THE USE OF NETWORKS TO CONNECT LOCAL EMERGENCY OPERATIONS CENTERS

By

ELIZABETH A. HARRIS

Bachelor of Science in Political Science

Oklahoma State University

Stillwater, OK

2007

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF ARTS
July, 2009

THE USE OF NETWORKS TO CONNECT LOCAL

EMERGENCY OPERATIONS CENTERS

Thesis Approved:

Dr. Brenda Phillips

Thesis Adviser

Dr. David Neal

Dr. Anthony Brown

Dr. A. Gordon Emslie

Dean of the Graduate College

ACKNOWLEDGMENTS

I would like to use this space to thank all the individuals and organizations that supported me throughout the process of researching and writing. This thesis would not have been possible without the guidance and support of my advisor Dr. Brenda Phillips. She not only provided research and writing suggestions, but she also provided encouragement and a sounding board when I needed them most. I would also like to thank my other committee members, Dr. David Neal and Dr. Anthony Brown, for their help during the process. I would also like to thank the faculty and staff of the Political Science Department at Oklahoma State University for their instruction and support during both my undergraduate and graduate career.

In addition to the academic support system mentioned above, I would like to thank my personal support system. I would like to thank my parents and brothers who have been patient with me throughout not only the thesis writing process but also life in general. Also, this would not be possible without the love and support I received from family that passed before they could see this achievement. I can only hope they are looking down smiling. The impact of the constant stream of fun and laughter provided by my friends and fellow graduate students cannot be overestimated in this process. I thank them for helping to balance my life. Last and certainly not least, I would like to thank the baristas at both Aspen Coffee Company, Stillwater, OK and Jude's Health and Java House, Bartlesville, OK for keeping me in caffeinated beverages, pumpkin bread, and cinnamon rolls over the last few months.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER I

INTRODUCTION

Emergency management in the United States has evolved over the past century into a complex network of organizations and relationships that spans all levels of government and the private sector. Generally, emergency management can be defined as "managerial strategies directed toward coping with emergencies, regardless of their cause, duration, scope, or frequency" (Drabek, Tamminga, Kilijanek, & Adams, 1981, p. 4). Those managerial strategies can be classified by the phase in which they are implemented: mitigation, preparedness, response, and recovery. Mitigation activities are those activities that are meant to reduce the impact of an event (Clary, 1985). Mitigation activities include public education and building codes. Preparedness activities are enacted prior to an event and meant to help manage the event (Clary, 1985). Preparedness includes putting warning systems and emergency plans in place. Response activities are those activities under taken during and immediately after an event (Clary, 1985). Response includes activities such as search and rescue operations and sheltering. Recovery activities are those long-term reconstruction and normalization projects that occur after response (Clary, 1985). It is important to remember that the boundaries between the four phases of emergency management are neither as distinct nor as simple as presented here. They each include a wide range of activities that are necessary to

manage a disaster event. They may also influence each other (Clary, 1985; Lewis, 1988; Mileti, 1999; Waugh Jr. & Sylves, 2002).

In the United States' system of federalism, the lowest level of government will respond to an incident. In the case of emergency response, this is local government, which can include municipal government, county government, or special district government (Waugh Jr., 2007a). The focus of this paper is how local governments interact using networks to respond to a multijurisdictional event. Emergency events rarely affect a single local jurisdiction, so it is important to understand how local governments interact during the response phase (Rubin, 2007). In many communities special entities such as colleges and universities add another level of complexity to the interorganizational nature of emergency response. A university adds another level of complexity because they present a unique set of concerns including science labs and large spectator events such as athletic events. These entities also include large residential populations that must be considered during an emergency event. Another factor that leads to greater complexity is that public universities are not considered to be jurisdictions. They are considered state agencies in many instances. Because of these factors, the relationship between a municipal government and the university located within its jurisdiction represents a unique interorganizational relationship that must be considered during response. To date there has been little to no research regarding this unique relationship. The research presented in this paper hopes to fill this gap in the research by describing one city-university relationship in a case study.

The significance of this research is that it begins to describe another facet of emergency response in the U.S. Despite the uniqueness of the relationship between a

municipality and a university, the way each responds to an emergency event is likely to be influenced by the same factors. Local government response can be defined by two sets of demands: agent-generated demands and response-generated demands (Dynes, Quarantelli, & Kreps, 1981; Lewis, 1988; Rotanz, 2007). Agent-generated demands are dependent on the type and scope of the event. They also depend on the values, norms, and available technology of the community (Lewis, 1988). Agent-generated demands occur both before and after the impact of an event. Pre-impact agent-generated demands begin with warning. Many events allow for some time to warn citizens of the intensity, duration, and scope of the event (Dynes et al., 1981). Warnings are used to lessen human and property loss of the event. The second pre-impact agent-generated demand is pre-impact preparations. Pre-impact preparation occurs after a warning has been issued. Activities included in this demand can include preparing resources, activating emergency operations plans, and taking steps to limit the damage of the event (Dynes et al., 1981). The final pre-impact agent-generated demand is evacuation, which is an extension of pre-impact preparation (Lewis, 1988).

Post-impact agent-generated demands include activities to begin to the normalization process. The first of these demands is search and rescue. Search and rescue involves locating, rescuing, and transporting trapped citizens (Dynes et al., 1981). Another post-impact agent-generated demand is the care of the injured or dead. Activities under this demand include moving injured rapidly away from the scene of the event, setting up a triage system, removing the dead, identifying the dead, notifying the family of the dead, certifying cause of death, releasing bodies to family members, and burial (Dynes et al., 1981). Welfare demands – a post-impact agent-generated demand –

are activities to provide food, clothing, shelter, and other basic needs to those affected by an event (Dynes et al., 1981). The restoration of essential community services is also a post-impact agent-generated demand. In order for a community to effectively respond to and recover from an event, it must restore gas, power, water, and transportation systems to minimum functioning levels (Dynes et al., 1981). In addition to providing assistance to citizens and restoring essential functions, there are two agent-generated demands to provide protection. The first of these demands is protection against continuing threats. After the impact of an event, hazards such as damaged buildings, downed power lines, aftershocks, rockslides, and fire are created as a result of the event (Dynes et al., 1981). There is also the demand to protect or maintain community order, which includes guarding property, directing traffic, and ensuring that resources are used for the public good (Dynes et al., 1981).

Response-generated demands are different than agent-generated demands in that they are not unique to the event (Rotanz, 2007). This more general set of demands will be faced in all types of events and throughout the response period (Lewis, 1988). The first response-generated demand is communications. Communications are necessary for and effective emergency response because information is important to every action taken during the event (Dynes et al., 1981). Information about the nature of the event, the impact area, resources needed in the field, resources available, and other information are necessary to meet event-generated demands. Effective communications and information flow are also important to coordinating the response. It cultivates good relationships between the government and the public, within the government, and also between different response organizations (Dynes et al., 1981). Information is also important to

maintaining situational awareness, which is another response-generated demand. Response organizations are under constant pressure to be aware of how the response is progressing. This involves information about which organizations have been dispatched, what resources are available, what resources have been requested and by whom, what resources have been authorized and to whom, and what actions have been taken (Dynes et al., 1981). Without this information response organizations will not be prepared to take the next action. The demand for situational awareness is constant because the context of the event is ever changing. In other words, the response effort is ever changing. In every event, human and material resources will be mobilized and utilized, which makes it a response-generated demand (Dynes et al., 1981). In terms of human resources, organizations active in response must recruit, train, and mobilize its members and/or volunteers. Material resources must be acquired, inventoried, maintained, and allocated in an effective way (Dynes et al., 1981). This is also a constant demand because as resources are allocated and new requests are logged the inventory of human and material resources must be updated and reviewed.

The demands discussed thus far involve some need for coordination (Dynes et al., 1981). This response-generated demand is needed for effective collective action to take place during the response phase. In order for effective response to occur many organizations and individuals must work together to meet the demands discussed previously. These actors may even be called upon to perform duties that are outside their everyday mission, but because they have the resources or skill-set necessary they are called on. For this to occur there must be some coordination. Coordination is also necessary in the request and allocation of resources. In order for coordination to occur,

there must be some sense of control and authority between response actors (Dynes et al., 1981; Wenger, Quarantelli, & Dynes, 1986). In other words, there must be a system of who is in charge and who has responsibility. That authority and control must also be legitimate in the eyes of other actors. In most cases, the emergency manager assumes this legitimate seat of control and authority over the entire process, but other forms of control and authority exist within the response phase. Some actors gain control and authority because they possess some technical expertise, others because they have disaster experience. Some use an information advantage to gain authority and control. This authority and control is legitimated by those same factors (Dynes et al., 1981).

The discussion of local response does not end with the demands of the response phase. There is also the question of how local government meets those demands. In other words what are organizational and interorganizational factors that lead to an effective response. Sorensen, Mileti, and Copenhaver (1985) list seven organizational factors that are needed for an effective response. The first of these factors is normativeness, which refers to the way an organization functions during an event. If an organization is able to function similarly during an event as it would during day-to-day activities the response will be more effective. Put another way, the less an organization has to shift its roles and functions during an event the more effective the response (Sorensen et al., 1985). The second factor – flexibility – is linked to normativeness. During the response to an event some organizations will have to shift roles and functions, so those organizations that are flexible enough to shift will respond more effectively than those that cannot (Sorensen et al., 1985).

Another organizational factor that determines the effectiveness of response is work definition. Each member of an organization must know what the mission of the organization is with regards to the response. They must also know their role within the larger organization and mission. The response will be more effective when the roles of organizations and their members are clearly defined and understood (Sorensen et al., 1985). Effective response also requires adequate resources. This involves each organization knowing the amount and types of material and human resources they will have during an event (Sorensen et al., 1985).

Information and communications are very important to effective organizational response. As stated previously information is needed in all response activities, so in order for response to be effective organizations must be able to communicate and share information both within and outside of their own organizations (Sorensen et al., 1985). The sixth factor of effective organizational response is organizational legitimation. Organizational legitimation refers to an organization's claim to authority and control during the response (Sorensen et al., 1985). If other response organizations do not believe that authority and control is legitimate, they will not respect it. When this occurs response is not effective. The final factor of effective organizational response is internal cohesion. In order for an organization to effectively respond to an event the members of the organization must display commitment, group cohesion, and a lack of role conflict (Sorensen et al., 1985).

Sorensen, Mileti, and Copenhaver (1985) reviewed the literature and found that the various factors affecting the effectiveness of interorganizational response fall into four categories. The first category is domain consensus and role specification. This

category involves each organization knowing about not only its own role during the response, but also the role of the other organizations involved in the response (Sorensen et al., 1985). In addition to clear roles there must also be clear lines of authority between the organizations involved in response. These clear lines of authority help to resolve conflict during the response.

The second category of factors related to interorganizational response effectiveness is integration. Integrating the diverse set of organizations involved in response into an effective response team can be difficult, but it can be done. Integration during the response to an event is much more likely if organization interact in their normal day-to-day activities (Sorensen et al., 1985). Another factor that leads to better integration is overlapping membership between organizations. These boundary-spanning members lead to better interaction, communication, and coordination between organizations (Sorensen et al., 1985). Another way to integrate organizations is by forming resource linkages. The sharing of resources can lead to other types of sharing, which increases integration (Sorensen et al., 1985). Overall, integration of organizations into an effective interorganizational response requires prior planning and work. Integration does not just occur when an event occurs. It must be fostered over time. But, integration leads to better coordination, which leads to a more effective response (Sorensen et al., 1985).

The third factor leading to an effective interorganizational response is communication. Communication between organizations during the response is essential to coordinating the response (Sorensen et al., 1985). Communication is important because information is important. In the previous discussions of response demands and

the intraorganizational factors of an effective response, the need for accurate information has been thoroughly discussed. However, it is worth repeating that information is necessary during every stage of response. In many cases, one organization has information that is needed by other organizations involved in response, but if there are no lines of communication between the organizations, an information gap forms. Information gaps lead to an ineffective response.

The final set of factors related to an effective interorganizational response is autonomy maintenance. During response not all organizations can have the same amount of control and authority as they would have during day-to-day operations. If organizations do not enter the response with this in mind, some will try to maintain the same level of autonomy. This can cause difficulties during the response. Organizations must understand that small losses of autonomy during the response maybe necessary to ensure an effective response (Sorensen et al., 1985).

The combination of the intra- and interorganizational factors of effective response led Sorensen, Mileti, and Copenhaver (1985) to set forth three principles that will lead to cohesive, effective disaster response. The first is organizations need to know what their role in the response is and who is to carry out that role. Second, the integration of organizations is necessary. Lastly, organizations must be flexible during the response. The combination also led the researchers to establish a framework for explaining effective response. In general the framework shows that organizational characteristics and prior planning affect both the intra- and interorganizational factors of the response network. The response network in turn affects the comprehensiveness and cohesiveness of the response (Sorensen et al., 1985).

In the preceding discussion of the factors that lead to an effective response, coordination was important both within organizations and between organizations. Coordination is also an important response-generated demand. The emphasis on coordination during response leads to questions about how local governments can foster better coordination. In his classic article "Managing the Emergency Response," Drabek (1985) proposes six strategies for enhancing intergovernmental coordination during disaster response. These strategies were the product of interviews with top managers from each of the organizations that made up six different emergency response networks. The interviewees revealed that a lack of interagency communication was the key operational problem during the response phase of their events. The communications failures were not simply technical failures though. They occurred in three different ways. In the first there was simply too much information to process. There were also horizontal and vertical communications gaps within the networks. In other words, there were communications failures between officials at the same level of government – horizontal gaps. There were also failures between different levels of government – vertical gaps. The final communication failure was due to no single agency being responsible for the flow of messages. But Drabek (1985) argues that the lack interagency coordination not communication was the real failure in the networks.

The first strategy for enhancing intergovernmental coordination involves viewing community disaster planning as a process not a product (Drabek, 1985). He states that in jurisdictions that viewed planning as a process, "the roles and relationships among the responding participants were clearest and coordination frequently was highest" (Drabek, 1985, p. 88). These clear roles and relationships lead to a stronger network – one with a

better capacity to respond to a wider range of events. The second strategy is related to emergency warning systems. Drabek (1985) argues that improving the capacity of local warning systems will reduce the need for large-scale search and rescue responses in future events.

The third strategy involves improving coordination through structural improvements such as an emergency operations center (EOC). According to Drabek (1985), EOCs can improve intergovernmental coordination by serving as communications hubs. They are a central location where all information can be gathered, disseminated, and passed along to appropriate organizations both at the scene and within the EOC. He also states, "no other structural element contributed as much to the degrees of coordination attained." (Drabek, 1985, p. 90)

A fourth strategy is to conduct community disaster exercises. These exercises must be based in reality, but they should also allow participants to improvise and respond to unanticipated situations. The fifth strategy is to be aware of multiagency decision styles. This is important because disasters and emergencies change the way decisions are made by changing the decision-making environment. In non-emergency situations, an organization's decision-making can be unitary and decentralized, but when that organization is responding to an emergency with other organizations the decision-making environment becomes multi-lateral and more centralized. The precise process of deciding in this environment cannot be laid out, but according to Drabek (1985), it must be systematic.

