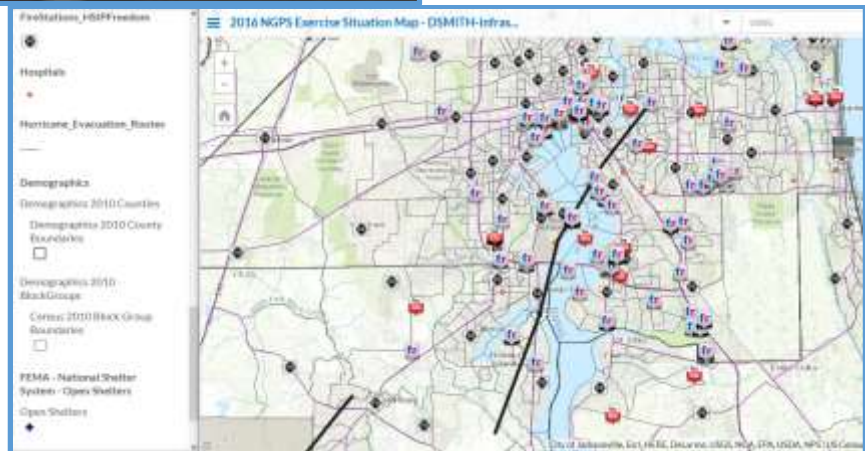


Tornado Operation Aid Exercise After Action Report



National Alliance for Public Safety GIS (NAPSG) Foundation
5335 Wisconsin Ave. NW Suite 440
Washington, DC 20015

Produced with support from the US Department of Homeland Security: HSHQDC-15-C-00070

Table of Contents

Acknowledgements.....	2
I. Executive Summary.....	3
II. Exercise Overview	4
III. Exercise Summary	5
Background	5
Exercise Goal and Objectives	5
Participants	6
Exercise Structure	6
Breakout Groups	6
Scenario.....	6
Simulation	6
Exercise Assumptions and Guidelines.....	7
IV. Analysis of Objectives	8
Objective 1: Identify and validate trigger points that indicate when mutual aid technologies should integrate and readily share information.....	8
Objective 2: Identify to what extent mutual aid systems need to integrate and share information.....	8
Objective 3 and 4: Identify common operational information requirements and decision points, and associated mission critical attributes.....	9
Objective 5: Identify feature and functional enhancements for decision making capabilities that could be provided by the IT and GIS staff.....	10
Objective 6: Identify potential shortfalls in how location-enabled decision support tools are provided and used for emergency or disaster operations.....	10
V. Conclusion.....	11
Appendix A: Evaluator/Observer Feedback Forms.....	13

Acknowledgements

As emergencies affecting the nation increase in complexity, and as resources are increasingly constrained, communities rely more on mutual aid every day to fulfill lifesaving capabilities. Addressing any mutual aid issue and geospatial preparedness in the national context requires meaningful engagement by a multitude of local, state, and national mutual aid stakeholders. NAPSG Foundation and the DHS Geospatial Management Office (GMO) are grateful for the invaluable contributions in time and expertise that the following agencies and organizations contributed in the development, design, planning, and conduct of the mutual aid technology exercise conducted on September 14, 2016, Tornado Operation Aid.

Agency or Organization
Association of Public Communication Officials (APCO)
Baltimore City Fire Department
California Governor's Office of Emergency Services
City of Laurel, MD
Emergency Management Assistance Compact (EMAC)
Fairfax County Fire Rescue
Federal Emergency Management Agency (FEMA), National Integration Center
Florida Division of Emergency Management
International Association of Emergency Managers (IAEM)
International Association of Fire Chiefs (IAFC)
Iowa Homeland Security & Emergency Management Division
Kansas Division of Emergency Management
National Emergency Managers Association (NEMA)
New Hampshire National Guard

NAPSG Foundation and the DHS GMO appreciates the ongoing commitment by the homeland security/public safety and GIS community as we work together to solve key challenges with mutual aid technology, geospatial preparedness, and increase effectiveness in changing the outcomes for survivors.

