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**Reproductive Improvisation and the Virtues of Sameness:
The Art of Reestablishing New York City's Emergency Operations Center**

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Abstract

Based on an inductive analysis of qualitative in-depth interviews, extensive field observation, and document material, we introduce the concept of reproductive improvisation, an improvisation form that emphasizes reproducing something valued that is lost. We address how an organization might choose sameness in turbulent and ambiguous environments, and how it achieves that goal. Using the reestablishment of the Emergency Operations Center (EOC) following its destruction during the September 11, 2001 World Trade Center disaster in New York City, we discuss how factors such as system stability, pressures to maintain the status quo, substitution accessibility, and retaining a preexisting mental map that develops into a shared vision all facilitate reproductive improvisation. This research differs from most other work on improvisation (e.g., Weick, 1998) that focuses on improvising to generate something new. Here we focus on improvising to generate something that is, as much as possible, the same as a previous model. We therefore add a new perspective on the usual thinking of improvisation and organizations responding to changing environments.

Keywords: Disaster, improvisation, organization.

Introduction

Standard organization theory emphasizes that organizations must be able to innovate and change their structures, products, technologies, and operations in order to meet changes in the environment (e.g., Baker et al. 2003; Daft 2004; Daft and Noe 2001; Jones 2004; Miner et al. 2001). For example, Hellreigel and Slocum (2007: 448) stated that

“...organizations must have the capacity to adapt quickly and effectively in order to survive,” an assertion supported by Hirschhorn (2002). Switching structures (Daft 2004), flexibility, innovation, and other such terms urge us to focus on changing to meet sudden demands. Some, such as Lin et al. (2006), have grappled with the change-versus-stability balance in ways that appreciate stability. For example, using both computational models as well as real organization crises, they found no significant increase in performance when organizations restructured during crisis, and they argued that the central question is not “whether” to restructure, but rather “how” (2006: 612). The authors suggested, citing Brown and Eisenhardt (1998), that an organization’s “first choice of adaptation may be subject to organizational design trap and may not yield the best possible outcomes for dealing with crises” (2006: 612).

Yet, even with exceptions such as Lin et al.’s (2006) to consider, sameness and structure seem dreary and shabby, and managers who are reluctant to change are blamed for shortfalls in competitiveness, sluggish response to challenge, and even organizational failure. Appreciation of change, even delight in it, borders on a moral prescription. We don’t deny the importance of change, and in much of our work we, too, have strongly emphasized change and transformation (see, for example, Kendra and Wachtendorf, 2003; Wachtendorf and Kendra, 2005a; Kendra and Wachtendorf, 2006; Kendra and Wachtendorf, 2007). We argue, however, that in situations of abrupt environmental change, sameness might yet be appreciated, even desired, as a deliberate and necessary response. Disasters are good settings to explore this idea as they provide opportunities to observe social structures as they emerge and how those structures function under stressful conditions (Dynes and Drabek 1994; Kreps 1989). The intersection between organizational stability and emergence is deeply rooted in the disaster research tradition and is well represented by research examining emergent groups (Stallings and Quarantelli 1985; Nigg 1994); organizational adaptation (Stallings 1970); improvisation within organizations (Kreps et al. 1994); role improvisation (Webb 1998); and struggles for enhancing improvisation through decision-support tools (Mendonca et al. 2001).

Sudden environmental jolts may unexpectedly unhitch an organization from its expectations about performance and capabilities. Disaster plans are a principal tool for mapping allocation of resources to problems. But sometimes plans are not enough. Sometimes events occur that are larger than anticipated; sometimes resources break down or are themselves destroyed. Improvisation, or the process of “[reworking] knowledge to produce a novel action in time to meet the requirements of a given situation” (Mendonca 2001: 1), closes the gap between expectations and actual capabilities and is therefore a key capacity for steering an organization through a turbulent environment.

Tsoukas and Chia (2002: 567) rightly noted that “[t]raditional approaches to organizational change have been dominated by assumptions privileging stability, routine, and order.” The authors argued that essentially there is no such thing as organizational stability; that there are always changes. We agree with their assertion, but only up to a

point. Improvisation and stability as operational concepts are ideal types. In practice, these function on levels of degree (Webb 1998). In the context of disasters, Quarantelli (1996) acknowledged that even organizations that were characterized as having routine structures or tasks could still “[exhibit] some temporary or minor emergent qualities” (Quarantelli 1996: 57).

But there is tension in how we construe stability and change. Feldman (2000) argued that routines are powerful sources of change, especially if one considers the agency of the enactors, but also asserted that “a routine can change and still be the same routine” (612). *This is an important observation for our discussion because we will not argue that nothing changed in the case we examine, but rather that we see the impetus was toward sameness.* We suggest that we can sometimes credit *improvised* action, implemented by thoughtful agents and directed toward preservation and reproduction, for results that simulate sameness.

Our focus here is on reproductive improvisation, an improvisation form that emphasizes reproducing something valued that is lost. We address how an organization might choose sameness, and how it achieves that goal. Using the reestablishment of the EOC following its destruction during the World Trade Center (WTC) disaster, we discuss how factors such as system stability, pressures to maintain the status quo, available substitutions, and retaining a preexisting mental map that develops into a shared vision all facilitate reproductive improvisation. The research differs from most other work on improvisation (e.g., Weick 1998) that focuses on improvising to generate something new. Here we focus on improvising to generate something that is, as much as possible, the same as a previous model. We therefore add a new perspective on the usual theoretical thinking on organizations responding to changing environments.

We do not argue that there was a return to the exact organizational state that existed prior to the galvanizing event. Improvising with substitutions in novel ways would indeed make that goal unattainable. Rather, we emphasize attention to both the unit of analysis and the motivations of those involved in the improvisation process. First, reproductive improvisation could occur for a specific task, resource, activity, or structure while the other forms of improvisation or stability more appropriately describe other elements of the organization. Second, in the same way that using a shoe to function as a missing hammer does not reproduce the exact resource but instead demonstrates an improvised approach toward sameness, the improvised reproduction of the EOC as considered in this paper does not generate an exact replica of the preexisting resource but instead shows a time-constrained reworking of what is at hand in a movement toward sameness. We illuminate how an organization network chooses its form during crisis—in this case choosing to keep its usual form and operational norms. In our case, for the concept of reproductive improvisation, we demonstrate that stability is not entirely discrete from improvised action.