The last strategy for increasing intergovernmental coordination is to acknowledge that recovery decisions will involve many agencies and organizations that are not

involved in the other phases. The recovery phase is not characterized by the urgency that is present in the response phase, but the decisions are just as important and just as complicated. Because of this, the process must by systematic and coordinated. Training, exercises and other preparedness activities focused on post-response activities can increase coordination.

The next section of this paper will review the extant literature regarding EOC design and operation. The purpose of this section is to describe the role and importance the EOC plays is coordinating local emergency response. The section also provides definitions for terms and concepts that are vital to understanding the results of the original research presented in the latter part of the paper. The next section also presents an overview of the literature on networked organizational structures. The networks section of the literature review not only defines networks but also provides a theoretical background as to why networked structures are appropriate for the field of emergency response. These two concepts are linked because they form the theoretical backbone of one way to improve interorganizational response. In other words, the concepts described in these two sections provide the theoretical basis for the argument that using networks to form an integrated interorganizational relationship between two EOCs will encourage a well-coordinated response during a multijurisdictional event.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to review the literature regarding EOCs and networks. Research supports the propositions that EOCs encourage a well-coordinated emergency response to a multijurisdictional event. The research also supports the use of networks in emergency management.

Emergency Operations Centers (EOCs)

As stated by Drabek (1985), an emergency operations center (EOC) is one of the most important structures utilized during disaster response because it is the central location where response personnel, equipment, communication, and activity is managed and coordinated (Kendra & Wachtendorf, 2003b; Wenger et al., 1986). In other words, it is where the response is coordinated from. Quarantelli (1978) analyzed EOCs based on eight questions: who participates in EOC activities; what is done in the EOC; where the EOC activities are carried out; when activities are carried on; how the EOC activities are carried out; why EOC activities are done; which problems in EOC operations were recognized after an event and; did any overall point run through each specific case (Quarantelli, 1978).

The functions carried out in an EOC during an emergency event fall into six general task areas. The first general task area is coordination. Coordination involves directing the overall response effort by making sure organizations and available resources act in concert with one another (Perry, 1995). This includes making sure that organizations are paired with tasks they are most capable of handling (Quarantelli, 1972). Coordination during an event generally increases over the course of the response because more and more information becomes available as the event progresses (Quarantelli, 1978). The early stages of response are notorious for low information flow but increases as the event progresses, which leads to more and better coordination.

Policymaking is the second general task area of EOCs. Policymaking involves making decisions about the overall community response (Quarantelli, 1972). These decisions generally affect the broad, overall nature of the response not specific operational decisions (Perry, 1995). Quarantelli (1978) argues that policymaking generally takes precedence over coordination because there is a perceived pressure to do something at the height of an event. This can lead to making decisions for the sake of making decisions (Quarantelli, 1978). This is can lead to problems in response, especially in light of Drabek's (1985) assertion that coordination is one of the areas of failure in emergency management networks during the response to an event.

The third general task area is operations. Operations tasks implement the disaster response strategy (Perry, 1995). They are tasks that are directly related to meeting disaster demands (Quarantelli, 1972, 1978). Much like with policymaking, some operations are taken on in order to give the appearance of doing something, but this strategy can backfire if a new crisis or situation emerges. The resources and personnel

used during the unnecessary operations might be unavailable during the new situation (Quarantelli, 1978). Another issue related to the operations task area is how to react to the changes in response activities over the course of an event (Perry, 1995). For example, in the beginning of an event, search and rescue operations are one of, if not the most, important activities, but later in the response sheltering and medical care become increasingly important.

Information gathering – the fourth general task area – is vital to both the previous task areas and those to follow. Information gathering is meant to determine the scope and nature of the event and resulting conditions (Quarantelli, 1972, 1978). This task is not always an initial focus of the response effort, but as discussed above, it can have serious impacts on the other task areas. As with policymaking and operations, there have been issues with gathering information simply for the purpose of gathering information (Quarantelli, 1978). In other words, there is either not enough activity in this task area or there is too much. The types of information gathered can be very broad such as information about the nature of the event. Or, the information can be very specific, such as information about the effectiveness of response operations. The information gathered could also be used in various ways such as adapting short-term managerial strategies to the event (Perry, 1995) or as feedback on how to improve future response activities in the long term.

The fifth general task area is dispersal of public information. This task area is concerned with informing the news media and the general public about the event and the response activities (Perry, 1995). This task is important because it allows the EOC to have a hand in what information is dispersed. It can help make sure the information is

accurate. If information dispersal occurs in a timely and accurate manner, the EOC maintains its legitimacy in the eyes of the public and the media. This is important because the media provides an important buffer between the public and the emergency management network (Perry, 1995). The media also acts to disseminate information for the EOC (Wenger et al., 1986). In many EOCs, the Public Information Officer (PIO) handles the dispersal of public information. The media is usually reserved their own room or area within the EOC.

Hosting visitors is the sixth and final general task area. Most emergency managers do not expect to receive visitors to the EOC during the response to an event, but that is not always the case. Many times government VIPs and elected officials have no disaster related function that requires them to be in the EOC, but they come anyway, which can cause conflict between those who are necessary to the disaster response (Quarantelli, 1978). They see these visitors as being distractions or impediments because it draws attention away from response operations (Perry, 1995). It can also exacerbate issues with space and noise in the EOC, especially in large disasters where the number of visitors is likely to be high. If available, a public information officer can be tasked to escort visitors around the EOC and answer any questions they have about the operation (Perry, 1995).

The external and internal design of the EOC can effect how the EOC functions. The reverse is also true. Because of this it is important to have an understanding of the issues surrounding the design of the EOC. According to Neal (2003), the amount of systematic review or empirical information about EOCs is not commensurate with their importance in the response phase of emergency management.

The first element of EOC design that should be considered is location. The author notes that both primary EOC location and secondary location should be considered (Neal, 2003). Whenever possible, the EOC should be located based on the results of a hazard analysis. This rarely happens though because many jurisdictions do not have the resources to conduct a hazard analysis. Usually, the EOC is located where a jurisdiction has space to spare (Neal, 2003). They are also generally located near other governmental agencies, which can make them more vulnerable to certain kinds of hazards. If the location of the EOC cannot be easily controlled or changed, there are steps that can be taken to make the building less susceptible. For example, the Smith County Texas EOC was designed and constructed post-September 11 (using FEMA funds) to include a roof and exterior walls hardened to resist tornadoes and high wind, the lobby was designed to minimize the effects of explosions, multiple security access levels, and a special media area (FEMA, nd). Neal (2003) outlines the recommendations for site location in a guide issued by the state of Ohio. These recommendations include:

- A location that minimizes the effects of local hazards;
- A location that does not change or alter national historic sites or structures;
- A location that is not in the 100-year flood plain; and
- A place close to government offices.

Once the primary EOC is located, a jurisdiction must consider options for secondary or back up EOC. The back up EOC will be activated in the event the primary EOC is not operational. Many of the same conditions apply to the location of the back up EOC that apply to the primary EOC. Without a back up EOC, jurisdictions might be forced to compose an ad hoc EOC after an event, much like happed in New York City

just after the attacks of September 11 that destroyed the city's EOC (Kendra & Wachtendorf, 2003b; Neal, 2003).

The New York City EOC was located in Building 7 of the World Trade Center (7WTC) complex prior to the attacks of September 11, 2001, but when the second plane struck, the building was evacuated (Kendra & Wachtendorf, 2003b). The evacuation of 7WTC caused serious complications in the response effort because the central coordinating function of the EOC was disrupted. Prior to September 11, the New York City EOC was one of the most technologically and functionally capable EOCs in the U.S. The operations room was equipped with 68 agency workstations arranged into groups – known as pods – based on their function in the response (Kendra & Wachtendorf, 2003b). There was also space to expand the operations area to facilitate 40 more agency workstations. In terms of communications, the EOC was outfitted with a computer messaging system, a phone system with microwave back up, separate systems for fire, police, and EMS, video monitoring of New York's waterways, traffic monitoring of city streets, and geographic information systems (GIS) software packages (Kendra & Wachtendorf, 2003b).

The EOC was designed to meet almost any anticipated need, save one, the event when the EOC needed to be evacuated. New York City had no pre-determined back-up EOC. When 7WTC, and the EOC, were evacuated on September 11, there was no redundancy of emergency operations (Kendra & Wachtendorf, 2003b). In other words, emergency management officials had to not only respond to the event, they also had to reconstitute an EOC. Because the evacuation occurred so quickly, emergency managers and EOC staff had no chance to save any equipment or documentation (Kendra &

Wachtendorf, 2003b). Over the next two days, ad hoc EOCs were setup at various locations. First officials relied on a mobile EOC then the library of the Police Academy and a high school. These arrangements were not sufficient, but they had to make due. On September 13, the EOC was moved to a cruise ship at Pier 92 on the Hudson River (Kendra & Wachtendorf, 2003b). This new facility would be the city's EOC until February 2002.

The new EOC at Pier 92 was very effective for the remainder of the time it was utilized. The Pier 92 EOC was much more than a back up EOC though. It was almost 2 city blocks long EOC that facilitated one of the largest emergency response and recovery operations in U.S. history (Kendra & Wachtendorf, 2003b). The new operations area was equipped with worktables, copy machines, maps, charts, and over 200 networked computers. The space was arranged in the same pod arrangement as the EOC at 7WTC but contained more agency workstations that could fit in the original space (Kendra & Wachtendorf, 2003b). The creation of the new EOC over the period of 48-72 hours represents an amazing feat of organizational resilience.

According to Kendra and Wachtendorf (2003b, pg 41) resilience is the "ability to sustain a shock without completely deteriorating." The emergency managers and EOC staff sustained the shock of losing their well designed and well equipped EOC by creating a nearly equivalent EOC on a cruise ship at Pier 92. They did so because the organizational aspects of the EOC displayed adaptive behavior, improvisation, focused on goals, and incorporated resources from many sources (Kendra & Wachtendorf, 2003b). These officials relied on the emergency response capacities of New York City to rebuild the EOC. New York City's emergency response networks rivals that of some

states, so the resources and capacity housed within the city was invaluable. The city also relied on previous relationships. Officials within the city's Office of Emergency Management called upon personal contacts made during training, meetings, and conferences to provide those resources they could not secure within the city (Kendra & Wachtendorf, 2003b). New York City emergency managers and EOC staff were able to reconstitute the EOC in such an effective manner because there was an emphasis on developing the capacity for adaptation prior to the events of September 11. The emergency operations staff had participated in extensive training and exercises that prepared them to work collaboratively and adaptively (Kendra & Wachtendorf, 2003b). While not every city will have the resources and capabilities of New York City, they do have the ability to promote resiliency and adaptability, which were key in the reconstitution of the EOC in New York City in the days following September 11.

During the selection of an EOC location, it is important to remember the amount of space that will be needed to run an effective EOC. When many people think of an EOC they imagine it as a single room with maps, computers, and communications systems, but it is more than that (Neal, 2003). An EOC also includes offices for the day-to-day EOC staff, conference room/s, a media area, a kitchen or break room, bathrooms, and storage spaces. The Smith County Texas facility also includes room and equipment for 25 people to sleep at the EOC, enough food to feed 50 people for up to two weeks, washers and dryers, and separate dressing rooms with showers (FEMA, nd). Neal (2003) also states that there is a lack of empirical evidence showing how these rooms should be arranged or integrated into the larger design of the EOC.

Once the physical location has been selected and the rooms designated, the internal design of the EOC must be considered. The internal design is often focused on the main operation room of the larger structure or location because this area is where coordination and decision making occurs (Neal, 2003). The internal design of an EOC must consider seating arrangements, physical installations, noise, room capacity, and overcrowding. The arrangement of desks and seating in the EOC has been classified into five general patterns (Paxton, 1980). Participants seated facing the front of the EOC characterize the first arrangement, known as the classroom style (Neal, 2003). The key decision makers are seated at the front of the room in this style. The arc style, on the other hand, involves the participants forming a backwards C around the decision makers (Neal, 2003). The U-shape style is similar to the arc style, but in the U-shape style, the key decision makers sit at the bottom of the "U" (Neal, 2003). The T-shape style is characterized by an upside down "T". The key decision makers sit along the bottom of the "T" facing the other participants who sit along the vertical part of the "T" (Neal, 2003). The last pattern is based on the National Response Plan's (NRP) Emergency Support Functions (ESF). The cluster style involves a table or group of tables for each of the ESFs, but the key decision makers would be seated at the front of the room facing not the other participants but the information boards (Neal, 2003). Even though these five patterns are present, there is little research on which design is the best or which works best in different situations. Neal (2003) and Quarantelli (1978) argue that it is important to keep in mind the influence seating arrangements can have on organizational structure and flexibility in the EOC.

The seating arrangement in the EOC is linked to the physical installations in the EOC. Some EOCs are simple rooms with tables, chairs, and phones, but others, like the Smith County Texas facility, are technologically complex facilities (FEMA, nd; Neal, 2003). Generally, the physical resources – maps, phones, radios, and desks – plus the central location facilitate the EOC's ability to coordinate disaster response. But, these resources are not generally placed within the EOC in a way that will minimize noise and overcrowding and maximize space and the flow of people and information. This is alarming because other researchers such as Kendra and Wachtendorf (2003a) have noted that EOC's designed to facilitate the flow of information both within the EOC and externally is essential.

Noise is considered by many to be one of the most important physical problems within the EOC (Neal, 2003). The noise problem derives from people talking, phones ringing, keyboards, TVs, and radios. Even though noise is a common concern there has been very little research on how to reduce the amount of noise in the EOC (Neal, 2003). The amount of noise could be reduced by reducing the number of people in the EOC, but that is difficult considering most participants who are in the EOC are necessary to the disaster response. Space planning might be one way to improve traffic flow and reduce noise. As noted by Neal (2003), the state of Ohio recommends there be 30 square feet per person available in the EOC. They also recommend that there be space available for one or two representatives from each agency. But, space planning will only work if the number of people present in the EOC is fixed. Overall, Neal (2003) concludes that there needs to be more systematic research on the physical attributes of EOCs. Once there is a

more complete view of these physical attributes, there can be more analysis of how these attributes are linked to the performance of the EOC.

In addition to his review of the literature concerning EOC design, Neal (2005) also conducted an analysis of four EOCs in central Alabama. Three of the EOCs served counties. The fourth EOC is part of a military installation that includes a firing range and is next to a chemical weapons storage facility (Neal, 2005). These four EOCs were evaluated in terms of their location, the presence of a back up EOC, space and layout, operations room configuration, the use of EOC space, noise, and resources.

According to Neal's (2005) analysis, convenience and availability are responsible for the location of each of the four EOCs. Neither hazard analysis nor ease of access was considered in the site location. The EOC at the military installation did locate their EOC as far away from the chemical storage area though (Neal, 2005). These four examples support Quarantelli's (1978) argument that opportunity and convenience are the two biggest determinants in the site location of EOCs. Three of the four EOCs have back up EOCs in case the main EOC is unusable (Neal, 2005). The military EOC has an agreement with the county EOC, which states that they are the others back up EOC. Two of the county EOCs have mobile operations centers (MOCs) that act as a back up EOC (Neal, 2005). Each of the MOCs has basic communications equipment, computers, television, and other pertinent technology. The MOCs are parked away from the EOC to ensure they are not affected by an event at the primary EOC, but not always far enough to be completely safe.

