

# **Comprehensive Common Operating Picture (COP) for Disaster Response**

**A Monograph  
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## Abstract

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In the aftermath of the response to Hurricane Katrina in 2005, government reviews highlighted the need to implement a comprehensive Common Operating Picture (COP). The COP requirements were to provide the situational awareness needed to improve understanding and facilitate collaborative decision-making across all echelons. Today, seven years after Katrina, the Federal Emergency Management Agency (FEMA), the government's lead entity for disaster response, has yet to implement a comprehensive COP, why?

FEMA has made notable advances in programs that support coordination and collaboration and has established an active posture focused on situational awareness. However, these advances serve purposes other than that of establishing a COP. To answer the research question it was first necessary to describe how FEMA currently obtains information to create situational awareness for disaster response. Next it was necessary to examine the emergency response to Hurricane Katrina to identify the information that were needed by emergency managers but lacked. Lastly, research was necessary to determine the authority and responsibilities that govern state, local and federal decision-making because those responsibilities determine their information needs. The Post Katrina Emergency Management Reform Act (PKEMRA) and the National Response Framework (NRF) were excellent sources for that information.

FEMA's inability to implement a collaborative tool has not been hindered by technology, as numerous agencies have implemented a COP. The evidence indicated that the major obstacles to creating a COP were contextual understanding, access to needed data and conflict resolution within a virtual environment. The NRF provides the foundation for the authorities and relationships between state and federal responders. The NRF states disasters are local and the state bears the burden and responsibility to provide for its citizens when a disaster occurs. Once the state has exhausted its resources it will then request federal assistance to support response and recovery operations. It is not until federal assistance is requested that state response decisions and information becomes available to federal responders. Until access to locally held data is guaranteed to federal emergency response agencies from the onset, addressing the remaining obstacles is not possible.

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## Introduction

History is full of disastrous events in which citizens and responders were not prepared to respond properly or were ignorant of the full magnitude of the situation. The terrorist attacks on September 11, 2001, and Hurricanes Katrina and Rita in 2005, each are examples of those events. Each of those events provided significant lessons concerning response and recovery that ultimately drove procedural and organizational changes at all levels of government. The Federal Emergency Management Agency (FEMA), the lead federal agency for disaster incident management, was criticized for its poor performance during these catastrophic events. Specifically, FEMA's response to Hurricane Katrina was described as slow. The agency was deemed unable to coordinate efforts with other federal, private sector, and volunteer organizations because FEMA lacked a Common Operating Picture (COP) to provide situational awareness.<sup>1</sup> It could also be argued that the federal government response to Katrina failed well before the storm made landfall because people and resources were neither positioned nor postured properly before the hurricane hit shore. Once the storm struck the Gulf coast, federal, state, and local governments were immediately overwhelmed, and were unable to comprehend the essential aspects of the situation. Because FEMA did not understand that every disaster "is rich in unique episodes"<sup>2</sup> the agency's response was less than ideal.

For disaster relief to be effective there must be a common understanding of what situational information is needed and how that information is displayed and how it is achieved. The emergency response community understands situational awareness to mean information gathered from a number of sources that, when communicated to emergency managers and

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<sup>1</sup>The White House, "Hurricane Katrina Lessons Learned," <http://georgewbush-whitehouse.archives.gov/reports/katrina-lessons-learned/> (accessed October 25, 2011).

<sup>2</sup> Carl von Clausewitz, *On War*, 1<sup>st</sup> ed. (Minneapolis: Princeton University Press, 1989), 120.

decision-makers can form the basis for incident management decision-making.<sup>3</sup> This data supports the COP, providing continual updates throughout the life of an incident. Information feeds through an integrated system and supports timely collaborative decision-making and ensures consistent situational understanding. The requirements for an emergency response COP at the tactical level were established two years prior to Hurricane Katrina. In 2003, the President of the United States published the requirement for a National Incident Management System (NIMS). That system provided the structure for incident management as it relates to doctrine, concepts, principles, terminology, and processes needed for effective operations. That structure supported efficient collaboration at all levels facilitated by a COP. Although NIMS provided the template, it was not an operational incident management or resource allocation plan. The system assigned disaster coordination responsibilities to the FEMA Federal Coordinating Officer (FCO).<sup>4</sup> The FCO is responsible for the timely delivery of federal assistance to the state and local governments, individual victims, and the private sector. The FCO is also responsible for obtaining and maintaining situational awareness at the tactical level to drive federal operations within the Joint Field Office (JFO) in support of the state. In the case of Hurricane Katrina, although key staff had been identified, the JFO was not setup at the outset because a presidential disaster declaration was pending. Although the delay in establishing a JFO played a role in the slow response, FEMA did not have a comprehensive COP in place that could facilitate situational awareness and a truly coordinated response.<sup>5</sup>

The fact that situational awareness within the affected area was not achieved, coupled with numerous competing stovepipe systems, contributed to the system failure. The FCO clearly

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<sup>3</sup> “USC 6 (321d), Sec. 515. National Operations Center,” PUBLIC LAW 109-295-Oct. 4, 2006, [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109\\_cong\\_public\\_laws&docid=f.publ295.109.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f.publ295.109.pdf) (accessed October 27, 2011).

<sup>4</sup> The White House, “Homeland Security Presidential Directive/HSPD-5,” <http://www.whitehouse.gov/news/releases/2003/02/20030228-9.html> (accessed October 25, 2011).

<sup>5</sup> The White House, “Hurricane Katrina Lessons Learned.”



stated in the Katrina Lesson Learned report that local emergency officials found it difficult or impossible to establish an understanding of the environment because they lacked the ability to communicate with federal officials. Having a comprehensive COP would have enabled local response officials to direct operations, manage assets, obtain situational awareness, and generate requests for federal assistance.<sup>6</sup> Because FEMA was passive, and unable to effectively communicate with responders to understand the magnitude of the incident, the demand for emergency services exceeded FEMA's standard response capabilities and methods. Decision-making at all levels suffered because emergency managers lacked a functioning comprehensive COP. Emergency managers need the ability to know and understand the hazard, the terrain, and the available response capability, in a format that supports comprehension. Situational awareness alone does not ensure success; it is the sharing of the information that supports a truly coordinated response. If the benefits of a COP are so blatantly obvious, why has the federal government not created a comprehensive COP for tactical responses to disasters?

The question is not simple because disaster response involves numerous decision-makers at various levels of government. These decision-makers have both special and common information needs. The decision-makers have unique individual responsibilities and are accountable to state and local authorities. The mechanics of producing a COP is not an obstacle. A COP is feasible from a software perspective, as a number of agencies have successfully implemented such a tool to include the Department of Defense. Because a COP is intended to provide a common understanding of a situation and to support timely decision-making, determining why it has been hard for FEMA to develop a comprehensive COP involved research in several other areas. First and foremost, it was necessary to determine the authority and responsibilities that govern state, local, and federal decision-making. A COP must provide information related to a decision-makers authority and responsibilities. Next, because various

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<sup>6</sup> The White House, "Hurricane Katrina Lessons Learned."

agencies involved in disaster response have formal and informal relationships, a COP must reflect the information needs created by those relationships. Determining those relationships was relatively easy because the relationships are defined in a variety of published sources such as the NIMS and Robert T. Stafford Act.

An examination of common relationships among disaster responders revealed that the reason FEMA currently operates without a comprehensive COP for all echelons of emergency management goes beyond the issue of physical capabilities. There are insuperable obstacles to creating a comprehensive COP for federal disaster response at the tactical level. These obstacles include diverse contextual perspectives arising from different authorities, access to necessary information prior to a federal disaster declaration, and conflict resolution within a virtual environment. FEMA has implemented a number of programs to mitigate the impact of not having a comprehensive COP. The Regional Watch Centers, Incident Management Assistance Teams and the National Operations Center (NOC) are examples of those programs. However, each of these programs serves a purpose other than creating a comprehensive COP.

