AN ANALYSIS OF THE INCIDENT COMMAND SYSTEM

by

Hsien-Ho Chang

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Disaster Science and Management

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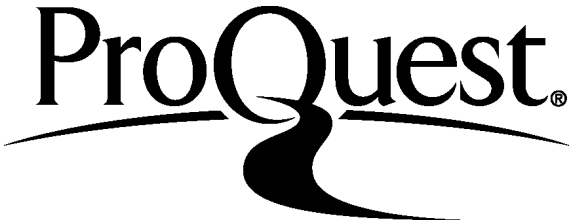

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Because, without all of you, there would be no Ray today.

DEDICATION

I dedicate this dissertation to my father, Jun-Yan Chang. He passed away on 05/13/2015, one month before I submitted this dissertation to all committee members. His wish was for me to devote myself to the development of my country, Taiwan, and to take good care of my mother. I will try my best to fulfill his wishes.

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ABSTRACT

This dissertation explores the nature of the Incident Command System. I utilized the lens of organizational theory (especially in the discussions between mechanistic and organic system) to review the majority of ICS research and discussions over the past several years. After my literature review, I developed the following research question: to what degree is the ICS mechanistic versus organic?

I utilized two methodological analyses to answer my research question. The first analysis I conducted is the content analysis. I analyzed two official ICS documents and three ICS online training courses, and found that this system combines both mechanistic and organic design elements. From this analysis, I also found that there are nine ICS decision points that determine whether this system leans towards being more mechanistic or organic in nature. Consequently, to further understand how responders make these decisions on the ground, I conducted a second type analysis: in-depth qualitative interviews followed by data analysis. Results from my interviews illustrate that this system is a combination system that includes both mechanistic and organic design elements, and also demonstrate that there are many ICS organic characteristics hidden within its mechanistic structure.

Based on the literature I read and the two analyses that I conducted, I draw five conclusions in this research: 1) Future ICS researchers have to think about how this system actually is being used at the disaster scene, 2) Future ICS discussions should think about the different scales of disasters involved, 3) It is necessary to look at events of the same scale where different choices were made, 4) People need to understand the implementation of the ICS across all scenes and incidents, and 5) Future ICS research should treat the ICS as a new type of system.

Chapter 1

INTRODUCTION

Disasters create demands for mobilizing resources and personnel. For example, Hurricane Andrew destroyed entire electrical systems; blocked roads, highways, and airports; and disrupted almost all communication channels. Because of the previous conditions, the milling process began almost immediately after the Hurricane struck. Consequently, disaster responders had to deliver food, water, and shelter in an environment that was entirely different than their normal operations (Schneider, 2011, p.118). Dynes (1970) and Quarantelli (1997) have categorized these demands as agent-generated (for example, a disaster could generate the need for bulldozers; it could create the need for debris removal; and/or a need for search and rescue activities) and response-generated (such as the need to coordinate responders from various organizations and the need to transport resources to certain locations). While fighting to the wild land fires in Southern California, for instance, responders not only found difficulties on fulfilling the agent-generated demands, but also on fulfilling the response-generated demands. Except for the lack of resources, responders also encountered problems including: 1) lack of common terminologies, so people cannot communicate at the incident level, 2) lack of coordination to prioritize all resources and tasks, and 3) lack of technologies such as radio communications, mapping systems, and meteorological monitoring and forecasting (Stambler & Barbera, 2011,

pp.3-4). The previous example demonstrates that successful disaster response operations are based on attending to both agent- and response-generated demands. While planning is often focused on resources and systems that attend to agent-generated demands, many researchers have suggested that fulfilling response-generated demands is equally as important during disasters. As a result, establishing protocols, mechanisms, or rules to facilitate interdepartmental cooperation and communication is important and necessary (Quarantelli, 1997, p.42).

Researchers are not alone in their focus on improving response systems. Emergency managers also suggest that successful response activities rely on the coordinated efforts of various departments and organizations. They correspondingly call for a strong disaster response system that can cope with events regardless of their sizes, types, and scales. Further, they also believe such a system should be usable by any department and/or organization to coordinate response activities (FEMA, 2013). Based on the experience on fighting wild land fires in Southern California, some disaster managers created a response system to solve the communication and coordination problems they encountered at scenes. This response system eventually became the early version of the Incident Command System, and it has been regarded as the most popular wild land fire response system since 1980's (Stambler & Barbera, 2011, pp.18-20).

Despite agreement on the importance of a well-developed disaster response system, ICS did not become a national response system until Homeland Security Presidential Directive (HSPD)-5 required state and local adoption of the Homeland

Security Department's approved National Incident Management System (NIMS) definition of the ICS as a condition for receiving federal preparedness funding (Sylves, 2008, p. 151). In short order, the Department of Homeland Security (DHS) mandated that all organizations and levels of government involved in emergency management adopt the Incident Command System (ICS) for orchestrating on scene disaster response activities. As one component of the national disaster response framework and policy, the ICS becomes a popular topic in disaster management field.

Although many disaster researchers and practitioners discuss this system; the majority of ICS discussions are centered on evaluating the pros and cons of this system. Only few ICS discussions are based on empirical data and emphasized on its natures and logics.

Many ICS critics, based on case studies of the system's use in disasters and catastrophes, have called into question the theoretical foundations and practical limitations of the system (Buck, Trainor, and Aguirre, 2006; Neal and Phillips, 1995; Neal and Webb, 2006; Quarantelli, 2002; and Wenger, Quarantelli, and Dynes, 1990). Meanwhile, some ICS proponents, report that the system is useful based on their use of the system. Given that ICS is the national framework for disaster response and as such it should define how American disaster responders act on disaster scenes, it is important to understand why significant differences in perspectives on ICS exist. To begin to understand these differences in perspective, it is useful to look more closely at how ICS critics and proponents have developed their conclusions.

Proponents Perspectives

In looking first ICS proponents' perspectives, many focus on certain ICS design elements (such as setting up a clear hierarchy to command and control all responders). Senior ICS users, for example, in California regarded (a) predefined hierarchy, (b) uniform terminology, (c) modular organization structure, (d) Incident Action Plan, and (e) span of control as major contributions to response coordination (Cole, 2000, p.218). More specifically, Bigley and Roberts (2001) analyze daily operations in fire departments and concludes the ICS hierarchy is adjustable, and thus it is flexible and reliable to be used on dealing with complex disastrous situations. Buck, Trainor, and Aguirre (2006) review several disastrous cases, and mention this system has created a simple platform for disaster responders to manage routine operations. These viewpoints are centered on using this system to command and control responders in the day-to-day based operations, so they are quite different compared to those of the ICS critics that we will discuss in the following paragraphs.

Critiques

In looking next at ICS critics, this group tends to suggest that other organizational characteristics (such as building a non-hierarchical structure to collect opinions from various organizations) are preferable during disasters. They conclude that setting up a non-hierarchical structure to improve cooperation and coordination is critical to orchestrate response activities (Harrald, 2006; Neal & Phillips, 1995; Neal & Webb, 2006; Moynihan, 2005; Moynihan, 2007; Quarantelli, 2002). Quarantelli (2002), for example, believes that disasters create complex situations, and thus cannot

be managed by a hierarchical system which relies on a person making all decisions. Consequently, Quarantelli (2002) claims coordination is more important than control while people respond to disasters and went on to suggest the importance of a decentralized response system to cope with complex disasters.

These perspectives from critics are most often generated from the observations and investigations during complex disastrous situations. For example, Neal and Phillips (1995) reported one of the lessons learned after Hurricane Andrew is: "flexibility and decentralization in large disasters allow new organizational structures to emerge in order to meet the needs (p.335)." Although they take large disasters as examples, they suggested disaster responders do not use a command and control approach in any scales of disasters. Similarly, Neal and Webb (2006) focus on large scale of disasters. They conducted extensive observations during Hurricane Katrina, and then interviewed responders from the same disaster. At the end of their research, they suggested to redesign the NIMS and ICS to better deal with complex situations (p.279).

Given the difference of complexity, different strategies and types of organizations have to be used to accommodate the environmental changes (Hatch, 1997, p.117). Consequently, discussing the ICS from different approaches causes confusions and possible misunderstandings. People focusing on responding to small and routine events would appreciate the clear hierarchy ICS established to manage disaster responders, but people who concentrate on coping with complex disasters would prefer to use a non-hierarchical structure to foster interdepartmental

cooperation. As I mentioned previously, different approaches to organization may perform better or worse in different contexts. Therefore, this distinction between event sizes is important and necessary when evaluate the usefulness of the ICS. Given this reality, both perspectives are logical and can be quite convincing, even so they are difficult to reconcile given the fundamental differences in their basic approaches to the topic. The most basic contribution of this research is to begin the process of scientifically examining the arguments in this debate.

Organizational theory has a number of concepts that can assist us in understanding and operationalizing this argument. For the purposes of this dissertation I have drawn on the discussions of using a mechanistic versus organic system. A mechanistic system focuses on establishing a hierarchy to manage its employees. Everyone within a mechanistic system has to follow many pre-determined rules and principles to complete individual tasks. An organic system focuses on the cooperation, coordination, and communication between all employees. People within an organic system do not follow rigid rules and principles and thus they have better abilities to accommodate changes on the environments (Burns and Stalker, 1972, pp. 250-255; Daft, 2008, pp. 153-155; Hatch, 1997, pp.169-170; & Tosi, 2009, pp.104-108).

The importance of these concepts is that they pay attention on pros and cons on two major types of organizations. Consequently, applying these ideas to ICS discussions is beneficial because having a predefined hierarchy, uniform terminology, modular organization structure, and span of control are characteristics often associated with the mechanistic form of organization. Meanwhile, setting up a non-hierarchical

structure to improve cooperation and coordination between different organizations approximates an organic system (Burns and Stalker, 1972; Daft, 2008). As a result, organizational theory provides insights to clarify ICS discussions. For instance, some critics observe the ICS establishes a hierarchical structure, and they conclude that ICS hierarchy alone cannot deal with complex disasters (Wenger, Quarantelli, and Dynes, 1990). This observation is generated because they regard the ICS as a mechanistic system. Proponents appreciate the clear line of authority created by ICS, which is actually one of the advantages of using a mechanistic system. Therefore, although many ICS discussions are centered on its pros and cons, critics and proponents actually focus on the limitations and advantages of mechanistic system. Consequently, through the lens of organizational theory, readers are able to further explore the natures of these ICS debates and discussions. Through the organizational theory, people could find the problems people have discussed and debated for over decades are not laid on the ICS itself, but more on the usefulness of a mechanistic system versus an organic system. Given the previous discussions are centered on the pros and cons of using two types of systems, the analytical focus of this research is to explore the natures of the ICS. If the analysis demonstrates that the ICS is a system combining both mechanistic and organic design elements, the discussions and debates on ICS mechanistic characteristics are not complete. Methodologically, content analysis can clarify to what degree is the ICS mechanistic or organic, and also illustrate certain decisions people made on the grounds would influence this system becoming more mechanistic or organic.

This dissertation aims to contribute to ICS debates and discussions. The research will begin by thoroughly analyzing the official ICS documents and isolating individual elements of the system's design. Once those elements are identified, the researcher will connect these elements to broader concepts and terminologies from organizational theory. For example, the concept: "Chain of command" appears frequently in ICS documentation. This concept refers to "the orderly line of authority within the ranks of the incident management organization (FEMA, 2008, p.3)", and thus can be connected to the mechanistic characteristic of a "hierarchic structure of control and authority (Burns and Stalker, 1972, p.251)".

After every ICS design element is connected to broader concepts and terminologies from organizational theory, I further explore the degree to which the results are organic or mechanistic and can improve our understanding on the nature of the ICS system. Further, the intent is to engage in thoughtful discussion and debate on this important national policy. The expectation is that careful analysis will provide new knowledge on the nature of the system. Further, it will also provide a more theoretically deep analysis of the design in order to foster greater understanding of critical factors that might impact its implementation.

Consequently, from a theoretical perspective the first phase of the research is designed to explore the following question: To what degree is ICS mechanistic or organic? For instance, many critics regard this system as a pure mechanistic system, so a hierarchical structure of control and command, based on organizational theory, would make it difficult to coordinate other departments. Building on past research

(Bigley and Roberts, 2001; and Moynihan, 2007) and professional experience I know that assertion is false. For instance, the Unified Command—an integral part of the ICS—coordinates the activities of various agencies with different legal, geographic, and functional authorities and responsibilities (FEMA, 2008, p.3) has the potential to provide significant insights into the nature of this system. That being said, to date, no one has conducted such a comprehensive study of its design. Such work is needed in order to balance the important insights of critics that suggest ICS does not facilitate interdepartmental coordination (Neal & Webb, 2006; Quarantelli, 2002; Wenger, Quarantelli, & Dynes, 1990) with the views of proponents that believe it is a critical and important tool (Harrald, 2006; & Neal and Webb, 2006).

To explore the question "to what degree is the ICS mechanistic or organic," I conducted two methodological analyses in this dissertation. The first methodological analysis is the content analysis. I utilized typical case sampling method (Patton, 2002, p.236) to analyze two official ICS documents and several ICS training courses. Each design element of the selected ICS document is identified and connected to classical definitions of mechanistic or organic characteristics (Burns and Stalker, 1972, pp.250-252). Results of content analysis not only clarify many ICS debates, but also demonstrate nine decision points that would influence the ICS becoming more mechanistic or organic.

The other methodological analysis is the analysis of twenty-eight in-depth qualitative interviews (Rubin & Rubin, 2005). This analysis is aimed to explore how people make certain decisions on the grounds which would influence the ICS

becoming more organic or mechanistic. I utilized snowball sampling method (Patton, 2002, p.237) to select my interviewees, and then transcribed the twenty-eight interviews into texts. After I analyzed these transcriptions, I developed themes and patterns to explain interviewees' concepts, perspectives, and experience on making certain ICS decisions on the grounds. I also noticed the conflicting responses from different interviewees and then went back to read some materials to examine these concepts and discussions. This methodological analysis helps me to better understand the ICS decision-making processes at the scenes of disasters and realize this system has both mechanistic and organic design elements. Both of the methodological analyses provide possible directions for future ICS research.

I reviewed several ICS literatures and discussions on the next chapter. All concepts, assumptions, and debates are discussed on my Chapter Two. I also carefully exam every paper's methodological bases and empirical supports to discover the possible bias. At the end of Chapter Two, I generate conclusions and assumptions from the ICS literatures, discuss why people have different perspectives toward the same system, and consequently develop a research question.

I conduct the first methodological analyses, the content analysis, to answer my research question. I discuss the methodological considerations on selecting my samples at the beginning of Chapter Three. The results of my content analysis demonstrate the ICS has both mechanistic and organic design elements, and also point out several decision points that would influence this system becoming more mechanistic or organic.

To further explore how people make certain decisions identified on Chapter Three, I conduct twenty-eight in-depth qualitative interviews, and analyze their transcriptions. As a result, I discuss the logics to select my interviewees, my interview questions, and the results of analysis in Chapter Four. At the end of this chapter, I give a chapter summary that concludes all my findings from interviews; these findings provide some directions for future research and build up the conclusions of this dissertation.

I make conclusions and compare them to other research on Chapter Five. I also provide directions for future ICS research, and report limitations of this research. Before we move to the next chapter, some possible bias of this research should be noticed: I was an officer on fire services, so I had followed ICS disciplines and thus appreciated to ICS mechanistic design elements for several years. When reading this research, please be careful on the possible bias which would favor ICS mechanistic elements and consequently disdain ICS organic elements.

Chapter 2

LITERATURE REVIEW

Introduction

The Incident Command System (ICS) was originally developed in response to fighting wildfires. This system was not officially accepted as a national disaster response system until the 9/11 terrorist attack. After 9/11, the Homeland Security Presidential Directive 5 (HSPD-5) required state and local adoption of the Homeland Security Department's approved version of the ICS as a condition to receive federal funding. As a result of this policy, the ICS became a national system, and all state and local government were expected to establish an ICS-based disaster response system and stay up-to-date and conform with the DHS-approved version of the ICS (Sylves, 2008, p. 151).

Despite having become a national policy in response to disasters, there is little ICS research with empirical data. Many ICS researchers and users discuss about this system via different types of publications (such as magazines, academic journals, and newspapers), but only few conduct the research and collect the necessary empirical data to support their arguments and debates. Therefore, I suggest utilizing scientific methods to examine these ICS discussions and research, which should provide a means to acquire the empirical data and conduct the methodological analyses to better understand this system.

In this chapter, I will break down and critically consider the arguments presented in the different literatures and their conclusions. I distinguish ICS writings that contain empirical research versus those that contain commentary. Although commentary made by experienced ICS users or researchers may help enrich and elucidate some of discussions and conclusions regarding ICS, in this dissertation, I will focus more on research that contains empirical data.

More specifically, this chapter will utilize organizational theory to organize and identify how ICS characteristics can be associated to two types of systems (mechanistic versus organic), which are actually not a dichotomy, since an organization normally includes both mechanistic and organic characteristics. I will also discuss three major factors that lead individuals to hold different perspectives toward the ICS, which include: 1) the disagreement on the natures of this system, 2) the scale of disasters involved, and 3) the implementation of this system. At the end of this chapter, I will propose my research question and explain the two methodological analyses I used to answer my research question.

Organic versus Mechanistic Systems

Burns and Stalker (1961) observed twenty industrial firms in England, and they found that the external environment had a large influence on the structure of internal management. They proposed that there are two types of management structures as a result: one is a mechanistic system which focuses on establishing clear rules and hierarchy to manage all workers in a firm, while the other is an organic system that relies on communication and cooperation to manage interactions between

individuals. Due to its emphasis on structure and hierarchy, a mechanistic system is more suitable in stable environments where there are less changes and the majority of the organizational tasks are routine. In an organic system, on the other hand, relationships are less formalized and hierarchical compared to the mechanistic organization. Consequently, an organic system is better suited to dealing with complex situations, where there are many unexpected situations and thus need to constant changes and improvisations.

