

Elements of Community Resilience in the World Trade Center Attack

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Summary

In this paper we examine how New York City coped with the destruction of its Emergency Operations Center following the World Trade Center attack and how it reconstituted that center in a new location. We make the observation that, although the physical facility was destroyed, the organization that had been established to manage crises in New York City remained substantially intact, enabling a response that drew on the resources of New York City and neighboring communities, states, and the federal government. A resilient emergency response was achieved through integrating the adaptive capacity of the response organization with the resources of New York City, private entities, and government at all levels. Availability of resources (which fostered redundancy of capability), pre-existing relationships that eased communication challenges as the emergency developed, and the continuation of organizational patterns of response integration and role assignments were among the factors that contributed to resilience following the attack.

Introduction

In this paper, we examine how organizational resilience was reflected in the activities of New York City departments as they responded to the World Trade Center attack in September, 2001 while at the same time losing their primary emergency operations center (EOC) facility at 7 World Trade Center. Our focus lies primarily on the reestablishment of the EOC in the days that followed the attack. Data for this analysis were gathered during exploratory fieldwork commencing within two days of the attack and continuing for two months thereafter, totaling over 750 collective hours of systematic field observations. In particular, we observed key planning meetings at highly secured facilities, including the EOC and incident command posts; we spent extensive periods observing operations at supply and food staging areas, the “Ground Zero” area, family service centers that were established for victims’ families, and respite centers that were established for rescue workers. These observations yielded voluminous field notes as well as over 500 photographs. Additionally, we collected reports, schedules, meeting agendas, and maps, and we sketched or collected floor plans of various facilities to track spatial-organizational changes over time. Through these data-gathering efforts we were able to document the evolution of the re-established emergency operations center from very early stages.

The response to the attacks on the Twin Towers necessitated the coordination and interdependency of hundreds of organizations within and outside the City of New York. Our focus of analysis, however, is on the Emergency Operations Center, the facility at which emergency operations are coordinated in disasters of all types. We consider the EOC not only as a physical space but as an

organization that facilitates and oversees the City's multi-organizational disaster response, and that has its own set of protocols, functional responsibilities, and organizational structure. Because the Office of Emergency Management (OEM) permanently staffs the EOC space and plays an instrumental role in its activation, the resilience of the EOC as an organization during an emergency is more tightly coupled to OEM's robustness than it is to other departments within the city. At the same time, the instrumental roles key City departments play in the EOC organization should not be understated. In a later section we distinguish *robustness* and *resilience*.

The Emergency Operations Center

One key function of an emergency operations center is to centralize at one location the personnel and equipment that are needed to manage a response to diverse types of emergencies. The New York City Emergency Operations Center occupied much of the 23rd floor of 7 World Trade Center and boasted an array of technological capabilities. There were computer-equipped workstations for up to 68 agencies, arranged into groups called *pods* (Health & Medical, Utilities, Public Safety, Infrastructure, Human Services, Transportation, Government, and Administration) with an ability to expand by another 40 workstations if the need arose (OEM, 2001). Workstations were equipped with software that made it possible to perform the specialized tasks of the various constituent agencies. The site was equipped with computer messaging systems for communicating among staff, a phone system with provision for microwave back-up, separate systems for Fire, Police, and EMS communications, Coast Guard-operated video monitoring of New York's waterways, and traffic monitoring of the city's streets. In addition, a raised "podium" provided selected staff an overview of the EOC and its operations and allowed for access to a variety of sources of weather information—including direct National Weather Service feeds—video conferencing, and ARCVIEW and MAPINFO GIS packages. Podium staff could also view the location of critical systems and facilities, such as the electric grid, the water system, and hospitals (OEM, 2001).

