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THESIS

**COMMAND RESILIENCY:
AN ADAPTIVE RESPONSE STRATEGY
FOR COMPLEX INCIDENTS**

by

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September 2005

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COMMAND RESILIENCY:
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ABSTRACT

Many organizations believe they are prepared for the next terrorist event by wrongly assuming there is a predictable threat that can be managed with the purchase of new equipment. Unless organizations develop a resilient response strategy that can adapt organizational and operational elements to respond to new terrorist incidents, they will find themselves with the same difficulties emergency responders did on 9/11. As terrorist attacks unfold, organizations are pushed beyond their normal capabilities. How quickly organizations adapt to the uncertainty of a new crisis is critical. Organizations that cannot adapt to new threats of large, complex terrorist events will be less likely to respond effectively to future attacks.

This paper recommends a resilient response strategy that is flexible enough to adapt to complex incidents. It proposes policy recommendations that address organizational strategy and operational crisis management to deal with the initial critical hours of a terrorist attack. Organizational strategy defines core competencies and what happens when competencies are pushed beyond their capacity. Operational crisis management will examine situational awareness requirements, flexible decision-making and innovation. Command resiliency is achieved by overcoming organizational bias and integrating organizational preparedness and operational adaptability into a synergistic response network.

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TABLE OF CONTENTS

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LIST OF FIGURES

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EXECUTIVE SUMMARY

Many organizations believe they are prepared for the next terrorist event by wrongly assuming there is a predictable threat that can be managed with the purchase of new equipment. Unless organizations develop a resilient response strategy that can adapt organizational and operational elements to respond to new terrorist incidents, they will find themselves with the same difficulties emergency responders did on 9/11. As terrorist attacks unfold, organizations are pushed beyond their normal capabilities. How quickly organizations adapt to the uncertainty of a new crisis is critical. Organizations that cannot adapt to new threats of large, complex terrorist events will not respond effectively, risking loss of life to first responders and the people they protect.

Analyzing the key elements needed during the World Trade Center attack on 9/11 will provide insight into how organizations must adapt to new terrorist incidents. Three methods are used to do this analysis:

- Research of the accounts describing the events of that day.
- Discussions with commanders on how they had to adapt normal procedures to command this complex terrorist event.
- Review of existing literature that supports the conclusions gathered from above.

The author will recommend developing command resiliency that is durable and flexible enough to adapt to terrorist attacks and propose policy recommendations that will address organizational strategy and crisis management to deal with the initial critical hours of a terrorist attack. These policy recommendations will include developing a strategy that defines:

Organizational Preparedness

- Core Competency Capabilities – defining the essential roles of an organization.
- Outstripping Capacity – understanding the breaking point of capabilities and anticipating innovative change.

Organizational Bias

- Understanding how organizational bias influences emergency responders
- Understanding how to eliminate organizational bias and develop organizational dependency and synergy

Operational Adaptability

- Dynamic Planning – using multi-dimensional threat scenarios for preparedness
- The Power of Situational awareness – seeking, exchanging and sense-making of information to maintain a common operational picture
- Flexible Decision-Making – making decisions under stress and uncertainty
- Adaptive Innovation – developing organizational, operational and technological solutions

Integrating Command Resiliency

- Anticipating risk and developing resiliency
- Developing a synergistic response network

Organizations must constantly evaluate the effectiveness of their structure and performance as it relates to a dynamic threat environment. Forward-looking strategies that help anticipate change that might occur after a crisis, but can be implemented before another crisis are critical. Leaders must move beyond traditional reactive behavior by anticipating resiliency and adapting to a changing threat environment for managing complex incidents.

I.   INTRODUCTION

On September 11, 2001, at precisely 8:46 a.m., I watched our world change forever as American Airlines Flight 11 aimed and crashed into the North Tower of the World Trade Center.

The attacks on 9/11, particularly those on the World Trade Center (WTC), forced organizations to consider their strategic homeland security role. Typically, many organizations have relied on preventing future incidents or on acquiring new equipment for chemical, biological or radiological attacks. While these initiatives are necessary they are not sufficient for developing an effective response. Organizations responding to disasters or terrorist attacks must develop a level of command resilience that enables them to cope with unanticipated dangers and adapt quickly to the changing dynamics of the crisis at hand. Organizations need to foresee when emergency responders will be stretched beyond their capacity, develop resilient capabilities for managing unpredicted risks after they have become manifest and learn how to bounce back during the complex incident.[1] Rather then relying only on expected scenarios for preparedness, command resiliency is the ability to mitigate developing dangers.[2]

This paper will outline policy recommendations that address organizational strategy and operational crisis management procedures for dealing with the initial critical hours of a terrorist attack. An organizational approach explores what happens when those traditional emergency responder capabilities or core competencies are pushed beyond their capacity, prompting a need for innovation. Operational crisis management requires an adaptive framework for situational awareness and flexible decision-making across the emergency responder community. Integrating both organizational and operational approaches requires surmounting organizational biases to develop a unified response network.

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[1] Aaron Wildavasky, *Searching for Safety*, (New Brunswick: Transaction Books, 1988), 77.

[2] Karl Weick and Kathleen M. Sutcliffe, *Managing the Unexpected*, (San Francisco: Jossey-Bass, 2001), 69.

This paper analyzes how organizational core competencies and systematic social biases affect information-sharing and decision-making when organizations are stretched beyond their capacity by the shock and stress of a terrorist attack. This paper is divided into four main sections:

- Chapter II defines an organizational framework for an adaptive response strategy by examining four concepts that run throughout the paper—core competencies, organizational breaking points, situational awareness and flexible decision-making.

- Chapter III investigates the 9/11 response at the World Trade Center in terms of information-sharing and decision-making.

- Chapter IV analyzes how organizational bias influenced emergency responders and what is needed to overcome this systematic shortcoming in emergency response.

- Chapter V focuses on a need for dynamic preparedness for complex incidents. Dynamic preparedness anticipates potential weakness in response and identifies opportunities for transformation. It also defines adaptability as the capacity to withstand the surprise of terrorism by remaining flexible to new information and the readiness to be innovative in adapting to the cumulative stress of an incident.

Four years after the September 11th attacks, we are left with many stories and memories of that day. Yet, even given the significant amount of reporting, there is much more to learn from these events. This paper attempts to put a face on the extreme complexity of that day and the challenge of preparing organizations for the next terrorist attack. Analyzing the key elements of the World Trade Center response on 9/11 will provide insight into how organizations adapt to complex incidents. This paper will identify the skills and capabilities needed during the first couple of hours of an attack, based on an analysis of information gathered from years of discussions with fire commanders who have had to adapt normal procedures to manage complex, multiple-rescue operations.

Analyzing the World Trade Center response may give us the greatest opportunity to prepare emergency response organizations for saving lives in the future. Effective crisis management requires foreseeing organizational breaking points and making necessary changes for resiliency prior to an incident. It also requires that leaders be able to adapt to unexpected situations and develop a unified response system robust enough to

manage complex incidents. Combining anticipated risk analysis with adaptive response strategies leads to command resiliency.

Given the dynamic and serious terrorist threat, emergency response organizations must develop the ability to withstand the cumulative stress of multiple events. Without this type of organizational engineering, these organizations will fall short of providing critical services during complex terrorist attacks. Organizations that are willing to adapt to these new threats not only will respond more effectively—saving more lives—but also create a greater level of protection for emergency responders.

A. DEFINING THE CHALLENGES

The events of September 11, 2001, challenged emergency response organizations in entirely new ways. During the first couple of hours of the 9/11 attacks, emergency responders in New York City, Washington, D.C., and Pennsylvania had to adapt operating procedures to deal with unfolding events. The New York City Fire Department (FDNY), in particular, was faced with multiple terrorist attacks that caused fires and emergencies on an incomprehensible scale. While standard operational procedures provide a framework to operate within, they proved insufficient to meet the challenges of that day. The magnitude of the crisis forced emergency response organizations to adapt their response to deal with the extreme complexity of the unfolding events.

This analysis mandates that incident commanders and crisis managers must prepare for critical decision-making roles and develop the appropriate capacity for innovation and change. Many organizations believe they are prepared for the next terrorist event by wrongly assuming there is a predictable threat that can be controlled with the purchase of new equipment. However, equipment alone will not address the issue of preparedness. Unless organizations develop a resilient response strategy that can adapt organizational and operational elements to effectively respond to new terrorist incidents, they will find themselves with the same difficulties emergency responders did on 9/11. As terrorist attacks unfold, organizations are pushed beyond their normal

capabilities. The speed with which these organizations are able to adapt to the uncertainty of a new crisis is critical for saving lives and protecting emergency responders.

Despite the best efforts of homeland security and defense, it is impossible to know if we are any safer today than we were 9/11. Much attention has been paid to counterterrorism throughout the world, yet Madrid and London witnessed their own terrifying attacks, with hundreds killed and injured in similar transit system attacks. These attacks paint a clear picture that the terrorist threats remain very real.

Many observers overlook the extent of the uncertainties surrounding the current terrorist threat. The details of the 9/11 attacks have become so ingrained into our perception of preparedness that we do not stop to consider the potential of the next attack. For instance, the emergency response community has adapted their response to better deal with the "plane crashing into a building scenario" and, as a result, may have a false sense of confidence that they have acquired the necessary skills to manage the next attack. However, the reality is the next attack is not likely to look like the last one. Military historians often lament the tendency of generals to rely on after-action reports to prepare personnel for future actions, in effect preparing them to fight past battles, not future ones. This phenomenon is happening in many emergency response organizations. Emergency responders may have become overconfident by becoming familiar with the details of the World Trade Center or the London attacks—not realizing no two attacks are the same.

Considering these challenges, crisis managers and strategic planners must make decisions for the future in the midst of tremendous uncertainty. We do not know who the next terrorists will be, when or how they will strike or on what scale. The countless unknowns create an environment of uncertainty for emergency responders. This paper will explore these new challenges by asking what organizational model is needed to design emergency response strategies that can adapt to the developing demands of complex incidents.

Emergency response organizations must not let crisis preparedness distract them from attending to their daily responsibilities. This is a difficult balance that requires

careful analysis and forward-looking vision. Despite the threat of terrorism, organizations must continue to perform their daily activities of firefighting, law enforcement and emergency medical services. Therefore, strategic planners must develop a strategy to prepare for both their core missions and new terrorism preparedness mandates. Since cities do not have the luxury of creating stand-alone terrorism response forces, emergency responders will need to efficiently utilize limited resources to build resiliency and strategically integrate their skills into organizational plans to meet both core and terrorism preparedness duties.

Emergency response organizations must consider whether they need to reinvent themselves. In reality, most emergency response organizations already have the key skills necessary for a terrorist response. Although the nature of any given terrorist attack is unpredictable, terrorist incidents ultimately will result in a fire, hazardous material release, structural collapse and/or medical emergency. Therefore, to meet the preparedness requirements for terrorism, fire, law enforcement and emergency medical services, first responders can build upon existing skill sets and adapt to new threats, essentially enhancing their level of proficiency in their core competencies.

Given the existing established skill sets of various emergency responder agencies, defining a distribution of work among agencies within the framework of these possible terrorism incidents is essential. The *National Preparedness Guidance* speaks of sharing preparedness responsibility through collaborating planning efforts and resources.[3] Planning based on capabilities permits specialization by agencies based on one's unique skills or core competencies. This willingness to collaborate preparedness efforts avoids costly duplication of services and gaps in response capabilities.

The first hour after an attack is the most critical period of response to most terrorist incidents. The skills assembled in this first hour define an organization's core competencies. Skills brought after this initial stage provide only core support. It is during the initial period that fires and hazardous material releases are mitigated most easily, rescues are made, emergency lifesaving measures are most effective, secondary devices are found, evacuation is controlled and the public is protected. Understanding

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[3] Department of Homeland Security, *National Preparedness Guidance (*Washington, D.C., 2005).

the limitation of an organization's capability and capacity in terms of the first hour of an incident will regulate the true distribution of work for emergency responders. Homeland Security planning efforts, however, rarely look at what capabilities are brought to the scene in the first hour.

Terrorism is fundamentally a strategy of surprise; terrorists continue to emerge in new areas of operation and rapidly adapt to changes in security. While Homeland Security efforts would like us to believe that we can anticipate the next attack, experience has shown that the next attack most likely will come as a surprise. Emergency responders must recognize that the problem lies mainly with how we manage the effects of the surprise, rather than in the fact that we were surprised.[4] Emergency response agencies, therefore, must build enough organizational and operational resilience to effectively manage the next generation of terrorist attacks. The WTC attacks give us insight into the most critical preparedness areas needed for the future. They reveal the problems and opportunities for dealing with the unexpected and the complex. This paper will explore those critical areas and make recommendations, not from the viewpoint of an outsider, but rather from the perspective of an insider who was a part of the command structure on 9/11 and who understands the true importance of command resiliency.

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[4] Colin S. Gray, *Transformation and Strategic Surprise*. (Carlisle, Pa.: Army War College, Strategic Studies Institute, April 2005), 27.

II. ADAPTIVE RESPONSE FRAMEWORK

As fire units entered the World Trade Center, it appeared as if we were stepping into a war zone. The damage in the lobby was extensive. Untold numbers of people were severely injured and trapped. Seventeen minutes later, a second plane crashed into the South Tower. We were faced with one of the largest rescue efforts of any fire department in the world.

The aim of this chapter is to develop an organizational framework for commanding large-scale, complex incidents. This requires four overarching elements:

- Leverage core competencies or unique capabilities that distinguish one organization from the others.

