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**July 2007**

Special theme:

Service-Oriented Computing

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# Coordination of Emergency Communication in Safe Hands (/en70 /rd/coordination-of- emergency- communication-in-safe- hands)

[R&D And Technology Transfer \(/En70/rd\)](#) 📅 02 July 2007

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*by Annette Kik*

**A Belgian Hercules airplane crashed at Welschap Airport near Eindhoven, the Netherlands on 15 July 1996. Firemen extinguished the fire, unaware of the fact that over forty people were still inside. Thirty-four people did not survive. This is a sad example of human communication that went wrong in moments of stress. Would an automatic communication system have detected that essential information was missing? Within the Cybernetic Incident Management (CIM) project, CWI collaborated with universities and high-tech companies to improve communications in emergency situations.**





Communication is often the bottleneck in disaster management.

Formerly, disaster management was all about knowing contingency plans by heart: mostly formal and legal rules. Nowadays, a more active approach is needed. During realistic simulations it often appears that communication is the bottleneck in disaster management. Reason for high-tech company Almende to investigate whether they could apply their ASK system to emergency control. This was originally designed for dynamic resource planning, communication, and distributed knowledge management.

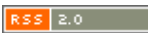
The ASK system is based on a set of intelligent agents: autonomic pieces of software that collaborate to fulfil a certain task. For instance, if 10 volunteer firemen are needed, agents in the system know who is on duty to form this team and whom to call if some of them cannot be reached or are otherwise unavailable. It calls people through their preferred communication medium, such as analogue or ISDN telephone, GSM, VOIP, SMS or e-mail. It can scale-up and escalate a situation according to the communication protocol. It searches the best solution and after the call, it asks for feedback in order to improve itself. Many test scenarios are provided. It takes care of the complete communication coordination.

The ASK system has several benefits. It is more consistent and reliable than human beings in stress situations. Workers are often closer to a disaster than a coordinator, so precious time could be saved and some "filtering problems" avoided if their first hand information could automatically be dispatched to the appropriate people involved. Despite all benefits, trials to experiment with it encountered some opposition in governmental organizations. Why change a safety-critical system that works well, at least most of the time?

For Almende, this was no reason to stop further product improvement. Improvements include the concept of mobile channels developed by the SEN3 research group at CWI - a change in the ideas of building modern software systems. The essentials are not about pieces of software anymore, but about programming the communication and coordination between them. Farhad Arbab, researcher at CWI and professor at Leiden University, foresees big advantages for Service-Oriented Computing, where composition of existing services can be offered as a new service.

### Infrastructure

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With mobile channels independent organizations can set up new businesses that do not require alterations to existing services. The crucial point is that mobile channels offer a mechanism to fully decouple software behaviour from its underlying code. Mobile channels only know dynamic connections: They determine which software module is connected to the others, and when. This becomes indispensable when each concern falls within the jurisdiction of an independent autonomous organization, as is the case in incident management.

CWI's Reo system implements communication and coordination protocols that regulate, synchronize, and combine the data streams through mobile channels. In the above example, if one volunteer fireman cannot assist at a certain moment, the protocol can have the system switch to a neighbouring fire department, without the involvement or knowledge of the fireman or his fire department. The SEN3 group provides the infrastructure for these communication systems.

### **Future**

Will the ASK system ever be used for emergencies? To test it in a more neutral and less stressful environment, the system was set up at an employment agency. Fifty freelancers received e-mails or SMS messages asking if they could work at a certain time. Without knowing that they were only talking to a computer, they all typed in the answer. Where it took one person at the employment agency 8 hours to call and schedule 50 people, the ASK system performed the same task in less than three minutes. The CIM team hopes that these kinds of successes help to win confidence and create the opportunity to test the system within both simulated and real emergency situations. It is all about coping well with small risk situations that can have big consequences.

The CIM project started in 2003 and will end in 2007. It is being financed by SenterNovem in the Netherlands. CWI's research partners in this project are the Technische Universiteit Delft, the Vrije Universiteit Amsterdam, Almende, CMotions and Falck.

### **Links:**

<http://www.cwi.nl/sen3/> (<http://www.cwi.nl/sen3/>)

<http://homepages.cwi.nl/~farhad/> (<http://homepages.cwi.nl/~farhad/>)

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