The Destruction of the Emergency Operations Center

The broad outlines of the events of September 11, 2001 are now widely known, featured as they have been on television and in other media. 7WTC was among the buildings evacuated after the second airplane strike because of the extreme hazard caused by its close proximity to the towers. In addition, early reports of a possible third hijacked aircraft with an unknown destination contributed to the decision to evacuate. The evacuation of the facility was very rapid, and little or no equipment or documentation was saved. 7WTC collapsed in late afternoon on September 11 as a result of fire that had engulfed the structure. Emergency managers, along with the mayor and some agency representatives, kept falling back from the attack area to intermediate sites in order to set up a command post. Before long each of these sites also proved hazardous or otherwise untenable. During the initial period after the attack, the City made use of a mobile emergency operations unit that was able to provide a base for initial reestablishment of the EOC. Preliminary accounts differ regarding the nature of communications difficulties during this early time; most communications were down, but one OEM official has stated that the 800Mhz capability remained and OEM personnel could communicate with other staff. Eventually OEM personnel reached the library of the Police Academy but they soon found its configuration and communications capability to be inadequate. Meanwhile, a parallel operations center was established at a nearby high school to serve as a forward staging area. This was an improvised arrangement, with cafeteria tables being used for meetings, wires running everywhere, and very old telephones. Nevertheless, this site was set up to resemble the spatial organization of the original EOC, with workstations and a command table. During the night of September 13th, approximately 60 hours after the attack, the operations at the

Police Academy moved to a large cruise ship facility at Pier 92 on the Hudson River. This semi-permanent facility still housed the EOC until mid-February 2002, when OEM moved to a facility in Brooklyn.

Resilience in New York City

One key aspect of the response to the September 11 attack is that, although the emergency operations center was destroyed, the emergency management organization was not. Rather, the organization itself exhibited resilient, adaptive behavior. When we arrived at the new EOC, some 96 hours after the attack, we found not a makeshift facility, but a two-city-block long space already half-filled with an expanding number of people, work-tables, copy machines, maps, charts, and over two hundred computers, all networked and functioning—a number which was to grow during the period of our observations. The facility did lack the well-appointed furnishings, lighting, and acoustics of 7WTC and it did bear abundant evidence of its rapid assembly, but it was nevertheless a functioning, continually maturing site for the performance of all necessary emergency management functions.

What occurred in the aftermath of the September 11 attacks can be analyzed using the definitions and dimensions of resilience developed by MCEER researchers. MCEER (Bruneau et al. 2002) defines resilience as “the ability of [a] system to reduce the chances of a shock, to absorb a shock if it occurs (abrupt reduction of performance) and to recover quickly after a shock (re-establish normal performance). Dimensions of resilience include *robustness*, *redundancy*, *resourcefulness*, and *rapidity*.

Robustness is “...the ability of elements, systems, or other units of analysis to withstand a given level of stress or demand without suffering degradation or loss of function” (Bruneau et al. 2002: 6). While the physical structure housing the EOC was not sufficiently robust to survive the September 11th attack, in contrast OEM did exhibit considerable robustness *as an organization*, demonstrating an ability to continue to function even after losing its facility and a great deal of its communications and information technology infrastructure.

Redundancy is “the extent to which elements, systems, or other units of analysis exist that are substitutable, i.e., capable [of] satisfying functional requirements in the event of disruption, degradation, or loss of functionality” (Bruneau et al. 2002: 6). Resourcefulness is the “capacity to identify problems, establish priorities, and mobilize resources when conditions exist that threaten to disrupt some element, system, or other unit of analysis” (Bruneau et al. 2002: 6). Rapidity is the “capacity to meet priorities and achieve goals in a timely manner in order to contain losses and avoid future disruption” (Bruneau et al. 2002: 6). The features of redundancy, resourcefulness and rapidity are well illustrated in the re-establishment of the EOC. In addition the WTC case demonstrates that the qualities of redundancy and resourcefulness are strongly interrelated. Resources, and resourcefulness, can create redundancies that did not exist previously. For example, one of the major concerns with the increasingly intensive use of technology in emergency management is the possibility of over-reliance on those tools, so that if technology fails or is destroyed the response falters. To forestall this possibility, many planners advocate redundancy. In the World Trade Center attack, the EOC was completely destroyed; everything was lost. Emergency managers thus were faced with two requirements: new space, and new tools.

A major impediment in meeting this suddenly emergent need was that there was no pre-established back-up facility at which OEM staff and other responding departments could conduct operations even on an interim basis. Any back-up facility should also have been geographically removed from the primary center. This might have increased the City’s resilience, and therefore response capacity,

at least in the short term. Instead, OEM staff had to seek space at several intermediate locations, eventually settling on the Police Academy, where they had to jury-rig telephone lines, for two to three days. Nevertheless, events would later demonstrate that any back-up facility would probably have been inadequate given the wide-ranging demands of this disaster. Improvisation on a large scale would still have been necessary, as was seen at the site that became the EOC for the next five months.

