The University Consortium for Geographic Information Science

Research Priorities

EMERGENCY DATA ACQUISITION AND ANALYSIS

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THE PRIORITY

Develop the geospatial infrastructure to provide emergency responders at any location with the best available data in the most useful form in the least amount of time.

DESCRIPTION OF RESEARCH CHALLENGE

The value of data for emergency response following an event is intrinsically linked to the lag-time within which it is available. For instance, in some emergencies, data to aid in locating survivors must be available within 72 hours of the event to have value. In the Kocaeli earthquake in Turkey in August of 1999, some 18,000 to 40,000 lives were lost. Many of the deaths were due to building construction, while an unknown number were due to misinformation. Numerous buildings existed without record while others had an incorrect number of floors reported. Timely, accurate information might have reduced this disaster's toll.

For many common GIS applications, the lag-time in gathering data is either negligible or considerably more lenient. For emergency response, the lag-time of identifying, obtaining and analyzing spatial data is paramount to its use in the decision-making process. Previous disaster events are typically followed by a downward trend in relevance, awareness, and decreasing attention. Immediately after an event the issue of emergency preparedness and mitigation are very relevant to all of society. This relevance results in increased attention, awareness, and subsequent allocation of resources. For example, numerous interagency agreements were established after Hurricane Andrew in 1992 and the events of September 11, 2001. Unfortunately, the post-disaster trends include a decreasing level of attention as the time from the event increases. This has been documented in public awareness, mitigation measures (e.g., insurance purchase), and agency budget allocations.

Aside from the disaster event-attention level trend a complicating issue is the evolutionary nature of technologies. Technology is not static but continues to evolve -- remote sensing platforms, GIS data sources, and communication media serve as examples. Any protocol for rapid response developed today may well be outdated and even unworkable in three to five years. For instance, relying on re-

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mote sensing assets (satellites or aircraft) that exist today is very short-sighted. New instruments (e.g., LIDAR) used immediately following the September 11 events were not even operational two years before. This pace of change in geospatial data availability and quality is likely to impact emergency response for many years.

Importance of Research Challenge

Advances in geospatial hardware and telecommunications technology are moving GIS from the desktop to the field. Many new and critical decisions are being made on-the-fly in emergencies with geospatial information. This will inevitably lead to increasing societal dependence on this information. The benefit of the right information at the right place and time can be enormous, while the consequences of anything less can be devastating. Many lost opportunities and mistakes can be avoided (or lessened) if this research area is a priority.

Eminent Research Questions

- How can a framework for rapid spatial data identification, access, analysis, and dissemination be developed?
- What operational spatial data framework is best suited for each hazard event and societal context (e.g. community, state, country)?
- What measures of success could be used to evaluate alternative frameworks?
- How can spatial information accuracy be assessed, managed, and communicated?
- What tools can be developed to support critical decision-making under uncertainty?
- How can data from many different sources be rapidly conflated and fused into a valuable resource?
- What are the common operations that users will need to do on data, and can they be predefined?
- What institutional issues impede the rapid collection and sharing of geospatial data, and how can they be overcome?

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