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EYES OF THE STORM: CAN FUSION CENTERS PLAY A CRUCIAL ROLE DURING THE RESPONSE PHASE OF NATURAL DISASTERS THROUGH COLLABORATIVE RELATIONSHIPS WITH EMERGENCY OPERATIONS CENTERS?

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Through the maturation of the national network of fusion centers, processes and capabilities originally designed to detect and thwart terrorist attacks are now applied to disaster responses. The fusion process, which involves the synthesis and analysis of streams of data, can create incident specific intelligence. The sharing of this information can enhance the operating picture that is critical to key decision makers and the discipline of emergency management.

This thesis examined three case studies of fusion center disaster responses through a collaborative-based analytical framework. The resulting analysis of the case studies identified the crucial role played by fusion centers in responding to disaster events in a collaborative effort with emergency operations centers.

This thesis concludes that fusion centers offer the greatest impact through enabling information sharing throughout the response phase. The specific benefits of the sharing of information directly influence executive briefings and the deployment of resources. This thesis also modeled a collaborative response. The research determined that the depth and breadth of these relationships involving cooperative responses must be proportionate to the incident and include a level of redundancy. Through a system design model, overconnectivity through efficiency was shown to increase the likelihood of fracturing cooperative relationships.

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ABSTRACT

Through the maturation of the national network of fusion centers, processes and capabilities originally designed to detect and thwart terrorist attacks are now applied to disaster responses. The fusion process, which involves the synthesis and analysis of streams of data, can create incident specific intelligence. The sharing of this information can enhance the operating picture that is critical to key decision makers and the discipline of emergency management.

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LIST OF ACRONYMS AND ABBREVIATIONS

AHIU	All Hazards Intelligence Unit
AOR	area of responsibility
ATICC	Auto Theft Intelligence Coordination Center
CIAC	Colorado Information Analysis Center
CPG 592	Comprehensive Preparedness Guide 502
CSP	Colorado State Patrol
CSPIU	Colorado State Patrol Intelligence Unit
DHS	Department of Homeland Security
EOC	Emergency Operations Center
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
FLIT	Fusion Liaison and Intelligence Training Unit
FRP	Federal Response Plan
HISN	Homeland Security Information Network
IASU	Investigative and Analysis Support Unit
IAU	Intelligence and Analysis Unit
ICC	Intelligence Collection Cell
ICS	Incident Command System
IT	Information and Technology
ITU	Information and Technology Unit
IWW	intelligence watch and warning
MART	Mobile Analytical Response Team
MOU	memorandum of understanding
NICS	Next-Generation Incident Command System
NIMS	National Incident Management System
NJ	New Jersey
NJSP	New Jersey State Police
NRF	National Response Framework
PPD	presidential policy directive

RFI	request for information
RM	Rocky Mountain
ROIC	Regional Operations and Intelligence Center
SAR	suspicious activity report
TLO	terrorism liaison officers
U.S.	United States
VDEM	Virginia Department of Emergency Management
VFC	Virginia Fusion Center

EXECUTIVE SUMMARY

The modern concept of fusion centers began as a consequence of the examination of the circumstances that led up to the coordinated attack on the U.S. on September 11, 2001. In *The 9/11 Commission Report*, the lack of sharing critical intelligence was identified as one of the main inhibitors in preventing the attack.[1] The idea of "fusion centers" was proposed to assist in pooling information in order to coordinate action.[2] The centers were later defined as:

> a collaborative effort of 2 or more Federal, State, local, or tribal government agencies that combines resources, expertise, or information with the goal of maximizing the ability of such agencies to detect, prevent, investigate, apprehend, and respond to criminal or terrorist activity.[3]

This model has grown into a national network consisting of 78 centers. The centers are positioned in 49 states, Puerto Rico, U.S. Virgin Islands, and Guam.[4] The maturation of the centers and the network at large is assessed through established critical operational capabilities, which are associated to a center's ability to receive, analyze, disseminate, and gather intelligence. These capabilities have afforded fusion centers the ability to widen their collection and analysis aperture beyond terrorism and move toward crime suppression and an "all hazard approach." This movement is captured in the *2012 National Network of Fusion Centers Final Report.* The report indicates that 96.1 percent of centers have embraced the "all crimes" and 70 percent have incorporated an "all hazards" paradigm.[5] The 2013, final report reflected similar percentages; additionally, the

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[1] National Commission on Terrorist Attacks upon the United States, *The 9/11 Final Report of the National Commission on Terrorist Attacks upon the United States* (New York: Norton & Company Inc., 2004).

[2] Ibid., 503.

[3] "Implementing Recommendations of the 9/11 Commission Act of 2007," Government Printing Office, August 3, 2007, http://www.gpo.gov/fdsys/pkg/PLAW-110publ53/html/PLAW-110publ53.htm, 265.

[4] U.S. Department of Homeland Security, "Fusion Center Locations and Contact Information," January 31, 2014, http://www.dhs.gov/fusion-center-locations-and-contact-information

[5] U.S. Department of Homeland Security, *2012 National Network of Fusion Centers Final Report*, June 2013, http://www.dhs.gov/sites/default/files/publications/2012%20National%20Network%20of%20Fusion%20Centers%20Final%20Report.pdf, 3.

embracing of an "all hazards" approach remained consistent.[6] This progression toward an all hazards approach has created an opportunity for the centers to begin to interact with emergency managers and, more specifically, emergency operation centers (EOC). Through a collaborative relationship these two distinct entities can assist in enabling an optimal response to disasters.

This thesis examines the role a fusion center can play in the response to natural disasters. Through the course of researching this question, a natural corollary became evident. If collaborative relationships enabled the overall response, should those coordinated efforts be permanent or *ad hoc*? This study overlaid three case studies onto an analytical framework designed to braid the capabilities of the centers through a four-step process. Once through the framework, the results were analyzed using a system design model in order to determine the essential elements of fusion center responses.

This thesis contends that fusion centers provide the greatest impact by empowering EOCs through information sharing during the response phase to an incident. This information sharing manifested itself through the application of the fusion process to data, making event-based analysis available for executive briefings, and affording decision makers a complete operating picture in order to effectively deploy resources. This outcome was visualized in a system design model. Figure 1 is a visual representation of a collaborative response by fusion centers and EOCs. The figure goes beyond representing the original research question by demonstrating how the incident will ultimately dictate the required connectivity in the cooperative response.

[6] U.S. Department of Homeland Security, *2013 National Network of Fusion Centers Final Report*, June 2014, http://www.sheriffs.org/sites/default/files/uploads/2013%20National%20Network%20of%20Fusion%20Centers%20Final%20Report.pdf

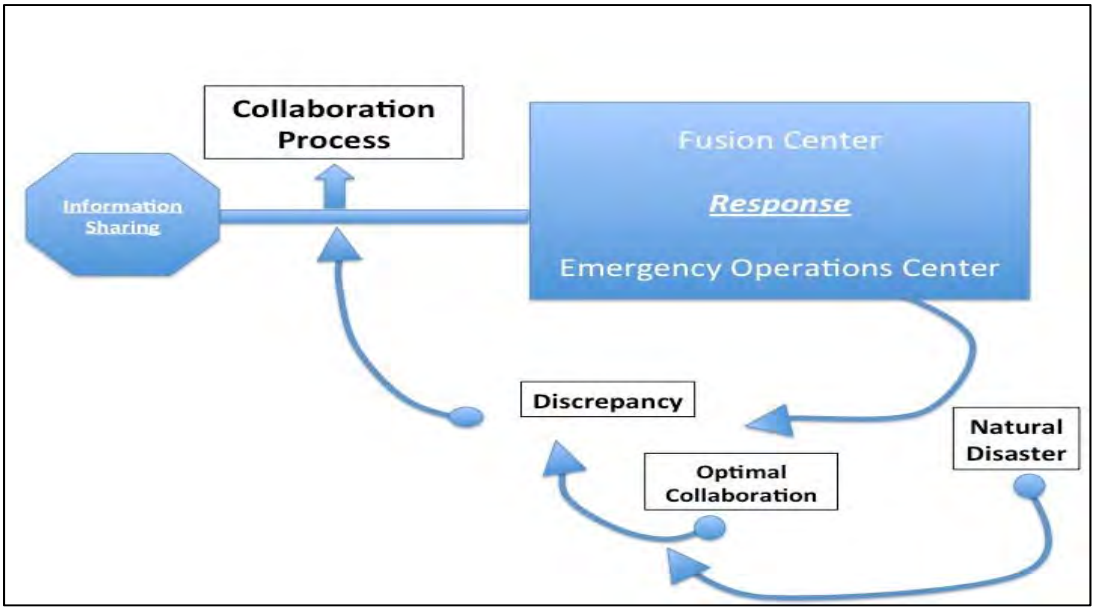

Figure 1. System Design Model of a Fusion Center and EOC Response

The system design process revealed that a policy-based collaborative relationship between the fusion center and EOC should be relative and proportionate. Figure 1 clearly illustrates that the scale of the incident drives the response. This creates a need for the centers to have a flexible relationship that can expand or contract so the partnership does not become fragile through "over efficiency." The goal should be to design a level of connection relevant to the scale of the incident. Through mutual exercises, center specific responses can be appropriately modeled in order to retain resilience and maintain flexibility.

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I. INTRODUCTION

A. PROBLEM STATEMENT

The coordinated attacks on our homeland that took the lives of over 3,000 U.S. citizens on September 11, 2001, revealed a critical need for the creation and sharing of intelligence between law enforcement on all levels. The National Commission on Terrorist Attacks upon the United States., commonly referred to as the 9/11 Commission, recognized the absence of intelligence sharing as a key factor in the failure to prevent attacks.[1] The report identified a number of inconvenient truths. One of the key elements was that relevant data was trapped in organizational silos. This practice was the norm due to internal policies and a history of fractured or non-existent interagency relationships. In 2002, U.S. Defense Secretary Donald Rumsfeld testified before the House and Senate Armed Services Committee. Secretary Rumsfeld stated:

> The dots are there for all to see. The dots are there for all to connect. If they aren't good enough, rest assured they will only be good enough after another disaster—a disaster of still greater proportions and by then it will be too late.[2]

The report highlighted a number of critical opportunities for the exploitation of available data, which may have provided opportunities to deter the terrorist plot.[3] The report contends that a shared analysis of known information collected may have averted one of the greatest tragedies in this nation's history. In the afterword of the report, Executive Director, Phillip Zelikow wrote, "Working with the FBI, [*sic*] key innovation at the regional or local level is the rise of 'fusion centers' pooling information and coordination action . . ."[4]

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[1] National Commission on Terrorist Attacks upon the United States [9/11 Commission], *The 9/11 Final Report of the National Commission on Terrorist Attacks upon the United States.* (New York: W.W. Norton & Company, 2004).

[2] *Prepared Testimony of U.S. Secretary of Defense Donald H. Rumsfeld before the House and Senate Armed Services Committees Regarding Iraq*, 107th Cong. (2002). (U.S. Department of Defense), http://www.defense.gov/speeches/speech.aspx?speechid=283

[3] 9/11 Commission, *The 9/11 Final Report.*

[4] Ibid.

Fusion centers were more clearly defined by the *Implementation Recommendations of the 9/11 Commission Act of 2007*. The act defined the centers as:

> a collaborative effort of 2 or more Federal, State, local, or tribal government agencies that combines resources, expertise, or information with the goal of maximizing the ability of such agencies to detect, prevent, investigate, apprehend, and respond to criminal or terrorist activity.[5]

This model has grown into a national network consisting of 78 centers. The centers are positioned in 49 states, Puerto Rico, U.S. Virgin Islands, and Guam.[6] Figure 1 is a map of all of the fusion centers within the national network. The maturation of the centers and the network at large is assessed through established critical operational capabilities. These baseline capabilities are associated to a center's ability to receive, analyze, disseminate, and gather intelligence. These capabilities have afforded fusion centers the ability to widen their collection and analysis aperture beyond terrorism and move toward crime suppression and an "all hazard approach." This movement is captured in the *2012 National Network of Fusion Centers Final Report.* The report indicates that 96.1 percent of centers have embraced the "all crimes" and 70.1 percent have incorporated an "all hazards" paradigm.[7] The 2013, final report reflected similar percentages, additionally the embracing of an "all hazards" approach remained consistent.[8]

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[5] "Implementing Recommendations of the 9/11 Commission Act of 2007," Government Printing Office, August 3, 2007, http://www.gpo.gov/fdsys/pkg/PLAW-110publ53/html/PLAW-110publ53.htm, 265.

[6] U.S. Department of Homeland Security, "Fusion Center Locations and Contact Information," January 31, 2014, http://www.dhs.gov/fusion-center-locations-and-contact-information

[7] U.S. Department of Homeland Security, *2012 National Network of Fusion Centers Final Report*, June 2013, http://www.dhs.gov/sites/default/files/publications/2012%20National%20Network%20of%20Fusion%20Centers%20Final%20Report.pdf, 3.

[8] Ibid.

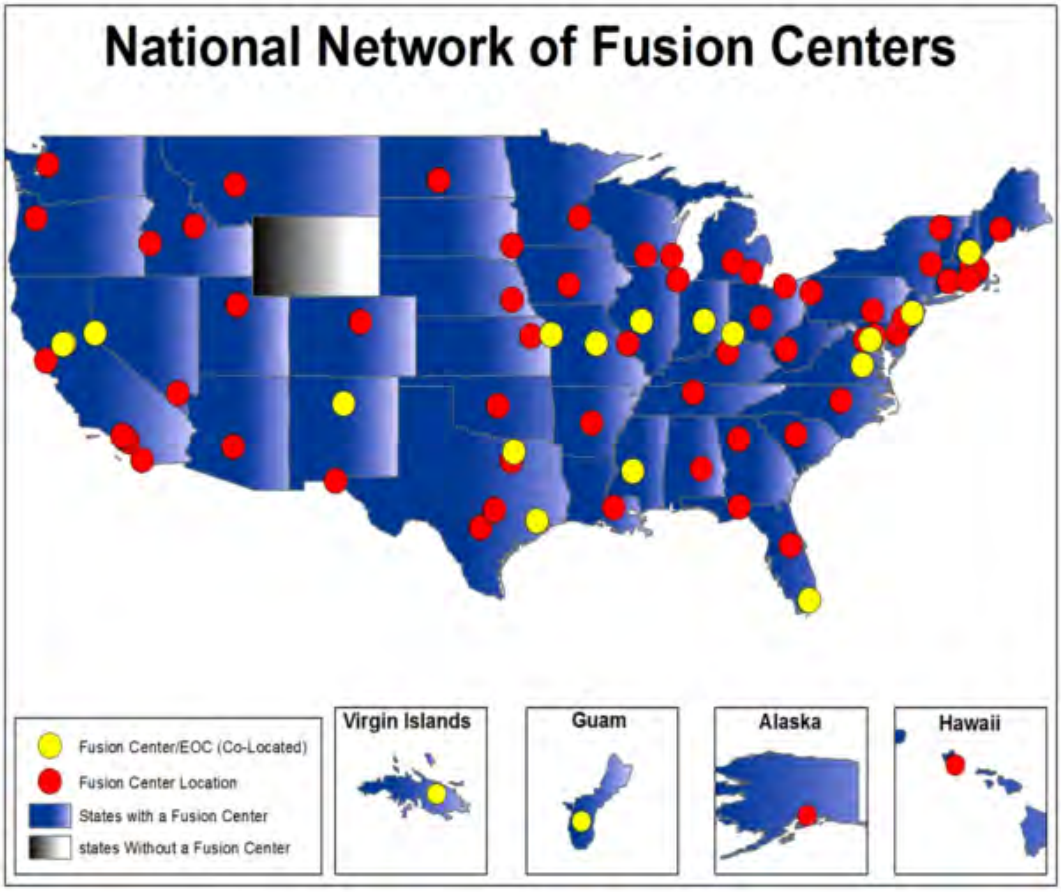

Figure 1. National Network of Fusion Centers

A fusion center's progression toward an "all hazards" approach signifies a philosophical shift to incorporating disasters both natural and manmade into its threat assessments. This approach requires a fusion center to be willing to focus its established baseline capabilities (gather, receive, analyze, and disseminate) toward emergency operation centers during the response phase to natural disasters. For the purpose of this study, the response phase is defined as the actions taken in the immediate aftermath of an incident to save and sustain lives, meet basic human needs, and reduce the loss of property and the effect on critical infrastructure and the environment.[9]

[9] Federal Emergency Management Agency [FEMA], *Developing and Maintaining Emergency Operations Plans, Comprehensive Preparedness Guide 101*, version 2 (Washington, DC: Federal Emergency Management Agency, 2010), http://www.fema.gov/media-library/assets/documents/25975?id=5697, 1–9.

An analytical framework developed in a federal preparedness guide, *Comprehensive Preparedness Guide 502, Considerations for Fusion Center and Emergency Operations Center Coordination* (CPG 502),[10] will be used to analyze fusion center responses to natural disasters. The guide's framework is divided into four steps. The steps include: familiarization with capabilities, needs and requirements; establish partnerships; determine the process; and training, workshops and exercises. A panel of emergency managers, law enforcement, intelligence researchers, and representatives from fusion centers designed these steps cooperatively in an attempt to improve disaster response through a unity of effort. The steps seek to integrate operations by deepening connections between the EOCs and fusion centers. This process requires that all involved have a baseline understanding of each other's capabilities and limitations. The steps are a mechanism to foster communication between the two centers. The framework will then determine if these baseline capabilities are aligned with the needs of emergency managers during an active state situation or natural disaster.

B. RESEARCH QUESTION

The mission and focus of fusion centers has evolved since their original inception. In the aftermath of the attacks of September 11, 2001, the centers were designed to promote information and intelligence sharing through the "fusion process."[11] This process refers to the overarching management of the flow of information and intelligence across all levels and sectors of government and private industry.

Though fusion centers continue to support the effort of counterterrorism, many have expanded their mission focus to include an "all hazard" approach. This approach is an acknowledgement that centers can apply their baseline capabilities to active state situations beyond terrorism. Ultimately, this thesis seeks to answer the following question. Can fusion centers play a crucial role during the response phase of natural

[10] Federal Emergency Management Agency [FEMA], *CPG 502 Considerations for Fusion Centers and EOC Coordination*, 2010, http://www.fema.gov/media-library/assets/documents/25970

[11] U.S. Department of Justice, *Fusion Center Guidelines, Developing and Sharing Information and Intelligence in a New Era*, 2005, https://it.ojp.gov/documents/fusion_center_guidelines_law_enforcement.pdf

disasters through collaborative relationships with emergency operation centers? In seeking to answer the primary question, this study will explore a secondary question: Should collaborative relationships identified through the case studies endure over a protracted period of time or should they be configured on an *ad hoc* basis?

C. SIGNIFICANCE OF RESEARCH

Since 2012, the federal government has declared 217 disasters.[12] If fusion centers had remained myopically focused on their original mission, which was rooted in counterterrorism, they would have only had meaningful participation in one event—the Boston Marathon Bombing on April 15, 2013. As the network of centers began to expand across the country, they have expanded the "fusion process" to include criminal based initiatives and eventually an all hazards approach. Throughout this maturation process, the U.S. Department of Homeland Security (DHS) has taken snapshots of the network through an assessment process. In a 2012 report,[13] 77 percent of centers in the national network characterized their overall mission as an "all hazard" approach. The network has shown a greater embodiment of this concept, 45 percent of centers list emergency management (emergency operations) as a mission focus area. In the 2013, final report over 55 percent of fusion centers in the network list emergency management as a mission area.[14] In addition to this broadened approach, 20 fusion centers within the network are collocated with an emergency operations center (EOC).

This shift would imply that collaborative relationships between emergency managers and fusion center personnel are driven by common sense. The Department of Homeland Security, Office of Inspector General conducted a study of EOCs and fusion

[12] Federal Emergency Management Agency, "Disaster Declarations by Year," accessed March 9, 2014, http://www.fema.gov/disasters/grid/year

[13] U.S. Department of Homeland Security, *2012 National Network of Fusion Centers Final Report*.

[14] U.S. Department of Homeland Security, *2013 National Network of Fusion Centers Final Report*, June 2014, http://www.sheriffs.org/sites/default/files/uploads/2013%20National%20Network%20of%20Fusion%20Centers%20Final%20Report.pdf

centers in an attempt to gage the level of collaboration between those entities.[15] The study consisted of visitations to 17 fusion centers and 31 EOCs. The study revealed the following:

- 83 percent of the locations visited were either unaware of or did not utilize the guidance in CPG 502.
- 12 EOC directors were unaware of CPG 502
- 16 EOC directors were aware of CPG 502, but were not applying the framework to improve collaborative relationships.
- 11 fusion center directors claimed that they were aware of CPG 502, but were not utilizing it.[16]

The report included a statement by a fusion center director who claimed he did not have a plan to coordinate with emergency managers. When asked about how collaboration is managed, the director was quoted as stating, "They just do it."[17] This report illuminates the need to identify the roles of fusion centers with regard to responses to natural disasters. While collecting data for this study, this researcher engaged in a conversation with a colleague in emergency management. Through an informal conversation, it became apparent that emergency managers and fusion center personnel are disconnected.[18] This study may assist in identifying a common lexicon of terms and definitions of requirements, which will enhance the overall coordination of the centers.

This study will examine the collaborative responses between fusion centers and EOCs centers through the lens of an analytical framework based on CPG 502, which is a DHS document focused on the coordination of the two centers. This resulting analysis will serve as a primer for fusion centers to begin to structure collaborative relationships with their emergency management counterparts.

As a result of collaborative relationships, practitioners in the enterprise may be able to buy down some risk through shortening the decision cycle. To accomplish this,

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[15] U.S. Department of Homeland Security [DHS], Office of Inspector General, *Relationships between Fusion Centers and Emergency Operations Centers* (OIG-12-15), 2011, http://www.oig.dhs.gov/assets/Mgmt/OIG_12-15_Dec11.pdf

[16] Ibid., 21.

[17] Ibid., 13.

[18] Anonomous emergency manager, personal communication, March 2014.

center personnel must learn from the successes and failures experienced in the field. This process should assist in aligning with the sentiment of President Barack Obama when he called for federal agencies to "lean forward" and facilitate the mobilization of resources to victims of Hurricane Sandy through the elimination of "red tape."[19] The analysis herein will seek to solidify a guidance document by testing it through real-world scenarios. Although every disaster will provide separate and distinct challenges, the overall goal will remain the same to improve service to our citizens through the streamlining of response polices and processes.

Recently, responses to some large-scale disasters have been hampered by the failure to distinguish information from intelligence and the systemic undervaluation of analysis. This exact scenario was presented in the *Review of the Civil Defence Emergency Management Response to the 22 February Christchurch Earthquake*.[20] On February 22, 2011, a 6.3 magnitude earthquake rocked New Zealand and killed 185 persons and injured thousands more.[21] This event resulted in over 40 billion New Zealand dollars in damages.[22] The New Zealand Director of Civil Defence and Emergency Management later reviewed this disaster. In a commissioned report, the lack of intelligence greatly minimized any situational awareness about the incident.[23] This lack of shared understanding hampered executive decision-making and contributed to a lag in response by emergency managers. Additionally, the ability to analyze information was specifically cited as a factor that may have assisted their EOC in responding to crisis.

