Papers)

Tuesday, April 24, 2:30 pm - 4:00 pm

Asia Pacific Hall

ID: 21 - Towards Evidence Based Command Post Exercises in Disaster Response

Erich Heumüller, Sebastian Richter, Ulrike Ulrike Lechner

Command post exercises prepare organizations' Command and Control systems for future challenges in disaster response. Our approach to evidence based command post exercises aims at a systematic and science based ap-proach to conceptualize, prepare, perform and evaluate command post exercises. The paper at hand presents results from action research in German disaster response organizations. We present our model of staff work, our approach to develop scenarios and injects as well as our approach to evaluate command post exercises.

ID: 216 - Developing Realistic Crisis Management Training

Lachlan MacKinnon, Liz Bacon

The provision of existing crisis management training, at the strategic level, is predominantly focused on two approaches, table-top exercises and large-scale physical simulations. Unfortunately, neither of these approaches provides the necessary realism to accurately prepare trainees for the stress, volume and speed of decision-making required in an actual crisis situation. Table-top exercises lack the intensity and pressure of the real situation, whilst large-scale physical simulations cannot achieve the sheer scale and scope required to address anything other than a constrained physical event. The development of virtual environments, rich multimedia, and games technologies have resulted in considerable work in developing new training support tools. Some of this work has introduced more realistic stress into the training environment, but to date there has been no systematic approach to the creation and management of stress within individual trainees engaged in crisis management training at a strategic level. The Pandora project has built from existing models taken from crisis management Gold Commander training, timeline-based event network modelling from space industry research, augmented and virtual reality serious games environments, affective computing research, and emotional ambience models from film and TV, to develop a rich multimedia training environment that provides just such a systematic approach.

ID: 238 - Serious Gaming in Training for Crisis Response

Simone De Kleermaeker, Loana Arentz

In this practitioner report, we present the experiences with the use of the serious game Water Coach in a national training for crisis response professionals in the Netherlands. This paper describes the set-up of the training and its learning objectives. We explain the usability of the Water Coach in such a training and the extended functionalities that were required. Finally, the evaluation of the training, in

which we focus on the added value of a serious game in the training for crisis response, is presented.

ID: 258 - eSEC Portal as a Tool for Improvement of Security Focused Studies

Jozef Ristvej, Katarina Kampova, Tomas Lovecek

This article describes progress within a project approved by The Education, Audiovisual and Culture Executive Agency (EACEA) in period from 10/2009 until 10/2012. The EACEA is responsible for the management of certain parts of the EU's programmes in the fields of education, culture and audiovisual. The idea of the eSEC project originated from the social requirement to increase the quality of education in the field of Security. The fault of the current educational systems is common detachment of the taught theory form the real practical requirements. That is the reason why it is necessary to focus more on the way in which the participants of education process can be prepared for the challenges which emerges from the labor market, which competencies are required and how it would be possible to link the educational systems of various institutions most efficiently. Therefore, the aim of our project eSEC is to develop and increase the competencies of students, pedagogues and research personnel working in the field of security, but even the expert public within the EU and the world. To achieve these objectives, an electronic portal eSEC is in process of development.

ID: 263 - MIRROR: Improving coordination in multidisciplinary crisis management teams

Lisette de Koning, Mirjam Huis in 't Veld, Kim van Buul, Kees van Dongen, Dianne van Hemert, Rosie Paulissen

In crisis situations different organizations have to cooperate to gain shared situation awareness and to take accurate decisions. However, several evaluation studies of crisis mitigation processes indicate that it is hard to effectively coordinate efforts of all organizations involved. The goal of our project is to improve coordination in crisis management teams, by improving the interaction processes in a crisis management team. The project consists of two main steps. First, the development of MIRROR, i.e.

an overview of 16 relevant factors that influence team interaction. Second, the development of a training based on MIRROR. We expect MIRROR and its training module to be a useful tool for team members of crisis teams. In addition, MIRROR has the advantage that it can be applied in non-crisis teams, during daily situations, as well. This enlarges the chances for potential team members of crisis teams to increase their team interactions skills.

Poster/Demo Session – Tuesday, April 24, 5:00 pm – 6:00 pm – Concourse Level

	ID	Poster Title / Authors
1	139	Emergency Rewinds: A Multidimensional and Social Storyboard System for Sharing Experiences in Crisis Situations Luca Lupo, Alessio Malizia, Paloma Diaz, Ignacio Aedo
2	178	An Approach Based on Environment Attributes for Representation of Disaster Cases Chao Huang, Shifei Shen, Quanyi Huang
3	233	Interpreting and integrating mismatched data on-the-fly during emergency response situations Fiona Jennet McNeill
4	243	Capturing the Task Model of Experts in Emergency Response using SYnRGY Jean F. Gagnon, François Couderc, Martin Rivest, Sébastien Tremblay
5	246	A multiteam international simulation of joint operations in crisis response S. Tremblay, R. Granlund, P. Berggren, M.E. Jobidon, M. Holmberg, P. Turner
6	256	Strategic Interactions in Disaster Preparedness and Relief in the Face of Man-Made and Natural Disasters Jun Zhuang, John Coles, Peiqiu Guan, Fei He, Xiaojun Shan
7	259	Systematic Method of Risk Assessment in Industrial Processes Katarina Zanicka Holla, Jozef Ristvej, Ladislav Simak
8	269	Intelligent Decision Support for Emergency Responses A. Khalili-Araghi, B. Fisher, U. Glässer, P. Jackson, H. Y. Shahir
9	278	Automated GLIDE Number Resource Consolidation for Rapid Disaster Location Identification