The four EOCs also differed in how much space they have and how that space is arranged. One EOC consisted of a single room with each wall dedicated to different

activities. The other three had separate rooms for office space, communications, and operations (Neal, 2005). Three of the four used the NRP's ESFs to decide which organizational representatives were in the operations space. Two EOCs had space for sleeping, and three had their own set of restrooms (Neal, 2005). The configuration of the operations room was different in each of the four EOCs. The non-county EOC used a variation of the classroom setting to organize their EOC. One county EOC, that was undergoing renovation at the time of the study, used a hybrid of the cluster and U-shape configuration. Another county EOC had a small operations room where 10-12 people can sit comfortably and seemed to be arranged according to ESFs. The one room EOC had a long table in the center of the room that was used as a meeting place for the handful of organizational representatives that gathered at the EOC while activated (Neal, 2005).

Neal's (2005) analysis also discussed the ways the three largest EOCs tried to mitigate the noise problem within their spaces. One EOC director replaced the ring on the EOC's phones with flashing red lights. The EOC that was being remodeled at the time of the study limited the number of phones in the EOC. They have also placed a room between the communications room and operations room that will serve as a noise buffer. Another of the county EOCs provided headphones for telephone operators, and installed baffles, which are meant to reduce noise (Neal, 2005). Despite these efforts, noise will probably continue to be a problem within EOCs especially during operations.

There are many ways technology is used to improve the emergency management network at all levels. A new way technology is enhancing emergency management is through virtual EOCs (VEOCs). VEOCs are one way that has been suggested to address the problems with EOCs discussed above. An EOC can be considered virtual when

functions, such as sharing information, making decisions, and deploying resources, can be performed without participants physically being at the EOC (Davis, 2002). In other words the EOC exists and functions in cyberspace. The VEOC can be spread throughout the world, across a city, or between the buildings on a university campus. VEOCs supplement the EOC because certain actors should be present at the EOC, especially during extended events.

Davis (2002) states that the VEOC should have six core functions. Communication and intelligence is the first function. A VEOC should send and receive information effectively. The command and control function is related to the VEOC's ability to implement response and recovery plans (Davis, 2002). Coordination and documentation – the third core function – includes activities such as organizing the response and recording the actions taken and their results. Automated checklists are used to that all activities are completed (Davis, 2002). The fourth core function of a VEOC is alert notification, which is important to the flow of information. Alert notification is essentially a way to sort, distribute, and log all the notifications that are received by the VEOC. Media management is the last core function of a VEOC. Media management allows the VEOC to keep the media informed about the event.

Despite these functions the main purpose of the VEOC is as a center for information management. It should centralize the efforts to gather and disseminate the information needed to quickly and effectively plan for and respond to emergencies (Davis, 2002). Davis (2002) states that the software can replace white boards, black boards, flipcharts, and pads of paper with electronic data that can be accessed from anywhere by participants. The software could also be used to address the

communications failures described by Drabek (1985) by implementing a systematic and accessible process for communicating and processing the vast amounts of information that is gathered during an emergency event. The VEOC could also track resource allocation information and provide real time briefings on this information to participants or the press.

There are disadvantages to the use of VEOCs, which include issues surrounding security, access, buy-in, cost, and the ability to use the technology. There must be some kind of system in place to ensure that the data gathered and stored in the system is not accessed by anyone other than those who are authorized. There must also be a guarantee that the information is safe from server or connection failure. In terms of accessibility, there might be problems with all participants having access to a computer at all times and being able to connect to the internet. In the event of a natural disaster, electrical and telephone services could be interrupted, which will preclude members from connecting to the VEOC. There is also some question as to whether virtual communication can replace face-to-face communication (Kamensky, Burlin, & Abramson, 2004). The VEOC must fit into the emergency management environment of the jurisdiction in order to be utilized and work properly.

Davis (2002) argues that the advantages of VEOCs outnumber the disadvantages. He also argues that the disadvantages can be overcome. One of the major advantages of VEOCs is that anyone can participate no matter where they are located. It makes the process of responding to and recovering from an event much more flexible. Another advantage is that VEOCs require less investment than physical EOC sites, both in terms of monetary investment but also in terms of infrastructure. Davis (2002) also states that

the VEOCs are designed to be easy to operate. The last advantage mentioned by the author is that in some cases it might be best for participants to stay in their locations or roles during an event, such as during a chemical or biological attack.

As the central point of coordination for emergency response, it is important to understand the design and operation of an EOC. It is also important to remember that the design of the EOC can affect how effective the response will be because an ineffective EOC will lead to an ineffective response. In terms of responding to a multijurisdictional, the EOC will serve as a central point of contact for other jurisdictions. The EOC will function as the central place where resources are requested and deployed. If there is to be a coordinated multijurisdictional response, there must be coordination and cooperation between EOCs. One way to obtain the cooperation and coordination needed for a multijurisdictional response is through networked structures, which are explained in the next section.

Networks

The way researchers have defined a network has varied over that time. This variation in definition is generally due to the changing amount of research interest in network arrangements. As the research on networks increased, the definition of a network became more precise and also more complicated. Myrna Mandell (1988, p. 399) defines an interorganizational network as, "a number of diverse actions that are connected through a specific type of interaction and within a certain context." She further defines public sector interorganizational networks as having unclear lines of authority and control. Laurence J. O'Toole and Kenneth J. Meier (2004, p. 682) provided another definition; they define a network as, "a pattern of interdependence among social

actors in which at least a portion of the links are framed in terms of something other than superior-subordinate relations." They also state that networks can include multiple whole organizations or only parts of organizations. Robert Agranoff (2004, p. 63) provides yet another more complex definition, "networks of public organizations, involving formal and informal structures, composed of representatives from governmental and nongovernmental agencies working interdependently to exchange information and/or jointly formulate and implement policies and programs that are usually designed for action through their respective organizations."

In terms of emergency management and the EOC, these definitions are very appropriate. Emergency management as a field is a network based on the definitions provided, even the more complex Agranoff (2004) definition. Emergency management is a cooperative effort among various organizations in both the private and public sectors. The organizations share information and work together to make policy that is implemented by the independent organizations. The definition of a network also applies more narrowly to the EOC. An EOC is not only a physical location and space; it also represents the organizations and individuals who staff the EOC during an event. The EOC is staffed by a wide range of organizational representatives who work together to make decisions and policies in response to an event. Those decisions and policies are then put into action by first responders in the field, by nurses and doctors in hospitals, by volunteers at shelters, and by other actors throughout the various aspects of the response phase.

Networked structures are becoming more numerous in the public sector. In the past there were a few networked structures scattered throughout the whole of the U.S.

public sector, but now more and more problems are being addressed in networks. The increased use of networks can be explained in several ways. The first is the rise of so-called wicked problems (O'Toole, 1997). Wicked problems are those very complex policy issues that have no easily agreed upon course of action. They are also ever present issues with no permanent solution. These issues also span organizational boundaries; they are addressed by several private and public sector organizations. In order to combat these wicked problems, these organization must work together toward a mutually agreed upon goal (Agranoff & McGuire, 2001). The limits on government involvement can also explain the increased use of networks (Goldsmith & Eggers, 2004). Networks allow the government to partner with the private sector and non-governmental organizations to deliver services and take other action as necessary while still limiting the size of the government. Public opinion calls for government action and small government, so networks have increased because they have the ability to meet public expectations. Similarly, cross-organization mandates have also spurred the rise in networks (Goldsmith & Eggers, 2004). The government has imposed umbrella mandates such as civil rights and environmental rules that affect all agencies within civil service. Because of these cross-organizational mandates, many agencies and organizations have networked together to find best practices and solutions for implementing the new mandates.

The political nature of policymaking and implementation has necessitated the rise of networked structures (Goldsmith & Eggers, 2004). In some cases, in order for new programs to be initiated and succeed there must be broad support among many different agencies. To accomplish this broad support, networks are formed. These same networks are then tasked with implementing the new program. Another explanation for the rise of

networks stems from the success of these informal support networks (Goldsmith & Eggers, 2004). Once these informal support networks were shown to be successful they were formalized into interagency committees and commissions.

Within the vast array of network structures present in the public and private sectors in the U.S., there are different types of networks. These types of networks vary in terms of scope, purpose, and powers. Mandell (1988) places networks into categories based on permanence: project networks and functional networks. Project networks are temporary networks that are set up to accomplish a specific project or type of project (Mandell, 1988). Project networks can even be formed to carryout a specific purpose that includes different types of projects. Functional networks, on the other hand, are permanent and focus on various projects at different times. Functional networks also exist during time when there is not a project to focus on (Mandell, 1988). Project and functional networks are not mutually exclusive. In other words, they coexist. In many instances they actually influence each other in various ways. The influence is generally due to the members of each network. When a project network is formed, the members are chosen from the broader functional network (Mandell, 1988). In the context of this paper, the field of emergency management is the functional network. It is an ever-present entity that focuses on different projects over time. The members of the project network – the EOC – are chosen from the functional network. The EOC then exists and functions until the project ends. In this case, the project would be the response phase.

Agranoff (2004) provides another classification system for networks. His system is based on the scope of the powers given to the network. The first type – informational network– is given the least of amount of power (Agranoff, 2004). Participants

voluntarily exchanging information about policies, programs, problems and solutions characterize informational networks. The participants then decide if and how to use that information within their own organizations. Participants in developmental networks not only exchange information they also use education and member service to develop higher problem-solving and implementation capacity within in their own agencies (Agranoff, 2004). According to Agranoff, the third type of network is known as an outreach network. In an outreach network, the exchange of information and opportunities is furthered by adding in the sequencing of programs (Agranoff, 2004). The implementation of the programs designed by the network is still the domain of the individual organizations and agencies. The final type of network described by Agranoff is the action network. Action networks differ from the other three because they have to power to act collectively (Agranoff, 2004). The participating organizations and the network share the power to implement decisions made by the network.

In the field of emergency management, networks come in all of these forms depending on the purpose of the network and the environment in which it is operating. In many instances emergency management networks take the first two forms. The exchange of information is extremely important because emergency management is such a varied field. In most cases the likelihood of emergency events is low, so communities rely on information and best practices provided by other communities who have endured similar events. This exchange of information occurs within in informational networks. Developmental networks take that same idea to another level. This next level would be the network providing training meant to increase the capacity of the members to respond to an emergency event. Outreach networks in emergency management can include those

networks that design preparedness programs that are then implemented by the individual organizations that participated in the network. The final type of network – action networks – also exist within emergency management. EOCs are an example of an action network because the organizations and individuals that make up the EOC jointly decide on a course of action; then the emergency manager and participating organizations share the implementation of the course of action.

Like any organizational structure, networks have advantages and disadvantages that must be weighed by government officials. Networks are generally seen as being more flexible and innovative than traditional, top-down bureaucracies. Flexibility is important to modern government because most policy problems do not lend themselves to routine solutions. Public policy has never been simple, but with the decentralization of power and devolution of responsibility to lower levels of government, more flexible techniques of resource acquisition and service delivery are necessary. Networks are not bound by bureaucratic norms and standard operating procedures like a traditional bureaucracy. For this reason, they are able to act quickly and flexibly to acquire and distribute resources (Goldsmith & Eggers, 2004; Kamensky et al., 2004). Many times networks of public and private sector participants are able to use private resources – both monetary and non-monetary – to fill gaps in service delivery (Goldsmith & Eggers, 2004). Networks are also better equipped to handle shifts in personnel. In other words, networks are able to upsize and downsize much easier than a hierarchy (Goldsmith & Eggers, 2004). This includes not only hiring and firing practices but also assigning and reassigning personnel. The type of flexibility afforded by networks to managers to public

managers allows them to more effectively handle changes in demand in the face of hiring limits and other personnel policies (Goldsmith & Eggers, 2004). .

Networks allow local government to collaborate with a variety of entities to provide essential services. Many times local government networks include organizational representatives from the private and public sectors, including non-governmental organizations such as religious organizations and not-for-profits. The wide range of participants leads to a wide range of ideas and solutions for the problem at hand. The innovation accomplished by networks is a result of these wide-ranging viewpoints and the experimentation that is allowed in network structures (Goldsmith & Eggers, 2004). Much like with flexibility, innovation is possible in networks because they are not constrained by the same bureaucratic norms, command-and-control culture, and centralization of power that constrains innovation with traditional bureaucracies. Access to information and communication are necessary for innovation to work though. If participants cannot or do not share information innovation will be stifled within the network. Citizen reactions are another source of innovation within a network (Goldsmith & Eggers, 2004). A network structure breaks down some of the barriers between decision makers and citizens that exist in hierarchical bureaucracies. Without these barriers, decision makers are more aware of the concerns and attitudes of their customers, the citizens. Once again, access to greater amounts of good information leads to more innovative decisions (Goldsmith & Eggers, 2004).

The innovation allowed by a networked structure was evident following the attacks of September 11, 2001. Kendra and Wachtendorf (2003a) document several forms of creativity that occurred during the response to the attacks. The attacks and

destruction of the city's EOC created the need for new maps of the impacted area (Kendra & Wachtendorf, 2003a). This need was filled by a newly created GIS and map distribution area in the Pier 92 EOC. Another instance of creativity in the aftermath of September 11 was the waterborne evacuation of lower Manhattan (Kendra & Wachtendorf, 2003a). In this instance the Coast Guard was instrumental in evacuating nearly 500,000 people, who would have otherwise been trapped. The Coast Guard also used vessels to refuel fire trucks (Kendra & Wachtendorf, 2003a). One last instance of creativity in the aftermath of September 11 is the creation of a new credentialing system by emergency operations staff. Prior to the attacks, the credentialing system used by the EOC consisted of specific badges, but those badges were destroyed in 7WTC EOC. In the days and weeks following the attacks, a new system of credentialing evolved from a simple color-coated paper name badge to a complex identification card that included a person's name, color photo, agency affiliation, and codes indicating where the person was allowed (Kendra & Wachtendorf, 2003a). These instances of creativity in the aftermath of the attacks of September 11 were facilitated by the networked structure of emergency response.

Specialization is seen as another advantage of the network structure. Networks allow governmental organizations to focus on their core activities and missions (Goldsmith & Eggers, 2004). In many cases, the network allows private sector and other non-governmental actors to take on problems that they are experts at solving. In the case of the emergency management network, the health department would be aided by private hospitals, nursing homes, health clinics run by non-governmental organizations. In a similar manner, local businesses, local aid agencies, and churches can assist the Red

Cross. Each participant in the network provides specialization and expertise about a specific part of the larger problem of emergency response.

Specialization is related to another advantage of networks – increased reach. Increased reach refers to a network's ability to achieve contact with more and varied types of organizations and individuals at a much lower cost than a traditional hierarchical organization. Through networks, local governments can cross geographic boundaries, share customers, spread technological costs over a larger base, reduce risk, and better use experts (Goldsmith & Eggers, 2004). The extended reach of networks also includes reaching more customers, which is especially important in emergency response. Increased reach, especially toward the private and non-profit sectors, also leads governments toward more innovative and flexible solutions to problems.

