EMERGENCY MANAGEMENT IN THE SCOPE OF RESEARCH

Zarządzanie kryzysowe w świetle badań

Summary
Research on IT–application in the domain of public safety and security is none of the traditional research areas in the field of emergency and disaster management. The availability of mobile and ruggedized computing equipment has been the enabler for these researches. C.I.K. focuses on user-integrated research in this context. Since 2007 specific funding schemes on European and national levels have been existing.

Streszczenie

Keywords: research in public safety and security, end user driven approach;
Słowa kluczowe: badania w dziedzinie bezpieczeństwa publicznego, bezpieczeństwo i ochrona, orientacja na użytkownika końcowego;

Introduction
First co-operated research activities of the Fire Department Dortmund (FDDO) and the re-search group “Computer Application and Integration in Design and Planning (C.I.K.)” started in 2000 within a project on tunnel fires. The first draft of the proposal was done from a research perspective, relevant end user oriented aspects and results were achieved by the participation of FDDO and C.I.K. Three additional corporate projects were successfully launched before researches on civil safety and security have been focused in European and national funding. Within all the numerous projects C.I.K. is the interface and coordinator between civil rescue organisations, transportation service providers, additional end user groups and other project partners. As a consequence now C.I.K. is one of the leading German institutes in this context. The grown expertise is the basis for new concepts, systems and technologies in the context of emergency planning, coordination support, training and decision support.

The C.I.K. is an interdisciplinary research group. One of the specific competencies is the analysis of end user requirements in close cooperation with stakeholders based on a broad and detailed knowledge of processes in public safety and security. Here the research is focused on the adaption and improvement of actual requirement engineering methods. In addition research priorities are the application of software engineering methods from conceptual design to implementation of information systems. Finally a continuous evaluation of research results and quality management in the field of product development focused on usability of software solutions is core part of the C.I.K. work (see Figure 1).
The end user focused approach even finds its way in the university education. Base is a long-term experiences and results related to the research activities in the field of public safety and security. In close cooperation with FDDO lectures and tutorials (see Figure 2) were created together with the head of FDDO, Dirk Aschenbrenner. This provides students from mechanical and industrial engineering and information technologies access to this field and attracts the next generation of researchers. The figure shows the content of the lectures “Emergency Response and Disaster-management” (light grey) and “Information-management for Public Safety and Security” (grey) and the linkage between them.

Research Activities (Examples)

C.I.K. is involved in European and National funded projects with various core themes. In national funded projects C.I.K. fulfill both roles to participate in and also to coordinate a project. Overall C.I.K. takes part in 17 research projects with a scope on public safety and security. The following figure shows the content direction of C.I.K which includes simulation as well as tactical information advices.

Besides the content-wise positioning of the research group, supporting all stages of disaster management - prevention, preparation, response and recovery - is an important aspect. Decreasing the likelihood for the occurrence of a crisis during the prevention, useful training and planning to be prepared for a potential incident, effective actions to resolve the crisis and at least a standardised process to get a stable state are here relevant topics. C.I.K. projects cover all stages to achieve an overall improvement. Some examples are given in Figure 4 and described further on in detail.

Figure 2. Content of cooperated lectures

Figure 3. Content-wise order of C.I.K. projects

Prevention and Response.

Research in public safety and security is often scenario-based. E.g. the main objectives of the projects OrGaMIR and OrGaMIRPLUS are an evaluation of the present and expected contamination of underground systems with smoke or hazardous substances by means of substance detection. Based on the calculation of the spread of such gaseous substances the specific distribution of consolidated context and organisation-specific information will be provided to affected passengers and all organisations involved, like subway operators, fire brigades, safety staff and train drivers. Figure 5 shows the demonstrator of the OrGaMIR-project.

Figure 4. C.I.K. projects related to the crisis management cycle

Figure 5. OrGaMIR demonstrator
Pedestrians in underground systems have less than 10 minutes to get out of the station before the situation becomes severe. Therefore it is important to direct them their way out as fast as possible. The main challenge is to achieve a reliable prognosis of the smoke and gas spreading within 30 seconds and furthermore dynamic escape routes for each pedestrian [1]. See Figure 6 to get an overview about the fast development of OrGaMIR scenario. C.I.K. aims of OrGaMIR+ are the including of human factors in the calculation of dynamic escape routes and the designing of new actuator approaches to guide pedestrians out of the involved station. The importance of taking the individual pedestrian into account is shown in [2].

**Preparation and Response**

The development of an event-driven system support command and control in emergency and rescue operations was one of the main tasks of the project PRONTO. Figure 7 and 8 show different perspectives of the PRONTO demonstrator.

**Recovery**

Another scenario is addressed by the project I-LOV. It aims to ensure the safety of rescue forces and victims at all times during natural or man-made catastrophes. Main target is timely rescue of people who have been trapped or buried under rubble. The project covers all relevant key aspects and challenges in terms of social conditions, emergency medicine, intervention psychology, law and new technologies.

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1 Using The Observer® XT with GeoViewer™ plugin provided by Noldus Information Technology BV. Source of map extract: URL http://www.idf.nrw.de/ausbildung/einrichtungen/aussengelaende/aussengelaende.php
The contribution of C.I.K. is the development of an IT support to provide dynamic, context-specific standard operation procedures for the necessary location and rescue tasks.

Conclusion

End user driven researches in the domain of public safety and security are highly interdisciplinary and demanding. They require close cooperation with end users and have to consider the mentioned and moreover further conditions. The key success factors are:

- Wide spread and detailed knowledge of operating situations and end user perspective,
- Definition of the required results and the methodology from the end users perspective point, e. g. in close cooperation during the definition phase,
- Development of information systems to obtain first action recommendations based on few known parameters, avoiding scientifically complex solutions with an extensive parameter definition and response time, which would be in contrast to fast response required during operations,
- A continuous evaluation and involvement of end users in the implementation process to achieve highly usable systems.

On the other hand possible risks like data losses and inconsistencies of IT-systems may interfere with on-going operations. For this reason IT-systems can be seen as a critical infrastructure. As a consequence off-line modes and even conventional procedures without IT support have to be provided as back-up solutions.

References


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