

National Mutual Aid Technology Exercise

After-Action Report and Improvement Plan

December 31, 2017

Developed in cooperation with the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) under agreement 2016-ST-108-FRG009



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Table of Contents

I. ACKNOWLEDGEMENTS2

II. EXECUTIVE SUMMARY3

III. EXERCISE OVERVIEW5

IV. EXERCISE SUMMARY6

 Background 6

 Exercise Goal, Objectives, and Outcomes 6

 Participants 7

 Exercise Structure 9

 Exercise Assumptions and guidelines 10

V. ANALYSIS OF OBJECTIVES.....11

 Objective 1 11

 Objective 2 12

 Objective 3 13

 Objective 4 19

 Objective 5 20

VI. CONCLUSION.....21

VII. IMPROVEMENT PLAN25

I. Acknowledgements

As emergencies affecting the nation increase in complexity and resources become increasingly constrained, communities rely more on mutual aid every day to fulfill lifesaving requirements. Addressing national mutual aid issues and geospatial preparedness requires meaningful engagement of local, state, and national mutual aid stakeholders. The NAPSG Foundation, the DHS Science and Technology Directorate (S&T), and several components of the Federal Emergency Management Agency (FEMA) are grateful for the invaluable contributions of time and expertise that the following agencies and organizations contributed in the planning, design, and conduct of the National Mutual Aid Technology Exercise conducted on June 28-29, 2017, at FEMA headquarters in Washington, DC.

Agency or Organization
International Association of Fire Chiefs
National Emergency Management Association / Emergency Management Assistance Compact
California Governor's Office of Emergency Services
New Hampshire National Guard
City of Nashua, NH Office of Emergency Management
Alabama National Guard
U.S. Department of Agriculture/U.S. Forest Service
Illinois Mutual Aid Box Alarm System
Federal Emergency Management Agency Office of the Chief Information Officer National Preparedness Directorate
U.S. Department of Homeland Security Office of the Chief Information Officer/National Information Exchange Model
National States Geographic Information Council
American Water Works Association

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

II. Executive Summary

Mutual aid is critical for unified response to and recovery from emergencies and large-scale planned events. Coordinating and employing mutual aid facilitates rapid activation and deployment of capabilities to affected areas. Several mutual aid, public safety, and non-governmental organizations that manage and/or provide mutual aid have information management systems that manage deployment and support use of mutual resources. Currently these systems do not readily share information in real-time. Nor has a national structure or framework been established for these systems to exchange information and work together effectively and efficiently during mission critical operations. To address a key action identified in the Mutual Aid Technology Action Plan (August 2016), an exercise was conducted on June 28-29, 2017, with 45 participants representing several of the nation's leading mutual aid partners. This exercise, referred to as, the National Mutual Aid Technology Exercise (NMATE), was a hybrid functional and discussion-based (tabletop) national exercise. NMATE maximized operational viability of the Nation's investments in technology systems being used to facilitate and manage mutual aid.

The National Alliance for Public Safety GIS (NAPSG) Foundation, in partnership with DHS S&T and FEMA, brought together key stakeholder agencies and organizations that have technology-enabled mutual aid systems. NMATE was designed to demonstrate in a "no-fault" live environment how technology systems can manage and facilitate mutual aid most effectively and efficiently can work together and how they can share information in real-time. Ultimately this effort aimed to maximize the operational viability of the Nation's investments in mutual aid technology systems. Through NMATE, various systems exercised seamless exchange of relevant situational awareness, resource management, and mutual aid information. Additionally, mutual aid technology systems demonstrated functionality, capability enhancements, exercise interoperability, and identified opportunities for improvement.

The purpose of this After-Action Report (AAR) provides a summary of exercise outcomes and findings, along with priority needs and requirements identified by participating stakeholders. This exercise identified interoperability challenges and opportunities for improvement. Trigger points were successfully identified for when and what types of resource information would need to be shared across mutual aid systems. These trigger points define parameters for future efforts to facilitate appropriate integration of mutual aid systems and effective information and data sharing.

The exercise successfully validated common operational information that needs to be available, discoverable, shared, and integrated into situational awareness applications, resource management dashboards, and other location-enabled decision support tools used by all

organizations supporting mutual aid during emergency or disaster operations. Provided below are key findings from the exercise, which are detailed in the Analysis of Objectives and Conclusion sections of this report:

- Establish a National Mutual Aid Technology Coordinating Group
- Conduct an annual National Mutual Aid Technology Exercise and Demonstration
- Develop implementation Guidance on Information Sharing Standards for Mutual Aid Technology
- Enhance existing mutual aid systems
- Integrate planning capabilities into existing mutual aid systems
- Develop a resource hub

Lastly, this AAR includes a summary of areas for improvement that inform mutual aid technology interoperability and information sharing enhancements. These lessons observed and areas of improvement are valuable in maximizing the potential for success of 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 and players.