It is important to note that this thesis is not intended to evaluate the roles and responsibilities of emergency managers; however, background chapter on emergency

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[19] Joe Davidson, "As Federal Workers Provide Sandy Relief, Obama Says 'No Red Tape,'" *The Washington Post*, October 31, 2012, sec. Local, http://www.washingtonpost.com/local/as-federal-workers-provide-sandy-relief-obama-says-no-red-tape/2012/10/30/3823ecc6-22c7-11e2-8448-81b1ce7d6978_story.html

[20] Ian McLean et al., "Review of the Civil Defence Emergency Management Response to the 22 February Christchurch Earthquake," June 29, 2012, http://www.civildefence.govt.nz/memwebsite.nsf/wpg_URL/For-the-CDEM-Sector-Publications-Review-of-the-Civil-Defence-Emergency-Management-Response-to-the-22-February-Christchurch-Earthquake

[21] Ibid.

[22] Ibid.

[23] Ibid.

management will describe the overall structure of its response for context. This description is solely to illustrate points of intersection where the fusion process can be applied.

D. CHAPTER SUMMARY

This chapter was designed to provide context regarding the origins and subsequent maturation of the fusion center concept. Also included were the central questions formulated to drive the study and underscore the significance of the research and resulting analysis. The next chapter will describe the methodological process and analytical framework used to interpret the data collected.

II. METHODOLOGICAL OVERVIEW

A. METHODOLOGY

This study will use a qualitative case study approach to identify the role of the fusion center response to natural disasters. The case study method will afford design flexibility to generate findings of relevance through the analysis of multiple scenarios.[24] According to Raya Fidel, in *The Case Study Method: A Case Study*, this method is applicable due to the presence of the following three factors:

- Large variety of factors and relationships
- No basic laws exist to determine which factors and relationships are important
- The factors and relationships can be directly observed.

1. Large Variety of Factors and Relationships

This study will examine the responses to recent natural disasters by the Colorado Information Analysis Center (CAIC), the Virginia Fusion Center (VFC), and the New Jersey (NJ) Regional Operations and Intelligence Center (ROIC). These centers are located in different regions of the country and are of varying sizes. The disasters examined will be the recent wildfires in Colorado (2012), extreme winter weather in Virginia (2013/2014), and Hurricane Sandy's impact on NJ (2012). During the response phase of these disasters, the fusion centers and EOCs entered into ad hoc collaborations. These incidents will serve as "crucial cases" in order to study the level of partnership between the two entities. Theses natural disasters are "most likely cases" for the affected regions. Each event is a large part of the natural threat profile in the area where they occurred.[25]

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[24] Raya Fidel, "The Case Study Method: A Case Study," University of Washington, 1984, http://faculty.washington.edu/fidelr/RayaPubs/TheCaseStudyMethod.pdf, 273

[25] "Where to Live to Avoid a Natural Disaster," *New York Times*, April 30, 2011, http://www.nytimes.com/interactive/2011/05/01/weekinreview/01safe.html?_r=0; Division of Homeland Security and Emergency Management Colorado Department of Public Safety, *Colorado Natural Hazards Mitigation Plan* (Denver, CO: State of Colorado, 2013).

2. No Basic Laws Exist to Determine Which Factors and Relationships Are Important

This study will break the cases into separate elements and overlay the centers' actions onto a preparedness guide created by the U.S. DHS. The guide serves as an analytical framework due to its focus on the coordination of fusion centers with emergency management centers. *Comprehensive Preparedness Guide 502* (CPG 502) provides four steps for the coordination process. These steps include: familiarization with capabilities, needs and requirements; establishment of partnerships; determination of processes; and training, workshops and exercises. These steps will be applied to the three case studies to examine the responses of the fusion centers through their collaborative approach to the disasters. The study will be conducted through two main components. The actions of the centers will be described in detail, and the subsequent responses will be divided into components and inserted into an analytical framework. This framework was created to foster collaboration between fusion centers and emergency management.

3. The Factors and Relationships Can be Directly Observed

The fusion center role and subsequent collaborative process will be examined through available data regarding the events. The data collected will be in the form of after action reports, storm related surveys, news articles, and scholarly articles related to natural disasters or other applicable weather related events. The case studies will incorporate these data sources in order to properly depict the dynamic nature of the event.

Once compiled, the case studies will be analyzed through a two-step process. The data will be inserted into an analytical framework, which is specifically designed to enhance collaboration between EOCs and fusion centers. Once through the framework, the result will be visualized through a goal oriented, balancing feedback loop system design model. This model will demonstrate the collaborative process in order to examine all of the "moving parts" in cooperative relationships.

B. ANALYTICAL FRAMEWORK

The purpose of this analytical framework is to supply a disciplined methodology that affords the evaluation of an abstract concept. This may foster the recognition of analytical patterns and identify the main data needed to come to a conclusion. The included analytical framework was designed to overlay onto the relationships between fusion centers and EOCs through the response phase to natural disasters. Case studies of three events provided the backdrop for the examination. The resulting analysis seeks to incorporate the conceptual system, purpose, and classifications of the related data regarding the capabilities of fusion centers, and their ability to influence responses to natural disasters.

Due to the decentralized nature of the national fusion center network, it is difficult to prescribe a "one size fits all" schema. Included in the descriptions of the model steps are the associated fusion center capability areas.[26] The inclusion of these capabilities is intended to illustrate the alignment of the proposed coordination processes to all fusion centers, regardless of their primary mission.[27]

[26] Global Justice Information Sharing Initiative, *Baseline Capabilities for State and Major Urban Area Fusion Centers, A Supplement to the Fusion Center Guidelines* (Washington, DC: Global Justice Information Sharing Initiative, 2008), https://www.fema.gov/pdf/government/grant/2010/fy10_hsgp_fusion.pdf

[27] Ibid.

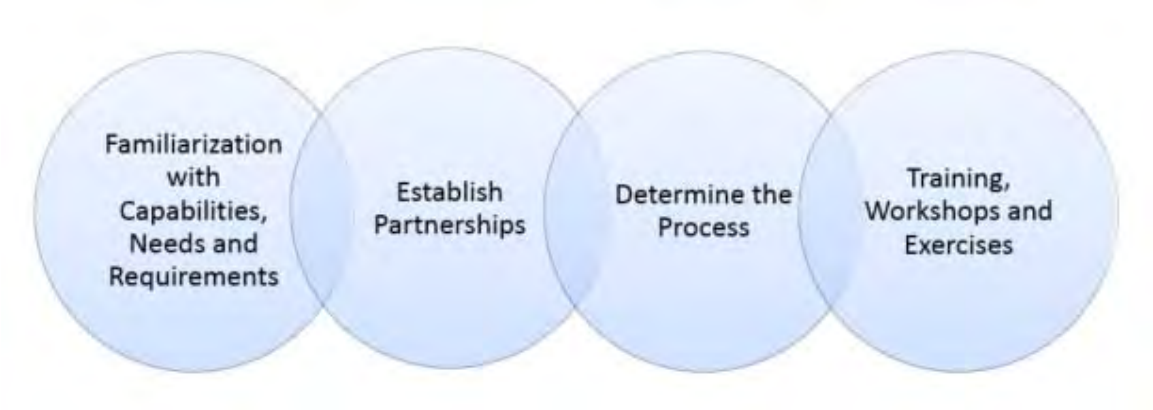

Figure 2. Four Step EOC and Fusion Center Coordination Process[28]

Figure 2 is an illustration of the four-step process contained within CPG 502.[29] Each step is fully described below so as to define how the fusion centers in the case studies will be analyzed. The description of each step is a summarized from CPG 502. In addition to each step, the specific fusion center ability area is included in order to demonstrate the alignment form what is proposed to current capabilities.

a. Step One: Familiarization with Capabilities, Needs and Requirements

The first step is focused on a basic understanding of each center's respective capabilities and "standing information needs" in an active state environment. Requirements such as timelines for analytical products, situation reports, and command briefing schedules should be shared. This would require both fusion center and EOC personnel to familiarize themselves with each other's policy and guidance documents.

Contained within this step is a set of corollary functions, which include:

- Ability to collect, disseminate, and analyze information
- Leveraging of interoperable systems between the two disciplines
- Maintaining virtual watch/warning systems that are linked to electronic distribution lists
- Production of analytical products that are synthesized with multiple data streams including queries of relevant databases

[28] DHS Office of Inspector General, *Relationships between Fusion Centers.*

[29] FEMA, *CPG 502 Considerations for Fusion Centers*; FEMA, *Developing and Maintaining Emergency Operations Plans.*

- Observing proper protocols in the handling and sharing of classified/ unclassified information
- Ensuring staff and subsequent analytical products conform to security and privacy policies
- Harness personnel that are cross trained or possess specialized skill sets related to the event
- Ensure continuity of operations throughout the crisis

b. Step One: Aligned Fusion Center Capability Areas

Section I Fusion Process Capabilities

D. Intelligence Analysis and Production

1. Analytical Products

c. Identify stakeholders and customer base for specific product lines and request feedback from customers to guide future products.

d. Ensure the production of value-added intelligence products that support the development of performance-driven, risk-based prevention, protection, response, and consequence management programs.

Section II Management and Administrative Capabilities

E. Information Technology/Communications Infrastructure, Systems, Equipment, Facility, and Physical Infrastructure

3. Communications Plan

a. Identify how fusion center partners will communicate during an incident or emergency. Ensure that existing communications capabilities are interoperable.

b. Incorporate current communications plans utilized by law enforcement and emergency services.

4. Contingency and Continuity of Operations Plans

b. Develop the plans in coordination with emergency managers and other appropriate response and recovery officials.

c. Clearly define personnel roles and responsibilities during emergency situations.[30]

c. Step Two: Establish Partnerships

The second step was designed to create agency-to-agency partnerships that focus on coordination and integration. These agreements should attempt to document roles and responsibilities for each respective center during the response to an event. These

[30] FEMA, *CPG 502 Considerations for Fusion Centers*.

partnerships can be formalized through MOU(s), standard operating procedures, or concept of operation documents.

d. Step Two: Aligned Fusion Center Capability Areas

Section II Management and Administrative Capabilities
- A. Management/Governance
  - 1. Analytical Products
    - 1.b. The center's governance body should include representatives from the state and local law enforcement and public safety disciplines.
    - i.c. Supporting emergency management, response, and recovery planning activities based on likely threat scenarios and at-risk targets.[31]

e. Step Three: Determine the Process

The third step focuses on the exchange of information. This involves the type of intelligence/information shared and the method in which it is disseminated. This step requires a complete understanding of existing relationships and methods of communication each center maintains with the law and public safety enterprise. Through this exchange, fusion center personnel should become familiar with the information requirements of emergency managers. Once familiar, fusion centers can begin to leverage information streams to meet those identified needs.

Contained within this step is the requirement to coordinate with fusion center liaison officers. These liaison officers can be a blend of both the public and private sector. This initiative was designed to foster communication with areas that may be foreign to emergency managers. The liaison program was constructed to connect with all critical elements of both the public and private sector. These sectors include critical infrastructure and key resources such as: electric companies, oil refineries, banks, and entertainment facilities. These liaison officers could also be utilized to supplement assessments through defining the criminal environment associated to a specific event.

[31] Ibid.

f. Step Three: Aligned Fusion Center Capability Areas

Section I Fusion Process Capabilities
- A. Planning and Requirements Development
  - 8. Analytical Products
    - a. Ensure that the center has identified its intelligence and analytical roles and responsibilities in accordance with the National Incident Management System (NIMS) and Incident Command System (ICS).

Section II Management and Administrative Capabilities
- A. Management/Governance
  - 3. Collaborative Environment
    - b. Include the identification of entities and individuals responsible for planning, developing, and implementing prevention, protection, response, and consequence-management efforts at the state, local, and tribal levels.
    - f. Develop and implement a Memorandum of Understanding (MOU) or Agreement and, if needed, nondisclosure agreements between the center and each stakeholder who intends to participate in or partner with the fusion center.[32]

g. Step Four: Training, Workshops and Exercises

The fourth step is centered upon joint training opportunities. These opportunities include formal training classes designed to cross train fusion center and EOC personnel, workshops, and scenario based group exercises.

h. Step Four: Aligned Fusion Center Capability Areas

Section I Fusion Process Capabilities
- A. Planning and Requirements Development
  - 10. Exercises
    - b. Exercises should involve all relevant center personnel and constituents and should contribute to understanding the value of the statewide Fusion Process, the center's collection plan, the SAR process, analytical products, the center's role in the Information Sharing Environment, and the center's role in response and recovery activities in accordance with NIMS and ICS.

Section II Management and Administrative Capabilities
- D. Personnel and Training
  - 3. Training Plan

[32] Ibid.

b. At a minimum, all center personnel should be b. trained on:
ii The center's privacy and security policies and protocols.[33]

C. SYSTEM DESIGN MODEL

The model will be based on a study of Donella Meadows' work in *Thinking in Systems: A Primer*.[34] The system design model will afford the reader the ability to visualize the elements and behaviors of an abstract concept such as a collaborative relationship between EOCs and fusion centers. Meadows addresses the central insight of the systems theory by observing the relationship between structure and behavior. Meadows believes that through observation, we can begin to understand how systems work, for the mere understanding of the elements of a system does not address how it performs.

D. CHAPTER SUMMARY

The methodological overview provides an insight to the approach used to determine the criticality of fusion centers during the response phase to natural disasters. The approach is specifically codified due to the boundless nature of studies in the social sciences. Within this chapter, an analytical framework, CPG 502, is dissected to demonstrate how the data will be interpreted and ultimately applied by overall study.

The following chapter will serve as a literature review for relevant works on fusion centers and EOCs. The chapter will continue to expand and view collaboration through several lenses, including the homeland security enterprise, natural environments, and societal contexts. This will offer a global view of the topic prior to exploring the practical applications of the study.

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[33] Ibid.

[34] Donella Meadows, *Thinking in Systems: A Primer* (White River Jct., VT: Chelsea Green Publishing, 2008).

III. LITERATURE REVIEW

A. INTRODUCTION

This review is divided into several categories in order to provide a baseline understanding of all of the issues influencing this topic. The research involved in examining the collaborative relationship between fusion centers and EOCs spans across several sub categories. The review will begin by using lens of the pertinent literature to provide a brief background of the EOC and fusion center the. Then, the concepts of complexity, systems design, and collaboration will be reviewed. It is important to establish a shared context of the scale of the disasters addressed in this study. Since disasters can be considered relative, this this thesis will use Naim Kapucu's definition of disasters. He defined major disasters as occurrences that are notable, rare, unique, severe, and profound in terms of their impact, effects, or outcomes.[35] This definition creates an understanding the post incident environment, which requires an enterprise wide response.

B. FUSION CENTERS

The modern concept of fusion centers began as a consequence of the examination of the circumstances that led up to the coordinated attack on the U.S. on September 11, 2001. *The 9/11 Commission Report* identified the lack of sharing critical intelligence as one of the main inhibitors to preventing the attack.[36] The idea of "fusion centers" was proposed to assist in pooling information to coordinate action.[37] This fusion concept continued to mature and was ultimately defined by a U.S. statute, the Implementation Recommendations of the 9/11 Commission Act of 2007, Public Law 10–53 August 3, 2007. The law defined the centers as:

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[35]Niam Kaucu, "The Role of the Public Sector in Managing Catastrophic Disasters: Lessons Learned," *Administration & Society* (2006): 38, no. 3, http://62.219.84.197/data/uploads/Articles%20and%20Reports%20from%20other%20organizations/20080518%20-%20The%20Role%20of%20the%20Public%20Sector.pdf, 290.

[36] 9/11 Commission, *The 9/11 Final Report*, 543.

[37] Ibid., 503.

> a collaborative effort of 2 or more Federal, State, local, or tribal government agencies that combines resources, expertise, or information with the goal of maximizing the ability of such agencies to detect, prevent, investigate, apprehend, and respond to criminal or terrorist activity.[38]

Between 2003 and 2005, the first iteration of centers were formed and organized into a decentralized national network. According to John Rollins, in a report prepared for the Congressional Research Service, "the fusion center movement can best be understood as a mounting tide."[39] As the centers began to come on line, they were designed to "exchange information and intelligence, maximize resources, streamline operations, and improve the ability to fight crime and terrorism by analyzing data from a variety of sources."[40] The centers became guided by a "fusion process,"[41] which was defined in a 2005 *Fusion Center Guidelines* report as the ability of turning information and intelligence into actionable knowledge. Once created, this knowledge would be shared across all levels and sectors of government and private industry.[42] Ultimately, the centers would be evaluated through assessments relative to four baseline capabilities: receive, analyze, disseminate, and gather. Although the centers are measured individually, the ultimate evaluation of the centers would be based on the collective capabilities of the national network as a whole.

Though linked through the national network, each center is independently governed by state or local entities, and each is measured by the ability to receive, analyze, disseminate, and gather information and intelligence.[43] This decentralized distributed network spawned the expression "If you have seen one fusion center you have seen one

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[38] "Implementing Recommendations of the 9/11 Commission Act of 2007," Government Printing Office, August 3, 2007, http://www.gpo.gov/fdsys/pkg/PLAW-110publ53/html/PLAW-110publ53.htm, 265.

[39] John Rollins, *Fusion Centers: Issues and Options for Congress* (RL34070) (Washington, DC: Congressional Research Service, 2008), ahttp://www.fas.org/sgp/crs/intel/RL34070.pdf, 15.

[40] U.S. Department of Justice, *Fusion Center Guidelines*.

[41] Ibid.

[42] Ibid., 2.

[43] U.S. Department of Justice, Bureau of Justice Assistance, "2011 Fusion Center Assessment," 2011, http://www.dhs.gov/2011-fusion-center-assessment

fusion center."[44] This decentralized model has also led to an uneven maturation of individual centers. Despite being conceived as a terrorism tripwire, most centers have transitioned into other areas. A 2012 assessment of 77 centers revealed that 96.1 percent of centers have ventured into crime suppression initiatives while 70.1 percent have incorporated an "all hazards" posture.[45]

Despite the short history of fusion centers, there is a considerable amount of literature dedicated to negative aspects of their operation. Specific areas such as: perceived violations of privacy, lack of a comprehensive strategy, sustainable funding, and ambiguous authority have become focal points of consternation. In 2007, DHS Secretary Michael Chertoff addressed the first annual national conference on fusion centers. Secretary Chertoff stated that despite initial grant funding, DHS would not be involved in long-term sustainment funding.[46] Secretary Chertoff's statement was corroborated by the 2012 assessment of fusion centers.[47] The report indicated that 76 percent of the funding for the national network is provided by state and local governments. This fiscal reality mitigates the federal government's position to mandate the practices and policies of the centers. Despite this fact, the report's findings include federal support through grant funding, training, technical assistance, federal personnel and access to information and networks.

A report from the American Civil Liberties Union warned,

> The participation of agencies from multiple jurisdictions in fusion centers allows the authorities to manipulate differences in federal, state and local laws to maximize information collection while evading accountability and oversight through the practice of 'policy shopping.'[48]

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[44] Abold, Guidetti, and Keyer, "Strengthening the Value of The National Network of Fusion Centers by Leveraging Specialization: Defining 'Centers of Analytical Excellence,'" *Homeland Security Affair* 8, no. 7 (2012). 1–29.

[45] 9/11 Commission, *The 9/11 Final Report.*

[46] Rollins, *Fusion Centers*, 44.

[47] U.S. Department of Homeland Security, *2012 National Network of Fusion Centers Final Report*, 9.

[48] Michael German and Jay Stanley, "What's Wrong with Fusion Centers?" American Civil Liberties Union, 2007, https://www.aclu.org/files/pdfs/privacy/fusioncenter_20071212.pdf, 10.

This ambiguous authority has reportedly led to violations of privacy protections that are deeply engrained in the centers. A 2012, report prepared by the U.S. Senate Permanent Subcommittee on Investigations found evidence of the collection and reporting of activities of U.S. citizens, who are protected by the First Amendment of the U.S. Constitution.[49]

The literature highlights that the growth and progression of fusion centers has not been linear. Their mission sprawl has entered into areas already covered by other disciplines. The fusion center is more than a physical location; it embodies a methodology of synthesizing data, resources, and personnel in order to provide comprehensive analysis of a given topic or incident. In defining the fusion center's future role, it is important to understand the philosophy underpinning its inception.

C. EMERGENCY OPERATIONS CENTERS

The 2010 national preparedness guide, *Developing and Maintaining Emergency Operations Plans,*[50] defines EOCs as the physical location at where the coordination of information and resources to support management activities normally take place. These facilities may be temporary or permanently established and organized or owned by any level of government. The literature involving EOCs is limited. A common theme in the literature on EOCs is that there is limited study on the centers. For example, Joseph Scanlon of the Emergency Communications Research Unit found that available EOC literature is generally self-congratulatory in nature yet it contains little empirical evidence of utility and best practices.[51] Scanlon further stated that the literature lacked detail and valid sources.[52] Much of EOC literature reviewed for this study involved federal guidance documents designed to familiarize practitioners with generalized EOC concepts.

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[49] *Federal Support for and Involvement in State and Local Fusion Centers, United States Senate Permanent Subcommittee on Investigations, Committee on Homeland Security and Government Affairs,* 112th Cong., 35 (2012), http://www.hsgac.senate.gov/download/report_federal-support-for-and-involvement-in-state-and-local-fusions-centers

[50] FEMA, *Developing and Maintaining Emergency Operations Plans.*

[51] Joseph Scanlon, "The Role of EOCs in Emergency Management: A Comparison of American and Canadian Experience," *International Journal of Mass Emergencies and Disasters*, 12, no. 1 (1994): 51–57.

[52] Ibid.

The *National Response Framework* NRF[53] and *National Incident Management System* (NIMS),[54] produced by DHS, list the EOCs as critical to creating a common operating picture in support of a multiagency coordination group's management of an incident. This picture is generated through the EOCs' ability to coordinate, communicate, resource allocate, track, analyze, and disseminate.

In an article for *Fire Engineering,* William Shouldis contended that EOCs could be scalable to specific incidents that are low frequency and high risk.[55] Shouldis believes the management structures of the centers rely on common operating pictures in order to allocate necessary resources during the response phase to an incident.

In 2006, Laura Militello, Emily Patterson, Lynn Bowman, and Robert Wears published a study based on the EOC model.[56] The study focused on information flow during crisis management. Emergency management practitioners were tasked with operating an EOC in response to hypothetical incidents. As a result, the researchers found three main challenges to EOC coordination: observation data identified issues with asymmetric knowledge, barriers to maintaining awareness, and uneven workload distribution. The resulting analysis found that the model itself does not guarantee success. The researchers recommended frequent exercises to validate the center design and ensure EOC personnel are familiar with common job functions and resources.[57]

In contrast to fusion centers, the significance of EOCs is rooted in the physical location. Through the centers, emergency managers run their command and control in active state environments. It is important to note that although some EOCs continuously

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[53] U.S. Department of Homeland Security, *National Response Framework* (Washington, DC: Department of Homeland Security, 2008).

[54] U.S. Department of Homeland Security, *National Incident Management System* (Washington, DC: Department of Homeland Security, 2008).

[55] William Shouldis, "The Emergency Operations Center: A Vital Preparedness Tool," *Fire Engineering* 163, no. 5 (2010), http://www.fireengineering.com/articles/print/volume-163/issue-5/Features/the-emergency-operations-center-a-vital-preparedness-tool.html

[56] Laura G. Militello et al., "Information Flow during Crisis Management: Challenges to Coordination in the Emergency Operations Center," *Cognition, Technology & Work* 9, no. 1 (2007): 25–31, doi:10.1007/s10111-006-0059-3.

[57] Ibid.

operate, they are reactive in nature whereas fusion centers are continually seeking to forecast through analysis.