## **FEMA Today**

In an effort to answer the question of why the federal government has not implemented a comprehensive COP it is important to understand FEMA, the primary federal disaster response agency. What must be known is how FEMA manages disasters today without a comprehensive COP. Despite FEMA's inability to implement a COP it has not ignored the importance of awareness, cooperation and collaboration with all echelons. Over the past several years, because of the Post Katrina Emergency Management Reform Act (PKEMRA), FEMA has striven to improve its service to the nation on a number of levels. Most notably, FEMA has improved response by establishing watch centers that support regional and national situational awareness, and has developed modern, rapidly deployable, emergency response teams called Incident Management Assistance Teams (IMATs). Additionally, FEMA leadership has implemented a

new program called Whole Community. The Whole Community recognizes that it requires all aspects of a community to effectively prepare for and respond to disasters.<sup>7</sup>

The most significant move by FEMA to achieve situational awareness was the establishment of watch centers within each of the ten FEMA Regions and at FEMA Headquarters. The watch centers were designed to analyze potential threats that could require a federal response. A memo, dated October 18, 2010, from the Assistant Administrator for Response states the watch centers are responsible for steady state monitoring of national and regional events and potential threats that may necessitate activation of the Regional Response Coordination Center (RRCC). The watch center staff continues to anticipate new requirements, while also supporting the activation of the RRCC for a disaster.<sup>8</sup> The watch centers were established at the FEMA Regional offices that do not currently have support from a Mobile Emergency Response Support (MERS) unit. FEMA Regions I, VI, VIII, and X merely increased their MOC responsibilities to include situational awareness, reporting, and coordination. The existing MOC watch structure supports 24-hour coverage with adequate staff to manage the new mission requirements. Regions II, III, IV, V, VII, and IX were required to stand up watch centers within their respective Response Divisions to meet the requirements. These watch centers reside within the RRCC Branch, but operate independently. The RRCC serves as the main coordination point between federal agencies that support state and local governments with response and recovery activities immediately following a disaster. This coordination center manages the response until the IMAT staff is in place and ready to assume control in the field.<sup>9</sup> At the national

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<sup>7</sup> U.S. Department of Homeland Security, FEMA, “FEMA Strategic Plan for FY 2011-2014,” [http://www.fema.gov/about/2011\\_14\\_strategic\\_plan\\_faqs.htm](http://www.fema.gov/about/2011_14_strategic_plan_faqs.htm) (accessed October 29, 2011).

<sup>8</sup> The Naval Post Graduate School Center for Homeland Defense and Security, Homeland Security Digital Library, “FEMA Memorandum: Change in Terminology for National and Regional Watches,” <https://www.hsdl.org/?view&did=15196> (accessed November 8, 2011).

<sup>9</sup> U.S. Department of Homeland Security, FEMA, “National Response Coordination Center,” <http://www.fema.gov/hazard/hurricane/2010/nrcc.shtm> (accessed November 05, 2011).

level, FEMA Headquarters (HQ) implemented a watch center responsible for regional support and FEMA senior level situational awareness. That watch center has a direct communication link to the Department of Homeland Security (DHS) NOC.

Authority to establish a full time all-hazard situational awareness watch came in Fiscal Year (FY) 2007 as a means to increase the agency's response posture. In FY 2008, FEMA started to receive funding to support hiring the required staff for this new requirement. During the interim period of 2007 – 2009, understanding the importance of situational awareness, regional offices implemented basic watch functions using existing resources when activity substantiated the need in their specific region. While these ad hoc watches attempted to meet the spirit of the requirement, there were no standards to guide their work and no comprehensive COP. The ad hoc watches only marginally improved the clarity in response efforts because of its regional focus. It was not until late 2010 that all watch centers were staffed at the level needed to support 24-hour coverage. However, although staffing was in place the standard operating procedures, training requirements, and comprehensive COP were again absent. As the infrastructure for the new mission of watch started to materialize, regional watches continued to support operations with policies and procedures that solely supported local initiatives in the absence of higher doctrinal guidance. Critical functions such as information gathering, management, analysis, and reporting were left for regional interpretation. The lack of standardization made senior level decisions outside the region difficult. Terms such as common operating picture and situational awareness existed but held little meaning outside the regional level since each of the ten FEMA regions had their own ad hoc standards.

Legacy analysis procedures and information flow processes quickly became road blocks for watch centers. The procedural standardization hurdles that watch center staff faced were minor when compared to overcoming the existing information and relationship stovepipes resident within the organization. Prior to watch centers FEMA organizations operated with liaisons, program managers, and subject matter experts who established relationships with federal

and state partners. Trying to redirect control and lines of communication to the watch was difficult. In order for the watch center to be successful, it needed to be the nucleus about which everything else revolved. The watch staff was unable to conduct accurate briefs, produce detailed reports, or make well-informed decisions without having full disclosure by all programs through a comprehensive COP. In the past, a significant portion of the staff would deploy to support a disaster response taking the stovepipe information with them into the field. Today, the watch center staff remains in place and is a permanent entity acting as an information repository to achieve situational awareness. The regional watch centers are essentially Emergency Operations Centers (EOC) at the federal level, collecting open source data to provide situational awareness.

The IMATs are full-time, rapid response teams with dedicated staff. IMATs are able to deploy within two hours and arrive at an incident within 12 hours to support the local incident commander. The teams support the initial establishment of a unified command and provide situational awareness for federal and state decision-makers. Situational awareness is crucial to determining the level and type of immediate federal support that may be required. The IMATs were developed by expanding the former Emergency Response Team concept at the national and regional levels. When fully staffed there will be 13 regional teams and three national teams. These 16 teams when deployed will provide forward federal presence to facilitate the management of the national response to catastrophic incidents. The primary mission of a FEMA IMAT is to rapidly deploy to an incident or forecasted incident. Once there, the IMAT leads the effort to identify and provide assistance, and coordinates the response in support of the state or territory.<sup>10</sup>

Furthermore, FEMA realized that the effects of natural disasters have become more frequent, far reaching and widespread. As a result, preserving the safety, security, and prosperity

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<sup>10</sup> U.S. Department of Homeland Security, FEMA, "FEMA Disaster Response Assets and Enhancements," <http://www.fema.gov/media/archives/2007/061207.shtm> (accessed October 28, 2011).

of all parts of society has become more challenging. This challenge drove the establishment of the Whole Community approach to emergency management. This approach presents a foundation for increasing individual preparedness and engaging community members who are vital partners in enhancing the resiliency and security of our nation. The Whole Community approach is not intended to be all encompassing or focused on any specific phase of emergency management or level of government. The approach does not direct specific actions or require communities or emergency managers to adopt certain protocols. Rather, it provides an overview of core principals, key themes, and pathways for action. In congressional testimony, the Administrator of FEMA described today's reality as follows, "Government can and will continue to serve disaster survivors. However, we fully recognize that a government centric approach to disaster management will not be enough to meet the challenges posed by a catastrophic incident. That is why we must fully engage our entire societal capacity."<sup>11</sup> As a concept, Whole Community is a means by which residents, emergency managers, practitioners and community leaders understand the needs of their communities. In doing this they are able to determine the best ways to organize and strengthen their assets, capacities, and interests. This approach builds partnerships and promotes collaboration and information sharing at all levels.