Methods

Our findings are based on an inductive qualitative analysis of data drawn from a broad range of data sources. Beginning two days after the disaster, we conducted over 750 collective hours of direct exploratory observation at key response-related sites around New York City, including the reconstituted EOC, incident command posts, and the federal Disaster Field Office (DFO). We attended meetings focusing on daily interagency coordination, federal support and involvement, security, logistics, safety, medical issues, and debris removal. Exploratory observation also included extensive periods at staging areas, the “Ground Zero” area, and the family assistance center. Regular debriefings in the field and a subsequent review of field notes revealed the substantial influence of improvisation in this response.

The following year, we conducted formal in-depth face-to-face and telephone interviews with over sixty key participants in the WTC emergency response. Questions in the semi-structured interview instrument included those focused on improvised action. Interviews were transcribed verbatim and open-coded. Codes were collapsed, resulting in the development of a continuity/improvisation typology (of which reproductive improvisation was one of several fundamental types). Each type was reconceived as a dependent variable influenced by a specific combination of independent variables (the presence of a plan or standard measure, the ability to carry out that plan if it exists and is known, the determination of the plan’s appropriateness given the emerging circumstances). Episodes were chosen for each improvisation type. Selection was based on identifying those episodes with the richest amount of data and on which data could be gleaned from multiple interview perspectives. Additional open-coding of the episodes led to a more nuanced understanding of the key factors or considerations that influence the emergence of each type.

Observation and interview data analysis were further augmented with analysis of both primary (such as situation reports and other documents produced by response participants) and secondary documents (such as after-action reports composed by others). The variety of data sources and collection strategies allowed for triangulation as a means to check for data validity (Denzin 1989). It also both filled gaps in the chronology of events and provided a more complete picture of the organizations and their involvement in particular response functions. Inductive qualitative coding of response actions led to the identification of distinct patterns of improvisation and continuity as well as the identification of type characteristics (see Wachtendorf, 2004 for a complete discussion). One type, reproductive improvisation, is discussed here.

Reproductive Improvisation

In a crisis, it is often the case that the organization has a system in place, but this system is then disrupted in ways that negatively affect the performance of activities and tasks, destabilize organizational structures, or destroy or compromise resources (Kreps et al. 1994). At the same time, the organization collectively may determine that those original elements are still needed and appropriate in order to respond to the newly emergent environment. Despite the demands placed on the organization by the disaster and its inability to implement the original structure, resource, activity or task, those elements may be collectively seen as the most appropriate to emerging needs. As a consequence, in these circumstances, those involved within the organization are compelled to improvise to ‘make do’ or, in other words, employ a substitution to achieve the same outcome the original measures or plans had intended. *This form of improvisation—reproductive improvisation—involves the time-constrained and unplanned-for substitution of an original or recently implemented organizational element consisting of a structure, an activity, a resource, or a task.*

The new social arrangements that emerge in a disaster situation are tightly coupled to previously existing arrangements (Kendra and Wachtendorf 2003; Kreps and Bosworth 1993; Quarantelli and Dynes 1977). Pre-arranged structures, planned actions and responsibilities, and acquisition of anticipated resources form the basis for decision-making in emergent environments. To a greater extent than other improvisation forms (Wachtendorf, 2004), reproductive improvisation is heavily influenced by what was originally in place. Original plans and procedures form the basis of a shared vision the organization strives for even though novel strategies are used to reproduce them. The organization, or in some cases group of organizations, find meaning in the environment and look to each other to collectively determine that the original element is no longer viable and, moreover, look to each other to replicate the original element as closely as possible with the use of one or more substitutions.

In a disaster, meaning is created through a social process of 1) looking back on what has occurred; 2) assessing the structures, activities, resources, and tasks in place; and 3) *making sense* (Weick 1993) of possible and appropriate courses of action in the dynamic environment. In the case of reproductive improvisation, the process can be as explicit as organizations coming together in a meeting and expressing a will to recreate the original model, or as implicit as one organization taking steps toward reproduction with other organizations reinforcing those steps with their own novel substitutions—or, at the very least, not working against the reproductive improvisations in which others are engaged.

Of course, organizations make reproductive substitutions during routine periods as well as during disasters. For example, a small community may look at the emergency management agency of a larger, wealthier community and determine that it should establish that type of organization locally. However, due to limited financial resources, the smaller community may not be able to establish the agency in exactly the same way.

Instead, it may choose to make use of substitutions in hopes of achieving the same results. For example, instead of having a stand-alone emergency operations facility, the smaller community may use the basement of a police station. Instead of employing paid staff, the community may choose to make use of both paid and volunteer staff.

In contrast to this routine substitution, *reproductive improvisation* occurs when those decisions are made under conditions of uncertainty and under tight time constraints. The organization has little time to choose substitutions, yet must do so while simultaneously making sense of what requires substitution and what substitutes are readily available. The organization must make sense of its own environment while simultaneously moving forward with its improvisation strategies. Reproductive action in routine periods allows for the consideration of viability and appropriateness before the decision to reproduce it is made.

In Weick's classic statement, "[considered] as a noun, an improvisation is a transformation of some original model. Considered as a verb, improvisation is composing in real time that begins with embellishments of a simple model, but increasingly feeds on these embellishments themselves to move farther from the original melody and closer to a new composition" (1998: 546-547). However, in the case of reproductive improvisation, Weick's definition does not fully account for the process involved. In this type of improvisation, there is significant movement toward returning to the original model to the greatest extent possible, but by using novel substitutions at hand. Instead of moving farther from the original "melody," improvisers want the original, making do with substitutions when the original is no longer viable.

Reproductive improvisation in disasters is consistent with improvisation in contexts such as music and theater. The script, the score, or the plan forms the shared vision for an ensemble; however, the ensemble recognizes that limitations demand that substitutions be employed. The realization that several keys on a piano are broken may require the pianist to improvise the melody of a performance by substituting notes to best reproduce the original score and cause fellow musicians to improvise accordingly. The absence of a critical prop during a theatrical performance may necessitate actors on stage to substitute the item with another, changing lines accordingly to incorporate the substituted item until they move on and can gradually return to the original script. The death or injury of key emergency response personnel during a disaster could require an organization to substitute these personnel by promoting lower ranked personnel to higher positions, bringing in personnel from outside areas, or making use of retired staff. In each case, the improvisers must continue to perform, to act, or to respond while simultaneously seeking and implementing a substitution that will eventually bring them to a close reproduction of the original model.