Quarantelli (2002), based on over forty years of disaster research, describes the ICS as a top-down, centralized system that emphasizes command and control. Neal and Webb (2006), similarly, also describe the ICS as a paramilitary "command and control" approach to disaster management (p. 273). Following this train of thought, Neal and Phillips (1995) encourage disaster responders to use a more flexible, malleable, loosely coupled response system instead of a command and control system because they think the latter one creates a rigid and bureaucratic structure which would impede disaster response activities. Hanley (1990), an experienced ICS user, places more attention on how does this system facilitate inter-organizational coordination and information sharing. He believes the ICS is not a command and control system, and that the ICS, under the right circumstances, can be a good system. Goldfarb (1997), based on his experience of using the ICS for more than thirty years, says the clear hierarchy of management, delegation of authority, and manageable span of control are all benefits of implementing the ICS on the ground.

The features of ICS mentioned above can be linked to characteristics of both mechanistic and organic systems. For example, command and control, clear hierarchy of management, delegation of authorities, and manageable span of control are all traditionally associated with a mechanistic system. A flexible, malleable, and loosely coupled system that places on emphasis on coordinating different agencies are the hallmark attributes of an organic organization (Burns and Stalker, 1972, pp. 250-252). The previous discussions demonstrate the discussions on mechanistic system versus organic system are possibly the keys to further understand ICS debates and discussions on the past forty years. Therefore, I selected organizational theory (especially with regards to using mechanistic versus organic systems) as the analytical framework behind in this research.

Many researchers believe that the ICS belongs to a specific type of system and thus lacks certain characteristics (Neal and Phillips, 1995; Neal and Webb, 2006; Quarantelli, 2002; & Wenger, Quarantelli, & Dynes, 1990). Moynihan (2007), however, after conducting extensive multiple case study, concludes the ICS has both hierarchy and network characteristics. His descriptions of hierarchy system are similar to a mechanistic system that utilizes a strict hierarchy of authority and control with many rules. The network system he mentioned is close to an organic system whose employees contribute to the common tasks of the department (Daft, 2008, p.154). Moynihan's research echoes to Burns and Stalker's (1972) observation that organic system and mechanistic system are not a dichotomy; these two systems represent a polarity. Therefore, a concern may (and frequently does) operate with a management

system which includes both types (p.253). Disaster researchers (Buck, Trainor, and Aguirre, 2006, p.15) also report the command and control and coordination are not controversial systems, but they can coexist (p.15). Moynihan (2007) and Bigley and Roberts' (2001) research also support this assumption that the ICS is a system combining both mechanistic and organic design elements. Therefore, treat ICS as a solely mechanistic system (Harrald, 2006; Neal and Webb, 2006; Quarantelli, 2002; & Wenger, Quarantelli, & Dynes, 1990) might lead to a misdiagnosis of management issues (Moynihan, 2007, p.6).

Using the lens of organizational theory; we can find that individuals have different perspectives toward the ICS is due to the following: 1) disagreement of the nature of the ICS, 2) the scale of disasters, and 3) the implementation of ICS. I will discuss all of them in the coming sections.

Disagreement on the Nature of the ICS

Based on the previous discussions, ICS discussions are generally centered on certain characteristics. Connecting these characteristics to organizational theory will help us further elucidate the core differences in arguments between ICS proponents and critics, and consequently allow us to obtain a better understanding of the nature of this system.

Researchers report that this system institutes a rigid hierarchy of authority and thus the ICS cannot cope with complex disasters (Harrald, 2006; Neal and Phillips, 1995; Neal and Webb, 2006; Quarantelli, 2002; & Wenger, Quarantelli, and Dynes, 1990). The hierarchy of authority reflects the distribution of authority between

different positions within the organization; consequently, each position within a hierarchical organization has its own authorities and rights. These authorities and rights are called positional powers because they belong to the position itself rather than the holder of the position. Position holders utilize authority to influence their subordinates and this influence is exercised via downward communication. Therefore, in a hierarchical organization, everyone, except for the person sitting at the top of whole organization, reports to a supervisor. Individuals near the top of the hierarchy use a combination of authority and vertical communication to gather information from, direct, control, and encourage high performance by all individuals at lower levels in the organization (Hatch, 1997, p.165).

On the one hand, critics regard the ICS hierarchy as an obstacle when it comes to managing disasters. Quarantelli (2002) says that the ICS hierarchy "unrealistically think[s] that anyone at the height of a crisis could be 'in charge' given the lack of information, conflicting and incorrect rumors, and the diversity of the many groups involved in such [complex] situation." Neal and Webb (2006) questioned the logic behind ICS hierarchy. They observed that, during Hurricane Katrina, responders had to be flexible enough to cope with the changing environment. They felt that the pre-established hierarchy and principles required by ICS were incapable of handling unexpected disastrous situations (pp.274-275). Wenger, Quarantelli, and Dynes (1990) reviewed eight disasters and interviewed local disaster responders from different backgrounds. They argued that, even though the ICS creates a clear hierarchy of authority, that authority shifts between different officers during different operational

periods. They believe the shift in authority created information loss and thus generated challenges for new Incident Commanders (IC). Additionally, they felt that the ICS hierarchy put too much emphasis on fire departments, and thus isolated other organizations. Not only that, but they felt that the strong emphasis on fire departments impeded cooperation at the scene since "many private and some public agencies are very unlikely even in planning, much less so in managing to put themselves in what they see as a subordinate role to an incident commander from a fire department (p.9)." Following this same train of thought, Harrald (2006), although he did provide empirical data, suggested balancing agility and discipline to deal with extreme events. He believed that, although the discipline imposed by the ICS hierarchy was important, agility was also critical in dealing with complex disasters.

On the other hand, many people think that the ICS hierarchy offer many benefits when it comes to managing disasters. Cole (2000) surveyed senior ICS users and found that the ICS hierarchy created predetermined internal alignments that enabled the transfer of positive experience and unified all terminologies and terms that people used at disaster scenes (p.218). Goldfarb (1997) appreciated the ICS hierarchy and the discipline it created. Based on his experience, he believed that having clear delegation of authority and responsibility are important when responding to disasters. Bigley and Roberts (2001) argue the ICS hierarchy is actually not rigid: after interviewing many firefighters and observing routine fire department operations, they concluded that the ICS hierarchy had certain amount of flexibility. As a result, they called the ICS hierarchy an "adjustable hierarchy," which includes structural form

change, people move, and authority moves. This adjustable hierarchy provides members with the means to shift effectively between preplanned organizational routines when dealing with the more predictable aspects of a disaster and improvised approaches when dealing with the unforeseen and novel complications that often arise in such situations (p.1282). This research demonstrates that if we look deeply at how people actually exercise the ICS on the ground, it is not merely a mechanistic system which relies on a hierarchy to manage all disaster responders. Following a similar line of thought, Moynihan (2007) concludes that the ICS is not an absolute mechanistic system; he regards the ICS as a hierarchical network system that has both mechanistic and organic characteristics. A senior ICS user, Hanley (1990), also comments that the ICS is not a military command and control system, and instead claims this system "provides ample opportunity for multi-agency coordination and command transfer when required, and the procedures for doing this are well documented."

The discussions above illustrate the complexity of this system. ICS critics tend to regard this system as a pure mechanistic system when, in fact, this system has many organic design elements that coexist with its mechanistic structures. Not only that, but under certain situations, the Incident Commander (IC) can be replaced by the Unified Command (UC), where representatives from different organizations are invited participating in the decision-making processes. After collecting opinions from all representatives, members in the Unified Command will then "collectively develop one comprehensive set of incident objectives, and use them to develop strategies (FEMA, 2008, p.17)." The UC thus utilizes a classical decision-making process common in

organic systems, while the overall structure below the UC still follows the design of a mechanistic system.

Therefore, a core argument between ICS proponents and critics is with over the exact nature of the ICS or, more specifically, over what degree is the ICS mechanistic or organic? I will explore this issue as my research question in this dissertation. However, before I go any further on this topic and propose possible ways to answer this question, I would first like to introduce the concept of the scale of disaster and how it influences people's evaluation of this system.

Scale of Disaster

ICS critics and proponents judge the ICS from different scales of disasters and thus they develop different perspectives of this system. Generally speaking, although Moynihan (2007) suggests not using extreme cases of disasters to judge the effectiveness of the ICS (p.18), many social scientists still focus on extreme cases of disaster while many practitioners do not (Harrald, 2006, p.264). ICS critics who evaluate the effectiveness of this system from complex disaster situations (Buck, Trainor, & Aguirre, 2006; Moynihan, 2005; Moynihan, 2007, Neal & Webb, 2006) tend to reject a mechanistic-oriented system and advocate an organic-oriented response system instead. Neal and Phillips (1995), for example, studied the cases of Loma Prieta Earthquake and Hurricane Andrew and then recommended that disaster responders use an organic response system (they called it as Emergent Human Resources Model) instead of a mechanistic command and control system.

ICS proponents, on the other hand, tend to evaluate the ICS within the context of day-to-day emergencies, and are generally looking to see if the ICS works. Focusing on day-to-day emergencies directs these proponents to look for systems that can facilitate daily operations. After having conducted extensive observations in routine firefighting operations and interviewing many firefighters, Bigley and Roberts (2001) concluded that the ICS was a reliable system, even in highly uncertain situations.

Cole's research (2000) is different than the previous two groups. Although he surveyed senior ICS users who had used this system in complex disaster situations, he still felt that this system was capable of dealing with any scale of disasters. He believed that the ICS provided a basic structure that enables responders to organize their response activities, and thus suggested that the federal government develop a strategy for promoting ICS as the standard for emergency incident management (p.225). However, Sylves (2008) commented that the ICS is generally regarded as a system primarily by fire service organizations (p.151). Consequently, it is possible that Cole's conclusion and his favorable outlook towards the ICS are linked to his firefighting background.

Goldfarb (1997), a senior fire officer, focused on the importance of ICS structure and the doctrines it established to manage day-to-day operations. Harrald (2006) reported that the ICS establishes the necessary discipline for orchestrating disaster response activities, but does not provide enough freedom for ICS users to improvise at the scene−which is important when dealing with extreme events−so he

suggested using an open system (similar to an organic system) to help prepare users for responding to extreme events. Wenger, Quarantelli, and Dynes (1990) researched eight large disastrous cases, and they suggest to reevaluating the ICS critically in the context of complex disasters. Quarantelli (2002) believes that disasters create complex situations, so the underlying philosophy behind the ICS was problematic in that it relied upon a single person to make all decisions at the disaster scene.

From the discussions above, it can be seen that ICS critics and proponents are actually looking for different types of systems to manage disaster response activities at different scales of disasters. This fact echoes Burns and Stalker's (1961) idea that the external environment (the disaster) influences internal management structure (the disaster response system), and also illustrates how the size of situations impacts the success of using a centralized and bureaucratic (mechanistic) system to manage an organization (Hatch, 1997, p.172). Consequently, when discussing the ICS, it is very important to consider the scale of disaster involved.

Implementation

Both researchers and practitioners report that there is variation in the way that the ICS is implemented. Cole (2000) reported that this system is implemented differently in one agency compared to another and from one region to another. Wenger, Quarantelli, and Dynes (1990) researched eight disasters and observed that this system was used in different ways by various organizations. Neal and Webb (2006) reported that, during Hurricane Katrina, even different levels of governments used this system differently.

Firstly, every organization has its own culture, so it is very hard to set up a system to coordinate between different organizational cultures. Wenger, Quarantelli, and Dynes (1990) observed that many private and some public organizations did not like to be incorporated into the ICS structure, where they would be seen as subordinate to the Incident Commander (p.9). Buck, Trainor, Aguirre (2006) thought that, while the ICS could coordinate the activities of well-trained and integrated communities of first responder organizations in emergencies, its principles were effective only in some and not all aspects of disaster response (p.14). As a result, they concluded that the ICS creates a bureaucratic system that cannot be used by different organizations.

Secondly, practitioners implement this system differently because of lack of sufficient training. Neal and Webb (2006) observed that people had not received enough training of the National Incident Management System (NIMS) and ICS prior to Hurricane Katrina, and even the federal government provided on-site training at scenes, this training seemed not work for people that did not hear about this system before disasters (pp.271-272).

Thirdly, since the underlying concepts of ICS originated from firefighting communities, people from different backgrounds might not be willing to use ICS in their routine operations. Decker (2011) surveyed 728 organizations throughout the state of Ohio regarding their acceptance and utilization of the ICS. Although the majority of ICS trainees thought that basic ICS training was beneficial to all personnel within their organizations, a large number of people in a variety of organizations still did not accept ICS concepts. Nearly all of public works participants surveyed, for

example, reported that they either seldom or never utilized ICS principles in day-to-day operations (p.227).

These discussions demonstrate that different organizational cultures, insufficient ICS training, and unwillingness to adopt the ICS in routine operations are major factors that impede the implementation of this system. Consequently, "organizations relied upon their own system of doing business and had little awareness of NIMS [and ICS] (Neal and Webb, 2006, p.271)."

In summary, since this system is exercised differently compared to the way that it was designed, understanding how people implement the ICS is a key to understanding why people have such different attitudes towards and evaluations of the ICS, and thus allows us to better understand the nature of this system.

Chapter Conclusion

In this chapter, I have discussed how disagreement regarding the nature of the ICS, the severity of the disaster in which the ICS is applied, and the way the system is implemented can lead to extremely different evaluations of the ICS. For the purpose of this research, I will explore the nature of the ICS and how people implement this system. The scale of disasters is controlled when I select my interviewees.

More specifically, since organizational theories and some disaster researchers have demonstrated that the ICS is a system which combines both mechanistic and organic design elements, my research question is: To what degree is the ICS mechanistic or organic? To answer this question, I utilized two methodological analyses in this dissertation. The first analysis is content analysis. I review two official

ICS documents and three ICS online training courses, and connect each ICS design element to the concepts developed from classical definitions of mechanistic and organic systems. The methodological considerations and results of my content analysis are presented in the Chapter Three. The results of my content analysis illustrate that there are nine decision points that strongly influence whether this system takes on a more mechanistic or organic quality, so I conducted qualitative in-depth interviews to further understand how people implemented ICS on the ground. The two criteria I used to design my qualitative interviewees were: 1) selecting for interviewees regarding their experience using this system in mid-sized disasters, because the scope of disaster does influence the user's evaluation of ICS, and 2) selecting interviewees from different organizations and who had served in different supervisory positions within the ICS, because " the representatives from different agencies or from different levels within a single agency had varying perspectives on and knowledge of ICS (Neal and Webb, 2006, p.267)." I will discuss all methodological considerations and results of my qualitative interviews in Chapter Four. The results and insights that I gained from the two analyses, plus major conclusions and future suggestions will be discussed in Chapter Five.

Chapter 3

METHODOLOGY AND THE CONTENT ANALYSIS

Introduction

As was discussed in the previous chapters, the majority of ICS discussions focus on the pros and cons of utilizing the ICS mechanistic design elements. In other words, authors typically suggest that ICS belongs to a specific type of system and then go on to describe the problems and benefits with organizing emergency responses this way. It is important to note, however, that organizational theorists have long suggested "organic and mechanistic" should be seen as ideal types (Burns and Stalker, 1972, p. 253). In other words, most suggest that the concepts "mechanistic" and "organic" are ends of a continuum rather than distinguishable types. Given that assertion, I analyze ICS official documents and training courses to explore both ICS mechanistic and organic design elements. The identification of each ICS design element would help readers to understand the natures of this system and realize the ICS is actually a system combining both mechanistic and organic characteristics.

Generally speaking, this chapter focuses on assessing to what degree ICS's organizational design elements are organic and/or mechanistic? In order to address this question, official ICS documents and online training courses were qualitatively analyzed in great detail. Each design element in the document was identified and

assessed to determine the degree to which that feature is mechanistic or organic. This chapter presents the details of the analysis and demonstrates the relevant findings below. The most important findings include: 1) that ICS includes both organic and mechanistic design elements, 2) Evidence that the ICS system is in fact more mechanistic than organic, 3) the identification of specific organic design elements in the system, and 4) The identification of a number of important decision points where individuals using the system can influence the degree to which it will be mechanistic or organic.

Methodology

In order to explore to what degree ICS's organizational design elements are organic versus mechanistic, I analyzed official ICS documents and ICS online training courses. Since this analysis aims to deductively analyze large masses of text and therefore identify core consistencies and meaning of these documents, content analysis was selected as the approach for this part of my research (Patton, 2002, p. 453). The advantage of using this method is that it produces a uniform schema of categories, which facilitates the understanding of the different documents to which it is applied throughout (Flick, 1998, p. 195). Consequently, results of the content analysis illustrate the design elements contained in ICS documents and online training courses, and draw a broad map of how these mechanistic and organic design elements come together to make this system.

Sampling Method

Generally speaking, I utilized a Typical Case Sampling Method (Patton, 2002, p. 243) to select ICS documents and online training courses that would be included in this study. This method requires that the researcher selects the typical cases which provide a normal distribution of characteristics from which to identify "average-like" cases (Patton, 2002, p. 236).

In considering what is typical for responders in the U.S., it is important to first note that ICS is a core component of the National Incident Management System (NIMS), and the NIMS is a product of the collaboration of Department of Homeland Security (DHS) with state and local government officials and representatives (Sylves, 2008, p. 150). Two documents published by DHS serve as the foundation for ICS practice in emergency management, Component Four of the NIMS Document and the DHS ICS Review Document. As the core of the ICS doctrine all other materials should flow from these sources. Consequently, the NIMS document was selected as the first document to be analyzed and the "ICS Review Document" − was chosen as the second document to be analyzed for this research.