- Consider what happens when these capabilities are pushed beyond organizational capacity as agencies are forced to bear the effects of the cumulative stress of a terrorist attack.

- Define information-sharing requirements to retain situational awareness.

- Develop flexible decision-making to consider the unexpected.

A. LEVERAGING CORE COMPETENCY

The events of 9/11 illustrated that emergency responders' ability to respond to acts of terrorism is inextricably linked with their ability to respond to traditional firefighting, law enforcement and medical emergencies. Capabilities that are unique to each of these agencies are referred to as core competencies. Core competencies are evaluated for three elements:

- Capabilities—unique skills that an organization performs.

- Capacity—how many resources or trained personnel an agency has.

- Proficiency—how well an organization performs each task.

What makes these elements of core abilities distinctive for an organization is the inability of other organizations to easily duplicate the same tasks.[5] For example, an organization may have some members who are paramedics; however, this does not give

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[5] John M. Bryson, *Strategic Planning for Public and Nonprofit Organizations*, (San Francisco: Jossey-Bass, 2004), 375.

them the core competency of pre-hospital care. The FDNY recognized that rather than adding core competencies for specific counterterrorism skills, their existing core competencies to respond to fire, medical, hazardous materials and structural collapse emergencies could be employed to respond effectively to terrorist events, both conventional and unconventional.

Emerging within the terrorism preparedness context is a disturbing trend of imbalanced capability building among emergency response organizations. Rather than building the capacity and proficiency of existing capabilities, many groups are redefining their missions in terms of the terrorism threat. To meet new Homeland Security demands, many organizations are adding new tasks that extend beyond their core competencies, a process that has inherent complications. For example, emergency responders who previously had only a peripheral role in hazardous materials response incidents now are training as the primary response force for chemical, biological, radiological, nuclear and high-yield explosives (CBRNE) threats.[6]

Establishing the competency for an effective response to these incidents requires a familiarization with new detection equipment and a thorough understanding of complicated information about the threat environment, as well as complex procedures to mitigate the hazard. These skills mandate an enormous amount of training that is perishable if not used often. The new equipment alone generates additional maintenance and inspection tasks that must be performed by organizations already operating with limited numbers of personnel. These dynamics add a host of logistical stress to an organization, which can prevent it from concentrating on effectively performing their core mandates for providing essential services.

Today's environment of robust federal Homeland Security funding has encouraged too many city organizations to adopt competitive positions, rather than cooperative ones. Vying for funds to increase their individual organization's perceived ability to respond to terrorism not only cheats cities of an optimally resilient emergency

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[6] Law enforcement now is performing hazardous material assessment which is a core competency of fire departments. In New York City's protocol for emergency response, *City Incident Management System* (New York City: April 2005), the police department has added hazardous material assessment as a core competency and is the only incident commander (single command) at a terrorist incident involving hazardous material. Other police departments such as LAPD, have acquired hazardous material units.

response system of complementary organizations, it may even lessen the ability of all involved to perform optimally at the individual level.

When agencies add new tasks outside their existing competencies, they run the risk of diluting the organization's primary mission. The effects may not manifest themselves during routine operations, but in times of crisis, organizations revert to their true principle tasks and may fail at their new terrorist-related mission. The core for law enforcement is protection, criminal investigation and keeping order; for fire departments, it is firefighting, hazardous material mitigation and rescue; and for emergency medical services, it is pre-hospital patient care.

Emergency response organizations will, however, benefit from leveraging their core competencies—the unique set of strengths that are fundamental to their organization—rather than attempting to add new capabilities. Ultimately, improving the ability of emergency responders to respond to the homeland security mission requires that commanders link existing skills to the threats of the new environment. Increasing preparedness depends on the strengthening of core competencies, not the addition of new capabilities beyond the scope of the department. Therefore, when properly designed and implemented, homeland security preparedness efforts serve to reinforce day-to-day operational competencies that can be employed effectively at both major disasters and terrorist attacks. The core competencies of fighting fires, delivering pre-hospital care, mitigating hazardous material and performing technical rescue for building collapse—as well as the homeland mission—are all, therefore, strengthened by every investment in planning, training and equipment. The conceptualization of how FDNY's core competencies support the counterterrorism mission is reflected in Figure 1.

Each type of emergency response organization has complementary skills to offer others. However, this optimal outcome is recognized only when emergency response organizations leverage their own comparative advantages and work in concert with sister organizations (*e.g.,* fire with police) to create synergistic models of cooperation. This approach not only allows the contributors to build stronger, more capable organizations through focusing on their specific core missions, but ultimately presents a more effective terrorist response at the systematic level.
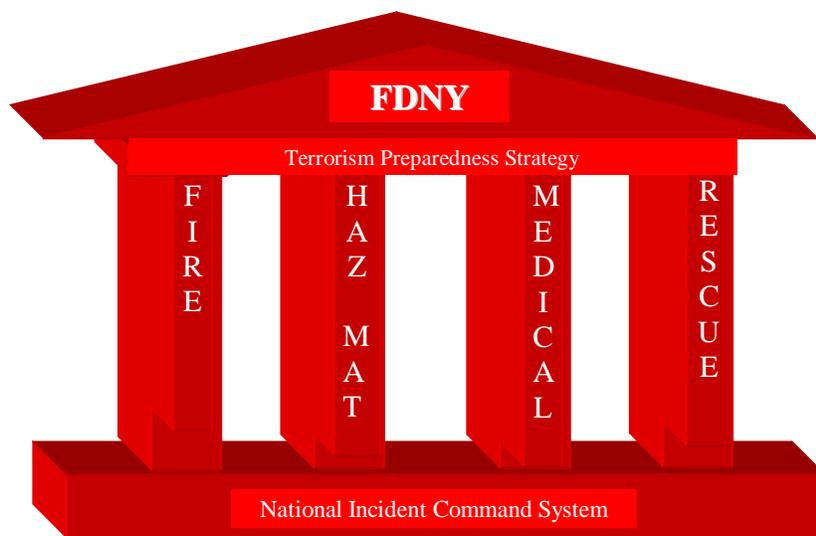
Figure 1.   Core Competencies

For CBRNE incidents, emergency responders will need to execute many different tasks simultaneously. Law enforcement will provide force protection for first responders, search for secondary devices, arrest possible suspects and conduct investigations. Fire departments will enter the contaminated scene to assess the hazard, perform rescue and evacuation of victims, confine, mitigate or extinguish the hazard and decontaminate exposed victims and rescuers. Emergency medical personnel may need to administer antidote to contaminated victims, treat other injuries and transport patients to medical facilities. Each of these tasks requires the enhancement of the organizations' core competencies and not the creation of totally new abilities.

When building response resiliency, it is critical to recognize that the first hour of an incident will require successful performance of the greatest number of essential tasks, with the fewest number of support resources. Effective response requires that all agencies are able to supply sufficient resources to perform their respective core duties and work in unison, so none of the vital tasks is overlooked. The danger in adding additional tasks to an organization's response repertoire is that it dilutes the supply of available resources to perform its core competencies, allowing almost no level of resiliency when the organization encounters the challenges of an extreme event.

B.   PUSHED BEYOND CAPACITY

Once emergency response organizations have identified their core competencies, the strategic task of preparedness has only begun. These organizations next must examine the limits of these competencies and plan how to increase their capacity to manage the next large-scale event. As the World Trade Center attacks unfolded, organizations faced increasing demands that swiftly outstripped their capacity to mitigate the incident. The incredible strain on response organizations during the first 102 minutes and during the aftermath pushed agencies beyond their capability and revealed their limited ability to respond to this new breed of complex events.

In future preparedness efforts it is, therefore, critical for senior commanders to understand their organization's capacity to withstand the initial shock and the cumulative stress exerted on their organization during such an incident. Commanders need to carefully track their organization's capability not only to scale emergency response to manage the crisis, but also the ability to maintain service to the rest of the community. As the events of 9/11 illustrated, this is not an easy task.

The ability to withstand increasing degrees of stress is critical to emergency responder organizations. Louise Comfort, a professor at the University of Pittsburgh, uses engineering "fragility curves" to illustrate this point. Buildings and bridges are designed using "fragility curves" to determine the cumulative effect of stress that a structure can withstand before failing. Crisis managers "may use this same concept to identify points at which governmental systems fail under different types of stress."[7]

Evaluation of consequence management performance in terms of breaking points is critical to preparedness. Emergency responders' capabilities are analyzed for their fragility or threshold of limited capacities. Local resources are examined to determine at what point they become overtaxed. On 9/11, New York City's extensive emergency response system, while robust, was outstripped by a new enemy. The response limitations incurred illustrate the need to understand where emergency breaking points might occur. Such knowledge then can be used to strengthen the system against future terrorist attacks.

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[7] Louise K. Comfort, "Rethinking Security: Organizational Fragility in Extreme Events," *Public Administration Review* 62 (September 2002), 102.

Understanding when an organization's capabilities and capacity are outstripped is essential for effective crisis management. Without such knowledge, crisis managers cannot effectively lead their organizations, nor can the organization effectively respond to the crisis at hand. The world watched in frustration as people on the upper floors of the World Trade Center waited to be rescued, an image surpassed only by the memory of the collapsing Towers. The World Trade Center was structurally designed to withstand a plane crashing into the building, but was not engineered to withstand the stress of a fast-spreading fire. Extending the construction example to emergency responders, fire departments were designed to fight high-rise building fires based on the belief that high-rise buildings are not supposed to collapse. Law enforcement was designed to fight crime in the street, not a foreign enemy using planes as weapons.

Emergency response systems on 9/11 were designed, on one level, to protect the public, but failed when exposed to cumulative stress at a different level. Both World Trade Center Towers and World Trade Center building number seven collapsed due to failure of certain structural components when exposed to fire. Likewise, when one part of government fails, the failure then can spread throughout the system.[8] The failure of law enforcement to prevent the attacks or the inability of the fire department to extinguish the fire, points to systematic failure of government when exposed to this unexpected terrorist attack. Understanding these breaking points of our security provides emergency responders with the opportunity to redesign more resilient strategies that will be able to withstand the cumulative stress of terrorism on different levels.

The concept of "fragility curves" highlights two important points of analysis for any emergency responder organization to consider. First, how much cumulative stress can an organization currently withstand before failing? Second, how can an organization further develop its capacity to withstand greater amounts of stress in both the short-and-long-term? In other words, how can an organization change the shape of its fragility curve?

Using this approach, an organization's capabilities, capacity and proficiency can be modeled by examining routine operations and assessing historical data about

8 Comfort, *Rethinking Security*, 102.

responses. Once current capacities for stress are understood, a new model can be developed that incorporates the shock of a terrorist attack—a far more dynamic emergency, which requires a much different approach and, potentially, scale of response.

At its most basic level, emergency response "fragility curves" can be described by examining the following:

- Organizational capability, capacity and proficiency (equipment, personnel and skills needed to support core competencies)

- Command capacity (operational adaptability and coordination)

Within the field of emergency management, New York City constantly tracks the first factor—the City's capabilities and resource capacity. Each agency contributes unique skills to the City's emergency response system. From routine operations statistics are recorded that can help identify minimal and maximum stress effects on emergency response, including the type and number of responses. Organizations can use the fragility curve to model both the type of skills and the amount of resources that are available at any given time to respond to an incident.

Measuring the breaking point of proficiency is a critical component for preparedness. Emergency responders need a proficient level of tactical and operational skills to use in response to a particular terrorist attack. These skills must be flexible enough to adapt to a dynamic emergency, requiring the ability to scale response to potentially large, complex incidents. A high level of training within an organization's core competencies will prove most adaptable during complex incidents.

The second dimension of the stress curve—command capacity—is also a significant component of preparedness. Organizational leaders need a deeper understanding of the strategic threat environment to better prepare and adapt to new threats. Perhaps the greatest stress placed on an organization during a terrorist attack is the lack of absolute knowledge during a crisis. As Bertrand and Lajtha note, building command capacity to manage uncertainty is important because "crises are characterized

by the absence of obvious solutions, the scarcity of reliable information when it is needed, and the lack of time to reflect on and debate alternative courses of action."[9]

C.   THE POWER OF SITUATIONAL AWARENESS

Effective crisis management depends upon having timely and accurate information about an incident—what hazards are present and what others might arise.[10] Commanders and crisis managers not only must pay attention to details, but understand the magnitude of the incident they are facing. For these leaders, maintaining situational awareness is critical for making sense of evolving events and deciding on necessary actions to take.   Having reliable information is also a critical factor in achieving coordination among emergency responders.[11]

As organizations respond to large, complex events, the most frequent and valuable assistance each can provide is a real-time exchange of critical information. The challenges in achieving shared situational-awareness stem from the way information is collected. Having each agency search for information is a rapid way to collect various pieces of a developing incident. However, looking for information from the viewpoint of a particular agency, by omission, is not looking for other indicators.[12] Therefore, it is necessary to exchange and compare the information gathered from different sources. The danger arises when agencies keep information to themselves and fail to see the value of information provided by other agencies. All agencies involved must realize that during complex incidents, the collection and sharing of small pieces of information are vital to forming a single operational picture for all emergency responders. Sharing information, as we will see in Chapters III and IV, may be one of the most challenging hurdles to overcome for emergency responders.

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[9] Robert Bertrand and Chris Lajtha, "A New Approach to Crisis Management," *Journal of Contingencies and Risk Management*, 10, No. 4 (December 2002), 184.