In the response to the WTC disaster, many instances of reproductive improvisation took place on an individual level. For example, responders repeatedly used pieces of debris and items at hand to serve as makeshift tools in the early hours of their search and

rescue efforts. Although later admitting to the adaptive (deviations from the original model) and creative (altogether new) improvisations that permeated the response, one deputy inspector from the New York Police Department (NYPD) described the reproductive improvisation he was involved in during the initial response to the WTC site:

There really wasn't too much of a difference [from a more typical disaster....The] basic lines of what you wanted to do existed. You wanted to evacuate and you wanted to contain. You wanted to get the people out of there, and you want to make sure that the area was secured for anybody else who would look to go in. And that basically remained the same...But [keep] in mind, that we did not have the resource of the police officers there. So, what we did was just made do. I had custodians; I had building workers [helping out].

One of the most dramatic examples of improvisation during the response was one of reproductive improvisation—the reestablishment of New York City's EOC. With the destruction of the EOC, a critical resource for the effective response to a disaster of the magnitude of the WTC collapse, city officials urgently needed to substitute the old EOC with a new facility. It is this reproductive improvisation episode that we focus on to illustrate the characteristics of this particular improvisation type.

Setting the Stage: The Destruction of the EOC at 7 World Trade Center

An EOC is a place where agency representatives can convene, coordinate response efforts during an emergency, and provide information and support to personnel engaged in operational response activities. A centralized location for multi-agency information distribution, resource sharing, and decision-making, it is a physical place, but it is also a process involving the centering of a multi-agency emergency operation that supports a decentralized implementation of the response. In other words, the EOC is a physical resource that supports the social structures, activities, and tasks of emergency management activities.

The New York City EOC on the twenty-third floor of 7 World Trade Center (7WTC) was constructed in 1999 with a price tag of \$13 million. It was one of the most sophisticated facilities of its type in the world. As one high-ranking Mayor's Office of Emergency Management (OEM) official stated, the EOC had "more bells and whistles than [one] could imagine." Heavily reinforced exteriors, back-up systems, impressively equipped workstations and communication systems, as well as access to databases and specialized monitoring systems were among its features. However, despite the structural reinforcements and the advanced technology employed in its construction, the building succumbed to the debris fall-out and to fire on September 11, and it collapsed at 5:20pm.

The emergency response organizational network (ERON) that would typically respond from the EOC repositioned itself over a series of locations and time periods. Initially, a handful of officials scattered to One Police Plaza, the site of the primary NYPD command post. Some deployed to the OEM mobile command bus, a designated back-up resource, while others simply made their way north, away from Ground Zero. Many made contact with the Mayor and his entourage of staff and commissioners as the group moved north to a series of buildings, ultimately regrouping at a firehouse on Houston Street to which the command bus was deployed. The EOC was activated at the Police Academy library at approximately 2pm on September 11, where in these early hours the self-initiated organizational arrangements already began mimicking the 7WTC resource. Eventually, the EOC was reestablished at the Pier 92 facility along the Hudson River. Representatives were instructed to report to the Pier 92 EOC for the 6pm shift on Friday, September 14, although staffing at the Police Academy continued overnight during the transition. Many of the organizational arrangements and resources were reproduced at this substituted site. The following discussion highlights the social factors that contributed to this process.

Ability to Carry Out a Plan

Whether an organization will improvise rests on the existence of a plan, the appropriateness of the plan, and the ability to carry it out (Wachtendorf, 2004). Organizations acting under time constraints must first determine whether or not a plan for a particular organizational element (structure, resource, activity, or task) is in place to contend with the scenario presented. Regarding resources for coordinating a multi-organizational disaster response, New York City did have in place the sophisticated, well-equipped EOC at 7WTC. The ERON relied on this resource and had incorporated it into the city's plans to monitor and respond to a host of emergency situations. Because a planned resource was in place, it was unnecessary to creatively improvise in an entirely new way. Potential improvisers must then ask whether the plan can be carried out and, if not, whether a contingency plan is in place. Unfortunately for New York City, neither was the case.

Almost immediately after the first plane attacked, OEM officials began the process of notifying agencies to report to the activated EOC. Many agencies, particularly those with a presence in Lower Manhattan, already anticipated the call and began responding on their own accord. New York City had disaster response plans in place and experience responding to major emergencies. Initially there was no reason to believe that established procedures—to use 7WTC as the EOC—would prove inadequate, but due to the building's proximity to the towers, officials in the EOC soon began discussing whether or not they should evacuate the building.

Milling is quite common in situations characterized by ambiguity and the need to act. Turner and Killian (1987) explain how individual behavior in crowds often emerges after an initial period in which the crowd develops a definition of the situation. Through verbal and non-verbal cues, individuals look to one another for signals about how to interpret their environment. On September 11, EOC officials initially looked to each other for evacuation cues. The milling among those at the EOC immediately after the planes struck contributed to the sense that people should stay rather than evacuate. Despite the risk, evacuation would have signified an abandonment of the plan or the script. They were, after all, in a state-of-the-art emergency hub for the city and had tremendous resources at their fingertips. They believed they would be best able to handle an emergency of this scale from 7WTC. Had they known, as they would later learn, that off-site back-up of electronic computer files had not actually taken place, they might have been even more hesitant to leave. Some personnel considered leaving the EOC, yet they were also aware that they were without a clear alternative of where to go. As one official who was part of the early discussions about whether or not to evacuate stated:

I was still for staying because it was our EOC and I couldn't think of where we would go if we left the EOC because at that time we didn't have a backup facility. We kind of had ideas of where we would go but we didn't actually have a place that we could walk [in] and turn [on] a light switch and it would [be] an EOC waiting for us.

Agencies had relied on the resources they had put in place in the EOC as well as on the symbolism that facility provided. The EOC was laid out in a manner that both symbolically conveyed and practically facilitated the interaction that officials needed to bring about a disaster response. Agencies were clustered in work pods assigned according to their emergency functions. Situated in a privileged position on a raised podium above all of the agencies were OEM staff, reinforcing the agency's role as coordinator. Not only were data, monitoring, and communication systems available, but so, too, were areas devoted to organizational coordination and media briefings.

