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EDITORIAL: INFORMATION TECHNOLOGIES FOR EMERGENCY AND CRISIS SITUATIONS MANAGEMENT

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Emergency and crisis management represents a set of procedures and activities that determines the ways how to cope with accidents where the goal is to save human lives and to protect the environment, to preserve assets, properties, infrastructure, etc. Our society is very commonly exposed to various types of risks including natural disasters (floods, earthquakes and hurricanes), to fires, industrial accidents, large traffic accidents and also to terrorist attacks.

Based on a long-standing experience crisis management experts identified 5 basic phases in the crisis management cycle: prevention, mitigation, preparedness, response and recovery

All the above mentioned phases are equally important.

With the extensive development of information and communication technologies they became an integrated part of a crisis management and all crisis management phases can benefit from the IT support.

This special section provides an overview on using various information technologies across the crisis management cycle.

The role of **prevention** is to eliminate situations that could lead to human and/or environmental hazards and property damage. In this phase it is important to gather information about all possible hazards with the aim to predict critical situations. IT experts together with experts dealing with many different types of hazards have been developing IT systems for data storage, sharing, effective evaluation and data mining. A huge international cooperation, knowledge and experience sharing are crucial for this phase of the crisis management cycle. The data can be acquired by mechatronic systems for monitoring critical infrastructure as it is described e.g. in a paper (Dobrovodský and Andris).

In the **preparedness** phase, computational simulations of crisis situations are used for education and training of rescue services. Computational simulations of crisis situations in this stage of the crisis management cycle save money, and even more, these systems can simulate situations where there is no chance to be trained for. Another result of a computational simulation is correction of existing evacuation plans and development of new effective plans for many types of threats and dangers. There are two papers addressing such problems in this section: (Weisenpacher et al., Kasanický and Zelenka). The papers focused also on utilization of high performance computing and parallelization of computationally intensive simulations.

In the **response** phase, the IT technologies directly support rescue operations in many levels. In the first place it is a communication support that is crucial for handling any crisis. IT improves communication and coordination by sharing mutually important information among diverse rescue services levels, national government organizations (NGO), local government organizations (LGO) and private sector organizations. Communication with imperiled or injured people and their relatives and acquaintances are assuredly very important. Many elements involved in handling a crisis situation are not in the same geographical location or not available at the same time. The paper (Fogues et al.) describes an approach how to support dynamicity in the emergency response applications.

In cases where big groups of people are to be addressed and guided, the systems for automated generation of expressive speech, e.g. like the one that is described in a paper (Rusko et al.), can be applied. The paper presents an original approach based on the idea that acoustic cues of affective features in speech can induce a proper evaluation of content by a message recipient. Messages can activate people in case when urgent actions are needed (to start an evacuation). On the other hand, they can calm down the situation in order to prevent mob violence, panicking of crowds and threat to human lives.

Emergency and mass disaster crisis management and accidents with the need of evacuation of citizens requires effective and purposeful materials, food, drinking water, medical help, and other civilian personnel management requirements. IT systems can support match making of suppliers and requirements. They facilitate real time information about available resources and about real needs at the same time. Systems that retrieve and gather information about resources (number of beds in hospitals and provisional lodging houses, etc.) directly from other information systems should ensure secure access to those systems. The issue is even more im-

portant when those systems use the cloud infrastructure. The security issues in the cloud infrastructure for such applications are addressed in a paper (Balogh et al.). A multi-agent cloud-resource management is described there.

Nuclear power plant accidents represent one of the most dangerous crisis situations that might happen. A paper (Kozák et al.) describes an intelligent modular information system for modeling and decision making support for some important critical processes in a nuclear power plant. The system utilizes soft computing methods and its prediction model was tested based on real operating data obtained from the Nuclear Power Plant in Jaslovske Bohunice, Slovakia.

Conclusion

Application of information systems in a crisis and emergency management cycle can proactively reduce risk, minimize losses and accelerate the recovery. There are many open issues that restrain IT from broader utilization. The research focus has moved from just supporting rescue teams with relevant information to advanced information systems that can be utilized in all phases of the crisis or disaster management cycle. Large national and international collaboration opens new issues on interoperability and standards for systems that can provide data and decision making support for the crisis management. Great expectations are given to social media and social networks that can be an irreplaceable source of information and can play also an important role in the recovery phase. We hope that this special section contributes to a great variety and diversity of research related to the problem of information technology utilization in the crisis and large-scale disaster management.

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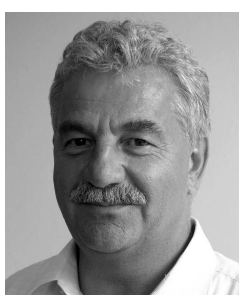

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