[10] Brian A., Jackson et al., *Protecting Emergency Responders: Safety Management in Disaster and Terrorism Response. (*Santa Monica, CA.: RAND Publishing, 2004), 24.

[11] Louise K. Comfort, "Managing Intergovernmental Response to Terrorism and Other Extreme Events." *Ublius* 32:4 (Fall 2002), 30.

[12] Stuart A. Whitehead, "Balancing Tyche: Nonlinearity and Joint Operations," in *National Security Challenges for the 21 Century,* ed. William Murray (Carlisle, Pa.: Army War College, Strategic Studies Institute, April 2005), 34.

The foundation for developing shared situational awareness is divided into the three components depicted in Figure 2. First, individual agencies seek to assess the situation through the gathering of information. Throughout a crisis, organizations are quickly searching for information, based on their core competencies and capabilities. Information must be gathered regarding how the crisis condition is interacting with people, structures and the environment. Information is also collected on emergency responders, including their location, capability, capacity and how well they are controlling the situation. The retrieved information then is shared within the organization and exchanged with other external crisis management stakeholders. These inward-and-outward-looking components of information-sharing are used to increase organizational absorptive capacity for knowledge diversity at an incident.[13] "This diversity enables people to see different things when they view the 'same' event."[14] Situational awareness then is achieved by making sense of the shared information. Sense-making is the ability to construct meaning from the information received. For decision makers, making sense of real-time information is necessary for maintaining an accurate understanding of the evolving situation.

Information
Gathering

Information
Exchange

Sense-
Making

Figure 2.   Situational awareness

[13] Cohen, Wesley M., and Daniel A. Levinthal, "Absorptive Capacity: A New Perspective on Learning and Innovation." *Administrative Science Quarterly,* 35:1 (March 1990), 133.

[14] Weick and Sutcliffe, *Managing the Unexpected*, 60.

At a major incident, commanders need accurate and timely information to make decisive, and sometimes life-and-death, decisions. The Gilmore Commission points out that the "exchange of information, whether by voice over a radio handset, via computer system or directly face to face, is crucial to the effectiveness of response operations and to the safety of individual responders."[15] At the World Trade Center, information-sharing was so poor that critical information never reached any fire department commander or the Chief of Department, who was the Incident Commander, leaving decision-makers at a severe disadvantage.[16]

This lack of information-sharing, where agencies do not share-information outside of their own agency, is referred to as "stovepipe situational awareness." Analogous to a stovepipe, information travels only within a single organization. As a result, one agency had superior situational awareness regarding the fire on the upper floors of the Towers while the fire department was left with little or no information. This inequity of information greatly affected the decision-making capacity of some emergency responders.

D.   FLEXIBLE DECISION-MAKING

The challenge for those examining the World Trade Center response stems from the lack of understanding of how firefighters make decisions under stress and uncertainty. The most widely accepted comparison model for decision-making comes from the work of Janis and Mann, who define decision-making as a process of comparing a range of options, evaluating each option, reexamining the positive and negative consequences of each, rating each one, and then determine which the best option is.[17] Such laborious comparison models may work in some circumstances, but at major crises there is rarely enough time or information for it to be useful.

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[15] Gilmore Commission, *Fifth Annual Report to the President and the Congress of the Advisory Panel to Assess Domestic Capabilities for Terrorism involving Weapons of Mass Destruction,* (Washington, D.C.: GPO, December, 2003), 271.

[16] *The 9/11 Commission Report*: *Final Report of the National Commission on Terrorist Attacks Upon the United States,* (New York: W.M. Norton & Company, 2004), 298.

[17] I.L. Janis and L. Mann, *Decision making: A Psychological Analysis of Conflict, Choice and Commitment,* (New York: Free Press, 1977).

Commanders and firefighters are usually called to make decisions under conditions of uncertainty, where information is missing, unreliable, inconsistent or ambiguous and 80 percent of their decisions are made in less than one minute.[18] It becomes apparent that comparing many options in search of one optimal solution is not feasible under these conditions. Gary Klein, through his extensive research on decision-making, explains that firefighters do not have the time to compare all possible options; instead, they make decisions by using cues to recognize a situation as typical and decide a course of action based on experience. "If the first choice did not work out, they might consider others—not find the best, but to find the first one that works."[19] Developing a course of action quickly is based on imaging how actions are carried out and adapting to new information; not by comparing choices. This allows the firefighter to act and not be paralyzed by evaluating the endless possible choices.

Decision-making on the fireground is based on conceptual and experiential learning—i.e., commanders process types of information during decision moments based on what they have learned and seen before. There is good reason fire commanders and firefighters process information this way: it allows them to quickly assimilate key information in stressful situations and readily process it, which is a powerful tool as long as the stressful situation is the same or similar to those seen before.

For instance, in a normal building fire, commanders evaluate the stability of the burning structure based on previous fires they have witnessed (experiential learning) combined with knowledge gained from classroom-type experiences (conceptual learning). Reaching the fire, experienced commanders will look immediately for the key indicators of fire damage to the building that, through experience and instruction, they will know where to bring hose-lines, where victims are likely to be trapped and which routes are the safest for rescuers. A new commander at a fire does not know where to look first to identify these key factors and must take precious time to assess every part of the fire before he or she can begin to make suggestions regarding how to approach it.

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[18] Gary Klein, *Sources of Power: How People Make Decisions*, (Cambridge, Mass: The MIT Press, 1998), 4.

[19] Ibid., 20.

The question for building command flexibility is if commanders make decisions by recognizing typical situations, is it then possible such cognitive bias can backfire when experienced commanders respond to a type of fire they have never seen? Their natural tendency to seek out known, helpful indicators dominates and, thus, they spend time scanning for those similar types of signals, perhaps overlooking the subtle signals that are the most relevant indicators of details of the new kind of fire. When events are not typical and cues do not fit together, commanders still take action even when they are not able to connect all the dots. Broken-pattern matching alerts fire commanders that something is wrong and action must be taken. It is, perhaps, one of the most intense stimulants for decision-making.

Klein points out when commanders read situations correctly they will match the situations to similar experiences; if there is no match, they quickly use their experience to recognize the anomalies.[20] He gives an example of a fire lieutenant leading his engine company into what they believed to be a private dwelling kitchen fire.

> The lieutenant leads his hose crew into the building, to the back, to spray water on the fire, but the fire just roars back at them. Then the lieutenant started to feel as if something is not right. He doesn't have any clues; he doesn't feel right about the house, so he orders his men out of the building—a perfectly standard building with nothing out of the ordinary. As soon as his men leave the building, the floor where they had been standing collapses.[21]

This example shows how fire commanders use cues that do not fit previous experience in order to make command decisions. The lieutenant was not limited by cognitive bias, but instead, used the available information of mismatched cues to make decisions. While not realizing the fire was underneath them in the basement, the cues of water not extinguishing the fire, the room getting hotter and an absence of cracking sound from the fire signaled the lieutenant that something was wrong and he made the decision to withdraw his firefighters.[22]

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[20] Gary Klein, *Sources of Power: How People Make Decisions*, (Cambridge, Mass: The MIT Press, 1998), 35.

[21] Ibid., 32.

[22] Ibid.

Understanding this decision-making process is critical to understanding the response to the World Trade Center. Commanders at the World Trade Center were drawn to certain cues for decision-making that did not fit with their experience.

Fire commanders, in particular, are always seeking to assemble small pieces of information to form an accurate picture of what is happening. Each piece of information builds on the previous pieces, signaling to commanders a new situation that fits or does not fit their knowledge. Experienced fire commanders, such as those at the World Trade Center, are able to use bits of information that would be regarded as inconsequential by others, but critical for decision-making. They are not limited by their experience, but are open to anomalies as signals to act despite uncertainty. "Experienced people have an impressive ability to withstand time pressure and generate plausible options so they do not have to waste effort and attention by comparing lots of options."[23] This openness to bits of information that do or do not match experience demonstrates the need for flexible decision-making.

Defining core competencies and their breaking points is necessary for developing the proper level of preparedness. Adapting to the shock and stress of a terrorist attack is dependent on information-sharing and flexible decision-making. These dimensions of command often are not fully understood by those who write about the World Trade Center response. It is, however, extremely important to be familiar with these concepts in order to understand the actions taken by emergency responders at the World Trade Center. Those who fail to understand these concepts will see the WTC as simply a tragic event. But for those who comprehend these concepts, the next few chapters will present a response model for increase resiliency and safety among emergency responders.

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[23] Gary Klein, *Sources of Power: How People Make Decisions*, (Cambridge, Mass: The MIT Press, 1998), 168.

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III.   ANALYSIS OF 9/11 RESPONSE

Each and every firefighter responding to the World Trade Center knew that tens of thousands of people were in their greatest moment of need. In those few minutes it took to respond, firefighters looked at the burning Towers and into their own hearts and souls, knowing they would be faced with the danger of climbing 110 stories and encountering fire to rescue those who could not get out. Nonetheless, they entered the buildings and began to climb the narrow stairs.

Analyzing the rescue operations at the September 11th World Trade Center response gives substantial insight into why certain actions were taken by emergency responders, clearing up many false assumptions and providing a direction for building command resiliency. This chapter examines how emergency response systems were easily outstripped and pushed beyond their capacity on 9/11 and what effects this had on information-sharing and decision-making. The chapter will provide an illustration of the importance of situational awareness, showing that on 9/11 organizational possession of information influenced how command decisions were made and affected how orders were followed within and outside participating organizations.

The World Trade Center response differed from the other events of 9/11 in many aspects. Covering 16 acres, the WTC was a rapidly changing fireground-battlefield, with tens of thousands of people at risk, multiple attacks, an advancing fire and the progressive deterioration of buildings, cutting off the withdrawal of rescuers, all occurring within only 102 minutes. Within this short time frame, commanders were faced with making numerous critical decisions. We will look at these events not to criticize, but to learn how to adapt to the next terrorist incident.

A.   DECISION-MAKING

Since very few people have the experience of managing large, unplanned complex incidents, it is important to examine how the response commanders of one of the most complex—and certainly unplanned—incidents in history made their operational decisions. Jules Naudet, who filmed the documentary, *9/11*, gives us a glimpse of what it

was like commanding the rescue operation from inside the lobby of the North Tower of the World Trade Center.[24]   This rare footage, coupled with this writer's experience, provide insight into the decision-making process and help to illustrate three critical requirements for decision-making: timely information, appropriate context and command flexibility.

First, commanders continually must scan for new information. Small pieces of information may not mean much by themselves, but the cumulative effect of connecting dots of information gives commanders cues for decision-making.   Once there are sufficient numbers of cues, commanders decide on the first possible course of action that can manage the crisis, rather than meticulously comparing all available options. "Fast decision makers pay close attention to 'real-time' information, that is, information about current operations or the current environment which is reported with little or no time-lag."[25]   Without the ability to make decisions quickly, commanders would be paralyzed by an endless search for information.

Second, commanders must view the incoming information within the appropriate context in order to graps the greatest possible degree of situational awareness. Context allows both the decision maker and the receiver of orders to understand the relevance of small cues. Only those commanders who can recognize a change in the operational environment will have the ability to adapt their decision-making to reflect that change.

And third, while decision-making depends on information and experience, commanders also must remain flexible and open to unexpected cues. The *9/11* film illustrates the flexibility of fire commanders who had to make strategic decisions despite the lack of reliable information.   This kind of flexibility, or command adaptability, enables commanders to modify their strategy and make swift, but informed decisions, to fit the characteristics of the evolving crisis. Flexibility, adaptability and innovation were key factors for commanding at the World Trade Center.

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[24] *9/11*. Documentary by Jules Naudet, Gideon Naudet, James Hanlon, (Aired on CBS, March 2002). With permission I viewed the uncut version of the film.

[25] Weick and Sutcliff, *Managing the Unexpected*, 21.

1.   Scanning for Cues

Flexible decision-making is based on scanning for cues to form an updated situational-awareness picture in order to make a decision. Each cue is considered a dot of information. Some dots are connected to experience, while other dots are connected to the evolving incident. These cues or dots of information form a contextual picture that assists commanders in making decisions, as well as assisting firefighters in carrying out those decisions.

Twenty-seven minutes before the collapse of the South Tower, there was an order given in the North Tower to have firefighters come down to the lobby. Understanding why this decision was made and why it was never followed gives insight into decision-making during a complex incident. This analysis also will provide an opportunity to build a more resilient decision-making process for future large-scale events.

At 9:32 a.m., a third plane was reported heading to New York City. Upon hearing this, a Command Chief in the lobby of the North Tower transmitted by radio the following: "Car 4-David, to all units come down to the lobby, everyone down to the lobby, now." The chief receiving this unverified piece of information made a critical decision within seconds to abort the rescue operations and ordered firefighters to come down to the lobby. There was no comparison of options; the chief made sense out of the information he had and acted accordingly. Two planes already had crashed into the World Trade Center and the potential impact of a third plane made the situation too dangerous for firefighters to remain in the Towers. Almost immediately after giving this order to come down, to the lobby it was learned that the report of a third plane was unfounded. The order was never repeated and there was no attempt to contact the incident command post or have this message relayed at high wattage by the communication vehicle in the street. In essence, the retreat order was abandoned because the situation had changed and it was deemed safe for the rescue operations to continue.