Of course, it is not as though OEM personnel had never considered where they could set up an appropriate back-up facility. Some of the ideas that had been suggested included city phone banks that would have made available a large number of communication lines, or the NYPD Command and Control Center. Most of these limited discussions had centered on the potential need for a temporary facility during a small or moderate-scale emergency. Discussions had never considered a catastrophic event like the one that was unfolding on September 11, and the City had never formally established a secondary site equipped with resources comparable to 7WTC. Moreover, despite the fact that operation centers had been destroyed or disabled in other U.S. disasters, there was no formalized evacuation plan for the EOC.

Political concern was another factor that contributed to the hesitancy to evacuate 7WTC, which is consistent with research on fast-paced industries that suggests that politics seems to slow decision-making (Eisenhardt 1999; Eisenhardt and Bourgeois 1988). OEM officials were acutely aware of the political consequences of evacuating the EOC. Indeed, in the late 1990s, several OEM personnel who were still with the agency on September 11 had been involved in promoting 7WTC as an appropriate site for the EOC, often against considerable skepticism and opposition. Some had even argued that it would be the “safest floor in the city.” Now those same officials were faced with the possibility of abandoning not only the facility, but also abandoning the notion that the chosen location was indeed safe. As this official recalled:

Believe it or not running through my mind at that time [was] do we order an evacuation of this facility during the worst disaster this city has ever seen and abandon our post or do we stick it out. And the only reason we evacuated was because we heard there was a third plane out there.

OEM officials initially decided they would stay in the building, while some other agency representatives who had converged to the EOC decided to leave. Many of the agencies had comparatively weaker ties to 7WTC than OEM because it was a space they used only during emergencies or disaster drills. In contrast, not only were OEM personnel considering leaving the EOC, but they were also considering leaving their daily working environment. Unlike other agencies that still had the continuity of their office space, OEM officials would find themselves without offices, technology, and support services were they to abandon 7WTC.

Eventually, representatives in the EOC decided to leave as a result of an order by a high-ranking OEM official. After both towers had been struck, and after hearing that another plane was in the air and missing, an OEM deputy director who had just returned from the multi-agency command post in Tower One ordered the evacuation of 7WTC approximately thirty minutes before the collapse of the south tower of the WTC, (although reports of when the evacuation actually occurred vary across sources).

The notion of widespread panic in emergencies is a myth the disaster literature has long debunked (Johnson 1987; Quarantelli 1980; Quarantelli and Dynes 1977; Wenger et al. 1975). The images put forth by disaster movies often show a fearful public overreacting to a threat and fleeing from a disaster site without regard for the safety of others. Contrary to this myth, research has demonstrated that encouraging people to leave an endangered area is a challenging task. There is a tendency to stay rather than leave, to maintain routine behavior and carry on as normal or at the very least, attempt to follow existing emergency procedures. To identify examples of a tendency toward maintaining routine behavior, one need only recall the difficulty in initially encouraging passengers to leave the damaged Titanic or the tendency of people to dismiss fire alarms as annoyances

unless other cues of danger are present. EOC staff was not immune to this kind of ‘normalcy bias.’ Direct statements calling for evacuation were not always enough to convince people that the EOC was no longer a viable location and to facilitate the abandonment of original plans. Indeed, one city agency representative would not hang up his telephone call until an OEM official took a more explicit step:

There was one guy on the phone. I said, ‘Let’s go!’ He says, ‘I’ll be right there.’ So I took a pair of scissors and cut the phone line. He goes, ‘What’s your problem?’ So I go, ‘We’re going to get hit. Get out!’

Officials then scattered to various points, including the command post at the Twin Towers and the mobile command bus. Yet many agency representatives and OEM staff went to the lobby of 7WTC, a movement that illustrates the extent to which individuals and groups adhere to daily routines even in major disasters. Gathering in the lobby to discuss “the next move,” as one official described, is an activity that is consistent with routine behavior, and the use of this space as a congregating point for members of the EOC was a logical choice. At this point, other agencies representatives had just begun to arrive. They met EOC evacuees who were waiting in the lobby deciding what to do next. One city official who met representatives in the lobby of 7WTC described their activities as “There were a lot of people that were just kind of milling about...They were trying to figure out where it was that the EOC [was] going to go.”

In other words, they were looking to each other to collectively make sense of the newly emerging environment and rely on one another for cues for subsequent collective action. As they left the building, many believed they would be returning later that day. They did not anticipate that the building would succumb to fire and collapse that same afternoon. Once the building collapsed, the question as to whether or not 7WTC was still a viable resource became moot.

Appropriateness of the Plan

Organizations involved in the disaster response quickly moved to consider the appropriateness of 7WTC as a resource best able to contend with the emerging disaster environment. The decisions about whether original elements are appropriate and should be reproduced are not necessarily linked to objective measures of whether the planned structure, action, resource, or task is indeed *the best* approach. Instead, the decision to engage in reproducing what was originally in place is itself based on collectively-developed organizational definitions of appropriateness. Perhaps a better course of action is available; however, if the organization collectively determines that the original was indeed appropriate, it will choose reproductive improvisation over new alternatives. The process of collective sense-making—deeming 7WTC as a would-be appropriate

resource—and the reproduction of the EOC itself occurred in concert. For this reason, the section below discusses the process of determining appropriateness along with the process of reproducing the EOC.

Members of the ERON began the reproduction process by moving toward two key symbols of the EOC—the OEM mobile command bus and the Mayor as he walked with his entourage away from the collapse site to several buildings. Even though both the command unit and the Mayor were on the move, the people who looked to them for direction, information, and coordination had begun to reinforce the legitimacy of the EOC even after it was destroyed. Instead of improvising new resources that led to new ways of coordinating the response, the ERON had already begun to look for substitutions that closely resembled the original EOC. Although it was difficult for many of those we interviewed to recall the exact chronology of their movements and interactions during the immediate aftermath of the collapse, they did report a number of interactions that fostered and reinforced steps toward reproductive improvisation.

