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Abstract: Since the establishment of the incident command system (ICS), the debates of the effectiveness of using this system have never stopped. The majority of ICS debates can be related to the discussions of using a mechanistic system or an organic system in organisational theories. Consequently, I utilise the lens of organisational theory to review the ICS research and discussions over the past decades. After conducting an extensive literature review, I find three factors contributing to different evaluations of the ICS, they are: 1) disagreement on the nature of the ICS; 2) scale of disaster; 3) the implementation of the ICS. At the end of this research, I provide three future ICS research directions: 1) focusing on the nature of this system; 2) controlling the scale of disasters that are discussed; 3) further exploring how people really implement this system on the ground.

Keywords: incident command system; ICS; organisation theory; disaster response.

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Biographical notes: Hsien-Ho (Ray) Chang is an Assistant Professor in the Department of Political Science at the Oklahoma State University. He spent six years in a Taiwanese Fire Department as a Fire Battalion Captain and one year internship in the Phoenix Fire Department. His research interests include the development of theoretical foundations for the incident command system that incorporates his experience from both Taiwanese and American fire departments to strengthen the practical applications of this system.

1 Introduction

A serious wildfire that struck southern California in the 1970s revealed many problems with intergovernmental and multiagency cooperation and communication (Coppola, 2007, p.280). The wildfires also demonstrated an urgent need for a unified system to respond to disasters. Thus, responders from different wildfire relevant organisations, the majority of whom were fire officials, began to create a system to solve the problems they had encountered while fighting fires in the wild land. "*Because many of the 'fathers of incident command/management' had military backgrounds, they began to mold and modify military command and control structures learned [while] serving their country*

into systems that would allow their perspective agencies to better respond to those needing assistance in times of crisis" (Molino, 2006). Consequently, the systems created incorporated many military elements.

To overcome these difficulties, the California government set up a project called Firefighting Resources of California organised for Potential Emergencies (or FIRESCOPE) to create a new structure for responding to emergencies in the state. The goal of FIRESCOPE was to create a system that could respond to all types of incidents, not just wildfire responses. Although many fire officials joined this project, representatives from other relevant organisations − such as the California Department of Forestry and Fire Protection, the [California] Governor's Office of Emergency Services – also contributed with the US Forest Service to develop the system (FEMA, 2004).

FIRESCOPE identified basic concepts and frameworks for managing response activities in disasters, which led to the development of three "manifestations" of the incident command system (ICS), they are:

- The Wildfire Incident Command System (FIRESCOPE)
- The National Fire Academy (NFA) Incident Command System
- The Fire Ground Commander System (Phoenix Fire Department) (Molino, 2006).

All of the previous ICSs include the following elements (Buck et al., 2006, p.1):

> "standardized job descriptions with a training program for those positions; common terms for equipment and supplies; a structured chain of command from the specialist on the ground to the incident commander with unity of command emphasized and each person in the organization reporting to one boss; authority commensurate with responsibility, and task assignment made rationally to the person most qualified for the assignment regardless of rank in the organization; span of control limited to the number of people that one person can effectively control; sectoring of work to insure efficiency, effectiveness[,] and safety; finally ICS is based on the scalar principle, with its size and complexity depending on the size and complexity of the disaster or emergency incident to which it is applied."

After the devastating terrorist attacks on 11 September, 2001, President George W. Bush issued Homeland Security Presidential Directive-5 (HSPD-5), which mandated that the federal government develop a National Response Plan (NRP). The NRP and the National Response Framework (NRF) that was established in 2008 (FEMA, 2008b) tried to promote the abilities of disaster responders to deal with large-scale disasters, so the National Incident Management System (NIMS) was introduced. The core element of the NIMS is the ICS, which tried to build a unified command and communication system between different jurisdictions and governmental organisations.

The ICS was promoted bottom-up, from a local command system to a national one. Such a system required that "*not only would every state and local government be expected to establish an ICS-based system of emergency of disaster response, but […] [they were expected] to stay up to date and in conformity with the DHS-approved version of the ICS*" (Sylves, 2008, p.151). Thus, this system imposed most of the responsibility on to state and local governments.

Although the ICS has become a national policy of disaster response, debates over this system have never ceased. ICS proponents, on the one hand, appreciate the hierarchical structure the ICS created to manage disaster responders and resources. Critics of this

system, on the other hand, argued a hierarchical structure is insufficient to cope with complex disastrous situations. Consequently, both sides generate different evaluations toward the ICS, and thus encourage the disaster managers to utilise different types of response systems at grounds.