I. Executive Summary

Mutual aid is critical for unified response to and recovery from emergencies and large-scale planned events. It facilitates rapid activation and deployment of capabilities to affected areas. Many mutual aid, public safety, and non-governmental organizations who manage mutual aid operations have information management systems that support deployment and use of mutual resources. Currently there is no clear national structure or framework through which these systems work together. In an effort to begin to address some of the key actions identified in the Mutual Aid Technology Action Plan, an exercise was planned and conducted on September 14, 2016 with nearly 150 participants representing all levels of government nationwide. This exercise, referred to as, Tornado Operation Aid, was a hybrid functional and discussion-based (tabletop) national exercise.

The purpose of Tornado Operation Aid was to facilitate a better understanding among and between operators and GIS/IT staff of decision points essential to promoting operational coordination, and the data, analysis, products, and technology requirements needed to support effective decision making. It sought to a couple of key questions that are at the nexus of mutual aid technology and geospatial preparedness:

- What incident-specific trigger points identify a need for mutual aid system integration and information sharing to support effective operational coordination?
- What features and/or functional enhancements to decision support tools are needed to address information requirements for decision making around operational coordination?

This After Action Report (AAR) provides a summary of the outcomes of the exercise and the information obtained that address the guiding questions the exercise sought to answer. Through this exercise trigger points were successfully identified for when and what types of resource information would need to be shared across mutual aid systems. This is a critical finding that defines a parameter for future efforts that facilitate appropriate integration of mutual aid systems and the sharing of information. The exercise was also successful in drawing out common operational information that would need to be available, shared, and integrated into situational awareness applications, management dashboards, and other location-enabled decision support tools used by all organizations support response efforts. Additionally, the exercise revealed national capability gaps in ensuring geospatial preparedness during events that require GIS in support of incident management and coordination across jurisdictions and states.

Lastly, this AAR also includes a summary of areas for improvement and enhancement for future mutual aid technology, information sharing, and geospatial preparedness exercises. These lessons learned and improvement areas are valuable in maximizing the potential for success in follow-on efforts. It should be noted that this AAR is a living document and will be refined as additional insights are gathered and compiled from conduct team members, observers & evaluators, and exercise participants & players.

II. Exercise Overview

Name of the Exercise

Tornado Operation Aid

Type of Exercise

Hybrid functional and discussion-based (table top) exercise

Start/ End Date

September 14, 2016

Duration

Three hours (0900-1200)

Location

DHS Homeland Security Acquisitions Institute – Washington, DC

Scenario Type

Response to a tornado and severe weather event

Exercise Planning & Conduct Team

- Peter Hanna, Baltimore City Fire Department
- Tari Martin, City of Laurel, MD
- Angee Morgan, Kansas Division of Emergency Management, NEMA, and EMAC
- Jonathan York, Kansas Division of Emergency Management, NEMA, and EMAC
- Eric Fisher, Fairfax County Fire Rescue
- Shelby Zelonis, Fairfax County Fire Rescue
- Richard Butgereit, Florida Division of Emergency Management
- Jon Paoli, Iowa Homeland Security and Emergency Management Division
- Tommy Hicks, International Association of Fire Chiefs (IAFC)
- Jeff Dulin, IAFC
- TJ Lyons, IAFC
- Jeff Snow, IAFC
- Rebecca Harned, NAPSG Foundation
- Carla Boyce, NAPSG Foundation
- Ryan Lanclos, NAPSG Foundation
- Don McGarry, ArdentMC
- Julie Carter, ArdentMC

III. Exercise Summary

The below presents a summary of the Tornado Operation Aid Exercise. For additional detail on exercise design or on the scenario, refer to the Tornado Operation Aid Exercise Situation Manual (SITMAN).

Background

The exercise scenario was based on a series of tornados and extreme weather in a geographic area that impacts multiple jurisdictions and cross state boundaries. A no-notice event of this type and characteristics would require response and recovery to be supported by resources from surrounding and unaffected jurisdictions and states, thus necessitating involvement and information sharing across the mutual aid hierarchy.

This exercise was designed to push players to identify the trigger points needed for mutual aid system integration, information sharing, and the development of GIS-based decision support tools to support effective operational coordination. Participants and players had the opportunity to discuss the effects of the event on their jurisdiction, neighboring communities, and the resources required in multiple operational periods to support effective response.

Exercise Goal and Objectives

The goal of this exercise was to facilitate a better understanding among and between operators and GIS/IT staff of decision points essential to promoting operational coordination, and the data, analysis, products, and technology requirements needed to support effective decision making.