III. Exercise Overview

Name of the Exercise

National Mutual Aid Technology Exercise

Type of Exercise

Hybrid functional and discussion-based (table top) exercise

Exercise Date

June 28-29, 2017

Duration

15 hours (0900-1630/day)

Location

Federal Emergency Management Agency (FEMA) Headquarters – Washington, DC

Scenario Type

Preparedness for and response to a wildfire

Exercise Planning and Conduct Team

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IV. Exercise Summary

The information provided below presents a summary of the National Mutual Aid Technology Exercise. For additional detail on exercise design or the scenario, refer to the National Mutual Aid Technology Exercise Situation Manual (SITMAN).

BACKGROUND

The exercise scenario was based on a rapidly spreading 5,000-acre wildfire in a geographic area affecting multiple jurisdictions. An event of this type, scale, and complexity would require response and recovery to be supported by resources from surrounding and unaffected local, state, and possibly from Federal jurisdictions. All of which would necessitate coordination and information sharing across the mutual aid hierarchy consistent with the National Incident Management System (NIMS).

The concept of the National Mutual Aid Technology Exercise was conceived in May 2016 at the Mutual Aid Technology Meeting, and it continued as stakeholders participated in follow-on conference calls and at the Mutual Aid Information Requirements Work Session conducted in December 2016. However, the idea for NMATE has its genesis in the Strong Angel concept that started in 1999, when an informal consortium of agencies hosted a series of demonstrations leveraging public-private collaboration within a complex disaster response scenario. The NMATE reflects the evolution of this idea with a focus on domestic technology interoperability and information exchange capabilities.

The NMATE design pushed players to identify specific thresholds needed for mutual aid system integration and information sharing to support effective and efficient operational coordination. Participants and players discussed effects of the event and test sharing of situational awareness and resource information across jurisdictions, agencies or organizations, and systems.

EXERCISE GOAL, OBJECTIVES, AND OUTCOMES

Goal

Demonstrate and exercise functionality and interoperability of mutual aid technology systems through seamless exchange of relevant situational awareness, resource management, and mutual aid information.

Exercise-specific Objectives

Mutual aid operations are essential components of successful disaster, pre-disaster preparedness and post-disaster response and recovery activities needed to stabilize

communities and meet the needs of disaster survivors. The National Mutual Aid Technology Exercise was an opportunity collectively to:

1. Establish and coordinate collaborative dialogue among owners of technology-enabled mutual aid systems commonly in-use today.
2. Bring technologists and users together in a no-fault environment to demonstrate and exercise interoperability across mutual aid technology-enabled systems.
3. Identify ongoing challenges and technology requirements needed to support multi-jurisdictional and/or cross-discipline mutual aid operations.
4. Exercise, identify and attempt to resolve interoperability issues as they arise - in real-time.
5. Capture and compile interoperability successes, challenges, and potential solution sets.

Outcomes

This exercise focused on achieving the following outcomes:

1. Shared understanding of current and emerging interoperability between mutual aid technology systems.
2. Improved collaboration across mutual aid providers and system owners – decision makers, operators, and technologists.
3. Developed mutual aid technology guidance for sharing real-time information to support mutual aid resource management, situational awareness, and interoperability.
4. Documented emerging requirements, un-met needs and shortfalls, areas for improvement, and suggested solutions for further exploration.

PARTICIPANTS

Provided below is a list of agencies or organizations and their respective mutual aid technology systems participating in this exercise. Each agency/organization team consists of individuals capable of filling the following roles:

- **System Technician/Technologist:** Individuals in this role discussed their systems' architecture and limitations, made just-in-time adjustments to address immediate interoperability during exercise play, and made recommendations for near/long-term enhancements.
- **Operator/Operations Specialist:** Individuals in this role fully use and operate their systems and provide public safety operational insight to mutual aid business practices,

procedures, and/or policies of the system owner.

- **Decision Maker/Commander:** Individuals in this role provide insight and recommendations regarding deployment, employment, and adjudication of resources requested/provided as well as inform unified mutual aid smart practices, procedures, policy, and/or validate information exchange requirements.

Participating Agencies and Systems	
National Emergency Management Association / Emergency Management Assistance Compact	<ul style="list-style-type: none"> • Mutual Aid Support System • Emergency Operations System
New Hampshire National Guard	<ul style="list-style-type: none"> • Domestic Operations Viewer
City of Nashua, NH Office of Emergency Management	<ul style="list-style-type: none"> • Domestic Operations Viewer
Alabama National Guard	<ul style="list-style-type: none"> • Domestic Operations Viewer
California Governor’s Office of Emergency Services	<ul style="list-style-type: none"> • SCOUT • WebEOC with AGOL Extension
USDA/US Forest Service	<ul style="list-style-type: none"> • Resource Ordering and Status System
International Association of Fire Chiefs	<ul style="list-style-type: none"> • MutualAidNet
Federal Emergency Management Agency National Preparedness Directorate	<ul style="list-style-type: none"> • Incident Resource Inventory System • Resource Typing Library Tool
Illinois Mutual Aid Box Alarm System	<ul style="list-style-type: none"> • Illinois Mutual Aid Box Alarm System
DHS/National Information Exchange Model	<ul style="list-style-type: none"> • VORTEX

Observing Agencies and Related Efforts	
Agency or Organization	Related Effort
American Water Works Association	WARN System
National States Geographic Information Council	GIS Inventory
Federal Emergency Management Agency	<ul style="list-style-type: none">• Office of Response and Recovery, Response Planning and Exercise Division• National Preparedness Directorate, National Integration Center• Office of the Chief Information Officer

EXERCISE STRUCTURE

The exercise was designed as a technically-oriented functional exercise and tabletop discussion for all participants and observers, across all disciplines and roles. It was designed to go beyond discussions and to provide an environment for developing, testing, and examining potential solutions and defining next steps to strengthen mutual aid technologies and business practices.