While these initiatives improve the agency's ability to communicate, coordinate and plan with state and local authorities, it does not meet the requirements of a comprehensive COP capable of providing real time situational awareness that can be shared.<sup>12</sup> The Post Katrina Emergency Management Reform Act and the Katrina Lessons Learned report mandated the requirement for a COP and the National Response Framework and Incident Management System

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<sup>11</sup> U.S. Department of Homeland Security, "Testimony of Administrator Craig Fugate, Federal Emergency Management Agency," [http://dhs.gov/ynews/testimony/testimony\\_1302038627496.shtm](http://dhs.gov/ynews/testimony/testimony_1302038627496.shtm) (accessed November 15, 2011).

<sup>12</sup> U.S. Department of Homeland Security, FEMA, "FEMA Disaster Response Assets and Enhancements," <http://www.fema.gov/media/archives/2007/061207.shtm> (accessed October 28, 2011).

also require it.<sup>13</sup> These programs put FEMA into a more proactive rather than reactive posture, supporting state and local authorities in advance to determine actual or potential needs. The challenge for FEMA is their inability to understand the environment, coordinate, collaborate and make decisions in a response setting. Communicating with responders prior to an event has not been a problem.

## **COP Development**

DHS recognized the need for a national secure web-based portal that provided a COP for those entities engaged in the homeland security mission. FEMA attempted to use this system as a comprehensive COP but found it did not meet the specific tactical needs of disaster response. The Homeland Security Information Network (HSIN) was established to provide a secure and collaborative information-sharing environment. This tool supports federal, state, local emergency responders, and private sector communities within a homeland security situation. HSIN is a means to share critical information with other jurisdictions and to plan and request resources. HSIN offers its users a variety of situational awareness tools such as a COP, real-time collaboration and instant messaging. The HSIN document library provides daily and periodic reports from its participants and thereby, enables participants to fuse threat related information.<sup>14</sup> DHS set lofty goals for the HSIN program, one of which was to share relevant and vetted homeland security information at all levels of government and the private sector.

The central goal of HSIN is to ensure that HSIN becomes a key component of the daily business processes of homeland security partners. The evidence suggests that HSIN faces significant challenges that it must overcome if it is to reach its full potential. Most importantly,

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<sup>13</sup> “PKEMRA Implementation: An examination of FEMA’s Preparedness and Response Mission,” <http://www.gpo.gov/fdsys/pkg/CHRG-111hrg54475/pdf/CHRG-111hrg54475.pdf> (accessed October 30, 2011).

<sup>14</sup> Department of Homeland Security, “Homeland Security Information Network,” <http://dhsconnect.dhs.gov/org/comp/plcy/frontofc/epp/Pages/hsin.aspx> (accessed December 26, 2011).

information sharing is not limited to the 14 components of the federal government and law enforcement agencies but reaches down the chain to the front line responders.<sup>15</sup> Additionally, there are strategic, programmatic, and operational challenges which are unrelated to the core system technology. Strategic issues revolve around the ability to attract and retain membership, being able to generate relevant actionable intelligence that supports situational awareness, demonstrating system value, and creating a cultural shift from “need to know” to “need to share.” The programmatic concerns focus on policies and guidelines surrounding the acquisition, use and retention of community data, and participating agency information validation. Finally, the operational challenges to keep participants using the system are those regarding building trust, standardization and customization, technological growth capability, and interoperability.<sup>16</sup>

Despite the published capabilities of the HSIN system, very few emergency responders used the system in the midst of Hurricane Katrina to gain situational awareness. Reports of lessons learned from the hurricane indicated agencies such as the National Guard and Eighth Coast Guard District Command Center opted not to use HSIN or was unaware of its existence.<sup>17</sup> Critical reviews of the system indicate the system lacked adequate user guidance, the users had received no user training, the data portal was hard to locate and ineffective as a storage location. System users were confused, and did not understand the role of HSIN or how to share information.<sup>18</sup> FEMA now limits use of this system to planning for potential man-made disasters and management of internal and national level exercise activity.

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<sup>15</sup>Department of Homeland Security, Connect “Department of Homeland Security, HSIN Overview and Implementation,” <http://dhsconnect.dhs.gov/searchCenter/Pages/results.aspx?k=HSIN> (accessed December 26, 2011).

<sup>16</sup> Ibid.

<sup>17</sup> The White House, “Hurricane Katrina Lessons Learned.”

<sup>18</sup> Department of Homeland Security, “Homeland Security Information Network Could Support Information Sharing More Effectively,” [http://www.oig.dhs.gov/assets/Mgmt/OIG\\_06-38\\_Jun06.pdf](http://www.oig.dhs.gov/assets/Mgmt/OIG_06-38_Jun06.pdf) (accessed December 26, 2011).



After FEMA encountered the challenges associated with HSIN it recognized the need for a disaster specific system that could easily be used by the emergency management community. In October 2007, FEMA began using the real time information sharing computer-based software Emergency Management Information Management System (EMIMS) that would serve as a single repository for disaster information.<sup>19</sup> This system was to provide decision-makers a broad picture of response actions and needs during a national crisis. EMIMS was intended to enhance decision-making. The EMIMS was to serve as the FEMA COP, affording all echelon levels the ability to share situational and operational knowledge during incidents, thereby, improving collaboration with partners to make smart well-informed decisions. Although EMIMS was an off-the-shelf technology, it supported the operating platform for the Geospatial Information System (GIS) that allowed for a visual depiction and facilitated easy development of standardized reports during steady state or disaster operations. Memorandums of Understanding (MOU) with state and local partners provided the mechanism to share this information and to access existing state web based systems. However, in 2009 it was determined the system was not capable of integrating the plethora of state systems currently in place. Consequently, FEMA officials decided to abandon the EMIMS program.

In the wake of disestablishing EMIMS, FEMA leadership recognized the need to provide the watch centers doctrinal guidance pertaining to standardization and reporting requirements. FEMA leadership established essential reporting requirements for watch officers and analysts and provided a standard basic reporting format. Essential Elements of Information (EEI) and Critical Information Requirements (CIRs) are the principle tools for maintaining situational awareness during incident operations. EEIs list information managers need to make effective decisions. Due to the considerable time involved in collecting, validating, analyzing, and publishing information,

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<sup>19</sup> Federal Computer Week, Strategy and Business Management for Government Leaders, "FEMA Readies Emergency System," <http://fcw.com/Articles/2007/10/10/FEAM-readies-emergency-system.aspx> (accessed November 10, 2011).

only those elements that are truly essential to the decision maker are included. Critical Information Requirements are those items or events so critical that the event must be immediately reported to senior staff. For example, the status of dams is an EEI, while a dam failure may be a CIR. At the very broadest, CIRs may be considered as those few EEIs that senior staff must immediately know because failure to respond would undermine operations. A CIR may also be an event that draws national level news coverage.<sup>20</sup> An information collection plan highlights the EEIs by specifying the required information, the locations of information sources, and by designating who is responsible for obtaining the information and how and when desired information will be reported. The CIRs are derived from this document and based on the type of scenario that generated the initial response.<sup>21</sup> These requirements set the stage for data collection and analysis by watch staff.

Watch centers identified sources of information that supported EEI and CIR requirements. That information could then be imported into a COP if one existed. The COP would streamline information gathering. Current data mining techniques for watch centers have been established and validated within each individual watch center (National, Regional). There are no current standard practices for achieving situational awareness within each watch center nor are there reporting triggers. In the absence of standard procedures the regions are accustomed to focus on events that could potentially require federal involvement. However, with no specific guidelines in place, watch centers tend to err on the side of over reporting. The watch centers, therefore, clog the information pipeline with unnecessary information that requires vetting at the national level. Information is extracted from a plethora of open sources, which varies from

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<sup>20</sup> U.S. Department of Homeland Security, Federal Emergency Management Agency, *Joint Field Office Activation and Operations, Interagency Integrated Standard Operating Procedures*, [http://www.fema.gov/pdf/emergency/nrf\\_JFO\\_SOP.pdf](http://www.fema.gov/pdf/emergency/nrf_JFO_SOP.pdf) (accessed November 12, 2011).