D. COMPLEXITY AND SYSTEMS THINKING

Complexity and systems thinking are pivotal components to this study. Both of these forces influence the optics through which the central question is analyzed. A great amount of literature has been written on both subjects. These concepts are so malleable they can be applied to almost and field of study. Included are examples where these approaches are applied to disasters. Although complexity is a broad topic, generally the literature is aligned with a definition offered by Yaneer Bar-Yam. In a paper for the New England Complex Systems Institute, Bar-Yam opined that complexity is a system of interacting components whose collective behavior cannot be easily inferred from the behavior of the parts in isolation.[58] This definition directly links to systems thinking. According to Lukas Schoenberger, Andrea Schenker-Wicki, and Mathias Beck, systems thinking is a field of study that examines complexity holistically through dynamic cause and effect over time.[59] The relation of these two concepts creates a mechanism that can address difficult problems. In essence, the system thinking design can visualize collaborative relationships that seek to mitigate the complex nature of disasters.

L. Douglas Kiel addressed the convergence of these two concepts in a paper centered on managing periods of extreme instability. According to Kiel, in times of high instability, such as disasters, emergency managers must match the incident with unstable fluid responses.[60] David J. Snowden and Mary Boone furthered the disaster scenario described by Kiel. In a *Harvard Business Review* article, "A Leader's Framework for Decision Making," the researchers explore frameworks that may assist in shortening the

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[58] Yaneer Bar-Yam, *Multiscale Representation Phase I*, New England Complex Systems Institute, 2001, http://www.necsi.edu/research/multiscale/SSG_NECSI_1_CROP.pdf

[59] Lukas Schoenenberger, Andrea Schenker-Wicki, and Mathias Beck, "Analyzing Terrorism from a Systems Thinking Perspective," *Perspectives on Terrorism* 8, no. 1 (2014): 16.

[60] L. Douglas Kiel, "Chaos Theory and Disaster Response Management: Lessons for Managing Periods of Extreme Instability," in *Proceedings What Disaster Response Management Can Learn From Chaos Theory*, ed. Gus A. Koehler, May 1995, https://www.library.ca.gov/CRB/96/05/over_12.html

decision cycle.[61] One of the main challenges faced by emergency responders is choosing the proper strategy when faced with several "right answers." According to Snowden and Boone, the possibility for multiple correct answers stems from the fact that the relationship between cause and effect can be impossible to determine because of continuous shifts that eliminate the ability to detect trends and patterns.[62] As a result of this dynamic environment, it is difficult to craft a strategy that accounts for all of the variables. Snowden and Boone believe these situations create a realm of "known unknowns." Executive leaders who are continuously seeking to stay ahead of the changing environment in order to satisfy public expectations compound this reality. According to Thad Allen, the "social contract" we have created with our citizens requires the emergency management discipline to efficiently respond to disasters and restore normalcy.[63] In addition to their response duties, emergency managers are charged with providing relevant and actionable information for public consumption. This is best accomplished through the analysis of multiple data streams in order to detect any existing "signals in the noise."

E. COLLABORATION

Susan Page Hocevar, Gail Finn Thomas, and Erik Jansen defined collaboration as the ability of organizations to enter into, develop, and sustain interorganizational systems in pursuit of collective outcomes.[64] Luis Camarinha-Matos furthered this concept. He identified the benefits of collaboration as an increase in "survival capability" relative to achieving common goals.[65] He included sub-components such as the sharing of resources

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[61] David Snowden and Mary Boone, "A Leader's Framework for Decision Making," *Harvard Business Review*, November 2007.

[62] Ibid.

[63] Thad Allen, "Confronting Complexity and Creating Unity of Effort: The Leadership Challenge for Public Administrators," *Public Administration Review* 72, no. 3 (2012): 320–21, doi:10.111/j.1540-6210.2912.

[64] Susan Hocevar, Gail Fann Thomas, and Erik Jansen, "Building Collaborative Capacity: An Innovative Strategy for Homeland Security Preparedness," *Advances in Interdisciplinary Studies of Work Teams* 12 (October 2006): 255–74, doi:10.1016/S1572-0977(06)12010-5.

[65] Luis Camarinha-Matos, "Fair Distribution of Collaborative Benefits," in *Encyclopedia of Networked and Virtual Organizations*, ed. Maria Manuela Cruz-cunha, 601–607 (Hershey, PA: Information Science Reference, 2008).

and joining of complementary skills. Much of the literature reviewed, lauded collaboration and focuses on its benefits. As a concept, collaboration is positively associated with increased efficiency, adding durability to collective decisions, and serving as a force multiplier. Loan-Clarke and Preston highlighted key results of collaborative efforts, such as the transfer of skills, sharing of individual abilities, and the enhanced dissemination of network capabilities.[66] Dilek Cetindamar, Bulent Catay, and O. Serdar Basmaci examined these positive attributes and observed competition through collaboration in the Turkish textile industry.[67] Their research determined that each contributing partner received individual benefits while collaboration can supply overarching macro benefits related to increased potential for competitive advantage arising from pooled resources and innovative capabilities.

This sentiment was echoed in a white paper written by Frost and Sullivan on the impact of collaboration on business performance.[68] Their research studied the impact of collaborative efforts on business performance. The study examined the process through the use of a collaborative index. The authors created the index to capture a measurement of collaboration for varying global industrial enterprises, which included health care, manufacturing, government, and financial services. These enterprises spanned both the public and private sector. The researchers were able to identify collaboration as a key driver of success for business performance, profitability, and sales growth. These benefits were directly tied to "high quality collaboration" that can be characterized by a significant breadth of applied interaction and sharing with external partners.[69]

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[66] J. Loan-Clarke and D. Preston, "Benefits of Research Collaboration," Eastern Michigan University, 2002, http://www.rcr.emich.edu/module9/i4_benefits.html

[67] Dilek Cetindamar, Bülent Çatay, and O. Serdar Basmaci, "Competition through Collaboration: Insights from an Initiative in the Turkish Textile Supply Chain," *Supply Chain Management: An International Journal* 10, no. 4 (2005): 238–40, doi:10.1108/13598540510612686.

[68] Frost & Sullivan, "Meetings around the World: The Impact of Collaboration on Business Performance," Verizon Business, March 2006, https://e-meetings.verizonbusiness.com/maw/pdf/MAW_white_paper.pdf.

[69] Ibid.

This Frost and Sullivan study pinpointed capacities that were essential to create the benefits.[70] The authors realized that collaborative benefits in global enterprises were realized through harnessing a culture of openness (intraorganizational communication) and the creation of a decentralized structure. Through this exploration of the concept, the researchers determined:

> collaboration quality directly impacts business performance through four channels: the productivity of collaborative efforts to achieve a given task, the effectiveness of supporting business strategy, the recognition that collaboration is a sustainable, competitive advantage, and a coordinated team that is committed to driving collaboration as a process in the path to success.[71]

These private sector examinations of collaborative practices assist in demonstrating a positive value in the concept. Unlike government, the private sector has an interest in assessing all of its practices relative to the "bottom line." This requirement compels it to measure all of its processes. Although this research does not create an index for the relationship between the two centers, the work of Frost and Sullivan is a useful tool in viewing how collaboration is valued in the private sector.

These attributes, related to collaboration in the "real world," extend into the natural world. In nature, most collaborative or symbiotic environments occur organically between organisms for survival. The literature in this area portrays natural collaboration as utilitarian rather than altruistic. In nature, collaboration is based on reciprocity in which the interaction is mutually beneficial for all parties. In the book, *Learning from the Octopus How Secrets from Nature Can Help Us Fight Terrorist Attacks, Natural Disasters, and Disease* Rafe Sagarin explores the concept of mutualism where collaboration can only be maintained through "natural" coercion between disparate species.[72] The book highlights a study conducted on rhizobium bacteria that were discovered living on legume plants, such as alfalfa or soybeans. The collaboration between the species entailed the bacteria receiving oxygen from the plant and in return it

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[70] Ibid.

[71] Ibid., 6.

[72] Rafe Sagarin, *Learning from the Octopus: How Secrets from Nature Can Help Us Fight Terrorist Attacks, Natural Disasters, and Disease* (Jackson, TN: Basic Books, 2012).

converted nitrogen to a form the plant could use nutritionally. Saragrin includes an experiment in which, nitrogen was replaced with argon, an inert gas. As a result, the plant withheld oxygen from the bacteria due to the inability of the bacteria in fulfilling its role.[73]

In a natural environment the participants regulate the degree and duration of collaboration through force. In our world, a collaborative environment occurs through less coercive means. Studies identify trust as becoming axiomatic to the creation and sustainment of a collaborative relationship. In order to understand how trust can create these cooperative domains the concept must be delineated. Akbar Zaheer, Bill McEvily, and Vincenzo Perrone authored a study of trust related to interorganizational and interpersonal performance.[74] They defined trust in two ways.[75] They found trust related to interorganizational relationships manifested itself as confidence or predictability in one's expectations about another's behavior, and confidence in another's goodwill.[76] In addition, Zaheer, McEvily, and Perrone linked trust related to individuals as focusing on fulfilling expectations, behaving in a predictable manner, and negotiating fairly when opportunism is present.[77] This definition became crucial in understanding how trust can bind organizations.[78]

This perspective on trust provides a context for the belief that personal relationships generate trust and discourage opportunistic behavior between firms.[79] Furthermore, the fostering of trust reduces inclinations to guard against opportunistic behavior. Finally, the Zaheer, McEvily, and Perrone study concludes that the more trust

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[73] Ibid., 189.

[74] Akbar Zaheer, Bill McEvily, and Vincenzo Perrone, "Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance," *Organization Science* 9, no. 2 (1998): 141–59, doi:10.1287/orsc.9.2.141.

[75] Ibid.

[76] Ibid.

[77] Ibid.

[78] Ibid.

[79] Ibid.

experienced between individuals of organizations the more likely organizations will be trusted.

Renee Graphia Joyal specifically studied the trust component of collaboration relative to the law enforcement community. In her study, "How Far have We Come? Information Sharing, Interagency Collaboration, and Trust within the Law Enforcement Community,"[80] Joyal studied the environment of fusion centers and found trust, reciprocity, and genuineness emerged as the most important personality characteristics facilitating the missions of the centers. Consequently, the nature of a bureaucratic environment was identified as a challenge to foment trusting relationships. These environments tend to be political and are characterized by high turnover rates that may fuel an adversarial atmosphere between aligned agencies.[81]

The discovery of collaborative aspects in the natural world as well as derivative subcomponents indicates that cooperation toward a common goal can be organic. In leveraging this principle for disaster response it is necessary to isolate the conditions in which these relationships thrive and attempt to reconstruct those influences. Despite the identified benefits of collaborative initiatives, the concept in and of itself is not a panacea. Collaboration inherently involves individuals working together, sometimes in circumstances that are new and challenging. A *Harvard Business Review* article, "Want Collaboration?," authored by Jeff Weiss and Jonathan Hughes, identified conflict management as a key to successful coordination.[82] Their study dispels the myth that simply putting people together for a common purpose will immediately create a utopic environment. Weiss and Hughes conclude that collaborative initiatives need to manage the eventual conflict through institutional mechanisms. The authors characterize this

[80] Renee Graphia Joyal, "How Far Have We Come? Information Sharing, Interagency Collaboration, and Trust within the Law Enforcement Community," *Criminal Justice Studies* 25, no. 4 (2012): 357–70, doi:10.1080/1478601X.2012.728789.

[81] Ibid.

[82] Jeff Weiss and Jonathan Hughes, "Want Collaboration?," *Harvard Business Review*, March 1, 2005, 10.

struggle by opining "clashes between parties are the crucibles in which creative solutions are developed and wise trade-offs among competing objectives are made."[83]

In *Collaborate or Perish,* William Bratton and Zachary Tumin provide a utilitarian context to collaborative relationships.[84] The authors propose that these relationships are more than facilitating a free information flow; they require actions that lead to results.[85] Additionally, Bratton and Tumin distil the concept further and identify that at an elemental level, much like in the natural world, these cooperative relationships must be mutually beneficial to the partners. The authors explain that in order to properly communicate within these relationships, it is critical to establish common platforms. These platforms must provide unfettered communication between the parties in order to ensure transparency. Depending on the sophistication of the relationship, the platform can be as rudimentary as a "grease board" or as complex as a virtual environment.[86]

Throughout the book, Bratton and Tumin cite examples of facilitators and inhibitors for collaborative relationships. One of the "Headwinds" the authors explore is the "endowment effect."[87] This effect explores the verity of prospective collaborators overestimating the value of their participation in the relationship. Bratton and Tumin attribute this to "loss aversion" and postulate that emotional attachment to processes can contribute to this phenomenon. They suggest that this effect should be confronted early in the relationship building and realistic values should be attributed to all aligned parties in order to establish a "net gain" for all participants.[88]

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[83] Ibid., 2.

[84] William J. Bratton and Zachary Tumin, *Collaborate or Perish!: Reaching across Boundaries in a Networked World* (New York: Crown Business, 2012).

[85] Ibid., 27.

[86] Ibid., 83.

[87] Ibid., 115.

[88] Ibid.

Although collaborative connections may occur organically, this does not alleviate the responsibility of leaders to ensure that individuals involved are receiving their perceived benefits. The need for equity goes beyond humanity and is evidenced in natural environments. These universal prerequisites for successful partnerships require attention through thoughtful management.

F. COLLABORATIVE PROCESSES BETWEEN EMERGENCY MANAGEMENT AND FUSION CENTERS

DHS has published several reports that focus on branding the capabilities of fusion centers with emergency operation centers during the response to major disasters. This literature is mostly in the form of preparedness and guidance documents. A 2011 report, *Relationships between Fusion Centers and Emergency Operations Centers*,[89] braids the capabilities of EOCs and fusion centers by in linking state and local information with strategies and response of the federal government during disasters. This report included an audit of the 2011, fusion center capabilities related to disaster response. The results of the study concluded that the majority of centers were unaware of their potential roles and responsibilities regarding responses to natural disasters. Evidence was presented that personnel in over 80 percent of fusion centers were unaware that these criteria were provided in the form of federal guidance documents.[90]

The literature focused on a collaborative approach between fusion centers and EOCs. This cooperative approach is standardized through frameworks designed to facilitate responses to natural disasters. Within these documents, the capabilities of the fusion centers and EOCs are codified. On the surface, these capabilities reveal that EOCs and fusion centers parallel each other. Both EOCs and fusion centers are tasked with collection and dissemination of critical information related to disasters. All of the available research provides recommendations to streamline these processes by clearly defining roles and responsibilities. The recommendations identify the need for efficient collaboration through coordination. Some of the methods suggested include, pre event

[89] DHS Office of Inspector General, *Relationships between Fusion Centers*.

[90] Ibid.

preparation and planning between fusion centers and EOCs. The desired outcome of these guidance documents center upon the fusion center's ability to contextualize the situation through analysis. The denouement of this analytical process provides the EOC with the "ground truth" of the areas affected by the incident. This information affords the EOC the ability to provide direction to the overall operation. These processes are designed to streamline the efforts of the centers and have not been formalized through policy due to the multiple layers of governments involved in the response to disasters.

In a joint guide prepared by DHS and the U.S. Department of Justice, Considerations for Fusion Center and Emergency Operations Center Coordination (CPG 502), two case studies are included to highlight collaboration between EOCs.[91] These cases focused on two national political conventions in which the roles of EOCs and fusion centers are diagramed. This document defines the capabilities of both fusion centers and EOCs and provides a four-step framework in which a collaborative environment can be achieved. The steps include familiarization with capabilities, establish partnerships, determine the process, and training workshops, and exercises. The examination of each step affords opportunities to find ways to create efficiencies and increase coordination.

A study into building a collaborative capacity for homeland security preparedness listed the development of interagency collaboration as critical for efficiently conducting routine tasks and innovative responses to natural disasters or terroristic threats.[92] This research found that collaboration specifically in the homeland security enterprise must be built upon trust flexibility, openness, mutual respect, social capitol and pathways of communication. These characteristics were highlighted due to the nature of disasters, which are traditionally hostile and complex events. The ability to capitalize on these traits will foster intelligent improvisation to a rapidly changing disaster environment.

[91] FEMA, *CPG 502 Considerations for Fusion Centers*.

[92] Hocevar, Thomas, and Jansen, "Building Collaborative Capacity."

A segment of the literature reviewed was in the form of journal articles pertaining to case studies of collaborative initiatives by the centers. An article published in the *Domestic Preparedness Journal*, authored by Christian Schulz and Raymond Guidetti, described how the NJ ROIC expanded upon existing collaborative frameworks established by DHS in CPG 502.[93] The article provided a firsthand account of how a fusion center could respond to a natural disaster. The reoccurring theme in the article was the center's ability to collect information and data from multiple sources and provide a synthesized analytical product designed by the requirements of the consumer. The article provided a snapshot of the collaborative potential for EOCs and fusion centers through their mutual response to natural disasters.

Henry Grabar wrote an article that was posted on the Atlantic Cities website that indicated Boston is one of the most prepared U.S. cities regarding disaster response. In the article, "Boston Is One of the Best Prepared U.S. Cities to Handle a Crisis," Graybar bases his argument on the collaborative practices of the Boston public sector.[94] These agencies include emergency management, law enforcement, and fusion centers. Graybar highlights the "Urban Shield" initiative as evidence of the cities commitment to the practice. The "Urban Shield" is a 24-hour exercise in which first responders must cooperatively respond to a simulated emergency. These drills produce a robust collaborative ethos that converts the practice into a type of "muscle memory" for the responding agencies.

The literature indicates that the field of emergency management is gradually shifting toward collaboration in order to enable response to disasters. This need for collaboration is illustrated by the work of William Waugh and Gregory Streib, who attempted to answer the paradox faced by modern emergency managers. They theorized that proper emergency responses are predicated on solid preparation, yet each incident

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[93] FEMA, *CPG 502 Considerations for Fusion Centers*; FEMA, *Developing and Maintaining Emergency Operations Plans.*

[94] Henry Grabar, "Boston Is One of the Best Prepared U.S. Cities to Handle a Crisis," The Atlantic Cities, April 19, 2013, http://www.theatlanticcities.com/neighborhoods/2013/04/boston-one-best-prepared-us-cities-handle-crisis/5308/

requires a high level of spontaneity.[95] The combination of these realities force emergency managers to draw from the array of resources available. This shift can also be observed in enterprise specific documents focused on streamlining processes through a unity of effort.

In an after action report written by Federal Emergency Management Agency (FEMA) for an EOC/fusion center collaboration-based conference, statistical data was offered to document the shift of fusion centers.[96] The document reported that 58 percent of centers assign personnel to the EOC during incidents, over 60 percent of centers involve the EOC in their polices, and over 80 percent contribute to mutually constructed risk assessments. In 2013, DHS released a guidance document regarding the incorporation of intelligence into the NIMS.[97] This document was a formal approach to establishing the value of intelligence for emergency management. Specifically, this new function was written to integrate with the national incident command model. Included within the document was a graphic that represents the flow of events during the course of an incident. Figure 3 is a visual representation of how the intelligence function can be implemented in the aftermath of an incident.

[95] William L. Waugh, Jr. and Gregory Streib, "Collaboration and Leadership for Effective Emergency Management," *Public Administration Review* 66 (2006, December): 131–40, doi:10.2307/4096577.

[96] Federal Emergency Management Agency [FEMA], *Fusion Center and Emergency Management Collaboration Meeting after Action Report* (Washington, DC: Federal Emergency Management Agency, 2014), 5.

[97] U.S. Department of Homeland Security, *National Incident Management System*.

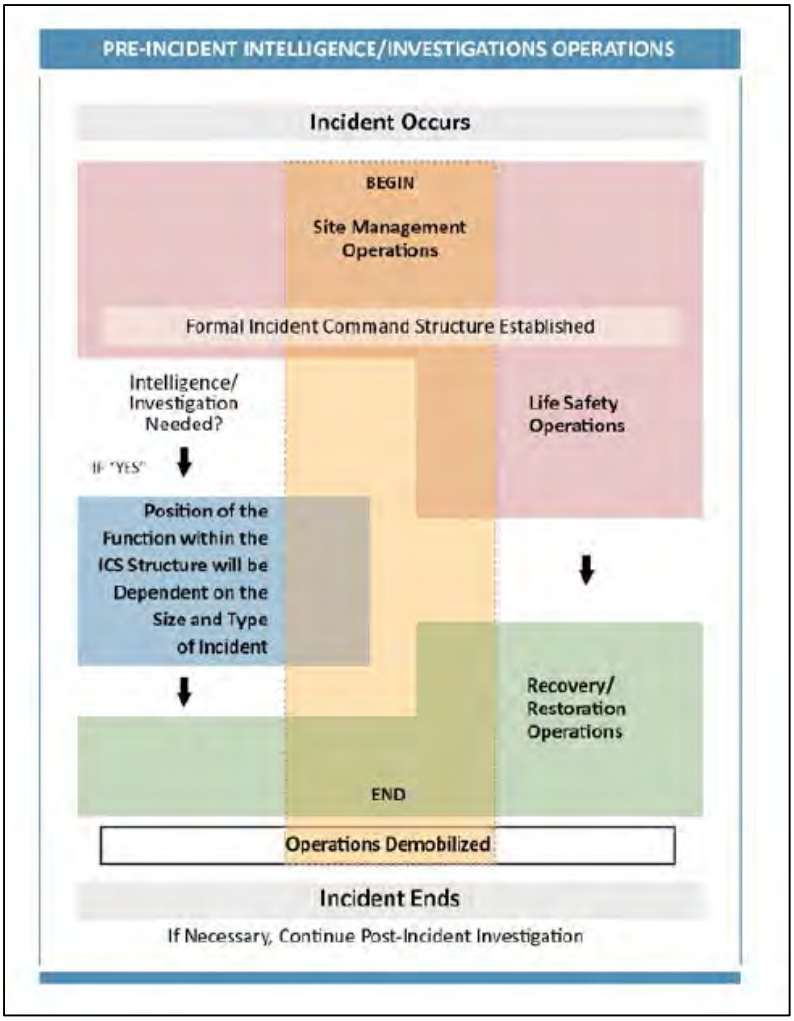

Figure 3. Disaster Event Flow[98]

Despite not being specifically named, the fusion center and its purpose could be easily included in the chart. This theme in the literature signifies that both fusion centers and emergency management are beginning to view the value of their cooperative efforts through the development of policies from within their own disciplines.

[98] Federal Emergency Management Agency, *NIMS Intelligence/Investigations Function Guidance and Field Operations Guide*, 2013, http://www.fema.gov/media-library-data/1382093786350-411d33add2602da9c867a4fbcc7ff20e/NIMS_Intel_Invest_Function_Guidance_FINAL.pdf

G. GAPS IN LITERATURE

Literature on EOCs and fusion centers is predominantly focused on federally produced guidance documents. The documents are clinical in nature and tightly define roles and responsibilities. These documents do not provide practitioners in the field a richer understanding of the nature of collaborative responses by EOCs and fusion centers.

Due to the dynamic nature of natural disasters, no response could ever be formulaic. Published case studies regarding disasters related to weather, seismic activity, and large scale regional flooding would add to the collective experience of practitioners and inspire innovative approaches to future events.

H. CHAPTER SUMMARY

The literature review was structured to provide an overview of fusion centers and EOCs through scholarly works on the disciplines. The remainder of the chapter was sequenced to examine the concept of collaboration beyond its positively connoted attributes. The depth of the exploration was necessary due to the fact that the majority of the works written on the subject laude collaboration through anecdotal examples. Thorough research of the subject unearthed studies that specifically identify the individual components of collaboration that make it the cynosure of efficiency based trends and programs.