		Beau Bouchard, Brian Tomaszewski
10	280	Image theory & ontologies for crisis improvisation Anouck. V Adrot, Gaetan Mourmant, Veda Storey
11	281	Improving Disaster Preparedness and Response by Considering Time-Dependency of Human Exposure in Crisis Modeling Christoph Aubrecht, Sérgio Freire, Wolfgang Loibl, Joachim Ungar
12	284	The neglected role of communication in crisis management training – Case study and suggestions for an integrated education approach Daniela Giebel, Sabine Färfers, Mario Hannapel, Christian Neuhaus
13	285	CR-Site: An Infrastructure Siting Tool for Crisis Response Ehren G. Hill, Frank Hardisty

	ID	Poster Title / Author
14	290	Information Security in Crisis Management Systems Ummul Khair Israt Ara, Dr. Fang Chen
15	291	Emergency Management and Facebook. The Affiliation of Social Media Technologies in German Emergencies Agencies: A Case Study Sabine Färfers, Daniela Giebel, Mario Hannappel, Christian Neuhaus
16	292	Addressing Situational Awareness Analytical Systems: an Information Visualization Approach Nadya Calderon, Sabrina Hauser, Lyn Bartram
17	294	Handling Unpredicted Data Requirement with Linked Open Data in Emergency Knowledge Base Systems Kelli de Faria Cordeiro, Marcos Roberto da Silva Borges
18	305	A generic system dynamic approach for the management of critical infrastructure disruption Thomas Münzberg, Tina Comes, Frank Schultmann
19	PhD1	Multi-Criteria and Locally-Oriented Relief Inventory Management

		Henning Gosling
20	PhD3	Emergency Management as Community Work: A Design Framework for Virtual Communities of Practice (VCoPs) Sergio Herranz
21	PhD4	Multidisciplinary coordination: A gaming simulation study of emergency management teams Theo van Ruijven
22	PhD5	Framework Design for Scenario-response Based Emergency Management Integration Platform System Yefeng Ma
23	PhD6	Designing information technology for public participation on crisis response Amro Al-Akkad
24	PhD7	Modeling the Dynamics of Agency-agency Partnerships before and following Extreme Events John B. Coles and Dr Jun Zhuang
25	PhD8	What-if: Simulation as Decision Support for Crisis Management Sigmund Kluckner
26	PhD9	Disaster Medical Education & Simulated Crisis Events: A Translational Approach Antony Hayes
27	PhD10	Automatic context based filtering of information to support sensemaking in disaster situations Stefan Möllmann

	Demo Title / Presenter(s)

1	Capturing the Task Model of Experts in Emergency Response using SYnRGY François Couderc and Sébastien Tremblay Submission ID: 243, Authors: Gagnon, Jean-François; Couderc, François; Rivest, Martin; Tremblay, Sébastien
2	Siting Crisis Response Infrastructure using CR-Site Ehren Hill Submission ID: 285, Authors: Hill, Ehren G.; Hardisty, Frank
3	Event Processing for Intelligent Resource Management Robin Marterer Submission ID: 215, Authors: Moi, Matthias; Marterer, Robin
4	Usability of RAVEN: A System For Collaborative Disaster Data Collection Nicholas Palmer Submission ID: 121, Authors: Palmer, Nicholas; Kemp, Roelof; Kielmann, Thilo; Bal, Henri
5	Real-time Situation Awareness via Social Media Streams Dr. Vitaveska Lanfranchi Submission ID: 164, Authors: Tucker, S.; Lanfranchi, V.; Ireson, N.; Burel, G.; Sosa, A.; Ciravegna, F.
6	A Walk through TRIDEC's intermediate Tsunami Early Warning System Matthias Lendholt Submission ID: 123, Authors: Lendholt, Matthias; Esbri Palomares, Miguel Angel; Hammitzsch, Martin
7	ALARM: ICT-based Tactical Worksheets for Mass Casualty Incidents Carsten Wirth Submission ID: 309, Authors: Lawatscheck, Robert; Düsterwald, Stephan; Wirth, Carsten; Schröder, Torsten
8	Pandora Advanced Training Environment Dr. Liz Bacon Submission ID: 216, Authors: MacKinnon, Lachlan; Bacon, Liz
9	Unsupervised Extraction of Situation Awareness Information from Social Media for Emergency Management Evan Sultanik, Clayton Fink, and Jaime Montemayor Submission ID: 190, Authors: Sultanik, Evan Andrew; Fink, Clayton
10	Real-time Twitter monitoring of incidents Arnout de Vries Submission ID: 172, Authors: Terpstra, Teun; de Vries, Arnout; Stronkman, Richard; Paradies, Geerte
11	Water Coach: Learn to be prepared

	Simone De Kleermaeker Submission ID: 238, Authors: De Kleermaeker, Simone; Arentz, Loana
12	Crisis Information Management based on crowdsourcing and Linked Open Data Axel Schulz Submission ID: 160, Authors: Schulz, Axel; Paulheim, Heiko; Probst, Florian

Technical Program – Abstracts of Presentations: Wednesday, April 25

Thoughts on the Growing Crisis in Disaster Response: Levels of Decision Making and Other Concerns

