

CHAPTER 17

Organizational Adaptation to Disaster

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Organized responses which may range from small emergent work groups to large, complex, and bureaucratic organizations are not only the primary agencies through which communities respond to disasters, they also provide the shaping contexts for most individual responses. (Kreps, 1978, p. 67)

The major focus of this chapter is twofold. We first consider what has been learned about organizational adaptation to disasters from original field studies by the Disaster Research Center (DRC) during the initial 20 years of its existence (1963–1983). We then examine a series of secondary data analyses (1982–2001) that we, along with our graduate and undergraduate students, completed using data archives produced primarily from these studies and maintained by the DRC. The groundwork established by what amounts to several decades of original field studies and follow-up archival analyses has continued to inform DRC field research on preparedness for and response to natural, technological, and willful disasters by organizations in both the public (e.g., Tierney, 1985, 1993) and private sectors (e.g., Webb, Tierney, & Dahlhammer, 2000). Arguably the most compelling example of continuity from the earliest to the most recent work within the DRC tradition is the Center's major study of organizational adaptation following the September 11, 2001 terrorist attack on the World Trade Center (Kendra & Wachtendorf, 2003; Kendra et al., 2003; Wachtendorf, 2004).

What has been learned about organizational adaptation within the DRC tradition provides an excellent foundation for implementing what we propose later in this chapter as an integrated research strategy to increase readiness for anticipated and improvised responses to disasters. That strategy captures organizational adaptations at role, organizational, and multiorganizational levels of analysis. The audience for the proposed integrated strategy includes both hazards and disaster researchers and emergency management practitioners. The first and longest section of the chapter argues that knowledge about organizational adaptation has evolved continuously from original DRC field research to follow-up archival studies of our own, and to more recent DRC primary research through reliance on core sociological concepts (Bosworth & Kreps, 1986; Dynes, 1970; Kreps, 1985; Kreps & Bosworth, 1993; Wachtendorf, 2004; Webb, 1998; Weller & Quarantelli, 1973). These concepts include formal organizing, collective behavior, and role enactment and their underpinning in even more basic conceptualizations of social action and social order (see in particular Kreps, 1989c and Wachtendorf, 2004). The initial

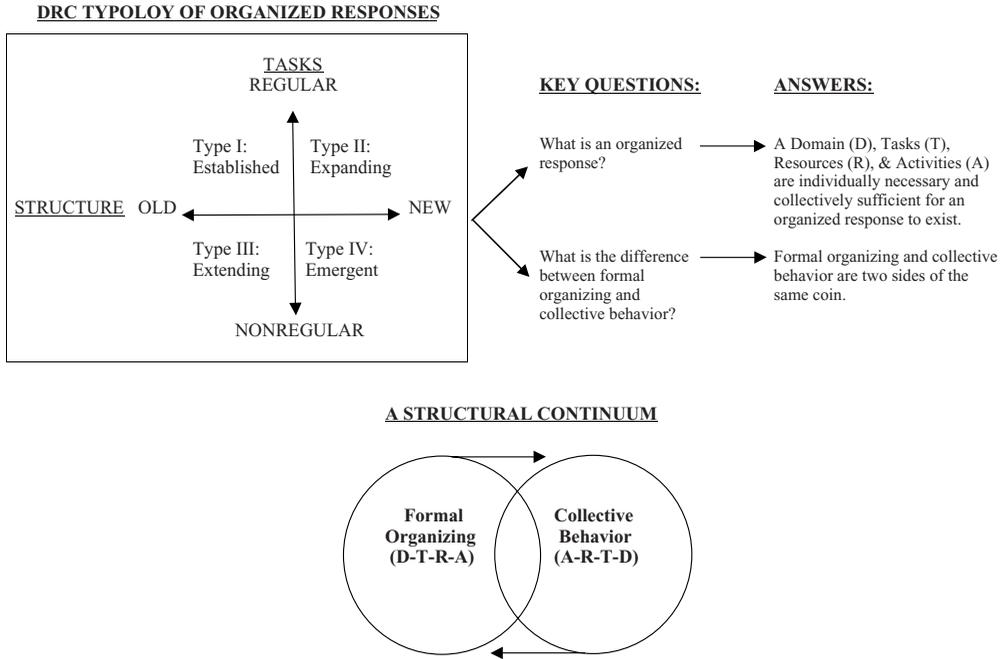


FIGURE 17.1. From a simple typology to a formal structural code.