Venue Layout

The exercise was conducted in a large room that simulated an Emergency Operations Center (EOC) environment with participants in pre-assigned sections and seats based on their organization and role. Screens were configured at the front of the room to facilitate sharing of applications as needed. There were no separate break-out rooms or spaces.

Scenario and Simulation

The exercise was based on a single scenario with all participants receiving injects at the same time via email and shared on the room displays. The scenario provided incident context to stimulate discussion and inform use of mutual aid systems, and the specific scenario was not the focus of the exercise. This exercise was designed to replace the planned incident with any other incident type using the scenario and replay injects with minor modifications.

The exercise and scenario were designed to achieve a basic level of simulation. Injects and role players (facilitators) simulated multiple agencies based on those likely to be involved in the incident scenario. However, technologies employed by the Master Control Cell (MCC) were not necessarily those used by agencies being simulated. This intentional exercise design ensured the exercise was technology agnostic and could be conducted using any threat or hazard. Each

participant simulated their own agency or organization using their existing mutual aid technology system(s) throughout the exercise.

EXERCISE ASSUMPTIONS AND GUIDELINES

Participants considered the following exercise ground rules to ensure objectives were met. Participants were guided to follow ground rules and assumptions throughout the exercise.

- **Conduct activity in the exercise “no-fault” environment**
There were no hidden agendas, trick tasks, or trick questions posed during the exercise. This exercise provided a no-fault environment for participants to come together with their existing technology systems. Many systems were developed prior to the availability of open standards and the use of legacy governance structures and business practices.
- **Participate openly and focus discussions on appropriate topics related to exercise objectives**
This was a safe environment for sharing information about systems, including any technical limitations or technical architecture considerations. Asking questions, sharing thoughts, and offering forward-looking, problem-solving suggestions were strongly encouraged to enhance participants’ exercise experience.
- **Focus comments and consider time constraints**
As in any exercise, the following assumptions were necessary to complete discussions in the time allotted:
 - The scenario and likely effects to the communities and surrounding area(s) were plausible, and events occur as they are presented.
 - Participants were asked to place certain issues and discussions in a “parking lot” due to time constraints.

V. Analysis of Objectives

OBJECTIVE 1

Establish and coordinate dialogue and collaboration among the owners of technology enabled mutual aid systems commonly in-use today.

Primary Core Capability Alignment: Operational Coordination

The NMATE process successfully established, coordinated, and facilitated dialogue and collaboration among all participating agencies and organizations. Additionally, the NMATE process involved a multi-phased approach for the facilitation of dialogue and collaboration among leaders in mutual aid technology.

Dialogue among participating agencies and organizations leading up to NMATE specifically involved a series of pre-exercise virtual meetings. Through these meetings, participants provided briefings about their agencies' mutual aid capabilities, processes, and systems. This allowed participants to gain a baseline understanding of each mutual aid technology system that would be used during conduct of the in-person exercise. Through these virtual meetings, technologists were also able to ask questions and exchange technical challenges and solutions, which led to more in-depth peer-to-peer exchange in support of seamless information sharing.

Conduct of the live exercise represented the culminating point for the participants, to work in-person using disaster scenarios to facilitate discussing and troubleshooting issues together. Dialogue and collaboration initiated in earlier virtual and in-person meetings were strengthened and in some cases formalized. And partnerships solidified among participating agencies. NMATE provided a live and in-person engagement that served as a constructive forum for participants to interact across agencies and organizations, as well as across system owner, operator, and decision maker roles. This exercise environment allowed them to work together to solve both small and large information sharing and technology challenges together, in real-time.

A key requirement identified by participants the need to formalize a stakeholder coordinating structure to continue collaboration, momentum, and collectively monitor progress. One participant suggested a name for this coordinating structure: National Mutual Aid Technology Coordinating Group (NMATCG). Several participating stakeholders suggested the NAPSG Foundation serve as the coordinating organization and executive secretariat for this effort. They stressed the importance of the group being managed by a neutral organization that does not own or manage an existing mutual aid technology system and is independent from yet

supported by relevant Federal agency partners. A more formalized stakeholder coordination group such as this would support the following functions:

- Identify and validate needs and requirements around resource management and mutual aid technology.
- Ensure needs and requirements addressed reflect ongoing cycles of outcomes from recent events, lessons learned from those events, and technology advancements.
- Foster dialogue that leads to defining solutions around resource management and mutual aid technology.
- Build an evolving and shared body of knowledge among the first responder community focused on resource management and mutual aid technology issues.
- Establish and maintain a forum for technologists to rapidly prototype and test solutions around resource management and mutual aid technology in direct partnership with decision makers and operators.
- Provide a formal observation role in national level exercises and demonstrations on resource management and mutual aid technology components of the respective exercise(s), such as National Level Exercises.