<sup>21</sup> U.S. Department of Homeland Security, Federal Emergency Management Agency, *Region VII Regional All Hazards Plan, Version 2.5 Interim Update* (Kansas City, 2011).

watchstander to watchstander but normally from government agencies such as the National Weather Service, Department of Transportation and Energy, also the Army Corps of Engineers and State Emergency Operations Centers. Once the information has been gathered, verified, and analyzed the watch staff decides when to report or monitor. Here again, the regions have set the parameters for handling information. If the information is reported, it is done via email in the form of a Spot Report or Incident Report. The Spot Report documents an event that has the potential for federal involvement but detailed data is not yet available or is significant enough to alert senior government officials immediately. The Incident Report follows the Spot Report and provides the detailed information about the event that was not previously available. Updates are provided as the event unfolds.<sup>22</sup> These reports are sent via email to interagency, state, local, and private sector partners. There is no central repository where a national picture of all ongoing events can be viewed. Identifying, processing, and comprehending the critical information provides a degree of situational awareness, but the system falls well short of a COP because there is no ability to share the information in real time through a common picture. Providing the information on a common display shared by all levels of command facilitates collaborative planning and decision-making at the national, regional, and field levels.<sup>23</sup> Forcing decision-makers to wade through numerous emails to decipher the operational picture on potentially multiple concurrent events cannot produce comprehensive situational awareness.

FEMA Regional Offices recognized the value that a comprehensive COP would add to response activities and began regional initiatives to create a COP. FEMA Region X in Seattle, WA created a regional level incident management tool called Emergency Response Unified Planning Tool (ERUPT). Region IV in Atlanta, GA, created the Spatial Tool for Operations and

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<sup>22</sup> Federal Emergency Management Agency, *National/Regional Watch Center Standard Operating Procedures*, Draft October 2010.

<sup>23</sup> Field Manual 1-02 *Operational Terms and Graphics* (Washington D.C, Department of the Army, Feb 2, 2010).

Response Management (STORM). Both systems are web based with an associated GIS viewer to support situational awareness. The ERUPT system provides a robust software package that provides a COP and tools that support other programs by providing for damage assessment, environmental analysis, and shelter updates. Real time information sharing through these systems remains troublesome, but the regions continue to seek a connectivity solution.

More recently, FEMA has begun investing time and resources into the Disaster Management and Support Environment (DMSE), which is a system of systems designed to support response and recovery. The DMSE called the FEMA Situational Awareness Viewer for Emergency Response and Recovery (SAVER<sup>2</sup>) is intended to leverage and enable existing capabilities, not result in the development of a new solution. System of Systems (SoS) technology is believed to be more effective at analyzing and implementing large, complex, independent, and heterogeneous systems working cooperatively. The main thrust behind the desire to view the systems as a SoS is to obtain higher capabilities and performance than would be possible with a traditional system view.<sup>24</sup> This conceptual framework resembles the Army's Network Centric Warfare (NCW) concept that employs ever more powerful information technology, to network a variety of military computing systems. The concept recognizes the existence of numerous separate technical applications that together form a SoS. When these military applications are connected to create a SoS, the synergy created produces dominant battle space knowledge, near-perfect mission assignment, and immediate and complete battle assessment.<sup>25</sup>

SAVER<sup>2</sup> serves as the visualization component of the DMSE.<sup>26</sup> The SAVER<sup>2</sup> displays FEMA's enterprise GIS data, as well as other agency data, and permits the analysis and display of

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<sup>24</sup> Mo Jamshidi, ed., *System of Systems Engineering: Principles and Applications* (Boca Raton: CRC Press, 2009), 2-3.

<sup>25</sup> Jamshidi, *System of Systems Engineering*, 2-3.

<sup>26</sup> Federal Emergency Management Agency, "FEMA: Week in Review," [http://www.fema.gov/pdf/hazard/hurricane/2005katrina/o40111\\_lro\\_week.pdf](http://www.fema.gov/pdf/hazard/hurricane/2005katrina/o40111_lro_week.pdf) (accessed December 28, 2011).

operationally relevant information. It facilitates collaborative planning, assists in achieving shared situational awareness, and enhances decision-making. SAVER<sup>2</sup> consists of hardware and software to collect, process, and display in real-time asset locations, personnel, and program data for response and recovery mission areas. The DMSE project was initiated to help create an environment in which integrated and coordinated GIS and imagery capabilities across FEMA can be depicted, thereby improving collaboration and understanding among the JFOs, regions, and headquarters. Entities outside from FEMA will be addressed later. Phase I of the DMSE only allows FEMA offices to access the system but follow on phases will attempt to open up access to all emergency response partners.<sup>27</sup> The SAVER<sup>2</sup> system has been under development since 2010. It has experienced a number of software setbacks that have precluded agency wide implementation. It had been expected to make its debut during the National Level Exercise (NLE) in FY2011, but was unable to support the heavy information load of an event of that magnitude. In fact, the NLE After Action Report (AAR) highlights that responding federal agencies did not have a single technological solution to gather, disseminate, and maintain situational awareness throughout the event.<sup>28</sup> At this stage it appears FEMA has shifted its focus from a comprehensive COP to a specific federal COP.

## **Doctrine**

It is important that the implementation of a COP not go without the foundational support of doctrine. Since Hurricane Katrina, FEMA has implemented numerous doctrinal support documents focusing on disaster response, coordination, collaboration, decision-making and

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<sup>27</sup> Federal Emergency Management Agency, "Situational Awareness Viewer for Emergency Response and Recovery," [http://www.fema.gov/pdf/privatesector/saver2\\_factsheet.pdf](http://www.fema.gov/pdf/privatesector/saver2_factsheet.pdf) (accessed December 28, 2011).

<sup>28</sup> Federal Emergency Management Agency, "National Level Exercise 2011 (NLE 11) Quick Look Report (QLR)," [http://www.fema.gov/pdf/media/factsheets/2011/nle11\\_quick\\_look\\_report.pdf](http://www.fema.gov/pdf/media/factsheets/2011/nle11_quick_look_report.pdf) (accessed December 28, 2011).

situational awareness to improve response efforts. These documents were constructed to address the key doctrinal principles that ultimately drive agency objectives. Webster's II New Riverside University Dictionary defines doctrine as "a principle or body of principles presented by a specific field, system, or organization for acceptance or belief." From an organizational perspective, doctrine consists of those shared beliefs and principles that define the work of a profession. Principles are: (1) basic truths, laws, or assumptions; (2) rules or standards of behavior; (3) fixed or predetermined policies or modes of action. Professions are occupations and vocations requiring training and education in a specialized field; specifically, training and education in the doctrine of that profession. Doctrine is the codification of what a profession thinks (believes) and does (practices) whenever the professional member performs in the usual and normal way.<sup>29</sup> FEMA further understands doctrine as what it believes about the best way to do things. Two words are particularly important in the definition. The use of the word "believe" suggests that doctrine is the result of an examination and interpretation of the available evidence. Additionally, it implies that the interpretation is subject to change should new evidence be introduced. The word "best" connotes a standard, a guide for those who conduct the business of emergency management.<sup>30</sup> FEMA doctrine pays appropriate attention to the relationship between agency doctrine, tactics, and strategy. Strategy in its simplest terms is a broad perspective on how to use resources to achieve a goal. Tactics is the deployment of forces in some specific instance. Doctrine provides the principles that guide how responding forces will be used.<sup>31</sup> These distinctions are critical in the development of FEMA doctrine.

