

GeoCollaborative Crisis Management:

Using Maps to Mediate EOC–Mobile Team Collaboration

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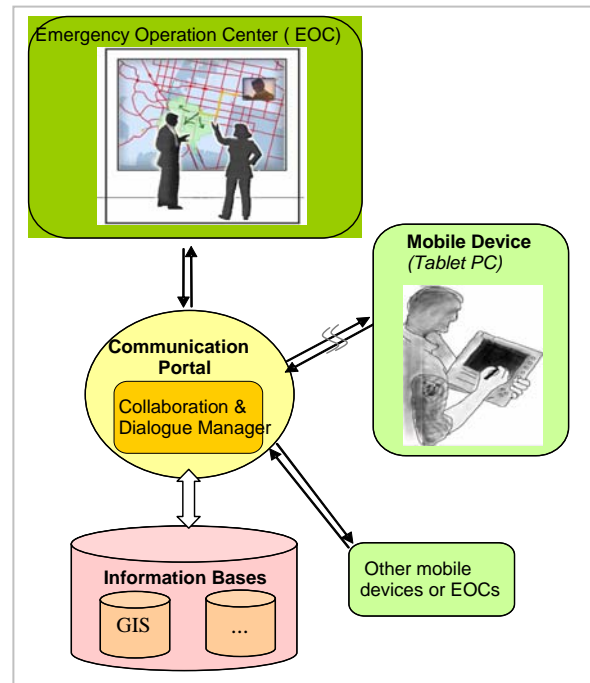
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Managing large scale and distributed crisis events is a national priority; and it is a priority that presents information technology challenges to the responsible government agencies. Geographical information systems (with their ability to map out evolving crisis events, affected human and infrastructure assets, as well as actions taken and resources applied) have been indispensable in all stages of crisis management. Their use, however, has been mostly confined to single users within single agencies. The potential for maps and related geospatial technologies to be the media for collaborative activities among distributed agencies and teams have been discussed [1-4], but feasible technological infrastructure and tools are not yet available. An interdisciplinary team from Penn State University (comprised of GIScientists, information Scientists and computer scientists), currently funded by the NSF/DG program, have joined efforts with collaborators from federal, state, and local agencies to develop an approach to and technology to support “GeoCollaborative Crisis Management” (NSF-EIA-0306845). The dual goals of this project are: (1) *to understand the roles of geographical information distributed crisis management activities*; and (2) *to develop enabling geospatial information technologies and human-computer systems to facilitate geocollaborative crisis management*. This demonstration presents initial progress towards supporting geocollaborative activities, focusing on one type of collaboration involving crisis managers in the field coordinating with those in an emergency operation center (EOC).

The architecture that underlies the demo system is sketched in the figure below. Here we assume that 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. The EOC coordinates with hand-held device clients (e.g., a Tablet PC) 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 (1) *understand and act on natural multimodal requests for geographical information from crisis managers*, (2) *allow each member to work with geospatial information individually or collaboratively with others*, (3) *manage mixed-initiative dialogues for cooperative decision-making*, and (4) *access existing data and services from an enterprise spatial (and non-spatial) informational infrastructure*. The “Collaboration & Dialogue Manager” component is an intelligent agent that mediates the collaborative discourses among humans and devices, and acts on database access and information display on user’s behalf.