Although the concept creates the appearance of being a panacea, interagency cooperative relationships have an optimal ambit. The following chapter provides an overview of the EOC—Emergency Support Function (ESF) method to disaster response. This chapter should serve as a scientific control compared to the upcoming variable responses in the fusion center case studies. In all of the disasters examined in this study, the EOC responses were predicated on the ESF format. Conversely, the fusion centers responses were *ad hoc* and specifically designed to mitigate a hurricane, wildfire season, and extreme winter weather.

IV. EMERGENCY MANAGEMENT RESPONSE

A. HISTORICAL CONTEXT

To answer the question of how fusion centers can play a critical role in responding to natural disasters, one must have an understanding of the mechanics of ESF specific emergency management. This understanding should include the structure from which it operates. The following is an overview of the ESF Emergency Operations Plan format. As previously noted, this researcher will not evaluate the form or function of the principles of emergency management. The description of the ESF Emergency Operations Plan format was designed to provide context to the reader and highlight where fusion centers can impact the overall response to an incident.

Nationally, the majority of emergency managers organize their disaster responses through the ESF Emergency Operations Plan format. This researcher discovered that the State of New Jersey, State of Colorado, and Commonwealth of Virginia are not exceptions to that trend. For the purpose of this study, this chapter shall serve as a primer for the EOC responses in the included case studies. Although the ESF format is not the only format available to emergency managers, it is the method employed by the states referenced in this study. The natural disasters case studies in the following chapters will be mainly focused on the actions taken by the fusion centers due to the similarity in the philosophies of emergency managers in the three states.

On March 30, 2011, President Barack Obama signed a directive, Presidential Policy Directive (PPD) 8[99] that attempted to strengthen the security and resilience of the U.S. through systematic preparation. This preparation included the threats that pose the greatest risk to the security of the U.S., including acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters.[100] Embedded within PPD 8 is the creation of the National Preparedness System, which calls for the following:

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[99] U.S. Department of Homeland Security, *Presidential Policy Directive 8: National Preparedness*, 2011, http://www.dhs.gov/presidential-policy-directive-8-national-preparedness

[100] Ibid.

> The national preparedness system shall include a series of integrated national planning frameworks, covering prevention, protection, mitigation, response, and recovery. The frameworks shall be built upon scalable, flexible, and adaptable coordinating structures to align key roles and responsibilities to deliver the necessary capabilities. The frameworks shall be coordinated under a unified system with a common terminology and approach, built around basic plans that support the all-hazards approach to preparedness and functional or incident annexes to describe any unique requirements for particular threats or scenarios, as needed. Each framework shall describe how actions taken in the framework are coordinated with relevant actions described in the other frameworks across the preparedness spectrum.[101]

PPD8 incorporated the National Response Framework (NRF), which was previously established.[102] The NRF included the innovative concept of integrating all levels of government in a common incident management framework. The NRF replaced the *Federal Response Plan* (FRP), which was created in 1992, but it outlived its usefulness due to its limited role in codifying federal roles and responsibilities concerning natural disasters.[103] It is important to note that the FRP was the origin of the ESF concept.

The NRF defines the principles, roles and responsibilities, and coordinating structures for enabling core capabilities required to properly respond to an event.[104] The framework illustrates how response efforts intersect with mission areas across the governmental spectrum (federal/state/local). The NRF was structured to be in continuous operation, and specific elements of the framework can be implemented at any time. The structures, roles, and responsibilities contained in the NRF can be implemented in a scalable fashion, depending on the scope of the disaster. The flexibility of the framework affords emergency managers the ability to use key components prior to an event. The strength of the system rests on the ability to selectively implement NRF structures and

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[101] Ibid., 3.

[102] U.S. Department of Homeland Security, *National Response Framework*.

[103] Federal Emergency Management Agency, *The Federal Emergency Management Agency Publication 1*, 2010, https://www.fema.gov/pdf/about/pub1.pdf

[104] U.S. Department of Homeland Security, *National Response Framework*.

procedures through a scaled response, delivery of the specific resources and capabilities, and manage coordination.[105]

B. ESF FORMAT

Nested within the NRF is the ESF format. The ESF format requires four subcomponents:[106]

> **Basic Plan:** This plan provides an overview of the jurisdiction's emergency management system. It provides a general description of the agencies hazard profile, capabilities, and organization chart.
>
> **Emergency Support Functions Annexes:** These annexes describe the expected roles and responsibilities of the function and list the aligned agencies for mission execution. Each function is thoroughly delineated and may include both governmental and non-governmental agencies. ESF(s) include the grouping of governmental and certain private sector capabilities into an organizational structure to provide support, resources, program implementation, and services that are most likely needed to save lives, protect property and the environment, restore essential services and critical infrastructure.[107]
>
> **Support Annexes:** The support annexes provide a description of the framework through the collaborative process. The annexes identify the roles of cooperating agencies for incidents that require a coordinated response.
>
> **Hazard/Threat/Incident Specific Annexes:** These annexes provide a list of policies, concepts of operations, and responsibilities for specific types of incidents. These annexes govern the global response of all assets to a particular situation.[108]

Figure 4 is a sample of an ESF format taken from an emergency management guidance document.

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[105] Ibid.

[106] FEMA, *Developing and Maintaining Emergency Operations Plans.*

[107] U.S. Department of Health & Human Services, *Public Health Emergency, Emergency Support Functions*, last modified February 14, 2012, http://www.phe.gov/Preparedness/support/esf8/Pages/default.aspx#eme, 3–5.

[108] Author summary of FEMA, *Developing and Maintaining Emergency Operations Plans.*

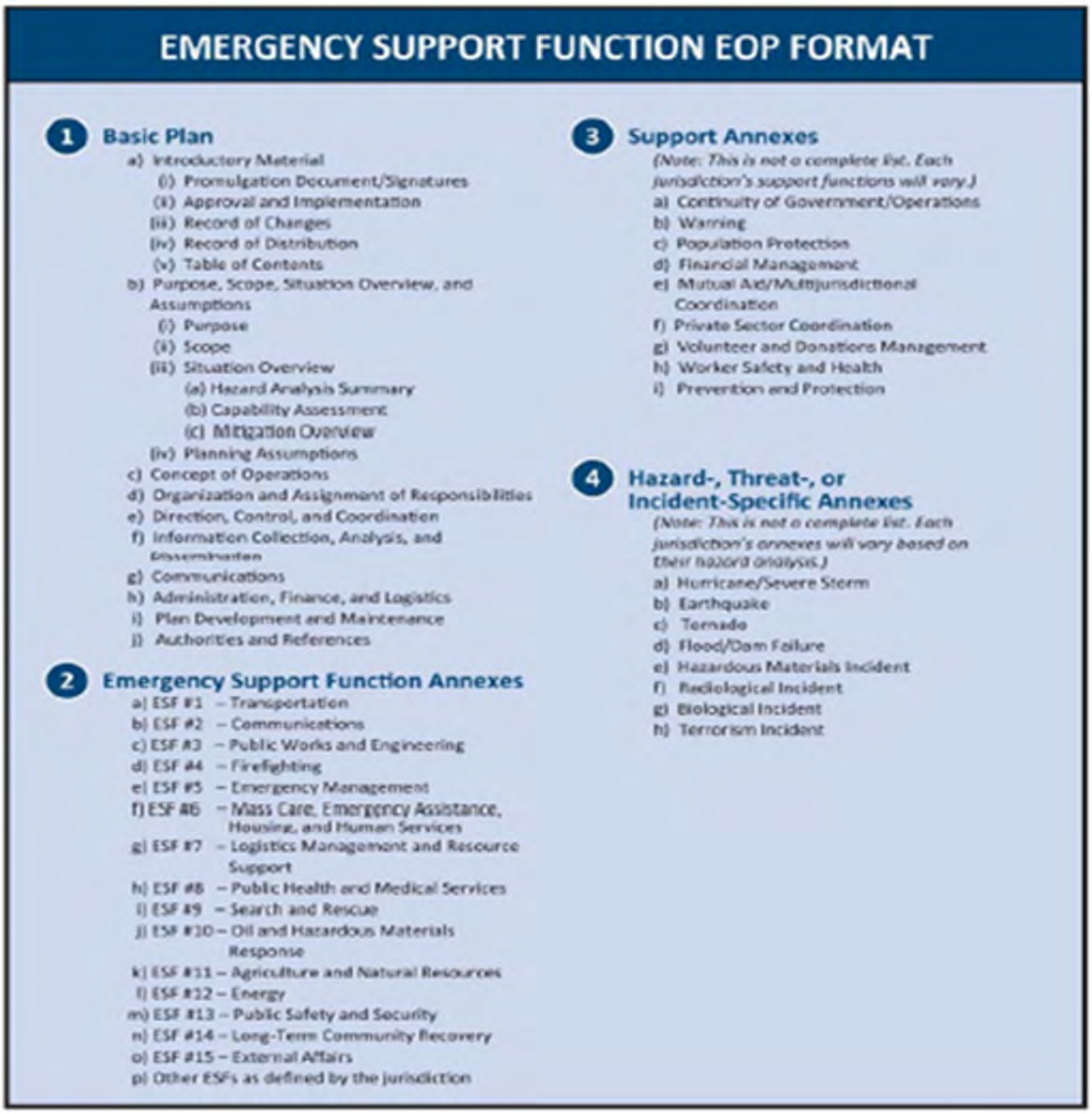

Figure 4. Sample ESF format[109]

[109] FEMA, *Developing and Maintaining Emergency Operations Plans.*

Figure 5 is an illustration of the array of sectors the ESF format continually monitors.

Figure 5. Established FEMA ESF(s)

Despite following the ESF format, the three identified state offices of emergency management vary on their labeling of ESFs.[110] For instance, the Commonwealth of Virginia utilizes 17 functions while New Jersey and Colorado employ 15 functions. Figure 6 (excluding subcategories).

[110] Virginia Department of Emergency Management, *2012 Commonwealth of Virginia Emergency Operations Plan*, 2012, http://www.vaemergency.gov/em-community/plans/2012COVEOP; New Jersey Office of Emergency Management, "Internal NJSP Office of Emergency Management Document—New Jersey Emergency Support Functions,"(internal document, New Jersey State Police, Trenton, NJ); Colorado Division of Homeland Security & Emergency Management, *State Emergency Operations Plan*, 2010, http://dhsem.state.co.us/emergency-management/operations/state-emergency-operations-plan

Figure 6 is a depiction of the ROIC EOC. It is important to note that the center is divided by sector.

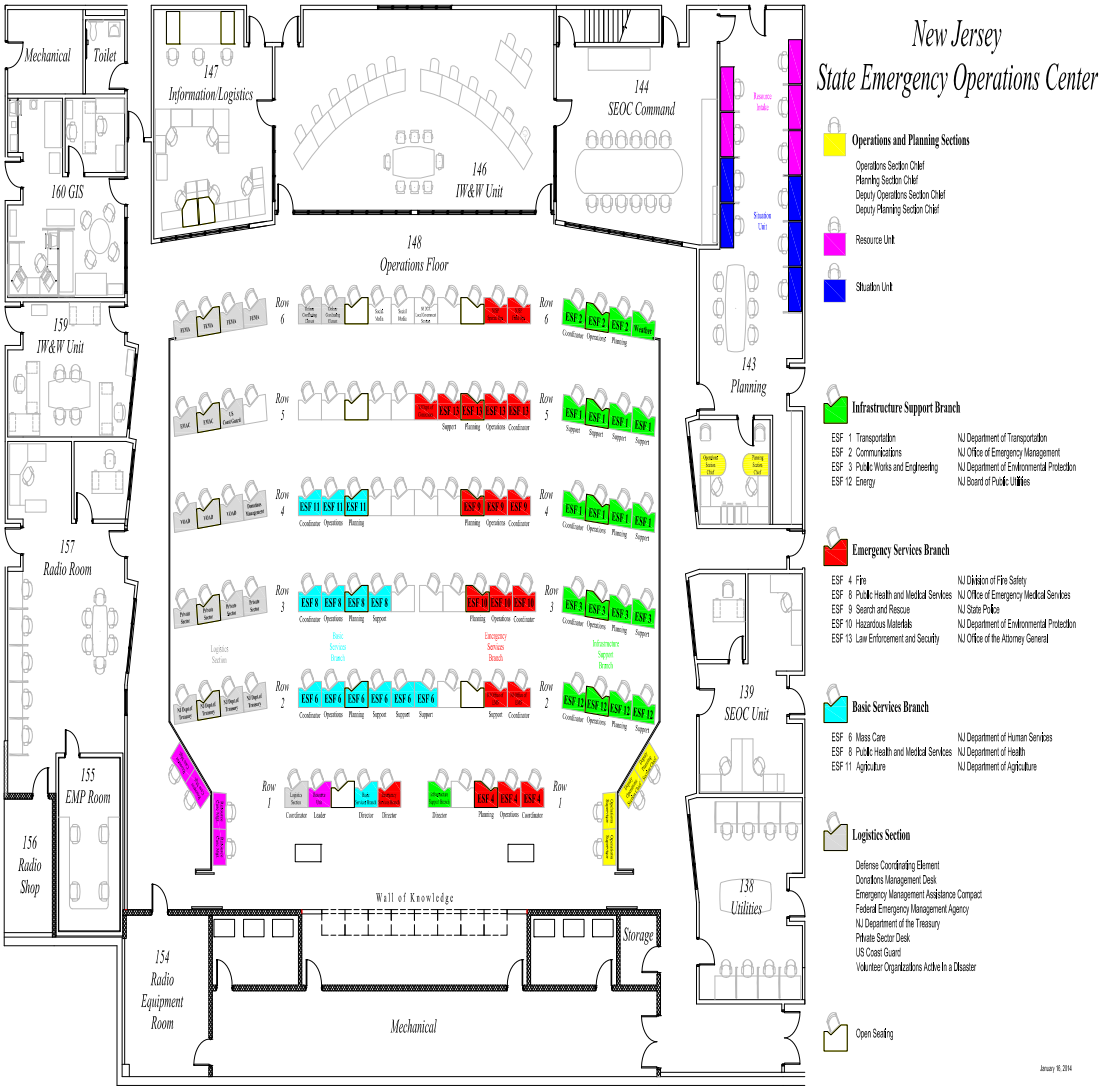

Figure 6. NJ EOC Floor Plan (Organized by ESF) Contained Within the ROIC[111]

111 New Jersey Regional Operations and Intelligence Center [NJ RIOC], *New Jersey State Emergency Operations Center* (internal document, New Jersey Regional Operations and Intelligence Center, West Trenton, NJ, 2012).

C. EOC OPERATIONS

EOCs are typically organized by a combination of ESFs or other coordinating structures aligned to disciplines or capabilities. State EOCs are the physical location where multiagency coordination occurs through state-level management structures. The core functions of an EOC include coordination, communications, resource allocation/ tracking, information collection, and dissemination. Through the harnessing of discipline specific expertise, personnel assigned to each function create a network designed to focus on consequence management. In addition, EOCs form a common operating picture by obtaining and interpreting incident specific data from the field. This occurs through the effective coordination and use of ESF(s). In essence, the ESF(s) become the "eyes and ears" of the EOC. It properly defines the post-incident environment in order to structure an effective response and recovery. Personnel and agencies assigned to specific ESFs create opportunities for the EOC to collect information and mitigate function specific problems. While, every state maintains an EOC to manage incidents that require assistance beyond local levels, some states have additional EOCs for coordinating information and resources within a region or area.

The function and control of the EOC on a state level is only activated after an incident has been passed up through the municipal and county levels. The state EOC will only assume control once a situation grows beyond parochial boundaries and is requested by a local authority. In instances when regional degradation exceeds the capabilities of the state, the Federal Emergency Management Agency (FEMA) will provide support.

D. CHAPTER SUMMARY

This chapter was intended to provide the reader a basic understanding of the specific emergency management response format utilized by all of the states in the upcoming case studies. The array of services and aid provided by emergency managers would require a study in and of itself. Incident mitigation begins at the local level prior to advancing to the state or federal authorities. This is an important distinction because full activations of state EOCs and fusion centers are rare. This creates the need for the centers

to communicate in steadily and actively since they have limited opportunities to work cooperatively. This overview of the ESF format was designed to avoid redundancy in each of the subsequent three chapters. The case studies do not specifically define EOC activity due to their common structure; rather, they focus on the fusion center responses that were unique in each incident.

The following three chapters will examine the ROIC, CIAC, and VFC responses to natural disasters in their states. Each case study will include background of the incident, structure of each center, and mitigation strategy employed. These cases were organized to offer the reader the opportunity to observe the strategy overlaid onto each center's structure. In addition to feeding the analysis, these cases may offer some insight for other centers in the network on how to respond to a similar challenge in their region.

V. HURRICANE SANDY CASE STUDY

A. EVENT

Prior to landfall, Hurricane/Post-tropical Cyclone Sandy exhibited several unique features that were different from traditional Atlantic Basin storms. The storm made an unprecedented approach from the east and created record storm surges on the East Coast, specifically New Jersey. As the storm transitioned to post-tropical, it merged with an intense low-pressure system, dramatically increasing its size before landfall.[112] Figure 8 detail the trajectory of the storm as it traveled toward the East Coast of the U.S.

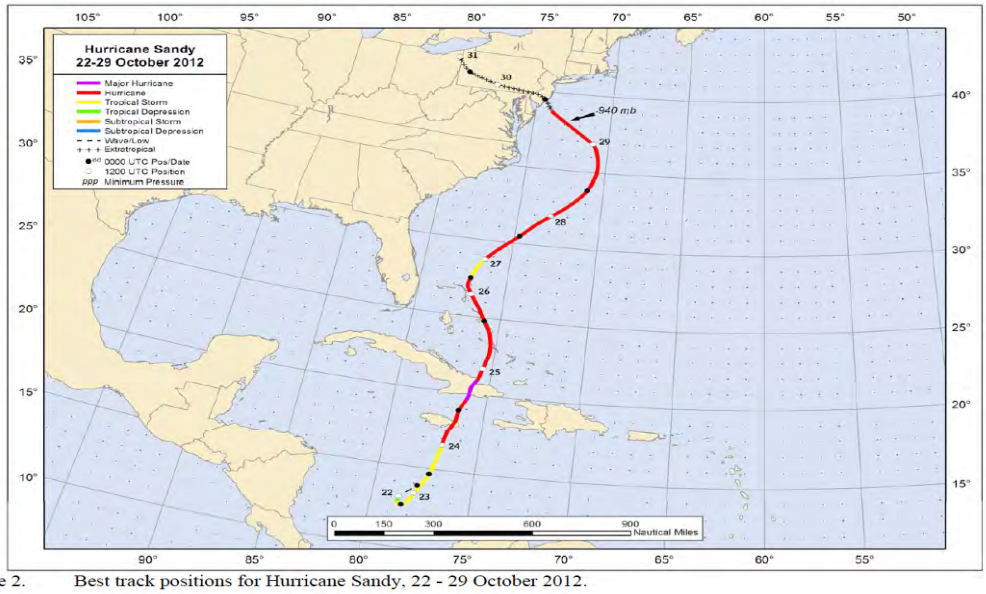

Figure 2. Best track positions for Hurricane Sandy, 22 - 29 October 2012.

Figure 7. Hurricane Sandy Trajectory October 22–29, 2012[113]

On the evening of October 29, 2012, the storm made landfall on the shores of Brigantine, NJ.[114] The storm was technically a post-tropical cyclone with hurricane force

[112] National Weather Service, "Hurricane/Post-Tropical Cyclone Sandy, October 22–29, 2012, May 2013, http://www.nws.noaa.gov/os/assessments/pdfs/Sandy13.pdf, 1.

[113] U.S. Department of Homeland Security, *National Response Framework*.

[114] Ibid., 8.

winds of 80 miles per hour.[115] The storm traveled across New Jersey until finally diminishing in Pennsylvania on November 1, 2012. This Atlantic storm was the second largest on record. At its peak, tropical force winds extended 580 miles from the center.[116] This massive size affected the entire Eastern seaboard and extended inland as far as Indiana.

In summary, 24 states were impacted by the storm, initial damage assessments exceeded $50 billion.[117] Hurricane Sandy was directly responsible for 147 total deaths, twelve of which occurred in New Jersey.[118] Hidden within these statistics are countless families impacted by the storm. On October 30, 2012, NJ Governor Chris Christie appeared on the *Fox News Channel* (Fox & Friends) and stated that approximately 2.4 million homes within the state were without power.[119]

The majority of power outages were caused by damaged substations and power plants as well as downed utility poles. A report prepared by Dr. Stephanie Hoops Halpin of the Rutgers School of Public Affairs and Administration found that 68 percent of NJ towns reported utility poles down immediately after the storm, with an average of 38 down per town.[120] Included in the study was a NJ municipal survey regarding storm damage. The survey indicated that 62 percent of towns reported no power at their police station, 65 percent at their fire stations, 76 percent at the municipal buildings, and 52 percent lost power for their water/sewer facilities.[121]

The lack of functioning utilities was soon exacerbated by a statewide gasoline shortage. The municipal survey listed, 95 percent of towns had generators to help power

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[115] Federal Emergency Management Agency, "Hurricane Sandy FEMA After-Action Report." 4.

[116] Ibid., 4.

[117] Ibid., 6I.

[118] National Weather Service, "Hurricane/Post-Tropical Cyclone Sandy, October 22–29, 2012." 1.

[119] "Chris Christie Update on Hurricane Sandy New Jersey— Fox & Friends," YouTube video, posted by SavageNationLiberty, October 30, 2012, https://www.youtube.com/watch?v=gQRqihex6gg

[120] Stephanie Hopes Halpin, "The Impact of Superstorm Sandy on New Jersey Towns and Households," Rutgers University, 2013, http://njdatabank.newark.rutgers.edu/sites/default/files/files/RutgersSandyImpact-FINAL-25Oct13.pdf, 38.

[121] Ibid.

their municipal facilities, but fueling them became an issue.[122] Also 52 percent reported running dangerously low on gasoline that powered their generators while nine percent of towns exhausted their entire fuel supply.[123]

The crippling of the energy sector became part of a cascading set of failures for all of the other critical infrastructure sectors. The storm either severely damaged or destroyed schools, hospitals, and roadways. According to FEMA estimates, over 6 million cubic yards of debris were created as result of the storm.[124] That amount of storm debris would fill approximately 1,770 Olympic swimming pools.[125] This debris did not account for the additional 2.5 million cubic yards of sand and silt pushed onto land from the surge.

This event affected all aspects of life within the State of NJ. Although not all regions of the state were affected equally, those that took the brunt of the storm would soon draw from the collective resources of all levels of government, local, county, state, and federal. The magnitude of the subsequent response was paralleled by the magnitude of need by the residents of the State.

B. NJ ROIC RESPONSE TO HURRICANE SANDY

The NJ ROIC is collocated with the NJ Office of Emergency Management. In the days prior to landfall, commanders of the NJ ROIC began to participate in preparations for the pending storm. Emergency managers knew that the storm was tracking with a northern trajectory along the eastern seaboard. Although the storm's track had not been finalized, NJ authorities began to brace for its probable impact. During this time, the ROIC raised its status to level 4 or full activation.[126] Upon reaching this level of activation, the watch operations element was mandated to assist the EOC with initial

[122] Ibid.

[123] Ibid.

[124] Ibid., 39.