Additionally, immediate next steps from the NMATE exercise continue to facilitate dialogue and coordination among leading mutual aid stakeholders through formal review and feedback processes on related guidance documents/tools in development and this AAR.

OBJECTIVE 2

Bring technologists and users together in a no-fault environment to demonstrate and exercise interoperability among mutual aid technology-enabled systems.

Primary Core Capability Alignment: Planning and Operational Coordination

The NMATE exercise was effective in establishing a truly no-fault environment to both demonstrate and exercise interoperability among mutual aid technology systems. All participants arrived with a common set of expectations and rules of engagement on how the exercise would be conducted. Pre-exercise virtual meetings proved to be critical in establishing a common set of expectations and transparency across participating organizations required to establish a truly open, low-stress, and no-fault environment.

The exercise was deliberately designed to achieve an open and no-fault environment. Basic scenario information was outlined in the Situation Manual and was provided to all participants at the same time in advance of the exercise. All participants electronically received the injects at the same time through the Master Exercise Scenario List (MESL) tool in PrepToolKit.

Additionally, the observation and evaluation component of the exercise did not focus on evaluating individual capabilities, rather it focused on assessing how exercise objectives were met collectively. These strategies were paramount to ensuring an open and no-fault environment throughout the conduct of the exercise.

During the post-exercise hot wash discussion, nearly all participants indicated a need to continue to coordinate, facilitate, and provide an open and no-fault environment for demonstrating and exercising information sharing and real-time enhancement across existing and emerging mutual aid technology systems. They requested the NMATE be continued and include a combination of virtual exercises on a quarterly basis with an annual full-scale demonstration similar in format and function to the initial NMATE exercise. This was requested to allow participating agencies an opportunity to routinely share updates on their systems so that interoperability testing and evaluation can be an ongoing process as a part of their technology efforts and investments. Ongoing efforts can be expanded to include other local, state, and national agencies and organizations that emerge as leaders in using advanced technology for mutual aid coordination.

OBJECTIVE 3

Identify ongoing challenges and technology requirements needed to support multi-jurisdictional and/or cross-discipline mutual aid operations.

Primary Core Capability Alignment: Planning and Operational Coordination

The post-exercise hot wash identified numerous interoperability challenges and technology requirements needed to support seamless mutual aid operations. This section is broken down into two sub-parts: A. Data Issues; and B. Technology Requirements.

A. Data Issues

- i. Lack of awareness of and access to common operational data with critical attributes and metadata.
 - o There was no consistency across systems with regards to their inclusion of common or core operational data and supporting attributes required to make data and information actionable.
 - o Most participants indicated that they have a good understanding of common or core operational information and general data sets required. However, additional specification is needed at the attribute level. While many were aware and understood the importance of such situational awareness data, several had not yet brought these data into their mutual aid systems.

- Further, some of the systems are national and therefore rely on national data sets with consistent attribute information to enable inclusion and integration of common operational data into the systems to support situational awareness and resource management decision making.
 - In most cases national data sets today do not include the attribute-level information. Therefore, further coordination and facilitation with the appropriate data owners/stewards is required to enhance the priority national data sets.
- ii. Lack of consistency in the use of standardized and interoperable data formats and data quality standards.
 - Location was the common denominator for sharing information across systems, even resource specific information.
 - In most instances, geospatial data formats were the most interoperable and easy to share and consume across systems.
 - There is a need to establish a standardized format and basic database schema for sharing situational awareness and resource information across systems.
 - Participants agreed that the optimal format is a dynamic live service (such as a REST service) with a download option so data can be used in disconnected environments.
- iii. Lack of consistent and common knowledge around existing data and information sharing standards and how they apply to mutual aid technology systems.
 - Most participants were not aware of existing data and information sharing standards and models.
 - They indicated that any information about standards and models usually is presented in a technical format, which is not readily understandable for operators and decision makers.
 - As such, most participants do not have the specialized technical expertise required to determine the most appropriate standard and how to apply it to mutual and technology systems, let alone how to direct technology staff or consultants on required usage.
 - Additional research on existing data and information sharing standards is needed, specifically focused on determining which standards are most applicable and how they should be used to support information sharing across mutual aid systems.

- National guidance is needed that bridges the communication and knowledge gap between technical experts and system owner/decision makers around the appropriate application of these interoperability standards.