While some personnel responded to directions they heard over their radios instructing them where to regroup, others identified in the midst of the post-collapse environment the mobile command unit bus or the growing entourage of agency heads surrounding the Mayor. They reinforced the social resource of the EOC by opting to follow these two lasting symbols. The process of moving toward the Police Academy and the set-up of Pier 92 were in part initiated by intense discussions at a firehouse where the Mayor's entourage and the mobile command unit stopped, but there were other alternatives that *could* have been followed. The Mayor *could* have directed all personnel back to their respective departmental headquarters or other departmental offices. Alternatively, EOC personnel *could* have opted on their own to return to and stay at department offices, at least temporarily. Yet discussions at the firehouse initiated movement toward gathering at a central facility. Actions by the collectivity of organizations reinforced that movement. The process of making sense of the appropriateness of the EOC continued at the Police Academy as organizations grouped themselves into work pods similar to those that were in place at 7WTC. OEM reinforced that reproductive arrangement by creating banners assigned to particular work areas, designating a specific area (albeit a less-developed one) that would mimic the podium, and taking other steps to reproduce EOC arrangements at Pier 92. As discussed below, these movements set the stage for verbal directions which, when supported, served as signals for additional movements along the reproductive improvisation path.

Both temporary facilities that were established—the Police Academy library and Pier 92—constituted important steps in the process of reproduction. OEM and other lead city agencies secured the Police Academy to house a temporary EOC. On September 11, OEM staff and others within the ERON improvised resources—such as telephones, basic office supplies, and a paper system to track logistical requests—to provide a very rudimentary EOC framework. After activation, agency representatives reinforced the

reproduction by rearranging the workspace in ways that mirrored the original EOC – or at least as much as possible, given the limited space in the library. Other information dissemination and coordination systems that had operated through computer support systems at 7WTC were improvised using paper, easels, and other materials that were more readily available.

Meanwhile, OEM and other agencies were attempting a fuller reproduction of the EOC at the Pier 92 facility. That improvised EOC became operational three days after the attack. When we arrived inside the Pier 92 EOC on September 15, the resemblance to the 7WTC EOC was striking. Like 7WTC, desks in Pier 92 were divided into work pods, each pod representing the same functions they had at the original facility, such as fire, health and medical, transportation, and human services. Several televisions were set up at the entrance to the EOC space. A media briefing area was set aside toward the back of the pier in what became known by staff in the EOC as the “martini lounge” because, according to one high-ranking OEM official, the area served as a lounge for cruise ship passengers during the facility’s more routine operations. It was there that the Mayor conducted his regular press conferences during the disaster.

Although Pier 92 was not the technologically sophisticated and aesthetically pleasing space that had existed at 7WTC, with its high ceilings and open floor spaces covering almost two city blocks it was larger and more accommodating than 7WTC, and it was a relatively comfortable area in which to work. OEM officials, cognizant of acoustic concerns, particularly in an environment that demands a great deal of inter-organizational communication, added carpet when setting up the site. OEM equipped Pier 92 with networked computers, fax machines, telephones, photocopiers, and supplies. Private sector companies and city agencies such as the Department of Citywide Administrative Services (DCAS) pulled together resources to outfit the EOC. Some of the supplies were donated or newly purchased, while others were redirected from existing city sources. OEM established a primary meeting room in a sectioned-off waiting area of the pier in what could be described as a large foyer space. This elevated area was outside of the EOC room proper but inside the same facility. This space away from the activity of the EOC was shared by all organizations within the ERON. In summary, by envisioning the 7WTC EOC as the goal toward which to move, members of the ERON were flexible in their use of substitute resources and supported the improvisations of others when those steps contributed to the collective reproductive goals.

Factors in the Process of Reproducing the EOC

The sections that follow discuss factors that contributed to the ERON’s selection of reproductive improvisation as a strategy for coping with loss of resources. Reproductive improvisation was feasible in part because other elements of organizational response capability remained stable. Preference for and ability to maintain the status quo was

another factor. Further, the resources needed to reproduce the EOC were available. Equally important, organizational members had a preexisting mental map that helped to generate a shared vision. This vision informed the EOC restoration despite losses that would otherwise have crippled the ERON's ability to act.

The Importance of the Stability of Other Organizational Elements

Perhaps one of the most important facilitators of the reproductive improvisation of the EOC was the fact that other elements (structure, activities, and tasks) related to the EOC's mission, purpose, and mode of organization remained relatively stable. OEM, the lead facilitating organization in the ERON and the organization in charge of the EOC, did not lose personnel in the attack. As a consequence, the organization most familiar with the EOC operation was able to step in to reproduce what it had originally developed in 1999. Moreover, the roles of organizations that had suffered many casualties did not change. All of the organizations that had been active at 7WTC during smaller emergencies, that had participated in disaster drills, and that were assigned duties in emergency plans understood that they had similar roles to play in the EOC during this disaster (even though some of those roles would change later on.) The positions of various departments in the organizational hierarchy were sometimes contested in the field, particularly at Ground Zero, yet this did not alter the intended design and use of the EOC as a coordination site. Although organization personnel often engaged in emergent activities in the field, the EOC's basic roles—of response and recovery coordination, policy making, operation management, information gathering, public information, and hosting visitors (Quarantelli, 1979)—were not substantially altered in this disaster. The tasks representatives in the EOC performed in order to fulfill these roles also remained fairly stable. OEM would be involved in a broad range of creative and adaptive improvisations, but given its relative continuity with respect to structure, activities, and tasks, OEM sought to reproduce the one critical feature of its response capacity that had been completely lost—the EOC. Because the EOC was designed as a resource that could support EOC structures, activities, and tasks, and because the three other elements associated with the EOC remained relatively stable, the ERON—primarily under the direction of OEM—easily moved toward reproducing the EOC.

The Status Quo Bias

An organization that has a vested interest in maintaining authority, responsibility, tasks, and activities will also tend to encourage reproductive improvisation over other forms that yield more change. In the case of the EOC, both the ERON and OEM, its lead agency, had such an interest.

On September 11 and the days that followed, the ERON was faced with a large and complex disaster response. Hundreds of organizations were responding, and many more were converging to New York City to offer assistance. Not only was the city facing a large-scale and often dangerous set of challenges associated with debris removal, firefighting, traffic control, emergency shelter, and a host of other activities, but an intense and urgent search and rescue operation was also underway. Successful disaster management and effective coordination were both key to this response. Without an EOC, the achievement of those goals could be critically compromised. To continue with a concerted response of the type demanded by this disaster while at the same time considering completely new and improved ways to coordinate the activities of so many organizational entities clearly was a luxury of time the ERON could not afford. Instead, it chose to reproduce the EOC using 7WTC as a template and to make adjustments as needs and time allowed.