This example illustrates flexible decision-making and how commanders can decide a course immediately after being provided with small pieces of information. While this was not a typical event, the commander was able to connect new information to his experience of managing other major incidents. He knew that a third plane would

cause catastrophic consequences. It made sense to have emergency responders come to the lobby when there was a threat and then to allow the operation to continue when the threat subsided. His experience and the context of events allowed him to react to new information by choosing the first feasible course of action considered. He was able to make decisions based on the situational-awareness picture and the information at the time.

2. Contextual Framework

Firefighters at 9:32 a.m. were somewhere between the second and 20th floors, based on National Institute of Standards and Technology (NIST) assessment that firefighters climbing with equipment take about two minute per floor.[26] Being so close to the lobby, there was a good chance that at least some firefighters would have heard the message, yet the 9/11 Commission found no evidence that units actually returned to the lobby.[27] So why did no one return to the lobby? The McKinsey Report stated that soon after giving the order to come down, the chiefs in the lobby learned that the threat of a third plane was false and the chiefs continued the rescue operations.[28]

Observing actions by firefighters inside the North Tower also gives us insight into how evacuation orders are received and what is needed for effective communications. For firefighters to make sense of the message, they need to understand the context of the orders.[29] The 9:32 a.m. message did not meet the criteria for effective communications on three levels:

- The transmitter must establish authority of command.
- The receiver must have an understanding that the situation has changed.
- The receiver must hear the message repeated, which relates the command to previous experiences of fire building evacuation.

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[26] National Institute of Technology, *Federal Building and Fire Safety Investigation of the World Trade Center Disaster: The Emergency Response Operation (Draft)* (Washington, DC, 2005), 91.

[27] *9/11 Commission Report*, 299.

[28] McKinsey & Company, *Increasing FDNY's Preparedness* (New York, Fire Department of the City of New York, 2002), 32.

[29] Karl E. Weick, "The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster," *Administrative Science Quarterly* (December 1993,38,4), 628.
Understanding the context of the situation is referred to by Weick as "Contextual rationality."

The term, "Car 4-David," used by the chief was not a term recognized by officers or firefighters. It is used as a designation of a command chief by the dispatcher on the apparatus radio and not the fireground portable radios. At high-rise fires, the term designating the commander in the lobby is "Lobby Command" or simply "Command." Firefighters needed to recognize this order as one coming from the authority of the incident commander or the "Lobby Command."

In the stairways of the North Tower, there was little damage and many people needed assistance. It made no sense to leave the building under these conditions. The firefighters needed to be given a situational-awareness update about a third plane to make sense of this message.

Normally, when an order is given to leave the fire building, it is repeated over and over again. Not having this message repeated would lead firefighters to believe that the message was an error. Firefighters needed to connect this message to their experience of other situations when they were told to leave the fire building.

Firefighters did not come down to the lobby because the message did not make sense and efforts to continue rescue operations were reinstituted by commanders. Decision-making, therefore, must take place within the framework of situational awareness. Without a contextual framework, information may be overlooked or ignored.

3. Recognizing the Unexpected

The events of 9/11 outstripped the response capacity of emergency services due to the events' scale and complexity. They also pushed commanders outside of any previous experiences or classroom knowledge. It would have been all too easy for the firefighters to have treated the situation as a high-rise fire, albeit a complex one. The FDNY chiefs recognized that a plane hitting the Towers represented an exceptional emergency and created a host of issues that they could not have foreseen and, therefore, they remained receptive to other abnormalities in the environment throughout the 102 minutes of crisis response.

Under normal conditions, even working in complete blackness, firefighters do not abandon rescue operations. Even though they did not know the South Tower had

collapsed, the resulting blackness in the North Tower lobby was a cue to the chiefs that the situation had changed and they ordered an unprecedented evacuation of rescue operations. By escaping their cognitive biases to only make decisions based on experience, commanders in the North Tower, through their actions, ultimately saved many of the firefighters' lives.

What many saw on television, the chiefs in the North Tower did not see, for them, the whole pattern of events just did not fit. There was no information on what took place; there was no matching this situation to the chiefs' experiences; there was only a loud roar, blinding dust and complete darkness. These commanders used this mismatch of cues and unconnected pieces of information as an indication that something had gone wrong and made the decision to evacuate the building.

Hearing repeated messages from chiefs and feeling the building shake, provided firefighters with the context that the situation had changed, enabling them to make sense of the evacuation order and prompting them to descend the stairs.[30] Comparing this order to the order given earlier, illustrated the importance of situational awareness. Unfortunately, other available contextual information that would have changed the evacuation from unhurried to rapid never reached the fire department.

B.   THE EFFECTS OF CUMULATIVE STRESS

As 9/11 response expanded, the emergency services of New York City surged to meet the demands of the situation. What began initially as a two-alarm fire response rapidly escalated to three sequential fifth alarms; one fifth alarm for each of the two towers and a third fifth alarm for additional resources.[31] This then progressed into recalling all off-duty firefighters. Yet, at 8:46 a.m., when the first plane struck the North Tower, it was not clear that the incident was going to escalate to this level. After the second plane hit the South Tower, the situation was extremely complex and dangerous, but the situation was manageable, even if at the extremes.

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[30] FDNY Oral History of 9/11, a member of Ladder 1 describes that he did not know that the South Tower had collapsed, but knew something was wrong, and hearing the evacuation order by chiefs understood the order to leave the building.

[31] McKinsey & Company, *Increasing FDNY's Preparedness*.

When the towers collapsed, however, the situation exceeded the capacity of the entire City of New York to respond. Far beyond a city-wide response, the crisis required massive federal aid and assistance from many organizations. The lessons from that morning are clear: no matter what equipment organizations may possess, they must develop, test and evaluate their ability to scale their response rapidly to an event as it unfolds and be able to bear the shock and cumulative stress of a terrorist event upon response capabilities.

The shock of 9/11 caused organizations to become isolated and organizational-centric, concentrating only on their own organization. This was not apparent until the cumulative effects of stress built with the collapse of the South Tower. At this point, organizations were pushed beyond their capacity for search and rescue, medical care and criminal investigation. Organizational fight for survival now became more dependent on inter-agency unity but instead agencies operated independently. The organization with the most resilient infrastructure for information had the best percentage of survival; others were left to fend for themselves.

C.   ESCAPE FROM THE NORTH TOWER

This case study compares two separate situational-awareness pictures given to emergency responders. The most accurate and timely situational-awareness reports given by New York Police Department (NYPD) aviation produced a rapid evacuation with a sense of urgency. The majority of the emergency responders within the North Tower, however, did not receive the same situational-awareness report of urgency, which caused an unhurried evacuation. Comparing these two cases demonstrates the severe consequences of "stovepipe situational awareness."

The analysis looks at the radio transmission on 9/11 between the time the South Tower collapsed at 9:59 a.m. and the collapse of the North Tower at 10:28 a.m. Messages transmitted during the 29 minutes between the collapses of the towers were given by radio to emergency responders according to each organization's intra-agency protocol. No messages were transmitted by radio, computer or face-to-face contact

between the two primary response agencies, resulting in separate operational pictures of the fires upper floors, thus creating "stovepipe situational awareness."

1.   NYPD Rapid Evacuation

When the South Tower first collapsed, NYPD Emergency Service Unit (ESU) teams in the North Tower, like firefighters, had no idea what occurred. After witnessing the first collapsed building of the World Trade Center from the air, NYPD aviation units immediately radioed the collapse of the South Tower and the ESU dispatcher gave five emergency transmissions, ordering all emergency service officers to get out of the North Tower.[32]

At 10:01 a.m., an ESU detective at the NYPD command post on Church and Vesey Streets saw the South Tower collapse and ordered the evacuation of all ESU units from the WTC complex.[33] An ESU officer inside the North Tower heard the message clearly about the collapse, but could not comprehend how a 110-story building could collapse, so he asked for the message to be repeated. It then was explained that the South Tower was gone and the North Tower building they were in was in imminent danger of similar collapse.[34] That message was an alarm for all ESU units to immediately begin their evacuation.

For these officers, it now made sense why they needed to leave rapidly. But it was these additional helicopter radio transmissions of observed fire conditions and building instability that made it more and more apparent to not simply evacuate the building, but rapidly escape from its inevitable collapse. These transmissions from the police helicopter were given over an NYPD Special Operation Division (SOD) frequency that was monitored by ESU officers inside and outside the North Tower.[35]

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[32] Jim Dwyer and Kevin Flynn, *102 Minutes: The Untold Story of the Fight to Survive inside the Twin Towers* (New York: Times Books, Henry Holt and Company, 2005), 214.

[33] *The 9/11 Commission Report*, 309.

[34] *The 9/11 Commission Staff Statement 13* (May 18, 2004), 24-25.

[35] Studies conducted by the 9/11 Commission, NIST WTC Investigation, NYPD McKinsey Report and *New York Times* authors Dwyer and Flynn have slightly different times for each NYPD helicopter report. However, they agree on content.

10:00 a.m.	A member of the NYPD aviation unit radioed that the South Tower had collapsed immediately after it happened, and further advised all people in the WTC complex and nearby area should be evacuated.[36]
10:07 a.m.	The pilot of Aviation 14, radio: "Advise everyone to evacuate the area in vicinity of Battery Park City, about fifteen floors down from the top, it looks like it's glowing red. It's inevitable."[37]
	To be certain that the message was delivered, the dispatcher repeated it, practically word by word, so that all the police officers on the air heard the warning. 'All right, he said from the 15th floor down, it looked like the building was going to collapse and we need to evacuate everyone...'[38]
10:08 a.m.	A moment later, the pilot of Aviation 6, reported, "I don't think this has too much longer to go, I would evacuate all people within the area of the second building."[39]
10:20 a.m.	NYPD aviation unit reports that the top of the tower might be leaning. (NYPD SOD Radio Channel)[40]
10:21 a.m.	NYPD aviation unit reports that the North Tower is buckling on the southwest corner and leaning to the south. (NYPD SOD Radio Channel)[41]
	NYPD officer advises that all personnel close to the building pull back three blocks in every direction. (NYPD SOD Radio Channel)[42]
10:27 a.m.	NYPD aviation unit reports that the roof is going to come down very shortly. (NYPD SOD Radio Channel)[43]

It is clear from these reports that NYPD officers had a comprehensive situational awareness, not only of the collapse of the South Tower, but also the imminent danger of collapse to the building they were occupying. The McKinsey Report states that NYPD "aviation warns that WTC 1 collapse is likely and advises immediate evacuation."[44] The officers who received these messages were able to correctly make sense of the

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[36] *9/11 Commission Report*, 309.

[37] Dwyer and Flynn, *102 Minutes*, 223.

[38] Ibid.

[39] Dwyer and Flynn, *102 Minutes,* 223 and supported by *Staff Statement 13*, 25.

[40] *NIST,* 37.

[41] Ibid.

[42] Ibid.

[43] Ibid.

[44] McKinsey & Company, *Improving NYPD Emergency Preparedness and Response*, (2002), 50. This evacuation warning was given to police personnel.

information received and quickly evacuate the building. Each subsequent message had a cumulative effect of added urgency, plus multiple validations of the original report.

Eyewitness reports indicated that ESU officers did not remain and, at one point, were jumping from landing to landing by sliding down the stair banisters. These reports confirm the importance of the helicopter messages for understanding that the building was about to collapse and the officers needed to rapidly evacuate the building. For these officers, situational-awareness reports received from NYPD Aviation and members outside the building were critical to their escape from the North Tower, most likely saving their lives.

2.   FDNY Unhurried Evacuation

The situational-awareness picture for the Fire Department of the City of New York (FDNY) was vastly different than that of the police department. When the South Tower collapsed at 9:59 a.m., rescuers on the upper floors felt the building shake, similar to a small earthquake. Simultaneously, operational commanders in the lobby had debris dust fill their location, forcing them to move to a passageway between the North Tower and 6 World Trade Center (the adjacent building). As the South Tower collapsed in front of them, the Chief of Department and his command staff, located on the far side of West Street, abandoned the command post and took shelter in a parking garage under the World Financial Center. Throughout the incident, there was the obvious absence of any NYPD commanders at both the incident command post and the operations section. These facts set the stage for operational "stovepipe situational awareness" and the looming disaster.

10:00 a.m.	The South Tower total collapse was immediately communicated on the Manhattan dispatch channel by a FDNY [fire] boat…no one at the site received this information, because every FDNY command post had been abandoned.[45]
	Despite the lack of knowledge of what had happened to the South Tower a chief in the process of evacuating the North Tower lobby sent out an order within a minute of the collapse: "Command to all units in Tower 1, evacuate the building."[46] [Immediately], some chiefs and firefighters on the upper floors of the North Tower heard the evacuation instruction and repeated it to other firefighters. [47]
10:10 a.m.	Another chief [after moving from the lobby of the North Tower to the North Bridge (connecting WTC to the World Financial Center)], "soon followed with an additional evacuation order…."[48]
10:15 a.m.	The Chief of Department issued a radio order for all units to evacuate the North Tower.[49]

Of the 100 interviews conducted by the 9/11 Commission and its review of 500 internal FDNY oral histories, only three firefighters mention hearing any possibility of "imminent collapse."[50] Indeed, most firefighters in the North Tower had little idea that the South Tower had collapsed and did not receive warning messages from police aviation predicting the collapse of the North Tower.[51] FDNY, as well as the Port Authority police, were never provided with the critical information that NYPD possessed.

3. The Importance of Sharing Information

While the 9/11 Commission shied away from using the term "stovepipe situational awareness," to describe inter-agency communication, it did recognize that critical information was not shared among agencies and FDNY chiefs would have

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[45] *9/11 Commission Report*, 306.