[125] Ibid.

[126] New Jersey Regional Operations and Intelligence Center [NJ RIOC], *New Jersey Regional Operations & Intelligence Center Hurricane Sandy after Action Report* (internal document, New Jersey Regional Operations and Intelligence Center, West Trenton, NJ, 2012).

management of the event.[127] In this case, the watch operations element monitored the situation and assisted in disseminating early notifications from the EOC to specified distribution groups.

The subsequent response of the ROIC was designed to align with the established baseline capabilities of the national network. These capabilities were carried out through its unit-based structure. At the time of the storm, the NJ ROIC was structured as follows (Figure 8).

Figure 8. NJ ROIC Element Structure[128]

[127] New Jersey Office of Emergency Management, *New Jersey State Hurricane Incident Annex 2013* (West Trenton, NJ: New Jersey Office of Emergency Management, 2013). 17.

[128] New Jersey State Police, NJ ROIC Taskforce Manual—NJSP Standard Operating Procedure A7 (internal document, New Jersey State Police, West Trenton, NJ), 5–6.

Within these elements, the fusion center further divided into a unit based structure. The units within the ROIC during the storm were as follows:

- **Intelligence Watch and Warning Unit (IWW)**—The IWW Unit operated on a 24-hour basis. The unit assumed building security responsibilities and served as the central notification point for all emergent operational, intelligence information and asset requests. The unit was primarily responsible for providing alerts, warnings, and notifications to both public and private sector entities.
- **Intelligence and Analysis Unit (IAU)**—The IAU was divided into two squads (Threat / Crime). The unit was designed to produce finished analytical products to support the needs of the law enforcement community. The squads also served as the analytical backbone for several statewide information sharing based initiatives. The threat squad was designated as a liaison to the federal intelligence community in order to coordinate suspicious activity reporting and terrorist screening center encounters.
- **Information and Technology Unit (ITU)**—ITU was primarily responsible for supporting the information and technology (IT) infrastructure of the NJ ROIC. ITU was the primary point of contact for creating a collaborative IT environment by synergizing systems for disparate agencies.
- **Fusion Liaison and Intelligence Training Unit (FLIT)**—FLIT was the point of contact for both the public and private sector to interface with the ROIC. The unit maintained the fusion liaison officer program. This program increased information sharing and inter agency connectivity throughout the state. The unit was also responsible for expanding the knowledge and tradecraft of the ROIC's analytical processes to all sectors working within the state.

As the storm approached the coast, the ROIC's original interface with the EOC focused on logistical matters.[129] Due to the amount of personnel from external agencies reporting to the EOC, the IWW unit assumed responsibility for building security. The unit was also designated as the center point for dissemination of information related to the ensuing event. Additionally, selected IWW unit members were assigned as liaisons to the EOC. The assigned liaisons were specifically designated to address the needs and requirements of the EOC throughout the event.

[129] NJ RIOC, *New Jersey Regional Operations & Intelligence Center Hurricane Sandy after Action Report*, 3–4.

During the hours prior to the storm's landfall, the EOC became populated with representatives of the various agencies required to carry out the ESF(s) of the EOC response. Members of the ITU were primarily responsible for creating a collaborative environment for those involved in the response. This included preparing workstations with functioning equipment, facilitating Internet access, and integrating the responders to a New Jersey State Police (NJSP) internal virtual platform for reporting and resource management.

Beginning on October 30, 2014, the IAU issued a "Hurricane Sandy" statewide criminal activity assessment.[130] The assessment included baseline situational awareness for the statewide criminal environment and was electronically disseminated through IWW. The original assessment compared historic pre-storm crime data to the post-storm reality. During the initial response, the assessment morphed into a regional product that focused on two counties most severely impacted by the storm.[131] The product expanded to incorporate thematic maps that overlaid several region specific layers: local criminal activity, power outage status, and crime trend/pattern analysis.

Due to the severity of the storm, IAU members sought to locate gaps in reported crime data from police agencies severely impacted. This prompted the unit to deploy intelligence collection cells (ICC) in the affected areas.[132] The ICCs were established in the two counties (Ocean County/Monmouth County), and the eastern portion of the counties were divided into areas of responsibilities (AOR). This forward deployment provided greater access to information and created a mechanism to further define the active state environment.

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[130] New Jersey State Police, 'Hurricane Sandy: Statewide Criminal Activity Assessment' October 30, 2012 to November 1, 2012" (internal document, New Jersey Regional Operations & Intelligence Center, West Trenton, NJ, 2012).

[131] New Jersey State Police, "Monmouth County Bay Shore Ocean County Barrier Islands Criminal Activity Related to Hurricane Sandy November 5, 2012 to November 6, 2012" (internal document, New Jersey Regional Operations & Intelligence Center, West Trenton, NJ, 2012).

[132] NJ RIOC, *New Jersey Regional Operations & Intelligence Center Hurricane Sandy after Action Report*, 5.

Beginning on November 5, approximately 280 troopers from eight states were deployed to assist in the response phase to the storm.[133] This deployment was designed to reinforce the 300 NJSP members already assigned to the impacted region. In support of this deployment, IAU members created mapping products for the AORs. These maps incorporated real-time information related to storm damaged roadways. The maps included alternate routes of travel that officers used to navigate the new landscape. This information was critical to both local and foreign officers deployed to the region. In addition, these maps were prepared in conjunction with the daily product and included a data collection form that was designed to record the officer's observations of their environment. A daily integration of all of these data streams was condensed to a briefing document for ROIC commanders to provide deeper situational awareness and add to the post-storm common operating picture.

Throughout the initial response phase considerable resources were expended to accurately define the post-storm environment. To further this effort, the FLIT Unit conducted an outreach effort to the 49 municipalities within the AORs.[134] This effort was centered on assessing the capabilities of each town's essential services, which included specific elements of critical infrastructure such as: public safety, education, and public health. Furthermore, FLIT members structured their assessment to a recognized FEMA standard.

Within days of the post-storm environment, the public began to exhaust the essential resources available to them. This problem was magnified by the inability of regional public utility authorities to provide power and water to customers in need. Additionally, the state began to experience a fuel shortage, which further hampered the ability for individuals to self-sustain. FLIT members created a relationship with the All Hazards Consortium and began the process of leveraging their managed private sector

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[133] "Troopers From Eight States Travel to New Jersey to Assist Law Enforcement," press release, New Jersey State Police, November 5, 2012, http://www.njsp.org/news/pr110512a.html

[134] NJ RIOC, *New Jersey Regional Operations & Intelligence Center Hurricane Sandy after Action Report*, 4.

service customers.[135] Through this process, the FLIT Unit was able to identify businesses that were capable of providing basic goods and services to those in critical need. This information was collected and electronically disseminated on a daily basis throughout the response phase to the storm.

C. CHAPTER SUMMARY

The following two chapters include two additional case studies that are intended to highlight the specific responses to natural disasters. This chapter provided a snapshot of an incident that can be technically classified as a catastrophe. This classification goes beyond an anecdotal observation; it is aligned with a six-point definition created by Dr. E. L. Quarantelli.[136] In essence, the classification is appropriate due to the degree of regional degradation that resulted from the storm. Since the following two chapters will provide studies of incidents that manifested lower levels of communal degradation, this becomes important. Though the incidents required coordinated responses, they did not directly affect basic human needs to the same extent.

Despite the differences, the events still offer value for study. Future fusion center responses can be aided by examining the temporal and spatial nature of each incident. In the book, *What Is a Disaster?*, Rohit Jigyash opined that disasters are more easily viewed through defined parameters such as temporal (pre event/post event) and spatial (defined geographic boundaries of incidents).[137] The included incidents were selected to demonstrate the ability of fusion centers to perform scalable responses. This ability is particularly important due to the dynamic nature of threats and uniqueness of each fusion center.

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[135] The All Hazards Consortium is defined as a network of thousands of stakeholders and resources to facilitate regional integration of systems and planning efforts between government and the private sector infrastructure owner/operators. The consortium was able to identify gas stations, banks, restaurants, pharmacies, and hotels that were open for business within the state of New Jersey.

[136] E. L. Quarantelli, "Catastrophes Are Different from Disasters: Some Implications for Crisis Planning and Managing Drawn from Katrina," Understanding Katrina, June 11, 2006, http://understandingkatrina.ssrc.org/Quarantelli/

[137] Ronald W. Perry and E. L. Quarantelli, *What Is A Disaster? New Answers to Old Questions* (Philadelphia, PA.: Xlibris, Corp., 2005).

VI. 2012 COLORADO WILDFIRE SEASON CASE STUDY

A. EVENT

Leading up to the summer of 2012, Colorado had an uncharacteristically warm and dry spring that created ideal conditions for wildfires. This trend was experienced nationally; the 2012 spring season was the warmest on record, surpassing the previous record set in 1910 by 2 degrees Fahrenheit.[138] The central Rockies experienced very dry conditions, and the region recorded the fourth driest spring in history. This dry and warm spring greatly affected the snowpack conditions in the Rockies. With the exception of the northwestern section of the mountain range, the majority of the Rocky Mountain states approached the summer with less than 50 percent of the traditional snowpack.[139]

The summer offered no relief to the warming trend. Nationally, the 2012 summer season was the third warmest in U.S. history, which included the warmest July ever recorded.[140] Colorado was no exception as the summer season was the warmest in the state had ever experienced. Due to these conditions, the National Seasonal Significant Wildland Fire Potential Outlook issued for June through August called for above normal significant fire potential through much of the western states, including Colorado. These arid conditions led to an increase in wildfire activity. Figure 9 is a temperature concentration map of the U.S. in 2012.

[138] National Interagency Coordination Center, *Wildland Fire Summary and Statistics Annual Report 2012*, 2012, http://www.predictiveservices.nifc.gov/intelligence/2012_statssumm/annual_report_2012.pdf

[139] Ibid.

[140] Ibid.

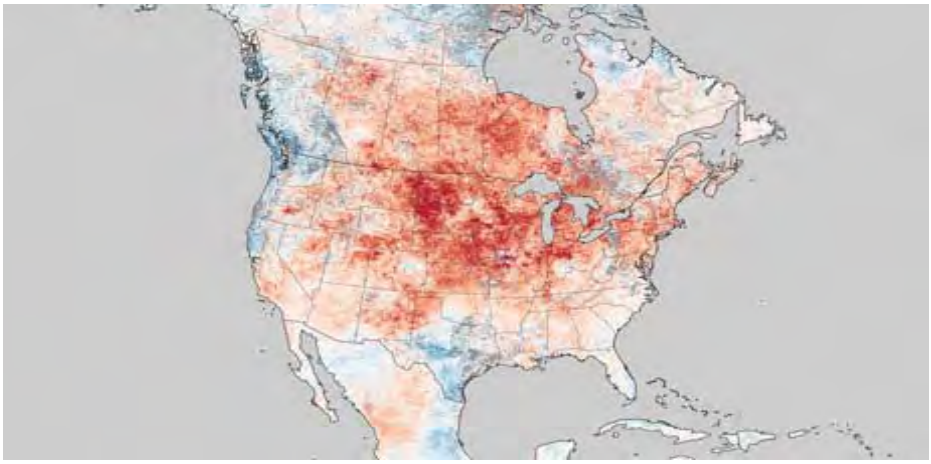

Figure 9. NASA Moderate Resolution Imaging Spectroradiometer Map of U.S. Land Surface Temperature Anomalies for June 17–24, 2012[141]

The Rocky Mountain (RM) region saw a dramatic increase in total fires and acres burned as compared to the previous 10-year average as shown in Figure 10.[142] Figure 11 depicts the amount of acreage burned by region in the U.S. in 2012.

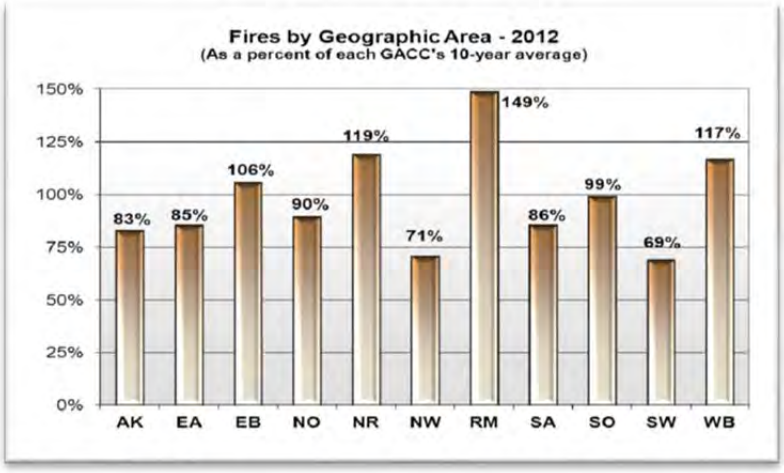

Figure 10. Total Number of Fires Per Region Over a 10-Year Average[143]

141 "Colorado Wildfires 2012: Stunning NASA Map Shows Severe Heat Wave Fueling Wildfires," *Huffington Post*, June 30, 2012, http://www.huffingtonpost.com/2012/06/30/waldo-canyon-fire-2012-st_n_1639836.html

142 Ibid.

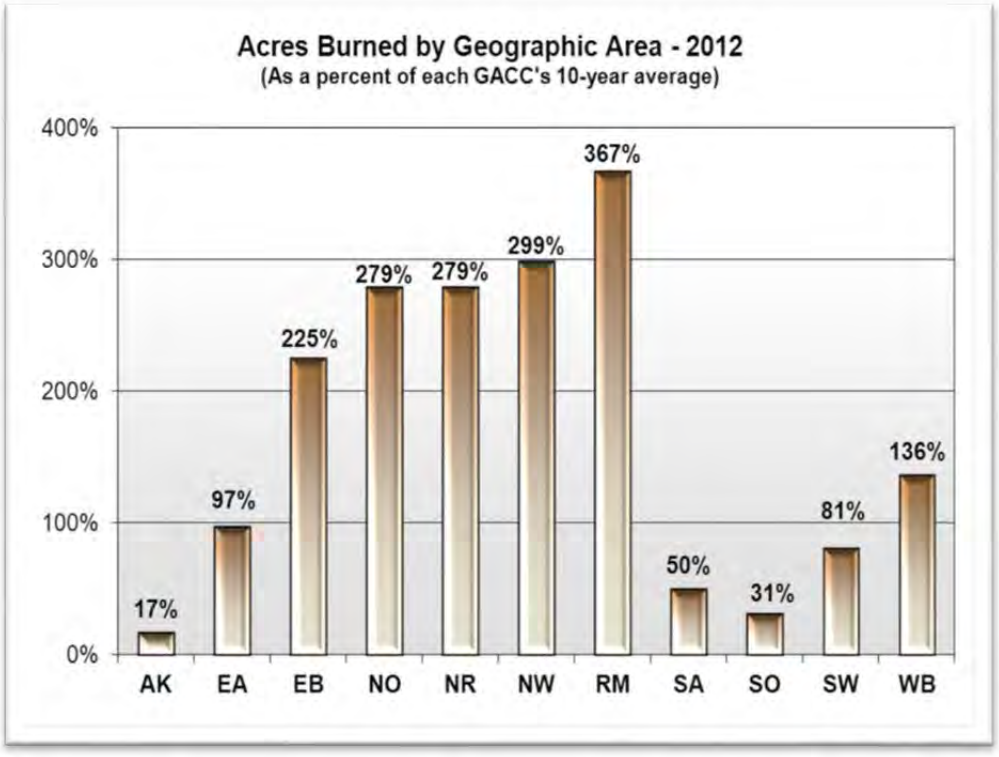

Figure 11. Total Number of Acres Burned by Geographic Area[144]

The 2012 Colorado wildfire season was responsible for some of the largest fires in the state's history. For example, the Waldo Canyon Fire destroyed 347 homes and necessitated the evacuation of 32,000 Colorado Springs residents.[145] In 2012, Colorado fire departments reported 4,167 wildland fires through the National Fire Reporting System.[146] The fires destroyed more than 648 structures, killed six individuals, and burned more than 384,803 acres.[147] These fires were believed to have caused over 538 million dollars of damage.[148] Several fires, including the Lower North Fork, High Park,

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[143] National Interagency Coordination Center, *Wildland Fire Summary and Statistics Annual Report 2012*.

[144] U.S. Department of Justice, *Fusion Center Guidelines*.

[145] Tom McGhee, "4,167 Colorado Wildfires Caused Record Losses of $538 Million in 2012," *The Denver Post*, January 17, 2013, http://www.denverpost.com/ci_22396611/4-167-colorado-wildfires-caused-record-losses-538

[146] Ibid.

[147] Ibid.

[148] Ibid.

Weber, Waldo Canyon, and Wetmore, qualified for $25 million in federal reimbursement through FEMA.[149]

B. CIAC RESPONSE TO 2012 WILDFIRE SEASON

The CIAC was designed to incorporate an all-crimes/all hazards approach in support of initiatives regarding counterterrorism, criminal interdiction, public health threats, agricultural threats, and natural disasters.[150] The CIAC fosters cross-jurisdictional partnerships between all levels of government and the private sector. The center has become Colorado's single-entry point for collection, analysis, and timely dissemination of all hazard related information. The dissemination of information is shared through analytical products created to service the center's broad spectrum of intelligence consumers. Historically the center has operated from a central location. During the wildfire season of 2012, center analytical personnel were forward deployed to support ongoing initiatives that were combating regional wildfires. Under its new alignment in the Division of Homeland Security and Emergency Management, the CIAC directly engaged its customers in the field.[151] This innovation provided support to the EOCs actively involved in coordinating the response to the fires. The CIAC was able to deploy analytical assets by harnessing the structure of the center. The CIAC was structured as follows[152]:

- **Investigative and Analysis Support Unit (IASU)—**The IASU is responsible for collecting and analyzing information points into cogent intelligence products. These products are developed collaboratively with local, state, and tribal partners in order to ensure that they coincide with an annual production plan. The production plan is a guide that ensures that the center meets the intelligence requirements of its stakeholders. The unit also evaluates the criminal environment by providing case support through processing queries and leads. The IASU also serves as an source of criminal deconfliction for multiple agencies investigating common offenders.

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[149] Ibid.

[150] "Colorado Information Analysis Center," *Colorado Sheriff* XXIX, no. 1 (2008, summer): 23–24, http://www.csoc.org/documents/magazine/COSheriffSummer08.pdf

[151] Colorado Division of Homeland Security and Emergency Management, *FY 2013 Annual Report*, 2013, http://dhsem.state.co.us/sites/default/files/Annual%20Report.pdf, 26.

[152] Ibid., 27.

- **Auto Theft Intelligence Coordination Center (ATICC)—**The ATICC was created to reduce auto theft by within the state by providing timely, viable, and reliable intelligence to law enforcement. The unit serves as a central repository of auto theft and related crimes. The ATICC has identified auto crimes as a transitional event that relates to more serious and violent crimes in Colorado. The ATICC analyzes the data collected in order to attempt to identify any patterns or statewide trends.
- **Colorado State Patrol Intelligence Unit (CSPIU)—**The CSPIU was intended to serve the Colorado State Patrol (CSP) by providing tactical, operational, and strategic intelligence to its command staff and field troops. This information was intended to drive operational deployments of CSP resources in order to optimize its effectiveness is disrupting statewide crime trends. The CSPIU is also tasked with identifying training needs regarding emerging criminal trends in Colorado.
- **Terrorism Liaison Officer Program (TLO)**[153]**—**The TLO program was intended to strengthen information sharing and enhance multi-jurisdictional partnerships between the public and private sector. The CIAC sought individuals from law enforcement, fire service, and emergency management in order to increase connectivity among allied partners.
- **All Hazards Intelligence Unit (AHIU)**[154]**-**The AHIU is staffed by both sworn troopers and civilian analysts. The unit was designed to assist law enforcement with case support in criminal and counter terrorism matters. The unit also has the ability to provide intelligence products relative to dynamic situations such as disasters.

In response to the unprecedented wildfire season of 2012, the CIAC developed the Mobile Analytical Response Team (MART) comprised of sworn CSP members and civilian analytical staff.[155] This team was tasked with deploying fusion center assets to the areas most impacted by the incidents. The MART was equipped to work with first responders on the scene and provide analytical support. MART members were chiefly responsible for designing an information sharing structure and disseminating incident specific analytical products.[156] The subsequent products were provided to executive level

[153] "Colorado Information Analysis Center." 24.

[154] John.P. Burt (Captain, CIAC Operations and Functions), interview with author, July 10, 2014.

[155] Global Justice Information Sharing Initiative, "Colorado Information Analysis Center Support to Colorado Wildfires," U.S. Department of Homeland Security, January 2013, http://www.dhs.gov/2012-fusion-center-success-stories

[156] Ibid.

decision makers to enable them properly allocate personnel and resources to the areas of greatest need. These products took a 360-degree approach to the incident and culled data far beyond traditional law enforcement concerns.

One of the main products was the *Flash Report*.[157] This report contained a running tally of the acreage burned, personnel involved, and estimated cost of the response. In addition, the report provided a snapshot of the anticipated weather and wind conditions, characteristics of the fire, and an overview of the area in which the fire was expected to travel. This product was shared with all of the responding agencies in order to support and assist in creating a common operational picture through situational awareness. The final analysis product combined all of the data streams that were fed by the numerous agencies deployed to fight the fires.

In addition to the MART, the CIAC remained in constant contact with its TLOs in order to gather real-time information about the incident. The information provided by the TLOs was a crucial piece of the CIAC response due to the fact that the liaisons were aware of the standing information needs of the center. The information provided by the TLOs was rapidly absorbed and turned around in the next cycle of Flash Reports. As the CIAC and the MARTs were collecting information, a resident fire specific analyst was monitoring the incoming data steams for trends and patterns that may assist in structuring the response. Due to the dynamic behavior of wildfires, the fire analyst continually monitored reports from the field, which included wind conditions, areas containing large amounts of low lying vegetation, and trajectory toward populated regions.

These relationships went beyond facilitating the response and mitigation efforts. During the wildfire season, the CIAC assisted a rural county sheriff's office with investigating a series of wild fires that appeared to be intentionally set.[158] The CIAC analytical team created a link analysis that leveraged data from multiple database queries such as automated license plate readers, temporal/spatial analysis, and historical criminal histories. Throughout this investigation, the CIAC supported all allied partners by

[157] Ibid.

[158] Ibid.

fostering information sharing techniques. As a result, the investigative team was able to focus the investigation on vetted leads and ultimately arrest and criminally charge a suspect.

C. CHAPTER SUMMARY

Historically, the State of Colorado has faced the threat of wildfires and managed to overcome crisis by utilizing a traditional emergency management response. This case study highlights the innovation of leveraging the capabilities of the CIAC for the discipline of fire response and arson investigation. During this examination, it was evident that the CIAC and its emergency management collogues began to gravitate toward collaboration prior to the incident. This can be inferred by the incorporation of a fire specific analyst to the fusion center. In an upcoming chapter, all of the fusion center responses will be analyzed to determine if the fusion process can be homogenized to assist the discipline of emergency management in abating heterogeneous threat profiles.

The following chapter will address a lower impact but higher frequency event. The study based on the efforts of the VFC will continue to feature the tensile nature of the fusion process, which is directly related to the capabilities of fusion centers. This study will highlight the function of fusion enters in more common occurrences rather than catastrophic or “black swan” incidents faced in NJ and Colorado. The actions of the VFC will assist in displaying that collaborative efforts are not formulaic and have varying degrees depending on the severity of the incident.

