

Getting the Most Out of GIS in an Emergency Operations Center:

Support for GIS operations using a Situation Status Unit.

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Abstract:

Although GIS has proven to be a valuable tool to local governments during major emergencies, it is often not fully leveraged. This paper will examine the reasons and explore steps to accomplish the goal of fully utilizing GIS during emergencies. Experience at the City of Seattle and the TopOff 2 anti-terrorism exercise will provide the basis for this discussion. Topics covered will include organizational culture, business process analysis, inter-jurisdictional coordination, the growth of the GIS user-base, metadata, applications with embedded GIS and the place of GIS in the Emergency Management organizations. The paper will offer GIS practitioners ideas on improving collaboration with emergency management.

The City of Seattle has been using GIS in its Emergency Operations Center since 1993. Seattle Emergency Management and Seattle Public Utilities, the owner of Seattle's enterprise GIS, have formed an effective partnership to provide GIS services at the City of Seattle Emergency Operations Center (EOC). Cross-training and long-standing relationships have extended it beyond the typical client/customer arrangements typical for GIS support. It has been so successful, that the City has used this model to extend analytical services in the wake of an increasingly complex operating environment by making GIS the centerpiece of a comprehensive suite of analysis delivering integrated information products.

Taking a baseline from the Incident Command System (ICS), Seattle Emergency Management created a Situation Status Unit (SitStat) as part of the City standard disaster response architecture. The new Unit builds out GIS by strengthening the GIS presence in the EOC and surrounding it with the support services necessary for it to reach optimal performance.

The catalyst for these changes was the 2003 TopOff 2 anti-terrorism exercise that simulated a 'dirty-bomb' attack in Seattle and a biological attack in Chicago. The event featured a full scale field operation, 36 hours of sustained activity, and involvement by all levels of government.

During TopOff 2, GIS operations demonstrated a new level of complexity. Not only was it GIS driven, but the GIS staff in our EOC were not doing the driving. Because so many different agencies were involved and all these agencies had evolved GIS programs

by 2003, the Seattle EOC served less as a data production shop (as it had in the past) and more as an integration center. The challenges of working with so many different organizations proved to be a major challenge and exposed shortfalls in the handling of GIS services. They included:

- Lack of organized data collection and processing;
- Difficulty distributing maps to end users in a format usable for them;
- Competing maps coming from the Federal level;
- Metadata issues; and
- Lack of defined roles and responsibilities surrounding geospatial data production;

Based on the lessons learned the Seattle Emergency GIS team (Seattle Emergency Management and Seattle Public Utilities) formulated a three point strategy:

1. Improve handling of GIS and related information in the EOC;
2. Improve coordination of GIS services among City departments and agencies;
3. Improve coordination of GIS services regionally, including with the Federal resources in our area.

Seattle Emergency Management started with the area over which we have most control: our City's Emergency Operations Center. Improvements there would have exponential benefit elsewhere throughout the organization. We realized that we needed to get our own house in order before engaging with other entities. We also hope that in the intervening time the State and Federal governments might step into the breach and start developing protocols and standards. Even with the limited goals of this first step it has taken nearly a year of hard work on borrowed time and without special funding to develop concrete solutions.

SitStat

The way Seattle sought to improve GIS services was to recognize that GIS is a part of comprehensive approach to data collection, processing and dissemination. It recognized that much of what GIS analysts needed to do at the Emergency Operations Center what not GIS: data collection, displaying maps on an AV system, developing reports, etc...

The Situation Status Unit created as the solution to this information management problem. It improves GIS and supporting information services. Its official mission is to integrate all information necessary to develop a common operational picture for senior leadership and other emergency responders.

More specifically the Unit will collect, analyze, and disseminate information across all Emergency Support Functions. The focus of the team will be to develop an integrated common operational picture of an emergency event. It will review information coming from the field, departmental control centers and EOC personnel to quality control the data, identify gaps and develop intelligence products for City staff.

It is composed of up to seven roles:

1. Unit Leader
2. GIS Specialist
3. Display Specialist
4. Communications Specialist
5. Field Observer
6. Analyst
7. Policy Specialist

The structure is modular. In a small event, one person could fill more than one role and in a big event several people could staff the same role. Staffing is accomplished by tapping staff who are not currently assigned emergency roles under current response plans. The City of Seattle found that it had many people in planning and policy roles who were not being used for emergencies. Other local governments are likely to be the same.

Most of the Unit's products will be built around geospatial information. These include a Situation Map, an Incident Action Plan and a Mayoral Briefing, however being a team approach, the GIS specialist will be called upon to support other team members as needed.

