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Title: **Geospatial Support Task Force Proposal for Catastrophic Emergency Response**

Position Statement

Current procedures for providing geospatial support to federal disaster operations limit DHS/FEMA's ability to support response and recovery efforts. Geographic Information System (GIS) & Remote Sensing capabilities within FEMA are continuously hampered by staffing and hardware limitations and deployment delays. These delays prevent our managers from utilizing critical information when it is needed. The most successful operations have been where FEMA has integrated its geospatial resources with those of other agencies to maximize use of staff, data, and equipment.

Background

When providing geospatial support to disasters, FEMA deploys staff and hardware from across the country to the Disaster Field Office (DFO) or other designated facility. FEMA's deployment process is capable of getting resources where they are needed but often generates significant delays assembling a credible geospatial support function in the field.

Staffing

FEMA currently has only a few highly qualified individuals employed to support the GIS & Remote Sensing needs in the field. FEMA's geospatial staff consists primarily of Stafford Act Employees (SAEs) who work only when needed. FEMA is challenged by the need to retain specialized staff interested in intermittent employment when there is a strong private-sector demand for full-time geospatial technology skills.

While FEMA struggles to maintain adequate GIS staff, the demand for advanced geospatial products at DFOs continues to increase. With the additional demand, FEMA has been forced to look elsewhere for the resources required to provide additional field support requirements. Unfortunately, efforts to locate and attain these specialized resources are often undertaken only after the requirements have been verified in the field. This creates significant delays in the application of geospatial technology to address critical response issues.

Hardware

FEMA's current hardware is not capable of meeting the requirements of large-scale, catastrophic events. While the FEMA systems fulfill the basic needs of the Technical Services Branch, these systems do not support the demands of advanced geoprocessing, remote sensing analysis, or large database applications.

GIS hardware is deployed as a kit (suite) from FEMA's Disaster Information Systems Clearinghouse (DISC). The suites are maintained by FEMA HQ, but are used exclusively in the field. FEMA's field GIS suites are designed to support 3-5 people. Staffing levels for large natural disasters commonly number 10-15 people. The 9/11 World Trade Center Attack in New York and the Space Shuttle Recovery events operated with as many as 35-40 concurrent users. Geospatial support for large events, which exceed typical agency response requirements, will be hampered by a lack of adequate equipment to support staffing, data processing, and data storage requirements.

While supporting past catastrophic events, FEMA's geospatial staff have been unable to share real-time data with other agencies, access products/data through the Internet, process large image files, access local data, support large database applications, or bring in resources from other agencies to work with our software. With inadequate database management resources, FEMA staff is required to maintain multiple, duplicate information systems. In some cases, lack of adequate equipment has prevented opportunities for interoperability with our partners.

Below are several case studies discussing specific problems, solutions and their effects on FEMA's operations.

Case Studies

1.) New York City 9/11

A number of staffing, equipment and coordination issues were identified in NYC concerning GIS support for the 9/11 event. Specifically, significant issues related to the Urban Search and Rescue (US&R) Incident Support Team (IST) and its use of GIS technology.

When the IST was activated, they requested on-site GIS support from FEMA. The IST was told that FEMA HQ would generate products as requested and deliver them to Manhattan. Anticipating that significant delays would occur in getting products from Washington DC to field staff in New York, the IST began looking for dedicated geospatial support once they arrived on-site. When the on-site FEMA GIS staff became aware of the IST's needs, GIS assets were relocated to provide direct support to the IST. To provide the highest level of service, FEMA's GIS field staff integrated with the US&R IST staff to create an interagency GIS team working within the Incident Command System (ICS). FEMA was asked by the IST Situation Unit Leader to provide overall management of the team. This included providing partial

staffing as well as the management of the hardware, software, and data. The IST was responsible for the definition and distribution of products and providing additional support staff. In the ICS structure, the Situation Unit Leader manages one or more GIS Technicians. The daily IST GIS staffing averaged 25 to 30 people across two 12-hour shifts. Without specific geospatial management, it would have been difficult for the existing system to maintain control of the interagency GIS team.

The GIS resources deployed by the IST consisted primarily of individuals assigned to the IST Situation Unit. In one case however, a group of four individuals equipped with a trailer-mounted GIS office was deployed to the IST. The trailer proved to be a great tool, allowing them to operate as a sub-group supporting the IST. The major downfall was that the trailer and its hardware were not assigned to the event but to the sub-group. When this group demobilized, their tools went with them. Following their demobilization, a multitude of problems required resolution to maintain the products the group had developed.