Howard Roy Williams

Wednesday, April 25, 9:00 am-10:00 am

Asia Pacific Hall

There is a growing consensus that the increase in the number, severity, and overall impact of natural disasters is on the rise. Witness the flooding in Pakistan and the earthquakes in Japan and Haiti as clear illustrations of the greatly expanded consequences of what had previously been manageable events. The combination of increased urbanization and environmental impact, often resulting in forced migration to already overpopulated areas, has exposed the weakness of the humanitarian response system as the numbers of the vulnerable continue to grow and the ability to assist declines. The outcomes of this new reality have been to put greater strain on existing mechanisms and assumptions on capability. What we are witnessing also calls into question the capacity not only to mitigate the impact but to prepare adequately in advance. The critical questions to be addressed relate to our ability to move beyond the present understanding and practices underlying operational planning and execution. We need to look closely at the relationships between the groups responsible for immediate and ongoing response, and, in turn, their relationship to decision maker's at the most senior levels and the thinking of the major donors. It is essential that the predicates for decision as well as the community-wide approaches to response be reexamined.

Track Open track (Full Paper - 2)

Wednesday, April 25, 10:15 am - 11:15 am

370 HSBC Executive Meeting Room

ID: 156 - Interoperability for Public Urban Transport Security: The SECUR-ED Interoperability Notation

Johannes Sautter, Heiko Roßnagel, Sebastian Kurowski, Wolf Engelbach, Jan Zibuschka

In public transport and at large urban hubs such as metro or train stations, transport operators and first responders collaborate in the prevention of and reaction to security issues. Within the EU demonstration project SECUR-ED a specific notation for interoperability in the domain of public transport security was developed. Based on UML (Unified Modelling Language) the notation language offers the possibility for structured modelling of system-of-systems architectures. Four interoperability objects and their interdependencies form the underlying basis. Domain-specific annotation rules and guidelines for the interoperability objects and their sub-component-structures allow collaboration and interpretation of this model on various granularities and stages during a systems engineering process. In this contribution we present the notation and demonstrate its feasibility by applying it to a real world scenario.

ID: 227 - When Online is Off: Public Communications Following the February 2011 Christchurch, NZ Earthquake

Jeannette Sutton

This work in progress investigates the communication issues encountered and the strategies used by local government to communicate electronically with disaster affected individuals in the immediate aftermath of the February 2011 earthquake in Christchurch, NZ. It also provides a preliminary examination of the effects of information access on individual perceptions of community resiliency. We draw from a variety of data sources, including field research, interviews, and focus groups with local community members. Ongoing survey research will be integrated into the findings presented here in the near future. This research provides insight into online crisis communications and the effectiveness of strategies to communicate with members of the public in a post-disaster environment when there is limited access to information via electronic channels.

Track Modelling and Simulation - Work in Progress (Short Paper)

Wednesday, April 25, 10:15 am - 11:15 am

470 Hamber Foundation Room

ID: 225 - MONTE CARLO AND DECISION MAKING SUPPORT IN CRISIS MANAGEMENT

José Miguel Castillo, Starr Roxanne Hiltz, Murray Turoff

Simulation is an interdisciplinary science applicable to many branches of knowledge. One field in which simulation is relevant is decision making support (DMS), in which we use computers to run models of real or possible scenarios in order to evaluate alternative actions before carrying them out. We will obtain a useful simulation system only when the model (engine of the simulation process) has been made accurately to represent reality. Thus it is necessary to use a methodology that helps us to construct a simulation system. This paper presents some classifications of simulation systems and an introduction to the Monte Carlo method, with the objective of creating a framework of application of this method for the construction of simulation systems for decision making support in crisis management. One area of applicability is scenario-based simulations for training for cross-national teams to cooperate in large scale disasters. The final aim of this research will be the recommendation of standards and methodologies to build simulation systems in crisis management, specifically in decision making support.

ID: 266 - Dynamic Planning of Fire and Rescue Services

Anna Gustafsson, Tobias Andersson Granberg

In this paper, we discuss decision support tools for more efficient planning of fire and rescue services. This includes considerations of smaller and more flexible units, and also a more dynamic utilization of the existing resources. We develop a quantitative measure for the preparedness, which is used as a base for the decision support tools. By constantly taking the current situation into account and use intelligent strategies to locate and allocate resources in order to maintain a good preparedness, the response times can be shortened. The tools will be tested using an experimental

setup where we will use human-in-the-loop simulations to compare situations where the decision makers have access to the developed tools, to situations where they lack access.

Track Wireless Connectivity Management (Full Papers)

Wednesday, April 25, 10:15 am - 11:15 am

420 Strategy Room

ID: 176 - Enhancing Robustness of First Responder Communication in Urban Environments

Kamill Panitzek, Immanuel Schweizer, Tobias Bönning, Gero Seipel, Axel Schulz, Max Mühlhäuser

Communication is crucial for first responders. Crisis management is nearly impossible without good means of communication. Unfortunately the communication technology used by first responders today does not scale well. Also most of the given infrastructure, such as cell towers, might be destroyed. In recent research ad-hoc and peer-to-peer based communication has been proposed to solve the problem of resilient communication. Most mobile devices are equipped with wireless transceivers that make them suitable to participate in ad-hoc networks. But node density might be too small for a connected topology. In this paper we, therefore, discuss the implications of an emergency switch for privately owned wireless routers. Wireless routers can transition to an emergency mode to create a supportive wireless mesh network. To analyze if such a network would be beneficial and give a resilient topology real data from wireless routers in a city is gathered. We calculate the locations of these routers from GPS traces and the resulting topologies are analyzed investigating suitability and resiliency issues.