To understand why people have different evaluations toward a system, we will first review ICS literature in the next section.

2 ICS literature and discussions

As I mentioned previously, some ICS proponents appreciate its clear hierarchical structure to manage disaster responders and resources, but some ICS critics argue that the same hierarchy created by the ICS impedes this system to be used on complex disastrous situations. By looking at organisation theories, especially on the discussions and comparisons between a mechanistic system and an organic system, many insights and interesting discussions can be applied to discuss the effectiveness of using the ICS.

I will begin with introducing the mechanistic and organic systems on the coming section.

2.1 Organisation theory: mechanistic vs. organic systems

Burns and Stalker (1961) observed 20 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. Owing to its emphasis on structure and hierarchy, a mechanistic system is more suitable in stable environments where there are fewer changes and the majority of the organisational tasks are routine. In an organic system, on the other hand, relationships are less formalised and hierarchical compared to the mechanistic organisation. Consequently, an organic system is better suited to dealing with complex situations, where there are many unexpected events and thus a need for constant changes and improvisations.

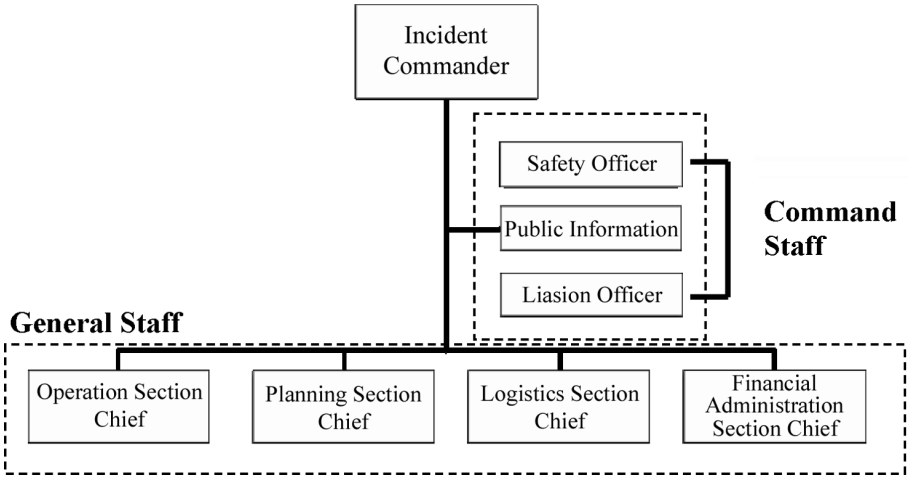
2.2 The basic concept of the ICS

The ICS is a standardised, on-scene, all-hazards incident management approach (FEMA, 2011) that:

- allows for the integration of facilities, equipment, personnel, procedures, and communications operating within a common organisational structure
- enables a coordinated response among various jurisdictions and functional agencies, both public and private
- establishes common processes for planning and managing resources.

Moreover, the ICS includes five major components: command, operations, planning, logistics, and finance. As incidents escalate to become disasters, three additional functional staffs, a public information officer, safety officer, and liaison officer would be added to assist the Incident Commander (IC). The structure of the ICS is shown below in Figure 1 (FEMA, 2008a):

Figure 1 The structure of the ICS



Some basic concepts of the ICS are:

1 The Incident Commander (IC) is required to orchestrate response activities.

  Before the ICS was created, one of the problems with responding to wildfires was unclear designation of authority (Molino, 2006). Practitioners indicated that determining an Incident Commander (IC) for all disaster response-relevant departments was difficult (Haddow et al., 2011; Moynihan, 2007). For example, dealing with a HAZMAT incident might require responders from the Department of Environmental Protection, Fire Department, Department of Transportation, and Police Department; in this situation, deciding who should be the IC could cause much confusion and conflict if these departments did not follow the ICS structure and could not reach any agreement before disasters happened. In the USA, in most cases, the local fire chief or fire commissioner became the designated Incident Commander (Haddow et al., 2011).

2 As a 'command'-based system, missions are assigned to division chiefs who then break out responsibilities to their staff members.

  The full name of the ICS suggests that it is a 'command' system. Although some similar systems and the National Incident Management System (which incorporates ICS as its core structure) use 'management' to replace 'command' to dilute the bureaucratic and military aspects of the ICS, this system – because of the way that missions are sorted out and then assigned and passed to the following staffs – is still regarded as a paramilitary system.

