

GIS for a Homeland Security Event: The Democratic National Convention

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Abstract: A group of more than 20 Federal, State and local government agencies and the private sector convened the Democratic National Convention GIS Working Group to plan GIS operations for the DNC held in Boston, MA, in July 2004. Through this close collaboration, a standard set of data was collected, verified and distributed along with more than thirty maps including a set of five standard base maps and a symbology standard. Agreed upon operating and sharing procedures were also developed and distributed in the concept of operations document. During this event, a Unified Modeling Group was also established. This type of working group was clearly necessary to ensure that all GIS professionals were working with the same data, to eliminate duplication of effort, and to ensure that a single air dispersion model was distributed to all emergency responders. This collaboration was highly successful because of the close cooperation of all agency participants involved.

Introduction:

The Democratic National Convention (DNC) GIS Working Group coordinated planning and support for local, State and Federal Geographic Information System (GIS) operations for the Democratic National Convention, a National Special Security Event (NSSE) held at the Fleet Center in Boston, MA on July 26-29, 2004. This working group was created to coordinate geospatial issues, increase communication among response organizations, and address GIS specific problems for this event.

The DNC GIS Working Group focused on three main issues:

- Data development and sharing
- Unified modeling
- Mapping support

The group found separate data sources existed in City, State and Federal databases. These separate data sources resulted in GIS products that displayed different and often conflicting information. Additionally, some of the data sources used by response organizations were not always accurate, resulting in incorrect maps. Lastly, data changes rapidly, particularly in urban areas. For example, traffic on Route 93 through the center of Boston was recently moved from elevated highways to underground tunnels as part of the Central Artery Project, commonly known as the "Big Dig". To address these data issues, the DNC GIS Working Group created a common data set accessible to all GIS personnel working this event. This data was gathered from several sources, vetted for accuracy and content, and then distributed within the working group. This dataset served as a resource for this event and will continue to serve for future events or response operations in Boston.

In the past, model results were released displaying differing and often conflicting information, causing confusion amongst responders. In an effort to resolve this confusion DHS is in the process of establishing the Interagency Modeling and Atmospheric Assessment Center (IMAAC) to provide single air dispersion models to emergency responders. The DNC GIS Working Group provided a similar service releasing one model for use in all operations. In addition to air dispersion models, the Working Group also coordinated the development of other models to support response operations to hurricanes, earthquakes, and floods.

A primary goal of the DNC GIS Working Group was to provide GIS map production support to local, State and Federal response organizations supporting DNC operations. Because many of the maps required by these organizations are the same or very similar, there was a strong potential for duplication of efforts. The Working Group addressed this by developing a set of common maps pre-event including standardized base maps for distribution to each of the approximately 20 command posts.

Coordination:

The DNC GIS Working group met monthly from December, 2003 through July, 2004. These meetings were attended by approximately 20 Federal, State and local agencies for public safety, emergency management and other supporting entities, as well as representatives from the private sector. These included the Boston Police Department, Boston EMS, Boston Emergency Management Agency (BEMA), Massachusetts Emergency Management Agency (MEMA), MA National Guard Civil Support Team, Massachusetts State Police, FEMA, US Environmental Protection Agency (EPA), US Secret Service, US Coast Guard, National Geospatial Intelligence Agency (NGA), Naval Undersea Warfare Center (NUWC), US Geological Survey (USGS), US Army Corps of Engineers, Department of Homeland Security (DHS), USNORTHCOM – CBIRF (Chemical Biological Incident Response Force) and JTF-CS (Joint Task Force Civil Support), NOAA (National Oceanic and Atmospheric Administration), the City of Cambridge, FEMA's Urban Search and Rescue MA Task Force 1, and ESRI. Minutes were created and distributed from each of these meetings.

A concept of operations document was produced to guide this collaborative process. This document described the agreed upon operating and information sharing procedures during the event. It included information on data format and type, naming conventions, data and map sharing procedures, documentation requirements, procedures for the modeling group, and contact information. Additionally it established procedures for distributing data and maps during the event through an EPA File Transfer Protocol (FTP) site, and an EPA message board capability for sharing general information on updates.