The exercise focused-on the following six (6) objectives:

Mutual Aid Technology Objectives

- Identify and validate trigger points that indicate when mutual aid technologies should integrate and readily share information.
 - How does incident scope, scale, and complexity of multi-jurisdictional responses shape requirements for integration of mutual aid technology?
 - Are there unique trigger points for single jurisdiction or complex cross discipline responses?
- Identify to what extent mutual aid systems need to integrate and share information.
- Identify common operational information requirements specific to resource management, and associated mission critical attributes.

Geospatial Preparedness Objectives

- Identify and validate common operational coordination decision points and information required to support decision making.
- Identify feature and functional enhancements for decision making capabilities that could be provided by the IT and GIS staff.
- Identify potential shortfalls in how location-enabled decision support tools are provided and used for emergency or disaster operations.

Participants

This exercise following types of participants were involved in the execution of this TTX in various ways, as described:

- Players responded to the situation presented, based on knowledge of response procedures
- Facilitators supported the group in developing responses to the situation during the discussion; they were not participants in the moderated discussion.
- Facilitators provided situation updates and additional information as required, and facilitated break-out groups
- Observers/Evaluators documented completion of exercise objectives.
- SMEs had technical knowledge to provide additional information or resolve questions as required. They variously participated as observers/evaluators, facilitators, players, or observers.

Exercise Structure

The exercise structured as a facilitated and primarily discussion-based exercise however, there will be a companion technical hands-on component for GIS/IT staff and some functional elements for operators and decision makers.

Breakout Groups

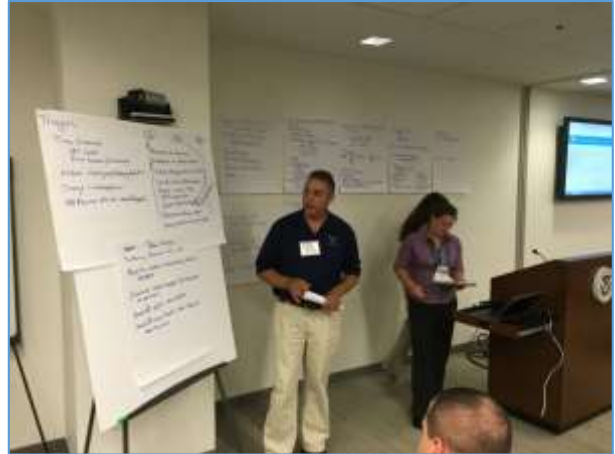
Participants were grouped into three (3) facilitated breakout groups. Each group consisted of approximately 30-40 participants and reflect blended and balanced participation by operators and GIS/IT staff. Participants were preassigned and directed to their assigned groups.

Scenario

All breakout groups used a single scenario and receive injects at the same time. The exercise scenario focused on the potential for a catastrophic/complex incident affecting a broad regional area resulting in an incident of national significance. In addition to a number of mass casualty events, residential, commercial, educational, health and medical, public safety, energy, communications, water/wastewater, and transportation infrastructure was significantly affected.

Simulation

Each Breakout Group represented a different agency/jurisdictional perspective affected by the scenario. The Facilitator/Controller guided players into exercise play based on the agency/jurisdiction they are simulating.



Exercise Assumptions and Guidelines

Participants and players were presented with the following assuming and guidance for participation in the exercise:

- The exercise was held in an open, low-stress, no-fault environment. Varying viewpoints, even disagreements, were expected.
- Players responded on the basis of their knowledge, experience, and insights.
- This exercise was an opportunity to discuss and present multiple options and possible solutions.
- There was no hidden agenda, and there were no trick questions.
- All players received information at the same time.
- Communication between breakout groups was unrestricted and was encouraged during the exercise.
- Not all aspects of response and mutual aid would be discussed during the exercise.
- NAPSG Foundation was not evaluating participant's individual skills or knowledge.
- NAPSG Foundation was observing and capturing information to evaluate the exercise.
- There were no right or wrong answers or solutions.

IV. Analysis of Objectives

Objective 1: Identify and validate trigger points that indicate when mutual aid technologies should integrate and readily share information.

At approximately 24 hours into response operations, the participants indicated that they would be searching for and requesting local resources from neighboring jurisdictions (closest available) available through existing intrastate mutual aid compacts. At this juncture they did not believe that they had exceeded their capacity.

