Information technology in support of incident management systems

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Biographical notes: Sang M. Lee is currently the University Eminent Scholar, Regents Distinguished Professor, Chair of the Management Department, and Executive Director of four outreach centres at UNL. He is a world-renowned scholar in the fields of multiple objective decision-making, global business, and operations/information systems management. His seminal work, *Goal Programming for Decision Analysis* published in 1972, laid the foundation for multiple objective decision-making based on hierarchical priorities. Since then, most of his professional work has been in the areas of productivity and quality management, global business strategies, information and telecommunication technologies, and developmental economics. He has published more than 50 books and 200 journal articles.

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1 Information technology in support of emergency management

It is humankind's lot to face the unexpected. Some things we do to ourselves. Wars have been with us as long as we have recorded history. Humans made decisions that led to the London blitz and Hiroshima. Terrorism has led to gassing the Japanese subway system, 9/11, the slaughter of Russian school children, and bombings of Spanish and British train systems. We also have demonstrated the ability to create tools, some of which bite back. We have dammed up rivers to control floods, to irrigate, and to generate power, as at Johnstown, PA. We have developed low-pollution, low-cost (at least expected to be) electricity through harnessing nuclear energy, as at Three-Mile Island, Pennsylvania and Chernobyl. We have built massive chemical plants that operate at low cost, as at Bhopal, India. But humankind has never been able to approach nature in the scale of destruction

experienced at Krakatoa and Pompeii, nor more recently the 2005 tsunami, nor hurricane Katrina in the way of single events, nor the massive scale of the droughts and plagues that have wiped out significant portions of populations.

We have learned to cope and to adapt. The old military saw was that the more you sweat in peace, the less you bleed in war, saying that preparation reduces the impact of negative events. Rescue operations at sea and fire stations on land reduce the level of disaster. Police and relief agencies help survivors recover faster. But they need help. The scale of disaster grows as the world's population grows, as humankind conquers and damages nature, and as we develop more complex systems.

2 The role of information technology in disaster management

Information Technology (IT) has proven very useful in many aspects of life. Computer systems control many of the complex (high performance and high reliability) systems humans develop, such as air traffic control, power plants of all sorts, and factories of all types. They also provide tools to make more informed decisions, statistical analysis to better understand system relationships, and modelling to predict system outcomes.

This Special Issue provides a view of IT tools available to support emergency management. Decision support systems are often viewed as containing database and modelling tools, with tailored interfaces to decision makers facing a particular problem.

Thompson *et al.*'s 'Improving disaster response efforts with decision support systems' reviews some existing emergency management information systems and their use in decision support. This paper also provides an analysis of the conditions needed for DSS technology to better support emergency management in the future.

Another key IT tool is database support. Ryoo and Choi's 'A comparison and classification framework for disaster information management systems' identifies essential requirements for effective data support in emergency management. These authors propose a comparison and classification framework that can be used by first provider organisations.

Data mining focuses on analysing large data sets. Hale's 'Information vs. intelligence: construction and analysis of an open source relational database of worldwide extremist activity' demonstrates the use of decision tree technology in evaluating terrorist incidents, utilising data obtained from the internet.

In 'Challenges and strategies of transportation modelling and simulation under extreme conditions' Ni discusses transportation and simulation modelling tools in the context of emergency management. This paper gives a conceptual case study to more firmly demonstrate the application.

The process of coping with emergency management is also important. Salasznyk *et al.*'s 'A system view of data integration for emergency response' discusses how IT can be used to enable first responders to share data, demonstrated with a traffic incident management domain in Albany, NY.

Woltjer *et al.*'s 'A case study of information and communication technology in emergency management training' focuses on the role of IT in the electrical and telecommunications domain, reporting results of an emergency management exercise in southern Sweden.

The last paper focuses on innovation. Mendonça and Fiedrich's 'Training for improvisation in emergency management: opportunities and limits for information technology' presents an approach with the potential to improve emergency management training based upon identification of key training outcomes. These authors suggest methods to develop effective improvisation based upon a musical domain.

Finally, Bartel van de Walle and Murray Turoff describe an important organisation for sharing research on crisis response and management. Participation in this promising organisation is encouraged.

3 The special issue

We are very grateful to the authors who submitted their work for this special issue on this important contemporary topic. We think that it demonstrates tools available, and how they can be used in the process of emergency management. We also are very grateful to the reviewers who made it possible to select and refine these papers.