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VII. VIRGINIA EXTREME WINTER WEATHER CASE STUDY

A. EVENT

On February 12, 2014, a costal winter storm impacted the Mid-Atlantic region causing major snowfall accumulations in the Commonwealth of Virginia. The heaviest snowfall, in excess of 25 inches, was in Floyd and Montgomery counties.[159] The remainder of the commonwealth ranged between 10–25 inches of accumulated snow.[160] In two regions of Virginia, this storm represented the third highest snowfall on record for a single event. This weather incident crippled the major vehicular interstates throughout Virginia. This was evidenced by the report of 1,599 motor vehicle crashes throughout the commonwealth.[161] The storm directly resulted in two fatalities and damaged public utilities causing 7,422 customers to lose electrical service.[162] Prior to the storm, Governor Terry McAuliffe declared a state of emergency on February 11, 2014.[163] Stemming from this action, 24 local emergencies were declared and 23 EOCs were opened.[164] Figure 12 and Figure 13 are graphic visualizations of the severity of the winter storm.

[159] National Weather Service Forecast Office, *February 12–13, 2014 Historic Winter Storm*, February 17, 2014, http://www.erh.noaa.gov/rnk/events/2014/Feb12-13_winterstorm/summary.php.

[160] Virginia Department of Emergency Management, "After Action Report—2014-02-12/13 Winter Weather" (internal document, Virginia Department of Emergency Management, Chesterfield, VA, April 2014).

[161] Ibid.

[162] Ibid.

[163] "Governor Terry McAuliffe Declares State of Emergency As Winter Storm Approaches," Governor of Virginia, February 11, 2014, https://governor.virginia.gov/news/newsarticle?articleId=3273.

[164] Virginia Department of Emergency Management, "After Action Report—2014-02-12/13 Winter Weather."

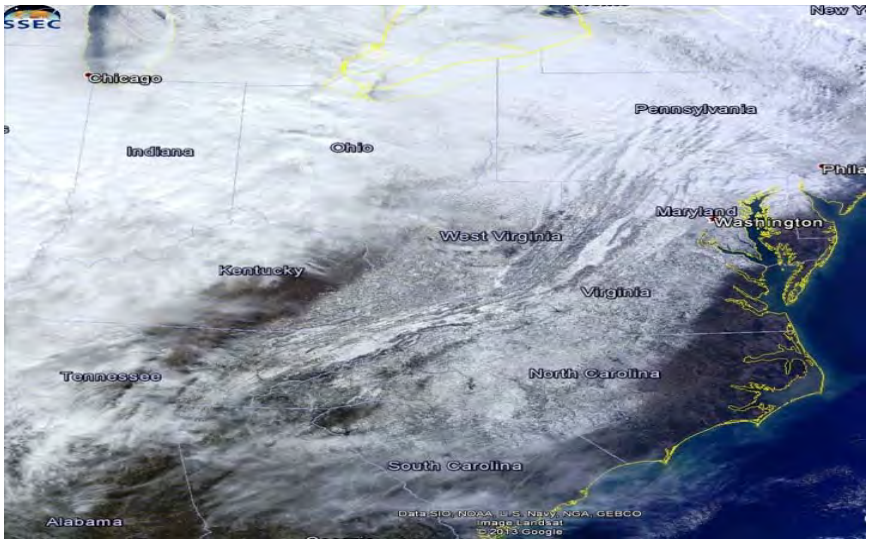

Figure 12. Polar Orbiting Satellite Imagery From February 14, 2014[165]

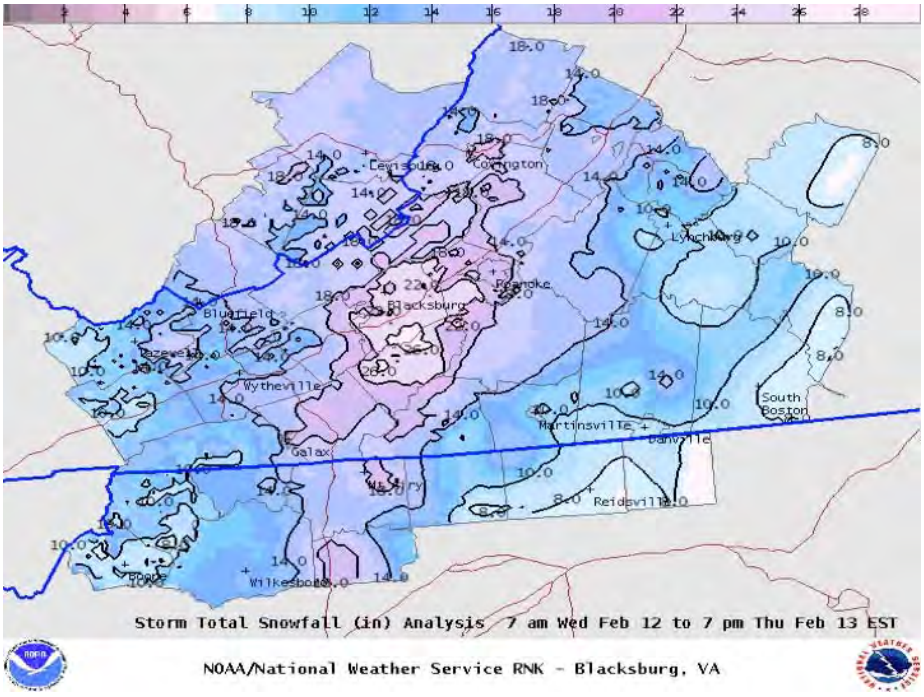

Figure 13. Snowfall Analysis for the Entire Event Ending 7 pm February 13, 2014[166]

165 "Historic Winter Storm" National Oceanic and Atmospheric Administration, February 17, 2014, http://www.erh.noaa.gov/rnk/events/2014/Feb12-13_winterstorm/summary.php

166 Ibid.

This storm resulted from a low-pressure system that moved off of the Virginia coast and interacted with a strong upper level wave, which assisted in creating a zone of heavy snow behind a "deformation zone." This zone contributed to the snowfall amounts by adding to the precipitation and causing the storm to pivot and remain over the Virginia Blue Ridge, New River, and Roanoke Valley regions.[167]

B. VFC RESPONSE TO EXTREME WINTER WEATHER

The VFCs stated mission is centered upon fusing together resources from local, state, and federal agencies and private industry.[168] Through this process, the center was capable of collecting, analyzing, and sharing information intended to increase the likelihood of preventing an attack. This overarching theme is fundamental to their secondary mission to support the Virginia EOC through centralizing information in order to participate in an effective response.[169]

In order to perform its mission the center's main operational units were structured as follows:[170]

- **Request for Information / Criminal Activity Unit** — The RFI unit provides database research assistance criminal case support services to VFC intelligence and public safety partners. This unit also monitors current and historical crime trends and provides cold case support.

- **International Terrorism / Domestic Terrorism Unit** — The terrorism unit collects and analyzes all source data regarding domestic and international terrorism trends and threats with a potential nexus to Virginia in cooperation with federal, state, local, and military partners.

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[167] Ibid.

[168] Lee Miller, "Virginia Fusion Center (VFC)—Secure Commonwealth Panel," Virginia Fusion Center, April 22, 2009, http://static2.docstoccdn.com/docs/72433609/Virginia-Fusion-Center

[169] Ibid.

[170] "Virginia Fusion Center—Table of Organization," (internal document, Virginia State Police Bureau of Criminal Investigation, November 4, 2013); "Virginia Fusion Center—Suspicious Activity Reporting, " Virginia Fusion Center, 2014, https://www.dcjs.virginia.gov/vcscs/training/ThreatAssessmentConference/2014/docs/2012%20SAR%20Flyer.pdf

- **Critical Infrastructure & Key Resources Unit** — The critical infrastructure unit focuses on the identification of key assets and dependencies, analysis of suspicious activity reporting and trend data, and supporting site assessment efforts for steady state operations and special event support

- **Gang Unit** — The gang unit manages gang member information across various databases to identify and analyze emerging threats and patterns from international, homegrown, Hispanic, street, and outlaw motorcycle gang activity in the Commonwealth.

The VFC manages the suspicious activity reporting (SAR) initiative for the commonwealth. The SAR initiative was designed to assist law enforcement line officers in understanding what kinds of suspicious behaviors are associated with pre-incident terrorism activities, documenting and reporting suspicious activity, and protecting privacy, civil rights, and civil liberties when documenting information. In furtherance of this initiative, the VFC houses a Joint Terrorism Task Force that assists in vetting investigative leads prior to entry into the national database.

The center also maintains a watch center that is staffed by member of the VFC staff. The watch officer role is rotational and is not staffed 24 hours a day. For critical incidents that happen outside of staffing hours, members observe an “on call” schedule. The watch center is primarily responsible for information collection and maintaining the center based information-sharing environment. Figure 14 and Figure 15 are representations of VFC sources of information and the subsequent manner in which it flows through the center.

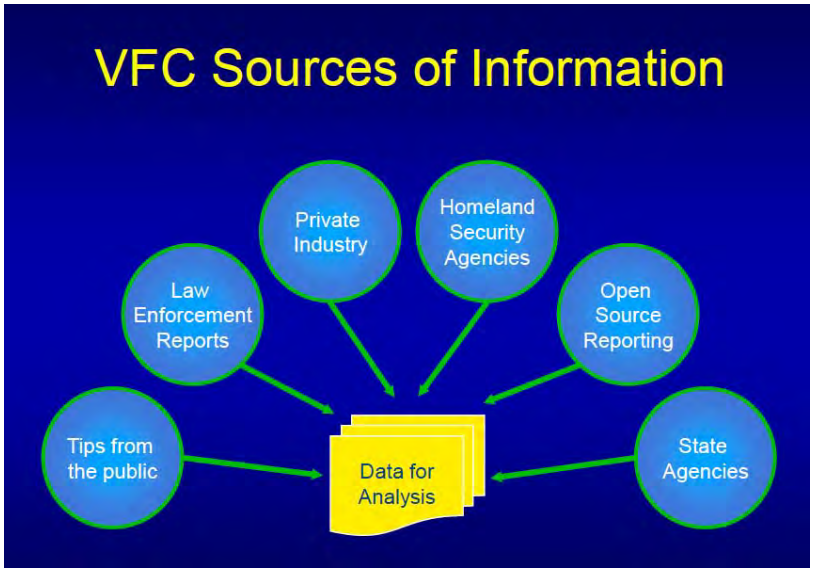

Figure 14. Representation of VFC Information Sources[171]

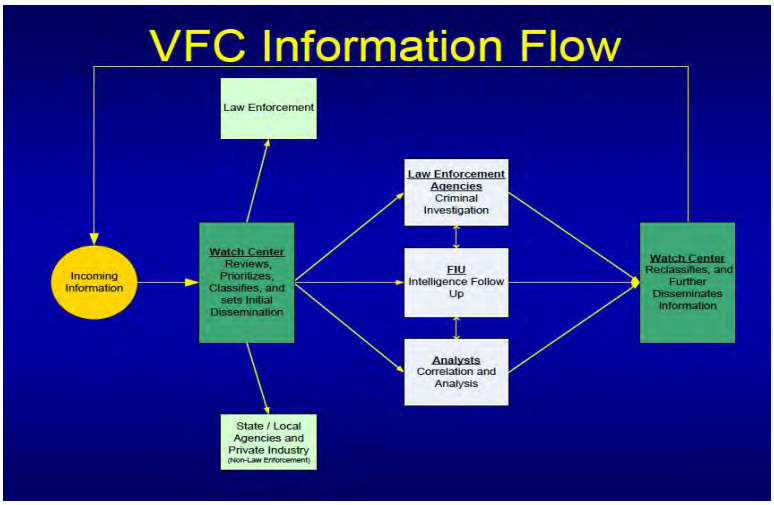

Figure 15. Representation of Information Flow within The VFC[172]

On June 16, 2014, this researcher met with Deputy Director Albert F. Vincent of the VFC at his office in Richmond, Virginia. Deputy Director Vincent provided a factual

[171] "Virginai Fusion Center (VFC)," DocStoc, accessed August, 20, 2014, http://static2.docstoccdn.com/docs/72433609/Virginia-Fusion-Center

[172] Ibid.

description of the operational aspects of the center specific to the centers assistance in the response to the costal snowstorm from February12, 2014.[173] Through that description this researcher learned the following.

> The VFC is connected to the Virginia Department of Emergency Management (VDEM). This relationship has been formalized through an MOU. The MOU codifies the roles for each of the entities. Relevant to this study, the VDEM employs all of the civilian analysts that are not provided by other partner agencies. Although these analysts are VDEM analysts they are assigned to the VFC and placed into one of the units previously identified. Once these members are trained for the requirements of the VFC, they are cross-trained with responsibilities of the VDEM regarding EOC operation.

During the snowstorm of February 12, 2014, the VFC transitioned the VDEM analysts from the VFC to the collocated EOC. The analysts became the point of contact for monitoring all databases related to identified critical infrastructure. This allowed the analysts to monitor and potentially forecast effects created by power outages to other sectors within critical infrastructure. The VFC analysts were also integrated into request management operations in order to deploy assets to the areas of greatest need.

Additionally, the analysts monitored social media websites in order to determine current trends and patterns for the EOC. The analysts were able to focus on "tweets" concerning loss of power and stranded motorist.[174] Through this method, VFC analysts were adding to the common operating picture by geolocating users of social media and generating areas of confluence that assisted in the deployment of resources.

C. CHAPTER SUMMARY

In comparison to the previous two chapters, this disaster is far more pedestrian. This event was included in order to examine the level of collaboration between the fusion center and EOC. Additionally, this incident included the use of an emerging technology by the responders. If this scenario were to have occurred five years prior, there would

[173] Albert Vincent (Deputy Directior, Operation Functions of the Virginia Fusion Center), interview with author, June 16, 2014.

[174] Virginia Department of Emergency Management, *After Action Report—2014-02-12/13 Winter Weather* (Chesterfield, VA: Virginia Department of Emergency Management, 2014).

have been no method to monitor the social media feeds. This forward leaning component of the VFC is an emerging tactic that is evidence of technological appropriation. It is a clear example of seizing “real-time” technology and leveraging it to the advantage of the VFC.

The following chapter will take an amalgam of the case studies and overlay the fusion center responses onto an existing analytical framework. This will assist in reviewing the framework through the use of real-world examples. This analytical procedure may facilitate a discourse regarding fusion center responses. By examining and understanding the challenges faced by fusion center leadership in the cases provided, future leadership may be able to adapt and build upon the concepts and actions utilized toward future events.

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VIII. ANALYSIS

A. INTRODUCTION

The analysis included in this chapter will be based on the framework developed in the federally produced document CPG 502. The net result will be visually represented through a system design model. The previous three chapters provided case studies that factually defined the fusion center responses to natural disasters.

Figure 16. University of Texas Assessment Process[175]

This chapter will examine the sum of those responses through the optics of a four-step process designed to increase coordination and information sharing between EOCs and fusion centers.

This process is akin to the program evaluation method created by the University of Texas. The model includes the creation of a study plan or methodology, data collection, and ultimately the reporting of results. It was designed to holistically examine fusion center response case studies through the metrics of environment, needs, procedures, and outcomes.[176]

The included analysis evaluates the diverse fusion center responses in order to identify and further understand its role. David Brannan Ph.D, Kristen Darken, and Anders Strindberg Ph.D provided a more laconic description of the analytical purpose. In their

[175] "Instructional Assessment Resources," September 21, 2011, University of Texas at Austin, https://www.utexas.edu/academic/ctl/assessment/iar/programs/?step=plan

[176] Ibid.

book, *A Practitioner's Way Forward: Terrorism Analysis*,[177] the analytical purpose was described as follows:

> Analysis is framed critical thought that allows the analyst or researcher to appropriately account for issues of bias, culture, source limitations, existing literature, common fallacies, limited access and challenges of the '*received view*.'[178]

Having a tested method allows the analyst to provide adequate "intellectual bins" to deconstruct narratives, case studies or assertions while critically exploring the relationship of the research subject to an "other." That "other" can be an idea, group, action or thing. Analysis, unlike opinion, is repeatable because it uses a known set of data (such as a case study, event, policy or group profile) and critically considers that data through the articulated methodology.

B. STEP ONE—FAMILIARIZATION WITH CAPABILITIES, NEEDS, AND REQUIREMENTS

An examination of the included case studies, relative to step one, revealed that "no-notice" events have the ability to produce greater levels of complexity than "notice events." The dynamic environments created by the incidents increased the challenges faced by the fusion centers. The common thread woven through the studies was the high level of spontaneity applied by the fusion center commands. The ability to improvise was enabled by the open communications between the fusion centers and the EOCs.

Prior to each event, all of the fusion centers studied were found to be connected to their EOC counterparts. Of the centers studied, the VFC had the most comprehensive relationship due to its incorporation of emergency management personnel into the fusion center. Several VDEM civilian analysts are assigned full time to VFC units. These analysts assume their required VFC duties and then cross-train in the roles and responsibilities of the EOC. This commingling of personnel continues up to the position of deputy director. Despite their mature relationship, the strategy to locate stranded

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[177] David Brannan, Anders Strindberg, and Kristen Darken, *A Practitioner's Way Forward: Terrorism Analysis* (Salinas, CA: Agile Press, 2014).

[178] Ibid.

motorists was devised in an ad hoc manner. Ad hoc solutions were present in all of the studies. These unscripted solutions were made possible through an understanding of the needs and limitations of each center. In all of the cases, fusion center commands amended their response plan based on identified information gaps from the EOCs.

1. Analysis of Ad Hoc Responses

During times of natural disaster in New Jersey, the IWW unit serves as a single voice of information dissemination during a significant event.[179] In addition to distributing situational awareness reports that define the impact of significant events or the potential for such events, IWW unit members perform database entries and queries on critical virtual platforms. These platforms include the Homeland Security Information Network (HISN), National Crime Information Center, and the Broadcast News Network. The IWW unit will also disseminate situational messaging and relevant analytical products through established electronic distribution lists. Between the dates of October 25, 2012 and November 11, 2012, the IWW unit was able to perform over 705 incident specific functions.[180] These functions included the following: circulation of situational awareness reports, resolving requests for information, and collecting "real-time" information from the field. Each of the events studied produced varied levels of communal degradation. Within this variance, the fusion centers applied their collective capabilities and created analytical processes focused on furthering the subsequent response to the incidents. These processes ranged from monitoring social media, assisting with resource management, and partnering with the private sector in order to identify locations where citizens could obtain life sustaining goods and services.

Due to the catastrophic aftermath of Hurricane Sandy, the prearranged response by the NJ ROIC was remodeled in an ad hoc fashion. The original plan only involved the use of the IWW component of the NJ ROIC.[181] As the fusion center command began to

[179] Global Justice Information Sharing Initiative, *Baseline Capabilities for State*.

[180] "NJSP InfoShare Database Spreadsheet" (internal document, New Jersey Regional Operations and Intelligence Center, West Trenton, NJ)

[181] New Jersey Office of Emergency Management, *New Jersey State Hurricane Incident Annex 2013*.

grasp the depth and breadth of the storm's damage, more of the fusion centers resources were activated and dedicated to support impacted areas.

The IAU transformed a daily deliverable analytical product. This product was an overview of the criminal and threat environment for the State of New Jersey. The NJ ROIC *Daily Overview* documented and thematically mapped all instances of gun violence, carjackings, and crime gun recoveries.[182] This overview was also inclusive of suspicious activity reporting and prospective hazards, which included both natural and manmade hazards.[183]

The new product was titled the *Statewide Criminal Activity Related to Hurricane Sandy*.[184] The product was designed to provide a distillation of the statewide criminal environment while focusing on the most impacted regions (Monmouth and Ocean counties). This document went beyond the traditional daily overview and included lesser offenses believed to be related to post-storm activities. The cover included a map with several layers. Each layer was applicable to different constituents. The base layer included a choropleth map indicating power outages in the state. Additional layers included locations of violent crime and post storm related offenses. The report also included the following: crime gun recoveries, reported incidents of crime in affected areas, and storm based criminal intelligence.

In the early stages of distribution, NJ ROIC commanders utilized the document to brief executive leadership, abet criminal information sharing for storm damaged police departments, and detect emerging criminal trends and patterns. Through the collection mechanisms created, the "Sandy Report" began to provide clarity and context in a time of crisis. On October 31, 2012, the *Huffington Post* reported that residents in storm-

[182] "New Jersey Regional Operations and Intelligence Center Daily Overview" (internal document, New Jersey Regional Operations and Intelligence Center Intelligence and Analysis Unit, West Trenton, NJ, December 17, 2013).

[183] Ibid.

[184] "Statewide Criminal Activity Related to Hurricane Sandy" (internal document, New Jersey Regional Operations and Intelligence Center Intelligence and Analysis Unit, West Trenton, NJ, November 3, 2013).

damaged areas were observing wide scale looting of abandoned properties.[185] The IAU leveraged forwarded deployed detectives that were embedded in those specific areas to vet the reports. Although there was evidence of thefts, further scrutiny of those reports revealed isolated incidents of residents "trash picking" from the curtilage of properties.[186] This information was passed to commanders in order to provide them with the "ground truth" of the post-incident domain. This context afforded commanders the ability to refute claims of widespread looting in a published *Star Ledger* story published online and in print.[187]

In early November, the IAU began to detect a pattern of sophisticated copper thefts from power stations in affected regions. The IAU compiled the reports and cross-referenced suspects from similar thefts with similar modus operandi(s). The IAU identified a suspect who was found to be a wanted recidivist offender with a violent criminal history. After the suspect's information was disseminated, he was arrested and charged for the theft of the copper. The criminal intelligence portion of the report provided IAU members the chance to include potential hazards not anticipated by law enforcement. Soon after the storm struck, the majority of resources were assigned to critical issues being faced by first responders. This reality left little room for prevention or forecasting. In support of prevention, the IAU began to record and disseminate to law enforcement partners the locations of firearm dealers reporting extensive storm damage to their facilities. This was not actionable intelligence, but it served as situational awareness to regional law enforcement of the potential for the thefts of large quantities of firearms. This analytical product served as a critical piece of the operating picture for those involved in the response. It clearly defined the criminal environment relative to the storm-impacted areas. It afforded decision makers the ability to deploy resources based on actual need rather than perceived need.

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[185] John Rudolph and Trymaine Lee, "Hurricane Sandy Looters Emerge as New Jersey Floodwaters Recede," *Huffington Post*, October 31, 2012, http://www.huffingtonpost.com/2012/10/31/hurricane-sandy-new-jersey-looters-_n_2052823.htm

[186] Researcher's own experience.

[187] James Queally, "Hurricane Sandy Looters Took from Those Who Lost Everything," November 18, 2912, http://www.nj.com/news/index.ssf/2012/11/hurricane_sandy_looters_took_f.html.

Despite the level of integration, the VFC made the decision with its EOC the decision to exploit social media to locate stranded motorist developed organically. As VFC analysts transitioned to the EOC, their original role was to assist with resource management. The social media monitoring component was an outcropping of their experience from the fusion center. Once the VFC analysts were activated, they identified specific locations of snowbound drivers and offered decision makers the ability to deploy limited resources to areas where they provide the greatest impact.