At the point of about 36 hours into the operations, the participants indicated that they would need to know what resources are available in neighboring states that they may need to call upon once they are close to exhausting all of the resources available from intrastate mutual aid compacts. At this juncture, participants indicated that they needed to be able to access some type of national database, map, or dashboard of available resources. They did not call out any one system, and this was largely due to the fact that most participants did not have prior knowledge of the existing systems in-use.

Not until about 48 hours into response operations did the participants indicate that they would need to start getting an idea of Federally-available resources, and particularly those used for individual assistance. It should be noted that participants indicated here that they would still be looking for other resources from neighboring states and would likely have already made some resource requests.

Objective 2: Identify to what extent mutual aid systems need to integrate and share information.

All of the groups resulted in needing to request resources from a neighboring jurisdiction and/or were the resource provider for an affected jurisdiction. In the case of Florida, they requested multiple teams through EMAC and the request was received and accepted by Georgia. They indicated that they would have used a web-enabled resource management platform to check for the nearest available resource or capability. However, since this was not available they decided to go straight to an EMAC request once a disaster declaration was made. The immediate information requirements that the players identified as a part of the resource request included the following:

Resource Requestor Information Needs identified:

- Number of personnel on each of the teams being provided and their basic capabilities
- Equipment and technology capabilities that the team came equipped with
- How long will it take for the deploying team to be mobilized, arrive at staging, and initiate operations
- Information on how the receiving agency will provide lodging and food provisions
- Point of contact responsible for mobilizing the available resource

This is indicative of the type of information that the resource management platform (or mutual aid system) would have needed to include about the resources visualized as being available for service. Participants indicated that additional information may be needed before accepting and mobilizing the identified and available resource. However, additional information is secondary to the request and it may not be necessary to share it via the resource management platform.

Resource Provider Information Needs Identified:

- Description of the mission to understand the capabilities and functions that they would need to fulfill
- Validation that the team’s technology capabilities fulfill the mission requirements
- Anticipated duration of the mission

The resource provider also identified some key information requirements (above) that may or may not need to be shared in a mutual aid system/resource management platform. The participants indicated that this information was secondary and could be shared through contact with the point of contact responsible for mobilizing the available resource.

Objective 3 and 4: Identify common operational information requirements and decision points, and associated mission critical attributes.

The exercise revealed numerous types of common operational information that would be critical in supporting effective mutual aid coordination and operations to this scope and scale of an event. The participants indicated that the following information would be needed and would need to be shared with responding personnel from all responding organizations.

H-24

- All available resources from immediate surrounding jurisdictions that are unaffected
- Hospitals – location trauma hospitals, available beds
- Roads – condition, restrictions for first responders, detours
- Social Media – feeds from social media outlets providing incident impact and damage information
- Shelters – location, status, general capacity, functional needs capacity, pet issues, availability of personal hygiene infrastructure, and staffing available
- Demographics – general for communities in impacted areas
- Fuel – location of available fuel (and types of fuel) for transportation as well as refueling to assist in recovery efforts
- Volunteer Organizations Active in Disasters – location and availability of VOAD groups
- Private Businesses – status of, fuel providers, hardware, pharmacy, grocery, refrigeration capacity)
- Status of neighboring county resources
- National Weather Service information – what’s occurred, path of tornado, what’s the forecast and how will it impact future operations
- Type of structures in Damaged Path - wood, concrete, high rise, single dwelling, flood plain, etc.

H-36

- All of above, plus:
- All available resources from immediate surrounding jurisdictions that are unaffected, plus neighboring states
- Availability of Federal resources, primarily Disaster Mortuary Operational Response Teams (DMORT) and Disaster Medical Assistance Teams (DMAT)
- Location of private warehousing for commodity coming-in from neighboring jurisdictions
- Status of Search & Rescue Operations
- Debris Removal – location and status

- Location of cleared routes
- Location of affected citizens temporarily relocated
- Prioritization of resource restoration

The common operational information requirements listed above help to identify the trigger points for sharing specific information about resources across mutual aid systems/resource management platforms. However, the above information goes further by beginning to prioritize common information that could be made available through common situational awareness applications or management dashboards to support effective and efficient operations by all responding organizations.