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<sup>29</sup> James J. Tritten, "Naval Perspectives for Military Doctrine Development," Defense Technical Information Center, <http://www.dtic.mil/doctrine/doctrine/research/p198.pdf> (accessed December 29, 2011).

<sup>30</sup> Dennis Drew, "Military Doctrine," Air University: The Intellectual and Leadership Center for the Air Force, <http://www.au.af.mil/au/awc/awcgate/readings/dre1.htm> (accessed December 30, 2011).

<sup>31</sup> Ibid.

FEMA emphasizes well-developed doctrine within an emergency management construct. Doctrine is critical to operations because it reduces the need for leaders and decision-makers to communicate detailed instructions. Effective doctrine explains how to respond to disasters based on past experience and an educated forecast of what lies ahead.<sup>32</sup> In the absence of tasking and communications, a subordinate who acts in accordance with doctrine has a better probability of conforming with his superior's desires than he would otherwise. In a chaotic response environment, doctrine has a cohesive effect on multi-agency responders. It promotes mutually understood terminology, relationships, responsibilities, and processes and thus, frees the leader to focus on the overall response operation. FEMA's experience is the principle source of FEMA doctrine. The doctrine is a collection of those things that have generally been successful in the past. The repeated successes or failures of disaster response over time are generalized into beliefs that will be relevant to the present and the future.<sup>33</sup> Because not all past experience is relevant to the present or potentially even the future there is no guarantee that what is relevant for FEMA today will remain relevant, hence its doctrine is continually growing and changing. Doctrine provides a bridge or common thread leading from the past to the present and future.<sup>34</sup> It is a commonly understood and shared framework that sets the structure in which specific operations can be planned and executed. The framework is needed if a comprehensive COP is to be effective.

FEMA has identified that emergency managers today need doctrine to effectively conduct operations. While there is some validity in the adage of "adapt and overcome," emergency responders cannot make everything up as they go. It is necessary to rely on the

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<sup>32</sup> Clinton J. Ancker III and Michael D. Burke, "The U.S. Army Professional Writing Collection," Doctrine for Asymmetric Warfare, [http://www.army.mil/professionalWriting/volumes/volume1/october\\_2003/10\\_03\\_1.html](http://www.army.mil/professionalWriting/volumes/volume1/october_2003/10_03_1.html) (accessed December 30, 2011).

<sup>33</sup> Drew, "Military Doctrine."

<sup>34</sup> Tritten, "Naval Perspectives for Military Doctrine Development."

foundational components of doctrine such as the principles previously discussed. This is not to say that FEMA does not expect emergency responders to adapt or modify the existing principles to address and solve unique problems. As the best way to conduct emergency management operations, FEMA doctrine provides a standard against which to measure effectiveness. Given that there are a number of situational factors that keep responders from doing things the best way; doctrine can still support analysis of successes and failures. These successes and failures drive the change and development of doctrine. However, despite FEMA's effort to establish applicable doctrinal resources to support response operations it has not facilitated the implementation of a comprehensive COP.

## **Information Access**

The Constitution of the United States recognizes the general police powers of the states. Accordingly the National Response Framework (NRF) assigns state governments the responsibility for the public health and welfare of the people in their jurisdiction. State and local governments are closest to those impacted by incidents, and those governments have always had the lead in response and recovery.<sup>35</sup> During response operations, state authorities play a key role in coordinating resources and capabilities throughout the state and in obtaining assistance from other states when deemed necessary. States are sovereign entities, and the governor bears the responsibility for public safety. States have significant resources of their own, including state emergency management and homeland security agencies; e.g. state police, health agencies, transportation agencies and the National Guard. It is the state's responsibility to supplement local response efforts before, during and after incidents. If a state anticipates that its resources may be

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<sup>35</sup> Federal Emergency Management Agency, NRF Resource Center, "National Response Framework, Resource Center," <http://www.fema.gov/emergency/nrf/> (accessed October 25, 2011).



exceeded, the governor can request assistance from the federal government or another state.<sup>36</sup> The federal government maintains an array of capabilities and resources that can be made available upon a request by the governor. When an incident occurs that exceeds or is anticipated to exceed state resources, the federal government can provide assistance to support the state response. The NRF calls for a tiered response, managing incidents at the lowest jurisdictional level and providing support when needed.

Because FEMA acts in support of the state, the state controls the flow of information and the level of federal involvement based on their needs. Essentially, the states operate within their own realm during the initial stages of the disaster until they reach a point where they have exceeded their capabilities to deal with the situation and request a federal disaster declaration. Because disasters are local and states usually seek to keep them local, states are reluctant to release decision support information to external entities. Controlling that information is a means to retain control and authority over the incident. There are a number of other factors that restrict access to information; such as general agency policy differences, authority structures and boundaries, costs, agency expectations and priorities, differing aims and objectives, as well as confidentiality and information sharing protocols.<sup>37</sup> All of these factors impede the implementation of a comprehensive COP. Significant impediments are the agencies' authorities and boundaries. The Robert T. Stafford Disaster Relief and Emergency Assistance Act mandate the authorities for the federal government. If the requirements of the state and federal government are congruent, collaboration is beneficial, but when requirements differ, there is friction that must be resolved. Additionally, involving the federal government in a disaster response unnecessarily can put the state in a precarious financial position. According to the Stafford Act when the federal

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<sup>36</sup> Federal Emergency Management Agency, NRF Resource Center, "National Response Framework, Resource Center."

<sup>37</sup> Mary Atkinson and etc., *Multi-Agency Working: A Detailed Study (LGA Research)*, (n.p.: Nat.Foundn.for Educ.Research, 2002), 1-10.

government provides assistance incident to a disaster declaration it will not pay less than 75% of the eligible response and recovery costs, leaving the state responsible for the remaining 25%.<sup>38</sup> For obvious reasons the state wants as much reimbursement for response and recovery expenditures as possible, while the federal government works to maintain fiscal responsibility and still provide needed services. Any one or combination of these factors affects the collaborative relationship between the state and federal government, inhibiting the implementation of a comprehensive COP.

In an effort to remain engaged in response activities, the FEMA Regional Watch Centers routinely communicate with the state emergency management offices either with the EOC if activated, the duty officer, or the operations officer via telephone or email. Through frequent communication regional watch centers attempt to mitigate some of the friction inherent in the state-federal relationships. Frequent communication facilitates development of a solid working relationship and increases the exchange of information. Additionally, during state EOC activations FEMA liaison officers are sent to the state to provide the needed link between the two entities. When the state and local EOCs activate, they designate a level that directly relates to the severity of the emergency. As an example, a Level 1 is a full-scale activation of state emergency response team personnel. In a full-scale activation, the EOC is staffed with emergency management staff as well as all Emergency Support Functions (ESF). There are 15 ESF positions that support a range of departments from transportation, communication, health, environmental, energy, and public works to name a few.<sup>39</sup> Level 2 is a partial activation of the state emergency response team. A partial activation requires the emergency management staff teamed with only necessary ESFs. Level 3 is the monitoring phase, during which notifications to appropriate staff

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<sup>38</sup> Federal Emergency Management Agency, "Robert T. Stafford Disaster Relief and Emergency Assistance Act," <http://www.fema.gov/about/stafact.shtm> (accessed March 31, 2012).