The promotion of social capital is another, less tangible advantage of the network organization. Social capital is seen as necessary for the individual members of networks to share resources and knowledge (Agranoff & McGuire, 2001; Kamensky et al., 2004; Lipnack & Stamps, 1994). More specifically, social capital includes the trust and norms that promote the cooperation and coordination necessary for networks to produce results (Agranoff & McGuire, 2001). Without social capital networks would crumble. They would not have the organizational capabilities to be flexible or innovative. They would not have the chance to reach out to other organizations or customers. They could not utilize the expertise of their members. Social capital is the glue that holds a network together.

The disadvantages of networks are as numerous as the advantages. Networks must be managed well in order to prove successful. The first issue network management

must confront is goal incongruence, which can be difficult in public sector networks (Goldsmith & Eggers, 2004). Public sector networks are often formed to perform tasks or solve problems that are ambiguous or difficult to measure, which can make identifying the goals of the network difficult. In order for goal congruence to be achieved by the network, the members must first agree on the goals or outcome. When participants do not agree, goal incongruence can occur. Goldsmith and Eggers (2004) identify a few general types of goal incongruence that occur in public sector networks.

- When the missions of the participating organizations do not align. (p. 41)
- When government activates a network but also competes against parts of the network. (p. 42)
- When network participants try to maximize their own interests against the government's will to put the public good first. (p. 42)

In order to mitigate these problems, participants in government, or public, networks must focus on agreeing on the outcomes of the network's efforts not the processes used by each of the participants to achieve goals. This is not a one-time event that occurs at the formation of the network though. Network participants must continually discuss and agree on the goals and outcomes of the network. Participants must also continually remember they are representatives of both the network and their home organization (Agranoff, 2004). This can be difficult but is necessary to mitigate the problems associated with goal incongruence.

Oversight and accountability are another issue to be confronted when managing a network. Oversight and accountability in a traditional hierarchical organizational structure is much more straightforward than in a networked structure. Agranoff and McGuire (2001) explain the differences in two ways. First they argue that accountability

in a networked structure is different because the relationships within the structure are different. In networked structures there is no clear principal-agent relationship present. The lack of clear lines of authority is one of the defining characteristics of a networked structure (Mandell, 1988). The second reason accountability in networked structures is different than in hierarchical structures is due to the lack of a clear principal-agent relationship (Agranoff & McGuire, 2001). Without this relationship every participant in the network is responsible for the activities of the network. In other words, the responsibility is shared in networked structures; where as in hierarchical structures there is absolute accountability.

Communication breakdowns occur within all organizational structures but they are especially devastating in networked structures (Goldsmith & Eggers, 2004). Communication is an essential linkage between the participants in a networked structured. It allows for the promotion of social capital. It enables the network to react with speed and flexible. With this said, it can also be difficult to maintain communication within a network. In traditional organizational structures, much of the communication occurs informally. Traditional structures allow for this because actors are usually housed in the same building or office. In networks participants do not have the same type of access to each other. Because networked structures are sometimes lacking informal communication between participants, it can take longer to identify and react to problems (Goldsmith & Eggers, 2004). Communication breakdowns within a network can also occur when participants are using incompatible communication systems.

Coordination problems can also develop in networked structures (Goldsmith & Eggers, 2004). A network is not just defined by the structure, but also by the

relationships that are present between participants. By definition, networks include participants from various levels of government, the private sector, and non-profit organizations working together to share information and/or formulate policy. In order for a network to exist there must be coordination between the participants. Coordinating the activities of these groups can be very difficult, especially when the problem is complex and authority is unclear (Goldsmith & Eggers, 2004). Another facet to the coordination problem is that a single bad relationship between any two participants can cause shock waves within the network (Gillespie & Murty, 1994). It can derail any real or potential progress. Agranoff (2004) argues that patience and interpersonal skills are necessary for the network to be successful. In other words, the relationships within the network must be nurtured and cultivated. They do not occur instantaneously when the network is formed.

A shortage of accurate data can also affect the performance of a network (Goldsmith & Eggers, 2004). All organizational structures must contend with a lack of accurate data, but in a networked structure the number of linkages makes the problem more difficult to remedy. A lack of accurate data can affect networked structures in different ways. It can affect formation and activation, the decision-making process, and performance. Accurate data is needed to decide if a networked structure is the best structure to undertake a certain type of problem. In the case of emergency management, a networked structure emerged due to the disparate organizations and individuals that provide essential services before, during, and after an event. In some other cases, governments have chosen from the outset to use a networked structure to address a problem. In order for a networked structure to be successful, the participants must be

willing to share information during the decision-making process. If participants do not engage in this way, the network will not have the full range of options, which is one of the main advantages of a network. Choosing appropriate performance measures is another way a lack of accurate data can affect a networked structure. Without accurate information about the costs and benefits of services, a network cannot establish performance measures (Goldsmith & Eggers, 2004). Without accurate performance measures there is no guarantee that the network is performing better than other organizational structures.

A final challenge of the network in the public sector is a shortage of employees with the capacity to manage a networked structure (Goldsmith & Eggers, 2004). Many public sector employees are not posses the skills, nor are they trained, to manage within a network. The skills necessary to manage a network are not the same skills needed to manage a traditional hierarchical organization. Managing a networked structure requires a wider range of knowledge. As stated earlier, it also requires more focus on cultivating relationships (Goldsmith & Eggers, 2004). Goldsmith & Eggers (2004) argue the structure and culture of the civil service in the U.S. is to blame for the capacity shortage. The civil service system rewards technical expertise over project management and negotiation skills. This emphasis leads to a personnel gap in networks.

In order to maximize the advantages of networks and mitigate the challenges a network must be effectively managed. Agranoff (2004) studied several Midwest networks to learn about managing in networked structures. The study allowed network managers to reflect on how managing in a network differed from managing a hierarchical organization. After these discussions, he developed ten lessons on how to manage in

networks (Agranoff, 2004). The first lesson is, "Be a representative of your agency and the network." (Agranoff, 2004, p. 92) This lesson argues that in order for a network to be successful the participants must balance their role in their home organization with their role in the network. Most networks do not have administrative staff like traditional organizations, so network participants have to share those tasks. This is lesson two, " Take a share of the administrative burden." (Agranoff, 2004, p. 94) The process of assigning administrative tasks is generally based on who volunteers, so to maintain relationships all members of the network should take their turn with administrative duties.

Agranoff's (2004, p. 94) third lesson is, "operate by agenda orchestration." When networks focus on agenda orchestration they are making sure they remain a collaborative organization of managers and organizations. Goal orchestration helps to ensure the activities of the network are purpose driven and goal oriented. Mandell (1988, p. 401) refers to this idea as making sure an interorganizational network works as a "purposive whole." Lesson four put forth by Agranoff (2004, p. 95) states, "Recognize shared expertise-based authority." The members of the network will be better able to collaborate when they accept this kind of authority. In addition to understanding authority within the network, participants must also understand the purpose of the network. In lesson five Agranoff (2004, p. 95) argues to, "Stay within the decision bounds of your network." One of the purposes of networked structures is to build capacity within participants, but that cannot occur if the network crosses its boundaries.

Agranoff (2004, p. 96) states in lesson six to, "Accommodate and adjust while maintaining purpose." This lesson is linked to flexibility, which is an advantage of

networks. Flexibility allows the network to move quickly to solve emerging issues. Similarly, in lesson seven Agranoff (2004, p. 97) asserts, "Be as creative as possible." The lesson seeks to encourage innovation, which is another advantage of networks. Networks seek to bring a wide range of members together to share information and build capacity. In doing so they allow for more creative solutions because most traditional organizations are not able to aggregate the same amount and breadth of information. Lesson eight encourages network managers to, "Be patient and use interpersonal skills." (Agranoff, 2004, p. 97) In order for the network to succeed each member must buy into the purpose, process, and goals of the network. This buy-in can be difficult though. It may take time and work to achieve.

Over the course of a project or problem-solving endeavor the context of the network may change. Because of these changes it is important for the network to also change. Agranoff (2004, p. 98) solution to allowing for these changes makes up lesson nine – "Recruit constantly." Constantly adding new members allows for new and/or better information to flow into the network continually. Agranoff's (2004, p. 98) final lesson argues that network managers should, "Emphasize incentives." Members of networks must be reminded of the benefits of the network arrangement. They must understand that the time and work necessary for a successful network will, in the end, be beneficial to their home agency and them as individuals.

Despite all of the research regarding the advantages and disadvantages of networks, there is still no definitive answer as to whether networks achieve better results than traditional, hierarchical organizations. Goldsmith and Eggers (2004) argue that networked structures will produce better results in some situations but not all. They set

forth a set to factors that can be used to determine when a networked structure is most appropriate. They also compiled a list of characteristics that would best served by a traditional, hierarchical structure. Table 1 outlines those characteristics.

Table 1: Characteristics That Determine Organizational Structure

Networked Structure	Hierarchical Structure
Flexibility	Stability
Differentiated response	Uniform response
Diverse skills	Single professional skill
Many potential private players available	Government predominant provider
Clear outcome or output goals	Ambiguous outcome
Skill gaps filled by the private sector	Government has necessary experience
Leveraging private assets is critical	Outside capacity is not needed
Partners have great reach	Government experienced with citizens in this area
Multiple services for the same customer	Stand-alone service
Third parties achieve goal cheaper than government	In-house delivery is cheaper
Rapidly changing technology	Service is not affected by changing technology
Multiple levels of government	Single level of government
Multiple agencies use similar functions	Single agency uses similar functions

Table 1 lists the characteristics that are best served by either a networked or hierarchical organizational structure (Goldsmith & Eggers, 2004, p. 51).

The argument between a networked structure and a hierarchical structure is similar to the argument between the command-and-control approach and the emergent human resources model (EHRM) that occurs in the field of emergency response. EHRM shares some of the attributes of a networked structure including flexibility and diverse skills (Neal & Phillips, 1995). The command-and-control approach shares characteristics such as a rigid bureaucratic arrangement with the hierarchical structure presented in Table 1 (Neal & Phillips, 1995). Overall, Neal and Phillips (1995) argue that the EHRM is more appropriate than the command-and-control model because emergence is a key characteristic of responding to events. Wise (2002, 2006) made a similar argument terrorism and homeland security.

When comparing the characteristics of emergency response, it becomes clear that a networked structure is more than appropriate. The use of networks in emergency is not a new idea though. Networks have been used or suggested for use in emergency response and for some time. McEntire (2002) illustrates the use of networks to coordinate emergency response in his study of the March 28, 2000, Fort Worth, TX tornado. He gathered observational data, information from newspapers and the Internet, and interviewed several key officials in the course of his research. He concluded that because the response involved many public, private, and non-profit organizations, coordination was the key to a successful response. More specifically, intra- and interorganizational coordination, as well as the coordination of several agent-generated demands, are the key to successful response (McEntire, 2002).

The emergency response in Fort Worth was the result of a network of organizations collaborating. But the entire response network was not involved in every response activity. Each activity was performed by a smaller subset – project network – of the larger emergency response network (Mandell, 1988). These project networks were based on previous experience, technology, and available resources. For example, a network of city and county emergency management staff, the EOC, the media, the National Weather Service, and Radio Amateur Civil Emergency Services (RACES) personnel faced warning and evacuation. The fire department, EOC, and dispatch center coordinated the medial response and incident management. The fire department also called in the Texas Task Force Urban Search and Rescue Team to help with search and rescue operations. The public information network was populated by the city Public Information Officer, the EOC, and the Media. These are just a few examples of how

networks of public and private sector organizations were networked together to provide a well-coordinated response.

According to McEntire (2002), the response to the Fort Worth tornado was well coordinated for several reasons. First, there was political support for emergency management. The support of political leadership led to emergency management officials and the EOC having a legitimate claim to authority and control within the response network. The response was also well coordinated because there was an emphasis on networking and cooperation (McEntire, 2002). Key players and organizations were aware of other organizations and how they were to interact with those organizations during the response effort. Prior disaster experience also enhanced coordination during the tornado response (McEntire, 2002). Having the appropriate technology to respond to the tornado played a role in coordinating the response, as well. Response organizations were able to utilize cell phones, trunk radios, and the Internet to relay information within organizations, between organizations, and to the public (McEntire, 2002). It is important to remember that technology was only effective because the network and cooperative relationships were already in place. The final factor that led to the well-coordinated response was the EOC (McEntire, 2002). Fort Worth's EOC was large enough to include the many response organizations. It was also well staffed and equipped with the right technology to respond to the event. McEntire (2002) notes that many of the officials interviewed felt the EOC and its staff were key to the coordination effort. In other words, the EOC functioned like it should.

In another study of the use of interorganizational networks in response, Gillespie and Murty (1994) researched poor linkage cracks in a post-disaster service delivery

network. Linkage cracks occur when organizations are not sufficiently connected within the network. When organizations within the network are not properly linked, the network will not be well coordinated (Gillespie & Murty, 1994). A poor linkage crack can take two forms: Type A and Type B. Type A poor linkage cracks occur when some organizations within the network have no interaction at all. The organizations with no interaction are known as isolates and result in the most serious type of linkage cracks. When a Type A linkage crack occurs subpar coordination is almost certain (Gillespie & Murty, 1994). Type B poor linkage cracks occur when an organization or several organizations are linked to the network through only indirect means. Those organizations with only indirect ties to the network are known as peripherals. When peripherals exist within a network, coordination will be inefficient (Gillespie & Murty, 1994).

In order to measure the presence of these cracks in a response network, Gillespie and Murty (1994) studied a Midwestern urban region. They used an earthquake vignette, or simulation, to study how 80 organizations interacted during a response. Each organization completed a questionnaire about their interorganizational relationships and characteristics of their own organization. The resulting analysis separated the organizations into nine structurally equivalent groups and six structurally unique organizations (Gillespie & Murty, 1994). Structurally unique organizations are those organizations that perform a unique role within the network. They relate to other organizations in the network in ways that are very different than any other organization (Gillespie & Murty, 1994). The same analysis discovered the presence of one group of isolates and two groups of peripherals within the network.

Using the results of their analysis Gillespie and Murty (1994) produced a map of the network studied that included the number of links between the groups. Based on the definitions of Type A and Type B poor linkage cracks given above both types of poor linkage cracks occur within the studied response network. These poor linkage cracks would represent weaknesses in the network – activities or functions that would not be effectively managed in the aftermath of an event. Because the response network researched by Gillespie and Murty (1994) was responding to a vignette and not an actual event, the coordination problems predicted did not come to fruition. But because response is directly linked to preparedness, the knowledge of these possible cracks should help improve the coordination of further response operations in the Midwestern urban area studied.

CHAPTER III

METHODOLOGY

After a review of the extant literature on both EOCs and networks, several key points should be highlighted. First, an effective EOC is critical to an effective local response because it is a central location that facilitates coordination and communication. Second, the physical characteristics of an EOC can affect the operation of the EOC. In order to be effective an EOC must be large enough to accommodate the local response network and also have the appropriate technology and resources to provide for the six general task areas described by Quarantelli (1972; 1978). Third, the demands placed on local EOCs by emergency response require integrated interorganizational relationships between the private and public sector. Fourth, a networked approach is an appropriate way to achieve this type of integrated interorganizational relationship.