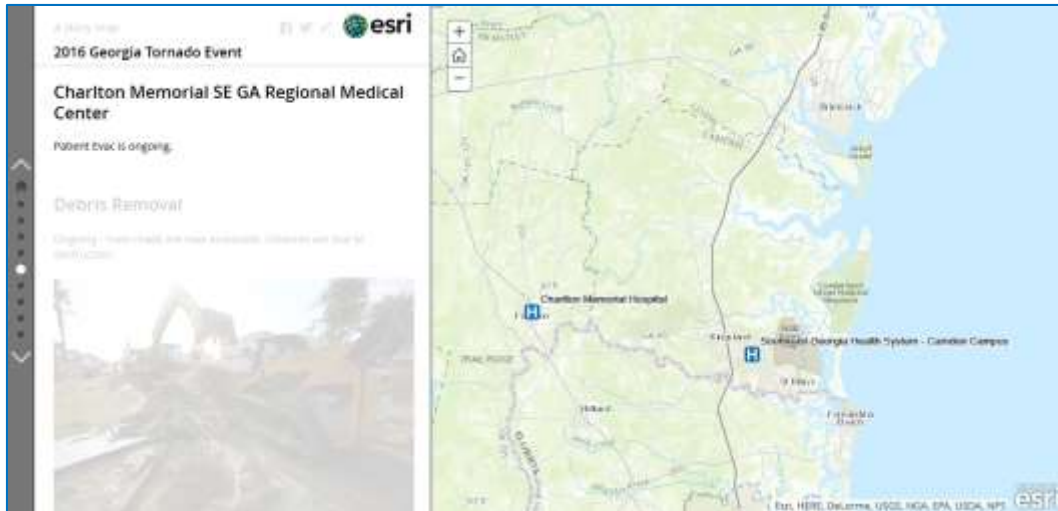
Objective 5: Identify feature and functional enhancements for decision making capabilities that could be provided by the IT and GIS staff

This objective was not directly addressed during exercise play due in large part to a capability gap by the GIS professionals playing in the exercise. It became evident very quickly that the majority of the GIS professionals participating in the exercise lacked web-based GIS knowledge, skills, and abilities. This capability gap prevented the participants from being able to go deep into the creation of decision support products, thereby inhibiting the ability to identify major feature and functional enhancements.

One area observed is that some of the GIS professionals were able to create basic web-based maps, but they struggled to use the software tools to the extent that they could turn the maps, and combine them, into effective decision support tools. Additionally, many of the GIS professionals successfully included the USNG on their maps for the decision makers however, most did not effectively communicate to the decision makers about how to properly use it for actions such as defining mission assignments and other practical applications.

Objective 6: Identify potential shortfalls in how location-enabled decision support tools are provided and used for emergency or disaster operations

In addition to searching, discovering, and publishing exercise data as feature layers, each group produced an average of 10 different incident related maps during the exercise. All of the maps produced during the exercise are available in a dedicated group within the NAPSG CENTER at <http://arcg.is/2cwO8kp>. The GIS professionals were generally successful in producing initial maps for the decision makers, including those that supported enhanced and predicative consequence assessment. They were also successful in producing maps that incorporated some operator-driven critical information points. For example, in the group that simulated the Georgia Division of Emergency Management operators and decision makers requested information about the location of critical infrastructure within the impact area, locations for road closures, impact summary statistics, and a “powerpoint style” roll-up of this information. The GIS professionals successfully created a web-based decision (in the form of a web mapping application called a Map Journal) support tool to support the operators in multiple operational periods. Below is a snapshot of one of the information components from the applications that is focused on patient evacuation from hospitals inside the impact area.



V. Conclusion

Overall the exercise successfully addressed the goal and objectives related to mutual aid technology and information exchange. Some enhancements should be made for future exercises that would have helped to progress into the scenario more expediently, and potentially refine further the information gleaned through exercise conduct.