<sup>39</sup> Federal Emergency Management Agency, "National Response Framework"

are made as necessary for those needing to take action as part of their normal daily responsibilities, while the EOC is manned by state emergency management staff.<sup>40</sup> It is during these activations that the State may request a FEMA Liaison Officer to report to the state EOC to commence federal coordination and directly link the state EOC to the RRCC. The liaison is able to embed directly into the state command structure to obtain situational awareness, which he then communicates to the Regional Watch Center and RRCC staff. The role of the liaison officer is extremely important. He helps provide federal assessments of the situation, and helps to identify state and federal shortfalls which assists planning and decision-making. The liaison also communicates the state's specific requests for assistance to the FEMA chain of command.

Although the federal government has not established a comprehensive COP, this has not stopped the states from implementing their own internal information sharing tool. The states typically use some form of web-enabled crisis management information system that provides real time information sharing with their respective emergency managers. While there are a number of different systems being used by states, the core system functions provide the users a chronological record of tasks, mapping, chat, standard report forms, visual displays, and exercise activity. Because the FEMA Regional Offices are not able or authorized to connect to the many systems that are in use, the liaison officer bridges that information gap by emailing information to the Regional Watch Center and the RRCC staff. These snap shots provide historical, not real-time updates, to decision-makers at the federal level. The FEMA staff must then analyze the snap shot data for relevance. Specifically, the staff must determine whether the information supports existing resource requirements, whether shortfalls have been identified, or whether the operational environment has changed, and whether the state authorized release of additional information to federal stakeholders. After the analysis, the Regional Watch Center and or the

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<sup>40</sup> Florida Division of Emergency Management, "State Emergency Operations Center Activation Levels," <http://www.floridadisaster.org/eoc/eoclevel.htm> (accessed November 20, 2011).

RRCC staff brief operational decision-makers and send a report both horizontally and vertically within the chain of command. This is often a lengthy process and could potentially slow decision-making significantly.

## **Diverse Contextual Perspectives**

If a picture is worth a thousand words, then applying this old adage to the topic at hand begs the question does the comprehensive COP articulate the same thousand words to each observer?<sup>41</sup> The most frequent rationale for a COP is the belief that a graphic representation overlaid upon a map will improve the observer's understanding of what is happening and aid decision-making. Dr. Jonas Landgren, research manager for the Public Safety Group, Victoria Institute, noticed there a significant interest in creating a COP to improve crisis response. He found, however, that there is very little evidence that supports the conclusion that a digital representation of a map is the ultimate solution. The graphic representations say little about what to do. Instead, the graphics merely show the objects and phenomena that some observers choose to see as relevant. In most cases, the meaning or significance of these objects and phenomena are understood very differently by observers from different organizations. Landgren is concerned that emergency managers will become too focused on what to display within the COP, and ignore the necessary interaction that takes place when using an actual map versus a digital depiction. The COP is not created by the picture but from the human interactions. Common understanding is the product of sharing a variety of interpretations and negotiating a shared interpretation.<sup>42</sup> This line of thinking is very similar to that of Richard McMaster and Chris Baber and their research on multi-agency use of a COP. They contend that operating within a virtual environment could add

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<sup>41</sup> Patrick J. Bindl, "Does a Common Operating Picture Result in a Common Understanding of the Battlespace" (monograph, Naval War College, 2005), page 1.

<sup>42</sup> Jonas Landgren, "Common Operating Picture?" Information Technology in Emergency & Crisis Response, entry posted March 02, 2007, <http://jonaslandgren.blogspot.com/2007/03/common-operating-picture.html> (accessed January 01, 2012).

ambiguity to the decision-making process, because the contextual understanding differs at each echelon. It is refined further in that there may be a number of non-verbal social cues missed and or processes that could get lost in the COP. Because of this, there is a need for a mechanism to check understanding and agreement across organizations to aid comprehension.<sup>43</sup> Within FEMA the watch center analyst is responsible for data analysis and for assessing the relevance of the information and for reporting his findings. It is expected that the state and local authorities will enter raw data into the COP system for federal interpretation. Doctrinal support is necessary to guide the analyst in their interpretation and assessment of raw information.

Research indicates that if an agency intends to implement a comprehensive COP as a means to replace the common communications architecture, the interagency cooperation will suffer due to the lack of common understanding of the environment. While the COP is designed to represent the information in a format that is understandable, the interpretation of the information is often different. Furthermore, in the absence of face to face interaction the ability to resolve potential jurisdictional or decisional conflicts is significantly diminished.<sup>44</sup> A key obstacle that FEMA has with implementing a comprehensive COP is the contextual understanding of the data, based on where within the organization the observer or decision maker works (federal, state, and local level). Everyone views things differently based on a number of factors such as experience, organizational role, and socio-cultural influences such as beliefs and values to name a few. In his book *Beyond the Information Given*, Jerome Bruner discusses veridicality, which refers to the degree that an observer's perception of a scene is accurate and predictive. People categorize what they observe based on experiences and familiarity with that which is being

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<sup>43</sup> Human Factors Integration Defence Technology Centre, "Common Operating Pictures and Their Potential for Multi-Agency Work," <http://www.hfidtc.com/research/multi/multi-reports/phase-2/HFIDTC-2-3-1-4-4-common-op-pictures.pdf> (accessed November 19, 2011).

<sup>44</sup> Ibid.

observed.<sup>45</sup> In pondering this issue it is useful to consider a lesson in observation and perception taught in basic psychology. Several people are tasked to observe a party then describe it. After observing the same party each person describes a very different scene. One thinks the music is loud and therefore describes an obnoxious party; another focuses on a couple having an argument and describes a party with negative vibes. A third observer sees people laughing on the dance floor and describes a fun party. Each person's perception of the party was determined by what he happened to focus on, and how he categorized that information based on experience, as well as motivational, personal, and social factors.<sup>46</sup> This example becomes relevant within a COP environment where there are multiple levels of command (federal, state, and local) reviewing the same picture and injecting various interpretations of the situation.

Since the disaster response COP would more often than not be a visual snapshot of an existing event, what you see is what you get. The observers must not overstep their authority in the decision-making process based on their perceived understanding. Decision-makers must understand that what is relevant information at the strategic or operational level is not necessarily relevant at the tactical level, where the development of the COP takes place. Each level has historical habits that support selection of relevant information. Such was the case in the Midwest ice storm in 2011, where decisions on employing FEMA generators resided at FEMA HQ. The further away an observer moves from the process of building the COP, the greater the chance the situation will be misinterpreted. This misinterpretation could be caused by the lack of understanding of the wider information needs. The COP is merely a depiction of data that is easily manipulated by the user based on their specific information needs, which is done by

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<sup>45</sup> Jerome S. Bruner, Selected, edited, and introduced by Jeremy M. Anglin, Contributors with Jerome S. Bruner to papers in this volume: George Austin [and others, *Beyond the Information Given: Studies in the Psychology of Knowing* (New York: W.W. Norton & Co Inc, 1973), 7-31.

<sup>46</sup> Bindl, "Does a Common Operating Picture Result in a Common Understanding of the Battlespace," page 3.

choosing layers of data to turn off or on. The user's experience and current level of responsibility dictates what layer he chooses to display on his COP and how he interprets that view. Can two observers be assumed to have a common picture and common understanding of events if, at the same time, they are allowed a choice in determining what data is being displayed and observed on their respective pictures?<sup>47</sup> If one accepts that COP data is nothing more than facts, then it is of little use without the context that comes from the personal understanding of how the data was developed and from whence the information came. Furthermore, those at the tactical level make a determination of what is relevant and what is not, so not all information gathered is displayed within the COP. Typically, higher echelons of command need broader, more generalized information and fewer data layers. Filtering out data creates a situation in which the COP is not well understood, giving the operational commander the impression that the COP has enough reliability that he can assume tactical control of the response. As an example, FEMA could reallocate national assets to another disaster area because their COP does not indicate those resources are currently being used, when in fact that data had been filtered. Furthermore, it is necessary to understand that different disasters have different information requirements. The communication and data link between agencies must streamline reporting, support conflict resolution, eliminate duplication of effort, and expedite decisions not cause confusion.