The use of networks in emergency management is not a new idea, but there is still the need for greater research about the range of relationships that exist within the larger emergency response network. One such relationship is the relationship between municipalities and large, public research universities that are located within their jurisdiction. The relationship between municipalities and public universities is unique because universities are not political jurisdictions. In many states, universities are state

agencies which means they are covered by a different set of statutes than political jurisdictions. Despite these legal differences, the need for effective response is the same, so public universities must collaborate with other local jurisdictions to provide for an effective response. The research presented here studies the relationship between a small municipality and the large public research university located within its jurisdiction. Specifically, it studies how the EOCs of each entity are evolving relationships for interaction in the event of multijurisdictional emergency. It is hypothesized that the two entities will form an interorganizational network to provide a coordinated response. The remainder of this chapter explains the process used to study the relationship including data collection and data analysis.

Research Process

A qualitative approach was chosen to research this relationship because it allows the researcher to describe and explain the behavior of the subjects (Spradley, 1980). In the case of this study, a qualitative approach allows each official to explain in his or her own words how their EOC operates and how they perceive the state of interorganizational relations with the other EOC. Such an approach is particularly appropriate given the significant gaps in the existing literature. In such instances, a qualitative approach allows the researcher to explore the research problem. Usually, this type of research unfolds inductively. In the present case, research literature informed the general approach, but the data analysis process allowed for themes to emerge inductively from the data

The data collection method adopted for this study was interviews. Interviews allow participants to frame their responses within broader contexts that enrich and deepen

their explanation. Interviews are also helpful when participants and processes cannot be directly observed (Cresswell, 2003). Using interviews also allows the researcher to keep subjects on topic more readily than other methods. This research topic is especially well suited for interviews because time constraints would not allow the researcher to wait for the opportunity to observe the response to a multijurisdictional event. The method also allows the officials interviewed to fully explain their procedures and perceptions of the interorganizational relationships, which could not be gleaned from observations or analyzing documents. Despite the advantages of using interviews, there were also some possible limitations. The first limitation is the indirect nature of interviews. There is no way to confirm that the procedures and relationships described by the subjects are how the response would actually proceed. There is also some question as to how the presence of the researcher affects the subject's responses (Cresswell, 2003).

Interview subjects were chosen using a non-probability sampling approach based primarily on snowball sampling techniques. This sampling technique was selected because of the nature of the problem being studied. Emergency management at the local level occurs through a network of organizations and individuals. The organizational structure of the EOC is a smaller network formed from the members of the larger response network, so the use of a snowball technique is one way to study the network. The use of a snowball technique also ensures that those interviewed are actually part of the response network. With a snowball technique, bias can be a concern because previous subjects could provide the researcher only those subjects that agree with them or could exclude some that are peripheral to the interorganizational network but important nonetheless. The first two subjects were chosen because they were known to be

associated with one of the two EOCs. Those two subjects then suggested additional subjects who could add to the research. The collection of data began once the Institutional Review Board (IRB) approved the research procedures. The completed and approved IRB application is contained in Appendix A.

The interview guide used to collect data for the study was composed of two sections. The first section of the guide was used to collect data about the two EOCs. The questions were derived from a review of the extant literature on EOC design and operations. The section's purpose was to provide data about the structures and operations of the EOC. The questions ranged from describing the physical arrangement of the operations room to naming the departments represented in their EOC to their activation procedures. The officials also discussed the amount of training and number of exercises that included the use of the EOC. Each official was also given an opportunity to describe the strengths and weaknesses of their EOC.

The next section of the interview guide was concerned with the dimensions of interorganizational relationships as defined by Drabek (1987). He argues that five dimensions of interorganizational relationships determine how successful an emergency manager is in integrating his/her agency into the broader response network. The five dimensions are frequency of director contact, structural location of contact point, degree of formalization, number of joint programs, and amount of overlapping memberships (Drabek, 1987). The assumption is that a successful emergency manager will create and nurture an integrated interorganizational response network based on these dimensions. This assumption is based on the extant literature concerning the need for interorganizational cooperation and coordination to effectively respond to all types and

sizes of events. The assumption is also based on the existing literature regarding networks, network management, and the use of networks in emergency management. Questions in this section of the interview include how often do you meet with your counterpart at each of the EOCs; do you have any formal agreements with other EOCs and; do you conduct any joint programs with other EOCs? One last subject covered in the final section of the interview was perceived interorganizational coordination, which provides a picture as to how each official views the relationship between the two entities. The questions used to examine this ask for respondents' perceptions regarding EOC coordination in the event of a multijurisdictional response. These questions are meant to provide insight into coordination between the two entities. To view the interview guide see Appendix B.

Interview Process

With IRB approval and a completed interview guide, the interviews were scheduled. In all, four interviews were conducted with officials from both the university and the municipality. Two interviewees were conducted with university officials, one with a boundary spanner, and one with a city official. The small number of subjects limits the generalizablity of the study, but along with other data described shortly and repeated contact, it provides enough information to describe the two EOC cases and their perceived interrelationships. The officials interviewed each hold management roles in one or both of the EOCs. Holding management positions within the EOC provides each respondent with invaluable information about the design and operations of the EOC. Each interview was conducted in the official's office or the EOC, which provided a comfortable atmosphere for the subject (Gorden, 1992). The interview process began

with an informed consent procedure to ensure the research subject understood his or her rights as a volunteer and also the possible risks of participating. Each subject was also informed that the interview would be recorded using a digital recording device and that the interviewer would be taking notes throughout the interview. Recording the interviews is advantageous for two reasons. First, it allows the interviewer to focus on the interview rather than on taking notes. It also allows the interviewer to have a complete record of the interview (Gorden, 1992). The subject and researcher each received a signed copy of the consent form prior to any questions being asked. The informed consent form is located in Appendix C.

Once informed consent was obtained, the interview began with a series of questions regarding the official's own EOC. These questions were presented at the beginning of the interview because it allows the interviewer and subject to gain rapport. This rapport will be helpful when the interviewer begins asking about the relationships between the two entities. The rapport was built by acting professionally toward the subject and actively listening to their responses (Gorden, 1992). The second portion of the interview included questions about the interorganizational relationship between the EOCs of the city and university. The questions in both sections of the interview elicited answers of varying lengths and amounts of detail. Those answers that needed more detailed were followed up by probe questions that were meant to provide that detail. The interviews ranged in length from 30 minutes to almost 2 hours. Overall, the interview subjects provided the information asked willingly and completely. In addition to the information gained through the interview guide, the researcher also collected visual data and observed the arrangement of the EOC.

After completing each interview, the researcher reviewed the recordings and notes to ensure that all questions had been answered and to determine whether any follow-up contact would be needed. Follow-up contact was made with each of the interview subjects. One university official and one city official were contacted twice following the initial interview, which included another visit to each of the EOCs. The remaining two interview subjects were only contacted once following the initial interview. After completing the review of completeness, the interviews were transcribed by the interviewer. The transcriptions were made from both the digital recordings and notes taken during the interview. The interviews were not transcribed in total (Gorden, 1992, p. 176). The relevant information and quotes were transcribed in order to focus the researcher's attention on the key data in a manner suggested by Spradley (1980). Relevancy was based on consistency of interview response vis-à-vis the relevance of questions that emanated from a review of the literature on EOCs and networks. The information in the interview transcriptions were then coded and analyzed as described next.

Documentary Data

In addition to the interview data, other documents were gathered to deepen and enrich the cases. The use of visual data is increasingly being used in disaster research (Blinn-Pike, Phillips, and Reeves, 2006; Phillips, 1997). The visual data collected includes photographs of the EOCs and observational sketches of the EOC complex. The photos and sketches of the two EOCs more data regarding the structures located in the EOC, which will enable the researcher to provide a more complete description of the EOC and serve as a point of triangulation.

In addition to photos and sketches, the community's multi-hazard plan was also collected. The multi-hazard mitigation plan includes information regarding the relationship between the city and university that will further inform the analysis of the degree of integration in the city-university EOC network. In the present case, the mitigation plan served as an important collaborative experience that occurred just prior to the development of the university EOC. As such, the planning process helped to establish and/or firm up interorganizational relationships. Webb (et al. 2000) that documents should be viewed with caution because of potential problems associated with selective deposit or selective retrieval which means that the document could be influenced or biased by those that created it. In most cases, selective deposit and retrieval mean that portions of a document could be lost. In this case, the mitigation plan required an open, public-involved process that operated through consensus-building. The document was available to the public and confirmed by local city officials and the Federal Emergency Management Administration regional office (FEMA). Portions of the university portion of the mitigation plan are available on a university website (http://disaster.okstate.edu/Multi-Hazard%20Mitigation%20Plan.html, accessed July 1, 2009) and demonstrate the existence of some degree of interorganizational relationships.

In addition to analyzing photos, sketches, and the mitigation plan, observational data were also collected during tours of each of the EOCs. The researcher visited each EOC multiple times; in addition, the researcher was a student intern in the city EOC in the summer of 2007. The first visit was for the purpose of the interview. The second visit included a tour of the EOC that enabled the researcher to sketch and observe the EOC. The observational data was collected through notes based on Spradley's (1980)

matrix that included the consideration of spaces, their use and the relationships that occur within those spatial areas. In each tour an EOC official guided the researcher around their EOC complexes describing each room's purpose and allowing the researcher to sketch the area. During the tours, notes were taken about both the official's descriptions of the rooms and also the researchers' own observations of the rooms. The notes regarding the official's descriptions of the spatial usage were taken in the form of a condensed account, meaning important phrases, words, and sentences were written down. After the tour a more detailed expanded account was constructed using the condensed account and the observations of the researcher. These notes were analyzed with the interview subject's responses to the interview guide to provide a description of the two EOCs.

Data Analysis

The first section of the interview guide and observational data was used to provide a picture of each EOC. The information provided during each interview along with observations of the EOC and documentary data were compiled and then translated into a narrative description of the design and operations of each EOC. The description of each EOC was then compared to the literature on EOCs to determine if they include structures that will support the six general task areas of EOCs described by Quarantelli (1972; 1978). If the EOC includes these structures, it would suggest that the EOC would be effective during response. The second section of the interview guide underwent two forms of analysis. The first form of analysis compared the statements of each official about their interorganizational relationship to the results of Drabek (1987). The purpose of this comparison is to determine whether the interorganizational network formed by the

two EOCs is integrated. The comparison not perfect though. The small sample size in this study limits the generalizabilty, but the comparison should provide a sense of if an integrated network exists. The use of multiple data sources also strengthens the findings. If the findings suggest that an integrated interorganizational relationship exists, it would suggest that the two EOCs would be well coordinated in the event of a multijurisdictional event. The second form of analysis is based in grounded theory. Grounded theory is characterized by the researcher as deriving a general explanation that is grounded in the views of participants in a study (Glaser and Strauss, 1967). To do so, the research conducts an initial coding of the data to identify themes. Using a constant comparative approach (Glaser and Strauss, 1967) the researcher then compares similarly coded data to insure the data should remain in their initial code. By doing so, it is possible to glean themes from the data that respondents offer per the interview questions. The researcher "listens to the data" for such themes to emerge by repeatedly reading the same transcripts and listening to the audio interviews. This approach allows for the research to be assured that themes are grounded in the data. Overall, the research uncovered five major themes or patterns that appeared in the officials' responses to the interview guide. The themes seem to lead to five factors or techniques that are used to build and maintain the integrated interorganizational network that exists between the two EOCs studied.

To analyze the visual data, the researcher conducted an inventory of the items and spaces within the photographs (Pike, Phillips, Reeves, 2007). By comparing the inventory with the narrative accounts provided in the interviews, it is possible to triangulate respondent perspectives with tangible, physical locations. As noted later in the findings, this comparison allowed for the researcher to compare EOC functions and designs and to

document that interorganizational relationships were emergent in nature. Observational data were analyzed using Spradley's (1980) matrix to look at the intersections between physical elements and human agency, for example, how respondents described the physical use of the spaces. These observations served as a further source of triangulation.

Credibility and Trustworthiness of the Data

Qualitative researchers examine the credibility and trustworthiness of their data through multiple means (Lincoln and Guba, 1985). For this project, several strategies were used. The first and most important was triangulation. For a qualitative study, triangulation means that the same topic is examined using multiple data sources. Interviews, documents, and observation strategies were employed to look at EOC design, structure, and interorganizational relationships. Each provided a means for double-checking the finding that emerged from the interview data. For example, if a respondent indicated that they had integrated the other EOC into theirs in order to enhance communications, examination of maps and photos allowed for independent confirmation. In addition to triangulation, peer debriefing and members' validity checks were used to examine credibility and trustworthiness. In peer debriefing the researcher discusses their research methods with an impartial third party. In this case, the researcher discussed the research methods and data with their faculty thesis advisor. The researcher also employed member validity checks to examine credibility and trustworthiness. The interview subject reviews and comments on the interview transcriptions characterize member validity checks. The respondents were asked to check for accuracy as well as add information they felt would add to the research.

CHAPTER IV

FINDINGS

Chapter IV presents the findings of the research described in the previous chapter. The first two sections describe each EOC studied. The next section describes the findings as to whether the two EOCs are creating an integrated interorganizational network. The final section of this chapter presents the five factors that built and maintain the relationship between the two EOCs.

University EOC

The current university EOC had been in existence for about six months prior to the interview. Before its construction, a police conference room served as the EOC when necessary. The new EOC consists of an operations room that contains a conference/EOC table in the center of the room and several workstations on the perimeter of the room. The EOC also includes medium and small offices that serve as meeting rooms. There is also a room to be used for training, but it was not complete at the time of the interview. The conference table includes phones and laptop connectivity at each station. The center portion of the EOC table contains cubbyholes for the phones and laptops, which enable the table to transform into a conference table. See Figure 1 for a visual of the operations room. The positions at the conference table and the workstations are not assigned to specific university or community entities. There would be a space saved for the city if

they requested a position. A university official explained that the EOC is so new, "there are no designated spots but there aren't designated spots for much of anything right now because the EOC is still being developed." The EOC has its own heating and air units, stand-by emergency power, and a fire detection system in place. The facility is also located below ground. The university EOC has no designated back-up EOC, but officials state they could share resources with the city or possibly use their football stadium's operations center.

Figure 1: University Operations Room

Figure 1 is a view of the university EOC researched. The picture was provided by one of the university officials interviewed and reproduced here with their permission.

Figure 2: University Executive Room

Figure 2 is a view of the executive meeting room in the university EOC. The picture was provided by one of the university officials interviewed and reproduced here with their permission.

Figure 3: University Training Room

Figure 3 is a view of the training room in the university EOC. The picture was provided by one of the university officials interviewed and reproduced here with their permission.

The university has trained and exercised their emergency response network in the past, but the new EOC has not been tested or exercised yet because of its newness. The officials interviewed recognize that more advanced training is needed. In fact one university official stated, "training is constant" in emergency management. But because almost all emergency response personnel at the university are involved in emergency management only part time – which is typical especially in smaller jurisdictions and organizations – finding time for training and exercises can be difficult. One official also believes that because emergency management has not been a priority in the past that training and exercises have suffered. The same official related a story that illustrates this point. In addition to training, the university has employed tabletop and functional exercises in the past. They are also planning to conduct more training and exercise programs once the EOC is completed.

