

## **Secure CITI: A Secure Critical Information Technology Infrastructure for Disaster Management**

The current primary mode of operation in disaster detection and response is through the 9-1-1 system, where humans call in emergencies to a central dispatch agency that receives the call and dispatches the appropriate personnel. This detection/response system has proven adequate in many situations, but slow in other scenarios. Reports from the field may be inadequate when communication links are severed between the area affected and emergency response agencies.

This research explores a concept of how to automate a process of risk detection efficiently. We propose a Secure and robust Critical Information Technology Infrastructure (Secure CITI) that uses already deployed data-sensing equipment and strategically deploys new sensors in areas of concern. For example, cameras that are used to monitor traffic and toll booths could be redirected to report on unexpected events (e.g., pieces falling from the roof of a tunnel, or a major crash) or re-oriented to collect information about a potential landslide in a nearby hill.

In essence, we propose to introduce a sociotechnical system to coordinate the use of existing and newly designed data collection instruments, integrate the data from multiple sources into a common profile of the status of the region, and distribute the relevant data among different organizational units with different responsibilities for maintaining continuity of operations for the region. The system will facilitate efficient and quickly coordinated actions in response to natural and human-caused threats. The system will also contain a learning module that will feed post-action data into the data processing module for pre-action decision making.

In order to carry out this project, we will specify scenarios and use the information generated from these scenarios to access/redeploy/use sensors for collecting specific data, establish communication between emergency managers and disseminate appropriate information to them. Our protocols will respect the different organizational units and the privacy of data through secure and authenticated data access. We will also make the protocols dependent on the level of risk, the load on the system, and the type of information being shared.

To manage the resources in the system (sensors, CPUs, wireless and wireline communication links, voice channels, cameras, etc), we will work with emergency managers to specify the critical thresholds for performance, so that the system can supply emergency managers at different locations and with different responsibilities with the data most relevant to their operating capacity. In particular, we will dynamically synthesize databases with new consistency and authentication procedures bound to the type, size, and importance of the data.

This project is funded by the Information Technology Research Program, National Science Foundation, #0325353, at \$2.8 million for the period, September 1, 2003 – August 31, 2008. Daniel Mosse, Department of Computer Science, serves as Principal Investigator. Rami Melhem, Department of Computer Science, and Louise K. Comfort, GSPIA, serve as Co-Principal Investigators.