The elaboration of the positions and their role in GIS support follows:

GIS Specialist

The most important function of the GIS analyst will be integrating the vast amount of data that a large event will generate. While SitStat does not directly address GIS coordination with agencies outside the EOC, it organizes the context in which this data comes into the EOC and it process within it.

The role will have to create a Situation Map every few hours that neatly summarizes the most important points of an emergency response on a small sheet of paper. It will also perform ad hoc analysis at the request of the Unit Leader. Part of the analytical function will be to perform analysis that verifies data. This specialist will also assist Emergency Public Information Officers produce spatial information for public consumption.

Unit Leader

For the GIS specialist, the most visible role of the Unit Leader will be performing "traffic control". GIS personnel staffing EOCs frequently complain about pressure from high-level managers. The Unit Leader takes this heat for the GIS staff. All work requests from the EOC management come through the Unit Leader who makes difficult decisions about prioritizing competing projects.

The Unit Leader should also be able to pinch hit in any of the Unit's positions, including GIS. The main reason is that the Unit Leader is the full-time cadre around which the Unit is built. The Unit Leader is a member of the Emergency Management staff and is therefore the first Unit member in the EOC after an event.

One of the most important duties performed by this position is preparing it for emergency response by developing staffing, ensuring personnel are adequately trained and equipped and by developing operational plans.

Display Specialist

This role supports the GIS staff by ensuring that maps and other GIS products reach the right audiences in the EOC. It puts GIS up on the "Big Board" at the front of the EOC and makes sure it stays up to date. Because events can sometimes unfold faster than a GIS work process can allow, the Display Specialist is cross-trained to perform simple GIS functions. Examples of this cross-training include adding and moving graphics on a map, adding and removing layers, and annotating a map. This position is also the audio-visual expert in the EOC and will also help combine live video with mapping products.

Communications Specialist

The role acts as the ears of the Unit by monitoring radio and TV communications. For the GIS analyst, it is an information source. It will often be the first to pick up new, raw information. The person filling this role will be able to provide frequent updates to the GIS specialist and assist with vetting information. This role will also be cross-trained to perform the simple tasks outlined above. In a fast moving event, the Communications Specialist would directly update a map document set up by the GIS Specialist.

Field Observer

This role acts as the eyes of the SitStat and GIS specialist in the field. It provides a way for SitStat to directly access an incident site. One of its most important duties is collecting GPS data and relay it back to the GIS specialist. This position verifies information for the GIS specialist.

Analyst

This position can perform research, database queries and statistical analysis for the GIS specialist. Frequently during emergencies, data comes into the EOC in less than pristine condition. The analyst will massage the data into a usable format. Having a database expert on site will free up the GIS specialist to concentrate on GIS analysis and map production.

Policy Specialist

The role is the Unit's writer. It produces the text that accompany maps and other analysis. The people staffing this position are drawn from the Executive and pool of senior public information officers (PIOs). They help ensure that GIS maps communicate with a lay audience and integrate with non-geographic material.

Technical Liaisons

While not officially, members of the Unit, as needed, the SitStat Unit will be augmented with scientific liaisons to better inform GIS analysis. Often, decision makers look to GIS

analysts to provide detailed technical analysis outside their areas of expertise. The SitStat plan provides a mechanism to request scientific support when needed.

Next Steps

The SitStat Unit is just emerging as a reality. Its operational plan is being finalized. Once done, the roles will be staffed out with a minimum of three people for each role. Equipment will be purchased as needed and the Unit trained as a group. As the project nears completion, it is time to look ahead to City-wide integration and beyond.

The next step will be organizing a City-wide GIS plan while keeping track of recent encouraging developments at the national level. The GIS shops across the City have matured. Working relationships with Seattle Public Utilities (SPU) and Seattle Emergency Management (SEM) are strong. SPU and SEM will capitalize on them to develop plans to define areas of operational responsibility for particular areas. They will have to work closely with operations staff to ensure that GIS remains in sync with the 'business' end of emergency response.

On a parallel track, the Seattle Emergency Management will track and participate in recent efforts to develop a more organized approach to GIS inter-operability at the national level. The Department of Homeland Security is addressing GIS as part of the National Incident Management System. A draft set of point symbols has been developed, but there is still much work to be done refining this set and other symbology for line and polygon data has not been drafted. The Common Alerting Protocol is an emerging XML-based means to share data including those with geospatial components. The City of Seattle would like to participate in the extension of these efforts and it develops its internal GIS data processing abilities.

The SitStat Unit represents a good first step for addressing inter-operability and GIS service delivery within an EOC. It is a "do-able" project that can be undertaken by an jurisdiction. It does not address every issue, but it will generate improvements because it does not attempt to re-define existing inter-agency relationships. It adds more analyst power to an EOC and improves GIS by complementing it with valuable supporting team positions.

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