The university's activation procedures are being redefined in a new emergency operations plan (EOP). At the time of the interviews the procedure was based on the request for resources or policy decisions from the incident commanders in the field. The

EOC group may also be called together if there is the possibility of an event that would produce the need for additional resources or policy decisions. The officials interviewed also recognized that each event is different; therefore the need to activate the EOC would be based on different factors. The EOP will include a general protocol, but it will not contain a set of detailed rules for activation.

Each official was given the opportunity to describe the strengths and weaknesses of their EOC. One university official described the use of technology, such as monitors, as a highlight of the newly renovated EOC. Another stated that it was too early to really understand the strengths of the EOC because it was untested. That same official did see some weak spots though. The official stated, "we have a mass notification system in place, but we are looking at ways to improve the system. We are looking at whether the system works." The same official would like to improve the public information function of the university EOC. Both university officials interview emphasized that the EOC is a work in progress. There is still a list of items on the EOC's to-do list. Once the EOC is complete and tested or exercised, officials assume that the strengths and weaknesses will become more apparent.

Based on the literature regarding EOCs, the university EOC's design should support the needs of the university during emergency response. While the EOC has not been tested yet, it contains or will contain the technology and structures necessary to perform the six general task areas of EOCs described by Quarantelli (1972, 1978). The university has also taken measures to ensure that the EOC will continue to be viable during and after the impact of an event by providing the center with its own heating and air units, back-up power, fire resistant wall material, and a fire detection system. The

EOC is not perfect though. Some of the problems include the lack of a back-up EOC that is separate from the city's EOC. The importance of a back-up EOC is emphasized in the work of Kendra and Wachtendorf (2003b).

Municipal EOC

The city has had a formal EOC since the mid-1970s, but the EOC has evolved since then. The first EOC was a conference room adjacent to the emergency manager's office. In the late 1970s, the EOC evolved into an operations room with cubicles for different city departments. In this version of the EOC there was a conference table at which the city manager sat at the head of the table. Each department had a spot at the conference table and then a cubicle that was directly behind their spot. The representatives in the EOC were from police, fire, public works, electric, water, parks and recreation, and the city attorney. In 2002 the city moved its EOC to a new building where the current EOC resides.

The current version of the EOC is larger than the previous versions. The EOC complex includes a large operations room with several smaller support areas located in different rooms. There is a communications room, an area for the public information officer (PIO), and a radar room. Each department has a cubicle in the operations room. The placement of the cubicles is based on their activity level. The departments that regularly respond to events are closer to the decision makers in the front of the operations room than those organizations that only respond to a few types of events. The departments that respond routinely include fire, police, public works, parks and recreation, electric, water and department of environmental quality. Those that only respond in certain types of events include the Red Cross, Salvation Army, sheriff,

highway patrol, and the state emergency management agency. Overall, the general arrangement resembles the classroom layout described by Neal (2003). The city EOC also includes a liaison from the university. The new EOC complex is also self-sustainable for up to two weeks.

Figure 4: City EOC Operations Room

Figure 4 is a view from the back of the city EOC looking toward where the decision makers would set. The picture is reproduced here with the permission of the city official interviewed.

Figure 5: City EOC Operations Room

Figure 5 is a view from the front of the city EOC, where decision makers would set, looking toward agency representatives. The picture is reproduced here with the permission of the city official interviewed.

Figure 6: City EOC Radar Room

Figure 6 is one view of the city radar room. The picture is reproduced here with the permission of the city official interviewed.

The city is currently working on a back-up EOC. The back-up EOC will include many of the same features as the EOC. A city official stated it would be the same except for the niceties of the EOC. It will have fewer phone lines and folding tables and chairs. The city also has a mobile EOC trailer that could be used. If necessary a city official stated, "We could share resources with the university." The city uses small incidents to train EOC staff. A city official stated that the turnover of staff within city departments causes difficulties in terms of training.

Figure 7: City Mobile Units

Figure 7 shows the different mobile units utilized by the municipality study. The picture is reproduced here with the permission of the city official interviewed.

The city utilizes functional exercises for non-EOC personnel. The city utilizes a situational protocol for activating their EOC, stating that the events determine the level of activation. During normal working hours the city EOC is at a level one activation, which means they are monitoring and in communication with staff. An event such as an ice

storm that would include electric, water, police, and fire personnel characterizes level two activation. A level three activation includes more personnel but no declared state of emergency. The highest level of activation – level four – would represent a declared state of emergency in which outside assistance is needed. The activation procedures employed by the city are consistent with activation levels at many EOCs.

The city official interviewed stated that the most important strength of the city EOC is that "it works". In other words, the EOC has been effective in responding to events in the past. The official also touted the information technology and communications capabilities of the EOC, which includes both internal and external wireless capabilities and redundancy. Another strength mentioned was in-house mapping of the community, including residential and commercial areas. The city EOC has saved all the maps and diagrams of the city on an internal network, which will allow for better access during EOC activity. When asked what they would change about the current EOC the city official stated that they would like to find more useable space in the current operations room. They also stated that they once had an idea about a different layout but now thinks it would not be more efficient than the current arrangement. They also stated that a better phone system would be beneficial.

Based on the literature on EOCs, the municipal EOC described includes structures necessary to meet the six general tasks of an EOC described by Quarantelli (1972; 1978). The EOC is a large complex with room for personnel from the different organizations within the community's emergency response network. The EOC also includes elements of resiliency such as redundancy, dedicated utilities, and back-up power. The city is in

the process of building a back-up EOC and also owns a mobile EOC, which further help to ensure effective response.

Analysis of the Five Dimensions of Interorganizational Relationships

Now that the two EOCs have been found to meet the six general task areas described by Quarantelli (1972, 1978), it must be determined whether a relationship exists between the two EOCs. And, if a relationship does exist, how integrated is the relationship. Drabek (1987) argues that the effectiveness of local emergency managers depends on how integrated their organizations are in the emergency management network that exists in their area. In order to determine the degree of integration, Drabek (1987) used five dimensions of interorganizational relationships. The analysis that follows is based on the assumption that a successful emergency manager will manage a successful EOC. By comparing the interview responses to the results of Drabek (1987) one can get a sense of the interorganizational network that exists between the university and the city EOCs. The first dimension studied by Drabek (1987) was the frequency of director contact. That studied concluded that successful emergency managers were in frequent contact with their counterparts (Drabek, 1987, p. 113). Frequent contact can be defined as meeting once per week to several times per week. The results of the current research found a similar pattern between the city and university EOC officials. Each of the officials stated they were in contact with their EOC counterparts at least once a week. One university official stated, "we [group of city and university emergency management officials] have lunch three times a week sometimes." A city official concurred independently that they "were in contact either by phone or in person several times a week."

The second dimension studied can be described as the structural location of contact point. Drabek (1987) found that successful emergency managers cultivate contacts at higher levels within other agencies. In other words their counterparts have a higher rank than they do. The research presented here differs from these results slightly. The officials interviewed responded that their counterparts at the other EOC are of about equal rank. A city official stated, "We are all managers," which accounts for these results. It is important to note that while their direct counterpart is of equal rank, each official interviewed also comes into contact with higher officials in the course of their work in the EOC. A university official stated, "I also have contacts at all levels that are outside of the city." In the interview guide the question was specific to the city-university EOC relationship, which could explain the difference.

The degree of formalization is a third dimension of interorganizational relationships. Drabek (1987) found that most successful emergency mangers used formal agreements to form and manage their interorganizational network. This cannot be said for the respondents in the research described here. The officials interviewed all stated that no formal agreements existed between the university and city at the time of the interviews. However, they also stated they were working toward formalizing verbal agreements. A university official stated, "We are working on making agreements more formal especially with regards to how to respond, plan and mitigate disasters." Specifically, the official are working to convert verbal agreements from the past into mutual aid agreements. A city official stated the formalization process is due to "the university being treated differently than the city under the state's intrastate emergency management compact." Another university official added another reason for formalizing

the relationship: “We are making sure we meet the FEMA requirements for reimbursement.” According to Drabek (1987), the process of formalization should make the city-university response network more integrated.

The number of joint programs is the fourth dimension of interorganizational relationships. According to Drabek’s (1987) results one half of successful directors reported 3 or more joint programs with other agencies in their interorganizational network. The officials interviewed in this study reported three to four joint programs between the two EOCs. The types of programs included mass notification, training, exercises, and a community mitigation plan. A university official stated, “All training is done together.” A city official stated, “We share warning sirens. The city is responsible for activating them, but the university has the ability to, if necessary.” In addition to sharing mass notification and training, another university official stated, “We have conducted joint exercises in the past. And, we plan to do more in the future when the EOC is complete.” Three of the four officials also included the community mitigation plan as a joint program. A university official and a city official also mentioned shared weather spotters. The results are similar to those of Drabek (1987), which suggests an integrated network.

The final dimension of interorganizational relationships is the amount of overlapping memberships. Informal relationships between members of the network are important because they help solidify the network (Drabek et al., 1981). In the results of his study Drabek (1987) found that about one half of successful emergency directors had some kind of additional contact with their counterparts outside of the response network. All of the officials interviewed indicated they had contact with their counterparts outside

of the EOC. A university official stated that they interact monthly at the Local Emergency Planning Commission meetings. Another university official indicated, "There is a lot of overlapping membership on outside projects and committees such as the community mitigation plan." A city official stated, "We [city and university emergency management officials] meet for lunch every Friday."

Overall, the university-city EOC network includes or will include all of the dimensions of an integrated interorganizational network as outlined by Drabek (1987), which suggests that the network will encourage a well coordinated response in a multijurisdictional response. Sorensen (1985) outlines the importance of an integrated interorganizational network. The degree of formalization is the one dimension that the relationship is lacking, but both entities are working to increase the degree of formalization. The structural location of contacts is one area that doesn't align exactly with Drabek's (1987) results, but this could be attributed to the wording of the question. The question was worded using the word counterpart, which could be interpreted in different ways other than the intended meaning. Based on the interviewees' responses in other questions it is clear that they are in contact with members at all levels of the other entity, whether it be the university or the city.

Conditions for Building and Maintaining the Interorganizational Relationship

In the previous sections of this chapter the data showed that the city and university EOCs formed an integrated interorganizational network. With that information the next step is to understand how the network was built and maintained. Using grounded theory, five important factors emerged to explain how the network formed and is maintained. The first theme is making emergency management a priority

in the community. In order to build an effective interorganizational network there must be support from the upper level management in the member organizations (Agranoff, 2004). The same goes for building a network between two EOCs. As discussed previously the emergency management program and EOC at the university are relatively new, but the idea of having a program at the university is not a new idea. According to the officials interviewed, there has "been some support for building a program for years, but it took a "very strong supporter within the university's administration" to make the program a reality. The support within the university coupled with the long-standing emergency management program and EOC at the city laid the groundwork for the integrated interorganizational network that formed between the two entities. But groundwork is not enough to support the network. There are still issues within the university in making emergency management a priority. One university official said the lack of priority is due to, "emergency management being a part-time job for most people." The same official also stated that, "it will be valued when something happens," which the official recognized as "too late." Just as the EOC is "a work in progress," the process of making emergency management a priority is also a work in progress.

A second theme that emerged was the importance of prior relationships to the university-city network. Drabek (1981; 1987) has emphasized the importance of previous relationships and informal ties for two decades. The study of the city-university network finds similar results, in that all of the officials included previous relationships as one reason they felt the two entities would be well coordinated in the event of multijurisdictional event. A university official stated that the two entities would be coordinated "because we know each other." A city official states that the two will be

coordinated "because we have worked together in the past" at university athletic events and other community wide events. Another university official stated that previous relationships are important because "there are things that can be handled better one-on-one." These responses indicate that the two entities have built trust – or social capital – through previous relationships that binds the network together.

The third major theme was the importance of overlapping membership in the city-university network. Each EOC can and will accommodate a liaison from the other during an event. This liaison acts to connect the two EOCs when they are activated, but a liaison is not the only way the two EOCs are connected. The EOCs are also connected by the relationships built between EOC staff that are members of outside organizations or serve on other projects together outside of EOC activities. One university official stated that the university and city "worked for months and months on a community wide mitigation plan" together. Another university stated, "Many of us [city and university EOC staffers] serve on the LEPC together." In addition to these projects, one official stated, "everything is trained together." This includes FEMA training and CERT training. In addition to joint training, the emergency management programs share weather spotters and warning sirens. The relationships formed during these endeavors build capacity within the network. In other words, these overlapping memberships, joint programs, and shared training are how previous relationships are built.

The use of WebEOC, a type of VEOC, also emerged as a theme in the interview responses. According to the officials interviewed the state emergency management office bought WebEOC for use in all the EOCs in the state. The state hopes the program will increase the flow of information and coordination between jurisdictions. The program

has not yet been implemented in the two EOCs but will eventually have an effect on the relationship between the two entities because it represents another way to link the two entities. A university official interviewed stated that a major benefit of the software is that the state "knows exactly what we are doing in the event they need to help us." The same official's general view of the program is "that is has a lot of benefit to it." A city official had a decidedly negative view of the program though. They stated, "Computers don't make things easier; they make things more difficult. You can run an EOC with a pad of paper and four people. If you add a computer, you add two more people. If you interconnect through the web, you add more. You don't get any more work done. It might even slow you down." The differing views on WebEOC will affect the implementation of the program in the city-university network because the system will not work if only one entity utilizes it.

The final major theme that was found throughout the data was the formalization of the relationship between the city and the university. Formalizing the relationship had not been necessary until recently. These agreements are now necessary because the state's intrastate emergency management only pertains to political jurisdictions, not universities. One university official explained that, "the university is considered a state agency; therefore, legally the university's contact for emergency resources is the state emergency management agency. But, realistically, you have to have agreements within the local area." Because of these circumstances the two entities must formalize their relationship. A city official stated that one of the major projects of both entities is "to formalize verbal agreements from the past." Once the new agreements are finalized they will be located in the EOPs of each entity. A university official stated "making sure they

meet the FEMA requirements for reimbursement" was another reason for formalizing the relationship between the city and university. The official further stated that " if the city helps the university and the university files with FEMA for reimbursement under public assistance. Unless there is a written memorandum of understanding or agreement with the city they are not eligible for reimbursement." When stated that way formalizing the relationship between the two entities becomes even more necessary.

Overall Findings

The research presented here sought to discover how two EOCs with adjacent and overlapping jurisdictions interacted during a multijurisdictional event. It was hypothesized that the two EOCs would form an interorganizational network to provide for a coordinated response. The research process was designed to provide information that would determine if the two EOCs included structures that would meet the six functions of EOCs and if the two entities formed an integrated interorganizational network. Overall the research found that the two EOCs did include structures or operations that would meet the six general task areas of an EOC, which suggests that the EOCs would be effective during an event. The research also found that the two EOCs had formed an integrated interorganizational network, which would suggest that the two EOCs would provide a well-coordinated response during a multijurisdictional event. In addition, the information was analyzed using grounded theory. From this analysis emerged five themes that seem to build and maintain the integrated interorganizational network between the city and university. The five factors are making emergency management a priority, the importance of previous relationships, the importance of overlapping memberships, the use of WebEOC, and formalizing the relationship.

CHAPTER V

CONCLUSION

The final chapter of this paper presents a summary of the previous chapters as well as the implications of the research and suggestions for future research.