While the above two documents, are indeed critical references it is important to note that not all responders have read these primary sources. Instead, many are exposed to ICS through ICS online training courses intended to help responders better understand this system. Therefore, in addition to the core documents, I also reviewed all of the ICS-related online training courses offered by the federal government. Since

these elementary ICS courses focus on using the ICS on single organization (please see table 3.1 below) and are categorized as either ICS-100 or ICS-200 levels (which are the first two levels of ICS training), I then select IS-100: Introduction to Incident Command System, and IS-200: ICS for Single Resources and Initial Action Incidents to represent other ICS online courses. These two courses are classical, so I select them to represent other ICS 100 and 200 series courses. Again, the selection of two ICS training courses follows the logic of Typical Case Sampling (Patton, p. 243).

Table 3.1: ICS online training courses

Course Code	Course Title
IS-100.b	Introduction to Incident Command System, ICS-100
IS-100.FDA	Introduction to Incident Command System (ICS 100) for Food and Drug Administration
IS-100.FWa	Introduction to Incident Command System (ICS 100) for Federal Workers
IS-100.HCb	Introduction to the Incident Command System (ICS 100) for Healthcare/Hospitals
IS-100.HE	Introduction to the Incident Command System for Higher Education
IS-100.LEb	Introduction to the Incident Command System (ICS 100) for Law Enforcement
IS-100.PWb	Introduction to the Incident Command System (ICS 100) for Public Works
IS-100.SCa	Introduction to the Incident Command System for Schools
IS-200.b	ICS for Single Resources and Initial Action Incidents
IS-200.HCa	Applying ICS to Healthcare Organizations

Analysis

In order to begin the coding process, I thoroughly read the documents identified above and isolate each individual element of the system's design. The unit of analysis is ICS organizational design element, which means any discussion of how ICS should be done, people should be organized, or ideas controlled and shared. Since the goal of my content analysis is to extend conceptually the discussion of mechanistic and organic organizations, I relied on classic organizational theory to guide my research and develop my initial codes. These initial codes are derived from the classical definitions of mechanistic and organic organizations, and they are utilized to determine each ICS design element mechanistic or organic (Burns & Stalker, 1972, pp. 250-252). More specifically, once an organizational design element was identified, I compare that element with the concept(s) from organizational theory that best captured the essence of that idea. This analysis approach, Directed Content Analysis, is a strategy to use existing theory and research on my research question, and consequently support and extend the organizational theory (Hsieh and Shannon, 2005, pp. 1281-1283). In this way, I connect every design element to classical mechanistic or organic characteristics (Burns and Stalker, 1972, pp.250-252) in order to help determine the degrees of ICS mechanistic or organic. For example, the concept: "Chain of command" appears frequently in ICS documentation, and it can be seen as an element of the overall system's design. This concept refers to "the orderly line of authority within the ranks of the incident management organization (FEMA, 2008, p.3)," and thus can be

connected to the mechanistic characteristic of a "hierarchic structure of control and authority (Burns and Stalker, 1972, p.251)."

Directed coding as described above, requires a set of a priori ideas to guide the coding process (Hsieh and Shannon, 2005). For this analysis codes were developed based on existing organizational theories. The codes and their descriptions are shown on table 3.2 on page 32-33.

After I completed the content analysis, I realized ICS design elements are usually connected to different codes, and often incorporate both mechanistic and organic characteristics. For example, ICS span of control is "key to effective and efficient incident management. Supervisors must be able to adequately supervise and control their subordinates, as well as communicate with and manage all resources under their supervision. The type of incident, nature of the task, hazards and safety factors, and distances between personnel and resources all influence span-of-control considerations (NIMS, 2008, p.47)." This description can be related to different mechanistic characteristics (such as M6-command and control, and M3-using pre-determined technique to complete individual tasks) and organic characteristics (such as O6-focus on external relationship and knowledge). If the results of this analysis are presented on the basis of the codes, then the ICS span of control concept would be introduced multiple times, and readers would obtain a fragmented understanding of this concept. Consequently, I will present the results using ICS concepts as a basis on the next section.

Table 3.2: The Codes and Descriptions

Type	Code #	Code	Description
Mechanistic	M1	Problems and tasks are broken down	Problems and tasks on a mechanistic organization are separated into parts and assigned to several functional positions.
	M2	Precise definition of rights and obligations	The translation of rights and obligations and methods into the responsibilities of a functional position (Burns and Stalker, 1972)
	M3	Using pre-determined techniques to complete individual tasks	Everyone in a mechanistic organization has to follow pre-determined methods or regulations to complete his or her tasks.
	M4	Concerning on individual task	Employees in a mechanistic organization focus on their individual tasks, but not the whole organization.
	M5	Hierarchy	A pyramid structure which allows less people in senior positions and therefore only one or few people at the top of organization make decisions.
	M6	Command and control	Everyone in a mechanistic organization reports to one supervisor who is responsible for managing his or her subordinates on his or her own special part of the main task.
	M7	Vertical communication	A tendency for interaction between members of the concern to be vertical, i.e. between superior and subordinate (Burns and Stalker, 1972)
	M8	Focus on internal relationship	A greater importance and prestige attaching to internal (local) than to general (cosmopolitan) knowledge, experience, and skill (Burns and Stalker, 1972)
Organic	O1	Contributions are made from people of different backgrounds	An organic organization encourages people from different backgrounds to participating in its operations.
	O2	Dynamic jobs	Everyone in an organic organization does not have fixed roles and tasks (Burns and Stalker, 1972)
	O3	Dynamic tasks	Individual tasks are adjusted and continual re-defined through interaction with others employees (Burns and Stalker, 1972)
	O4	Non-Hierarchical structure	A structure that concerns on cooperation and communication between employees rather than instructions from supervisors.
	O5	Sharing information and advice rather	An organic organization emphasizes more on sharing information and advice between

		than making instructions and decisions	employees, rather than making instructions and decisions to subordinates.
	O6	Focus on external relationship and knowledge	Importance and prestige attach to affiliations and expertise valid in the industrial and technical and commercial milieu external to the firm (Burns and Stalker, 1972)

Results

In this section, I present the results of that content analysis. I discuss individual ICS design elements, and how they are implemented. I also illustrate the degree to which ICS has both mechanistic and organic design elements, and identify critical decision points people must make when implementing ICS that will influence this system mechanistic or organic nature. These ICS decision points serve as the foundation for my interview guide and the questions discussed in the next chapter.

ICS Overview

Analysis of ICS is complicated. The system is complex and includes many moving parts. In the over view that follows, I have tried to identify the most central organizational design ideas embedded in the ICS system for each of these I provide a detailed discussion of how ICS doctrine recommends an event be organized.

Selecting and Maintaining Incident Command

In looking at the ICS documents, all activities, decisions, and authority begins with Incident Command (DHS, 2008, p.91). Regardless if command is a single Incident Commander (IC) or Unified Command (UC). The practice of designating a

single IC is recommended for small emergencies that last for a short period while UC is expected in big and complex disasters which involve multiple jurisdictions and/or multiple agencies, the UC would be set up to coordinate different agencies with different legal, geographic, and functional authorities and responsibilities (FEMA, 2008, p. 3). In considering incident command, it is important to note that regardless of which version is implemented that every decision thereafter hinges on the capabilities, style, and decisions of that person or group of people. This idea is central to the operation of ICS and almost every design element thereafter is focused on how that authority can be distributed at the IC or UC's discretion, to other responders. The vesting of authority in a small group like this is a clear mechanistic design arrangement. It should be noted, however, that different individual styles and approaches can to some degree reduce the rigidity of this arrangement and provide some organic influence. For example, using a single IC to make decisions and direct the whole ICS is more mechanistic than utilizing a UC − which allows incident commanders from various backgrounds to make decisions collectively. In essence this first decision point could shift the balance from more mechanistic towards being some degree more organic. Consequently, the determination of using a single IC or UC is the first important decision point for influencing the degree to which a specific ICS is more mechanistic or more organic compared to another.

Although the system framework never espouses a particular approach to how an IC should wield power, it is important to note that managerial and/or leadership styles

of these individuals will matter a great in determining the level of centralized vs distributed/shared decision-making that occurs. The former approach will lead to more mechanistic and the latter will lead to more organic operations. Consequently, how those individuals make decisions within the Unified Command is the second important decision point for influencing the degree to which the ICS is more mechanistic or more organic.

Setting Objectives, Strategies, and Priorities

Generally speaking, the ICS utilizes a principle called "Management by Objectives" which authorizes ICS managers to "establishing specific, measureable objectives for various incident management functional activities and directing efforts to attain them, in support of defined strategies; and documenting results to measure performance and facilitate corrective action" (FEMA, 2008, p. 3).

The ICS utilizes a method called the Planning "P" to guide the process and steps involved in planning for an incident (FEMA, 2008, p. 20). The demonstration of this method is shown below:

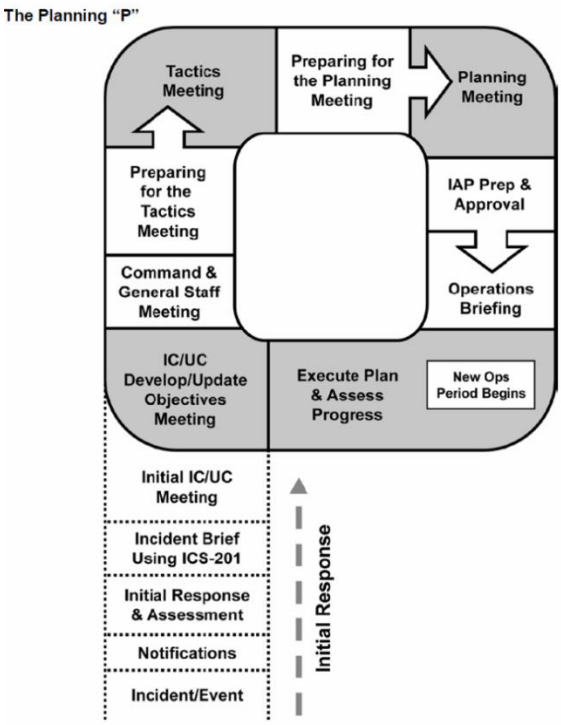

Figure 3.1: The Planning "P" (FEMA, 2008, p.20)

This planning process involves the Incident Commander (IC) and Unified Command (UC) members and all Command and General Staffs. Although the whole process is connected to many mechanistic characteristics, such as M3-using pre-determined technology to complete individual tasks and M1-problems and tasks are broken down; some details involved in this process are also connected to organic codes. The Planning Meeting, for instance, provides the opportunity for the Command and General Staff to review and validate the operational plan as proposed by the Operations Section Chief (FEMA, 2008, p.23) – which is also associated to O1-

contributions are made from people of different backgrounds. This fact shows the process of making Incident Action Plans (IAPs) would influence the degree of this system mechanistic or organic. Therefore, when I select disastrous cases to conduct qualitative interviews, I exclude those small disasters which do not require disaster responders writing (IAPs). I will further discuss this sampling method on the Chapter Four.

After the IC or UC sets up objectives, strategies, and priorities of incident, the IC or UC then begin to delegate authorities to different functional positions. I will further discuss this concept on the coming section.

Delegation of Authority

The next major feature of the ICS system is a set of processes and structures that guide the delegation of authority and responsibility. As incident complexity increases, "the organization expands, from the top down, as functional responsibilities are delegated" (DHS, 2008, p.47). When the ICS expands, three positions (the Command Staff) are created to assist the IC, and four functional sections are established to accommodate disaster responders. Once ICS sections are built up, the section chiefs are authorized to establish new branches to better manage those responders and resources under his or her administration. "Concurrently with structural expansion, the number of management and supervisory positions expands to address the requirements of the incident adequately (DHS, 2008, p. 47)". This process

of delegating authority establishes a clear pyramid-shaped structure (please see the figure 3.1).

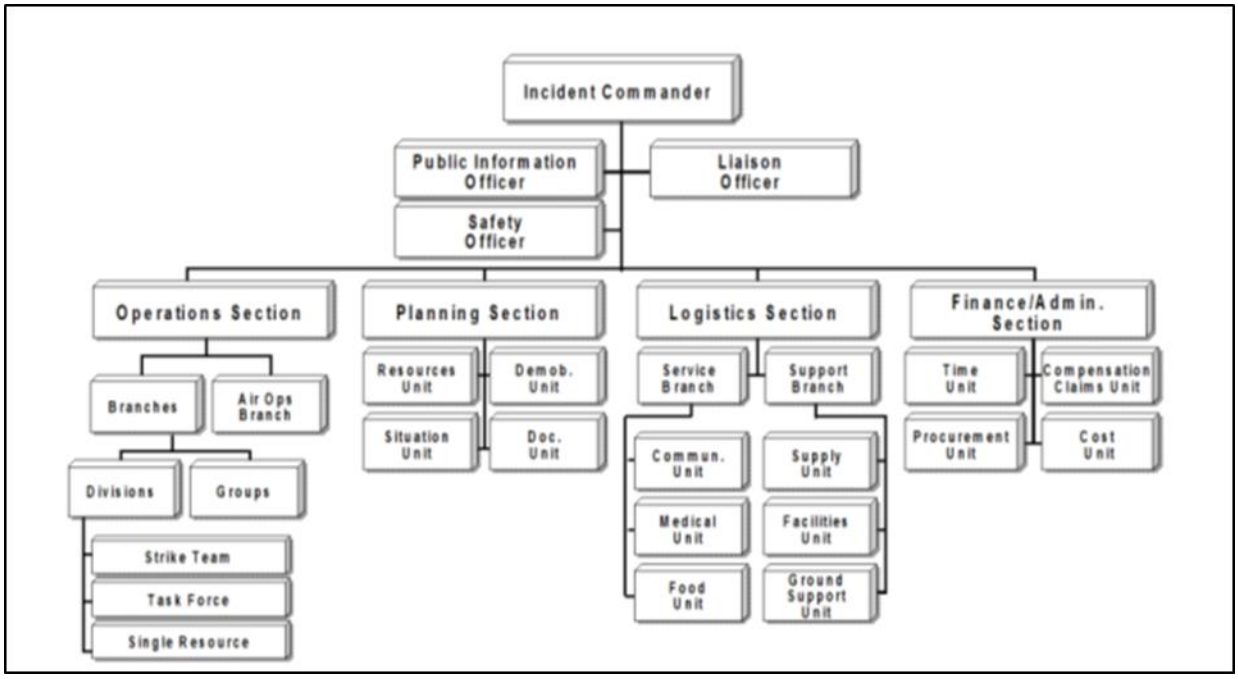

Figure 3.2: ICS organizational chart (FEMA, 2008, p. 7)

In organizational theory terms, this cascading of order and authority through vertical lines of accountability is called the establishment of hierarchy (which is coded as M5 on this research) (Hatch, 1997, pp.164-165). The idea describes the ICS system well. As discussed before, all ICS structure begins with the incident command, and

then expands to form a pyramid-shaped structure. The procedures and processes to make this system as a hierarchical system are as follows:

1) The ICS organization expands from the top to down

The ICS organization is built from top to down (DHS, 2008, p.47 & p.91; & EMI IS-100b, 2013, p. 3.6 & p. 3.23). The Incident Commander (IC) decides how many functional divisions she or he needs and expends the ICS organization "to protect the safety of responders and citizens, to control the spread of damage, and to protect the environment" (EMI IS-200b, 2013, p. 3.12). As the result, the expansion of ICS structure is based on the decisions made by the Incident Commander (IC). As a result, it is important to understand the process an IC uses to determine when to create new ICS divisions or sections. The degree to which this is determined by pre-established rules, this system is more mechanistic. If, however, these decisions are made through a more interactive exchange with other ICS users and/or some disastrous environments and needs, the ICS is more organic.

2) Authority is granted from top to down

ICS sets up an orderly line of authority within the ranks of the incident management organization; this is the principle of chain of command (DHS, 2008, p.48; FEMA, 2008, p. 11; EMI IS-100b, 2013, p. 3.6; EMI IS-200b, 2013, p. 1.14; & EMI IS-100HE, 2013, p. 3.12). The chain of command enables one or few people (the Incident Commander or the Unified Command members) to sit at the top of the whole organization. After decisions are made by the Incident

Commander or Unified Command members, other responders would copy and execute these instructions from their supervisors. In order to make the ICS work, for instance, all responders have to follow 1) not going around the chain of command, 2) reporting critical information, and 3) not self-dispatching (EMI IS-100HE, 2013, p. 7-5). This fact illustrates the success of exercising the ICS relies on everyone within this system fulfilling her or his responsibilities, but not the more general and broader goals of the whole organization. The above discussions reflect the ICS has a hierarchy structure of control, authority, and communication – which is highly close to a mechanistic system (Burns and Stalker, 1974, p. 251). That being said, the greater the degree to which IC's interact with subordinates as equals and take in information from across the ICS organization the greater the entity reflects organic principles.

3) Process for dividing the ICS structure

As discussed before, the major mechanism for creating the ICS' pyramid-shaped organization (DHS, 2008, p.94; FEMA, 2008, p.7; EMI IS-200b, 2013, p. 2.32; & EMI IS-100HE, 2013, p. 6-19) is a series of rules that guide the process of breaking down the event into specific problems and tasks (this characteristic is coded as M1 on this research) and assigning them to predetermined functional positions. More specifically, problems and tasks are broken down through a series of rules and guidelines while an IC chooses when to activate the subdivisions the process for doing so is fixed:

a) Functional areas

ICS is structured as five major functional areas: Command, Operations, Planning, Logistics, and Finance/Administration (DHS, 2008, p.46; FEMA, 2008, p. 1; EMI IS-100b, 2013, p. 18; EMI IS-200b, 2013, p. 61; & EMI IS-100HE, 2013, p. 4-5). Additional functional divisions (such as intelligence and Investigation division) can be established when required (DHS, 2008, p.47).

b) Subdivisions

Once a major functional division is established, more subdivisions will be set up to support it. The establishment of subdivisions is to maintain manageable span of control (DHS, 2008, p.55).

c) Physical or geographical areas

When an incident strikes to an area including different physical or geographical areas, the ICS suggests responders to separate an area "according to natural terrain boundaries or other prominent geographical feature, such as rivers" (DHS, 2008, p.100).

d) Types of activities

Responders who conduct different types of activities during disasters would be assigned to various groups within ICS. The Operations Section, for example, can be divided as suppression, rescue, medical, and mass care groups (DHS, 2008, p.100).

e) Periods

Some ICS tasks are divided and assigned to different periods of disaster response. For instance, incident objectives are set up by "taking the overall incident objectives and break them down into tactical assignments for each operational period" (FEMA, 2008, p. 21).