[46] Ibid.

[47] Ibid, 307.

[48] Ibid, 306.

[49] Ibid, 308.

[50] *Ibid,* 550.

[51] Ibid, 554.

benefited greatly had they been able to receive the same situational-awareness picture as the NYPD.[52] The situational-awareness picture for the fire department members inside the North Tower was limited to a rumbling sound and orders to evacuate the building. The fire department received no updates about the spreading fire or the deterioration of the building. There were no warnings of possible building collapse from helicopters to reinforce the urgent need for a rapid evacuation.

Essential to situational awareness is the need to make sense of the information received. Organizational psychologist Karl Weick describes the basic human process of "sensemaking" as a "search for context within which small details fit together and make sense."[53] The more detailed the information is, the better the "sensemaking" capability of the receiver.

The NYPD and FDNY case studies dramatically portray how emergency responders reacted to different levels of situational awareness. Information about the collapse of the South Tower, the spread of the fire and potential collapse of the North Tower provided the police department with enough information to precipitate a rapid evacuation, while the lack of available information for the fire department translated into an unhurried evacuation—and the lethal consequences that followed. These facts illustrate how information-sharing affects emergency responders' interpretation of evacuation orders.

The strongest statement about the dangers of "stovepipe situational awareness" comes from a two-year-long investigation by the National Institute of Standards and Technology. That systematic investigation concluded that "a preponderance of evidence indicates that emergency responder lives were likely lost at the WTC resulting from the lack of timely information-sharing and inadequate communication capabilities."[54] This is further clarified by the 9/11 Commission that any radio failure, while important, "was not the primary cause of many firefighters' deaths in the North Tower."[55] The main reason why so many firefighters died in the North Tower was that those commanders in

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[52] *9/11 Commission Report,* 321.

[53] Karl Weick, *Sensemaking in Organizations* (London: Sage Publications, 1995), 133.

[54] NIST, Draft, 174.

[55] *9/11 Commission Report*, 323.

possession of vital information from police helicopters never shared it with FDNY, resulting in an uneven distribution of critical information.

An unhurried evacuation made perfect sense to those who lacked situational awareness in the North Tower. Equally, it made perfect sense to those police officers who heard the repeated warnings of possible collapse to leave the North Tower as rapidly as possible. "If events are noticed, people make sense of them, and if events are not noticed, they are not available for sensemaking."[56] Those emergency responders with the power of situational awareness were able to escape the collapse of the North Tower; those with no situational awareness did not stand a chance.

Commanding during a crisis is dependant upon strengthening information-sharing to maintain common situational awareness. When an organization possesses critical information, it must be immediately shared with other commanders and all emergency responders operating at an incident which, in turn, enables emergency responders to make sense of and act quickly to new messages. The single most important safety lesson learned by emergency responders on 9/11 is to simply share information. Command resiliency is directly connected to the power of situational awareness.

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[56] W.H. Starbuck & F.J. Millken, "Executives' perceptual filters: What they notice and how they make sense," *The Executive effect: Concepts and methods for studying top managers* (Greenwich, CT: JAI, 1988), 60.

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IV.   ORGANIZATIONAL BIAS

At 9:59 a.m., the South Tower collapsed. What the world saw on television, we could not see. Our world in the lobby of the North Tower went black. In darkness, I radioed to the firefighters above. "Command to all units in Tower 1, evacuate the building!" While many of the firefighters assisting people heard the message, they were already dozens of floors above ground level. Little did we know that time was running out.

This chapter examines how organizational bias influenced emergency responders at the World Trade Center. The analysis illustrates the negative effect organizational bias has on commanding complex incidents. Most importantly, this chapter provides a model for overcoming organizational bias—something vital for effective Homeland Security and the command of complex incidents of terrorism.

A.   THE INFLUENCE OF ORGANIZATIONAL BIAS

In trying to understand critical aspects of the response of New York City agencies to the crisis at the World Trade Center on September 11, 2001, many observers overlook the effects of years of inter-agency fighting for sole command power. The following analysis explores the impact that social group behavior has on information-sharing under conditions of stress and uncertainty.

The action aim of this chapter is to demonstrate the likelihood of sharing vital information at critical times during complex incidents becomes greater when groups that ordinarily are competing or acting independently are organized to act as an integrated group under a unified command where all members are equally responsible for command-coordinated action. However, to achieve this level of integration, biases need to be overcome.

Social identity that promotes power of one organization over another organization produces two social outcomes during complex incidents. First, there is the creation of a positive in-group bias toward those who are part of the same group and a negative out-group bias against those who are part of an alternate group. When providing information

across groups, individuals are prone to give more information to members of their own group and less to members outside that group.[57] Secondly, when under stress, individuals feel little obligation to share valuable information with those outside their group since responsibility for acting is diffused within their in-group. This phenomenon excludes the out-group from receiving information that may be vital to their operation.

To fully understand the power of organizational (systematic) bias, one must examine how information-sharing within and outside groups influenced the evacuation of first responders from the North Tower of the World Trade Center. As demonstrated, the most accurate and timely information reported by police aviation produced a rapid evacuation with a sense of urgency. However, the majority of the emergency responders, including firefighters within the North Tower, did not receive the same situational-awareness report of urgency. That information-transmission failure was responsible for an unhurried evacuation without any sense of apparent urgency. Comparing these two cases demonstrates the severe consequences of keeping critical information within an organization. It also raises the more important question regarding why commanders of one agency did not communicate vital information to another.

B.   UNDERSTANDING ORGANIZATIONAL BIAS

The case studies in the previous chapter revealed the vital role that information-sharing or lack of it played in decision-making at the World Trade Center. Simultaneously, it is shocking to think that critical information was not shared among first responders from these New York City agencies. Some observers would like to conclude that it was a technological problem with portable radios, but the 9/11 Commission confirmed that the evacuation messages were heard.[58] Furthermore, the NIST investigation concluded that the WTC repeater (a system to boost radio signals)

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[57] A summary of the research and theoretical perspectives regarding social biases focused around social identity and intergroup biases can be found in the overview chapter by social psychologist Kay Deaux, "Social Identification," in *Social Psychology: Handbook of Basic Principles.* Ed. E.T. Higgins and A.W. Kruglanski (New York: Guilford Press, 1996.): 777-798, and Philip Zimbardo, "A Situationist Perspective on the Psychology of Evil," *The Social Psychology of Good and Evil* (A. Miller, ed., New York: Guilford, 2004).

[58] *9/11 Commission Report*, 554.

was incapable of working after the South Tower collapsed and would not have assisted in the evacuation of firefighters from the North Tower.[59]

A lack of radio interoperability is another theory used to account for the communication gap among agencies. However, agencies, commanders and personnel were within a short distance of each other.[60] Regardless of any prior history of infighting between the police and fire departments, it is inconceivable that any commander would ever deliberately withhold vital information that could save the lives of personnel from another organization. Then why did police commanders over the course of 29 minutes remove their members from the vicinity of the towers and not think to inform the fire department of the dangers observed by police aviation? One answer lies in years of organizational biases within the first responder community, where organizations are generally autonomous. This is not a conscious bias by individuals, but rather a long-standing bias on a systematic level.

Organizational bias stems from the desire to belong to an omnipotent group that is capable of excluding those who are not part of the group. In government, it usually is demonstrated through command power and the power to control information. The turf battles between NYPD and FDNY mirror those recently made public between the CIA and FBI. In both instances, the key to understanding the failure to share information for command of incidents or operations is ultimately a quest for superiority of one agency over the other.

This inter-group competition is illustrated by a lack of cooperation, duplication of effort and strict control of information that might benefit the other. Many times, one group wishes to exclude the other from an operation or is not forthcoming with information, simply to demonstrate its perceived group power over another. This bias not only leads to one group having an advantage over the other, but it systematically conditions groups to think inwardly only of themselves.

One would expect that these social biases would be abandoned during times of crises; however, the WTC case studies illustrate a stronger bias toward individual group

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[59] *NIST*, 138.

[60] *NIST*, 162.

self-interest, proving a fatal flaw for first responders. Even with thousands of police officers and firefighters at the scene and many only a few feet from each other, reports from the police helicopter never reached any fire chief. During the 9/11 World Trade Center attack, first responders were unable to overcome their organizational biases, causing a fragmented command structure. One can observe the ramification of these biases under three different command conditions:

- Resistance to a single incident commander.
- Development of blindspots in command capacity.
- Diffusion of personal command responsibility.

First is the failure of pre-incident planners to recognize that at terrorism incidents, with multiple agencies, social biases cause organizations to resist a single incident commander. The WTC response depicted a refusal by agencies to operate under the fire department's incident commander. Agencies implicitly think of themselves as being most important and, as a group, their natural tendency is to resist being under command of another organization. This is especially true for police and fire departments whose organizational development reinforces a sense of belonging to an important group. These organizations call themselves the "Finest" and "Bravest" and each has significant roles to play during a terrorist incident.

During large complex incidents, agencies must change this perception by viewing themselves as being equally important and necessary to the outcome of the operation. Doing so eliminates the tendency to hold back information in the quest for retaining or obtaining power. Organizational social biases will engender considerable resistance to accepting a single incident commander—who is not "one of their own"—when the group believes its role to command is equally important to the outcome of the incident.

Second is the development of blindspots in command capacity. These blindspots develop as part of a group bias toward members of the same group and against those outside the group, as noted earlier. This was seen in the case studies where information

was provided within one group, but not shared across groups. It also is found that as stress and complexity of a crisis increase, people tend to narrow their focus on aspects judged most important to them.[61]

As the intensity of the WTC crisis increased, police commanders became so focused on central organizational tasks, they neglected to perform the critical task of information-sharing. Their command capacity became so myopic they did not recognize the information from helicopters might be significant for the fire department. Critical messages were never passed from the police to the firefighters or their commanders, nor did fire commanders ever request information from police on conditions as seen from police aviation. Both organizations were so preoccupied with performing their own operations that they developed blindspots that reduced their own command capacity. These agencies never crossed group boundaries to consider the welfare of the other, nor considered how the other could have contributed to the welfare of their own organization.

Third is organizational diffusion of responsibility away from the individual and toward the group. Many ranking police officers in the street heard reports from police aviation warning of structural failure and acted quickly to move their members to safety, yet they never considered telling the fire department. When asked, they could not explain why they pulled back police officers but did not make sure firefighters also were withdrawn quickly, except to say, "I thought the fire department was evacuating, too." Indeed a few firefighters and police officers together in the North Tower felt individually responsible to tell each other to evacuate the building, but there is no evidence that detailed messages from helicopters were ever relayed to fire personnel. Most disconcerting is that many officers did not feel individually responsible for ensuring that the fire department knew why it was urgent to evacuate the North Tower.

Similar group dynamics played out in 1964 when 38 people could not explain why they did not phone police as they witnessed the stabbing death of Kitty Genovese in Forest Hills.[62] In these cases, "the presence of others diffused the sense of personal

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[61] Weick, *Sensemaking in Organizations*, 102.

[62] Malcolm Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference* (New York: Little, Brown and Company, 2000), 27.

responsibility of any individual."[63] When people are in a group they assume that someone else will make the notification or, since no one is acting, there is not really an urgent problem.
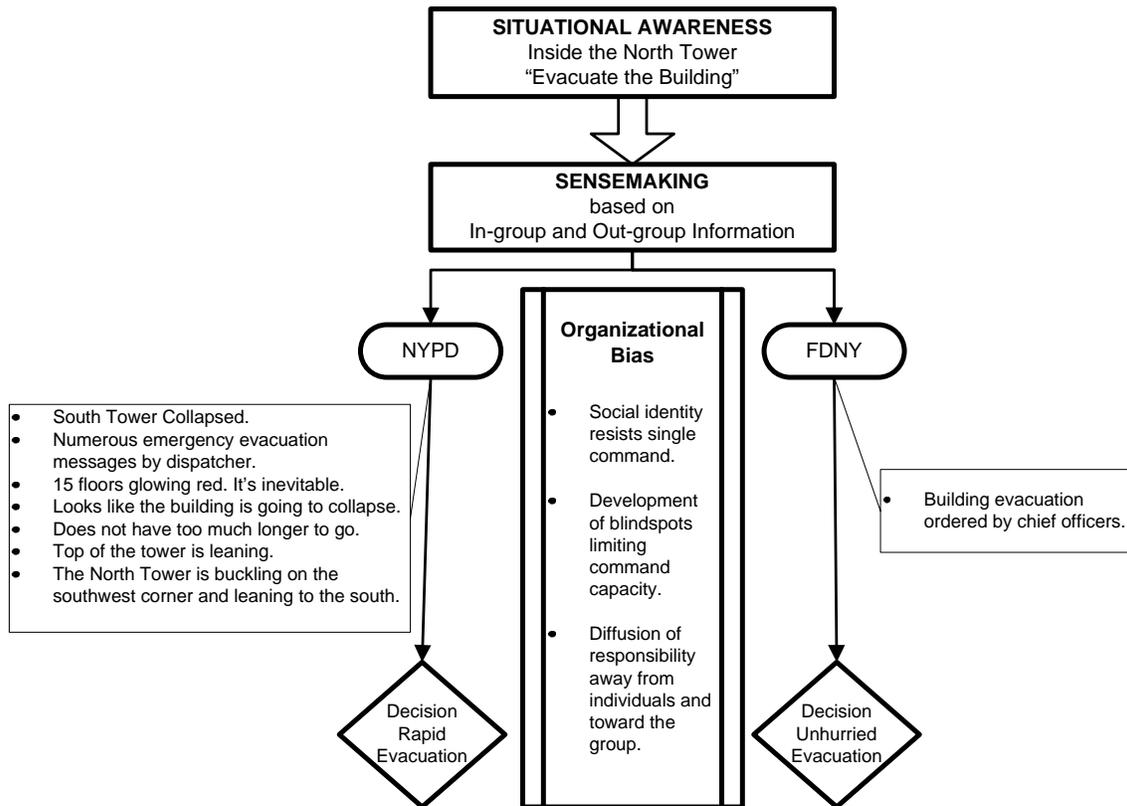
Figure 3. **Organizational bias blocks information-sharing and reduces sensemaking. Routine use of unified command removes organizational biases, allowing information-sharing to take place.**

On 9/11, it was assumed that some police commander had to have told the fire department about messages from police aviation. Or, it was assumed that it was not a problem if the fire department did not receive this exclusive information about the fire on the upper floors because they were evacuating their members anyway. To this day, there is not a public statement of a sense of personal responsibility by any police commander for not sharing information with the fire department. That absence of concern supports

63 Philip Zimbardo, "A Situationist Perspective on the Psychology of Evil," *The Social Psychology of Good and Evil* (A. Miller, ed., New York: Guilford, 2004), 42.

the theory that people feel less responsible for their behavior when their focus is narrowed by an in-group mentality. Ironically, if there was a unified command at the WTC with one fire department incident commander and one police department incident commander, there would have been a sense of responsibility not only for one's own organization, but also for the other's organization and many more firefighters and other emergency responders would be alive today.