ID: 229 - Simulation of wireless, self-organising and agent-based dynamic communication scenarios

Volkmar Schau, Stefan Hellfritzsch, Sebastian Scharf, Gerald Eichler, Christian Erfurth, Wilhelm Rossak

In the inter-disciplinary collaborate project SpeedUp research activities are focused on an IT framework to support communication and collaboration between potentially mobile rescue forces. Starting with investigations of organizational structures and strategies for courses of action within various rescue forces (firefighters, medical service and police) SpeedUp tries to define an IT solution, which is acceptable and utilizable by the different organizations in complex situations. The communication between mobile devices is based on ad-hoc network strategies. In most cases the rescue activities are highly dynamic, so the choice for networking takes mobile agents. The challenge is located at the communication layer for discovering a data path between two nodes within the dynamic instable ad-hoc network.

ID: 289 - The Impact and Opportunities for Wireless Communications in Chinese Disaster Planning and Management

Dilek Ozcelan, Michael R Bartolacci

Natural disasters such as hurricanes, floods, earthquakes, fires as well as those of manmade origins, such as dam breaches, necessitate communication between and among emergency responders, governmental officials, and the impacted populace. As the third largest country in terms of area and first in terms of population, China is no stranger to natural and manmade disasters of varying kinds. Until recently, the country had no central focus on dealing with such events and allowed local officials for the most part to plan and carry out all of the activities involved in disaster planning and management. Advances in the Chinese economy and more of a nationalist slant on policies have attempted to broaden the planning scope and management across the country with varying results. The deployment of wireless communications across China has assisted in disaster planning and management activities, but inconsistent policies and a haphazard approach to its deployment has hindered its ability to fully aid such activities. In response to these events, several strategies for emergency management should be implemented, but in particular the integration of the deployment of wireless networks throughout the rural parts of the country with disaster/emergency planning for the same areas should be undertaken.

Special Session, ISCRAM 2012: Improving Information Systems for Crisis Response and Management through Modeling and Analysis of Humanitarian Workflow

Panel: Mark Haselkorn (Chair), Keith Butler, Robin Mays, Nick Macdonald, and Roy Williams

Wednesday, April 25, 10:15 am - 11:15 am

320 Strategy Room

There is a critical, worldwide need to improve the quality, effectiveness, appropriateness, cost and accessibility of information systems intended to facilitate crisis response and management in the face of devastating international disasters. Information systems have great potential to support the complex community of humanitarian stakeholders involved in these efforts, but the potential of information systems remains largely unrealized. Development and adoption of these systems faces resistance based on serious concerns, such as large start-up cost, difficult transition of systems across organizations, unpredictable benefits, and disruption to established humanitarian workflow. Popular design paradigms for information technology focus on software features without making a clear, predictable connection to the way people and organizations actually work, and how these features will achieve gains in efficiency and quality. Failure to make this essential connection can have the unfortunate side effect of changing workflow and decision-making by accident rather than by design. In order to exploit the potential of IT in crisis situations, designs must be based on an understanding of how response and management activities are actually performed, including an analysis of constraints and problem areas to prioritize how IT should be applied to achieve measurable gains in efficiency, quality and coordination. This session will explore the feasibility of an NGO/Academic collaboration that will bring together researchers and practitioners who can together model complex humanitarian activities and the flow of information in support of those activities. We will employ state-of-the-art methods to acquire and model this work and information flow, including new software tools and techniques that have been developed specifically for this purpose under funding from the Office of the U.S. National Coordinator for Health Information Technology (ONC). The current plan is

to conduct this workshop in conjunction with ISCRAM 2013 (May 2013) in Baden, Germany.

Track Event-Driven Techniques and Methods for Crisis Management - work in progress (short papers)

Wednesday, April 25, 10:15 am - 11:15 am

Asia Pacific Hall

ID: 242 - Integration of Uncertainty into Emergency Procedures of Water Boards

Karolina Wojciechowska, Hanneke Vreugdenhil

In the Netherlands, Royal Dutch Meteorological Institute warns water boards for extreme rainfall if per-specified thresholds are (expected to be) exceeded. When a water board receives a warning, certain response measures can be taken. In general, the thresholds are based on experience and intuition. Clear procedures, which describe decision-making under uncertainty in available information (e.g., forecasted rainfall), do not exist.

In this document, first results of the project "Extreme weather for water boards" are briefly described. The aim of this project is to study integration of the uncertainty into emergency procedures of the water boards. The current emergency procedures of two water boards are analyzed. Recommended adjustments to the procedures allow including the uncertainty by estimation of a probability of overload and cost-benefit analysis of response measures (benefit as avoided damage). A simple scheme that supports estimation of the probability is introduced.

ID: 124 - Event-Driven Agility of Crisis Management Collaborative Processes

Anne-Marie Barthe-Delanoë, Frédérick Bénaben, Sabine Carbonnel, Hervé Pingaud

This article aims at presenting a whole approach of Information Systems interoperability management in a crisis management cell. We propose a Mediation Information System (MIS) to help the crisis cell partners to design, run and manage the workflows of the response to a crisis situation.

The architecture of the MIS meets the need of low coupling between the partners' Information System components and the need of agility for such a platform.
Based on the Service Oriented Architecture (SOA) and the Event Driven Architecture (EDA) principles which, combined to the Complex Event Processing (CEP) principles, it will leads to an easier orchestration, choreography and real-time monitoring of the workflows' activities, and even allows the automated agility of the crisis response on-the-fly —we consider agility as the ability of the processes to remain consistent with the response to the crisis—.