Organizational theorist (Hatch, 1997) says "hierarchy alone is not enough to integrate the many activities defined by the division of labor, especially as the organization grows in size and complexity or copes with high levels of uncertainty or interdependence (p.166)." Once disaster becomes more complex and thus creates new problems; those ICS leaders in middle positions have to decide when to delegate a problem to specific position. Therefore, the decisions of dividing those problems; which responders are not encountered before; and assigning new tasks to certain positions could determine ICS organic or mechanistic. If middle ICS leaders seek for instructions from their ICS supervisors when they encounter unexpected problems, this system is more mechanistic, but if leaders seek for assistances from professional groups (who are outside the ICS hierarchy) or have a meeting with other ICS leaders attempting to reach some consensus, this system is more organic.

Based on the previous discussions, we can conclude the ICS assumes all tasks can be linked to its divisions, so all problems are broken down and then assigned to particular ICS functional positions.

Breaking into Task and Definition of Rights and Responsibilities

Since the ICS gives precise definition of rights and obligations to every functional position, ICS leaders know who should be assigned to the problems and tasks. More specifically, the precise definition of rights and obligations (which is coded as M2 on this research) includes:

1) Exact tasks one position has to complete

   ICS writes down clear tasks a position has to complete. For example, a Public Information Officer (PIO, who is one of the ICS Command Staffs) is responsible for "interfacing with the public and media and/or with other agencies with incident-related information requirements (DHS, 2008, p. 64)".

2) Who is the ICS supervisor to report to

   In order to avoid possible confusion, everyone in the ICS has a pre-determined supervisor. The General Staff members, for instance, report directly to the Incident Commander.

3) Possible subordinate groups under a particular position

   ICS also mentions the possible subordinate groups under a position; such as the Planning Section can be further staffed with resources, situation, documentation, and demobilization units (EMI IS-100HE, 2013, p. 5-27).

All discussions above can be connected to another mechanistic code, M3-using pre-determined techniques to complete individual tasks. Specifically, the pre-determined techniques on the ICS include:

1) Using common terminologies on this system

Important ICS concepts and principles are clearly defined on its documents. All ICS documents analyzed on this research begin with the definitions and explanations of fourteen essential ICS features and several ICS common terminologies (DHS, 2008, pp.46-49; FEMA, 2008, pp.3-4; EMI. 2010, IS-100, pp. 1-12; EMI, IS-200, pp. 1.14-1.16).

2) How to complete particular tasks

ICS expects responders to complete their tasks by strictly follow certain protocols. To manage resources at scene, for example, ICS suggests "resources are defined as personnel, teams, equipment, supplies, and facilities available or potentially available for assignment or allocation in support of incident management and emergency response activities" (FEMA, 2008, p. 4). Moreover, all response operations must be directed and coordinated as outlined in the Incident Action Plan (EMI ICS-100b, 2013, p. 55). If disaster responders cannot complete their assigned activities, they must tell their supervisors and wait for instructions to take further actions. The ICS prohibits disaster responders to create their own plan of action (EMI IS-100HE, 2013, p. 233).

3) The titles and responsibilities of new ICS positions

The names of new ICS branches and the titles for these new branch leaders are pre-determined. The common ICS organizational levels and their supervisor titles are shown on the Table 3.3. Consequently, once new ICS

branches are established, new ICS supervisory positions are also created (EMI IS-200b, 2013, p. 6.5). Because this system expects "incident managers at all levels must be able to control the actions of all personnel under their supervision (EMI, IS-200b, 2013, p. 2.4)", maintaining a reasonable number of resources and responders under an ICS supervisor is important. "If a supervisor has fewer than three people reporting, or more than seven, some adjustment to the organization should be considered (EMI, IS-200b, 2013, p. 2.35)." ICS documents do not mention much on how to adjust the organization if one ICS supervisor has less than three subordinates, but if he or she has too many subordinates, new subdivisions have to be set up (DHS, 2008, p.55). The pre-determined numbers of subordinates under one ICS supervisory position, or the span of control, illustrate the ICS relies on certain mechanistic characteristics to manage disaster responders.

Table 3.3: ICS organizational levels and their supervisor titles (EMI IS-100b, 2013, p. 5.5)

Organizational Level	Supervisor Title	Support Position Title
Incident Command	Incident Commander	Deputy
Command Staff	Officer	Assistant
General Staff (Section)	Chief	Deputy
Branch	Director	Deputy
Division/Group	Supervisor	N/A
Unit	Leader	Manager
Strike Team/Task Force	Leader	Single Resource Boss

More specifically, common ICS leadership responsibilities include (EMI IS-200b, 2013, p. 8.4):

1) Taking command

All ICS responders must report in to receive an assignment in accordance with the procedures established by the Incident Commander (EMI IS-100b, 2013, p. 2). If an ICS plan is not working or the responders cannot complete their assigned tasks; they are encouraged to tell their ICS supervisors to receive further instructions. All ICS users are prohibited to create their own plan of action (EMI IS-100b, 2013, p.7.9).

2) Communicating by giving specific instructions and asking for feedback

The ICS relies on all supervisors successfully managing their subordinates, so vertical communication is important. Therefore, "each individual maintains a formal communication relationship only with his or her immediate [ICS] supervisor (EMI IS-200b, 2013, p. 2.4)". The vertical communication occurs not only top down, responders have to report critical information about safety hazards, status, changing conditions within assigned areas, and resource needs to their ICS supervisors (EMI IS-100b, 2013, p. 7.9).

3) Supervising

ICS supervisors must be able to adequately supervise and control the actions of all personnel, as well as communicate with and manage all resources under their supervision (EMI IS-100b, 2013, p. 3.7; & EMI IS-200b, 2013, p. 1.14).

4) Evaluating the effectiveness of the plan

As mentioned before, the "Management by Objectives" principle suggests ICS supervisors to collecting documents to measure performance and facilitate corrective action (FEMA, 2008, p. 3). For example, the Incident Commander has a responsibility to "establishing the level of organization needed, and continuously monitoring the operation and effectiveness of that organization" (FEMA, 2008, p. 8).

5) Understanding and accepting the need to modify plans or instructions

ICS supervisors are authorized to approve and change current plan of action. For example, The Safety Officer reviews specific risks to operational resources and then identified safety and mitigation measures (EMI IS-200b, 2013, p. 5.13). If The Safety Officer believes certain activities would jeopardize the safety of responders; he or she has immediate authority to stop and/or prevent unsafe acts during incident operations (DHS, 2008, p. 52). This fact demonstrates the ICS is not a fixed system; it actually allows its participants to change some plans to adapt themselves to the changing environments. Consequently, this fact echoes to Bigly and Roberts' (2001) observation: "the ICS structure oscillate effectively between various preplanned organizational solutions to the more predictable aspects of a disaster circumstance (p. 1282)." As a result, the frequencies of ICS supervisors change the current plan of action would determine this system mechanistic or organic; if they change the plan frequently according to the disastrous environments, this system is more organic, but if they rarely change their plan of action, this system is more mechanistic.

ICS users are encouraged not only to focus on their own tasks, but they are also expected to work with other peers. The cooperation between ICS participants can be related to two organic characteristics: sharing information and advice rather than making instructions and decisions (O5) and contributions are made from people of

different backgrounds (O1). This fact shows the ICS is also an organic system. I will discuss the two ICS organic design elements mentioned above on the following sections.

Explicitly Organic Design Elements

Wenger, Quarantelli, and Dynes (1990) provide the best-known critique of ICS that used the logic of the coordination model (Buck, Trainor, & Aguirre, 2006, p.3). They said there is little place in the ICS for inter-organizational plan. Thus the ICS pays little attention to integrating activities of the fire department with other involved organizations (p.9). Based on my content analysis, however, the ICS also emphasizes on the coordination between different organizations. For instance, the ICS welcomes the inputs from people of different backgrounds, which can be associated to an organic characteristic: contributions are made from people of different backgrounds (which is coded as O1 on this research). The contributions are made by allowing: 1) different organizations to decide incident objectives together, 2) recruiting personnel from different backgrounds to serve in deputy positions, and 3) using experts or technicians of various specialties. I will present more details below:

1) Different organizations decide incident objectives together

   The Unified Command (UC) allows "all agencies with jurisdictional authority or functional responsibility for the incident to jointly provide management direction through a common set of incident objectives and strategies" (DHS, 2008, p. 50). All agencies within the UC share the

authorities, so each participating agency maintains its authority, responsibility, and accountability (DHS, 2008, p.50; FEMA, 2008, p.3; & EMI IS-200b, 2013, p.1.15).

2) Recruit personnel from different backgrounds to serve deputy positions

ICS encourages the assignment of deputies from other agencies when the incident involves various jurisdictions (DHS, 2008, p.54), because this is a way to improve inter-agency coordination (FEMA, 2008, p.9; & EMI IS-100b, 2013, p. 5.9). The cooperation between ICS leaders and their deputies influences this system organic or mechanistic; if the deputies of different backgrounds are invited to join the decision-making processes, this system is more organic, but if they are only expected to follow the instructions made by the IC or UC, this system is more mechanistic.

3) Use experts or technicians of various specialties

ICS incorporates technical specialists from various fields. The ICS Planning Section, for example, uses many specialists to evaluate the situation, develop planning options, and forecast requirements for additional resources (DHS, 2008, p.55 & p.95). Consequently, if these technical specialists are managed by the ICS hierarchy, this system is more mechanistic. If these specialists do not receive instructions form ICS supervisors or are invited to participate in the decision-making processes, this system is more organic.

Moreover, the ICS encourages different organizations to share information and advice rather than make instructions and decisions (this concept is coded as O5). ICS food unit, for instance, must interact with: 1) Planning Section to determine the number of personnel who must be fed, 2) Facilities Unit to arrange food service area, and 3) Supply Unit to order food (DHS, 2008, p. 123). This fact means the communication inside ICS is not limited to vertical directions. Disaster responders are allowed to communicate with parallel coworkers or sections to complete their tasks.

All of the ICS organic design elements discussed above demonstrate the two statements − ICS is a firefighting based system, and thus it lacks of inter-organizational coordination (Wenger, Quarantelli, and Dynes, 1990), and ICS is a merely hierarchical system; it unrealistically relies on one person at the top of the hierarchy to be "in charge" (Quarantelli, 2002) − might not be accurate.

I have discussed many ICS design elements above and pointed out some decisions people made would influence ICS mechanistic or organic. I will present the rest of ICS design elements on the following sections, and explore more decisions that affect this system organic or mechanistic.

Overview and Summary of Results

The results of content analysis (see figure 3.3 on page 56) show 20% of ICS design elements are associated to the concept of command and control (which is coded as M6 on this research). The concept of "command and control" comes with the ICS hierarchical structure. It means every supervisor is responsible for managing his or her

subordinates on his or her own special part of the main task (Hall, 1996, p. 115; & Tosi, 2009, p. 51). Because command and control is a common design element shown on ICS documents, many disaster researchers (Harrald, 2006; Neal & Webb, 2006; Wenger, Quarantelli, & Dynes, 1990) regard this system as a command and control system. To command and control all ICS users, this system regulates:

1) Everyone reports to one supervisor, and this supervisor has the authority to direct and monitor her or his subordinates' operations.

    Disaster responders have to follow the Unity of Command principle when they using the ICS. Under this principle, everyone has a designated supervisor (DHS, 2008, p.48; FEMA, 2008, p.3; EMI IS-100b, 2013, p.3.6; EMI IS-200b, 2013, p.1.14; & EMI IS-100HE, 2013, p.3-6), and this supervisor has authority to command and control her or his subordinates (DHS, 2008, p.48; FEMA, 2008, p.3; EMI IS-100b, 2013, p.3.6; & EMI IS-100HE, 2013, p.3-6). For example, one of the keys to successfully exercise the ICS is "Not going around the chain of command", which means all disaster responders only take directions from their supervisors (EMI IS-100HE, 2013, p.7-5). Bigley and Roberts (2001), however, analyzed this system and concluded "[ICS] supervisors provide subordinates with a degree of latitude to improvise – that is, to activate and coordinate their own routines and to apply novel tactics to unexpected problems (p.1289)." Consequently, the degrees of improvisation ICS supervisors authorize their

subordinates to cope with unexpected problems determines this system mechanistic or organic.

2) Maintain effective and efficient management of personnel and resources

   a. Span of control

      The ICS span of control can be ranged from three to seven subordinates under one supervisor (FEMA, 2008, p.3; EMI IS-100b, 2013, p.3.29; EMI IS-200b, 2013, p.2.35; & EMI IS-100HE, 2013, p.3-37), one to five responders under a person (DHS, 2008, p.97; EMI IS-100b, 2013, p.3.29; & EMI IS-100HE, 2013, p.3-37), or up to ten people (DHS, 2008, p.97). Although the ICS provides general rules, the consideration of span of control is based on the type of incident, nature of the task, hazards and safety factors, and distances between personnel and resources (EMI IS-100b, 2013, p. 3.29). Consequently, "the ICS organizational management is directly correlated with the size and complexity of the incident (DHS, 2008, p. 97)" − this concept is associated to an organic characteristic: Focus on external relationship and knowledge. Therefore, many ICS users think this system is flexible, because "ICS offers flexibility in determining the right structural approach for the specific circumstances of the incident at hand" (DHS, 2008, p. 54). Therefore, the determination of ICS span of control influences this system organic or mechanistic; if the span of control is determined by the numbers of subordinates under a person, this system

is more mechanistic. If the span of control is decided by the disastrous environments, this system is more organic.

b. Add supervisory positions or groups when organization expands

When the ICS structure grows (which means situations become more complex), ICS supervisors are allowed to add more positions or groups to assist them (DHS, 2008, p.47 & p.55). Divisions and groups are created, for instance, when "the number of resources exceeds the manageable span of control of Incident Commander and the Operation Section Chief" (DHS, 2008, p. 55).

The ICS command and control design elements focus much on the relationships between ICS supervisors and their subordinates. As a result, we can connect it to another mechanistic characteristic: focus on vertical communication (which is coded as M7 on this research).

The majority of communications within the ICS are vertical. For example, the purpose of maintaining manageable span of control is to communicate with and manage all resources under supervisors' control (DHS, 2008, p. 59). Besides, when use ICS on the incidents of short duration, the Incident Action Plan (IAP) is developed by the Incident Commander and then communicated to subordinates in a verbal briefing (FEMA, 2008, p.24). The vertical communication on the ICS is not only top down, but also bottom up. All responders, for instance, are educated to "keep

supervisor informed" (EMI IS-200b, 2013, p.2.23), and the resource requests must go through their immediate ICS supervisors (EMI IS-100HE, 2013, p.7-5).

The above discussions demonstrate all ICS reports, instructions, and requests are transmitted through the lines of authority, the bigger the ICS structure is; the longer time it takes to transmit information. Therefore, when situations change fast and therefore require quickly adjustments and improvisations; a big and fully expanded ICS structure might prolong the response time. This fact possibly explains why some disaster researchers think this system cannot deal with complex disasters (Buck, Trainor, & Aguirre, 2006; Harrald, 2006; Neal & Phillips, 1995; Neal & Webb, 2006).

Since the majority of ICS communication occurs vertically, this system pays much emphasis on building relationships between ICS supervisors and their subordinates, which can be associated to the final mechanistic characteristic – focus on internal relationship (which is coded as M8 on this research). For instance, to make the ICS work, all responders have to follow some command and control approaches, such as the "Unity of Command" (EMI IS-100HE, 2013, p. 87). The importance of building vertical and internal relationships between ICS participants explains why responders from para-military organizations (such as firefighters, police officers, and Emergency Medical Technicians) have better chance to exercise this system successfully. On one hand, responders from para-military organizations are trained to receive commands from their supervisors, so they have better understanding of the command and control approaches (Sylves, 2008, p.192). On the other hand, the leadership in the para-

military organizations is linked to trust and competence. Consequently, people from these organizations have fewer problems on building trust at scenes, so they are able to exercise this system successfully during disasters (Klein, 1999, pp.236-238). As a result, Moynihan (2007) concludes: establishing positive internal relationships is a key for ICS success (p.34).

The above analysis demonstrates this system combines both mechanistic and organic design elements. Figure 3.3 below summarizes the results of my analysis.