B. Technology Requirements

- i. Identified critical enhancements needed to the Incident Resource Inventory System (IRIS)
 - Currently IRIS-to-IRIS sharing (i.e., for sharing of resource inventories across multiple agencies) requires that agencies be on a common IT network. This is not a scalable option since it would be limited to only agencies within the same jurisdiction that have a common or shared IT network. This limits sharing at all levels and specifically makes it difficult for sharing resource inventories across organizations or jurisdictions, since agencies often don't share a common IT network.
 - There is a need to develop and provide a common Applications Programming Interface (API) service for instances of IRIS to be shared with 3rd party systems. These API services should be made discoverable by other IRIS users with the sharing levels, rules, and access controlled by each individual agency.
- ii. Need of a self-service tool for public safety to develop agency-specific resource typing definitions for resources currently not typed through NIMS.
 - There is a need to create a web-based form with standardized fields that are consistent with the fields in the NIMS resource typing template. This form would allow for agencies to automatically generate a resource typing definition (or position qualification sheet) for local/private sector or any other non-NIMS typed resources in a consistent format, with common fields to drive consistency.
- iii. Resource HUB – Participants collectively identified the need for a centralized technology solution to be used by all types of agencies and organizations that own and manage resources, to be formally requested and deployed to support an event. The principal business/operational challenges and associated requirements for this technology solution (otherwise referred to as the Resource HUB) are that resources are often double or triple referenced across various mutual aid and resource management systems. This creates confusion and contributes to delays during response operations when resource status information is unavailable or inconsistent across systems. It also results in

managers having to complete numerous manual steps for mutual aid requests, which increases time to adjudicate mutual aid requests and deploy assets. Currently there is no way to automate identification of specific resources (inclusive of, but not limited to teams, task forces, and individual personnel) and their status and availability across levels of mutual aid and systems to validate information and prevent double or triple counting of resources. The following are the key requirements and considerations participants identified for the Resource HUB:

Unique Identifiers

- Generates a random unique identifier (ID) for an individual resource or resource component following a standard ID convention.
- System builds a bank of unique identifiers that it can automatically access to query and validate that a unique identifier is not given out to more than one discrete resource.
- System provides the option for a unique identifier to be manually generated for discrete resources following a standard ID convention.
- Individual resource information is not stored within the system; thus, it is not a centralized repository of resource information.
 - Participants explicitly indicated that they do not want a centralized repository, inventory, or database of resource information. They expressed concern around any system that would centrally store resource information owned by locals and states, yet hosted and managed by a Federal agency.
- System would include a widget that could be brought into existing resource inventories and mutual aid systems.
 - Purpose of the widget would be to generate unique IDs for resources within an agency's resource inventory and/or mutual aid systems pulling from the common bank of IDs.
- Requires the establishment of a standardized ID convention that is consistent with existing data interoperability and information sharing standards.
 - Standardized ID convention should be developed following the existing data and information sharing standards.
- System would be designed to generate unique IDs at the discrete resource/personnel level, team or task force level, and at the Mission Ready Package (MRP) level.
 - Teams, Task Forces, and MRPs contained in existing mutual aid systems would be able to include the unique IDs for the discrete

resources that they comprise, this would further prevent the double/triple counting issue.

- For example – a Search & Rescue Task Force that is registered in an existing mutual aid system would include the references to the unique IDs for everyone rostered on that team and their specific status information. This is a critical feature since often a single first responder is rostered on multiple teams and is qualified to perform multiple capabilities.
- With this functionality mutual aid systems that are connected would be able to automatically validate the availability of the individual responder (or resource) on a given team as already committed or deployed on another mission. This is the functionality necessary to be able to automate the process and achieve improved time efficiency in the mutual aid request process.

Mutual Aid Information Exchange

- The Resource HUB would serve as an information exchange portal that allows mutual aid system owners to share resource information across systems, which are not otherwise interoperable.
 - During NMATE this proved essential to achieve information sharing across existing systems.
- The information exchange portal component of the Resource HUB would provide the following:
 - Implements a common cyber security stack to ensure data going out of other systems automatically complies with a common and standardized cyber security architecture.
 - Implements a common set of business rules and checks/balances around which attributes and metadata for resource information can be shared with various mutual aid systems and when they can be shared. These rules would be determined by the mutual aid system owners and can be coordinated through the National Mutual Aid Technology Coordinating Group.
 - Provides the technical solution that translates the resource information and serves it up in a common format that is automatically consumable by other systems. This could be a technical solution such as Vortex (the NIEM Emergency Management Lose Coupler IEPD which also uses the Emergency

- Data Exchange Language Distribution Element), Exchange Core, or another existing capability.
 - Includes the capability of automating the generation of unique resource IDs if they are missing for the resources contained in the information attempting to be shared across systems.
- None of the resource information shared into Resource HUB would be stored or hosted, it would merely serve as an exchange for just-in-time resource information sharing. The participants explicitly indicated that they would not want resource information stored, maintained, and/or hosted in a centralized database.