3 Responders use identical terminologies and integrated communication systems.

As mentioned before, the ICS was created to improve the cooperation and communication between different departments and organisations; consequently, having consistent terminologies and integrated communication systems are necessary. FEMA's Emergency Management Institute (EMI) lists common terminologies on the beginning of its ICS training manuals (EMI, 2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2013i, 2013j); unification of terminology can thus be regarded as the fundamental of utilising the ICS.

4 This system has been used for dealing with different types of disasters

Many of law enforcement, public works, and public health officials have regarded the ICS as a fire service system (Sylves, 2008, p.151). As I mentioned before, the establishment of the ICS had included the inputs from those people of different backgrounds. This system has also been applied in hospitals (also known as the Hospital Emergency Incident Command System), law enforcement agencies, and U.S. Coast Guard (such as the Exxon Valdez Oil Spill in 1989; Allen, 2010). The confusion of ICS as a merely firefighting system causes a backlash of irrational criticism when officials tried to promote this system to disaster management-relevant organisations (Kotter and Schlesinger, 2008).

5 ICS is scalable

In small incidents, responders can be assigned to fill more than one position in this system and the Incident Commander can determine how many functions and divisions are needed to respond to the incident. Molino (2006) mentioned: "*The specific organizational structure is established for any given incident and is based upon the management needs of that incident. If one individual can manage all major functional areas simultaneously, [then] no further organization is necessary*" (p.43). On the basis of Molino's understanding, the ICS is scalable; its structure will expand when disasters develop.

2.3 Criticisms and discussions about this system

Since ICS had been introduced to the world of emergency management, many researchers and practitioners have provided a multitude of comments and criticisms about this system. The following paragraphs will introduce some of the major criticisms (the majority of which are from academia) in conjunction with some supportive comments (many of which were given by practitioners).

2.3.1 The conflicts between hierarchies and networks on the ICS

Hierarchy is important on communicating risk in disaster environments (Comfort et al., 2010, p.37). When decisions must be made on an hourly or daily basis, a hierarchy is needed (Moynihan, 2008, p.211). ICS users (Cole, 2000; Goldfarb, 1997) also point out that ICS hierarchical system is necessary to manage disaster resources and personnel, because the ICS hierarchy establishes a clear chain of command and thus decrease some possible confusion between response organisations.

However, organisational theorists believe hierarchy alone is not enough to integrate the many activities defined by the division of labour, especially as the organisation grows in size and complexity or copes with high levels of uncertainty or interdependence (Hatch, 1997, p.166). Quarantelli (2002) also found coordination rather control is needed when dealing with disasters. Combining Hatch and Quarantelli's observations, one can possibly assume that as the incident expands and more and more organisations and departments join in the command hierarchy, horizontal only cooperation might cause a serious problem in the ICS system.

The main issue is that the hierarchical command system is good for dealing with incidents involving few response organisations; however, when dealing with large-scale disasters, networking systems are required. Lagadec (1990) mentioned that larger crises require more resources and skills, which necessitates a larger and more diverse network. A network-based type of response also helps responders to cope with operational uncertainty, the one certainty in all crises. Thus, it is not only important but also necessary to add structural elements of a network into the ICS as well.

Consequently, at its core, the ICS was designed as a hierarchical structure, that would assume network-like features with increasing severity of the disaster. Moynihan (2007) describes the features of both as follows: "*Hierarchies tend to be viewed as rigid and based on formal controls. Networks tend to be seen as fluid and based on relationships. […]An ICS is neither a pure network nor a pure hierarchy, but it combines elements of both*" (p.6).

Since the ICS has a hierarchical management structure, there should be one person (the Incident Commander, IC) or a group of people (the Unified Command) sitting at the top of whole hierarchy. Research shows that determining an IC is a challenge for ICS users (Moynihan, 2007). I will further discuss this challenge on the next section.

2.3.2 The conflicts on determining the incident commander (IC)

As mentioned before, determining who should assume the responsibilities of the IC is always a cause for conflict and confusion. Because many natural and man-made disasters threaten human lives, it is unrealistic and impossible to require one person to become familiar with how to deal with all disasters as the incident commander, "*given the lack of information, conflicting and incorrect rumors, and diversity of the many groups involved in such situations*" (Quarantelli, 2002).