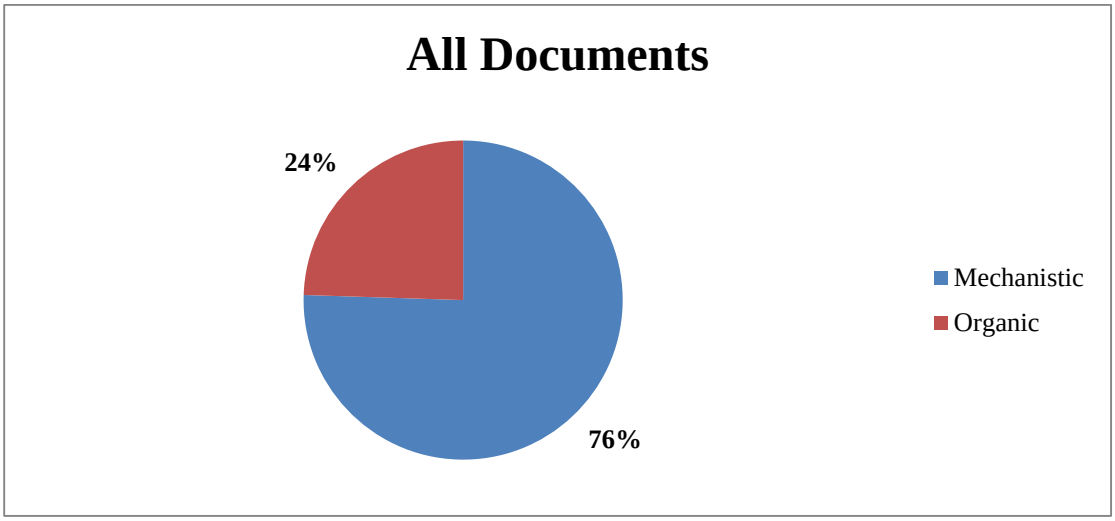

Figure 3.3: the results of content analysis

In looking at the figure above, as other scholars have suggested (Harrald, 2006; Neal & Webb, 2006; Wenger, Quarantelli, & Dynes, 1990), ICS is significantly more

mechanistic (76%) than organic (24%). One could interpret this as suggesting that critic's view of ICS as "mechanistic" holds true. However, I suggest that such an assertion underappreciates the complexity of the system's design. It ignores the almost 25% of design elements that are organic. These findings should be of great interest to both proponents and critics of the ICS system, the fact−ICS incorporates both mechanistic and organic design elements−exposes a duality or a more nuanced organizational design than has been previously recognized. Although critics are correct that the system is more mechanistic, their interpretation of ICS is not completely justified. At the same time, proponents should note the degree of organic control that is built into the system and the possibility that differences in how these elements are utilized or ignored are significant and important in determining how the system works.

Discussions

We have discussed the methodological considerations of conducting the content analysis, general concepts of constructing the ICS, and characteristics of achieving each ICS design element. Based on the content analysis, there are nine decision points that would determine the degrees of ICS mechanistic versus organic, please see table 3.4 below.

Table 3.4: The nine decision points determining ICS mechanistic or organic

Decision Point	More Mechanistic Design	More Organic Design
1	Uses a single Incident Commander	Uses the Unified Command (UC)
2	Final decisions are made by a single person in the UC	Decisions are reached by consensus in the UC
3	New ICS branches are created by pre-determined rules or regulations	New ICS branches are created by disastrous situations
4	One person makes the decision on where and how to set up new ICS branches	Multiple individuals reach a consensus on where and how to set up new ICS branches to adapt this system to the disastrous environments
5	Middle ICS leaders seek instructions from their supervisors on how to allocate responsibility to resolve unexpected problems	Middle ICS leaders receive suggestions from peers or professionals in order to determine how to allocate responsibility to resolve unexpected problems
6	ICS leaders do not change the plan of action under any circumstances	ICS leaders change the plan of action in disastrous situations
7	ICS leaders command people from different organizations and backgrounds	ICS leaders cooperate with people from different organizations and backgrounds
8	ICS users do not improvise on the ground	ICS users improvise in response to disastrous situations
9	The ICS span of control is determined by the pre-established rules and regulations	The ICS span of control is determined by disastrous situations

The overall result of my content analysis is shown on figure 3.4 below. Since rights and obligations are clearly defined on this system to cope with expected problems, two organic codes (O2-dynamic jobs and O3-Dynamic tasks) are not seen on this analysis.

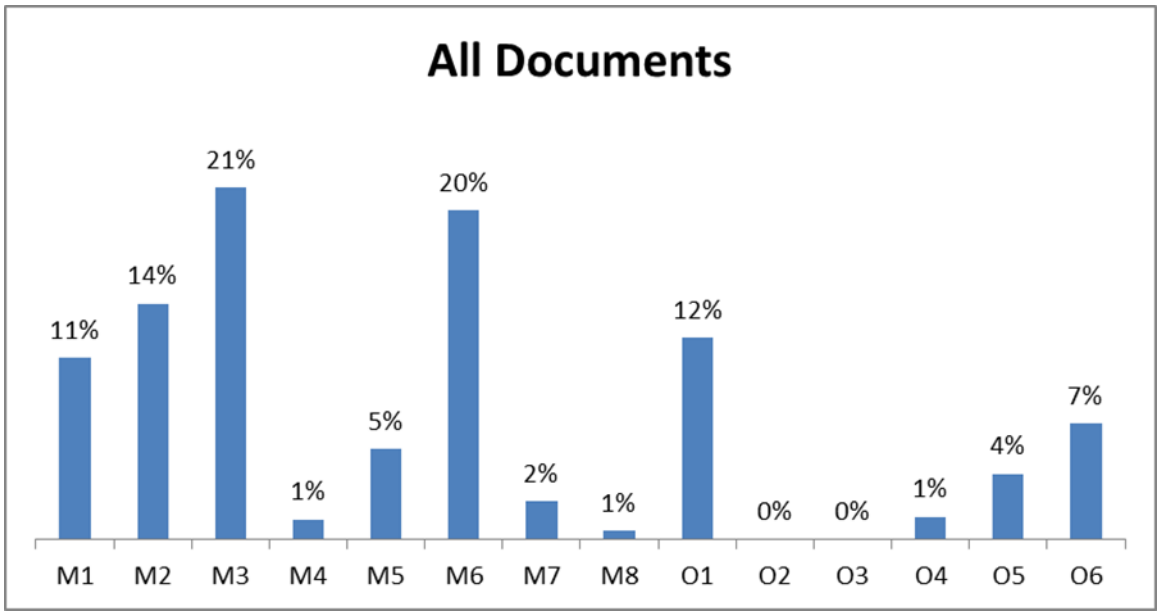

Figure 3.4: Frequencies of each mechanistic and organic design elements on all ICS documents

The results of my content analysis demonstrate the ICS actually incorporates both mechanistic and organic design elements. The ICS structure is generated through both centralized and decentralized structuring processes (Bigley & Roberts, 2001, p.1294), so this system is closer to a "hierarchical network" model that Moynihan (2007) concluded on his research. Consequently, if people simply relate the ICS to a command and control system and neglect its organic design elements (Neal & Phillips, 1995; Neal & Webb, 2006; Quarantelli, 2002; Wenger, Quarantelli, & Dynes, 1990), they would be led to a misdiagnosis of management issues (Moynihan, 2007, p.6). Moreover, since the ICS has more mechanistic design elements than organic ones, this

system is more like a bureaucratic system that requires certain conditions for it to work well (Buck, Trainor, & Aguirre, 2006, p.15).

Through the content analysis, I have found nine decision points would influence the degrees of ICS mechanistic versus organic. Since these decision points are related to how people implement the ICS on the grounds, I plan to conduct qualitative interviews to further explore how these factors influence ICS mechanistic or organic. I will explain the methodological considerations and present the results of my qualitative interviews on the next chapter.

Chapter 4

METHODOLOGY AND THE QUALITATIVE INTERVIEWS

Introduction

This research aims to understand the degrees of ICS mechanistic versus organic. To answer my research question, I conducted a complete analysis of ICS documents on the previous chapter and consequently understood this system swings between organic and mechanistic under certain situations. In the previous chapter, I have been focused on analysis of the ICS documents and several key federal ICS training programs in order to identify the specific design recommendations within ICS and to associate those design recommendations with theoretical concepts used to describe organizational designs. While the content analysis chapter presents a full description of my results, the analysis shows that ICS guidance includes more mechanistic design elements (76%) than organic ones (24%.) Even so, it also identifies nine specific decisions points that influence the degree to which any specific implementation of the ICS framework is more mechanistic or organic (Please see Table 4.1 on the next page). Since these decision points are related to how disaster responders implement this system on the ground and Jensen (2011) has reported this system is implemented in the different ways as it was designed, for the interview portion of my dissertation I plan to conduct in-depth qualitative interviews to understand how responders navigate these choices.

This chapter explains the methodological considerations of conducting the qualitative interviews. These considerations include selecting samples and interviewees, collecting data and improving data quality, and developing interview questions. After the methodology section, I will present the results of my qualitative interviews, which include the general results and discussions of specific ICS design elements. This chapter concludes with summary and discussions.

Table 4.1: Nine Decision Points that Influence How Mechanistic or Organic the ICS Is

Decision Point	**More Mechanistic Design**	**More Organic Design**
1	Uses a single Incident Commander	Uses the Unified Command (UC)
2	Final decisions are made by a single person in the UC	Decisions are reached by consensus in the UC
3	New ICS branches are created by pre-determined rules or regulations	New ICS branches are created by disastrous situations
4	One person makes the decision on where and how to set up new ICS branches	Multiple individuals reach a consensus on where and how to set up new ICS branches
5	Middle ICS leaders seek instructions from their supervisors on how to allocate responsibility to resolve unexpected problems	Middle ICS leaders receive suggestions from peers or professionals in order to determine how to allocate responsibility to resolve unexpected problems
6	ICS leaders do not change the plan of action under any circumstances	ICS leaders change the plan of action in disastrous situations
7	ICS leaders command people from different organizations and backgrounds	ICS leaders cooperate with people from different organizations and backgrounds
8	ICS users do not improvise on the ground	ICS users improvise in response to disastrous situations

9	The ICS span of control is determined by the pre-established rules and regulations	The ICS span of control is determined by disastrous situations

Methodology

The primary data collection task associated with this portion of my analysis are in-depth semi-structured qualitative interviews. These interviews explore how disaster responders actually use the ICS on the ground and consequently understand how these decision points influence ICS mechanistic or organic. Since I wish to obtain disaster responders' interpretations of their experiences on exercising the ICS, the interviews will use the Responsive Interviewing Model (Rubin & Rubin, 2005, p. 36). This approach aims to explore a solid and deep understanding of what is being studied, rather than breadth. Depth is achieved by going after the context; dealing with the complexity of multiple, overlapping and sometimes conflicting themes; and paying attention to the specifics of meanings, situations, and history (Rubin & Rubin, 2005, p. 35). Moreover, the interviews I conducted are to gain the "thick descriptions" of complex lived experiences while implementing the ICS as recounted by participants. In order to explore such topics, a semi-structured interview guide is more appropriate than fixed questionnaires (Hesse-Biber & Leavy, 2011, p. 95; Kitao & Kitao, 2002, pp.42-43). This approach is better than highly structured interviews because it allows the researcher to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic. Semi-structured interviews are also better than unstructured interviews because it avoids the researcher to feel lost in a sea of

divergent viewpoints and seemingly unconnected pieces of information (Merriam, 2009, pp.90-91).

Sampling

Qualitative research focuses in depth on relatively small samples selected purposefully (Patton, 2002, p.230), so I used purposive sampling method (Patton, 2002, pp.230-242) to select typical disastrous cases and information-rich interviewees.

Determining selection criteria is the first step to initiate purposive sampling (Merriam, 2009). The three factors identified by content analysis are considered to set up sampling criteria. These criteria include the criteria of selecting disastrous cases, the criteria of selecting organizations, and the criteria of selecting interviewees. I will explain each of them in the following sections.

First of all, the ICS is difficult to be implemented on extreme complex disastrous situations (Buck, Trainor, & Aguirre, 2006; Neal & Webb. 2006; & Neal & Philips, 1995). Small incidents, however, only involve particular emergency response departments, so they cannot provide enough qualitative data to explore certain decision points (such as the cooperation between ICS leaders and their deputies of different backgrounds, and the management of technical specialists). As a result, within all purposeful sampling method, I utilize Typical Case Sampling Method (Patton, 2006, p. 236) to select disastrous cases. The typical cases are selected based on the five disaster types categorized by the US Department of Homeland Security (DHS) (please see table 4.1 below). By the definitions of FEMA, type one disasters

generate the most complex situations that would impede the implementation of the ICS, so this type of disasters is excluded on this research. Also, Type Four and Five incidents are simple, so responders are not required to complete a written Incident Action Plan (IAP). The previous content analysis has shown the processes of making an IAP would influence the ICS become more mechanistic or organic, so given that responders in these two categories do not have to write an IAP, they are excluded from this interview. Consequently, Type Two and Three disasters are selected to be the first criteria to design these qualitative interviews.

Table 4.2: The Incident Types (FEMA, 2006)

Type 1	This type of incident is the most complex, requiring national resources to safely and effectively manage and operate. • All Command and General Staff positions are activated. • Operations personnel often exceed 500 per operational period and total personnel will usually exceed 1,000. • Branches may need to be established. • The Agency Administrator will have briefings, and ensure that the complexity analysis and delegation of authority are updated. • Use of resource advisors at the incident base is recommended. • There is a high impact on the local jurisdiction, requiring additional staff for office administrative and support functions. • Typically involve incidents of national significance.
Type 2	When the incident extends beyond the capabilities for local control and the incident is expected to go into multiple operational periods. A Type 2 incident may require the response of resources out of area, including regional and/or national resources, to effectively manage the operations, command, and general staffing. • Most or all of the Command and General Staff positions are filled. • A written IAP is required for each operational period. • Many of the functional units are needed and staffed. • Operations personnel normally do not exceed 200 per operational period and total incident personnel do not exceed 500 (guidelines only). • The Agency Administrator is responsible for the incident complexity analysis, Agency Administrator briefings, and the written delegation of authority. • Typically involves incidents of regional significance.
Type 3	When capabilities exceed initial attack, the appropriate ICS positions should be added to match the complexity of the incident. • Some or all of the Command and General Staff positions may be activated, as well as Division/Group Supervisor and/or Unit Leader level positions. • A Type 3 Incident Management Team (IMT) or incident command organization manages initial action incidents with a significant number of resources, an extended attack incident until containment/control is achieved, or an expanding incident until transition to a Type 1 or 2 IMT. • The incident typically extends into multiple operational periods. • A written IAP is typically required for each operational period. • Examples include a tornado touchdown, earthquake, flood, or multiday hostage/standoff situation.

Table 4.2: The Incident Types (Continued)

Type 4	• Command Staff and General Staff functions are activated only if needed. • Several resources are required to mitigate the incident, including a Task Force or Strike Team. • The incident is typically contained within one operational period in the control phase, usually within a few hours after resources arrive on scene. • The Agency Administrator may have briefings, and ensure the complexity analysis and delegation of authority are updated. • No written Incident Action Plan (IAP) is required but a documented operational briefing will be completed for all incoming resources. • Examples may include a major structure fire, a multivehicle crash with multiple patients, an armed robbery, or a small hazmat spill.
Type 5	• The incident can be handled with one or two single resources with up to six personnel. • Command and General Staff positions (other than the Incident Commander) are not activated. • No written Incident Action Plan (IAP) is required. • The incident is typically contained within an hour or two after resources arrive on scene. • Examples include a vehicle fire, an injured person, or a police traffic stop.

Organizations and Individuals

The second part of my analysis focused on gathering data from people that work in different kinds of organizations and backgrounds. This strategy is to reflect a variety of perspectives and therefore enhance the credibility of this research (Rubin & Rubin, 2005, p. 67). Since semi-military disaster response organizations have different cultures than civilian departments (Sylves, 2008, p. 192), uniformed disaster responders − firefighters, police officers, and Emergency Medical Technicians (EMTs) − and the responders from other civilian departments are selected to reflect different points of view.

Finally, I interviewed people from two groups. The first group is those people who served as the Incident Commanders, participants of Unified Command, Command Staffs, or the General Staffs (section chiefs). The other group of interviewees are those who were ICS leaders from a middle or lower position, such as Branch Directors, Division Supervisors, or Strike Team Leaders. This sampling method would help me to gather contradictory or overlapping perceptions and nuanced understandings that different individuals hold (Rubin & Rubin, 2005, p. 67).

I completed twenty-eight qualitative interviews in this study. The overall design of my interview is illustrated on the Figure 4.1 below:

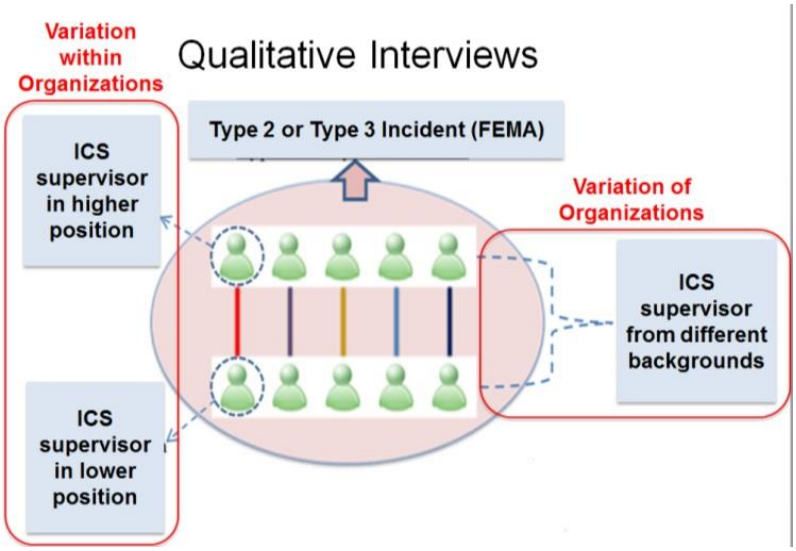

Figure 4.1: The illustration of interview design

In summary, I select interviewees from various disaster response organizations and different levels of ICS supervisory positions. The variation of interviews' backgrounds and their ICS positions are demonstrated on the Figure 4.2 and Figure 4.3 below.