ID: 270 - Real-time Support for Exercise Managers' Situation Assessment and Decision Making

Rita Kovordanyi, Jelle Pelfrene, Amy Rankin, Rudolf Schreiner, Johan Jenvald, Magnus Morin, Henrik Eriksson

Exercise managers and instructors have a particularly challenging task in monitoring and controlling on-going exercises, which may involve multiple response teams and organizations in highly complex and continuously evolving crisis situations. Managers and instructors must handle potentially incomplete and conflicting field-observation data and make decisions in real-time in order to control the flow of the exercise and to keep it in line with the training objectives. In simulation-based exercises, managers and instructors have access to a rich set of real-time data, with an increased potential to closely monitor the trainees' actions, and to keep the exercise on track. To assist exercise managers and instructors, data about the on-going exercise can be filtered, aggregated and refined by real-time decision-support systems. We have developed a model and a prototype decision-support system, using stream-based reasoning to assist exercise managers and instructors in real-time. The approach takes advantage of topic maps for ontological representation and a complex-event processing engine for analyzing the data stream from a virtual-reality simulator for crisis-management training. Aggregated data is presented both on-screen, in Twitter, and in the form of topic maps.

Track Open track (Full Paper - 3)

Wednesday, April 25, 11:45 am - 1:15 pm

370 HSBC Executive Meeting Room

ID: 245 - Ontology-driven Multimodal Interface Design for an Emergency Response Application

Elena Tsiporkova, Tom Tourwé, Nicolás González-Deleito, Anna Hristoskova

In this paper, we propose an ontology-driven modelling framework, which allows to capture the domain and expert knowledge available within the interface design community, and to support designers in their daily design tasks by eliciting user and application dependent design recommendations. We illustrate how this framework can be used in practice with a concrete case study devoted to multimodal interface design for the purpose of emergency response applications.

ID: 252 - Describing a Pipeline Emergency Response Communications System Using Situational Awareness Informational Requirements and an Informational Flow Analyses

Norman Groner, Charles Jennings

The Christian Regenhard Center for Emergency Response Studies at John Jay College, City University of New York, is working on developing best practices for communications during hazardous material pipeline emergencies. The approach involves describing a generic goal-based interagency emergency communications system using a two-step process. First, a situational awareness information requirements analysis (SAIRA) will yield a description of the information required for an effective response. Second, findings from the SAIRA will be used to develop an information flow model. The project team will assist a panel of experts in developing these models. Later, a Delphi group will use a failure modes and effects analysis that analyses why components might fail and the effects on an effective emergency response if they do fail.

ID: 264 - Developing a Framework For a Social Vulnerability and Consequence-Based Post-Disaster Behavior Analysis Methodology

H. Can Unen

The proposed study is expected to focus on the less investigated areas by the previous seismic risk analyses in Turkey. Most of the existing loss assessment methodologies focus on structural damage, infrastructural damage, economic impact, and casualties. However, affected population estimates and development of plans for the immediate needs and recovery requirements of the surviving population are also of equal importance. The proposed framework in this aspect will be utilizing previous social vulnerability and seismic loss assessment studies to develop an analysis methodology for affected population and social response analyses. The methodology is expected to help response planners and decision makers in determining the needs for the surviving population in the recovery process.

ID: 279 - Technological adaptation in crisis response: A proposition of metrics

Anouck. V Adrot, Wei Zhou, Yannick Meiller, Sylvain Bureau, Selwyn Piramuthu

As the panel of technological tools used in crisis response has been expanding, both researchers and practitioners commonly agree on the importance of reliable information systems in critical contexts. However, when unreliable, the support from IT infrastructures to crisis response can put organizations at risk. In this research in progress, we aim to examine Information Technology (IT) tools used to accommodate the sudden change caused by crisis, which could arise due to economic, political, technical or natural events. To attain this objective, we propose a two-step approach. First, we rely on coding of crisis management literature to propose a typology of diverse scenarios for technological adaptation in crisis response. Second, we draw on the house of quality methodology to propose a metric system for technological adaptability in crisis response to capture a number of issues that are vital to crisis management. We conclude with a discussion of its contributions and future directions for research on ICT adaptation and adaptability in crisis response situations.

ID: 302 - X24 Mexico

Murray Eugene Jennex, George Bressler, Eric Frost

Can populations self organize a crisis response? This is a work in progress report on Exercise 24, X24, Mexico, a follow up to the first two exercises, X24 and X24 Europe The X24 exercises uses a variety of free and low cost social media and web 2.0 tools to organize, plan, and manage local and international expertise and organizations in the response to a preset disaster scenario. The first X24 focused on Southern California, while the second X24, X24 Europe, focused on the Balkan area of Eastern Europe. These exercises involved over 10,000 participants for X24 while X 24 Europe had over 490,000 participants. This paper presents the goals, set up, and organization used to plan and execute X24 Mexico. The conference presentation will also present the lessons learned and experiences gained from the execution of X24 Mexico.