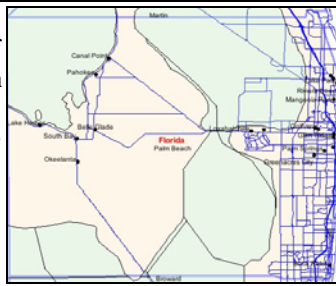
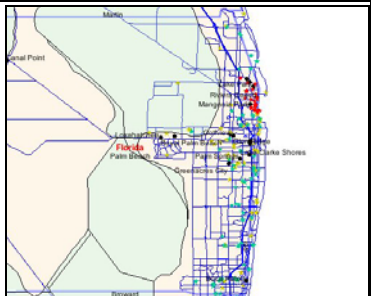
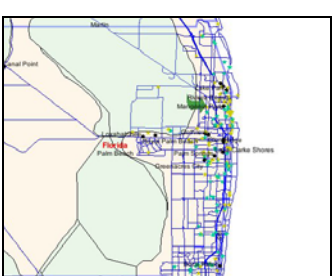
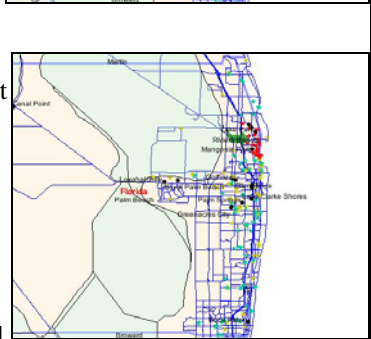
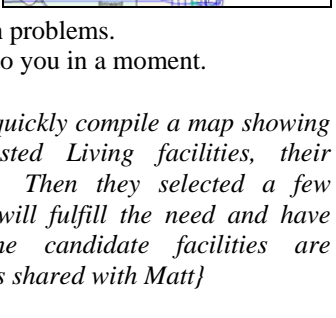
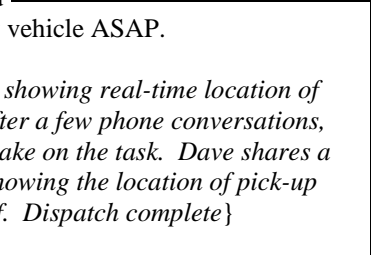

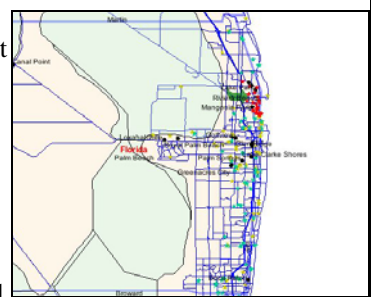

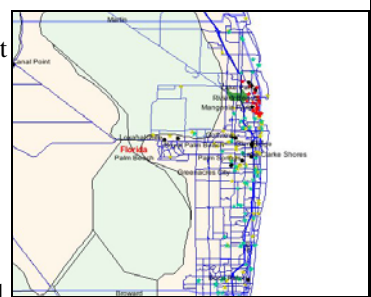




Our demonstration is based on the following hypothetical scenario for a typical crisis event:

Scenario: A category 4 hurricane has struck the south east part of Florida, potentially causing flooding that affects a number of counties along the coastal area. While evacuation alerts have been sent out to affected communities, state and local emergency management forces must make sure that all residents evacuate in time and (if needed) find shelter in designated facilities.

While he was searching a residential area in Palm Beach county, Matt (a member of the first responder team) found a group of people who need assistance getting to a shelter. These people are elderly and some have serious health care needs.

In the EOC, a manager, Sue, and her assistant, Dave, have access to a large-screen display which shows the overall situation in the whole flooded region. They get reports from multiple sources (sensors, satellite, 911 phone calls, field reports) and have the responsibility to help field team.

<p>Matt: Sue, I need help evacuating a group of people in Palm Beach county. { a map is shared that shows the general area of Palm Beach county }</p>		<p>Sue: Matt, there are several facilities that we can let you use. Which one looks practical?</p>	
<p>Sue: Could you identify your location on the map please?</p>		<p>Matt: {gesture on one highlighted facility} show me details about this facility</p>	
<p>Matt: I am here {gesture on the map screen. A marker is placed on the map}.</p>		<p>System: This is Center Region Retirement Center. It has 70 beds, and two nurses.</p>	
<p>Sue: What is the condition there?</p>		<p>Matt: That sounds perfect ... Let's take these folks there.</p>	
<p>Matt: There are 12 elderly people and some of them have serious chronic health problems.</p>		<p>Sue: Great! I will send you an emergency vehicle ASAP.</p>	
<p>Sue: OK, we'll get back to you in a moment.</p>		<p>{Dave brings up a map showing real-time location of emergency vehicles. After a few phone conversations, he finds two willing to take on the task. Dave shares a map with the drivers, showing the location of pick-up and location of drop-off. Dispatch complete}</p>	
<p>Matt: Thanks! {Sue and her EOC team quickly compile a map showing information about Assisted Living facilities, their specialty and capacity. Then they selected a few candidate facilities that will fulfill the need and have enough capacity. The candidate facilities are highlighted and the map is shared with Matt}</p>			

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