Core Requirements

- Requirements should be developed in close coordination with DHS, FEMA OCIO, and the FEMA Lab to support consistency with existing and new cyber security threats, associated policy, and best practices.
- The system should not store, host, or manage resource and/or emergency personnel information.
- The system should not be a centralized database of resource and/or emergency personnel.
- The system should be used in the United States exclusively, with the option to explore a template or model for how a similar capability could be established by other countries but not in the same IT environment.
- It should be developed, hosted, and maintained by an agency or organization that is different from that which serves as the manager and executive secretariat for the National Mutual Aid Technology Coordinating Group (NMATCG).
 - Whoever serves as a member on, manager of, and executive secretariat for the NMATCG would be precluded from developing, hosting, and maintaining the Resource HUB.
 - This control measure will prevent potential conflicts of interest and allow for requirements from the stakeholders to remain independent, in high integrity, and to flow to the developers and owner of the Resource HUB.
- The system must support and enables the implementation of NIMS resource typing and the National Qualifications System (NQS).
- Existing national resource management tools and platforms should be explored to determine if the technology capabilities already exist within supporting capabilities, such as but not limited to: Incident Resource

- Inventory System (IRIS), Resource Typing Library Tool (RTLTL), Preparedness Toolkit, and VORTEX
- Participants did not indicate a potential developer or owner for the Resource Hub. However, they indicated that the mission partner that would operate as the system owner and steward must be equipped with the following capabilities:
 - Information Technology backbone that complies with standardized cyber security policy and protocols
 - Scalable and cloud-based architecture
 - Modern access and ID management protocols that enables easy access and use by all emergency response partners, including but not limited to: local, state, tribal, territorial, non-profit, faith-based organizations, private sector, and federal
 - 24/7 technical help desk with capacity to rapidly and reliably surge in support of disaster operations
 - Existing trusted partnership and strong relations at the local, state, tribal, territorial, federal, and nonprofit levels in the US
 - Additional detail and specifications should be developed and provided by the NMATCG and/or a technical sub-group

OBJECTIVE 4

Exercise and attempt to resolve interoperability issues in real-time.

Primary Core Capability Alignment: Infrastructure Systems

During NMATE, a multitude of interoperability issues and challenges arose when system owners attempted to share information out of their system and when other systems attempted to consume information provided by others. Participants worked together to resolve interoperability issues in real-time. In some instances, participants could determine a technical work around that temporarily resolved the issue, allowing information to be shared between systems. This was most often achieved for systems whose information included geolocation as an attribute. This also applied to systems that could consume data with a geolocation attribute.

For two of the systems, data and information could only be shared out in static formats, providing a view of that information based on the snapshot in time. While this met the most fundamental requirements, when exercise injects asked the participating systems to change the status of certain resources, those status changes weren't reflected in the information that other systems had consumed. This highlighted the importance for mutual aid technology systems to share data and information as dynamic live feeds.

Despite preparations through virtual meetings and email communications, two of the systems did not come prepared to turn on their systems and technically attempt to exchange information in real-time. In these two cases, the facilitators worked with them to walk through how they could accomplish information sharing both technically and operationally. They also discussed the technical architecture of their system to establish a common understanding of how data and information would be shared out and consumed by those systems respectively. For one of the systems, it was determined highly likely that interoperability would be readily achieved and that data could be shared and consumed in live dynamic feeds. However, additional technical testing and evaluation would be necessary to confirm this.

One of the key findings shared by all participants was the need to conduct an annual full-scale demonstration that tests and evaluates interoperability and integration between existing and emerging mutual aid technologies, resource management dashboards, and existing standards-based connections and bridges. Nearly all participating agencies and organizations currently have major system upgrades and/or are developing entirely new versions of their systems that need to be able to exercise interoperability with other systems throughout the update and development process. Additionally, participants indicated that an annual exercise would provide an opportunity to formally test and evaluate their own systems to inform future investment in enhancements. The participants also expressed the importance of conducting an annual exercise in-person (in addition to virtual engagements) as essential to sharing lessons learned more substantively. These follow-on efforts can be expanded to include additional local, state, and national agencies and organizations that emerge as leaders in applying technology in support of mutual aid coordination.

The annual exercise could be coordinated by NAPSG Foundation and continue to build on the partnership with DHS S&T, FEMA, and the leading mutual aid system owner. It could serve as the annual culminating point for other mutual aid technology capabilities in development to participate in a live simulation-based testing and demonstration experience. It would provide a forum for rapid solution development to achieve interoperability between systems in the context of an event. The exercise would result in the production of a detailed After-Action Report and Plan that addresses how mutual aid systems were interoperable, integrated, and areas for improvement in achieving more efficient request, deployment, and demobilization of resources.

OBJECTIVE 5

Capture and compile interoperability success, challenges, and identify solution sets.

Primary Core Capability Alignment: Infrastructure Systems

The NMATE process successfully resulted in NAPSG Foundation and the participating agencies and organizations capturing and compiling specific interoperability successes, challenges, and identification of potential solution sets. In keeping with NMATE being a no-fault environment, a specific set of interoperability challenges for each system is not included in this report. NAPSG Foundation and the participants are aware of these challenges and will use them as a basis to inform the exercise and demonstration design for a follow-on NMATE next year.