The CIAC leveraged the MART to produce flash reports that were infused with real-time information from the field. Due to the aggressive nature of fire, this report was continuously updated and disseminated to incident commanders. Due to the pace of production much of the information was considered "raw" and was continually refined and vetted in future iterations.[188] During this incident, it was determined that rapid updates offered greater value than delaying reports through the vetting process. This created the need to caveat the document and limit its distribution. This practice became the standard and was employed during a criminal investigation. When area near Colorado Springs was experiencing small but repetitive fire events,[189] the CIAC was able to generate geo-spatial mapping product that included activity trends based on temporal/ spatial analysis associated with over 6,000 license plate reader entries.[190] The products were provided to the investigative team who followed the leads generated. The creation of the MART took fusion capabilities outside the walls of the fusion center and into the field. This expedited the collection process, which allowed analysts to receive data in real time. As the environment rapidly changed, the MART created a method to capture analytical snapshots of the behavior of the fire.

[188] John.P. Burt (Captain, CIAC Operations and Functions), interview with author, July 10, 2014.

[189] G. C. Sam McGhee, "The Wicked Problem of Information Sharing In Homeland Security—A Leadership Perspective" (master's thesis, Naval Postgraduate School, 2014), https://calhoun.nps.edu/handle/10945/42684

[190] Ibid.

2. Location of Centers

Throughout the crisis states in which the centers operated, both the fusion centers and EOCs were able to effectively communicate. Through an examination of the activation process, it appears that colocation was pivotal to establishing an architecture dedicated to event driven information sharing. In New Jersey and Virginia, the fusion centers and EOCs are collocated in the same building. In Colorado, the CIAC is a distance from the state EOC. During the wildfire season, the CIAC created the MART for the specific purpose of relocating to the EOC in order to fully integrate with emergency managers.

C. STEP TWO—ESTABLISH PARTNERSHIPS

The highlighted disaster response functions performed by the fusion centers were aided by structured relationships with their EOC counterparts. Each fusion center was connected to its EOC through varying means and at varying levels. In Virginia, the two centers are aligned through a formal MOU. This understanding covers personnel and budgetary issues. During the 2012 wildfire season, the CIAC was absorbed into the Colorado Division of Homeland Security and Emergency Management, which placed both centers in to the same hierarchical structure.[191] Finally, the NJ model is distinctive from the majority of states in the U.S. In New Jersey, both the Office of Emergency Management and the NJ ROIC are sections within the NJSP,[192] and enlisted and civilian members of the NJSP staff both of these centers. All of the studied fusion centers report to a governance board, which is inclusive of leaders from a diverse array of government including representation from their EOCs.

D. STEP THREE—DETERMINE THE PROCESS

The fundamental elements of this step are centered upon the exchange of secure information and engaging the broader homeland security enterprise as well as key

[191] Colorado Division of Homeland Security and Emergency Management, *FY 2013 Annual Report*.

[192] "New Jersey State Police," New Jersey State Police, accessed July 11, 2014, http://njsp.org/divorg/homelandsec/ems.html

components of the private sector. Through the research of the fusion center responses it was revealed that all of the centers have mechanisms in place to disseminate secure information to their EOC counterparts. Specifically, in the VFC, cross-trained analysts with secure clearances would have the ability to transition to the EOC and act as conduits of secure information.[193] At the ROIC the IAU, which includes agents from the Federal Bureau of Investigation, would have the ability to analyze and disseminate secure information to IWW. In the event of activation, IWW unit members position themselves within the EOC.[194]

Within this step, the central concept focuses on the maintenance and application of fusion center based liaison programs. All of the fusion centers within this study maintain formal liaison programs. The CIAC and ROIC studies provide an in-depth look at these programs. During the 2012 wildfire season in Colorado, the CIAC became dependent on the strength of the liaison relationships with the EOC. During the season, the CIAC leveraged its TLOs for collection, inquiry, and dissemination.[195] During the creation of flash reports, CIAC analysts obtained real-time information regarding the atmospherics of the rapidly changing fire environment from TLOs in the field.[196] The liaisons were also used to confirm that analytical products were received by allied agencies involved in the incident. TLOs also offer an ability to gain from the collective experience of agency based subject matter experts. Selected individuals from the fire services supported the analytical process by providing expertise and context to the nature of wildfires.

Once Hurricane Sandy subsided, first responders were left to pick up the pieces. Due to the severe damage to costal infrastructure, including governmental buildings, essential services, such as police, fire, and medical were greatly hampered. The ROIC liaison program was innovated in order to meet the needs of responders. The FLIT unit

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[193] Fred Vincent (Deputy Director, Operation Functions of the Virginia Fusion Center), interview with author, June 16, 2014.

[194] New Jersey State Police, *NJ ROIC Taskforce Manual*.

[195] FEMA, *Fusion Center and Emergency Management*.

[196] Ibid.

moved beyond traditional governmental contacts and solidified relationships with private sector partners, such as the casino gaming industry, retail industry, and public utilities. This process began prior to storm landfall. On October 26, 2012, FLIT unit members facilitated the transfer of utility company assets across the U.S./Canadian border in preparation for power restoration.[197] This served the EOC in furthering its resource management requirement.

E. STEP FOUR—TRAINING, WORKSHOPS, AND EXERCISES

The study of the included centers revealed that prior to each of the incidents the fusion centers and EOCs conducted joint exercises. Prior to Hurricane Sandy the ROIC had participated in emergency management exercises but those interactions were limited to the IWW component. The drills usually consisted of tabletop exercises regarding incidents at public utilities. In Virginia, the VFC is mandated to participate in a drill involving the loss and subsequent restoration of power. The VFC and EOC conducted those drills by injecting various severe weather scenarios in order to stress test their response. Contained in CPG 502 is a model of the CIAC's cooperative exercise with their EOC. Through the preparation for the 2008 Democratic National Convention both centers trained toward establishing collaborative roles.

F. CAN A CRUCIAL FUSION ROLE BE DETERMINED?

Prior to answering the central question of this study, the subjective nature of the term "crucial" must be addressed. The *Merriam-Webster* online dictionary website defines crucial as, "important or essential as resolving a crisis."[198] The analysis of the fusion center responses uncovered common trends that were central to studies. These trends translate into important and essential elements. Collectively, these elements create a measurement that identifies the value of the role. The measurement created will not

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[197] New Jersey Regional Operations & Intelligence Center, "Hurricane Sandy Private Sector Assessment Initiative and Interaction," (internal document, New Jersey Regional Operations & Intelligence Center, West Trenton, NJ, 2012)

[198] *Merriam-Webster*, s.v. "Crucial," accessed July 11, 2014, http://www.merriam-webster.com/dictionary/crucial.

have a scientific certainty, it is based on the concept from Douglas Howard's book *How to Measure Anything: Finding the Value of Intangibles in Business*.[199] Howard defined the purpose of measurement as a method to reduce uncertainty. This definition is befitting this social science study due to its qualitative methodology.

The purpose of this study is to determine if fusion centers can play a crucial role in responding to natural disasters through collaborative relationships with EOCs. The preliminary answer to this question is simply "yes." The research demonstrates that fusion centers provide a crucial role but that role is dependent on the collaborative relationship. For example, the majority of fusion center efforts were designed to meet the needs of the EOC. The value and relevance of the analytical products were directly linked to the data obtained by the EOC. The research suggests that the maturation of the national network of fusion centers is shifting toward an all hazards approach. This progression is evidence that existing capabilities can be appropriated to non-traditional functions. For example, throughout the case studies the fusion process was applied to culling data that is foreign to the criminal and threat environment. This data was analyzed and condensed. Ultimately, this added to creating a richer operating picture of the incidents.

From a macro perspective, the crucial role of fusion centers is directly tied to the capacity to foster information sharing. The notion of information sharing is a very broad subject and can be abstract. The specific information sharing aspects found to be crucial were as follows: the application of the fusion process, executive decision support, and resource deployment. Figure 17 is a representation of the critical information sharing attributes related to disaster response.

[199] Douglas Hubbard, *How to Measure Anything: Finding the Value of Intangibles in Business*, 22nd ed. (Hoboken, NJ: Wiley, 2010).

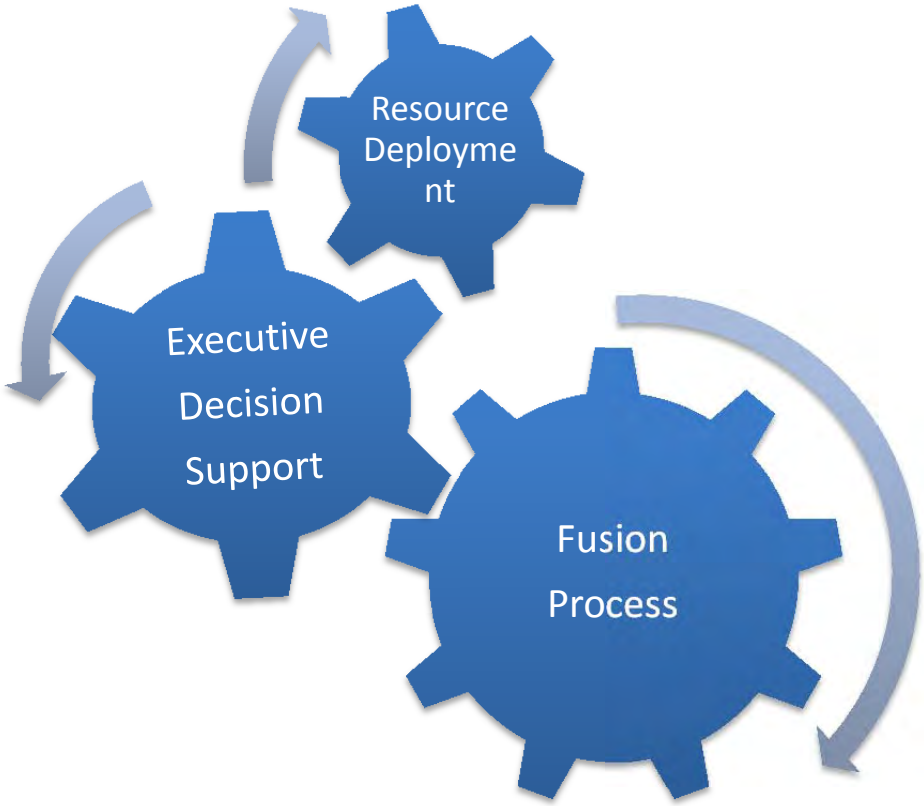

Figure 17. Information Sharing Aspects

The fusion process generally refers to turning information and intelligence into actionable knowledge. This is related to the instances where the fusion centers filtered large sets of data and produced analytical products designed for a wide array of disciplines within the homeland security enterprise. Nested within this process are the mechanisms in which the fusion centers collected data. Through innovative processes and relationships, the centers obtained access to information from non-traditional sources and assisted in creating relevant deliverables to an enterprise wide audience.

In a post-disaster environment, elected officials and executives require thorough decision support. This support should be derived from the common operating picture. Examples of this support are executive briefings that can assist in the creation and management of response strategies. Yi-Ru Chen explored this concept in her thesis “Tell Me What I Need to Know: What Mayors and Governors Want from Their Fusion

Center."[200] In her study, Chen interviewed elected officials from major U.S. cities and states. Through interviews she learned that officials expected briefings to anticipate their needs. She also learned that the greatest value was providing information that could be readily disseminated to the public. The interviewees also expressed the need to establish public trust by avoiding surprises in rapidly changing environments. In a response to a survey question regarding decision-making needs, respondents noted that information should provide "true fusion" and not pass unsynthesized information.[201]

Chen's findings are corroborated by the work of Paul 't Hart, Uriel Rosenthal, and Alexander Kouzmin in their essay, "Crisis Decision Making: The Centralization Thesis Revisited."[202] In the essay, the researchers concluded that crisis events tend to create "explosions of data" these events could lead to "sketchy and ambivalent" reports.[203] Without proper analysis and context, crisis mangers may mislead and make poor decisions.

A repeating theme in the case studies was the ability of the fusion centers to assist in broadening and deepening the shared situational awareness space for the aligned partners. This space was leveraged to provide executives a true account of the disaster environment. In the case of the Colorado wildfire season, the briefing tempo exceeded the CIAC's ability to fully vet all of the information obtained. The CIAC mitigated the release of potentially misleading information through limiting distribution and retracting inaccuracies in future iterations.

In all of the cases, the centers were able to pin point areas that required the deployment of resources. The centers accomplished this through the examination of confluences of data in concentrated regions. This ability allowed decision makers to prioritize need and to make informed decisions prior to committing personnel.

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[200] Yi-Ru Chen, "Tell Me What I Need to Know: What Mayors and Governors Want from Their Fusion Center" (master's thesis, Naval Postgraduate School, 2009).

[201] Ibid., 87.

[202] Paul 't Hart, Uriel Rosenthal, and Alexander Kouzmin, "Crisis Decision Making: The Centralization Thesis Revisited" (Thousand Oaks, CA; Sage Publications, 1993).

[203] Ibid.

G. A SYSTEMS APPROACH TO UNDERSTANDING THE ROLE OF COLLABORATION

The remainder of this chapter will answer the secondary question posed in this study. Should collaborative relationships identified through the case studies endure over a protracted period of time or should they be configured on an ad hoc basis? This question will be addressed by modeling the collaborative components through systems theory. For the purpose of this analysis, the collaborative relationship will be the system modeled. It fits the definition of a system by manifesting sets of interconnected elements that are coherently organized to achieve something. The included model is a visual representation of the fusion center and EOC relationship during a natural disaster. Figure 18 is a visual representation of a collaborative response by fusion centers and EOCs. The figure goes beyond representing the original research question by demonstrating how the incident will ultimately dictate the required connectivity in the cooperative response.

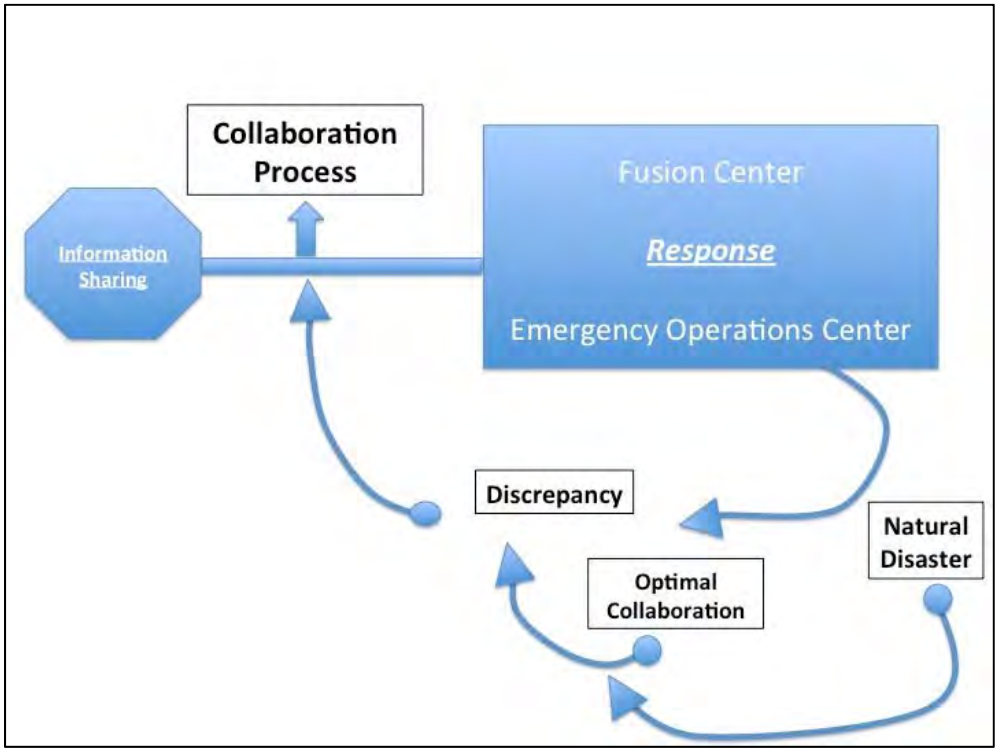

Figure 18. System Design Model of Collaborative Disaster Response

During a disaster, both the fusion centers and EOCs will assume a role in the response. During that response, their collective output is represented in information sharing (previously identified as the crucial outcome). As information sharing is expended the central element will need to compensate for the output. The need to increase optimal collaboration will seek to replenish the main element (fusion center and EOC response). This description of the model has excluded two conditions: discrepancy and natural disaster. Discrepancy accounts for the difference between the current state and the desired state. In Figure 18, the arrows directing toward the empty space are inputs adding to the system. The natural disaster influence will ultimately dictate the tempo of the flow.

The degree of degradation caused by the disaster will directly influence the amount of collaboration required to create the proper response output. As observed in the broad spectrum of incidents studied, the VFC had far fewer challenges than experienced by the CIAC. Conversely, the ROIC had to exceed its preplanned strategy to meet the needs of responders. This analysis may seem intuitive, but it deserves further thought.

The majority of the literature on collaborative relationships focuses on increasing or maintaining current levels regardless of the situation. In certain circumstances, the attainment of optimal collaboration (or any other desired goal) may break the system. Lance Gunderson and C. S. Holling explored this possibility in the book *Panarchy Understanding Transformations in Human and Natural Systems.*[204] In their book, the researchers found that in social systems the accumulating of potential skills, networks of human relationships, and mutual trust can increase to a degree of being over connected and rigid. At these points, an agent of disturbance easily fractures the system. This pattern is clearly illustrated by Figure 19.

[204] Lance H. Gunderson and Crawford Holling, *Panarchy: Understanding Transformations in Human and Natural Systems*, 2nd ed. (Washington, DC: Island Press, 2001).

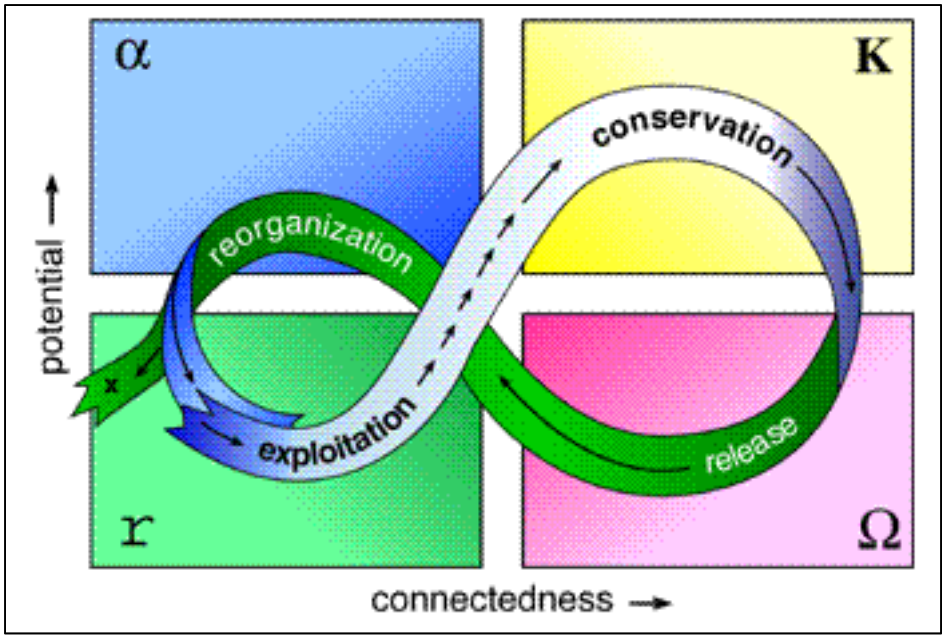

Figure 19. Panarchy Model[205]

This illustration demonstrates that if optimal collaboration begins in the lower left corner of **r** (exploitation), it will continue to grow and solidify to the point of fragility in the lower right corner of **k** (conservation). During the release phase, the fractured components will travel toward reorganization and begin the process again. This concept is extremely relevant to collaborative relationships specifically designed around the response to natural disasters. An example of the threat posed by this theory can be observed in the VFC case study. Imagine if the VFC had only one analyst in the center that had the expertise to data mine social media for stranded motorists. If that individual could not report to work on the day of the incident, the program could not be applied. Although this is a simple example, the perceived benefits of efficiency should be balanced with the cost and security of redundancy.

This approach proposed by Gunderson and Hollings examines the possibility that the level of collaboration should be driven by the nature of the event.[206] The best defense from progressing toward rigidity is adding resilience to the relationship. In the case

[205] Ibid.

[206] Ibid.

studies, a degree of resilience is observed in the VFC. Analyst cross-training is a redundant action. When the VFC assigns them to the EOC in times of crisis, they become force multipliers. If the VFC analysts were forced to assume primary EOC roles, the loss of one individual could hinder the response. This system remains in balance until the incident becomes magnified. For instance, if the Virginia snowstorm involved 100 feet of snow accumulation, all resilience is eliminated and all systems become fragile due to the enormity of the event. In this exaggerated example, the fragility of the fusion center and EOC relationship becomes unimportant since the event is so large all other systems will be breaking. The goal should be to design a level of connection relevant to the scale of the incident. Through mutual exercises, center specific responses can be appropriately modeled in order to retain resilience and maintain flexibility.

The final evaluation of the collaborative role is making conceptual alterations to the original analytical framework used in this study. The original framework was designed symmetrically in an open ended, linear fashion. This depiction of the framework organizes the steps into a loop. The circular design allows the process to continue rather than ending at the final step. This distinction is important, as technology advances or non-sustainable funding streams end. The continued progression through the model will account for these conditions and allow the relationship to acclimate to new realities.

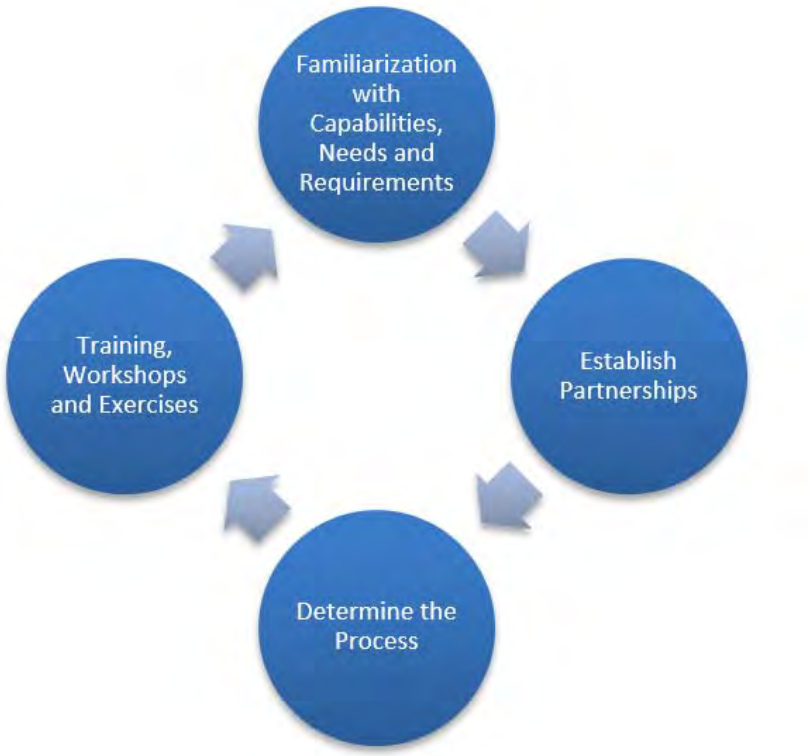

Figure 20. Conversion of The Four-Step Collaboration Process

H. CHAPTER SUMMARY

This chapter analyzed the fusion center responses in order to definitively answer the research question. Although the answer may seem intuitive, this study provides evidence to defend the finding of information sharing as the crucial role fusion centers can play in disaster response. Additionally, the findings regarding the secondary question delve into an area outside the scope of the majority of relevant literature. The next chapter will list the study's findings, present a conclusion, and offer recommendations that are designed to increase information sharing while not diminishing resiliency.

