ABSTRACT

Federal, state, and local government agencies must develop coordinated strategies and adopt advanced and usable technologies to prepare for and cope with crises in contexts ranging from natural disasters to homeland security. A desire among agencies to coordinate activities, however, is not enough. Meeting the challenges of crisis management in a rapidly changing world will require fundamental information science and technology research. To have an impact, that research must be linked directly with development, implementation, and assessment of new technologies supporting coordinated work within and among government organizations in both civilian and defense sectors. To be useful and usable, that technology development must be human-centered, involving practicing crisis management personnel at all stages.

RESEARCH ACTIVITY

Current geospatial information technologies fail to support group work and have typically been designed without scientific understanding of how groups (or groups of groups) work in crisis management to collect, process, and use geospatial information. Our research addresses both of these problems in an integrated way, within the context of real world crisis management activities. The research is designed to result in parallel, integrated advances for two fundamental components of GeoCollaborative Crisis Management (GCCM):

(A) developing a deep understanding of group work with geospatial information and technology and

(B) developing advanced geospatial technology to support both same-place and distributed, dialogue-enabled, collaborative crisis management activities.

Our approach builds on theories of distributed cognition, emphasizes development of intelligent adaptive systems, applies robust Cognitive Systems Engineering (CSE) methods, and takes a Living Laboratory perspective.

CSE-BASED SYSTEM DEVELOPMENT

We have implemented a first version of the GCCM support system, which uses maps to mediate Emergency Operation Center (EOC) and mobile team collaboration. The assumption is that an EOC needs to coordinate with a team of first responders in the field. The EOC is equipped with a large-screen display together with microphones and cameras to capture human speech and free-hand gestures and support human-system dialogue. Field responders carry hand-held devices (e.g., a Tablet PC), running clients that support user-tool dialogue with natural speech and pen-based gestures. All communications are through XML-based web service protocols. Mobile devices use wireless connections, while the EOC system(s) use high-speed network connections. Central features of this system are its abilities to: (a) understand and act on natural multimodal requests for geographical information from crisis managers, (b) allow each member to work with geospatial information individually or collaboratively with others, (c) manage mixed-initiative dialogues for cooperative decision-making, and (d) access existing data and services from an enterprise spatial (and non-spatial) informational infrastructure.

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