Additionally, most participating agencies and organizations documented the unique and specific interoperability success and challenges for their respective systems. Many of which have begun to implement system enhancements, use them to inform specifications for new systems, and/or plan for near and mid-term investment in system upgrades. Some participating agencies and organizations began working together, independently following the exercise to help each other address and improve system information sharing. This type of inter-agency collaboration to develop and implement solution sets was a desired outcome from the NMATE process. The development of these solution sets are also disseminated nationally by NAPSG Foundation and by the other organizations that participate in the NMATE process.

As mentioned above in Objective 4, participants indicated the need for follow-on NMATE exercises and demonstrations to be conducted on an annual basis. Each year, a detailed After-Action Report and Plan should be developed that provides for strategic and tactical planning on mutual aid system interoperability enhancements.

VI. Conclusion

Overall the exercise successfully addressed the goal and objectives related to mutual aid system interoperability and information sharing. Some enhancements should be made for future exercises and demonstrations that will help to progress efforts and potentially refine the information gleaned through exercise conduct.

- **Establish a National Mutual Aid Technology Coordinating Group:**
 - **Routine Sharing of Mutual Aid System Enhancements and Upgrades:**

Participants expressed the importance of providing a forum for mutual aid system owners nationwide to share information, conduct live demonstrations, exchange ideas about enhancements and upgrades that they are making (or planning to make) to their systems, and collaboratively examine real-time solutions to continuing or emerging challenges. Additionally, a Technologist Sub-Group should also be formed that would give them a peer forum to go more in-

depth into technical issues and solutions and be better informed to advise the decision makers and operators in the broader National Mutual Aid Technology Coordinating Group (NMATCG). The NMATCG and the Technologist Sub-Group should be convened on at least a quarterly basis to support momentum by the community through a combination of virtual and in-person meeting formats.

- **Virtual Coordination Meetings:** Participants indicated that regularly occurring virtual meetings (e.g., on a bi-monthly basis) should be coordinated and conducted to provide stakeholders an opportunity to regularly connect, share lessons observed, and exchange information coming out of recent events. These virtual meetings would also provide for invited guest presenters from non-NMATCG agencies and organizations that are working through related issues to share emerging best practices and/or discuss challenges and solutions – which is one method for broadening the NMATCG reach. Importantly, these virtual meetings would serve to keep the NMTTCG connected and allow for ongoing collaboration among mutual aid technology leaders.
- **Conduct an Annual National Mutual Aid Technology Exercise and Demonstration:**
 - **Purpose:** Provide a no-fault forum for annual testing and evaluation of mutual aid systems, information sharing solutions, and model resource management dashboards. Each year a scenario-based exercise and demonstration will be planned and conducted that tests and evaluates interoperability and integration between existing mutual aid technologies, resource management dashboards, and existing standards-based connections/bridges/tools as required. This annual exercise will be conducted in coordination with DHS S&T, FEMA, leading mutual aid system owners, and other key stakeholders as identified. The specifics of recent and/or major emergency events will be the exercise venue when feasibly possible.
 - **Time:** The exercise was conducted with enough time to test a basic level of interoperability between systems. While the exercise still provided valuable information towards addressing the objectives, extending the exercise by another 1-1.5 hours would allow time to delve deeper into operational considerations at each level and type of mutual aid.

- **Sub-Group and Exercise for Technologists:** In future exercises and demonstrations, consideration should be given to the design process to include a separate sub-group and exercise component specifically for technologists. Several participating technologists in NMATE had specific and detailed issues and ideas around technical requirements that require a deeper technology-focused discussion and hot wash. This would allow technologists to more substantially work through the technical development of potential solution sets such as unique identifiers and the Resource Hub. When available, subject matter experts would facilitate dialog within this group.
- **Expansion of Mutual Aid Partners and Stakeholders:** A select number of additional stakeholder organizations that represent other mutual aid partner agencies and organizations were invited to participate in NMATE. Future exercises and demonstrations should consider expanding the scope of the exercise beyond traditional emergency services, and incorporate other response partners into the exercise design and play. This may include partners from sectors such as utilities, water, public health, and mass care.
- **Develop Implementation Guidance on Information Sharing Standards for Mutual Aid Technology:** Another priority issue identified by NMATE participants is the need for Implementation Guidance on Information Sharing Standards for resource management mutual aid technologies. Most participants were not aware that numerous information sharing standards already exist. And they expressed concern about the level of technical literacy required to understand these standards and how they should be implemented. As a result, participants indicated the need for implementation guidance to help navigate existing data interoperability and exchange standards and to bridge the gap in understanding how they can be used directly support resource management and mutual aid technology.
- **Enhance Existing Mutual Aid Systems:** Participants indicated they would be taking immediate action, and some have already begun to enhance, upgrade, and (in some cases) develop new mutual aid systems that support greater interoperability and automated information sharing. Mutual aid system owners should continue to make enhancements to their systems and use insights gained through the NMATE to inform their efforts both near and long terms.