Special Panel: The Future of ISCRAM

Panelists: Simon French, Julie Dugdale, Murray Turoff, Jonas Landgren and Bartel Van de Walle. Moderator: Zeno Franco

Wednesday, April 25, 11:45 am - 1:15 pm

Asia Pacific Hall

Description: The Future of ISCRAM research will feature five distinguished mid-career and senior scholars, all with years of contribution to the ISCRAM community as conference organizers and board members. The session is designed to draw on their understanding of the strengths of the ISCRAM community as well as the challenges that face researchers in this transdisciplinary arena. By looking forward over a period of the next two decades, the panel is charged with conceptualizing what unanticipated threats may be most important to address through our research efforts, to begin to imagine the next generation of crisis management technologies, and to assist in identifying rate-limiting issues that face all ISCRAM researchers that require changes to research infrastructure in this area which are best addressed through public policy change.

Abstracts of Posters

ID: 139 - Emergency Rewinds: A Multidimensional and Social Storyboard System for Sharing Experiences in Crisis Situations

Luca Lupo, Alessio Malizia, Paloma Diaz, Ignacio Aedo

During and after crisis situations people are interested in getting knowledge about what happened and in obtaining information regarding damages, victims, and possible repercussions. However, such knowledge is not easy to extract from available sources. Since press is often more interested in acquiring high audience than reporting actual facts, primary media information, such as journals, radio, and newscasts, can be less reliable for people. Social network systems represent powerful sources due to their rapid growth in the last few years and the amount of continuous updated information published by people. Nevertheless, due to the wide distribution of information and the absence of an efficient system for retrieving and filtering such data, it is very awkward for people to select the right information in crisis situations at the right time. For the above reasons in this paper we present Emergency Rewinds, a social platform for helping people to retrieve and filter materials available on the Internet and to compose and share personal experiences about crisis situations. The system has been evaluated by means of experimental studies to check its ability to help citizens in creating stories, sharing experiences, and obtaining information in crisis situations.

ID: 178 - An Approach Based on Environment Attributes for Representation of Disaster Cases

Chao Huang, Shifei Shen, Quanyi Huang

In this paper we overview the ongoing research into the application of case-based reasoning in emergency management, based on which we propose a new approach for representation of large-scale disaster cases. The approach takes the environmental factors into account, and the case is organized according to key scenes, rather than

disaster types. Each scene consists of inherent attributes, which are concerned with the disaster type, and environment attributes, which usually facilitate the adjustment of the decision-making, and sometimes play crucial role. To describe the environment attributes, the fuzzy sets are employed to take use of the non-quantitative information. The nearness of the fuzzy sets is used to retrieve the similar case. Based on this approach, the case retrieval could even extract the case with different type but similar environment, supposing the inherent attribute is analogous.

ID: 233 - Interpreting and integrating mismatched data on-the-fly during emergency response situations

Fiona Jennet McNeill

In this paper we introduce our work on interpreting data during an emergency response situation. Such situations are characterised by the need to respond quickly to unexpected occurrences; sharing data is a crucial part of this. Many of the key responders can be anticipated: for example, Fire & Rescue services, police, ambulances, local government. But many cannot: non-local services, those who can provide particular expertise for an unexpected problem, and so on. All of these organisations will have their own data sources and these data sources will not be compatible.

In this paper, we discuss our work adapting methods for dynamic ontology matching to the domain of data sharing during a emergency response. This work is currently at an early stage, and in this paper we present our characterisation of the problem, an overview of the techniques with which we approach the problem and a discussion of our evaluation methods.

ID: 243 - Capturing the Task Model of Experts in Emergency Response using SYnRGY.

Jean-François Gagnon, François Couderc, Martin Rivest, Sébastien Tremblay

This paper addresses the issue of the measurement of task modeling in the context of emergency response. Emergency response entails great complexity and dynamism, consequently leading to complex interactions between decision makers and their

environment. There is a need for better measurement of these complex interactions in order to develop models of expert cognition in naturalistic environments. We report the development of a human centered technological tool for emergency management that entails measurement and simulation capabilities. These capabilities will allow the development of dynamic models of expert cognition of emergency response in naturalistic environments and provide guidelines for the development of better tools, training methods and procedure in this context.

ID: 246 - A multiteam international simulation of joint operations in crisis response

Sebastien Tremblay, Rego Granlund, Peter Berggren, Marie-Eve Jobidon, Martin Holmberg, Paddy Turner

A series of distributed experiments that will address teamwork and its social, organisational and cognitive dimensions within the context of multi-national joint operations in crisis response and management. In most cases of multi-national collaborations in relation to crisis response and management, multiteam systems can be defined as a group of teams. Groups are generally defined as collections of individuals whose tenure together and shared goal is relatively impromptu and temporary most often in response to a new event or need. Multiteam systems are a key issue in international operations, both civilian and military, whereby different nations must collaborate to resolve a particular situation. When personnel from different organizations come together – with different backgrounds, training, and language skills – these differences undoubtedly impact upon team effectiveness. Both civilian and military departments see this as an important concern. This poster introduces a functional simulation approach for studying how social, organisational and cognitive as well as cultural dimensions can affect multiteam systems in a controlled environment that offers the best compromise of ecological validity and internal validity.

ID: 256 - Strategic Interactions in Disaster Preparedness and Relief in the Face of Man-Made and Natural Disasters

Jun Zhuang, John Coles, Peiqiu Guan, Fei He, Xiaojun Shan

Society is faced with a growing amount of property damage and casualties from man-made and natural disasters. Developing societal resilience to those disasters is critical but challenging. In particular, societal resilience is jointly determined by federal, local, and foreign governments, private and non-profit sectors, and private citizens.