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IX. FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

A. FINDINGS

This study was designed to determine if the fusion center could play a crucial role in responding to natural disasters collaboratively with EOCs. This question becomes pertinent when considering that the maturing national network of fusion centers is gradually shifting toward an all hazards approach. As a result of this shift, fusion centers have become more involved in disaster response and are venturing into the domain once solely occupied by emergency managers. Prior to initiating this inquiry, this researcher observed firsthand the role a fusion center played during a natural disaster. This spurred further thought about the nature of fusion center responses.

- Do all fusion centers have disaster response capabilities?
- Is there a way to measure the value of the response?
- What can fusion centers add to the response effort?

The research on this subject revealed that natural disasters are complex issues involving dynamically changing environments that require comprehensive responses. Traditionally, the mitigation of these disasters has been the responsibility of emergency managers. In order to properly direct and control the actions of personnel, emergency managers have created EOCs. Through these centers emergency managers have drafted policies and practices to maximize resources and assets. The fusion centers were originally conceived around the notion of preventing future terrorist attacks. In recent years, the emergence of fusion centers has created the opportunity to enhance their mission by incorporating new processes. These centers began to grow in numbers until forming a national network. As the network expanded, so did their purpose. Individual centers matured from threats to applying their processes toward criminal environments. Fusion centers continued to adapt and took on an all hazards approach.

Once fusion centers opened their capabilities to the threat of natural disasters, their missions began to intersect with those of emergency managers. In an effort to maximize the effectiveness of the collective effort, leaders in both fields have been

working on methods to construct cooperative relationships. Through smart practices, national guidance, and the creation of common lexicons, EOCs and fusion centers are seeking to identify the proper breadth and depth of integration.

B. RECOMMENDATIONS

This study has shown that the fusion center's information sharing capability can serve as a resource for the EOC to draw upon during disaster responses. This section includes several strategic recommendations to mature collaborative relationships in order to generate timely and relevant information worthy of sharing. In considering the recommendations, it is important to note that the sheer size of this nation contributes in creating a diverse natural threat profile. This variance is also present in how threats are mitigated. Despite the fact that most EOCs utilize the ESF format, there are a myriad of manners in which they implement the function. What has become evident is that there is no "one size fits all" solution. These recommendations are strategic rather than tactical. Moreover, they will all stem from ways to enrich communication in order to allow data to flow and ultimately be fused. Their design accommodates the dissonant manners in which the centers operate and relate to one another during an active state environment.

1. Role and Function of Intelligence in the EOC

The case studies have identified specific instances where the intelligence role has been inserted in an ad hoc or incident specific manner. The manner in which the EOC performs during a disaster is based on a system of systems. Emergency managers should seek to understand the role of intelligence and formally place the component within a system of the EOC. This process should be decided at regional or local levels. As in most emergency management principles, the intelligence component is scalable to the needs of the situation. It is conceivable that this element may manifest as a command function, support annex, or section. It is more important for the component to be incorporated to the EOC than focusing on a national standard for organizational charts.

Once the role is established it can be exercised through disaster based scenarios. With the exception of a "black swan" event the EOCs will coordinate with their regional

fusion center. As the relationships mature it will create a trusting environment that will permit the free exchange of data and information.

2. Fusion Center Menu of Services

Through the case studies, informal discussions with colleagues, and personal experience some of the main inhibitors to collaborative functions is a lack of understanding of capabilities. The emergence of fusion centers is relatively new. This, coupled with the recent attention given to the notion of intelligence applications for disasters, may present itself as a fad or short-term point of emphasis. Fusion centers should develop a menu of services relative to the standing information needs or essential elements of information required by an EOC during an active state response. A common menu can be shared throughout the national network, but each center should maintain an individual list. This individual requirement is founded on the reality that each center is unique and distinct. Although all of the fusion centers are collectively measured by critical operational capabilities and enabling capabilities, the operational tempos are proprietary to individual centers.

3. Leveraging Common Communication Platforms

EOCs and fusion centers each have a set of commonly used virtual platforms designed explicitly for their function. During periods of activation, the centers should have a fundamental understanding of web-based resources that may serve to add to their collection, dissemination, and analytical duties. The systems that have a common nexus to both centers, are free of cost, and only require basic training to perform query functions.

a. HISN

The Homeland Security Information Network (HISN) is a trusted network within the homeland security enterprise. It affords the sharing of sensitive but unclassified information. The system allows partners use to manage operations, analyze data, send alerts and notices, and in general, share information to a community of interest. One of the most applicable functions of HISN is its connect application. This feature affords an

entire community to conduct virtual briefings that are inclusive of live video feeds. This feature has assisted response personnel in relaying the visual impact of disaster areas. The combination of traditional data collection methods combined with the live video feed can greatly enhance the assessment process. This feature has been extended for use mobile devices. Figure 21 and Figure 22 are screen shots of HISN information sharing platforms.

Figure 21. Example of HISN Connect through a HISN Case Study[207]

Figure 22. Example of HISN Situation Room HISN Case Study[208]

[207] U.S. Department of Homeland Security, "Homeland Security Information Network."

[208] Ibid.

b. Next-Generation Incident Command System

The Next-Generation Incident Command System (NICS) is a mobile, web-based command and control virtual environment for dynamic incidents. It was created to assist first responders in properly defining the operating environment. It provides first responders the ability to collaborate by mutually building a common operating picture through the creation of digital diagram of the incident. This diagram is then available to all responders, who then can modify the image as the incident changes. The major advantage to NICS is that it is visually based rather than text based. All of the features of the program can be accessed through smart phones and mobile devices. NICS is a non-proprietary, open community project that is free of cost for users. Figure 23 is an example of a user modified NICS map.

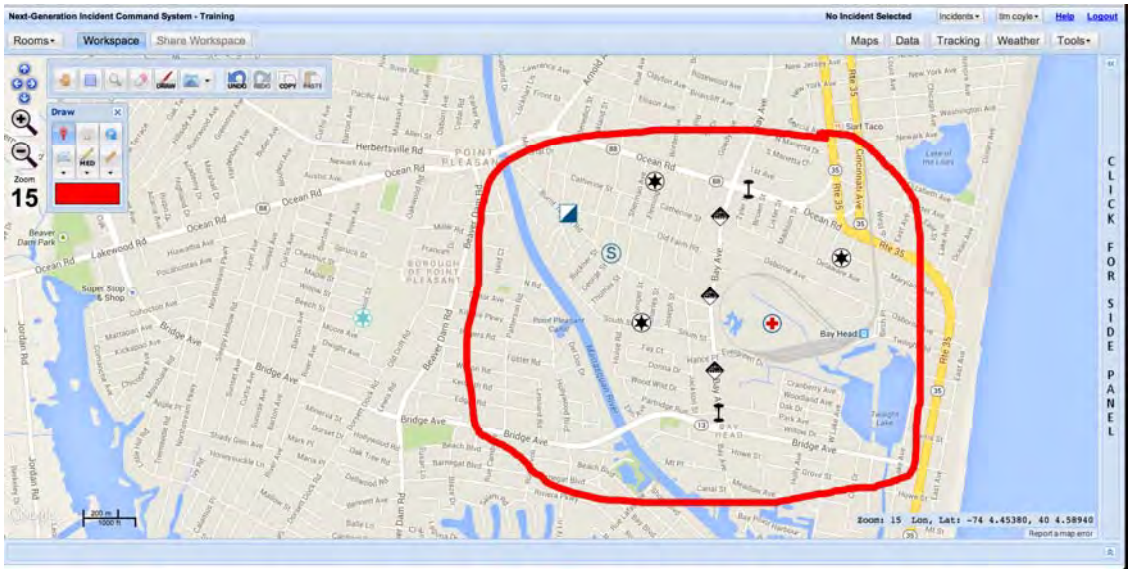

Figure 23. Example of NICS Map[209]

4. Collaborative Focused Conferences

Through a series of scheduled collaboration based meetings, practitioners can meet in order to discuss current challenges and enable trends to collaborative relationships. Through presentations, center personnel can begin to build upon smart

[209] Web based NICS map.

practices created from cooperative responses to events. The meetings serve as an in person exchange of discipline based information. These conferences can also be a method of informal networking between personnel from distant regions with similar threat profiles.

In March of 2014, DHS, National Fusion Center Association, Naval Postgraduate School, and National Emergency Management Association held a collaboration meeting in New Orleans, Louisiana. The meeting took place over several days and included over 68 members of the fusion center and emergency management community. The stated purpose of this meeting was to provide a common understanding of the roles each center plays and how creating a collaborative environment would assist in protecting the homeland.[210]

C. CONCLUSION

Our society has advanced toward a state of heavy reliance on interconnectivity through technology and modern conveniences. This reality can strain resources in a steady state environment. When disruptive events occur, they can paralyze a community, region, or nation. A major challenge faced by emergency responders is returning impacted areas back to a normative condition. This study nests in the space between the event and the period when recovery begins. Emergency managers can benefit from the role of fusion centers in the response phase. The research has shown that the processes of the fusion center have assisted in creating a more thorough operating picture. In reality, this picture is a mosaic created through synthesizing data by analysis. From this picture, incident related information becomes consumable to stakeholders. These groups include decision makers, field personnel, and the community. In the wake of disasters, information becomes a perishable commodity due to the fluidity of a situation. Through the proper engagement of fusion centers, the picture can be refreshed with relevant information that can be a sound foundation for mitigation strategies.

[210] FEMA, *Fusion Center and Emergency Management*.

The secondary question of this thesis developed into a thought that is outside the scope of much of the relevant literature. In viewing the concept of collaboration, it would appear that by putting the right people together, problems would begin to solve themselves. The research has shown that in order to maximize collaborative relationships, effort must be spent beyond the planning phase and into the function of the initiative. Collaboration is not a "one size fits all" or "plug and play" operation. The amount and duration of these relationships should be directly associated to the driving disaster influence. Furthermore, once these relationships are active, a basic level of redundancy must be preserved. An unintended consequence of optimization is fragility. In the specific case of collaboration, over connectivity between partners can cause the system to crack when it is needed most.

This thesis sought to study the potential role for fusion centers related to natural disasters. Through research this question was answered as well as a secondary question regarding cooperative partnerships. Ultimately, this thesis should serve as a basic reference for fusion center responses. It can offer inspiration for the creation of policy or assist in the early planning stages of a pending incident. Although this thesis applied the tenets of social science, its intended audience goes beyond academia. This study was originated by considering what would most benefit practitioners in the field, especially when those practitioners are faced with enormous challenges such as natural disasters. This study goes beyond a "how to" guide, it provides readers a distillation of the pertinent literature, presented current case studies, and applied an emergency management based framework to the current trend of collaborative relationships. A lasting tribute to this thesis is not maintaining a space on a library shelf. It is better suited lying on the corner of a fusion center conference table, covered in coffee stains with frayed edges. This study should be used to further conversations between the two centers by going beyond anecdotal success stories through the examination of research in the topic area.

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LIST OF REFERENCES

Allen, Thad. "Confronting Complexity and Creating Unity of Effort: The Leadership Challenge for Public Administrators." *Public Administration Review* 72, no. 3 (2012): 320–21. doi:10.111/j.1540-6210.2912.

Bar-Yam, Yaneer. *Multiscale Representation Phase I*. New England Complex Systems Institute. 2001. http://www.necsi.edu/research/multiscale/SSG_NECSI_1_CROP.pdf.

Brannan, David, Anders Strindberg, and Kristen Darken. *A Practitioner's Way Forward: Terrorism Analysis*. Salinas, CA: Agile Press, 2014.

Bratton, William J., and Zachary Tumin. *Collaborate or Perish!: Reaching across Boundaries in a Networked World*. New York: Crown Business, 2012.

Camarinha-Matos, Luis. "Fair Distribution of Collaborative Benefits." In *Encyclopedia of Networked and Virtual Organizations,* edited byMaria Manuela Cruz-cunha, 601–607. Hershey, PA: Information Science Reference, 2008.

Cetindamar, Dilek, Bülent Çatay, and O. Serdar Basmaci. "Competition through Collaboration: Insights from an Initiative in the Turkish Textile Supply Chain." *Supply Chain Management: An International Journal* 10, no. 4 (2005): 238–40. doi:10.1108/13598540510612686.

Chen, Yi-Ru. "Tell Me What I Need to Know: What Mayors and Governors Want from Their Fusion Center." Master's thesis, Naval Postgraduate School, 2009.

Colorado Division of Homeland Security & Emergency Management. *State Emergency Operations Plan*. 2010. http://dhsem.state.co.us/emergency-management/operations/state-emergency-operations-plan.

"Colorado Information Analysis Center." *Colorado Sheriff* XXIX, no. 1 (2008, summer): 23–24. http://www.csoc.org/documents/magazine/COSheriffSummer08.pdf.

Davidson, Joe. "As Federal Workers Provide Sandy Relief, Obama Says 'No Red Tape.'" *The Washington Post*, October 31, 2012. sec. Local. http://www.washingtonpost.com/local/as-federal-workers-provide-sandy-relief-obama-says-no-red-tape/2012/10/30/3823ecc6-22c7-11e2-8448-81b1ce7d6978_story.html.

Division of Homeland Security and Emergency Management Colorado Department of Public Safety. *Colorado Natural Hazards Mitigation Plan*. Denver, CO: State of Colorado, 2013.

Federal Emergency Management Agency. *CPG 502 Considerations for Fusion Centers and EOC Coordination*. 2010. http://www.fema.gov/media-library/assets/documents/25970.

———. *Developing and Maintaining Emergency Operations Plans, Comprehensive Preparedness Guide 101*, version 2. Washington, DC: Federal Emergency Management Agency, 2010.

———. *The Federal Emergency Management Agency Publication 1*. 2010. https://www.fema.gov/pdf/about/pub1.pdf.

———. *Fusion Center and Emergency Management Collaboration Meeting after Action Report*. Washington, DC: Federal Emergency Management Agency, 2014.

———. *NIMS Intelligence/Investigations Function Guidance and Field Operations Guide*, 2013. http://www.fema.gov/media-library-data/1382093786350-411d33add2602da9c867a4fbcc7ff20e/NIMS_Intel_Invest_Function_Guidance_FINAL.pdf.

Fidel, Raya. "The Case Study Method: A Case Study." University of Washington. 1984. http://faculty.washington.edu/fidelr/RayaPubs/TheCaseStudyMethod.pdf, 273.

Frost & Sullivan. "Meetings around the World: The Impact of Collaboration on Business Performance." Verizon Business. March 2006. https://e-meetings.verizonbusiness.com/maw/pdf/MAW_white_paper.pdf.

German, Michael, and Jay Stanley. "What's Wrong with Fusion Centers?" American Civil Liberties Union. 2007. https://www.aclu.org/files/pdfs/privacy/fusioncenter_20071212.pdf.

Global Justice Information Sharing Initiative. *Baseline Capabilities for State and Major Urban Area Fusion Centers, A Supplement to the Fusion Center Guidelines.* Washington, DC: Global Justice Information Sharing Initiative, 2008). https://www.fema.gov/pdf/government/grant/2010/fy10_hsgp_fusion.pdf.

Gunderson, Lance H., and Crawford Holling. *Panarchy: Understanding Transformations in Human and Natural Systems,* 2nd ed. Washington, DC: Island Press, 2001.

Hocevar, Susan, Gail Fann Thomas, and Erik Jansen. "Building Collaborative Capacity: An Innovative Strategy for Homeland Security Preparedness." *Advances in Interdisciplinary Studies of Work Teams* 12 (October 2006): 255–74. doi:10.1016/S1572-0977(06)12010-5.

Hubbard, Douglas. *How to Measure Anything: Finding the Value of Intangibles in Business*. 22nd ed. Hoboken, NJ: Wiley, 2010.

Huffington Post. "Colorado Wildfires 2012: Stunning NASA Map Shows Severe Heat Wave Fueling Wildfires." June 30, 2012. http://www.huffingtonpost.com/2012/06/30/waldo-canyon-fire-2012-st_n_1639836.html

Joyal, Renee Graphia. "How Far Have We Come? Information Sharing, Interagency Collaboration, and Trust within the Law Enforcement Community." *Criminal Justice Studies* 25, no. 4 (2012): 357–70. doi:10.1080/1478601X.2012.728789.

Kaucu, Niam. "The Role of the Public Sector in Managing Catastrophic Disasters: Lessons Learned." *Administration & Society* (2006): 38, no. 3, 279–308. http://62.219.84.197/data/uploads/Articles%20and%20Reports%20from%20other%20organizations/20080518%20-%20The%20Role%20of%20the%20Public%20Sector.pdf.

Kiel, L. Douglas. "Chaos Theory and Disaster Response Management: Lessons for Managing Periods of Extreme Instability." In *Proceedings What Disaster Response Management Can Learn from Chaos Theory*, edited by Gus A. Koehler. May 1995. https://www.library.ca.gov/CRB/96/05/over_12.html.

Loan-Clarke, J., and D. Preston. "Benefits of Research Collaboration." Eastern Michigan University. 2002. http://www.rcr.emich.edu/module9/i4_benefits.html.

McGhee, G. C. Sam. "The Wicked Problem of Information Sharing In Homeland Security—A Leadership Perspective." Master's thesis, Naval Postgraduate School, 2014. https://calhoun.nps.edu/handle/10945/42684.

McGhee, Tom. "4,167 Colorado Wildfires Caused Record Losses of $538 Million in 2012." *The Denver Post*, January 17, 2013. http://www.denverpost.com/ci_22396611/4-167-colorado-wildfires-caused-record-losses-538.

McLean, Ian, David Oughton, Stuart Ellis, Basil Wakelin, and Claire Rubin. "Review of the Civil Defence Emergency Management Response to the 22 February Christchurch Earthquake." June 29, 2012. http://www.civildefence.govt.nz/memwebsite.nsf/wpg_URL/For-the-CDEM-Sector-Publications-Review-of-the-Civil-Defence-Emergency-Management-Response-to-the-22-February-Christchurch-Earthquake.

Meadows, Donella. *Thinking in Systems: A Primer*. White River Jct., VT: Chelsea Green Publishing, 2008.

Militello, Laura G., Emily Patterson, Lynn Bowman, and Robert Wear. "Information Flow during Crisis Management: Challenges to Coordination in the Emergency Operations Center." *Cognition, Technology & Work* 9, no. 1 (2007): 25–31. doi:10.1007/s10111-006-0059-3.

National Commission on Terrorist Attacks upon the United States. *The 9/11 Final Report of the National Commission on Terrorist Attacks upon the United States*. New York: Norton & Company, 2004.

National Interagency Coordination Center. *Wildland Fire Summary and Statistics Annual Report 2012*. 2012. http://www.predictiveservices.nifc.gov/intelligence/2012_statssumm/annual_report_2012.pdf.

New Jersey Office of Emergency Management. *New Jersey State Hurricane Incident Annex 2013*. West Trenton, NJ: New Jersey Office of Emergency Management, 2013.

New York Times. "Where to Live to Avoid a Natural Disaster." April 30, 2011. http://www.nytimes.com/interactive/2011/05/01/weekinreview/01safe.html?_r=0.

Perry, Ronald W. and E. L. Quarantelli. *What Is A Disaster? New Answers to Old Questions*. Philadelphia, PA.: Xlibris, Corp., 2005

Rollins, John. *Fusion Centers: Issues and Options for Congress* (RL34070). Washington, DC: Congressional Research Service, 2008). http://www.fas.org/sgp/crs/intel/RL34070.pdf.

Rudolph, John, and Trymaine Lee. "Hurricane Sandy Looters Emerge as New Jersey Floodwaters Recede." *Huffington Post*, October 31, 2012. http://www.huffingtonpost.com/2012/10/31/hurricane-sandy-new-jersey-looters-_n_2052823.htm.

Sagarin, Rafe. *Learning from the Octopus: How Secrets from Nature Can Help Us Fight Terrorist Attacks, Natural Disasters, and Disease*. Jackson, TN: Basic Books, 2012.

Scanlon, Joseph. "The Role of EOCs in Emergency Management: A Comparison of American and Canadian Experience." *International Journal of Mass Emergencies and Disasters*. 12, no. 1 (1994): 51–57.

Schoenenberger, Lukas, Andrea Schenker-Wicki, and Mathias Beck. "Analyzing Terrorism from a Systems Thinking Perspective." *Perspectives on Terrorism* 8, no. 1 (2014): 16–36.

Shouldis, William. "The Emergency Operations Center: A Vital Preparedness Tool." *Fire Engineering* 163, no. 5 (2010). http://www.fireengineering.com/articles/print/volume-163/issue-5/Features/the-emergency-operations-center-a-vital-preparedness-tool.html.

Snowden, David, and Mary Boone. "A Leader's Framework for Decision Making." *Harvard Business Review*. November 2007.

‘t Hart, Paul, Uriel Rosenthal, and Alexander Kouzmin. “Crisis Decision Making: The Centralization Thesis Revisited.” Thousand Oaks, CA; Sage Publications, 1993.

U.S. Department of Justice. *Fusion Center Guidelines, Developing and Sharing Information and Intelligence in a New Era*. 2006. https://it.ojp.gov/documents/fusion_center_guidelines_law_enforcement.pdf.

U.S. Department of Health & Human Services. *Public Health Emergency, Emergency Support Functions*. Last modified February 14, 2012. http://www.phe.gov/Preparedness/support/esf8/Pages/default.aspx#eme.

U.S. Department of Homeland Security. *2012 National Network of Fusion Centers Final Report*, June 2013. http://www.dhs.gov/sites/default/files/publications/2012%20National%20Network%20of%20Fusion%20Centers%20Final%20Report.pdf.

———. *2013 National Network of Fusion Centers Final Report*. June 2014. http://www.sheriffs.org/sites/default/files/uploads/2013%20National%20Network%20of%20Fusion%20Centers%20Final%20Report.pdf.

———. “Fusion Center Locations and Contact Information.” January 31, 2014. http://www.dhs.gov/fusion-center-locations-and-contact-information.

———. *National Incident Management System*. Washington, DC: Department of Homeland Security, 2008.

———. *National Response Framework*. Washington, DC: Department of Homeland Security, 2008.

———. *Presidential Policy Directive 8: National Preparedness*. 2011. http://www.dhs.gov/presidential-policy-directive-8-national-preparedness

U.S. Department of Homeland Security, Office of Inspector General. *Relationships between Fusion Centers and Emergency Operations Centers*. OIG-12-15. 2011. http://www.oig.dhs.gov/assets/Mgmt/OIG_12-15_Dec11.pdf.

Virginia Department of Emergency Management. *After Action Report—2014-02-12/13 Winter Weather*. Chesterfield, VA: Virginia Department of Emergency Management, 2014.

———. *2012 Commonwealth of Virginia Emergency Operations Plan*. 2012. http://www.vaemergency.gov/em-community/plans/2012COVEOP.

Waugh, Jr., William L. and Gregory Streib. “Collaboration and Leadership for Effective Emergency Management.” *Public Administration Review* 66 (2006, December): 131–40. doi:10.2307/4096577.

Weiss, Jeff, and Jonathan Hughes. “Want Collaboration?” *Harvard Business Review*, March 1, 2005.

Zaheer, Akbar, Bill McEvily, and Vincenzo Perrone. “Does Trust Matter? Exploring the Effects of Interorganizational and Interpersonal Trust on Performance.” *Organization Science* 9, no. 2 (1998): 141–59. doi:10.1287/orsc.9.2.141.

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