- **Integrate Planning Capabilities into Mutual Aid Systems:** Another priority area emerging from NMATE that was validated as a requirement during Hurricanes Harvey and Irma is the need for major technology enhancements to existing mutual aid technology systems commonly used today by local and state first responders. Specifically, there is a need for mutual aid systems to be equipped with a strong resource planning and allocation component. Existing and emerging resource planning tools should be leveraged as a starting point to develop a technology module onto an existing mutual aid system. Testing and evaluation of this component could be incorporated into the design of the proposed annual exercise and demonstration, and included in the routine virtual meetings.
- **Develop a Resource Hub:** Participants collectively identified the need for a centralized technology solution that could be used by all types of agencies and organizations that own and manage resources that can be formally requested and deployed to support an event. The principle business/operational challenge and associated requirements for this technology solution (otherwise referred to as the Resource HUB) is that resources are often double or triple referenced across various mutual aid and resource management systems. Additional detail on the Resource Hub requirements is outlined in detail in section V.3.B.iii of this report.

VII. Improvement Plan

This improvement plan outlines specific next steps that begin to address the challenges identified thus far, validate the potential solution sets, and begin to implement solutions and course of action proposed by the stakeholders.

Key Actions	Lead	Timeframe	Percentage Complete
Establish Mutual Aid Technology Coordinating Group (MATCG). Conduct initial meeting and develop a Charter to guide stakeholder participation.	NAPSG w/ all mutual aid organizations	Jan. 2018	5%
Conduct quarterly meetings of the MATCG and the Technologist Sub-Group	NAPSG w/ all mutual aid organizations	Feb. 2018 (and each quarter)	0%
Plan and conduct the Mutual Aid Technology Summit with FEMA to share briefings and live demonstrations on lessons observed by local, state and federal agencies that used mutual aid technology during 2017 disasters.	FEMA, DHS S&T w/ NAPSG and select state agencies	April 2018	0%
Conduct first semi-annual in-person meeting of the MATCG for the purpose of: refining requirements, assessing progress since the annual demonstration, and developing national guidance.	NAPSG, DHS S&T, FEMA, mutual aid organizations	June 2018	0%
Conduct second semi-annual in-person meeting of the MATCG for the purpose of conducting the annual full-scale demonstration to test and evaluate interoperability and integration between existing mutual aid technologies.	NAPSG w/ mutual aid organizations	November 2018	0%
Plan and conduct a full-scale exercise/demonstration in 2018 to test system integration and data interoperability and validate ability to support effective decision making needed to achieve/change outcomes.	NAPSG, DHS S&T, and FEMA w/ all mutual aid organizations	August 2018	0%
Develop and issue After Action Report from 2-18 full-scale demonstration to document the results of the testing and other results that inform the guideline and templates.	NAPSG w/ all mutual aid organizations	October 2018	0%
Form an Ad-Hoc Task Force of local and state stakeholders to guide the development of Implementation Guidance on Information Sharing Standards for Mutual Aid Technology.	NAPSG w/ all mutual aid organizations	May 2018	0%
Complete initial research and assessment of existing standards that apply to resource management and mutual aid technology.	NAPSG	July 2018	0%

National Mutual Aid Technology Exercise

After-Action Report
December 2017

Key Actions	Lead	Timeframe	Percentage Complete
Develop draft Implementation Guidance on Information Sharing Standards for Mutual Aid and release for national engagement	NAPSG	Sept. 2018	0%
Release final version 1.0 of the Implementation Guidance on Information Sharing Standards for Mutual Aid	NAPSG	Dec. 2018	0%
Develop and implement outreach and education strategy for local and state agencies on the Implementation Guidance on Information Sharing Standards for Mutual Aid	NAPSG w/ all mutual aid organizations	Jan. 2019 Ongoing	0%
Complete annual review and update on the Implementation Guidance on Information Sharing Standards for Mutual Aid based on new or emerging technology and standards	NAPSG	Mar. 2019 Annual	0%
Leveraging the MATCG, develop validated set of requirements for mutual aid planning capabilities	NAPSG	May 2018	0%
Complete review and assessment of all existing mutual aid planning tools (i.e. Mutual Aid Resource Planner) and compare with validated set of requirements	NAPSG	July 2018	0%
Complete technical development and configuration of mutual aid planning capabilities into one or more existing mutual aid technology systems	NAPSG w/ select mutual aid organizations	Sept. 2018 Ongoing	0%
Conduct local/state agency pilot on mutual aid planning tool within the technology system(s)	NAPSG w/ select mutual aid organizations	Feb 2019	0%
Determine options for potential owners and hosts of the Resource HUB and conduct outreach with potential c owners	NAPSG w/ DHS and FEMA	July 2018 Ongoing	0%
Develop refined set of Resource HUB requirements based on additional development by the Technology Sub-Group	NAPSG	August 2018	0%
Provide concise set of technical and functional requirements for the Resource HUB to the potential owners identified	NAPSG	Sept. 2018	0%
Incorporate the Resource HUB owner/system host into the MATCG and share routine updates on development	NAPSG w/ system own	Dec. 2018	0%
System owner/host develops version 1.0 of the Resource HUB	System Owner/Host	Nov. 2018 Ongoing	0%