A primary objective of OEM was clearly to provide the ERON with a functioning EOC as a mechanism to improve response capabilities. It would be a mistake to overlook, however, the positive impact the reproduction of the EOC had on OEM's legitimacy as a coordinating agency, or also, the negative impact not quickly reproducing the EOC would have had on the organization. OEM is responsible for ensuring that the EOC is activated. Its failure to secure a back-up facility as part of a contingency plan and the choice in the late 1990s to locate the EOC so closely to a primary terrorist target such as the Twin Towers—a structure that had been attacked in the recent past—were decisions that were already generating criticism. In the immediate aftermath of the attack, the overall sentiment in and around New York City was still one of shock, grief, and willingness to support. However, an organization as closely linked to the Mayor as OEM could not have been blind to the political ramifications of failing to provide a resource that was critical for the management of response operations. OEM's credibility was at stake at a time when its legitimacy as a coordinator could not have been more important. Failure to act expeditiously would have directly affected the Mayor's image as well. By reproducing the EOC at Pier 92 under such pressing time constraints, OEM did ultimately withstand criticism. The lack of a suitable back-up facility and the location of the EOC at 7WTC were still viewed by city residents and the emergency management field as shortfalls, but the organization was also commended for its rapid accomplishments. Furthermore, reproducing the inter-organizational relationships reflected by the work pods and the podium reinforced OEM's role in the EOC as lead coordinator and facilitator of other organizations within the ERON.

By emphasizing the effectiveness of the original EOC and reproducing the site in such an expedited manner with available substitutes, OEM was able to maintain its credibility and ensure continuity of the overall emergency response structure. What Giddens (1976) refers to as the production of meaning—that the EOC was an appropriate resource and that the ERON, OEM, and ultimately the Mayor were coping and in

control—was essentially achieved through the process of reproducing the EOC and the system itself.

Access to Suitable Substitutions

Access to resource alternatives is of course critical in an organization's ability to engage in reproductive improvisation of an original resource. Clearly, if an organization needs to provide a substitute for a resource like the EOC at 7WTC, it must have access to resources that will aid in this process. Fortunately, resourcefulness is a major strength of a city as large and diverse as New York City. Efforts to locate and mobilize alternative resources began as soon as OEM personnel recognized that they would have to abandon 7WTC.

Immediately after the evacuation, a group of OEM personnel ran toward the city's deployed mobile command unit bus. As the bus, with its contingent of public officials, slowly moved block by block out of harm's way, more OEM staff and agency personnel gathered in and around the vehicle. The bus allowed members of the ERON to identify a mobile representation of the EOC that could serve as an area where they could coordinate, discuss subsequent moves, and share information with officials.

The mobile command unit drove to a firehouse on Houston Street, a location to which the Mayor had walked. Outside the firehouse, officials discussed where to go next but eventually decided to establish a temporary EOC in the library of the police department's training academy. The group that had congregated around the Mayor made this decision, and the presence of the Director of Emergency Management, OEM's First Deputy Director (both of whom had served previous appointments with the NYPD), and the Police Commissioner certainly played a role in the selection of the Police Academy as an alternative site. It was a logical choice for officials with links to the police department to think first of a facility closely linked to that organization. Furthermore, the facility allowed for the implementation of security measures, a concern that was foremost in the thoughts of officials whose city had just come under attack.

The "walking EOC"—now consisting of the Mayor, key OEM personnel, and representatives from approximately thirty to forty other agencies—moved operations into the library shortly after noon on September 11 with activation at approximately 2pm, but they quickly recognized the inadequacies of the facility. It was, as one person put it, a "place to park until a better facility was established."

Many of the supplies used at the Police Academy were commandeered from elsewhere within the building. Computers were not readily available so much of the work was initially done on paper. On the night of September 11, approximately forty computers were set up at the Police Academy EOC. Many officials complained that because of the cramped quarters and lack of appropriate software, the computers were difficult to use. A great deal of time was spent stringing telephone lines from other

offices in the Police Academy into the library. But still, many of the lines did not work. As one official who was present recalled:

The phones were horrible, 'cause they were like pay phones [lines]. They strung all the phones into the room. But you know pay phones – you have to put a quarter in. So you would pick up a regular phone and you would dial the number and you'd get the, 'Please deposit 25 cents.' And then you [would] look for a place to deposit 25 cents [and] it was [a regular phone]!

But while the ERON was actively responding from the Police Academy, others were tapping informal and formal networks with private contractors, vendors, and city agencies to pull together the vast array of equipment and internal facility support needed to more fully reproduce the EOC that had been at 7WTC. Important in efforts to engage in the reproductive improvisation process was the ERON's performance as bricoleur, or "someone able to create order out of whatever materials [are] at hand" (Weick 1993: 639). Instrumental in this process was the transformation of the ERON into an *emergent multi-organizational network* (EMON). That is, not only did the reestablishment of the EOC rely on organizations within the established network of New York City government organizations with previous working relationships with OEM, but it also relied heavily on the donations and services provided by a host of organizations new to the network. OEM officials were able to pull together materials at hand to replicate the EOC at 7WTC. Consider the management information systems component of the EOC as described in OEM documentations of the disaster. OEM mobilized resources from the Department of Information Technology and Telecommunications (DoITT), Computer Horizons Corporations (CHC) and the New York City Human Resources Administration (HRA) to develop the management information systems at Pier 92. Several technicians as well as over one hundred fifty computers and printers were redirected from HRA to the emerging EOC. At the same time, HRA and DoITT acquired components for a Public Branch Exchange, or phone switch in support of over two hundred fifty digital lines from Verizon and Nortel telecommunications. These two companies, along with Nexteria and Williams Communications, helped to make the phone switch operable and deploy over two hundred telephone sets within thirty-six hours. The MITRE Corporation, contractors to the Department of Defense and the U.S. intelligence establishment, provided satellite phones. PolyCom and its distribution network established video teleconference capabilities. Ricoh Corp provided several high-speed copiers, while Time Warner Communications provided high-speed Internet access and cable services. Numerous other agencies and companies played a role in reproducing the information technology capability for the EOC. As the EMON continued to grow, so too did the resources available to OEM and other agencies involved in the reproduction of the EOC. The more

resources at hand from which the organization could draw, the more capable the organization was in its reproduction efforts.