OEM compensated for a lack of robustness and redundancy in physical systems through strategies that not only succeeded in mobilizing resources but also created an alternative physical facility where none had existed before. A pier on the Hudson River, which had been scheduled to be used for a bioterrorism drill on September 12, was leased for long-term usage. OEM staff then arranged for the delivery of hundreds of computers; these were installed and networked within 36 hours, with more arriving thereafter. With space as well as computing and communications equipment, OEM staff were able to establish a functioning replica of the old facility. There was no pre-existing redundancy for the EOC. Rather, with access to resources from within the city and relationships with the private sector, the Office of Emergency Management created redundancy. Obviously, one source of this enormous capacity for resilience inheres in the City itself. New York City alone, even without recourse to external sources of assistance, possesses immense capacity, with emergency services departments equaling the population of a small city, and a resident citizenry possessing every art and talent.

New York was also the focus of an outpouring of support that further enhanced its resilience. Resources of nearly every description arrived, with convergence becoming at times a management problem in itself. This convergence of volunteers and equipment is well documented in reports of other disasters as well (see, for example, Neal (1992, 1994). See Kendra and Wachtendorf (2001) for a discussion of convergence in New York City.). In terms of the community aspect of resilience, New York participated not only in formal mutual aid agreements, but also there was a network of personal contacts between the emergency managers in OEM and their colleagues in other nearby communities. They knew each other and often attended meetings and conferences together, and thus they were able to ask for and give assistance more readily. For example, personnel from nearby Nassau County worked at the logistics station, augmenting the existing staff. Police officers from New York State Police staffed barricades and checkpoints. National Guard personnel and police from well beyond the city's borders—and ultimately from across the country—also arrived to provide help in a similar capacity. The role these assisting officers and military personnel played enabled New York City's officers to work at tasks requiring more local knowledge. Such emergent redundancy was not limited to the police force but also seen in a variety of areas such as logistic offices and fire departments.

Another large source of personnel were the Red Cross volunteers who served hot meals (prepared by a commercial caterer) in the EOC and in respite facilities established close to Ground Zero – at first near forward staging areas in outdoor tents and then later at the Marriot Financial Hotel and St. John's University. In these respite centers established at the latter two facilities were cots, easy chairs, showers, dining halls, televisions, and computers with Internet and email access. They also provided such services as massage therapy and chiropractic care, counseling, and first aid. Urban Search and Rescue teams arrived from across the United States. Nextel supplied thousands of radiotelephones. Other Hudson River piers were pressed into service for Federal Emergency Management Agency (FEMA) office space and the establishment of the Family Service Center, where relatives of victims and survivors displaced from their homes or jobs could find assistance

with the many administrative processes. New York City and Company, the visitors' bureau, helped volunteer and other relief workers find accommodations. Hewlett Packard, ESRI, and professors and graduate students from local colleges were among those who supplied GIS support and equipment. As these examples suggest, a large influx of materials can, at least in some instances, counteract a lack of redundancy.

Mirroring the original EOC, which as indicated earlier was organized by function into working modules called pods, staff established comparable pods at the new EOC. It is important to stress, particularly in terms of the rapidity dimension of resilience, that the improvised EOC that was set up within 48-72 hours of the attack was already twice the size of the original, both in size and in terms of the number of organizations represented and computers involved. Over two hundred fifty computers and a comparable number of organizations were eventually present in the EOC, and some 700 people worked there or passed through during the day. One senior OEM official said, in fact, that the city would have been unable to manage the event entirely from 7WTC even if it hadn't been destroyed.