Data and Mapping:

A single set of data was distributed to the emergency GIS planners from the Federal, State and local levels participating in this emergency planning. This 10 gigabit (GB) data set included over 8 GB of imagery and approximately 170 vector files. The major contributors of data were MassGIS, Boston Police, EPA, DHS groups and MEMA. The Working Group established data requirements early in the process by creating a list of datasets needed which was subsequently vetted through the GIS representatives and key operational representatives to ensure completeness. Each agency then provided the source, vintage, and scale for their available dataset. These lists were collated by the data coordinator, and the most appropriate source for each dataset assimilated into the database. The data was collected and reformatted to a common projection. A symbology standard was created for this dataset, and vetted through key operations personnel and through GIS personnel for comment. Once completed, an ArcGIS 'style' was created and distributed along with layer files for most of the datasets.

Additionally, new datasets were developed with DNC specific data. These included information such as DNC event venues, location of medical and hazardous materials response teams, security zones, staging areas, transportation changes included closings of roads and public transportation, and emergency operations centers. A short time before the DNC, the main phase of the Central Artery Project was completed, resulting in the rerouting of traffic on Route 93 from the elevated highway to the underground tunnel. Because the Fleet Center, the venue for the DNC is in extremely close proximity to the new tunnel and the demolition of the elevated structures, the landscape around this venue was changing rapidly in the months before the DNC. In response, aerial orthophotos were taken in the spring of 2004 and distributed to the group.



Figure 1: Orthophoto of Fleet Center, Spring 2004

In an effort to reduce duplication of effort over 30 maps were produced pre-event for both the ArcGIS 8.x and ArcView 3.x platforms. Additionally, in order to ensure that all of the operations centers were viewing and making decisions using the same information, 5 base maps were created. These were vetted for comment and approval through both the GIS personnel on this group and through several key operations groups from FEMA, MEMA and the Boston Police Department. These base maps were published in the Field Operations Guide (FOG) produced by FEMA for the Consequence Management Sub-Committee. The remaining 30 maps produced included critical facilities, demographics, security areas and DNC event specific information. These maps were distributed to members of the Consequence Management Sub-Committee through a reference CD also produced by FEMA.