One of the objectives of the FEMA GIS lead was to make contact with the local GIS community and acquire the best data available. The IST GIS staff did not have the time or understanding of the data requirements for an event of this magnitude. The FEMA GIS staff was able to quickly obtain a copy of New York City's geospatial data, immediately improving the quality of the IST products. One of the most difficult datasets to acquire was the digital floor plans of the World Trade Center buildings. Early products developed by the IST used building footprints digitized from a tourism map of the area. While this dataset met the immediate needs of the response, improved data was required to support the increasing complexity of US&R activity. After spending several days trying to locate the floor plan information, the IST GIS team received three different datasets from three separate sources. One of the data sources was a US&R team, unaware that someone else needed the data. After working with a structural engineer and US&R staff, one of the datasets was selected and integrated into the GIS database. This dataset was used to track the daily progress of search efforts through the duration of the event.

While FEMA's integration with the IST was identified as a success, it was also noted that some of the US&R task forces had GIS analysts with them. These individuals worked independently, producing products exclusively for their own teams. Ideally, they could have worked within the larger GIS team and had access to additional assets such as local data, larger printers, and additional information collected in the field. While meeting the needs of their team, the products and data created could have been utilized by others involved in the incident.

2.) Salt Lake City 2002 Winter Olympics

In support of the Winter Olympics, US&R was deployed without a plan for acquiring geospatial products. Without access to event-specific geospatial products, the IST created their own, posting several "gas station" type maps with hand annotations identifying critical facilities. FEMA's National Emergency Response Red Team

(ERT-N Red) was on site in a readiness capacity to support the event. US&R proved to be one of the major consumers of geospatial products produced by the ERT-N.

The Winter Olympics provided FEMA's GIS team the opportunity to work with representatives from all three national US&R ISTs and discuss their geospatial requirements. Several meetings were held to identify potential geospatial solutions and educate them on FEMA's system for geospatial support. When the IST teams demobilized, they had a much better understanding of FEMA's geospatial capabilities and how the technology could be accessed in future events.

In this "preparedness" setting, FEMA's geospatial staff had the unique opportunity to invest time in pre-event planning activities. Working with the state, county, and city GIS offices, FEMA acquired pertinent data in advance of their deployment for the Olympics. During this time, plans were also made for FEMA to provide local governments with any geospatial data collected and/or developed for the Olympics. After supporting the Winter Olympics, the final task of the FEMA GIS staff was to deliver all publicly available data to the state of Utah. These partnerships supported FEMA's access to pre-event data as well as ensuring that the state of Utah and its local governments had access to new data for their area.

3.) Columbia Shuttle Recovery Operation

The Columbia Shuttle tragedy was a massive search/recovery operation and included many responders who are not typically part of a FEMA disaster environment. The success of the operation hinged on the abilities of federal and local responders to quickly access and analyze new and existing data.

The state of Texas assigned the Texas Forest Service (TFS) as the lead state agency for the recovery of the Space Shuttle Columbia. To accomplish this task, TFS utilized ICS. Building on experiences from the 9/11 response in New York City, FEMA's GIS staff proposed the creation of an Interagency GIS Team to provide geospatial products and support for the operation. Working under the ICS structure, FEMA was assigned as the lead agency for the interagency team with NASA coordinating remote sensing issues, and TFS and others providing support staff.

Once in place, the Interagency GIS Team operated as the largest federal response-based GIS entity ever compiled to support disaster operations. Much like the GIS operation in NYC, the team worked under both FEMA and ICS management structures, allowing resources from both systems to be utilized. Once again, the integrated system worked well and blended the FEMA & ICS systems together into a single functional unit.

The majority of current, pre-event data used in the geospatial products was acquired from the state of Texas. A satellite data vendor provided post-event imagery. The State's data was downloaded from their servers and integrated into the on-site data server at the DFO. Only four primary geospatial datasets were created and maintained throughout the event: a debris centerline, centerline buffer, search grid, &

debris points. These critical pieces of information required the GIS team to re-configure the GIS servers to support a large user base with multiple people editing the data while others generated products from it.

The response to the breakup of the Space Shuttle Columbia was the first time that a FEMA Disaster operation was supported in the field by a corporate-type GIS infrastructure and was one of the many successes tackled by the Interagency GIS Team during the Shuttle Recovery Operation.

4.) Hurricane Isabel

When Delaware received a disaster declaration following Hurricane Isabel, FEMA Region X was already on-site to provide support to the state. The Region X GIS management team was involved with daily conference calls and conversations with FEMA HQ and other DFOs supporting the widespread recovery efforts.

