GPS/GIS Applications for Emergency Response

If time and money were no problem, emergency planners would have an easy job. But as things stand, even as the scale of manmade and natural disasters is increasing, funding is growing tighter and tighter. That is why planners are turning to Global Positioning Survey/Geographical Information System (GPS/GIS) for solutions. GPS/GIS technology provides fast, accurate data for emergency planning and for on-the-spot assessment if a disaster should occur. With the use of GPS/GIS, planners are collecting information about everything and anything that may effect public safety—road conditions, likely points of toxic release, and vulnerabilities of airports and drinking water supplies. In the business of knowing what is out there and where, planners are discovering that GPS/GIS makes it entirely feasible to collect public safety information rapidly and simply. Moreover, it collects the information in a format that is useful for many other city agencies.

GPS/GIS technology is invaluable for collecting multiple descriptive features over large distances. For example, in Virginia, county planners recently used a data collection system to produce comprehensive mapping and addressing for an enhanced 911 project that would automatically provide emergency dispatchers the location of a distress call by accessing address databases.

The traditional means of comprehensive addressing requires sending large crews into the field. Numbers are manually assigned and runners tag these numbers on every house. This information is then manually transcribed onto existing maps and later keyed into databases. Any new mapping of developing areas must be accomplished separately. Faced with this prospect in Virginia, county planners turned to the GeoLink GPS/GIS Mapping System (GeoResearch, Inc., Vienna, Virginia) for its compactness, ease of use, and cost-efficiency. Planners were more than pleased to find that they had created a highly accurate database in just a few weeks.

How did they do it? Using GeoLink, only a small field crew was required for data collection. Nontechnical personnel collected information from a moving vehicle, using "hot" keys that were preprogrammed for automatic data input. Addressing, mapping, and validation were all accomplished in one pass and data were automatically setup for GIS. These coverages became the source for layer databases that were used to update older digital map files. The completed coverages were then downloaded into Responder E911™ computer-aided dispatch and FIREFOX™ emergency management information and planning systems.

Other forward looking counties are turning to GPS/GIS for fast, inexpensive data solutions. Many counties face the challenge of collecting information in large rural areas where people and facilities are dispersed and perhaps not even officially addressed. Until recently, counties with such limited resources could not dream of creating public safety coverages. Now they’re using GPS/GIS and getting results. Musselshell County, Montana recently completed an extensive GIS of its infrastructure with 185 coverages including communications and transportation networks, energy and water systems, and housing and community facilities. Montgomery County, Indiana is also conducting a 911 base mapping project to direct emergency response for its very dispersed residents. GeoLink’s mapping system overcomes problems of distance because it uses GPS to map accurately regardless of the cruising speed of the recording vehicle.

Disaster Response

Government agencies as well as businesses are finding GPS/GIS invaluable for rapid response when a disaster does occur. Planners can now quickly map disaster conditions and precisely note the locations of fires, downed power lines, disrupted roads, etc., for assessment and rapid repair. City agencies or contractors use GeoLink-produced maps as electronic work orders that can be updated as repairs are made to speed the recovery phase. These work orders also double as disaster documentation for state, federal, or private insurance funds.

After the civil unrest in Los Angeles, emergency planners used the software to record 1,500 damage sites in a 95-sq mi area of the county. Over the course of three days, a field team plotted hard coordinates and provided descriptive data for damage sites using the program’s laptop menus. The project furnished Los Angeles County with an amount and quality of data that would have taken several weeks to produce manually. Additionally, these data were used to document disaster relief tax deferral granted by the California legislature to stimulate recovery in the impacted area.

The software was also used by Florida Power and Light after Hurricane Andrew to locate downed power lines and notate general damage to their utility system. Exxon used GeoLink after the Valdez oil spill to precisely locate spill areas from the air. These maps then became part of Exxon’s legal documentation of the oil spill. The program is also being used to directly respond to forest fires. By mapping the changing perimeter of fire lines onto topographical maps, fire chiefs can fight fires more effectively.

GPS/GIS technology is already important to emergency planners in in numerous areas.

• Digital system map creation and maintenance.
• Inventorying structures relevant to preparedness.
• Enhanced 911 mapping.
• Rural addressing.
• In-Vehicle Navigation Aid—Employing local system maps from CAD or GIS to assist out-of-district help and contractors to use as electronic work orders.
• Dispatch Aid—Dispatch nearest available vehicle to the task relate location to network map.
• Recovery Phase—Rapid repair response documentation for federal and state funding.
• Instrumental Measurement Mapping—Pollution containment flood management.

GeoLink’s External Data Source (XDS) tags instrumentation measurements to specific locations. Patterns of radiation, air, water, and other chemical pollutants can be mapped for intensity and dispersion and overlaid onto other GIS coverages, such as housing, population density, etc., for damage control and assessment. Bathymetric readings are available for measuring changing volumes of water. The company’s new GeoPhoto will also automatically georeference on-site photographs for office reference and assessment.

GPS/GIS technology is extremely versatile. It answers the needs of anyone who needs to know what is out there and where it is. As such, its applications are being redefined daily by the real-life needs of its users.