We will present a sequence of games among players such as federal, local, and foreign governments, private citizens, nonprofit organizations, and adaptive adversaries. In particular, the governments and private sectors seek to protect lives, property, and critical infrastructure from both adaptive terrorists and non-adaptive natural disasters. The federal government can provide grants to local governments and foreign aid to foreign governments to protect against both natural and man-made disasters. All levels of governments can provide pre-disaster preparation and post-disaster relief to private sectors. Private sectors can also make their own investments.

The tradeoffs between protecting against man-made and natural disasters—specifically between preparedness and relief, efficiency and equity—and between private and public investment, will be discussed.

ID: 259 - Systematic Method of Risk Assessment in Industrial Processes

Katarina Zanicka Holla, Jozef Ristvej, Ladislav Simak

The modern technologies are becoming still more complicated and may lead to industrial accidents. Industrial processes running over in „Seveso establishment" (notice Legal Act Nr. 261/2002 Coll. about major industrial accidents prevention) using hazardous substances are potential treat for employers, public, environment, property that is why it is needed to pay attention to prevention. The part of prevention is risk management and the part of it is risk assessment. In Slovak Republic there exist a lot of approaches for risk assessment but nearly none of them is clearly structured and is not harmonized with European standards. The purpose of this project is to create a logic and clear complex model for risk assessment based on structured diagrams and

quantitative methods in compliance with European standards for „Seveso establishments" in Slovak republic.

ID: 269 - Intelligent Decision Support for Emergency Responses

Ali Khalili-Araghi, Brian Fisher, Uwe Glässer, Piper Jackson, Hamed Yaghoubi Shahir

With a coastline touching upon the Pacific and Atlantic Oceans, the Great Lakes and the Arctic Sea, the Canadian MSOCs are faced with a daunting task. They are responsible for both routine duties, including patrolling coastal areas and collecting satellite data, as well as critical missions, such as emergency response and crime intervention. Both kinds of mission require the fusion of data from a variety of sources and the orchestration of myriad heterogeneous resources over great physical distances. They must deal with uncertainty, both in terms of what can be known and also in the outcomes of actions, and must interact with an environment prone to dynamic change.

We present the architecture and core mechanisms of a decision support system for marine safety and security operations. The goal of this system is to enhance complex command and control tasks by improving situational awareness and automating task assignments. This system concept includes adaptive information fusion techniques integrated with decentralized control mechanisms for dynamic resource configuration management and task execution management under uncertainty. Autonomously operating agents employ collaboration and coordination to collectively form an intelligent decision support system.

ID: 278 - Automated GLIDE Number Resource Consolidation for Rapid Disaster Location Identification

Beau Bouchard, Brian Tomaszewski

There is a growing body of research focused on how analytical outputs based on remote sensing and Geographic Information System (GIS) such as disaster impact assessments can be formatted into usable information products for crisis management practitioners. In this poster, we will describe our preliminary results on

addressing these issues via a web-based application called the Automated Space Aid Program or ASAP. ASAP digests text-based disaster descriptions and processes them through a spatial analysis model. In an effort to design our application to centralize resources in such a way that they are easily exportable the end product of the ASAP process is Area of Interest (AOI) polygons in Shapefile and KML file formats. These can be downloaded and consumed immediately post-processing and potentially be used for satellite tasking and by GIS professionals and responders in the field. We outline a proof-of-concept case study of using ASAP to gathers text-based, disaster descriptions from the GLIDE number website (http://www.glidenumber.net). We also describe technical details of our study design such as the use of ArcGIS server geoprocessing services used in combination with Esri model builder functions and custom python geocoding scripts.

ID: 280 - Image theory & ontologies for crisis improvisation

Anouck. V Adrot, Gaetan Mourmant, Veda Storey

Improvisation is a core dimension of crisis response. It helps organizations deal with the complexity of a crisis situation and generate innovative responses in a short period of time. However, managers lack tools to effectively support improvisation. This paper responds to this need by reviewing the literature on crisis and improvisation. This analysis of the literature suggests conceptualizing improvisation as a two-step cognitive process: idea development and idea selection. The former is studied as a cognitive process, possibly involving ontologies. The latter is studied using Image Theory (Beach, 1998), specifically, its screening process. From the literature review, we infer several IT requirements. This research in progress exhibits a combination of quantitative and qualitative analysis from an experimental investigation.

ID: 281 - Improving Crisis Preparedness by Considering Time-Dependency of Social Vulnerability in Crisis Modeling

Christoph Aubrecht, Sérgio Freire, Wolfgang Loibl, Joachim Ungar

Vulnerability describing the status of a society with respect to an imposed hazard or potential impact is considered a strongly multidisciplinary concept. A central objective of vulnerability assessment is to provide indications where and how people – and more specifically, what kind of people – might be affected by a certain impact. For assessment of the social dimension of vulnerability, population exposure mapping is usually considered the starting point. Integration of social structure and varying aspects of resilience further differentiate situation-specific vulnerability patterns on a local scale. Identifying distinct daytime/nighttime population distribution characteristics is a major improvement compared to standard residence based models, but does however only display part of reality. New technologies and data processing capabilities allow moving into the field of real-time representation of human movement. The vulnerability of each relevant element at risk, including human beings and society in general and its time-dependent variation is characterized both by its pre-event status and by its possible evolution during a crisis.