- **Baseline Information on Existing Mutual Aid Systems:** Many participants (even operators and decision makers) did not possess knowledge of existing mutual aid systems/resource management platforms. And some did not have a solid understanding of the different types of mutual aid governance structures, and the hierarchy of the system. For future mutual aid technology exercises a pre-exercise webinar should be provided to participants that provides them with this baseline information.
- **Web-Based GIS Skills and Training:** One of the capability gaps identified by the GIS professionals participating is the need to build web-based GIS skills prior to the conduct of the exercise. NAPSG Foundation plans to look at potentially offering optional technical training in web-based GIS (namely ArcGIS Online) the day before NGPS starts. This will give participants that have not developed and honed their skills in this area an opportunity to do so and then stress test those skills through the exercise component.
- **Technical USNG Skills and Training:** Another capability gap identified by the GIS professionals is the technical incorporation of USNG into datasets and results from analysis. Many lacked familiarity with the USNG and lacked the skills on how to incorporate it into decision support tools. NAPSG Foundation plans to look at potentially including a technical USNG skills training for GIS professionals during the first day of NGPS to allow them to gain the skills and then apply them during the exercise.
- **Pre-Exercise Webinar:** One action that can be taken to maximize the exercise benefit for the participants is to conduct a pre-exercise webinar for the purposes of providing GIS professional participants with preparatory information a month or so prior to NGPS. This would give NAPSG

Foundation an opportunity to get the participants fully set-up in the platform, point them to online training tutorials, and provide them with additional information that will allow them to better prepare.

- **Exercise Datasets:** For all national GIS exercises that NAPSG Foundation plans to conduct, exercise common datasets will be developed and published to the selected GIS platform prior to the exercise. This is necessary to better simulate the GIS operating environment during a major incident. Most GIS professionals will have pre-staged the data they most commonly used for incidents in their communities, as such having this data available will better simulate the real world operating environment. However, not all data will be pre-staged since some data needs to be searched for and created that is specific to the incident or exercise scenario.
- **Structure:** There are multi areas for improvement related to the structure of the exercise. One would be more conducive space that simulates more of an Emergency Operations Center (EOC) environment. Another would be loosely pre-assigning EOC roles to participants/players, and providing them with position vests to ensure roles and perspectives are clear. The technical GIS participants should also be pre-assigned roles and a GIS Team Leader or GIS Supervisor pre-identified for each group and coordinated with in advance. This would maximize the time used during the exercise and aid the GIS players in getting deeper into the exercise faster. Additionally, smaller groups would also be helpful to prevent good ideas from getting overlooked amid the dialogue.
- **Time:** The exercise was conducted in the minimal time duration possible. While the exercise still provided valuable information towards addressing the objectives, extending the exercise by another 1-1.5 hours would have allowed for sufficient time to delve deeper into the creation of GIS-based decision support tools at the 36 and 48-hour operational period, and beyond.
- **Technology Play:** While this exercise served its intended purpose, any future and follow-on exercises should incorporate a technical system integration and information sharing component that will test and validate the feasibility of sharing the resource information at the appropriate operational periods, and slightly prior to the start of those operational periods. The technology component can also pre-stage exercise resource data that could be used as a test case for information sharing among systems at the appropriate trigger points.

Appendix A: Evaluator/Observer Feedback Forms

Evaluator/Observer Name: _____

Breakout Group Name: _____

Mutual Aid Technology Observation & Evaluation Criteria:

1) Were trigger points identified for timing of mutual aid technology integration and information sharing?

a) If yes, what trigger points were identified? _____

b) If no, why not? _____

2) Given the scenario, participants, and courses of action for requesting appropriate and timely mutual aid, where did operators indicate they would look to find available resources?

a) D-24 _____

b) D-36 _____

c) D-48 _____

What information did participants immediately indicate needing to know about needed mutual aid resources prior to making a request? _____

Evaluator/Observer Name: _____

Breakout Group Name: _____

Geospatial Preparedness Evaluation and Observation Criteria:

1) Did GIS practitioners produce an enhanced and predictive consequence assessment that effectively supported operator decision making? (i.e. Did the products inform and change or affirm decisions using sound location-enabled analysis?) _____

2) Did GIS practitioners successfully incorporate operator-driven critical information points that successfully aided in operational decision making? _____

a) If yes, what critical information points were incorporated and why did they prove effective? _____

b) If no, why not? What challenges were experienced? _____

3) Did GIS practitioners successfully incorporate USNG to identify areas of interest, describe areas of responsibility, and communicate consequences to increase accuracy or confirm planning assumptions to support each discipline? (e.g. rather than communicate projected consequences by entire county, city – were GIS practitioners able to use USNG to “zero” in on affected areas?) _____

a) If no, why not? What challenges did they experience? _____