While an operational commander might need to assume tactical control of the response, his staff cannot properly inform him sufficiently about the situation and context to permit effective command and control.<sup>48</sup> The absence of information management above the tactical level puts the decision maker in a position of responding to data rather than exercising command and control based on a common understanding of the environment, which is typical. However,

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<sup>47</sup> Bindl, "Does a Common Operating Picture Result in a Common Understanding of the Battlespace," page 3.

<sup>48</sup> Bindl, "Does a Common Operating Picture Result in a Common Understanding of the Battlespace," page 10.

that may not always be the case but certain steps need to be taken to prevent responding to data; e.g., involving the FEMA liaison or IMAT in the decision process. The contextual understanding presents a real challenge surrounding the implementation and use of a comprehensive COP. The decision-maker needs to stay in his lane when exercising command and control. The success of the COP is dependent upon the implementation of data management discipline since technological systems require doctrine, standardization and training to provide its foundation.

Everyone relies on technology and emergency managers are no different as they attempt to stream live video, track commodities and pre-determine community impacts. Emergency managers must be cautious, however, not to become so engrained in technology and modern conveniences that they lose sight of the mission. All the conceivable technology in the world will never replace the trust emergency managers will lose if they forget their primary responsibility to save and protect the citizens. Blindly assuming that technology is the answer to any problem can be costly and potentially risky. If the decision to implement a comprehensive COP is made, it should be developed on a solid theoretical model of information management to facilitate understanding, sense making, knowledge creation, and decision-making at the tactical level.<sup>49</sup> However, decision-makers need to recognize that the use of a COP does not come without its own challenges. Research indicates there are a number of issues surrounding information management within a COP; such as, access to and ownership of information, representation of information (voice, text graphics, and common language) that leads to contextual understanding, trust, accuracy, and authenticity, and eventually conflict resolution.<sup>50</sup>

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<sup>49</sup> Dennis K. Leedom, "Functional Analysis of the Next Generation Common Operating Picture," The Command and Control Research Program, [http://www.dodccrp.org/events/8th\\_ICCRTS/pdf/138.pdf](http://www.dodccrp.org/events/8th_ICCRTS/pdf/138.pdf) (accessed December 21, 2011).

<sup>50</sup> Human Factors Integration Defence Technology Centre, "Work Package 3.1.4 Analysis of Multi-Agency Intent: An Example from the Emergency Services," <http://www.hfidtc.com/research/multi/multi-reports/phase-2-3-1-4-1-multi-intent.pdf> (accessed November 22, 2011).



As previously stated, a COP is an integrated system that takes situational awareness inputs to support collaborative decision-making and attempts to produce a consistent situational picture and common understanding. This system provides everyone within the chain of command (strategic, operational, and tactical) the same ability to display a picture that ultimately supports their specific information needs. Maximizing the capability of the COP provides responders, decision-makers, and everyone in between all the necessary information they require to respond to a disaster through a tailored visual depiction. When a major disaster occurs, it is critical for the supporting emergency response agencies to manage their vital information effectively to provide a timely response. However, because the visual depiction within a COP can be manipulated to meet agency specific needs, collaborative agency decision-making is difficult because the environment is being viewed differently.

To understand the complexity of implementing a comprehensive COP, it is important to evaluate how some agencies successfully implemented COP systems. This comparison shows the leadership relationship between the users of the COP and the purpose for its implementation. Specifically, this highlights the concept that a COP may only be common to that community of interests that operates within a given sphere. Each sphere, further, has a single commander to maximize effectiveness of command and control.<sup>51</sup>

Over the past 10 years, the discussion of collaboration between government agencies has grown from a terrorism-centric focus to one that encompasses an all hazards approach. The use of a COP is one tool available to agencies to close the information sharing and collaboration gap. The experience of the armed forces of the United States provides a number of examples of how the employment of a COP can support information sharing and situational awareness among levels within a command structure. The United States Coast Guard uses multiple COPs that are

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<sup>51</sup> Stuart E. Johnson and Martin C. Libicki, *Dominant Battlespace Knowledge: The Winning Edge*, (Washington, DC: National Defense University Press 1995), 36.

mission specific, and address the many challenges of the 21<sup>st</sup> century. Specifically, the Maritime Domain Awareness (MDA) mission requirements are supported by systems such as the Citizen's Action Network, managed by the Command and Control Personal Computer (C2PC). This system populates a shared COP populated with citizen reports of suspicious activity along the coast and provides Coast Guard forces with time critical MDA information.<sup>52</sup>

Another example is the Department of Defense, who in 1996 replaced its aging Worldwide Military Command and Control System (WWMCCS) with a client server computer based system called the Global Command Control System (GCCS). With GCCS, commanders can coordinate globally dispersed units, receive accurate feedback, and execute more demanding, higher precision requirements in fast moving operations. The system provides the connectivity to synchronize the actions of air, land, sea, space, and special operations forces. There are three versions of the GCCS that support land operations (Army), Maritime (Navy, Marines, and Coast Guard), and Joint operations by integrating inputs of over 94 existing command and control systems (radar, intelligence, weapons systems, etc.). This multi-mission tool can support missions from actual combat operations to humanitarian assistance.<sup>53</sup> The development of the existing Army COP was driven by the need to improve situational awareness to facilitate better, faster synchronized planning and execution decisions. Evidence of this improvement is demonstrated by examples of operational and tactical decision-making during Operation Iraqi Freedom in comparison to similar decisions made in Operation Desert Storm. These examples include efficient destruction of enemy forces and the precision attacks on high-value targets by theater level air and missile assets.<sup>54</sup>

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<sup>52</sup> Pacific Northwest, "Coastal Watch Success," [http://www.pacnwest.org/Port\\_Angeles\\_CAN.ppt](http://www.pacnwest.org/Port_Angeles_CAN.ppt) (accessed December 20, 2011).

<sup>53</sup> U.S. Department of Defense, "Global Command and Control System Adopted," <http://www.defense.gov/releases/releases.aspx?releaseid=1049> (accessed December 21, 2011).

<sup>54</sup> Leedom, "Functional Analysis of the Next Generation Common Operating Picture"

The U.S. Coast Guard and Navy effectively used GCCS to deploy time critical assets in response to the Haiti earthquake in 2010. The system provided information and identified service assets best able to respond. Additionally, in Haiti, satellite overlays within the COP allowed responders to visualize what was happening on the ground, what was needed, and how supplies could best be brought in to theater. Furthermore, the nine Coast Guard District Command Centers responded to thousands of calls for assistance that required immediate response. The GCCS was able to support in real time by providing rescue asset locations and by identifying current activities, not only military forces but also commercial shipping.<sup>55</sup> These examples highlight effective implementation of a COP spanning multiple mission areas, bringing to bear resource adjudication, mapping, information sharing and time critical decision-making within a common military command structure. The command structure with a senior subordinate relationship at the strategic, operational and tactical levels enables a common understanding of the environment, within their sphere. This structured relationship does not exist between state and federal emergency response entities, thereby causing friction as a result of overlapping spheres.