Moreover, ICS assumes that the Incident Commander is the officer who has the highest rank and is the most experienced in terms of managing disasters at the scene. However, a department leader does not necessarily have the most experience. Consequently, in many cases, department leaders would instead assign an experienced officer to fill in this position. Goldfarb (1997), a retired deputy fire chief from the Fire Department of New York (FDNY), raises issues related to this phenomenon in his paper: "Officers senior to or ranking higher than the incident commander are at the scene but not acting as the IC. […]Who are they going to hang if something goes wrong? Who is the most senior, knowledgeable, and experienced person on the scene?"

These questions from Goldfarb reflect the difficulties and confusions in determining the IC when utilising ICS. Because this system was constructed as a paramilitary one, the founders of this system might have failed to consider that in some occasions and organisations, promotions are not based on working performance and experience.

This aspect is especially true in departments in which leaders have been nominated politically and in non-governmental organisations and volunteer groups. In these types of organisations, ICS might not work well in terms of assigning the incident commander.

2.4 The benefits of implementing the ICS

ICS provides many solutions to problems in responding to wildfires in California. Because wildfires share many common elements with other disasters, both in terms of complexity and scope (Molino, 2006, p.8), the concepts and structures of the ICS have been comprehensive in terms of dealing with the questions that arise during the course of many disasters. Practitioners have indicated that the ICS provides a complete structure in terms of planning and responding to disasters, consistent terminologies, and a manageable span of control. The following paragraphs will discuss in detail the merits of utilising the ICS to manage disasters.

2.4.1 ICS creates a complete structure on planning and responding to disasters

ICS separates the disaster commanding mission into five categories (as shown on the Figure 1). A division chief is assigned to each category, and then he or she can further subdivide the tasks between subdivision chiefs to complete the necessary functions. This design provides a reasonable and logical framework that allows incident commanders to expand response activities as necessary. Consequently, the ICS structure provides a blueprint for managing disasters that allows incident commanders to assign tasks and positions to their staff members.

Moreover, the ICS provides templates for managing disasters to other organisations that lack experience in responding to disasters. Following the ICS structure, one can easily tell that disaster response includes some specific function, each of which has particular missions that needs to be completed. These templates also benefit departments on planning their disaster management strategies and organisations. Since positions and missions are listed on the ICS format, they can be considered in advance.

2.4.2 The ICS provides unified terminologies

Before the implementation of the ICS, disaster responders utilised different terminologies associated with their professional fields. When they responded to small and local incidents, which involved few disaster response-relevant organisations, responders did not encounter many communication problems. However, in large-scale or state wide disasters, responders from different departments and jurisdictions have to work hand-in-hand; problems associated with using different terminologies to apply to the same thing or similar terms with different meanings became extremely apparent, and much confusion arose.

An example provided by Molino (2006, p.38) illustrates this point. When emergency medical technicians (EMTs) and police officers responded to a gunshot emergency, the police officer who went on scene declared it ‘secure’. EMTs thought that this word meant the perpetrator was no longer a threat in the area. However, in police speak, ‘secure’ mean that they had surrounded the perimeter to prevent anyone from entering or exiting without police knowledge of their presence. Another example includes the word ‘clear’, which has different meanings in military and law enforcement agencies.

Additionally, some slang terms have opposite means in different organisations, and the same apparatus might have different names in different jurisdictions. ICS unifies these terminologies to improve disaster communications.

2.4.3 The ICS provides a manageable span of control

One of the problems the California government confronted in responding to wildfires was that "*too many people were reporting to one supervisor*" (Gallant, 2008). An overly wide span of control not only led to redundancy but also confusion when it came to transferring information. As a result, it also jeopardised responders' safety. The ICS span of control can be ranged from three to seven subordinates under one supervisor (FEMA, 2008a, 2008b, p.3; EMI, 2013a, p.3.29, 2013i, p.2.35, 2013e, p.3-37), one to five responders under a person (DHS, 2008, p.97; EMI, 2013a, p.3.29, 2013e, p.3-37), or up to 10 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, 2013a, p.3.29). Consequently, "the ICS organisational management is directly correlated with the size and complexity of the incident" (DHS, 2008, p.97). Also to strengthen personnel accountability and safety, as a disaster expands, an extra safety officer should be assigned to the command post.