There was a drastic difference in the level of GIS support from office-to-office. In one operation, support staff were deployed from other federal agencies and given minimal direction by their FEMA managers. There was no coordinated use of common data. Each office was developing their own data and map products, duplicating the efforts of a limited resource. Remotely sensed data was in high demand. With the wide-ranging capabilities in the field, some operations were able to exploit this information immediately, while others never accessed the files. All of this led to widespread confusion and frustration among the individuals providing GIS support and their respective customers.

Increased education of FEMA staff on available technology and use of appropriate resources to address various needs would have improved DHS/FEMA's ability to make the most of the geospatial support available to them.

Recommendations

Develop a minimum of 3 Geospatial Support Task Force(s) (GSTF) designed specifically to support Federal Response Operations for Catastrophic events. The term "Task Force" defines a combination of resources assembled for a specific mission. The GSTF fits into the structures of both ICS and the National Incident Management System (NIMS).

When deployed to an event, the GSTF would provide response-based support to meet the operational and tactical requirements of the operation. The GSTF would be available to support US&R operations, national/local exercises and other domestic operations where an advanced geospatial capability is required. To provide effective support to high security events, core team members would require security clearances granted/approved by DHS, allowing them to analyze all available intelligence. When demobilizing, it is imperative that a constant level of support be available throughout the event. All data collected and created by the GSTF, as well as any staff, hardware, and/or software deemed critical to the success of the operation, must remain on-site for the duration of the

operation. These assets would be quickly returned or replaced and charged to the respective incident at demobilization to maintain a level of readiness for the future.

DHS/FEMA staff would lead the GSTF. Support staff would include DHS/FEMA personnel as well as individuals from other federal, state, and local agencies. All members would be rostered to the team with each position staffed three deep to support 24 hour operations. The job titles would include:

- Task Force Leader
- GIS Coordinator
- Remote Sensing Coordinator
- Geospatial Database Manager
- Geospatial Analyst
- Remote Sensing Analyst
- Geospatial Technician
- Information Technology Specialist
- Military/Law Enforcement Liaison
- Logistics Manager
- Logistics Specialist
- Administrative Assistant

To effectively meet the requirements of a catastrophic environment, FEMA's geospatial hardware and software must be updated. While supporting the Space Shuttle Recovery Operation, the Interagency GIS Team developed specifications for a Catastrophic GIS hardware suite (see attached). The purchase of new hardware would facilitate complete interoperability with other federal, state, & local partners involved in response operations. To support "near-immediate readiness", the new hardware must be maintained as a live system, assigned to the GSTF Leader and/or support staff. To ensure that all software, hardware, and data is current, meeting DHS security requirements, the GSTF hardware must replicate with DHS/FEMA's fixed geospatial data-servers. With an advanced geospatial suite, disaster operations would receive the same level of support as other fixed critical facilities.

The GSTF would be required to train together bi-annually in order to maintain currency and support team building. Team relationships are essential to success and GSTF training objectives could easily be met while supporting peacetime exercises.

Benefits to DHS & FEMA

- Improved response time and quality of services provided. The GSTF would completely eliminate the delay in service.
- Through a single point of contact (the GSTF Leader), a packaged geospatial resource would be on-site and operational within 24-36 hours. With a predictable operational timeframe, geospatial technology can be utilized for response specific support, consistent with FEMA's goals to save lives and protect property.
- Geospatial support will be provided by the best-qualified personnel, allowing DHS/FEMA to overcome existing problems with staff availability & capability.
- GSTF members will arrive at an incident with clear knowledge of their co-workers personalities and abilities. Fostering and maintaining existing relationships develops a level of trust that facilitates an efficient and effective operation.

- DHS/FEMA will possess an increased capability to perform advanced geospatial analysis in the field, providing managers with immediate access to products derived from imagery and other data resources.
- Event specific data can be made available to all entities involved in the response to the event. Access would be on an as-needed basis to groups such as field camps, Regional Operation Centers (ROC), DFOs, & DHS/FEMA HQ.
- Access to critical information in a real-time environment will minimize the confusion that occurs when decisions are made based on outdated and/or inaccurate information.
- Improved relations with local government and our state counterparts, assisting with the acquisition and dissemination of critical information.
- FEMA's capability to effectively support disaster response & recovery operations in future catastrophic events will be greatly enhanced.
- The GSTF will ensure that FEMA maintains its position as the lead federal agency for geospatial activities for catastrophic events.
- The GSTF model facilitates interoperability with our federal partners and conforms to both NIMS and ICS.
- Response to major events will be less chaotic, more efficient, and better serve DHS/FEMA's customers.