There are also a number of other concerns with the use of a comprehensive COP that are related to contextual understanding and these concerns cannot be ignored. The emergency response system lacks a common language and common data analysis procedures. The differences are driven by the different responsibilities and requirements of federal, state, and local responders. Research shows that today's state information systems use the same concept to manage emergency data as is used to manage physical assets. Information is collected and put in a storage place where it can be easily accessed. The COP essentially becomes a warehouse for large amounts of information, much of which is (1) poorly organized and validated, (2) difficult

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<sup>55</sup> Navy League of the United States, "Gaps, Deficiencies, and the C4ISR Solution," [http://www.navyleague.org/sea\\_power/feb\\_03\\_39.php](http://www.navyleague.org/sea_power/feb_03_39.php) (accessed December 21, 2011).

to search, and (3) of marginal relevance to the decision maker.<sup>56</sup> As a result, these information warehouses become useless to the decision maker and their staff because they are unable to find what they need in a timely manner. Knowledge management becomes more difficult when multiple agencies share the COP and numerous entities enter data into the system. Each of these entities depends on the other to enter data that is relevant, timely and accurate.

Additionally, because government officials believe that advances in technology provide a more detailed picture of events, today's leaders are expected to make decisions that respond precisely to the emergency's requirements regardless of the disaster's context. The days of sending troops to sector X or the deliveries of humanitarian aid to town B are past. Government officials demand a high degree of precision. The requirement is now not only what to do or what aid to send but also what the effect of the action or response on the populace and how that effect will serve to meet strategic objectives. Additionally, maintaining the reliability of the information through frequent updates of the COP or through continuous data transfer a concern.<sup>57</sup> In a disaster scenario, users populate the COP with data. Those users will most likely provide data through manual entry instead of automatic or sensor systems. These reports are normally less accurate or less relevant and, therefore, do not satisfy the decision-makers need. If decisions are made to move personnel or commodities prior to a COP update, then it could cause a costly logistical nightmare or delays in providing assistance where it is truly needed. The old adage holds true in that poor input equals poor output. Thus, for the COP to work properly the data analysis and entry must be timely, accurate, and in a common language all can understand, which is difficult with today's workforce constrained environment. Because there are different perceptions and interpretations of data at the state and federal level, the decision-makers are unable to trust the

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<sup>56</sup> Leedom, "Functional Analysis of the Next Generation Common Operating Picture."

<sup>57</sup> Human Factors Integration Defence Technology Centre, "Work Package 3.1.4 Analysis of Multi-Agency Intent: An Example from the Emergency Services."

system. Absent trust decision-makers revert to what is for them comfortable, reliance on legacy processes to validate information. Obviously, larger organizations with more resources have greater incentive to establish a comprehensive COP. However, this requires dealing with multiple agencies with differing perspectives, and stovepipe systems and that are content with operating within a vacuum.<sup>58</sup>

Given the number of federal, state, and local officials involved in disaster response, the variety of data needs and decision concerns, and pressure to mitigate damage and save lives quickly, friction between decision-makers is unavoidable. If operating in a totally virtual environment, with limited human-to-human contact, will impede resolving conflicts over is the allocation and use of emergency resources. A COP can inform a decision-maker but it cannot resolve differences that arise between federal, state, and local responders. This highlights the overall importance of in person collaboration and communication. Currently the liaison officer sufficiently fills this role by personally representing the views of his agency; FEMA plans to continue this practice.<sup>59</sup> An organization needs to be clear about the purpose of the COP. Is the COP an aid to the current decision-making process or will it replace the current communication architecture all together. In the latter, the opportunity to check understanding and agreement of intended actions across echelon levels would be lost. The COP could lead to improved response performance, in terms of more rapid dissemination of incident information and intent, but decision-making and conflict resolution would be degraded.<sup>60</sup>

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<sup>58</sup> LTC Jeffrey Copeland, “Emergency Response: Unity of Effort Through a Common Operating Picture” (research project, US Army War College, 2008), pg 10.

<sup>59</sup> Ibid.

<sup>60</sup> Human Factors Integration Defence Technology Centre, “Work Package 3.1.4 Analysis of Multi-Agency Intent: An Example from the Emergency Services.”

## Conclusion

Hurricane Katrina slammed into the U.S. Gulf Coast on August 29, 2005, destroying beachfront towns in Mississippi and Louisiana, displacing millions of people and killing nearly 1,800. When levees were breached in New Orleans, 80% of the city was submerged under water, trapping approximately 500,000 people in the city without power, food, or drinking water. Rescue efforts from all emergency management echelons were slow and haphazard. The responders were not prepared and, once engaged they were quickly overwhelmed. The list of lessons learned from that catastrophic event is long and distinguished, highlighting issues from poor leadership to lack of coordination among federal, state, and local organizations.<sup>61</sup> Improvements within incident management continue to be realized. FEMA initiatives like regional watch centers, incident management teams, and programs like Whole Community have improved coordination and collaboration among participants. Despite these advances the federal government has not established a comprehensive COP.

The means of achieving situational awareness through a comprehensive COP may sound somewhat simple, especially in today's technologically advanced environment, but it is actually quite complex. There has been a significant push over the past decade in a wide spectrum of professions to design information systems to support a COP, and emergency management is at the top of the list. Achieving a commonly understood graphical depiction of the disaster event is sought as the solution to situational awareness.

Reflecting back on the Hurricane Katrina catastrophe, it is easy to pin point conceptual examples in which a comprehensive COP would have supported gaining much-needed situational awareness. Being able to identify and share information about functional infrastructure locations, impact areas, commodity distribution locations, road closures, logistics routes, and evacuation

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<sup>61</sup>The White House, "Hurricane Katrina Lessons Learned."

routes throughout the entire area would have been beneficial to individual agencies.

Unfortunately, because of the unique information requirements and objectives of each agency, sharing that information would not have created a shared understanding. Hurricane Katrina Lessons Learned document highlighted the need for situational awareness by urging the federal government to establish a National Operations Center to coordinate the national response and provide situational awareness through a COP for the entire federal government. Although the NOC has been established, its COP does not meet the requirement for a comprehensive COP at the tactical level. The COP within the NOC is not shared with lower echelons down to the tactical level.

A more pressing and concerning discovery revealed that the entire command structure tasked with responding to the disaster lacked the level of situational awareness necessary for a prompt and effective response. The absence of a COP allowed for an inefficient and ineffective federal response.<sup>62</sup> However, because the members of the emergency management community have different responsibilities and authorities, leadership recognizes it is difficult to gain consensus on a common understanding of what a COP is and is not. Just as FEMA has made a number of attempts to implement a COP (EMIMS, SAVER, ERUPT, STORM) so have the state agencies, which have created a field of systems that are not interconnected and unable to share data. The lack of established standards for sharing and interpreting data through a comprehensive COP has been mitigated by frequent in person coordination and collaboration by either liaison officers or engagement from the Regional Watch Center staff. As a result, FEMA has opted to move in a direction that supports the foundation of achieving situational awareness, collaboration and coordination while it seeks to find the right balance within the virtual environment.

The answer to the question, why has the federal government not created a comprehensive COP for tactical responses to disasters, is as complex as the COP itself. Implementing a COP is

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<sup>62</sup>The White House, "Hurricane Katrina Lessons Learned."

feasible from a systems perspective. A number of agencies have successfully implemented such a tool. The reason FEMA currently operates without a comprehensive COP that supports all echelons is not a technical issue. FEMA deals with the reality that disasters are local, and that states prefer to manage those incidents at the lowest possible level until such time that they exceed their capabilities. States are reluctant to give the federal government visibility of disaster activity's and response decisions prior to requesting federal assistance. If the DHS were to actually meet the requirement for a comprehensive COP as defined in the Post Katrina Emergency Management Reform Act, DHS would need to solve a number of very difficult problems, not the least of which is early access to state and local data. Until access to locally held data is guaranteed to federal emergency response agencies there can be no solution to the problem of interpretation. Context and responsibilities shape the perceptions and interpretations of a variety of agencies and represent a cognitive obstacle to producing an effective COP. The obstacles may not be insuperable, but without access to the data it is not possible to address the cognitive issues.



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