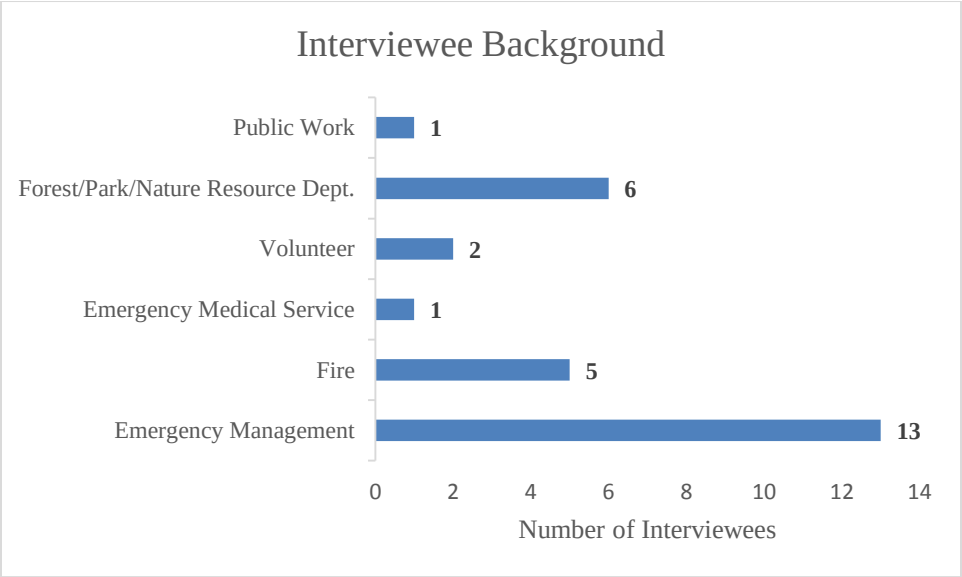

Figure 4.2: Interviewee of various backgrounds

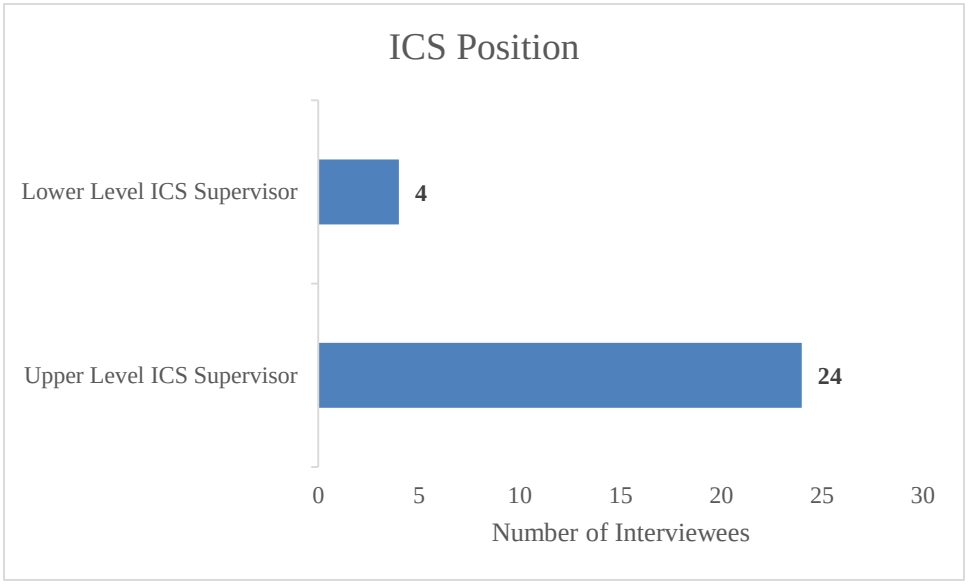

Figure 4.3: Interviewees of various ICS positions

Entree

Above I have explained the three criteria on selecting interviewees on the previous section. More specifically, I will explain how I find each interviewee on this section.

Patton (2002) suggests researcher should "cooperate with key informants, such as program staff or knowledgeable participants, who can help identify who and what are typical (p.236)." To find informants for this research, I participated in the sixteenth FEMA Emergency Management Higher Education Symposium and met an officer from FEMA Field Counsel Division. He introduced me to his supervisor (who is a branch chief of FEMA Urban Search and Rescue Team). We arranged a conference call to discuss my purpose of this research, the design of my interviews, and some

possible interview questions at June 24th in 2014. The branch chief recommended two people to me via an email after the conference call. Based on his email, these two informants are "Chief Fire Officers with two of the largest Fire Departments in the State of California, with extensive experience serving on Incident Management Teams." I worked with these informants to find senior ICS users who had responded to a type two or type three disasters.

Besides, I posted a note on the International Association of Emergency Managers (IAEM) Dispatch, which is a web-based journal that is sent to all IAEM members every week (Please see the Appendix A). I also initiated a discussion at a professional group on the Linkedin.com to find more interviewees (Please see the Appendix B). Table 4.3 below demonstrates the basic information of my interviewees:

Table 4.3: List of twenty-eight interviews

	ICS Role	Representing Group	Disaster Name/Type
1	General and Command Staff	Emergency Management Office	2013 CO Flood/ Type 3
2	ICS user	NYPD/Incident Management Team	Hurricane Sandy/Type 3
3	Operation Division Chief	Volunteer and later become a federal contractor	Waynesville, Missouri flooding/Type 3
4	Operation Division Chief	FEMA	Hurricane Irene/ Type 2
5	Incident Command/Operation Division Chief	Emergency Management Office	Imperial sugar refinery explosion 2008 (Georgia)/Type 3
6	Command Staff/Liaison Officer	Southwest Incident Management Team	2013 CO Flood/ Type 3
7	Safety Officer	FEMA	9/11 Ground Zero US&R Operation
8	Planning Section Chief	Emergency Medical Technician	2012 Ohio Tornadoes/ Type 3
9	Federal Coordination Officer	FEMA	2014 Mississippi Tornados/ Type 2
10	UC member (the Federal Coordination officer)	FEMA	Tornados and floods/ Type 2
11	Incident Commander	Southwest Incident Management Team	2013 CO Flood/ Type 3
12	EMS Branch Leader	Contra Costa County	2013 Asiana Air Crash
13	Incident Commander	Director of Butler County Emergency Management Agency	Hurricane Sandy
14	IC for EOC Operation Support Chief	San Francisco EOC	2013 Asiana Airplane crash
15	Incident Commander	Forest Service- Fire & Aviation management	No Specific disastrous case
16	Incident Commander	Incident Command Team	No Specific disastrous case
17	Incident Commander	Public Works	1996 Floods in Portland
18	Incident Commander	Park Services	No Specific disastrous case
19	Incident Commander	Salvation Army	No Specific disastrous case
20	Incident Commander	Fire Department	Train Crush in Washington State
21	Operation Division	FDNY	Hurricane Katrina

	Chief		
22	Incident Commander	Washington State Forest Service	Many Type 2 and Type 3 Wildfires
23	Operation Section Chief	National Park Service	Hurricane Irene
24	Incident Commander	Department of Nature Resource	Type2 and type 3 disasters; no specific one
25	Incident Commander	LA County Fire Department	Type 3
26	Deputy Planning Section Chief	LA Department of Forestry Safety	Wild land Fires in California
27	Incident Commander	A city fire department in SF bay area	Wild land fires in California
28	Incident Commander	Orange County Fire Department	Type 2 and Type 3 wild land fires

Data Collection, Quality, and Analysis

This dissertation has completed twenty-eight in-depth qualitative interviews. The purpose of conducting my qualitative interviews is to gain qualitative data that demonstrate how the nine decision points influence the degrees of ICS mechanistic versus organic (please see Table 4.1). Since I have realized the goals and types of qualitative data I need from the interviews, and have found nine decision points that would provide possible answers to my research question, I design these interviews as "tree and branch structure." This interview structure divides the research problem into more or less equal parts, and each part is covered with a main question (Rubin & Rubin, 2005, p. 145). In preparing questions in the "tree and branch structure", I first develop main questions that "translate the research topic into terms that the conversational partner can relate to and discuss (Rubin & Rubin, 2005, p. 135)." The

key of implementing this interview structure is to logically connect all main interview questions, so people can make sense to them (Rubin & Rubin, 2005, p. 145).

Also, preparing follow-up questions is important to "get more depth and understanding about an idea, a theme, an event, or an issue suggested by the interviewees (Rubin & Rubin, 2005, p. 173)." Consequently, following the principles of developing main interview questions and follow-up questions (Rubin & Rubin, 2005, pp. 152-200), I developed several main questions, followed by several follow-up questions and probes to be used in the interviews. The complete qualitative interview questions can be found on Appendix A of this dissertation.

Qualitative data were collected during interviews. With the approvals of interviewees, the researcher audio recorded the interviews and then transferred them into texts. All interview questions and materials were sent to and approved by the Institutional Review Board (IRB) at University of Delaware before I conduct any interview (please see the appendix D). After I began to recruit interviewees, I found it is very difficult to find enough people who responded to one particular disaster together, so I changed my interview design that allows people responded to different disasters to join this research. This change had been approved by the UD-IRB before I conducted any interviews (please see the appendix E).

Besides, two strategies are used to promote the validity and reliability of this research (Merriam, 2009, p.229), they are: 1) Adequate engagement in data collection, and 2) peer review. I will discuss each of these strategies on the following sections.

Adequate Engagement in Data Collection

As I mentioned before, I interview people from different backgrounds and various ICS supervisory positions. Patton (2002) suggests a researcher should look for data that support alternative explanations. “Failure to find strong supporting evidence for alternative ways of presenting the data or contrary explanations helps increase confidence in the original, principle explanation you generated (p.553).” Therefore, the data collected from people with various backgrounds and positions help me to identify possible contradictory perspectives, and encourage me to consider possible alternative explanations to the research findings.

Peer Review

All findings in this research are reviewed by dissertation committee members who have long time experience on conducting disaster research and are familiar with this research topic. This strategy would increase the validity and reliability of this research.

Data Analysis

I utilized thematic content analysis to analyze all qualitative data I collected on the interviews. After every interview, I first transcribed them into text for further analysis. I utilized computer software, Atlas.ti 7.0, to mark all concepts and themes I found on my transcriptions. These concepts and themes eventually guided me to develop codes to analyze my qualitative interviews. Table 4.4 illustrates the codes I developed to analyze my qualitative interviews.

Table 4.4: Codes to analyze qualitative interviews

Mechanistic			
A	Even within the UC, there is one person making the ultimate decision		
B	Within the ICS structure, any changes would be reported to ICS supervisors		
C	When looking for new ICS leaders, people would consider		
	C-1	Qualification (Certain training he or she had received)	
		C-1-a	The National Qualification System
		C-1-b	The Red Card System (Wildland Firefighting Qualification System)
	C-2	Experience/Background	
Organic			
A	The determination of using a IC/UC relies on the situations and conditions (the nature of the disaster)		
B	ICS gives a broad structure and general principles, but not tactical details		
	B-1	The IAP only gives broad objectives	
	B-2	People can communicate to their supervisors to change the instructions or request more resources	
	B-3	The determination of the actual span of control depends on the situations	
C	Improvisation is necessary on the grounds		
	C-1	The disastrous situations are too complex	
	C-2	Situations are different than those people were trained	
D	Trust is a critical factor that makes this system work		
	D-1	When looking for new ICS leaders, people also prefer to select those had built relationships before disasters	
	D-2	The more complex a disaster is, the more important of building trust between ICS users	
	D-3	The leadership within the ICS relies on trust between supervisors and subordinates	
E	ICS users do not command and control volunteers		
	E-1	Communication and cooperation instead of command and control	
	E-2	It is critical to build relationship with volunteers before disaster	
	E-3	Volunteer groups “plug in” the ICS structure through the liaison officer	

The Results of Qualitative Interviews

The interviews demonstrate that the Incident Command System has both mechanistic and organic design elements. The decisions made by ICS supervisors do strongly influence whether this system becomes more mechanistic or organic. I will discuss the results of my qualitative interviews based on the following four characteristics: 1) Centralized versus decentralized decision-making, 2) Management, 3) Selection of new ICS leaders, and 4) Volunteer management.

Centralized versus Decentralized Decision-Making

Using IC or UC

The majority of the interviewees mentioned that the decision of whether to use a single Incident Commander (IC) or Unified Command (UC) depended on the situation. Many interviewees explained that the complexity of the disaster was a major factor in the decision. For instance, one interviewee said: "it [the determination of using IC or UC] is very situational driven. If it is—for instance, if it was solely under the jurisdiction of my agency, we would manage that as a type 3 or type 2. The type 2 [incident management] teams arrive with interagency capabilities, but the type 3 would have been an agency-specific organization with a delegation only from my agency." Some interviewees said the decision on whether to use IC or UC also depended on the agencies sharing the jurisdiction; if these agencies trusted in having one Incident Commander, then they would allow an IC to manage the whole ICS structure. However, if these agencies insisted on making decisions collectively, then

they would respond to a disaster under the administration of an UC committee. One interviewee said: “Those agency administrators have to trust me as a single incident commander to carry out their directives through their delegations of authority and do our incident objectives that make it all work. Some agency administrators cannot get there. They want to have their own person at the table representing them. If you get to that point, now you’re in a unified command.” Only a few interviewees claimed that the decision to use either the IC or UC depended on official documents. As an example, one retired emergency manager said: “that [the determination of using IC or UC] is agreed very much by the Federal Response Plan where it says we go in as partners with the state…invited by the government and we go in as the states partner, so everything is done by Unified Command.”

Furthermore, even though the purpose of having the Unified Command is to enable agencies make decisions collectively, many interviewees said even within the UC structure, there was still one person who made the ultimate decision. Normally, this responsibility is given to the most experienced incident commander within the UC committee. As an interviewee said: “the ultimate decision is made by who has the specialty of the incident that you are managing…I think that if we are on the scene of the fire and you have evacuations and you have road closures, there is going to be unified command between police and fire and EMA [Emergency Medical Service]. But the fire chief would be the one that would have the final say. If it is a bank robbery, the police chief, or the police person will have the final say.” Moreover, the person designated to be the final decision-maker can also include local elected

officials or emergency managers as well. As a FEMA Federal Coordinating Officer said: "The concept, my concept of the unified coordination as a unified command. At the end of the day the system of governments here in our country is that essentially an elective official whether it is the governor for statewide incidence or the mayor of a city. They are the ones ultimately responsible for safety and the citizen rate."

Decisions are Made by ICS Supervisors at Different Levels

Many disaster researchers think that the ICS relies on one person sitting at the top of whole system to make all decisions (Quarantelli, 2002).The majority of interviewees in this research, however, said that decisions are actually made by ICS supervisors at different levels. For instance, during a disaster response, the ICS requires responders to create an Incident Action Plan (IAP). As an interviewee said "You have to react to what the situation is. So when you get an IAP—it is either for 12 hours or for 24 hours—things are going to change during 24 hours. You are constantly making changes. Sometimes right after the operations briefing something happens and you make changes. So IAP changes significantly from operational period to operational period." Due to the fast-changing nature of emergencies and the quick response required, not all modifications of the IAP go directly to the Incident Commander. In many cases, as an interviewee who served as the ICS Operation Section Chief during the Hurricane Irene said: "basically we allow the branch supervisors, the group supervisors, branch directors and the group supervisors to basically change the [Incident Action] plan, document on their incident logs and at the

same time let us know that they're changing those plans. If it's something very serious, then they will call and ask permission to change the plan. But if it is something simple, they can change it on their own, and it's not a big deal. They understand it's a minor change, and they can—they can react to that and—and take care of business." To react and modify the Incident Action Plan is connected to the concept of improvisation, which I will further discuss in the next section.

Improvisation

The concept of modifying the IAP in response to the situation can be connected to Bigley and Roberts' (2001) concept of improvisation. They claim that improvisation "is considered legitimate and supported only to the extent that it fits with extant organizational goals and is not likely to cause harm to the improviser or anyone else (p.1289)." The majority of interviewees agreed with this definition of improvisation and therefore conceded that improvisation is necessary and commonly seen at scenes. Very few interviewees said that they do not improvise. In one instance, an incident commander for a logistics staging area during Hurricane Sandy said: "We were basically in a gigantic parking lot…there really was not a lot of improvising there because we were all together in one exact same location." Later on in the same interview, however, he did admit that people do improvise in more complex disaster situations. Consequently, based on these discussions, improvisation is necessary when responding to disasters because the situation is too complex to be managed by one plan (the Incident Action Plan). As an Incident Commander from the Washington State Department of Nature Resources said: "The Incident Action Plan is never gonna be

perfect, because it's an emergency. So, in any emergency you cannot be one hundred percent sure what you will send in those responders to accomplish. So consequently, you have to allow some latitude to do that [improvisation]."

The discussion above demonstrates that the ICS, as Bigley and Robert (2001) said, provides subordinates with a degree of latitude to improvise (p.1289), and this delegation of authorities is related to many of the management/decision-making issues within the ICS. One of these issues is that ICS subordinates must first understand what levels of improvisation are allowed, and that improvisations that reach a certain magnitude should be reported to their supervisors for approval prior to implementation. In my interviews, I called this issue "reaching a consensus before disasters," which means that all ICS users must reach some sort of consensus before responding to a disaster, or else they will not be able to work together at the scene. As a fire chief who served as the IC on a train crush accident said: "Most of the [disaster response] actions are based on consensus. There are times when somebody doesn't necessarily agree, but they realize that we have to move forward, so it is the best plan that we can put forward." The concept of reaching consensus with all ICS users is related to the building of relationships with different organizations prior to disaster. One interviewee, who served as an IC for the National Park Services, reiterated the importance of building relationships before disasters: "If you have relationships already built [before disasters], that never ends; you are always working on that. Then when the bad day comes, it is just goes so much better." Many interviewees said that holding training, exercises, and other activities together is a good way to build

relationships between all ICS users. This concept echoes back to one of Moynihan's (2007) recommendations for managing hierarchical networks (the ICS) (p.35).

I will further discuss other ICS management issues in the next section.

Management

The ICS structure begins with either a single IC or UC and then extends from there in a top-down design. The determining factor behind creating new ICS branches relies on span-of-control. Although the ICS provides certain rules to help determine span-of-control, the majority of interviewees said that they only use the ICS doctrine as a general rule; actual span-of-control is determined by the situation itself.