None of OEM's regular staff was killed, though its members were dispersed and out of regular contact with one another for several hours after the attack. Some were temporarily trapped or missing or had been injured. Nevertheless, OEM was able to preserve its organization, even though it had to reconstitute that organization in an entirely new location. OEM's creativity lay not so much in creating something new, but rather in reproducing what it had lost: the familiar sociotechnical system in which personnel had worked and trained in previously. Physical elements of the EOC, such as the workgroup pods, the podium, the raised platform for the watch officers, were replicated. The ability to re-establish that level of familiarity with respect to physical facilities and arrangements helped to maintain the shared vision that most researchers agree is important to a resilient organization and, in this case, a resilient community. OEM did not merely use what it already knew; it drew upon resources in order to duplicate familiar operational patterns. When existing procedures were destabilized in the face of unexpected catastrophe, OEM created the operational context for maintaining them. This was possible because, through training, frequent drills, and exercises that often involved the mayor, OEM had developed a capacity for adaptive behavior that was not dependent on either specific physical facilities or specific technological systems. As one senior official said, "It [the organization] was in my head." OEM thus created, not a new "shared vision," but the means of preserving the vision that had guided its activities prior to September 11.

Conclusion

Our findings with respect to the response to the World Trade Center attack support conceptions of resilience that are found in the existing literature, but we also find some divergences, especially with regard to the anticipation-resilience dichotomy presented by Wildavsky (1991). Anticipation is the perspective he prefers only for situations in which there is "considerable knowledge" and change is "predictable" (1991: 123). These are the minority of situations. In other situations, he argues, problems are addressed through actions that demonstrate resilience. We argue, however, that resilience and anticipation are not polar opposites or mutually exclusive characteristics or states. Indeed, Wildavsky himself often conflated resilience and anticipation, probably because they are so closely related. Resilience is achieved by preparing, not for a particular event, but rather for the maintenance of a range of capabilities. "The organization was in my head," the statement made by the OEM official, is a key phrase in this respect, because the organizational outline or template "in his head" was a schematic of tasks to be performed and the interorganizational relationships that

would accomplish them. Anticipation lay in the design of an organization that would focus on the dimensions of the response—what, how, where, who—and that would be able to “think” about needs and then fulfill them.

The case of New York demonstrates that, rather than being conceptually distinct, anticipation is an integral dimension of resilience. The distinguishing feature concerns what is to be anticipated. NYC certainly devoted attention to anticipating, and preparing against, a certain range of expected hazards, biological attack among them. Researchers from DRC attended a bio-warfare exercise just a few months prior to the attack and were again scheduled to observe another bio-terrorism exercise on September 12. There is a strong measure of anticipation evident in NYC’s resilience: in its previous training and drills, and in the organization itself, which was able to expand dramatically to cope with new demands. Importantly, there were no rigid boundaries that excluded new agencies from participating.

Given the foregoing, we return to what the case of New York City can tell us about resilience or, stated more generally, about socially constituted adaptability to unpredictable ambient forces. Clearly, an organization involved in emergency response wants to maintain the established and known aspects of its operations, such as policies, procedures, practices, or tools. Yet, as illustrated by the World Trade Center attack, such organizational features can fail or prove inadequate to deal with the emerging disaster situation. It is at these times that resilience proves instrumental for bolstering effective response efforts. We see from New York that craftsmanship with respect to problem solving—almost an artisanal quality—allows people to deploy rapidly adaptive strategies. Like any craftsmanship, activities associated with emergency response derive from training, experience, and the ability to become inspired by features in the surrounding environment and to translate those inspirations into creative and innovative actions. Inspiration here is not meant in an ephemeral sense. Instead, it implies that the craftsman has taken note of a feature or features in the surrounding environment, engaged in a cognitive process of interpretation of that feature to produce a vision of a new goal or a previously unthought-of way to achieve an existing goal, and redirected his or her actions. Just as an artist may employ a new tool, new material, or new strategies, so too do decision makers in a resilient organization invoke new tools, materials, and strategies to rebound when established methods fail or when unanticipated circumstances arise. In both cases, training and preparation remain fundamental, but creative thinking, flexibility, and the ability to improvise in newly emergent situations are vital.

Acknowledgements

This research is supported by grants from the Multidisciplinary Center for Earthquake Engineering Research (MCEER), New Technologies in Emergency Management, No. 00-10-81 and Measures of Resilience, No. 99-32-01, and by special supplemental funding provided by the National Science Foundation following the September 11 attacks. An earlier version of this paper was presented at the 48th North American Meetings of the Regional Science Association International, Charleston, SC, USA. November 15-17, 2001. We are grateful to Professor Kathleen Tierney for her comments and suggestions on successive drafts of this paper.

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