C.   UNIFIED COMMAND

Evaluating the events of 9/11 and the effects of systematic social bias is not intended to assign blame or exonerate any first responder. It is intended to help develop a command system that is resilient enough to overcome these organizational biases in future crisis events. The World Trade Center responses demonstrate the shortcomings of advocating a single incident commander. After completing its investigation, the 9/11 Commission strongly recommended, "when multiple agencies or multiple jurisdictions are involved, they should adopt a unified commend."[64]

To overcome social bias, organizations with a major role at terrorist events must not seek to control each other, but instead work equally in synergistic fashion to command the incident. A unified command allows agencies with different functional responsibilities to work effectively without affecting individual agency authority.[65] Incident commanders in a unified command structure will eliminate organizational blindspots by combining knowledge to build a more robust command. Each incident commander will take individual responsibility for jointly sharing information and developing operational objectives. Incident commanders in a unified command will have prior training, a new sense of command and will be personally responsible to each other for all actions taken at an incident.

Today's Homeland Security efforts of exercising together under a unified command provide a good first step. However, it may not be enough to overcome these ingrained social biases. It is documented that as stress increases, people tend to abandon

[64] *9/11 Commission*, 397.

[65] Department of Homeland Security, *National Incident Management System* (Washington, D.C., 2004), 11-12.

recently learned responses and fall back on over-learned systematic responses.[66] Public service organizations need to repeatedly practice how to systematically depend on each other at small incidents, as well as at large-scale terrorist events. During these incidents, it is necessary to develop a network of organizations that uses common language and participates in everyday social interaction.[67] Organizations that seek power over another through their endorsement of a single commander at inter-agency incidents will revert back to an individual group bias during a terrorist event. Only through daily practice of unified command and organizational dependency on each other, can agencies hope to prevail over systematic social biases, thereby enabling organizations to coordinate their strengths in effectively dealing with the next terrorist incident.

Commanding during a crisis is dependant upon overcoming organizational biases and strengthening information-sharing to maintain a common situational-awareness picture of the crisis venue. When organizations possess critical information, members must feel responsible for sharing it with other emergency responders operating at an incident. Information-sharing provides emergency responders with an opportunity to make sense of any emergent ambiguity and act quickly to new messages.

Finally, there is the need for building a synergistic response network for preparedness. This point cannot be overstated. The term network implies interconnection into a cohesive fabric. In the context of incident response, this cohesion is only possible through a thorough familiarity with the capabilities and limitations of each member of the network and a willingness to overcome organizational bias to ensure a free flow of information among all members.

Commanding complex incidents is directly connected to the systematic development of a unified command at everyday incidents and building a mutual system of respectful interaction with each other. Unless our public service organizations can be integrated into a unified command group, where decisions are made with full awareness of the capabilities and capacities of each of the relevant groups, we are doomed to be

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[66] R. P. Barthol and N. D. Ku, "Regression under stress to first learned behavior," *Journal of Abnormal and Social Psychology* (*59*): 134-136, and K.Weick, *Sensemaking in Organizations*, 102.

[67] J.P. Walsh and G.R. Ungson, "Organizational Memory," *Academy of Management Review* (*16): 60.*

governed by our organizational biases and repeat the mistakes of limiting command capacity at the most important times in the lives of the communities we have pledged to serve.

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V.   DYNAMIC PREPAREDNESS

Then, at 10:28 a.m., after fighting our way out into the street, I heard the roar of the North Tower starting to collapse. The beautiful morning that was filled with sunshine turned black. After the collapse, in the darkness there was complete silence. It was like a first snowfall: you heard nothing; there were no radio communication; there was only an eerie silence. When I stood up, I saw the skeletons of the collapsed buildings.

Command resiliency entails adapting to new challenges of complex and unexpected events. As the uncertainty of these events unfolds, there is a greater need for organizational adaptability, flexibility, innovation and a keen understanding of the limits of an organization's capabilities.

Dynamic preparedness requires the ability to adapt to the new threat environment on both an organizational and operational level. "An ability to adapt will be critical in a world where surprise and uncertainty are the defining characteristics of our new security environment."[68] The next terrorist attack will not be limited to a finite set of scenarios. Most likely, it will come as a surprise, in timing, location and form. Command resiliency will require commanders to adapt to an evolving threat through the understanding of organizational breaking points and the training of operational personnel for flexible decision-making and innovation during an incident. To achieve this goal requires a new model of planning—one of dynamic planning—which is used by commanders to develop procedures to deal with uncertainty through the use of multi-dimensional threat scenarios.

Dynamic planning does not only look outward at the threat environment, but also inward at the organization itself. Emergency response organizations need to evaluate their strategic and operational capabilities to manage potential attacks from two perspectives:

- Understanding breaking points of core competencies for organizational preparedness
- Developing operational adaptability (flexibility and innovation)

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[68] Donald Rumsfeld, "21st Century Transformation of U.S. Armed Forces," Speech, National Defense University, Fort McNair, Washington, DC, January 31, 2002, *http://www.defenselink.mil/speeches/2002/s20020131-secdef.html.*

This evaluation is done through the use of dynamic scenarios. Peter Schwartz describes using scenarios as a tool to help decision-makers deal with uncertainty by considering alternate courses of action.[69] The scenarios are not predictions of the future; rather, they are vehicles that assist people in learning the presence of alternative tactics.[70] Scenario building enables commanders to identify the blindspots in their static planning process and assists in developing adaptability to deal with uncertainty. Dynamic planning is the conduit between existing core competencies and future resiliency.

A. ORGANIZATIONAL PREPAREDNESS

Identifying breaking points through the use of the fragility curve as a part of dynamic planning is an exercise that is usually neglected by planners. However, it is imperative that agencies use this tool to take a close look at their capacity to withstand different forms of attacks. When organizations use this type of planning they will discover the inevitable outstripping of capabilities and the discovery of blindspots in existing policies and protocols. For example, failure to institute a unified command to manage terrorist incidents and plan for new firefighting equipment were unidentified breaking points or blindspots in preparedness before 9/11. Dynamic planning takes the lessons learned from 9/11, along with the examination of new scenarios, and focuses organizations on the need to identify and deal with these critical breaking points.

The utilization of the "fragility curve" for dynamic scenario planning promotes innovation within core competencies in the face of uncertainty. To use this dynamic planning effectively, leaders must move beyond our traditional tactics against a fixed or static set of scenarios and demand resilient and adaptive leadership at both strategic and operational levels. Progressive leaders will take the necessary steps to recognize breaking points in their organization and then make the changes needed to position their organization to better adapt to the surprise of an unforeseen event through dynamic planning.

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[69] Peter Schwartz, *The Art of the Long View* (New York: Doubleday Dell Publishing Group, Inc., 1991), 4.

[70] Schwartz, 6.

To effectively demonstrate how the "fragility curve" model works in the context of evaluating the 9/11 attacks, it is important to understand the details of the 9/11 response from the time the planes struck the World Trade Center until the collapse of both the North and South Towers. It is during this time period that the City's emergency responders were without extensive State or Federal assistance. This examination reveals that emergency responders on 9/11 were, in fact, stretched beyond their capacity. It also reveals new opportunities to incorporate more resiliency into the City's emergency response system and further clarifies that jurisdictions must understand their response vulnerability and counteract it with greater resiliency.

1.   Resource Capabilities

The FDNY's 11,000 plus firefighters and almost 3000 medical personnel gave the fire department great flexibility in responding to the World Trade Center attack, while maintaining emergency services for the rest of the City. On 9/11, the fire department's response time for fire incidents in other parts of the city increased by only one minute.[71] Yet, more than 200 fire department units responded to the WTC within the first hour. Upon initial analysis of the event between 8:46 and 10:28 a.m. it appears that resource capacity was not a problem for the country's largest fire department. But, in fact, there was one significant resource capability deficit, which would have gone unnoticed, except for the 9/11 Commission's public hearings held in New York in May of 2004.

One of the members of the 9/11 Commission asked Fire Commissioner Nicholas Scoppetta what the fire department would do if there was another similar attack in New York City, where people were trapped on the upper floors in a high-rise building, with a fire that could not be extinguished and all exit stairs blocked by flames.[72] Commissioner Scoppetta had no definitive answer. Later, in private conference, fire chiefs also were unable to provide an answer. New York City is not unique in this regard. In effect, the fire service in the United States has yet to answer the principal question of the 9/11 hearings: what do we do if it happens again? Even more disconcerting is that no one has demanded an answer.

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[71] McKinsey, *Increasing Preparedness for the FDNY*, 38.

[72] *9/11 Commission Public Hearings*, May 18, 2004.

The single, most significant response capability breaking point disclosed by the World Trade Center attack on 9/11 was that the fires on the upper floors, which weakened the building enough to cause a progressive collapse, could not be extinguished with existing resource capabilities. If the fires had been extinguished, it is likely that the buildings would not have collapsed and perhaps thousands of lives would have been spared. Eyewitness accounts and tape recordings reveal that firefighters laden with heavy equipment were unable to ascend the narrow stairs quickly enough to extinguish the fire with handheld hose-lines before the buildings collapsed.[73] [74] Comprehending the difficulties of that day and the limits in resources, we can only conclude that traditional firefighting could not have extinguished the fire.

Defining this as a crucial breaking point requires that the FDNY search for an answer to the 9/11 Commission's critical question. One absolutely frightening answer is simply telling New Yorkers that there is no hope for them if they are trapped above the fire in a similar attack. For the FDNY and the fire service, this is clearly not an acceptable position to take. A more imaginative solution is to develop new equipment that could effectively control the fire. This potential scenario provides a good illustration of how crisis creates opportunities for innovation or a new order.[75] Developing a firefighting helicopter, designed to shoot a dry chemical extinguishing agent and thousands of gallons of water into the upper floors of a high-rise building fire, is one innovative idea for solving the problem.

2.   Command Capacity

More broadly than acquiring innovative resources, organizations' ability to command often are outstripped on the strategic level of coordinating joint operations at complex events. The cumulative stress of agencies not working together results in failure to exchange information and the creation of separate command structures. *The 9/11 Commission Report* correctly revealed that critical information was not shared among

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[73] *FDNY Oral Histories*, compilation of interviews of fire personnel taken during the recovery phase.

[74] Port Authority of New York and New Jersey, audio tapes of the repeater system from the South Tower.

[75] Timothy L. Sellnow, Matthew W. Seeger, and Robert R. Ulmer, "Chaos Theory, Informational Needs, and Natural Disasters," *Journal of Applied Communication Research* 30 (4): 269.

decision-makers at the World Trade Center incident.[76] On 9/11, the lack of informational knowledge pushed the fire department beyond its ability to maintain situational awareness. The root cause of this behavior was discussed in Chapter IV as organizational bias.   While understanding the cause of this as systematic, the effects of not communicating set the stage for outstripping command capacity. Without information-sharing, agencies were limited in comprehending the urgency for evacuation.

The Commission further explains the importance of coordination, which entails a unified command to track all first responders and exchange pertinent information.[77] This protocol, however, was not used on 9/11 and, instead, parallel commands were established for fire and police. The lack of a unified command outstripped New York City's ability to manage this crisis. Instead of combining capabilities to strengthen the City's response, agencies operated alone, thus weakening the overall capacity of the City's emergency responders. For Homeland Security, this exposed a critical need and provided an opportunity for major changes in emergency response across the United States.

Viewing established incident management systems as potential breaking points during terrorist attacks has caused policy makers to act decisively in establishing a national management system that joins response agencies instead of dividing them. Homeland Security Presidential Directive 5 calls for a National Incident Management System (NIMS),[78] which was established as part of the National Response Plan.[79] The principles of this directive are reinforced by recommendations from the 9/11 Commission for a nationwide adoption of the Incident Command System.[80]   Finally, NIMS was established as part of the National Response Plan.[81] When correctly implemented, NIMS effectively adds resiliency into a command system, providing the flexibility to include

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[76] *The 9/11 Commission Report*, 321.