Using the General ICS Rules to Determine the Span-of-Control

An appropriate span of control is three to seven subordinates under one ICS supervisor, with one ICS supervisor managing five responders being the optimal situation. In certain large-scale law enforcement operations, one ICS supervisor can manage up to ten people (DHS, 2008, p.147). The type and complexity of incident, nature of the task, distance between personnel and resources, and hazards and safety factors all influence span-of-control considerations (EMI, 2013, ICS 200b, p. 2.36). Many of the interviewees in this research said that they did adhere to the general rules when determining span-of-control. For example, the Incident Commander of the Southwest Incident Management Team said that: "It [the determination of span-of-control] is more dictated by the situation; however, the rules let you know when—if you started exceeding the principles, your subordinates are well trained in ICS, so they'll say, 'Hey, listen. This is a little bit bigger than we can manage over here. We've

got a little bit too many moving parts.' Your safety officer can pick it up." I will discuss more about how situation and disasters complexity impact span-of-control in the next section.

The Determination of Span-of-Control Depends on the Complexity of Disasters

Many interviewees mentioned that the complexity of a disaster does influence actual span-of-control on the grounds. As an operation section chief on Hurricane Irene said: "The way you determine [span-of-control] is basically how complex the incident is, so if the incident is very complex, your span of control's gonna diminish, gonna decrease because you got too many things going on and the work is very complex or very risky." More specifically, as another interviewee who served as an Incident Commander during a Type Two disaster who gave me an example of how to decide the span-of-control said: "What really drives us is safety of your responders. You know cause that's you're—you got to take care of your own force. And then are you able to do that by having the appropriate amount of leadership out there with them when they're actually executing the incident action plan…and a lot of times an example could be, you could have a—let's say—you had a law enforcement group, and one of their assignments was simply to establish and maintain a perimeter. As simple as perimeter posts would probably be static, so therefore you could have a squad, a crew of 10 officers and just have one crew supervisors, and that's gonna be fine because what they're doing is relatively the same and there's a really comfort level within that community level of doing that. As opposed to if you were doing the

heavy equipment operations and you still had civilians in the area or a lot of other moving parts in the area, maybe you don't wanna go over three to one [one supervisor mange three subordinates] just cause there's too many moving parts and the potential to get somebody hurt was too great, so you wanted to drop a little more leadership and structure over that piece of the business."

These discussions illustrate that whereas the ICS provides general principles, the way people specifically implement ICS functions is based on the situation itself. Consequently, ICS leaders manage their subordinates by objectives, and then leave a certain amount of autonomy for their subordinates to determine how they accomplish these goals. As one interviewee said: "The incident commander is setting up the objectives of what needs to be accomplished, and the group supervisor is strategy and tactics of how he's gonna do it. So, really the incident commander is not going to tell him: 'I need you to pull this size ladder and this size hose line.' He's just, 'I want you to go put the fire out,' and supervisor makes the decisions how he's gonna do it." Another interviewee who was the Incident Commander at the 2013 Colorado Floods told me a similar thing: "It's important to set the objectives, but the tactics and the strategies are happen inside your organization but they happen lower down so that the people have enough freedom to do what it takes to meet the objectives, not necessarily lend themselves to a strategy especially if it's not working."

Therefore, disaster response activities are driven by overall objectives set up by upper-level ICS leaders. Responders in the lower ICS positions are granted a certain amount of latitude in determining how to best achieve the overall objectives,

and then report their activities back to their ICS supervisors. Consequently, the vertical communication within the ICS is not a one-way street: ICS supervisors and subordinates actually do discuss and communicate with each other up and down the chain of command. An interviewee who was an IC during a Type Three disaster explained the ICS decision-making processes to me as follows: "Incident commanders develop the incident objectives, ok, comes from the mission tasking or their delegation depending on the case, then you work out those objectives, then the plans and operations section takes those objectives, develop a tactical plan that is developed you know the—this is the plan for the next operational period, and then as you work your way through communicating to that, then you get down and you brief the responders of what they're supposed to do, they provide feedback throughout that operational period back to those leaders, and then you start the whole process over again."

Consequently, the successful implementation of this system relies heavily on ICS supervisors operating at different levels. They must be able to communicate the overall objectives down to their subordinates, and then send feedback back up to the upper-level ICS decision-makers. In this case, selecting the right ICS leaders is crucial to the successful implementation of this system on the ground. I will further discuss how to select new ICS leaders in the next section.

Selecting New ICS Leaders

Almost all interviewees noted that qualification, relative background, and relationship were the three most important criteria they considered when it came to selecting new ICS leaders. The majority of interviewees felt that these three criteria

were equally important; only a few interviewees claimed that they ranked either qualification or relationship higher than the others. I will discuss each of these three criteria in the following sections.

Qualification

When selecting new ICS leaders, members in the IC or UC can identify candidates through two different systems. One of the qualification systems is the Wild Land Firefighting Qualification System, or the Red Card System (RCS). Some states also maintain their own state-wide qualification systems. In all-hazard scenarios, people are encouraged to use both systems. In responding to wild land fires, however, disaster responders are encouraged to use the RCS instead. An interviewee explained the difference between these two types of systems as follows: "in wildfire world, it goes through the wildfire system [Red Card System], but in the all-hazard world, you can sometimes work into—for instance, an operations section chief in the all-hazard world [state-wide qualification system] and an operations section chief in the national wildfire coordinating group system [Red Card System] should be able to cross over and do the same and typically does. So, as an example, so, so they really do cross back and forth typically the national wildfire coordinating group does not cross over to the all-hazard group to get people to work wildfire, but it doesn't work in the other side." This quotation seems to suggest that the RCS might be more popular than other state-wide qualification systems among disaster responders. Not only that, but from my interviews, most interviewees also seemed to know more details about the RCS as opposed to the other state-wide qualification systems.

Many interviewees additionally mentioned that a good ICS supervisor must not only be qualified for his or her position, but must also have the skills to manage people. These skills can be assessed by looking at the ICS supervisor's background or be verified by someone who personally knew him or her prior to the disaster.

Background

When selecting a new ICS supervisor, it is important to ensure that the candidate has working experience in a relevant area. An interviewee who was the Incident Commander at the 2013 Colorado Floods explained the importance of this factor when it came to selecting new ICS leaders: "the guy who's in charge of the city's public works, and if you place him in charge of his division for his group, if he becomes the group supervisor for public works, then he probably knows how to run his people better than bringing in a division supervisor who has no knowledge of public works." Another interviewee presented his strategy for selecting new ICS supervisors as follows: "you would consult with their boss or with the director of the bureau that had responsibilities with that topic [New ICS Branch]. So I would consult on the shift of the deputy fire chief when they needed somebody from fire. Or I would consult with the police commander when I needed someone from police, that sort of thing." Both of the discussions above demonstrate that the selection of new ICS leaders is based not only by using the qualification system to identify someone, but on also on personal relationships that are built before disasters.

Relationships

Both of the qualification systems mentioned above only help to identify candidates for common ICS positions. When the IC needs a new ICS supervisor with a specific background, then the IC has to work together with local authorities to find the right candidate. An interviewee provides an example of how the IC identifies these specific individuals: "Our team carries our own IT [Information Technology] and GIS [Geographic Information System] people but most teams will reach out to the local country that they are working or deployed in to the local or county offices and ask them if they have a GIS or an IT person." Therefore, building relationships with local disaster management organizations is critical when it comes to selecting new ICS leaders. As Buck, Trainor, and Aguirre (2006) concluded, one of the pre-conditions that makes this system successful is having a response community that "develops an understanding of intentions and begin to understand the subtleties of personalities and habits, as well as the development of personal ties and shared experiences that are difficult to create during the disaster or in its immediate aftermath (p.12)."

Building relationships is not only important to selecting new ICS leaders, but also crucial in terms of working with volunteer groups. I will explain how ICS users work with volunteers in the following section.

Volunteer Management

The majority of the interviewees said that volunteer groups could be incorporated into the ICS structure. Before these volunteer groups are incorporated into the ICS structure, however, it is very important to know who they are and what

their capabilities are. As an interviewee who served as an IC during a train crush accident said: “The primary method was using primary local emergency management folks to process those volunteers and to first make sure that they are who they say they are. Once we get past that, organizing them into functional groups, for example if it is a flood and we have to [use] sand bag, we often use volunteers. And we form them into crews so that they can do hand bagging. They are sent to us by emergency management who checks them all out and helps organize them as they requested and then they send them to us and they are a resource that we can apply to the problem.” Another interviewee claimed the following: “You know who—you know who--at the beginning before disaster, get contacts, all that stuff and then work with them [volunteers] during the disaster if you have to.” Consequently, developing a relationship with volunteer groups prior to disaster is critical to ensuring that they can be successfully incorporated into the ICS structure when responding to disasters.

With the exception of certain national volunteer groups, many volunteers are from local communities. Therefore, local disaster management organizations have better chances when it comes to building positive relationships with them. An IC of a Type Three Incident Management Team (IMT) told me that: “many of our team members that took that [disaster response] class were part of the incident management team that we were working with, and we adapted the things [concepts of working with volunteer groups] that we had learned in that class quite easily, and we had absolutely no problems working with volunteers and things like that. So we know that the system and particularly as it applies to the federal employees and federal teams really are

scared of the volunteers. They really have some issues with the volunteers and they would just about not use them if they could avoid it. We know that's the case…when a federal team shows up they can order federal resources and they can call for some like fire crews and things like that. They own those resources. But a type 3 team, all hazard team, doesn't own any resources and has to work with what's there and has to cooperate with people on the ground and many times those are volunteers. So, we don't actually own a resource, we are you know—we are working with the—were working by everybody's good will." This remark indicates that, since federal departments tend to have difficulties in building relationships with local volunteer groups, they usually work with national volunteer organizations instead. As an interviewee who served as an IC for the National Park Service told me: "We worked with some NGOs, American Red Cross, and friends of—friends of the islands and a couple other groups, but not many because of our position, we don't have a lot of private entities within our jurisdiction. See National Park Service lands do not incorporate much of any inholdings or private lands within our jurisdiction. So because we don't have that, we don't have a lot of NGOs involved—it's basically just National Park Service employees and National Park Service lands, that's it."

Once volunteer groups arrive at the scene, volunteers will normally check-in with ICS Liaison officers. As an interviewee said: "you simply link to them [volunteers] through your liaison officer and identify them as a cooperator. And to keep, so you guys are coordinating your activities cause you don't want you—if you're gonna use them—you don't want your logistics section duplicating what

they're gonna do to get everybody fed. And so you link them through your liaison officer and this faith-based group is an identified cooperator supporting your organization."

The purpose of making these volunteer groups sign in with the liaison officer is to maintain accountability at the scene. An Incident Commander in the 2013 Colorado Flooding told me: "There is risk—there is risk in having those people [volunteers] there, and it goes on, and it is a challenge to get them on the same page…Well they showed up and they never bothered to check-in. So to go back to the liaison function, if they try and get those people wrangled in and get them into the command post so you know who they are, you have a way to contact them, and you can explain to them what's going on and how you can get with them and square things up quickly. If they [volunteers] just show up and doing stuff, you don't have that opportunity [to manage them]. So, the liaison function is really big when you're dealing with that [volunteer groups]."

The majority of interviewees who had experience working with volunteers said that these volunteer groups were assigned to different ICS branches based on which services they provided. For example, an interviewee explained how he incorporated a volunteer search and rescue team into the operation section: "let's say you've got a search, and you've got a volunteer search and rescue group which is obviously very common in this country. They're gonna want to participate in more of a tactical orientation and that's great. You just bring them in, you get them checked into your incident and you make sure if they don't have a clear understanding of the incident

command system, just all they really need to know is who they're gonna work for. And you explain that to them, they're going to work in the operations section and then we're gonna give them direction through this plan, and they're in." An interviewee gave me another example to explain how he managed volunteer groups: "You only use divisions and groups under the operations section, so I wouldn't have division or a group form under planning or logistics. I may resource some of what they do with those volunteers…for instance, let's say it was a sand bagging crew on a flood and I say that we have a sandbagging branch. I would have that crew assigned to a group or a division underneath that branch."

Once the volunteer groups have been incorporated in the ICS structure, the Incident Commander will generally try to coordinate and communicate with them rather than commanding or controlling them. As one senior federal disaster manager told me: "We don't try and tell them [volunteers] what to do; we tell them what we need done and find out what they can do and they will tell us what they can bring to the table. What resources you got for me." Even though it is commonplace for ICS users to work with volunteers, the majority of the ICS supervisors interviewed said that they would not include the volunteers in the decision-making processes. An interviewee explained the following to me: "They [volunteers] don't have any legal statute, they don't have any authorities, and therefore they are never in a unified command, but they're a critical role in a lot of disasters. We utilize them in a different way, but they do not make command decisions…simply because they don't have any authority or responsibility. They are a cooperator, but they are not a manager…we

want them, but not at the command level. They will tell us what they can do, and we will incorporate them into a level below command, but we will not delegate them any command." Another interviewee indicated that, "Although we have in a lot of cases a lot of teams are now using the liaison officer as part of the command and general staff to give out information to NGOs, city, country, state officials for giving them information as to what we're doing. Uh, they're not involved in the planning process. They're not involved in making decisions or anything like that, at least not for the type of things we were doing, but we do provide them a lot of information." Only one interviewee, who is the director of a local volunteer group, told me he could participate in the ICS decision-making processes. According to him, "it [the participation of Unified Command] all depends upon the relationships. So, here in [the city his office is located], I'm very involved in planning, and I am invited to because of the reputation I've made. I'm invited to the emergency operations center and am involved with Unified Command. If I go to a different county where I have not built that relationship, I may not be invited in."

These discussions illustrate that volunteers are generally regarded as assisting groups during disaster response. They can be part of Incident Command System, but in many cases, members within this group are generally not considered part of the Incident Command. An operation section chief on a type one IMT expressed his concerns with working with volunteers as thus: "Volunteers that just come well intentioned they usually become more of a problem then help. There is no body vouching for them and nobody knows if they can even be trusted. They can be

criminals for all we know. Until we get the prospers and find out what their qualifications are they usually can be a lot of work." An IC explained how he managed a volunteer sandbag team as follows: "We would have one of our people go with them [volunteers] and then we would spend some time showing them how to do sandbagging although a lot of pictures show a lot of rehabs in sandbagging. And so that is how that happened we just enrolled them and put them in and created places for them to go, supervisors for them to report too, to incorporate them into the branch…And that was delegated down to the first level of supervisory person. So if the city employee that was supervising the volunteer group found someone that was working unsafely or didn't take direction. We would send them home. We discussed that because even through you are volunteers, you need to be absolutely cold blooded. If they are not doing what they are told to do, you cannot waste screwing around with them. So you deal with them briefly and then you send them home. You only have to deal with one or two of them. The rest of them figure it out." For the most part, though, volunteer groups do try to be responsible and maintain accountability at the scene. As a director of local Salvation Army branch told me: "If we had somebody who—if a person can't do the job in my case also represent the Salvation Army, then they will not be invited to volunteer again. Absolutely. I can't—you know—when we're out there feeding people, our job is to—is to care for the individuals coming to our canteen. And if somebody's having a personality issue they can't' resolve, if somebody's not working well with simple instructions, simple teamwork that's put in place, then they're not going to be able to serve the public well, and I can't' have them

there." Therefore, both the responsibility of overseeing and ensuring that volunteers adhere to overall objectives is shared by both the IC and volunteer group leaders, both of whom have the authority to halt any activities performed by volunteers if they deem that there is a problem.

Chapter Summary

In this chapter, I have introduced the methodological considerations for conducting these qualitative interviews. The results of my interviews demonstrate that the ICS is much more complex than what is presented in documents. Furthermore, when implemented on the ground, there are many decisions made by people that can shift this system towards being more mechanistic or organic in nature. I will further discuss the results of both my content analysis and qualitative interviews in the coming chapter, and will compare them to the conclusions, observations, and discussions that have been made in the past thirty years.

Chapter 5

DISSERTATION CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Introduction

In the last two chapters, I went over two different methodological analyses of ICS documents and the in-depth qualitative interviews that I conducted. I will present the results in this chapter and then compare them to the conclusions, observations, and discussions made in the past thirty years.

Generally speaking, qualitative interviews demonstrate that: 1) The nature of the ICS is far more complex than described in documents, and 2) the incidents that were studied influence people's evaluation of this system.

Based on the evidence collected, one can reach the following conclusions in this dissertation: 1) Future ICS researchers have to think about how this system actually is being used at the disaster scene, 2) Future ICS discussions should think about the different scales of disasters involved, 3) It is necessary to look at events of the same scale where different choices were made, 4) People need to understand the implementation of the ICS across all scenes and incidents, and 5) Future ICS research should treat the ICS as a new type of system.

At the end of this chapter, I will discuss some of the limitations of this research and provide suggestions for future ICS research. Specifically, I will go over the topic: Limitations of qualitative research.

Before I discuss the results from both my content analysis and qualitative interviews, I need to reiterate that the purpose of this dissertation is not to judge the usefulness or implementation of this system. The evidence collected only supports that this system is far more complex than what is described in documents and thus there is a need to discuss it more sophisticatedly.

The Nature of this System

This System has Both Mechanistic and Organic Design Elements

Results from both content analysis and qualitative interviews demonstrate that the ICS is not a merely mechanistic system. In many cases, this system incorporates both mechanistic and organic design elements.

Based on the documents analyzed in Chapter Three, 76% of the design elements in the ICS are mechanistic in nature while 24% are organic in nature. The most common ICS mechanistic design elements are "using pre-determined techniques to complete individual tasks" and "command and control." This phenomenon might explain why many ICS researchers (Neal & Webb, 2006; Neal & Phillips, 1995; & Wenger, Quarantelli, & Dynes, 1990) regard this system as a command and control (mechanistic) system.

However, the ICS is actually a hybrid system, as supported by results from the qualitative interviews. For instance, the purpose of setting up the Unified Command

(UC) structure at scenes is to enable "agencies [to] work together through the designated members of the UC…to establish a common set of objectives and strategies and a single Incident Action Plan (EMI IS-100b., p.12)." Within UC structure, however, there is usually one person who makes the final decision. Having contributions from various organizations is a characteristic of an organic system, but letting one person make the final decision is a fundamental feature of a mechanistic system. As another example, the ICS provides many guidelines to determine the span-of-control (DHS, 2008, p.47). However, many interviewees said that the determination of span-of-control is actually based on the situation itself. Again, using pre-determined techniques to complete individual tasks is a classical attribute of a mechanistic system, but making decisions based on the external environment is a characteristic that belongs more to an organic system.