ID: 284 - The neglected role of communication in crisis management training – Case study and suggestions for an integrated education approach

Daniela Giebel, Sabine Färfers, Mario Hannapel, Christian Neuhaus

The importance of communication for a successful crisis management is widely acknowledged. Against this background it seems remarkable that in the aftermath of a disaster, 'communication problems' are mentioned as a crucial factor for an inadequate management. According to a current research project, which engages in security communication in general, the paper presents qualitative research results that focus on the role of communication within the training of emergency services in Germany. The novel insights indicate a strong need for both an improvement of communicative competences and a broader integration of different stakeholders before, during and after an event. The findings form the basis for an approach of an 'Integrated Safety/Security Education (ISSE)' whose constituent parts will partially be presented and put in a broader context of social resilience.

ID: 285 - CR-Site: An Infrastructure Siting Tool for Crisis Response

Ehren G. Hill, Frank Hardisty

Many crisis response and recovery efforts require choosing locations in order to deliver needed materials and services. Automated methods can help choose optimal locations for relief camps, field hospitals, command centers, and other critical relief infrastructure. However, current information technology tools for siting relief infrastructure suffer from exposing too much complexity to the user. We are developing a tool, CR-Site, which we hope will serve as an exemplar of an emergency siting tool that eliminates unnecessary complexity, while exposing necessary parameters. In this paper, we describe the technical design and user workflow for CR-Site and provide a case study for the functionality provided by CR-Site.

ID: 290 - Information Security in Crisis Management Systems

Ummul Khair Israt Ara, Dr. Fang Chen

Information security is an important part of almost any kind of Information System. Crisis Management Systems (CMS) are a type of Information System that deals with information which needs to be secure. Natural disasters, IT outages or terrorist attacks, no matter what kind of crisis, the Crisis Management Information Security System (CMISS) shouldn't be compromised. There are many challenges regarding exchange of qualified information and interoperability between Expert Systems. CMS exchanges information with many Expert Systems, so its important to have strong security in terms of technology, skills, security requirements, sensitivity of information and trust-worthiness.

In this paper, the importance of Information Security in CMS will be discussed. Methods for secure exchange of qualified information are analyzed and a secure and dynamic CMISS design is introduced.

ID: 291 - Emergency Management and Facebook. The Affiliation of Social Media Technologies in German Emergencies Agencies: A Case Study.

Sabine Färfers, Daniela Giebel, Mario Hannappel, Christian Neuhaus

In recent years, the use of the Internet and its technologies has become more and more part of everyday life. Especially the use of social media, with applications like facebook continue to gain importance in people's daily life. This does no longer only affect the younger generation but all ages and sections of the population, as well as the security sector. This paper aims to answer questions of how professional workers in German emergency agencies make use of social media against the background of their divergent manners. Following a two-step methodological approach, the analysis includes quantitative and qualitative methods. Further, the developed approach takes account of all stakeholders in German emergency services, namely firefighters (FF), the German Red Cross (GRC), the German Federal Agency for Technical Relief (THW) as well as the German Police (GP).

ID: 292 - Addressing Situational Awareness Analytical Systems: an Information Visualization Approach.

Nadya Calderon, Sabrina Hauser, Lyn Bartram

This paper presents an information visualization approach to tackle challenges in emergency management response. Ethnographic observations of emergency managers in action, led us to the proposal of a system that gathers and combines information about incidents from multiple sources including social media. We present capabilities of using visualization techniques to address three defined task scenarios in the context of emergency response. In the first hand, a glyph system tackles the sense-alert general overview for situational awareness by featuring incidents and their different attributes that are additively related. Secondly, methods of dynamic queries in filtering and highlighting address the need of the users to work with shown events. Finally, different visualization techniques such as a dot matrix and a ring chart address the need of giving the emergency managers more details on the received information about incidents and its sources distribution. In contrast to previous methods for situational awareness, the combination of different sources and the inclusion of social media, is a contribution this work aims to highlight. We conclude with the definition

of an experts-evaluation and requirements for further iterations of the work based on problems found during a first iteration of a prototyping stage

ID: 294 - Handling Unpredicted Data Requirement with Linked Open Data in Emergency Knowledge Base Systems

Kelli de Faria Cordeiro, Marcos Roberto da Silva Borges

The diversity of data sources to support emergency management increases everyday due to the information technologies evolution. On one hand, more data can lead to better decisions. On the other hand, find relevant up-to-date data and handle its structure and organization volatility represent a great challenge to Knowledge Base System Design, especially during the response phase where most of the relevant data cannot be predicted and loaded previously. Build a system that can make use of external data on demand is a mandatory requirement. An emerging global data source, called Linked Open Data (LOD) Cloud, can meet these demands as its content is constantly fed by different sources and domains, and can be consumed without known the data structure in advance. Our proposition relies on an approach to improve the conventional way Emergency Knowledge Base Systems are design, i.e., a system that make efforts on schema design for unpredicted data requirement, making use of LOD cloud as a data source.

ID: 305 - A generic system dynamic approach for the management of critical infrastructure disruption

Thomas Münzberg, Tina Comes, Frank Schultmann

This paper presents a decision support tool for strategic management of Critical Infrastructure (CI) disruption by using a generic system dynamics approach. The application provides strategic decision support to emergency managers such as fire brigades, civil protection or other local emergency management agencies (LEMA) who need to develop action plans for the event of CI disruptions.
Our prototype uses system dynamics to describe the interdependencies of the CI sectors. This approach aims at the identification of the main functionalities of a town

or a municipality regarding CIP. Discrete emergency scenarios are integrated into the model to ensure that systematic results are available for decision makers.