[77] Ibid.

[78] Homeland Security Presidential Directive 5 (Washington D.C.: GPO), 4.

[79]Department of Homeland Security, *National Response Plan: Initial Plan* (Washington, D.C., 2004).

[80]*The 9/11 Commission Report*, 397.

[81]Department of Homeland Security, *National Response Plan: Initial Plan* (Washington, D.C., 2004).

many different agencies as part of a unified command and creating an environment that supports consistent information exchange.

B.   OPERATIONAL ADAPTABILITY

Adapting quickly and decisively to the surprise of a terrorist attack is something commanders must do at the next incident. It is naive to think we can anticipate and prevent every terrorist event, though it is an important goal to pursue. The surprise of when, where and how the United States is attacked is ultimately controlled by the terrorist, but the consequences of that surprise are controlled by us.[82] It is in the realm of consequence management that decision-makers deal with the effects of surprise. Adaptability is the capacity to withstand the shock of the surprise attack by remaining flexible to new information and having a willingness to be innovative and imaginative in adapting to the cumulative stress of the new environment.

1.   Dynamic Scenario Planning

Training people to identify and assess the relevant indicators in a new environment, without clinging to preconceived lists of favorite indicators, is a challenge. Developing the capacity to imagine what might happen, evaluating the likelihood of outcomes and quickly choosing the first feasible option are skills that can be developed with time and experience, but are still missing in too many individuals.

One approach for developing these skills is to expose individuals (and organizations) to high-stress training in completely unfamiliar scenarios and then rigorously reviewing with trainees the ways they gathered information to help them recognize threats, identify central problems and make correct decisions. Ultimately, the goal is to help the trainees learn to keep their eyes and minds open to crucial elements in situations they have not experienced before. Trainees learn to be willing and able to weigh all information for potential worth, including signals that may come from unexpected quarters. Their ability to imagine and even anticipate the unthinkable is critical to effective decision-making during crises.

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[82] Gray, *Strategic Surprise*, 10.

Many scenarios, however, portray a single event absent of a responsive enemy. Such static scenarios create two dangerous conditions for emergency responders. First, non-dynamic threat scenarios tend to reinforce our assumption about a pre-conceived threat environment. If emergency responders are not forced to deal with uncertainty during training, they will continue to incorrectly assume that, even in the midst of a response, they will still have time to assess and allocate the right resources for the next event. Second, threat scenarios that are one-dimensional can be managed with standard operational procedures. This eliminates necessary practice in dynamic decision-making and command innovation. In reality, the threat is rarely one-dimensional, but rather is multi-level and complex, where protocols need to be adapted to each dimension of the threat. Training against one type of threat can lead us to overestimate our capabilities to respond to an extended crisis and underestimate our enemy's capabilities to attack. Continued training against these static scenarios limits thinking and allows complacency to emerge.

Instead, organizations must recognize that the threat is dynamic and characterized by extensive uncertainty. To move beyond preparing for the last war, training must challenge and test our assumptions about operating in complex environments, examine operational and strategic constraints, and evaluate capabilities to respond effectively to challenging, changing events. This must happen at all levels of the organization, especially at the leadership level. In taking this approach, organizations can begin to build flexibility into their planning process. This type of dynamic planning allows organizations to develop new strategies for addressing unimaginable events. Dynamic scenario planning also allows emergency responders to train against a dynamic, unpredictable, multi-dimensional enemy. This gives emergency responders an opportunity to exercise operational adaptability for new events.

2. Situational Awareness

Situational awareness is a critical component of operational adaptability. It is the ability to collect significant information, rapidly process that information and then effectively use it to understand the dense context of a constantly evolving incident. It is also the basis for all subsequent decision-making and is, therefore, a crucial element in

managing complex incidents. Successfully achieving situational awareness is exceptionally challenging because it requires overcoming many challenges, including severe time constraints; incomplete information, lack of information-sharing; complex interactions with other agencies (including organizational bias); and the pressure of substantial penalties when it not achieved. For situational awareness to be fully developed, it must deal with all of these factors and exist as an incident management priority across all participating organizations.

Situational awareness is particularly critical when dealing with multiple attacks and complex rescue operations, as was the case at the WTC. On 9/11, command and control were hindered by deficient situational awareness resulting from the lack of information they received, primarily because the information available was not being effectively shared with them. As was explained in Chapter III, it was the cumulative effect of inadequate information-sharing that crippled commanders' situational awareness and perpetuated the crisis for the fire department. Organizations must develop capabilities to continually update and share various aspects of the incident, since sharing diverse pieces of information among emergency responders is the only way to achieve true situational awareness.

3.   Flexibility in Decision-Making

Flexibility in decision-making is dependent on scanning for cues, understanding the contextual framework of the situation and recognizing the unexpected. These are the requisite tools of commanders who have to make life or death decisions in a matter of moments. Preparing for the next terrorist surprise requires more than just acquiring new technology and equipment, it mandates that commanders possess the knowledge and skill to remain flexible when making decisions in complex incidents. It also mandates that when a decision is made to change tactics, it is communicated in a way that is clearly understood by the receiver. The emergency responder who receives the message must know on what authority the message is given and the context of the order. To reinforce importance and urgency, the order must be repeated.

Confronted with the complexity of the terrorism attacks on 9/11, commanders in the North Tower did not simply react to the information they received. Instead, they used each small piece of information to paint a picture of the current situation and used both information and intuition as cues to predict and proactively deal with an uncertain future. Commanders remained flexible in their decision-making in the midst of uncertainty by looking for cues that either fit or did not fit their previous experiences. It is this ability to incorporate unexpected information into decision-making during a crisis that allows commanders to be responsive to changing conditions and maintain the necessary degree of flexibility without the benefit of pre-planned contingencies.[83] Decision-making must remain flexible enough to adapt to the changing environment, yet it cannot be overly delayed because of uncertainty; commanders need to act decisively during a crisis and take action.

The analysis of decision-making by commanders and emergency responders in the North Tower illustrates the need for command and response flexibility. It further demonstrates how situational awareness influences decision-making capabilities. Decision-making is dependent on how well organizations share information with each other under increasing levels of stress and how they adapt to the new information they receive.

4. Innovation

Innovation is often thought of as a deliberate process that occurs before or after a crisis. However, commanders must be innovative throughout a crisis and encourage members at all levels of the organization to find solutions outside standard operating procedures. Thousands of people were saved on 9/11 because firefighters and other emergency personnel were able to cope with an extremely dangerous and complex situation. Innovation improves the effectiveness of an organization to adapt to new situations.

In some cases, a shocking event may even have a positive effect by stimulating people to initiate novel actions or create new inventions.[84] For example, innovation at

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[83] Klein, 279.

[84] Karl Weick, *Sensemaking in Organizations*, 84.

the operational level brought the private and public sectors together to address how to document the locations where victims, equipment and significant wreckage were found at the WTC. The 16-acre World Trade Center site had few recognizable landmarks after the collapse, hampering rescuers' ability to accurately map the points in the rubble where they found victims; which were key indicators of other victims' locations. The FDNY's Planning Chief brought together a team from the private sector to develop a mechanism to accurately record these positions in an efficient manner that would be manageable within the 10-story pile of debris. Firefighters defined the problem and guided the technological solution. Within three days, technical experts created and deployed to Ground Zero a global positioning system that worked in conjunction with a small handheld computer, which automatically captured time, date and location of items. The new technology, developed in response to unexpected requirements identified by operational personnel, proved invaluable in assisting the recovery operations.

Strategic level innovation also occurred following 9/11. At the World Trade Center attack, the radio repeater system in the building failed and the point-to-point radios were not strong enough to penetrate the highest floors of the 110-story building. In the months following the attack, it was an FDNY Captain who came up with an innovative solution. He took spare radio parts, assembled them in a suitcase and built a portable radio. This high-wattage portable radio, called a "Post-radio," works with existing equipment, forming a dependable portable communication system that is now brought to every major emergency. This example not only demonstrates the recognition of necessary change, but also shows readiness to adapt by implementing an innovative concept.

In the hours and days following that September morning, there were hundreds of other examples of innovation. Some of these innovations proved valuable and others did not. Nevertheless, it is impossible to overestimate the importance of the firefighters' willingness and ability to adapt to the changing situation and innovate throughout the crisis.

This chapter touched on several key aspects of dynamic planning and crisis leadership for complex incidents. First, the analytical use of the "fragility curve," not only helps us to understand how organizational core competencies are outstripped by terrorism, as was discussed earlier, but foresee how organizations must dynamically plan for future attacks by understanding potential weaknesses and recognizing opportunities for change. The use of the "fragility curve" clearly illustrates the breaking points of those organizations that responded on 9/11 when exposed to extreme stress. It also provides government with an opportunity to redesign emergency response organizations to withstand a greater level of stress, providing an increase in resiliency. It is important to note that resiliency must be fabricated into preparedness before an event occurs, so that when it is needed during complex incidents, commanders can depend on a more durable emergency response system. Failure to anticipate new needs to increase resiliency ultimately allows the potential for total system failure.

Second, a model for operational adaptability incorporates situational awareness, flexible decision-making and innovation as necessary elements for resiliency. What is most central to the question of expanding resiliency is how crisis managers can balance the demands of routine operations with the immeasurable risk of terrorism. The issues demand fire departments evaluate the opportunity costs of pursuing one endeavor over another. Terrorism preparedness is the ultimate insurance question; crisis managers must ask themselves, "How much of what type of insurance should they purchase?"

Emergency responders are not the only organizations asking these questions. Private firms, government agencies and individual citizens have to question how much they can afford to focus on firefighting capabilities as a security measures at the expense of other issues. An estimated cost of $20 million for a firefighting helicopter used as a regional resource for a 100-mile radius around New York City may be far less expensive when compared to the billions of dollars paid for the recovery effort.

The dynamic planning model involves organizational preparedness, operational adaptability and construction of synergistic response networks. It takes into consideration the adaptive response elements of core competency, breaking points, situational awareness, flexible decision-making and innovation into developing resiliency

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for commanding complex incidents. The lessons learned from 9/11 illustrate the need for dynamic planning on the organizational and operational levels and its power to spur imagination and innovations for future states of readiness.

VI.   CONCLUSION: INTEGRATING COMMAND RESILIENCY

Terrorism aims to take away hope. On September 11th, in the dust of the collapsed Towers, our world was in its darkest hour, but through the darkness, a ray of light appeared. The silhouette of firefighters searching for those lost became a symbol for the world, not because so many were lost, but because so many were inspired to hope.

With thousands of people trapped and hundreds of rescuers on the scene, critical decisions were made to manage the extreme crisis at the World Trade Center on 9/11. Those decisions saved an estimated 20,000 people, but at a heavy cost to emergency responders; 343 FDNY personnel, 37 NY/NJ Port Authority police officers, 23 NYPD police officers and numerous other first responders, as well as good-samaritans, died trying to rescue those trapped by the flames and destruction. The firefighters, police officers and emergency personnel were faced with an unimaginable event and performed their duties honorably. Their bravery, heroism and the lives of 2749 people who died at the World Trade Center, along with those at the Pentagon and in Pennsylvania, will always be remembered. Despite the incredible achievements of first responders on 9/11, much apprehension remains regarding what should be done differently to manage the first couple of hours of the next extreme incident.

This author has taken an in-depth and sometimes personal look at commanding and managing the multifaceted crisis of the World Trade Center attack. The actions taken inside and outside the Towers were analyzed for systematic insight on crisis management. It is not the intent of this paper to single out the successes and failures of individuals or even particular organizations, but rather to use the events of 9/11 to examine emergency response as a whole and determine what is needed to build an integrated response system that will foster future preparedness.

Organizations must constantly evaluate the effectiveness of their structure and performance as it relates to a dynamic threat environment shaped by vast unknowns that may stretch organizations to their limits without notice. Forward-looking strategies that help imagine change after a crisis, but implemented before another crisis occurs, is now

57

critical. Leaders must move beyond traditional reactive behavior by demanding resilient and adaptive approaches for managing complex incidents at both strategic and operational levels.

It is this glimpse of duty at the World Trade Center that may give us the greatest opportunity for saving lives in the future. This paper centered on understanding how organizational core competencies and social biases affect information-sharing and decision-making when stretched beyond their capacity by the shock and cumulative stress of a terrorist attack. Failure to carefully examine these issues may place emergency responders at even greater risk at the next incident. This author, therefore, proposed an adaptive response strategy for command resiliency.

In order to avoid complacency and a false sense of security, commanders and crisis managers must understand that terrorists are extremely adaptive and responsive to change in the security environment. They seek to exploit the weakness of their targets and are willing to be patient in their planning and execution. They enjoy the tactical advantage of determining the time, place and method of attack. The attacks on 9/11 and the recent attacks on Madrid's and London's transportation systems mark a significant evolution in terrorist strategies. Future attacks may bear the influence of Al Qaeda, but may be carried out by small, ad hoc groups with similar mindsets. CBRNE weapons span the gamut of crude to sophisticated military types with both the public and emergency responders as targets. As terrorists move to alternate methods of attack, commanders and crisis managers must anticipate the move and ensure a high measure of adaptability in their response.