2.5 The shortcomings of implementing ICS

After 9/11, research on the National Incident Management System (NIMS) and the ICS became popular. The majority of these research papers point out ICS is weak in terms of encouraging interdepartmental cooperation. There are some practitioners, on the contrary, who think that ICS strengthens cooperation and communication between different departments, but practitioners and researchers alike agree that the ICS is weak in terms of integrating volunteer and non-governmental organisations. Furthermore, the consensus is that participants in the ICS need education and to perform exercises in advance for optimal functioning of the ICS. Two of the major debates on ICS will be discussed in this section; other debates – such as ICS only being good for dealing with large-scale disasters but not daily response activities, or that the ICS was created from the aspect of firefighters only – are more the result of misunderstanding and bias, and can be easily corrected if we review the history of the development of the ICS.

2.5.1 The ICS is weak in terms of working with volunteers and NGOs

Both scholars and practitioners have indicated that the ICS is weak in terms of promoting cooperation with volunteer and non-governmental organisations (NGOs) (Buck et al., 2006; Jensen and Yoon, 2011; Molino, 2006; Moynihan, 2007; Sylves, 2008). The critical problem is that the ICS tries to build a hierarchy for command responders on disaster scenes. As more departments join disaster response activities, a network organisation must be established to orchestrate all responders. Researchers have concluded that, as it stands, the hierarchical and networking structures are incompatible. Others like Alter and Hage (1993) claim that "*a basic normative characteristic of networks is that they are not hierarchical, relying on lateral linkages and self-regulation*"

(p.78). Indeed, networks are praised for avoiding the very pathologies associated with traditional hierarchies (Moynihan, 2008). Owing to the lack of hierarchical structure, both of the ICS and NIMS were not well-received by either responding volunteer fire chiefs or volunteer firefighters in North Dakota State (Jensen and Yoon, 2011). Consequently, the ICS did not work very well when taking into consideration volunteer and non-governmental groups, which do not have hierarchical structure of management.

2.5.2 New disaster responders have difficulties to successfully implement the ICS at scenes

On the basis of Moynihan's (2007) case study, one of the keys behind the successful response to the 9/11 attack on the Pentagon by the Arlington County Fire Department (ACFD) was that its members were familiar with the concepts and ideas of the ICS (p.25). As the assistant fire chief in ACFD, James Schwartz, the initial Incident Commander on Pentagon terrorism attack in 2001, stated: "*We've done it [ICS] with the recognition that if we didn't do it every day on everything we go to, we would never do it for the big one. Or we'd never do it well for the big one*" (Varley, 2003). The 1995 bombing attack in Oklahoma City is another example. The city's disaster response-relevant department leaders had just finished the ICS trainings from the Emergency Management Institute one year before the terrorist attack, so they were able to deal with this large-scale disaster quickly and smoothly (MIPT, 2002).

Besides, Buck et al. (2006) and Moynihan (2007) identify that trust and emotional connection are important when responding to disasters with the ICS structure. The close personal relationships between the ACFD chiefs and other department leaders, for instance, contributed to the successful response to the 9/11 Pentagon attack. Because they had participated in ICS exercises together and thus knew each other well, the Incident Commander could choose officials from other fire and rescue departments to take up key positions; which avoided assigning only fire officials to run the ICS and therefore increase the inter-departmental cooperation. Following the same train of thoughts, FEMA failed in its response to Hurricane Katrina in part because many senior managers had left FEMA in the months and years before, which removed the long-term relationships that existed between these experienced managers and state responders (Moynihan, 2007, p.27). As a result, Buck et al. (2006) regard establishing relationships between ICS users as one of the pre-conditions of successfully implementing this system at scenes (pp.11, 12). Consequently, in some civilian organisations, because the leaders do not have shared experiences and training with their staff members, this system might not work well.

3 Analysis

The previous discussions of the benefits and shortcomings of utilising the ICS can be connected to Burns and Stalker's (1972) observation of a mechanistic system, which creates a clear hierarchic structure of control, authority, and communication to govern all employees. Using a mechanistic system is appropriate in stable conditions. In changing environments, which include fresh problems and unforeseen requirements for action

that cannot be broken down, they suggest to utilise an organic system; which creates a network structure of control, authority and communication, emphasising more cooperation between all employees (pp.250–252).

Although many ICS discussions (Neal and Phillips, 1995; Neal and Webb, 2006; Quarantelli, 2002; Wenger et al., 1990) can be associated to the pros and cons of using a mechanistic system, after conducting an extensive multiple case study, Moynihan (2007) concludes the ICS has both hierarchy and network characteristics. His descriptions of hierarchy system are similar to a mechanistic system that utilises 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 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). Buck et al. (2006) review several disastrous cases and report the command and control and coordination are not controversial systems, but they can coexist (p.15). Bigley and Roberts's (2001) research on the ICS also demonstrate that the ICS is a system combining both mechanistic and organic design elements. Therefore, Moynihan (2007) suggestion of treating ICS as a solely mechanistic system might lead to a misdiagnosis of management issues (p.6).