The findings above demonstrate that the ICS is a system where elements from both mechanistic and organic systems actually intertwine to help shape and define this system. This fact supports Bigley and Roberts (2001; p.1297) and Moynihan (2007; p.6), who believe that the ICS is neither a pure mechanistic or organic system.

Consequently, the ICS is too complex to be categorized as a particular type of system (such as a command and control system). As mentioned in Chapter Two, many discussions, comments, and research revolving around the ICS over the last thirty years have centered on the mechanistic aspects of its structure and design elements. However, in order to better understand and analyze this system, it is necessary to pay more attention to ICS organic design elements, such as those involved with building

trust, consensus, and leadership. Evidence collected from my interviews show that trust and relationships are two important factors that glue together different organizations within the ICS structure. Moynihan (2007) also reported that building trust and relationships between participating response organizations were key behind the successful responses during both the Oklahoma City and the 9/11 Pentagon terrorist attack.

The Nine Decision Points

At the end of my Chapter Three, I have demonstrated that there are nine decision points that determine whether the ICS becomes more mechanistic or organic. These decision points involve: 1) the decision to use either a single IC or a UC, 2) the decision-making process, 3) whether pre-established rules are used to create new ICS branches or not, 4) how decisions regarding the setting up of new ICS branches are made, 5) how mid-level ICS leaders deal with unexpected problems, 6) the ability to modify the plan of action on the ground, 7) how ICS users interact with people from different backgrounds, 8) the amount of improvisation acceptable at the scene, and 9) the determination of ICS span-of-control. The choices made on these nine decision points can completely change the nature of the ICS from being more mechanistic to being more organic (or vice versa), and thus lead to different outcomes in disaster response.

As a result, the ICS is more complex than what has been previously believed. Each of the decision points can drive this system towards becoming more mechanistic

versus organic, so there are many variations when this system is implemented on the ground. This fact makes it hard for any definitive statements to be made regarding the nature of "the system," since there is so much variation in its implementation.

Also, since Harrald (2006), Neal and Phillips (1995), and Neal and Webb (2006) treat this system as a pure mechanistic system, they feel that the national response system should be redesigned to use an organic-oriented system instead. However, since this system is neither a pure organic nor mechanistic system, and is too complex to be judged from the standpoint of a single disaster, these authors might need to reconsider this system. For example, Neal and Webb (2006) had mixed up the concepts of "improvisation" and "freelancing." They thought that the ICS created a rigid structure that discourages responders from improvising at the scene (pp.276-277). However, the evidence collected in this research suggests that, although disaster responders do not freelance at the scene, they do improvise in order to achieve overall goals. Quarantelli (2002) had criticized the ICS as being a top-down, centralized system that emphasized command and control. In reality, though, all ICS leaders, however, are expected to "use positive feedback to modify duties, tasks, and assignments when appropriate (EMI IS-200b., p.2.21)." Results of the qualitative interviews also indicate that all ICS users do modify and change plans as necessary to achieve overall goals and objectives on the ground, and that these modifications and changes can be approved by ICS supervisors in different levels as long as they do not conflict with overall objectives.

The Incidents that were Studied

In addition to the disagreement on the nature of the ICS, another reason behind the different evaluations held by individuals toward this system can be attributed to the fact that most research is based on single incident and limited data. Moynihan (2005), for instance, had reached his conclusions regarding the ICS based on an extensive single case study on how responders used the ICS to respond to the Exotic Newcastle Disease (END). From his analysis, he concluded that the ICS was the primary model for managing emergency networks and was flexible enough to be adapted to different types of outbreaks (p.32). Although Bigley and Roberts (2001) observed fire department operations and interviewed many firefighters, they had focused primarily on routine operations. Despite their focus on small emergencies only, they concluded that the ICS was an ideal system even under extreme conditions (p.1282). Neal and Phillips (1995), in conjunction with a review of the literature in the Disaster Research Center, only collected data from two complex disasters, the Loma Prieta Earthquake and Hurricane Andrew. Based on their findings from these two large-scale incidents, they suggested that all emergency managers should not take the command and control approach (p.335). Furthermore, Neal and Webb (2006), who observed disaster response activities and interviewed many disaster responders during Hurricane Katrina, concluded from this single incident that the ICS was a firefighting system that may not be applicable at all times for managing other types of events, including large-scale catastrophes (p.278).

However, these findings do not mean that all of the conclusions made above are wrong. There are many factors and variations that can influence the implementation and outcomes of using this system. These findings only suggest that these authors might need to reconsider their conclusions and evaluations of the ICS. I will further discuss this topic in the next section, where I discuss some possible directions for future research.

Future Work

Need to Think about how System Actually is Being Used on the Scene

People at different levels of the organization and possessing different experiences and backgrounds have differing perspectives towards this system. Although I did not statistically test the relationships, people who worked in the Federal Departments implemented the ICS differently compared to those who worked in local governments. Disaster managers from the Federal Government, for example, tended to have less opportunities to work with local volunteers and NGOs, so they tended to have more difficulties working with them under the ICS structure, and thus tended to involve them less. Not only that, but personal experience also influenced one's understanding of the ICS. People who have responded to all types of disasters (Type One through Type Five, for instance) tended to be more aware of the limitations and difficulties of exercising this system. People who have never responded to a Type One or Type Two disaster were only aware of how this system worked for a single organization. Consequently, I suggest that future ICS researchers compare the different

perspectives of people who work at different levels of the government, possess varying types of experience, and who come from different backgrounds. Such research would help facilitate cooperation between various organizations within the ICS.

Need to Think about the Different Scales of Disasters Involved

Since I controlled for the scale of disaster in this research by focusing on mid-sized disasters only, another possibility for future ICS research is to replicate this research on different sizes of disasters to better understand the correlations between different scales disaster and the ICS structure. For example, the majority of my interviewees said that the determination of ICS span-of-control in mid-sized disasters is based on the situation itself. Future ICS research can explore whether people use the same principles to determine ICS span-of-control in either larger or smaller disasters. This research would help to clarify some of the disagreement underlying ICS debates over the past thirty years.

Need to Look at Events Where Different Choices were Made

I found nine ICS decision points that determine whether this system would take on a more mechanistic or organic nature on the ground. As a result, I suggest that future ICS research compare the results of how large of an impact varying a single decision point for the same disaster scale has. For example, people can explore the difference between using a single IC and the UC in two different mid-sized disasters, and then compare and discuss the possible pros and cons of making this decision. This

research will help people better understand the nature of this system, and also facilitate future ICS training and implementation.

Need to Understand the Implementation of the ICS Across All Scenes and Incidents

After we understand the impact of a single decision point on same scale of disaster, we can then further explore the implementation of ICS across all scenes and incidents. For instance, after we understand the effect of using a single IC versus UC in the mid-sized disasters, we can further compare the implications of this decision across all scales of disasters. As mentioned before, the ICS is a system where elements from both mechanistic and organic systems intertwine to help shape and define this system. Consequently, future research will need to collect more evidence to prove that ICS takes on a more mechanistic characteristic when dealing with small emergencies, and it becomes more organic when working with large disasters. Such a finding would echo to a fundamental principle in organizational theory: a mechanistic system is more suitable for dealing with routine situations, and an organic system is more appropriate for handling changing environments, and the relation of one form to the other is elastic, so that a concern oscillating between relative stability and relative change may also oscillate between the two forms (Burns and Stalker, 1972, p.253).

Need to Treat the ICS as a New Type of System

As mentioned before, the ICS cannot be categorized as either a pure mechanistic or organic system. Moynihan (2007) regarded the ICS as a hierarchical

network. Bigley and Roberts (2001) felt that the ICS was a highly reliable temporary system. One interviewee, who is a senior ICS user, supported this claim, stating that the major characteristics of the ICS matched up to the five characteristics of a highly reliable system. All the research and observations mentioned above indicate that future ICS researchers should not regard this system merely as a command and control system. Rather, ICS researchers should further explore the different organizational types and theories that might better account for the combination of both mechanistic and organic design elements present in the ICS. As Moynihan (2007) said: If we treat this system as purely one type of system or another, then we may reach a flawed conclusion (p.6). Conducting research with this understanding will help future researchers better grasp the nature of the ICS.

Limitations of this Research

I realize there are certain limitations of this research, and will discuss these limitations in the following section.

Limitations of Qualitative Research

Because this research was designed as a pure qualitative inquiry, I utilized purposive sampling methods to select documents and interviews. Therefore, the results of this research do not represent all perspectives toward the ICS. For example, I analyzed two official ICS documents and several online ICS training courses in this research. Although these documents are the primary and official resources for people who are interested in this topic, owing to the fact that the ICS has been implemented

differently compared to what is described in these documents (Cole, 2000 & Jensen, 2011), the ICS characteristics and how people implement this system as described in my dissertation do not represent the all situations in the United States or other countries using the ICS.

Limited Access to ICS Users

As a student, I had limited access to senior ICS users. Many disaster responders were unwilling to participate in this research. As I mentioned before, at the end of every interview, I requested my interviewee to recommend few ICS users for me to further my interviews. With the snowball sampling method used, it was hard to balance the amounts of my interviewees from upper and lower ICS supervisory positions. As a result, I had twenty-four upper-level ICS supervisors (such as the IC, Command Staff, or General Staff), but only had four interviewees from lower-level ICS supervisory positions.

This dissertation has illustrated the complexity of the Incident Command System and provided some possible directions for future ICS discussions and research. As mentioned before, future ICS research and discussions should be based on conducting scientific analysis and collecting empirical data of this system, or else it will be difficult to provide a fair justification of the effectiveness of this system.

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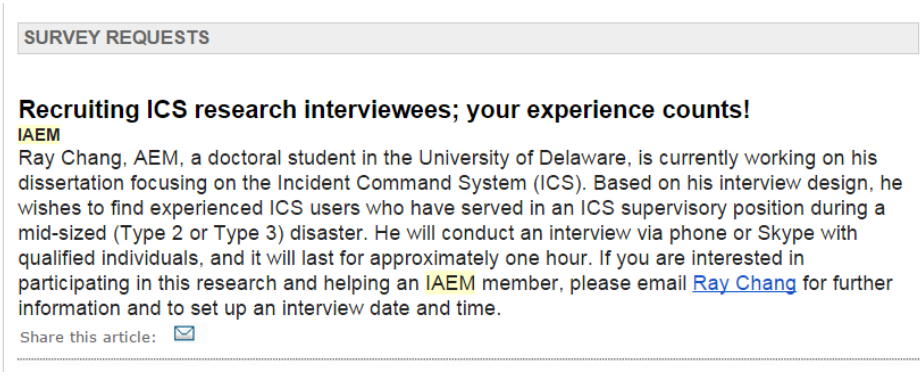
Appendix A

RECRUITING INTERVIEWEES ON THE IAEM DISPATCH (ISSUED ON 2/26/2015)



SURVEY REQUESTS

Recruiting ICS research interviewees; your experience counts!

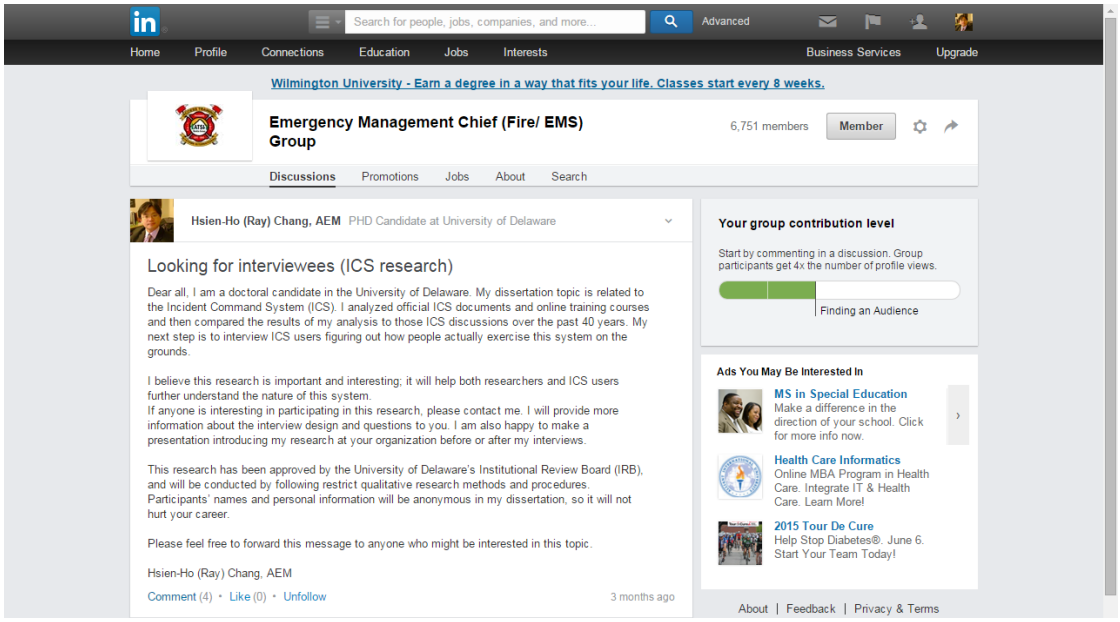
IAEM

Ray Chang, AEM, a doctoral student in the University of Delaware, is currently working on his dissertation focusing on the Incident Command System (ICS). Based on his interview design, he wishes to find experienced ICS users who have served in an ICS supervisory position during a mid-sized (Type 2 or Type 3) disaster. He will conduct an interview via phone or Skype with qualified individuals, and it will last for approximately one hour. If you are interested in participating in this research and helping an IAEM member, please email Ray Chang for further information and to set up an interview date and time.

Share this article:

Appendix B

RECRUITING INTERVIEWEES AT LINKIN.COM (AT 01/23/15)



Appendix C

QUALITATIVE INTERVIEW QUESTIONS

1. (This question is only for the interviewees who served as IC on the selected disaster) to get started I want to ask you about XYZ event. I want to know during that event were you the sole Incident Commander (IC) or were you part of a Unified Command (UC) team? How that decision was made? **(this interview question is to understand how people determine using a single IC or UC, which is the first decision point)**
    a. What were the driving factors that led to this? Did you ever consider doing the alternative set up? Why or why not?
    b. Same or different from other events
    c. What were the processes for making that decision at the scene?
    d. Would you please give me an example showing how you make decisions under the UC structure? **(this question is aimed to understand how people cooperate in the UC, which is the second decision point)**
2. How do you decide when to or not to activate branch, division, team, group, and etc. What are your criteria for deciding you actually need to use these structures? **(this question is aimed to understand how do people create new ICS branches, which is the third decision point)**

a. The ICS mentions if personnel or resources exceed a manageable span of control, ICS leaders have to create new branches. What is a manageable span of control? How can you determine it? **(this question is aimed to understand how do ICS leaders determine ICS span of control, which is the eighth decision point)**
b. Once you establish a new ICS branch, how do you decide who should lead it?
    i. Do you consider people out of your organization?
    ii. What skills do you look for serving as a leader in that new ICS branch?
    iii. What are most important traits to select new ICS leaders?
c. From you experience, this leader is selected from the original ICS hierarchy (promoted people from lower ICS positions) or outside communities (hired people from other groups that were not within the ICS structure)?

3. Can you explain to me how Incident Action Plan (IAP) works **(this question is aimed to understand do ICS leaders change the IAP during disasters, which is the fifth decision point)**
    a. Based on your experience, do you change the IAP?
    b. If you do, can you explain the reasons of changing the IAP?
    c. If you do not, how do you deal with those situations that are not expected before disasters? **(this question is aimed to understand how**

do ICS leaders allocate responsibility to resolve unexpected problems, which is the fourth decision point)

4. Based on your experience, do you think ICS users improvise at the scene? **(this question is aimed to understand do ICS users in response to disastrous situations, which is the seventh decision point)**
    a. If they do, can you give me an example of improvisation?
    b. If they do not, how do they deal with those situations that are not expected before disasters?
5. On the selected disaster, did you work with people from different organizations or backgrounds, such as the deputies or technicians? **(this question is aimed to understand how do ICS leaders work with people from different organizations and backgrounds, which is the sixth decision point)**
    a. If you did, did you give instructions to them or work with them on making decisions?
    b. Would you please give me an example of the above situation (instruct them or make decisions with them)?

Appendix D

THE APPROVAL LETTER FROM THE UNIVERSITY OF DELAWARE IRB

(PAGE 1)

RESEARCH OFFICE

210 Hullihen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: January 6, 2015

TO: Hsien-Ho Chang
FROM: University of Delaware IRB

STUDY TITLE: [657507-1] An analysis of Incident Command System (ICS)

SUBMISSION TYPE: New Project

ACTION: APPROVED
APPROVAL DATE: January 6, 2015
EXPIRATION DATE: January 5, 2016
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # *(6,7)*

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

Appendix D

THE APPROVAL LETTER FROM THE UNIVERSITY OF DELAWARE IRB

(PAGE 2)

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.

Appendix E

THE UD-IRB APPROVAL LETTER OF CHANGING INTERVIEW DESIGN

(PAGE 1

RESEARCH OFFICE

210 Hullihen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: March 4, 2015

TO: Hsien-Ho Chang
FROM: University of Delaware IRB

STUDY TITLE: [657507-3] An analysis of Incident Command System (ICS)

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED
APPROVAL DATE: March 4, 2015
EXPIRATION DATE: January 5, 2016
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # *(6,7)*

Thank you for your submission of Amendment/Modification materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

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Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

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THE UD-IRB APPROVAL LETTER OF CHANGING INTERVIEW DESIGN

(PAGE 2)

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.