For emergency response organizations, it is crucial to understand how the changing threat environment affects organizational capacity to respond. Organizations should strategically anticipate how to strengthen their core competencies to meet the demands of each new threat. The surprise of a major terrorist attack will push responders beyond their normal limits, requiring operational adaptability and innovation. Crisis management demands leadership that is able to foresee organizational breaking points and make necessary changes prior to an incident. Resiliency cannot, however, be totally dependent on anticipating the capabilities needed for every event. It also requires that

leaders have the ability to adapt to unexpected situations and develop a synergistic response network robust enough to manage complex incidents. Combining anticipated risk analysis with adaptive response strategies, along with the ability to overcome systematic social bias, leads to command resiliency as depicted in Figure 4.
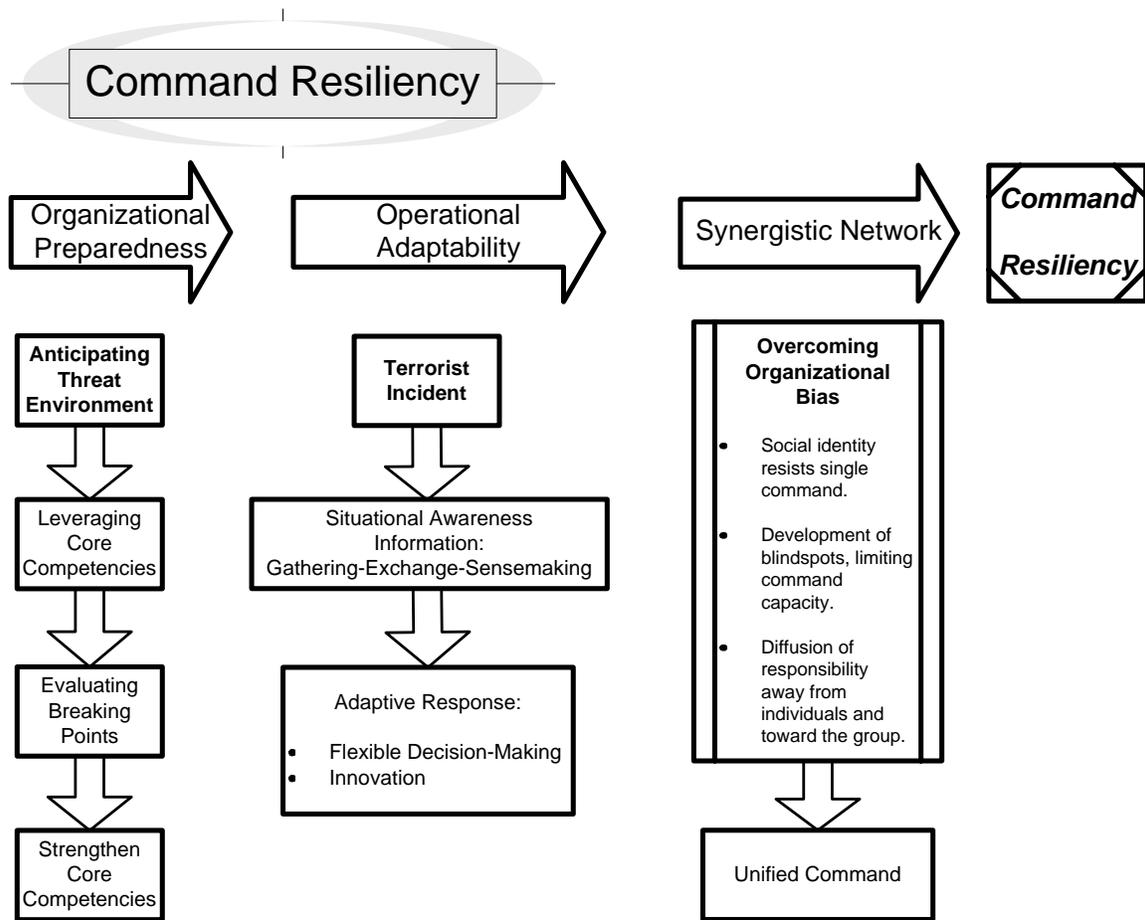

Figure 4. **Command resiliency is achieved through organizational preparedness, operational adaptability and the ability to overcome organizational bias to develop a synergistic response network.**

A. ANTICIPATED RISK

Aaron Wildavsky's book, *Searching for Safety*, describes crisis management as the balance between 'anticipation' and 'resiliency.'[85] A strategy of anticipation is an assessment of the community's vulnerability to risk and its strengths; a strategy of

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85 Wildavsky, 77.

resilience is the capacity to respond to an incident once it has occurred.[86]   Building resiliency, therefore, requires that emergency responders first consider the dynamic threat environment and their organizational vulnerability before they can understand the risk and what is needed for preparedness.

Understanding when an organization's capacity is outstripped is critical for effective command. Without such knowledge, commanders cannot effectively respond to the next crisis. Organizational breaking points and blindspots in emergency response are discovered by examining core competencies in terms of constraints in resources, trained personnel and command capacity during the initial stages of an incident. To lessen the extent of uncertainty, organizations need to fully grasp the limits of these capabilities, as well as the strengths. In many cases, organizational change may need to take place to enhance its capacity to respond to new threats.

The World Trade Center attacks illustrate both blindspots and breaking points in preparedness. One blindspot was that engineers and architects never considered the possibility that an uncontrolled fire could damage the Towers to the point of causing a progressive collapse of the entire buildings. This blindspot, coupled with the breaking point of not being able to extinguish the fire, was significant for emergency responders. Understanding the breaking points of 9/11, future building construction must consider the damaging effects of fire on their structures and fire departments need to develop the capacity to extinguish fires on the upper floors of a high-rise building without depending on the building's integrated systems.

Dynamic planning that makes use of the "fragility curve" will cause organizations to anticipate the consequences of future attacks and effectively prepare for them. The intent is not to develop a wish list of new capabilities, but a roadmap for expanding existing core competencies. By capitalizing on inherent strengths of emergency responders and working to increase the core competencies of each, organizations will be better prepared to meet the challenges of a terrorist incident.

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[86] Louse K. Comfort, Yesim Sungu, David Johnson, and Mark Dunn, "Complex System in Crisis: Anticipation and Resiliency in Dynamic Environments," *Journal of Contingencies and Crisis Management* 9 (3): 146.

B.   ADAPTABILITY

The capacity to adapt to an unforeseen or changing incident requires timely situational awareness, flexible decision-making and innovation. Adaptability is demonstrated by evacuation orders given in the North Tower. Commanders used cues to realize something was wrong and made a critical decision to evacuate rescuers from the building. Emergency responders with a more accurate situational awareness picture were able to more quickly evacuate the building. This example establishes a direct connection between situational awareness and decision-making capacity. This also demonstrates that as the complexity of an incident increases, so does the significant demand for accurate and timely information and better coordination among agencies.[87]

Terrorist incidents, not unlike fires, are usually large in scale, involve maximum amounts of damage and are surrounded by uncertainty. Emergency responders must be able to recognize the danger, immediately anticipate the potential scope of damage, and respond quickly according to continually changing information. When confronted with dynamic, unpredictable, complex terrorist incidents, adaptive response systems are undoubtedly the most successful.

The WTC has shown the weakness of relying on standard operating procedures and parallel commands in a rapidly changing environment. Instead, it is imperative to begin instilling a culture of unified adaptability in order to ensure that future responses are as dynamic as the threats. Establishing the basis for adaptability begins by changing the mindset of organizations to become more open to innovation in thinking and unified behavior. An adaptive response strategy involves evaluating the constant loop of information scanning, sensemaking, decision-making and innovation.

C.   SYNERGISTIC NETWORK

The complexity and scale of a 9/11-type attack mandate that agencies work together. In a synergistic response network there are multiple core competencies formed, not to compete with one another, but rather to complement each other's capabilities and increase overall response capacity. Adaptability in multiple attacks comes from

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[87] Comfort, *Complex Systems in Crisis*, 144.

combining the core competencies of various agencies.[88] In the simplest form, fire departments perform rescue and mitigate the life hazard; law enforcement investigates and provides protection and emergency medical personnel care for patients. In the initial critical hours of an attack, there must be a clear distribution of work, based on an understanding of the breaking points of individual organization's core competencies and the need for adaptability during the incident.

During the initial critical hours of an incident, emergency responders depend on multiple core competencies to save lives and mitigate the dangers. The WTC, in particular, clearly demonstrates a need for joint planning among emergency response organizations to better withstand the shock and cumulative stress of a complex terrorist attack. Planning to use multiple core competencies enables cities to better adapt to the uncertainty of the event. The key is for cities to create synergies among the different levels of emergency response.

Organizations that are willing to have joint scenario training sessions identify new methods of information-sharing and resource allocation at every new scenario. These joint training sessions create a dynamic planning process that results in better understanding of each other's capabilities, as well as better understanding of the potential challenges they will encounter during a terrorist attack. Dynamic planning creates flexibility and innovation in adapting to the complexity of a terrorist attack, ultimately leading to an increased capacity to mitigate its effects. Commanders who can train their personnel to rapidly gain and share accurate information will operate more effectively than less prepared organizations at complex incidents.[89] Failure to develop synergistic response networks will leave commanders with little resiliency at the next complex terrorism incident. Overcoming organizational bias and combining the strengths of emergency organizations will form a robust, synergistic response network.

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[88] Brian Dickerson, "Adaptability: A New Principle of War," in *National Security Challenges for the 21st Century*, ed. Williamson Murray (Carlisle Pa: Strategic Studies Institute, Army War College, October 2003), 214.

[89] Mica R. Endsley, et al, *Modeling and Measuring Situational Awareness in the Infantry Operational Environment*, (U.S. Army Research Institute for the Behavioral and Social Sciences, 2000), 17.

D. RESILIENCY

Organizations that truly comprehend limits in their capacity to withstand the shock of a terrorist attack realize that terrorism is multi-dimensional and optimal response operations require a more robust emergency response system that is dependent on the complementary efforts of many agencies. Organizations that can assess their own breaking points and adapt to an evolving event must build a redundancy in their core capabilities, then join with other principle agencies to form a synergistic network for response.

The unpredictable nature of terrorism and the uncertainty of the next attack necessitate that preparedness involves redundancy. Effective command management includes contingencies for significant loss of resources and capabilities during the course of response and recovery. 9/11 highlighted the catastrophic implications for fire departments in relying too heavily on the building construction and inter-agency information-sharing in carrying out their primary mission of firefighting and rescue. The WTC's fire protection, suppression and communication systems failed and there were additional breakdowns in systematic inter-agency communication and coordination. This placed the fire department at an extreme disadvantage. FDNY was so dependent on the WTC building systems and information from other agencies that failure of these systems left them with no redundancy or alternative. On that fateful day, without their own resiliency for information and fire suppression, they did the best they could to rescue those who were desperately trapped and needed assistance.

We should certainly demand better building construction and better interoperability among emergency responders, but 9/11 has taught fire departments an equally important lesson: they need to ensure continuity of operations in case these systems are rendered inoperable again. Emergency responders must not depend on the building for communications. Instead, they need to bring a communication system to the building in the form of high-powered radios and develop a robust communication infrastructure. These systems must have enough resiliency and redundancy built into the system to ensure there is no single point of failure.

The most successful terrorist attack in history used fire as a weapon and it is likely they will continue to seek other incendiary methods. Fire suppression has always been seen as only a component of high-rise buildings. Fire departments must develop alternative firefighting tactics to deal with another 9/11-type fire and not depend solely on existing building fire suppression systems.

Information-sharing is so essential that emergency responders must seek information from multiple sources. Organizations need to build an information system that will provide an equal level situational awareness for all responding organizations. Gathering information from multiple sources gives the fire department more resilience and ensures commanders have the necessary information for critical decisions.

Information is best gathered, exchanged and made sense of through the use of a unified command. Inherent in emergency responders, however, is an organizational bias that produces positive in-group favoritism to those in the same organization and a negative out-group prejudice against those who are part of a different group. Overcoming these biases is essential to information exchange, decision-making and coordination. This became painfully evident through the analysis of the evacuation from the North Tower. Agencies must actively take the steps outlined in Chapter IV to eliminate organizational bias through the use of unified command.

The principles of redundancy and resiliency do not simply suggest duplication of assets or stockpiling of resources. Redundancy as a strategy is present to help build surge capacity into the core competencies and preparedness and response capabilities. It reduces the probability of blindspots in planning and breaking points in response.

In order to optimize command resiliency, organizations must be able to identify threats, assess vulnerabilities of core competencies and determine the impacts of many potential incidents. While organizational security efforts cannot anticipate the time or the place of a terrorist attack, they can anticipate the potential effects and ramifications of an attack and enhance capabilities to manage potential threats. They must also be able and willing to become more adaptive. Informing commanders and personnel of all relevant information will increase situational awareness for decision-making and innovation.

Sharing information contributes to the overall adaptability of command by ensuring that the element of surprise is reduced and organizations have the best chance to adapt rapidly to a changing situation.

Command resiliency is the ability to adapt to uncertainty before and during an attack. This is accomplished through dynamic planning that anticipates weaknesses and strengthens organizational breaking points. The use of dynamic scenarios further develops adaptability skills for better information exchange, flexible decision-making and innovation. Command resiliency is achieved by overcoming organizational bias and through dynamic planning, integrates organizational preparedness and operational adaptability into a synergistic response network.

Senior commanders and crisis managers must continue to develop organizational capacity to withstand the cumulative stress of terrorist crises. They are equally responsible for integrating these organizational core competencies into a unified network of response. Failure to build this synergy will result in the inability to provide critical service during the initial hours of a terrorist attack. Careful strategic planning with these principles, however, will ensure the development of command resiliency for successfully commanding complex incidents.

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