Overview

The importance of the response period cannot be overstated. In order to effectively recover from an event, a community must first effectively respond to that event. Response activities can vary based on the type and scale of the event, but there are some activities that must always take place. These are known as response-generated demands and include communications, maintaining situational awareness, mobilizing and utilizing resources, control and authority, and coordination (Dynes et al., 1981). In order to effectively respond to an event a community's response network must meet these demands. The effectiveness of response is also dependent on the interorganizational relationships that exist between the organizations and governments that are involved in response activities. According to Sorensen et al. (1985) there are four main factors that determine the effectiveness of interorganizational response: domain consensus and role specification, integration, communication, and autonomy maintenance. Overall, how a community coordinates the many organizations that are active in response determines the effectiveness of response.

With that said, the question becomes how to improve interorganizational relationships for the purpose of more effective response. Drabek (1985) argues there are six strategies to improve interorganizational coordination. These strategies include viewing community disaster planning as a process, improving warning systems, creating an effective EOC, conducting community disaster exercises, understanding multiagency decision styles, and knowing the response will be a multiagency activity. This paper focuses on how EOCs can improve interorganizational coordination during response. The EOC is important to coordination because it serves as a central location for communications, resource management, and policymaking (Kendra & Wachtendorf, 2003b). According to Quarantelli (1972, 1978) the functions of an EOC can be separated into six general areas: coordination, policymaking, operations, information gathering, dispersal of public information, and hosting visitors. In order to be an effective EOC, it must be designed and operated with these six general functions in mind. The presence of structures to accomplish these tasks does not ensure effective response though. The various response organizations must work collaboratively and cooperatively within the EOC to ensure effective response. EOCs must also collaborate and cooperate with other EOCs because disasters rarely affect only one jurisdiction.

One way to foster this kind of collaboration and cooperation is a networked organizational structure not only within the EOC but also between EOCs. Agranoff (2004, p. 63) defines a network as, "networks of public organizations, including both formal and informal structures, composed of representatives from governmental and nongovernmental agencies working interdependently to exchange information and/or jointly formulate and implement policies and programs that are usually designed for

action through their respective organizations." This definition describes how the organizations active in response work together in the EOC to coordinate an effective response. But the presence of a networked structure is not enough to ensure an effective collaborative response. Each member of the network must understand that the network must be nurtured and managed.

The original research presented in this paper sought to discover how two EOCs with adjacent and overlapping jurisdictions would interact during a multijurisdictional event. It was hypothesized that the two EOCs would form an interorganizational network to provide for a coordinated response in a multijurisdictional event. In order to study this issue a two-part interview guide was utilized during four interviews with city and university officials. The responses of the officials along with observational data were then analyzed. The analysis took three forms. The first form of analysis sought to determine if the two EOCs studied could be considered effective. Effectiveness was based whether the EOCs included structures to meet the six general task areas of EOCs, as described by Quarantelli (1972, 1978). The second form of analysis sought to determine if the two EOCs had formed an integrated interorganizational network. This determination was based on the five dimensions of interorganizational relationships described by Drabek (1987). The final form of analysis employed grounded theory, which elicits theory from the view of the interview subjects (Cresswell, 2003).

The findings of the analysis suggest that the two EOCs do include the structures necessary to meet the general task areas of EOCs. The findings also show that the two EOCs have formed an integrated interorganizational network. These finding suggest that the two EOCs will provide a well-coordinate response in the event of a

multijurisdictional response. From the analysis based on grounded theory emerged five themes that seem to be factors in building and nurturing the integrated interorganizational network between the city and university EOCs. Those themes include making emergency management a priority, the importance of previous relationships, the importance of overlapping memberships, the use of WebEOC, and formalizing their relationship. In general, the research findings support the hypothesis that the two EOCs would form an integrated interorganizational network to provide for a coordinated response during a multijurisdictional event.

Implications

Despite the fact that each community is unique, the research presented here has implications for not only city-university response networks but also the many other types of response networks that exist. First, the research upholds the idea that emergency management must be made a priority in order to provide effective response. Using terminology from the network literature, there must be promoters in the upper echelons of each organization (Agranoff, 2004). Another implication for response networks is the importance of prior relationships and boundary spanners. The research on response has indicated that prior relationships and overlapping memberships help increase the effectiveness of response (Drabek, 1987; Drabek et al., 1981; Sorensen et al., 1985). This indicates that other networks should work to build relationships between EOC personnel prior to an event. There are many ways to build relationships between members of the network. In the case of emergency response, the activities could include conducting joint training, community disaster exercises, and programming. Prior relationships and boundary spanners help increase social capital/trust between members of the network.

The increase in trust leads to more collaboration and cooperation in the network (Agranoff & McGuire, 2001; Kamensky et al., 2004; Lipnack & Stamps, 1994).

This research also highlights the importance of mutual aid. Mutual aid is important to city-university networks because the legal issues between the two entities. In the community studied, the state's intrastate emergency management compact only pertained to political jurisdictions not universities that are considered state agencies. Because of these legal differences mutual aid agreements were necessary between the city and university. While not all city-university relationships are the same, it is important for cities and universities to understand the legal issues that may arise prior to an event occurring. If these legal issues are not understood, there could be serious consequences for not only response activities but also for reimbursement and recovery activities.

A final implication that can be gleaned from the results of this study regards the use of VEOCs such as WebEOC. Technology can provide ways to improve the operation of EOCs but technology is not a panacea. The technology can only aid the response network in its activities (Wenger et al., 1986). In order for these aids to work the relationships must be in place first. So communities should not install technological solutions for coordination problems unless they also seek solutions that will connect members of the network.

Suggestions for Future Research

The use of networks in emergency management has been studied previously (for examples see Gillespie & Murty, 1994; Kiefer & Montjoy, 2006; McEntire, 2002; Waugh Jr., 2007b), but there is still more research to be done. One area of research could be the

EOC as a network. In other words, what are the human factors that affect how the EOC operates? Similarly, how does the design of an EOC affect response operations? In other words, are there structural changes that can be made within the EOC that will increase the effectiveness of response? In general, we know that the EOC is a communications and coordination hub during emergency response. We also know what functions should be accomplished within the EOC, but there is still much research to be done on how to increase the effectiveness of EOC operations. This type of research is important not only for policy but also for practice. If we understand the physical structures and organizational structures within the EOC that lead to more effective response, a set of best practices or policy guidance can be formed. State and local officials could then use these documents to evaluate and improve the capacity of their own EOCs to respond to events.

The direction of future research should include studies regarding VEOCs. How VEOCs either aid or hinder EOC operations? VEOCs have disadvantages that must be overcome for them to be effective, so there must be research on how to overcome those disadvantages. There should also be research devoted to how VEOCs are best implemented in EOCs. The use of VEOCs is a new concept, so there is a great need for more descriptive and systematic research on their use. The information is necessary in order for decision makers to make good decisions regarding their use. The cost of the software and the time necessary for implementation require good decisions regarding their use because local governments cannot take chances with monetary and human resources. This is especially true under current economic circumstances.

In addition to studies of VEOCs, there should also be research about the general effectiveness of networked structures in emergency management. There is no clear picture as to whether networked structures produce better results than hierarchical structures. The circumstances that lend themselves well to networked structures are described above, but whether those structures are more effective than a hierarchical structure is not known. It is important for both policy makers and practitioners to have this kind of information before they commit to one organizational structure over another because it would require considerable effort and resources to reverse such decisions. It is also possible that choosing the wrong organizational structure could lead to ineffective response. Ineffective response can have serious and deadly consequences.

These ideas only represent a few of the possible avenues of future research on the use of networks in emergency management. The key thing to take away from this is not a specific idea for research but that there is a need for more systematic study of the use of networks in emergency management. The scope of this study is limited to only one network across one community, but there are an almost infinite number of networks in the U.S. emergency management system. Future research should focus on mapping and understanding this vast array of networks. It should also include the similarities of these networks and information of what makes certain networks effective and others ineffective. Information about the response network in the U.S. is important because it could lead to policy learning within the system. In other words, it can be used to inform better broad policy decisions at the federal level. It can also provide state and local governments and response organizations with best practices about how to use networks in

their community. Overall, there is much still to know about the emergency management system in the U.S.

REFERENCES

Agranoff, R. (2004). Chapter Three: Leveraging Networks: A Guide for Public Managers Working across Organizations. In J. M. Kamensky & T. J. Burlin (Eds.), *Collaboration: Using Networks and Partnerships*. Lanham, MD: Rowman & Littlefield Publishers, Inc.

Agranoff, R., & McGuire, M. (2001). Big Questions in Public Network Management Research. *Journal of Public Administration Research and Theory, 11*(3), 295-326.

Blinn-Pike, L., Phillips, B. D., & Reeves, P. (2006). Shelter Life After Hurricane Katrina: A Visual Analysis of Evacuee Perspectives. *International Journal of Mass Emergencies and Disasters, 24*(3), 303-330.

Clary, B. B. (1985). The Evolution and Structure of Natural Hazard Policies. *Public Administration Review, 45*(Special Issue: Emergency Management a Challenge for Public Administration), 9.

Cresswell, J. W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Davis, S. C. (2002). Virtual Emergency Operations. *Risk Management, 49*(7), 46-52.

Drabek, T. E. (1985). Managing the Emergency Response. *Public Administration Review, 45*(Special Issue: Emergency Management: A Challenge for Public Administration), 85-92.

Drabek, T. E. (1987). *The Professional Emergency Manager: Structures and Strategies for Success*. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Drabek, T. E., Tamminga, H. L., Kilijanek, T. S., & Adams, C. R. (1981). *Managing Multiorganizational Emergency Responses: Emergency Search and Rescue Networks in Natural Disaster and Remote Area Settings*. Boulder, CO: University of Colorado's Institute of Behavioral Sciences.

Dynes, R. R., Quarantelli, E. L., & Kreps, G. A. (1981). *A Perspective on Disaster Planning*. Newark: Disaster Research Center, University of Delaware.

Federal Emergency Management Agency (FEMA). *Hardened First Responder Facility: Full Mitigation Best Practice Story, Smith County, TX*. Retrieved. from www.fema.gov/mitigationbp/briefPdfReport.do?mitssId=841>.

Gillespie, D. F., & Murty, S. A. (1994). Cracks in a Postdisaster Service Delivery Network. *American Journal of Community Psychology, 22*(5), 639-660.

Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine Publishing Co.

Goldsmith, S., & Eggers, W. D. (2004). *Governing By Network: The New Shape of the Public Sector*. Washington, D.C.: Brookings Institution Press.

Gorden, R. L. (1992). *Basic Interviewing Skills*. Long Grove, IL: Waveland Press, Inc.

Kamensky, J. M., Burlin, T. J., & Abramson, M. A. (2004). Chapter One: Networks and Partnerships: Collaborating to Achieve Results No One Can Achieve Alone. In J. M. Kamensky & T. J. Burlin (Eds.), *Collaboration: Using Networks and Partnerships*. Lanham, MD: Rowman & Littlefield Publishers Inc.

Kendra, J., & Wachtendorf, T. (2003a). Creativity in Emergency Response to the World Trade Center. In *Beyond September 11th: An Account of Post-Disaster Research*: http://www.colorado.edu/hazards/publications/sp/sp39/.

Kendra, J., & Wachtendorf, T. (2003b). Elements of Resilience After the World Trade Center Disaster: Reconstituting New York City's Emergency Operations Centre. *Disasters, 27*(1), 37-53.

Kiefer, J. J., & Montjoy, R. S. (2006). Incrementalism before the Storm: Network Performance for the Evacuation of New Orleans. *Public Administration Review, 66*(Special Issue on Collaborative Management), 9.

Lewis, R. G. (1988). Management Issues in Emergency Response. In L. K. Comfort (Ed.), *Managing Disasters: Strategies and Policy Perspectives*. Durham, NC: Duke University Press.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications.

Lipnack, J., & Stamps, J. (1994). *The Age of the Network: Organizing Principles for the 21st Century*. Essex Junction, VT: Omneo.

Mandell, M. (1988). Intergovernmental Management in Interorganizational Networks: A Revised Perspective. *International Journal of Public Administration, 11*(4), 393-416.

McEntire, D. A. (2002). Coordinating Multi-Organizational Responses to Disaster: Lessons from the March 28, 2000, Fort Worth Tornado. *Disaster Prevention and Management, 11*(5), 369-379.

Mileti, D. S. (1999). *Disasters by Design: A Reassessment of Natural Hazards in the United States*. Washington, D.C.: Joseph Henry Press.

Neal, D. M. (2003). Design Characteristics of Emergency Operating Centers: What We Know and Don't Know. *Journal of Emergency Management, 1*(2), 35-38.

Neal, D. M. (2005). Four Case Studies of Emergency Operations Centers: Design Characteristics and Implications. *Journal of Emergency Management, 3*(1), 29-32.

Neal, D. M., & Phillips, B. D. (1995). Effective Emergency Management: Reconsidering the Bureaucratic Approach. *Disasters, 19*(4), 327-337.

O'Toole, L. J. (1997). Treating Networks Seriously: Practical and Research-Based Agendas in Public Administration. *Public Administration Review, 57*(1), 45-52.

O'Toole, L. J., & Meier, K. (2004). Desperately Seeking Selznick: Cooptation and the Dark Side of Public Management in Networks. *Public Administration Review, 64*(6), 681-693.

Paxton, K. F. (1980). *Manual for Developing EOC Standard Operating Procedures*. Washington, D.C. (Federal Emergency Management Agency).

Perry, R. W. (1995). The Structure and Function of Community Emergency Operations Centres. *Disaster Prevention and Management, 4*(5).

Phillips, B. D. (1997). Qualitative Methods and Disaster Research. *International Journal of Mass Emergencies and Disasters, 15*(1), 179-195.

Quarantelli, E. L. (1972). *Problems and Difficulties in the Use of Local EOC's in Natural Disasters*. Columbus, OH: Disaster Research Center, Ohio State University.

Quarantelli, E. L. (1978). *Uses and Problems of Local EOCs in Disasters*: Disaster Research Center, University of Delaware.

Rotanz, R. A. (2007). Chapter 8: Applied Response Strategies. In W. L. Waugh Jr. & K. Tierney (Eds.), *Emergency Management: Principles and Practice for Local Government* (2nd ed.). Washington, D.C.: ICMA.

Rubin, C. B. (2007). Chapter Two: Local Emergency Management: Origins and Evolution. In W. L. Waugh Jr. & K. Tierney (Eds.), *Emergency Management: Principles and Practice for Local Government* (2nd ed.). Washington, D.C.: ICMA

Sorensen, J. H., Mileti, D. S., & Copenhaver, E. (1985). Inter- and Intra-organizational Cohesion in Emergencies. *International Journal of Mass Emergencies and Disasters, 3*(3), 27-52.

Spradley, J. P. (1980). *Participant Observation*. New York, NY: Holt, Rinehart and Winston.

Waugh Jr., W. L. (2007a). Chapter One: Local Emergency Management in the Post-9/11 World. In W. L. Waugh Jr. & K. Tierney (Eds.), *Emergency Management: Principles and Practice for Local Government* (2nd ed.). Washington, D.C.: ICMA.

Waugh Jr., W. L. (2007b). EMAC, Katrina, and the Governors of Louisiana and Mississippi. *Public Administration Review, 67*(Administrative Failure in the Wake of Katrina), 7.