Even the building that would ultimately house the emerging EOC was an improvised resource. Ironically, OEM had scheduled a bioterrorism exercise for September 12, 2001. Pier 92 was the site OEM had previously arranged to use for the drill. On the morning of September 11, several OEM staff members were already at the facility setting up for the exercise. Not only were OEM staff members familiar with the site, but the organization had a short-term lease on the facility. Then, after the collapse of 7WTC, officials decided to extend the lease on the pier.

As Weick (1998: 546) suggests, “improvisation does not materialize out of thin air. Instead, it materializes around a simple melody that provides the pretext for real-time composing.” In the case of reestablishing the EOC, the original provided a guiding template, as did the OEM’s earlier experience with Pier 92. The resources at hand made possible the process of improvisation. The shared vision of the EOC as a resource, discussed next, provided the template around which to garner those resources and on which to model them.

Persistence of Mental Map / Shared Vision through Virtual Role Systems

The multi-organizational network’s ability to retain a preexisting mental map and articulate a shared vision through virtual role systems was important to the EOC’s reproduction of the 7WTC EOC and its effective response during the reproduction process. According to Weick (1993), virtual role systems allow members of a group to mentally maintain a conception of the systems of which they are part. Moreover, each group member is able to conceptualize his or her role, the roles of others, possible actions, and overarching goals despite system disruptions. The virtual role system operates in the minds of the participants long after the tangible system has ceased operating (Weick 1993). Mallak (1998) interprets virtual role systems to mean that an organization can function when one or more of its members are absent. Weick and his colleagues (1993; 1999) use the concept virtual role systems in a way that highlights its importance for organizational resilience not only when a member is absent, but at all times. For them, the virtual role system enables all organization members to simultaneously develop a shared vision of emergent challenges and ranges of action, as well as allows each member to cognitively reproduce the organization. Virtual role systems are important in disaster responses when system disruption can reach extreme levels.

A shared vision does not imply absolute homogeneous thinking. It does, however, reflect overarching goals and procedures that influence the types of strategies (and types of improvisation) organizational members choose under crisis. The shared vision is not unlike the structure in Giddens’ concept of the duality of structure and agency in which

“social structures are both constituted by human agency, and yet at the same time are the very medium of this constitution” (1976: 121). The shared vision is both constructed by members of the organization through their participation in it and imposed on the members by policies, training, and the extent to which practices are crystallized prior to the time members join the organization. But just as the shared vision guides the actions of the organization’s members, so too do the members have the opportunity to sustain or reject the vision. Organizations with a shared vision are guided by the overall structure while at the same time collectively constructing meaning from environmental cues and developing strategies to work toward that vision.

The initial tendency is for organizational actors to resist changing normal routines and practices. Weick’s study (1993) of the Mann Gulch fire, for example, found that during crises, emergency response organizations are likely to revert to original plans and practices even when the situation demands improvisation. In that study, firefighters killed in the wildfire rigidly adhered to an established course of action that was no longer appropriate given the newly emergent conditions. Sense-making that reflects the operation of virtual role systems did not emerge. While the group leader was able to envision a way to survive, others who did not have a shared vision were unable to come up with the same solution or even recognize that the solution was appropriate given the imminent threat of the fire, even when directed by their leader to respond differently.

In contrast, in the case of improvising the EOC organizations were able to draw upon virtual role systems for their action repertoires after 7WTC was evacuated. Evacuated organizations stationed at the EOC were able to use the recollected role system of the EOC to envision the leadership, activities, and coordination procedures they needed to accomplish and improvise resources in their response repertoire as they reproduced 7WTC and also fulfilled their response roles. They improvised space, they improvised communication strategies—whether technology based, such as telecommunications equipment, or interpersonally-based, such as the physical arrangements of response-based workgroups—and they improvised the equipment and support material in the EOC that helped them carry out their responsibilities. The relative ease with which they were able to do so was facilitated by the fact that the improvisation was reproductive in nature, as opposed to adaptive or creative. Unlike the Mann Gulch firefighters, who were unable to envision a virtual role system, organizations in the EOC had what they considered an appropriate resource to use as a model and, in retrospect, their assessment of the resource as appropriate was a correct one. Because the organizations had an appropriate model to envision, their challenges lay in how best to reproduce that model rather than creatively envisioning and enacting a different system.

It is worthwhile to remember that the EOC at 7WTC had been a relatively new facility. Many of OEM personnel who were with the organization on September 11 had played a part in designing and contributing to the improvement of the original EOC. The OEM Deputy Director responsible for overseeing the reestablishment effort at Pier 92

was the same person who had helped pull together resources in the design and development of the EOC at 7WTC. Another Deputy Director who contributed to this effort described the EOC, its constituent organizations, and interorganizational linkages as being “in [his] head.” This official, like many we interviewed or whose actions we learned about, had a mental picture or template for the EOC as a coordination resource that continued to exist beyond the abandonment of 7WTC. That is to say, the abandonment of 7WTC signified the abandonment of the building housing the EOC, but not the collectively-held belief that the EOC was a valuable resource or the vision of what constituted that resource. The formal doctrines that supported its form and the experience of working at the facility reinforced the facility’s merit in the minds of those reconstituting the EOC. Furthermore, the organization fostered a shared vision because the ERON had retained its institutional knowledge and also because OEM had not suffered large casualties within its ranks.

This vision of the EOC was shared by other organizations in the ERON in addition to OEM. Even as early in the reproductive improvisation process as the establishing of the temporary EOC at the Police Academy, representatives had begun grouping themselves into work pods to replicate the networking function of the EOC. They collectively organized themselves into work pods without external direction. As this OEM official observed about the Police Academy work pods, “We never formally told the agencies where to sit, but they all kind of grouped themselves together.”

In part owing to their previous visits to 7WTC and in part owing to their recognition of the types of activities that needed to be accomplished, organizations took it upon themselves to arrange the limited number tables that were available based on the arrangement of pods at the original EOC. OEM soon reinforced that reproduction by posting pieces of paper identifying the work pods. The city’s disaster planning process, which had involved organizations within the ERON in drills and meetings, encouraged the adoption of a shared vision of how the EOC was to look and function. The designations used for work pods were in turn based on the emergency support functions (ESFs) identified in the Federal Response Plan in place at the time. This set of formal plans thus enabled the ERON to replicate the EOC resource.