Using the lens of organisational theory; we can find that individuals have different perspectives toward the ICS owing to:

- disagreement of the nature of the ICS
- the scale of disasters
- the implementation of ICS.

I will discuss all of them in the following sections.

3.1 Disagreement on the nature of the ICS

On the basis of the previous discussions, both ICS proponents and critics are concerned with certain characteristics. Connecting these characteristics to organisation 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 et al., 1990). The hierarchy of authority reflects the distribution of authority between different positions within the organisation; consequently, each position within a hierarchical organisation 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 utilise authority to influence their subordinates and this influence is exercised via downward communication. Therefore, in a hierarchical organisation, everyone, except for the person sitting at the top of whole organisation, 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 organisation (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 et al. (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 organisations. 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 not 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 offers 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. On the basis of 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 organisational 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). The previous 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 organisations 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, 2008a, p.17)." The UC thus utilises 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 over the exact nature of the ICS or, more specifically, over what degree the ICS is mechanistic or organic.

3.2 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 et al., 2006; Moynihan, 2005, 2007, Neal and 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 the 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. For example, 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 (2000) research is different from 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 organise 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). Since Cole and the majority of the participants of his surveys have firefighting backgrounds, his conclusion and favourable outlook towards the ICS are possibly 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 et al. (1990) researched eight large disasters, and they suggest 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 centralised and bureaucratic (mechanistic) system to manage an organisation (Hatch, 1997, p.172). Consequently, when discussing the ICS, it is very important to consider the scale of disaster involved.

3.3 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 et al. (1990) researched eight disasters and observed that this system was used in different ways by various organisations. Neal and Webb (2006) reported that, during Hurricane Katrina, even different levels of governments used this system differently.

Firstly, every organisation has its own culture, so it is very hard to set up a system to coordinate between different organisational cultures. Wenger et al. (1990) observed that many private and some public organisations did not like to be incorporated into the ICS structure, where they would be seen as subordinate to the incident commander (p.9). Buck et al. (2006) thought that, while the ICS could coordinate the activities of well-trained and integrated communities of first responder organisations 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 organisations.

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 organisations throughout the state of Ohio regarding their acceptance and utilisation of the ICS. Although the majority of ICS

trainees thought that basic ICS training was beneficial to all personnel within their organisations, a large number of people in a variety of organisations still did not accept ICS concepts. Nearly all of public works participants surveyed, for example, reported that they either seldom or never utilised ICS principles in day-to-day operations (p.227).

These discussions demonstrate that different organisational 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.

4 Conclusions and future research

In this research, 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. As a result, I suggest future ICS research and discussions can focus on

- clarifying the nature of the ICS
- controlling the scale of disasters that are discussed
- further exploring how people really implement this system on the ground.

First of all, since organisational theories and some disaster researchers have demonstrated that the ICS is a system combining both mechanistic and organic design elements, future research can further explore to what degree is the ICS mechanistic or organic. Researchers are suggested to conduct contend analysis (Patton, 2002, pp.452–471) to review the official ICS documents and ICS online training courses. By connecting each ICS design element to the concepts developed from classical definitions of mechanistic and organic systems, one can better understand how mechanistic or organic is the ICS.

Also, since people discuss the ICS from different scales of disasters and therefore contribute to different evaluations of this system. Researchers are suggested to control the scales of disasters that are discussed on the context. The Department of Homeland Security has categorised disasters as five types (Table 1; FEMA, 2006, pp.2–19, 2–20); this table provides a basic picture of different scales of disasters in the USA.

Finally, future ICS research can further explore the implementation of this system. As I mentioned previously, different organisational cultures, insufficient ICS training, and unwillingness to adopt the ICS in routine operations are major factors that impede the implementation of this system. Consequently, researchers are suggested to conduct surveys, qualitative interviews (Rubin and Rubin, 2005), or on-site observations (Patton, 2002, pp.259–332) to understand how people actually exercise this system on the ground. The results of ICS implementation research will benefit future ICS training, implementations, and possible revisions.

Table 1 The incident types

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 1000. • 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 organisation 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.
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.

Table 1 The incident types (continued)

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.

Source: FEMA (2006, pp.2–19, 2–20)

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