Waugh Jr., W. L., & Sylves, R. T. (2002). Organizing the War on Terrorism. *Public Administration Review, 62*(Special Issue), 145-153.

Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. (2000). *Unobtrusive Measures* (Revised ed.). Thousand Oaks, CA: Sage Publications.

Wenger, D. E., Quarantelli, E. L., & Dynes, R. R. (1986). *Disaster Analysis: Emergency Management Offices and Arrangements*: University of Delaware Disaster Research Center.

APPENDICES

Appendix A: IRB Application

1. Describe the purpose and the research problem in the proposed study.

The purpose of the study is to discover the extent to which local emergency managers use collaboration and networks in multi-jurisdictional mass emergency and disaster events.

2. (a) Describe the subjects of this study:

1) Describe the sampling population: The population will be local emergency managers who are acting in the course of their professional duties. The initial participants were selected because of their geographic proximity to the investigators.
2) Describe the subject selection methodology (i.e. random, snowball, etc): The first two subjects were selected based on convenience. The remaining subjects will be selected using the snowball technique because the research centers around the use of networks.
3) Describe the procedures to be used to recruit subjects. Include copies of scripts, flyers, advertisements, posters or letters to be used: A letter of request will be sent to the first two subjects. Once the other subjects are identified they will be sent a letter of request.
4) Number of subjects expected to participate: There will be no more than ten participants
5) How long will the subjects be involved: Each subject will be involved in the study for at least one interview with the possibility of follow up discussions. The total time should be no longer than two hours.
6) Describe the calendar time frame for gathering the data using human subjects: The research will take no more than one year to complete gathering data.
7) Describe any follow-up procedures planned: Follow up discussion might be necessary for clarification and confirmation purposes.

(b) Are any of the subjects under 18 years of age? ☐Yes ☒No

If Yes, you must comply with special regulations for using children as subjects. Please refer to IRB Guide.

3. Provide a detailed description of any methods, procedures, interventions, or manipulations of human subjects or their environments and/or a detailed description of any existing datasets to be accessed for information. Include copies of any questionnaires, tests, or other written instruments, instructions, scripts, etc., to be used.

The interviewees will be asked to respond to a series of questions meant to gain information about their emergency operations center and the nature of their collaboration and networking relationships with other local emergency operations centers. The interviews will be conducted in a location that is most convenient for the interviewee. The questions were developed using the relevant literature from the fields of emergency management and networks. The information gained from the interviews will be recorded using notes and an audio recorder. The notes and audio recordings will be used to transcribe the interview. The primary investigator will do the transcribing. The information will then be analyzed for patterns of responses most likely using Spradley DRS. It will also be compared to similar studies on interorganizational relationships in emergency management.

4. Will the subjects encounter the possibility of stress or psychological, social, physical, or legal risks that are greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests? ☒Yes ☐No

If Yes, please justify your position: The possible harm to the subjects is due to the possible loss of confidentiality, but steps will be taken to minimize this risk. Another possible harm could be revealing more information than they would like, but they will be informed that they have the right to refuse to answer any question or to end the interview at any time.

5. Will medical clearance be necessary for subjects to participate because of tissue or blood sampling, administration of substances such as food or drugs, or physical exercise conditioning? ☐Yes ☒No

If Yes, please explain how the clearance will be obtained:

6. Will the subjects be deceived or misled in any way? ☐Yes ☒No

   If Yes, please explain:

7. Will information be requested that subjects might consider to be personal or sensitive? ☒Yes ☐No

   If Yes, please explain: The information requested will include information about the operations and relationships utilized in the course of his/her duties within in the local emergency operations center.

8. Will the subjects be presented with materials that might be considered to be offensive, threatening, or degrading? ☐Yes ☒No

   If Yes, please explain, including measures planned for intervention if problems occur.

9. Will any inducements be offered to the subjects for their participation? ☐Yes ☒No

   If Yes, please explain:

   NOTE: If extra course credit is offered, describe the alternative means for obtaining additional credit available to those students who do not wish to participate in the research project.

10. Will a written consent form (and assent form for minors) be used? ☒Yes ☐No

    If Yes, *please include the form(s). Elements of informed consent can be found in 45 CFR 46, Section 116. Also see the IRB Handbook or webpage* http://compliance.vpr.okstate.edu/IRB/consent.aspx .

    If No, *a waiver of written consent must be obtained from the IRB. Explain in detail why a written consent form will not be used and how voluntary participation will be obtained. Include any related material, such as a copy of a public notice, script, etc., that you will use to inform subjects of all the elements that are required in a written consent. Refer to IRB Handbook or webpage http://compliance.vpr.okstate.edu/IRB/consent.aspx.*

11. Will the data be a part of a record that can be identified with the subject? ☒Yes ☐No

    If Yes, please explain: The interviews will be recorded and transcribed. In order to protect confidentiality, the interviewees' name will not be written on the tape. The tape will be coded with a number. A separate list with the names and numbers will be kept apart from the tapes and will be password protected on a computer in a locked university office.

12. Describe the steps you are taking to protect the confidentiality of the subjects and how you are going to advise subjects of these protections in the consent process.

    The names of interview subjects will be coded in order to protect their confidentiality. The code and other records will be kept separate from documents that could lead to a loss of confidentiality. The tapes and other records will be kept under lock and key in the Center for the Study of Disasters and Extreme Events with access limited to the principal investigator and advisor. After the research is complete, the tapes will be destroyed in 2 years or returned to the subjects

13. Will the subject's participation in a specific experiment or study be made a part of any record available to his or her supervisor, teacher, or employer? ☐Yes ☒No

    If Yes, please describe:

14. Describe the benefits that might accrue to either the subjects or society. *Note that 45 CFR 46, Section 46.111(a)(2) requires that the risks to subjects be reasonable in relation to the anticipated benefits. The investigator should specifically state the importance of the knowledge that reasonably may be expected to result from this research.*

The most important benefit is the knowledge gained though participation. The information can be used to improve the effectiveness of emergency operations centers, influence planning in local emergency management, and change how actors in local emergency management train for multijurisdictional events. It will also provide the participants a chance to reflect, which may enable them to gain professional insights. The research will also bring attention to an area of emergency management that has not been studied at a level commensurate with its importance to emergency response.

Appendix B: Interview Guide

EOC Specific Questions:

1. How long has your current EOC been in existence?
2. How long have you been in charge of the EOC in your jurisdiction?
3. Describe the setup of your EOC?
    a. How large is your EOC?
        i. Number of rooms
        ii. Square footage
    b. How many rooms?
        i. Cubicles?
    c. How is the Operations room arranged?
        i. By function?
        ii. Other
        iii. As for a layout of the EOC.
4. What agencies or departments are represented in the EOC?
    a. How are agency representatives arranged within the space?
        i. By function?
        ii. Some other way?
    b. What other local governments are represented in your EOC?
        i. Other cities
        ii. The county
        iii. The university
5. Do you have a back-up EOC?
    a. What kind of facility is the back up EOC?
        i. Mobile EOC
        ii. Another building?
    b. How comparable are your EOC and back-up?
6. Have you conducted training that included the EOC?
    a. How many training sessions?
    b. Who participated?
    c. What kinds of training.

    d. What did you learn from the training
        i. Coordination issues
        ii. Communications issues
7. Have you conducted any exercises that included the EOC
    a. How many exercises?
    b. Were they tabletop exercises or functional exercises?
    c. Who participated in the exercise?
    d. What lessons did you learn from those exercises?
    e. Are there copies of the reports available?
8. How do you decide to activate your EOC?
    a. Types of situations
    b. Some kind of protocol
    c. When there is a watch?
    d. A warning?
9. What are the best parts of your EOC?
    a. What works the best?
    b. Something you are really proud of?
10. What concerns or problems do you have with your EOC?
    a. Noise issues
    b. Space issues
    c. Agency representation
        i. Too much
        ii. Too little
11. If you could redesign your EOC, what would you do differently?

Network and Collaboration Questions

12. Do you work with any other EOCs or EMs?
    a. If yes, skip to #16
    b. If no, go to #13
13. Why don't you work with other EOCs or EMs?
    a. Personal differences
    b. Professional differences

c. No reason to
d. No opportunities to

14. Do you know any other EMs in this area?
15. Would you like to work with other EOCs or EMs?
    a. Why?

*Ask for each of the EOCs they work with

Frequency of Director Contact

16. How often to you meet with your counterpart at each of the EOCs?
    a. Never; a few times a year; about once a month; every few weeks; about once a week; several times a week
17. Would you like to meet with your counterparts more?
    a. Why?
18. Why do you meet with certain counterparts more than others?
    a. More need?
    b. Higher comfort level?

Structural Location of Contact Point

19. Compared to your rank in your own organization, are your counterparts in other organizations ranked higher than, lower than, or at about the same level as you in their own organization?

Degree of Formalization

20. Do you have any formal agreements with other EOCs or EMs?
    a. Is so, what kinds of agreements do you have with each?
        i. Memorandums of Understanding, Interagency Agreements
    b. If no, are there any in the works?
    c. If no, why?

Number of Joint Programs

21. Do you conduct any joint programs with other EOCs or EMs?

a. If so, how many and what kinds of joint programs with each counterpart?
b. In past joint programs, who has initiated the program?
c. If no, are there any in the works?
d. If no, why?

22. Do you conduct joint exercises or training with other EOCs or EMs?
    a. If so, what kinds of training and exercises are you involved in with each of your counterparts?
    b. If no, do you plan to do so in the future?
    c. If no, why?

Amount of Overlapping Memberships

Informal ties among people who interact with each other away from their jobs often link two organizations.

23. Do you interact with your counterparts at other EOCs outside of your job?
    a. If so, do you think this makes your working relationship better?
    b. If no, do you think this would improve your working relationship?

Perceived Interorganizational Coordination

24. Do you believe you and your counterpart's activities with regards to the EOC are well coordinated?
    a. If yes, why?
    b. If no, why?
    c. If no, how do you think your activities could become better coordinated?
25. Do you believe your activities and those at other EOCs will be well coordinated in the event of a multi-jurisdictional event?
    a. If yes, what leads you to this conclusion?
    b. If no, why?
    c. If no, how would you improve coordination?

Appendix C: Informed Consent Form

Project Name: Networks and Collaboration Among Local Emergency Operations Centers

Investigators: Elizabeth Harris, Oklahoma State University

Purpose: The purpose of the study is to discover how local emergency managers use collaboration and networks to provide more effective response to multi-jurisdictional emergency and disaster events, especially with respect to emergency operations centers (EOCs).

Procedures: A graduate student from the Oklahoma State University Department of Political Science will conduct the one-on-one interview. The questions will provide you an opportunity to explain in your own words how your EOC functions and interacts with other EOCs. The interviews will be taped using an audio recorder. The interviews will last about one hour. There is also the possibility of contact after the initial interview to clarify or confirm information provided in the interview. After the interviews are completed, the information will be analyzed for trends and other information. The final product of the research will be a Master's thesis.

Risks of Participation: The study involves minimal risk to the participant including loss of confidentiality and revealing information they did not want to reveal. Your name and title will not be revealed in the final document.

Benefits of Participation: The research will benefit both the researchers and interviewees in several important ways. The most important benefit is the knowledge gained though your participation. The information can be used to improve the effectiveness of emergency operations centers, influence planning in local emergency management, and change how actors in local emergency management train for

multijurisdictional events. The interview will also allow the participant to reflect on their plans and actions, which may enable them to gain professional insight. The research will also bring attention to an area of emergency management that has not been studied at a level commensurate with its importance to emergency response.

Confidentiality: In order to protect your confidentiality, any documents that may identify you as an interviewee will be coded in a way that will protect your name. The code and coded documents will be kept separately under lock and key. The interview tapes will be destroyed after two years or returned to you, the subject. The records of this study will be kept private. Any written results will discuss group findings and will not include information that will identify you. Research records will be stored securely and only researchers and individuals responsible for research oversight will have access to the records. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research.

Compensation: There will be no extra compensation for participating in this study.

Contacts: If you have any questions about the research, please contact Elizabeth Harris at (918) 521-1954 or Dr. Brenda Phillips at (405) 744-5298. If you have any questions about your rights as a research volunteer, you may contact Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, (405) 744-1676 or irb@okstate.edu.

Participants Rights

As a volunteer participant, you have the right to refuse to answer any question or end the interview at any time without the threat of punishment or penalty.

Signatures:

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy of this form has been given to me.

_____ _____

Signature of Participant Date

I certify that I have personally explained this document before requesting that the participant sign it.

_____ _____

Signature of Researcher Date

VITA

Elizabeth A. Harris

Candidate for the Degree of

Master of Arts

Thesis: THE USE OF NETWORKS TO CONNECT LOCAL EMERGENCY OPERATIONS CENTERS

Major Field: Political Science

Biographical:

Education:
Completed the requirements for the Bachelor of Science in Political Science at Oklahoma State University, Stillwater, Oklahoma in May, 2007
Completed the requirements for the Master of Arts in Political Science at Oklahoma State University, Stillwater, Oklahoma in July, 2009.

Experience:
AmeriCorps Member, American Red Cross: Tulsa Area Chapter
August 2009-
Teaching Assistant, Oklahoma State University Department of Political Science
Aug.2007 – May 2009
Research Associate, National Council on Disability and EAD & Associates
Feb.2008 – Feb. 2009
Intern, Government Accountability Office
Summer 2008
Intern, Stillwater Emergency Coordination and Communications Center
Summer 2007
Tutor/Coordinator, Oklahoma State University Math Learning Resource Center *August 2004–May 2007*

Professional Memberships:
Pi Sigma Alpha
Phi Kappa Phi

Name: Elizabeth A. Harris Date of Degree: July, 2009

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: THE USE OF NETWORKS TO CONNECT LOCAL EMERGENCY OPERATIONS CENTERS

Pages in Study: 98 Candidate for the Degree of Master of Arts

Major Field: Political Science

Scope and Method of Study: This study seeks to discover how local emergency operations centers in one community connect to provide a coordinated multijurisdictional response. The study is based on a qualitative research design. In order to gain data for analysis, the researcher employed interviews, visual evidence, and documents. The data analysis consisted of three phases. The first phase compared the studied EOCs to the existing literature to determine if they included structures to meet the six general task areas of EOCs as described by Quarantelli (1972; 1978). The second phase compared the statements of each official about their interorganizational relationship to the results of Drabek (1987). The final phase of analysis employed grounded theory to discover the conditions that enabled the EOCs to build and maintain their relationship.

Findings and Conclusions: Overall the research found that the two EOCs did include structures or operations that would meet the six general task areas of an EOC, which suggests that the EOCs would be effective during an event. The research also found that the two EOCs had formed an integrated interorganizational network, which would suggest that the two EOCs would provide a well-coordinated response during a multijurisdictional event. In addition, the information was analyzed using grounded theory. From this analysis emerged five themes that seem to build and maintain the integrated interorganizational network between the city and university. The five factors are making emergency management a priority, the importance of previous relationships, the importance of overlapping memberships, the use of WebEOC, and formalizing the relationship through mutual aid agreements. The study concluded that the two EOCs studied formed an integrated interorganizational network in order to provide a well-coordinated multijurisdictional response.

ADVISER'S APPROVAL: Dr. Brenda Phillips