The drills, planning, meetings, and training worked to instill a common vision in the minds of those who would make use of the EOC. One official recalled an agency representative telling him several months after the response that indeed, 7WTC was instrumental to the response even though it had collapsed, because it set the stage for the networks, relationships, and coordination that could only have resulted from the activities that had taken place there in previous years. The reproduction of the EOC at 7WTC was therefore not a new “shared vision,” but the means of preserving through reproductive activity the vision that had guided the ERON’s activities prior to September 11. As this official remarked regarding the EOC.

[We were] best prepared in the management structure. And that's from the EOC. We've done a lot of work figuring out how to figure out how to manage large-scale incidents. And this went from the EOC, we had done a bunch of EOC drills, we had an EOC protocol, we knew how we were going to manage the EOC into functional groups and how that flow of information would work. We had done a lot of thinking about that. So that's something that definitely worked and was there.

After the EOC was destroyed, it was the work done at the EOC prior to September 11 that had facilitated the shared vision and reproduction of the EOC resource. Planning for a disaster results in a process, not a product (Quarantelli, 1997). According to this official who played an important role in the reestablishment of the EOC:

When you're in the planning process, it builds relationships with people and you learn about agencies and what they're capable of. And so no plan that you write ... and no disaster [goes] according to the plan...So you know, building the relationships and understanding how the agencies operate and what some of the issues are between the interactions with [the] agency—that's where your planning really pays off. Because that paper document as far as I'm concerned is useless. It's all of the things that you get, that you go through to get that paper document, that's the value that's ... in planning, and so like knowing the players and understanding what the agencies are capable of and, you know, having them understand you and what your agency is capable of. That's where the value is.

The plans for the EOC, though vital, were not as important as the shared vision of that resource. Because the shared vision was still in place, the ERON could create a virtual EOC, making do with space and ad-hoc resources, while they worked toward reestablishing a better reproduction of the original. Although communities may come away with written documents that provide an undisputable contribution to disaster response, it is impossible to anticipate every specialized resource or action that a given disaster may demand. The planning process, therefore, can contribute to the capacity of the organization to improvise and integrate those improvisations system-wide (Drabek 1985).

Conclusions

Reproductive improvisation occurs when the organization or collectivity of organizations determines that an original but unachievable structure, activity, resource, or task is appropriate in the crisis environment, and then employs novel substitutions under

time-constraints to replicate the original. This analysis focuses on New York City's reestablishment of its EOC during the WTC disaster response. Through a process of collective sense-making, the collectivity of organizations involved in response activities defined their circumstances by looking at cues in the dynamic disaster environment and at information from other organizations regarding the viability and appropriateness of the EOC at 7WTC. Several characteristics of this disaster response milieu facilitated reproductive improvisation. These included, for example, the stability of the coordination needs demanded of the EOC personnel. Even when other specific response activities or structures may have changed somewhat, the coordination needs were familiar to them. In addition, they had tremendous access to a wide range of resource substitutes, and they enacted a preference for maintaining existing systems of authority and network structure. As one official said, "It [the organization] was in my head." By maintaining a shared vision of the resource and the structures, activities, and tasks it was supporting, the ERON was able to reproduce the EOC while carrying out response activities during a large-scale and protracted disaster. A virtual EOC persisted in the minds of those who had trained and worked in the facility despite the loss of 7WTC.

The EOC reestablishment example illustrates a successful instance of reproductive improvisation. Still, reproductive improvisation can have disadvantages. The same factors that facilitate this type of improvisation can blind participants to cues pointing to alternative courses of action. Rigid adherence to an original model when no longer appropriate can result in increased response challenges. The time constraints of the World Trade Center response and demands to proactively respond to the disaster while improvising lost resources also encouraged the ERON to maintain the status quo and reconstitute a resource with which it was familiar rather than pursuing more radical adaptive or creative improvisations. Numerous adaptive improvisations did develop after the EOC was reconstituted and the ERON had to adjust to emergent needs. Even when a collectivity of organizations accurately determines that an element is ideal, this can contribute to a delay in recognizing that the element is in fact no longer viable or possible to implement.

That improvisation worked to reproduce the EOC rather than produce a new resource that was different from the original does not conflict with the concept of improvisation or improvisation processes that take place in other contexts. As Weick (1998: 551) states, "improvisation is a mixture of the pre-composed and the spontaneous." Improvisation must have something upon which it is based; "[t]he connected themes of order and improvisation become even clearer when we look more closely at the object to which the improvisation is applied (Weick 1998: 546). People "combine familiar and unfamiliar components in response to new situations. [In doing so, they follow] an underlying grammar and an evolving aesthetic" (Bateson 1989: 3). The theoretical contribution here is in finding that improvisation can involve steps toward sameness and substitution in addition to movement away from or in place of existing forms. Like Barrett's (1998)

examination of jazz improvisation and organization, a balance between the new and the established is necessary for successful improvised action. As he states, “too much reliance on learned patterns...tends to limit the risk-taking necessary for creative improvisation; on the other hand, too much regulation and control restrict the interplay of musical ideas....[F]or jazz players[,] their purpose, by definition, is to avoid that which is automatic and safe and formulas that simply repeat past success” (Barrett 1998: 607-608). Yet attempts to repeat the past can involve significant improvisation, as we’ve seen in the case study of the EOC reestablishment. According to Zack (2000: 230), “While improvisation is grounded in forms and memory (Weick 1998), each improviser must determine to what extent they want to improvise—within those forms, with those forms, or outside those forms?” Arguably, adaptive improvisation and creative improvisation (Wachtendorf, 2004; Wachtendorf and Kendra, 2005b) constitute the latter two determinations while reproductive improvisation more closely resembles improvisation within existing forms. To privilege more novel actions and choices while ignoring the role substitution or “making do” can play in organizational improvisation imposes limits on our understanding of the improvisation phenomenon, be it in more traditional disaster-response environments or other turbulent environments where organizations find themselves under stress and in crisis. Improvisation can involve movement towards pre-established scripts that are difficult to achieve without novel substitution. The motivation for such improvisation is dependent on the presence of a plan or standard measure, the ability to carry out that plan if it exists and is known, and the determination of the plan’s appropriateness given the emerging circumstances. While the study of the EOC reestablishment points to several key factors that facilitate the reproductive improvisation process, research on other episodes and on organizations in other environments may lead to a fuller understanding of this distinct improvisation form.

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