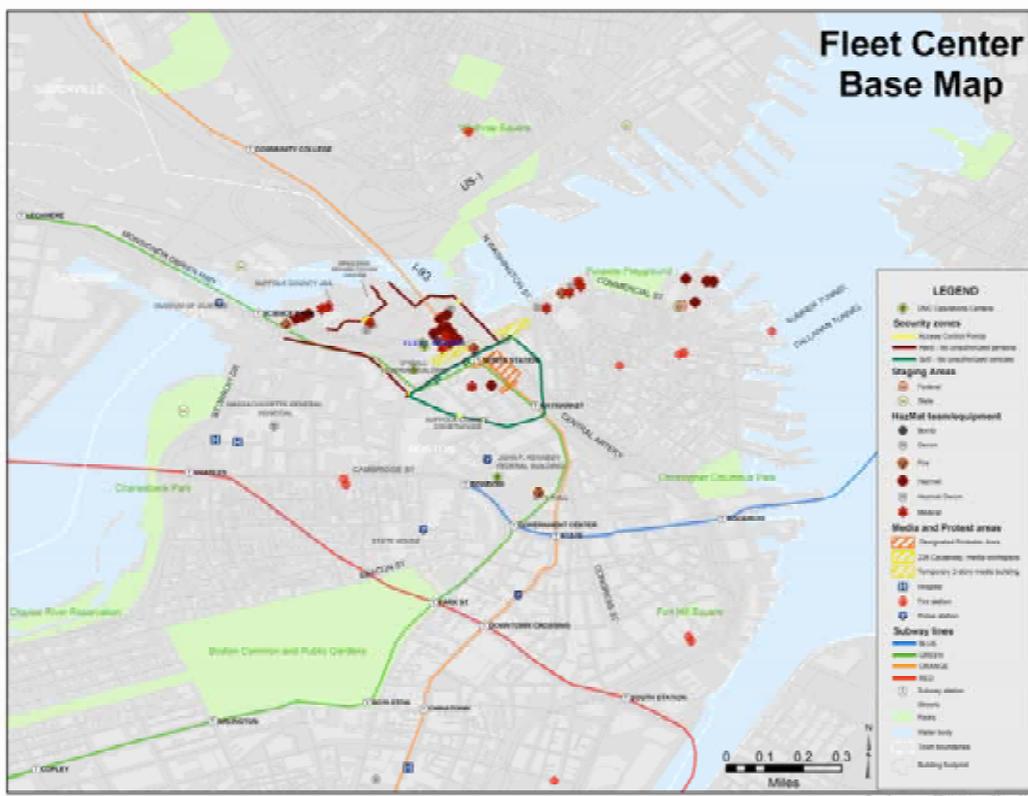


Figure 2: The Fleet Center Base Map, one of the 5 base maps produced.

All data and maps were designated For Official Use Only until August 15, 2004 because of the sensitive nature of some data including specific locations of field response teams. Once completed, the data and maps were distributed to 20 agencies on 15 CD's and 1 DVD.

Modeling:

The DNC GIS Working Group's Centralized Modeling Group convened at the Boston Police Headquarters during the event. The group included modelers from Boston Police, EPA, NOAA, and NARAC. They used three primary air dispersion models, Arial Locations of Hazardous Atmospheres (ALOHA), Hazard Prediction and Assessment Capability (HPAC), and NARAC web based or reach-back air model. The procedure for this group was to run each model according agreed upon inputs, then choose one and disburse those results via the NARAC website. The models were sent to each GIS representative to share with the appropriate responders in their agency or operations center.

Additional meteorological support for the modeling group was provided for the event as well. Twelve portable anemometers and one surface level wind detection device for monitoring upper level atmospheric weather for weather analysis were positioned at pre-determine locations throughout the city by the Boston Police Department in consultation with NOAA. All meteorological data for the area was consolidated and distributed

through the Defense Threat Reduction Agency's (DTRA) weather service for modeling, a part of their HPAC support suite.

Hardware and Software:

The ESRI software platforms were used for this event. Although much of the group was using ArcGIS 8.x, a significant number were using ArcView 3.x, and as a result all maps were created in both platforms. Due to these factors and easy translation of the shapefile into other forms, the shapefile was chosen as the data distribution standard. Completed maps were also distributed in Adobe Acrobat .pdf and in JPEG format for easy printing and sharing.

One concept scoped during this course of this working group was that of a common operational picture and GIS portal using ArcIMS and other technologies. This would have allowed for real-time data updates and a common operational GIS picture. Unfortunately, time and financial resources did not allow for the realization of this project.

Personnel:

Several weeks before the DNC, an invitation was distributed to local contacts and through the ESRI business partners to be included on a list of available personnel or equipment resources to be called upon in case of a significant event during the DNC. The response to this invitation was outstanding, with 12 organizations responding, resulting in a pool of approximately 30 additional personnel with various expertise and resources to be activated if needed. Although there were no significant incidents during the DNC, in the case of a large disaster resources would have been quickly overwhelmed, and these personnel would have been invaluable.

Conclusion:

This collaboration was highly successful because of the close cooperation of all agency participants. The coordination and communication involved throughout the process of this working group was outstanding, and proved to be the primary reason for the success of this effort. Similar working groups are recommended for NSSE's or other planned events. The Working Group found that one set of data and maps were extremely valuable to ensure all agencies were looking at common information. Additionally, the implementation of the Unified Modeling Group succeeded to solve issues of conflicting plume models by providing a consistent result.

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FEMA did overall coordination including the concept of operations, and created the symbology standard, the event-specific data and the common maps.

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