DRC tool to capture organizational adaptation was a deceptively simple typology of organized responses. What has come to be known as the DRC typology (see Fig. 17.1) has not only stood the test of time (Brouillette & Quarantelli, 1971; Dynes, 1970; Kreps, 1978, 1985; Quarantelli, 1996; Stallings, 1978; Wachtendorf, 2004; Webb, 1998; Weller & Quarantelli, 1973), but it has also led to more elaborate understandings about how organized responses emerge, link with each other, and flexibly adapt during disasters in both planned and improvised ways. The second section of the chapter connects briefly what continues to be learned about organizational adaptation from DRC-based studies to broader research issues about disaster preparedness and response (for recent summaries of the broader research literature see Mileti, 1999, Chapter 7; Tierney, Lindell, & Perry, 2001).

By building on the foundation of what is known about organizational adaptation to disasters, both within the DRC tradition and more generally in hazards and disaster research, the final section of the chapter offers an integrated strategy for research and application that connects most directly Gary Webb's contemporary work on role improvisation within our own research program (Webb, 1998, 2002a) with related recent research on planned and unplanned organizational improvisations by, respectively, David Mendonca (2001, in press; Mendonca & Wallace, 2002, 2004) and Tricia Wachtendorf (Kendra & Wachtendorf, 2003; Kendra et al., 2003; Wachtendorf, 2004). Noteworthy is that Webb's research includes archival studies of primarily natural disasters as well as some technological events and major civil disturbances; Mendonca's work combines both more selective archival studies of natural and technological events with primary data collection on the September 11, 2001 terrorist attack on the World Trade Center; and Wachtendorf's work is based on a major DRC study of the same 9/11 World Trade Center attack. Given the broad range of complementary data captured by Webb,

Mendonca, and Wachtendorf, we believe a firm foundation has been established to expand and codify knowledge about organizational adaptation through more highly structured studies and computational models of disaster preparedness and response. Such knowledge, we also believe, can be used productively by emergency management practitioners in preparing for both anticipated and improvised responses to natural, technological, and willful events (Kreps, 2001).

ORGANIZED RESPONSE TO DISASTER: FROM THE DRC TYPOLOGY TO A FORMAL STRUCTURAL CODE

There was a tendency in most disaster research within the social sciences from World War II until the founding of the Disaster Research Center (DRC) at the Ohio State University in 1963 to describe disaster responses at either the individual or overall community levels of analysis (Kreps, 1981, 1984; Quarantelli & Dynes, 1977). But both the founders of the DRC and those funding its studies believed that learning more about distinct types of organizational adaptations and their interconnections was essential. Structurally speaking, major disasters exhibit stunning complexity as existing groups and organizations restructure to meet disaster demands, new groups and organizations emerge, and both existing and new entities become parts of broader social networks of collective action. Unraveling that complexity was and remains a central issue at the DRC and within the broader hazards and disaster research community.

The Emergence of Organization: Formal Organizing and Collective Behavior Are Two Sides of the Same Coin

An important start was made on what, as noted earlier, has historically been called the DRC typology of organized disaster responses. As noted in Figure 17.1, the typology clusters into a simple fourfold table the range of discrete organized responses that can be observed within a community during a disaster. Type I organized responses are termed established because they exist prior to an event and much of what they do is expected (e.g., hospitals; law enforcement and fire fighting units; public utilities; departments of public works; mass media; military units; and specialized units dealing with chemical, biological, or radioactive hazards). Type II organized responses are called expanding because while much of what they do is expected as well, their core structures change from a small cadre of professional staff to a much larger unit of volunteers (e.g., local community emergency management agencies, Red Cross chapters, Salvation Army units). Type III organized responses are called extending because while they exist prior to an event, much of what they do is not predetermined (e.g., other governmental agencies, small businesses, larger firms, social clubs, public service organizations, religious organizations). Finally, type IV organized responses are termed emergent because both their existence and activities are ad hoc and therefore unique to the event.

Studies of all four types of organized responses have been undertaken under DRC auspices as well as by many other researchers over several decades (for summaries see Drabek, 1986; Dynes, 1970; Mileti, Drabek, & Haas, 1975; Quarantelli & Dynes, 1970; Tierney, 1985, 1993;

Tierney, Lindell, & Perry, 2001; Wenger, Quarantelli, & Dynes, 1989). Much has been learned about what they do and how they relate structurally to each other as parts of broader community response systems. As noted in Figure 17.1, of particular interest to us in reconstructing hundreds of cases of organized responses during the immediate emergency periods of natural, technological, and willful disasters have been two key questions. While these questions are most directly relevant to emergent organized responses (type IV), we think they apply whenever the existence of an organized response cannot be taken for granted. The first question is: What is an organized response? Building on the DRC typology, the answer we have developed during our archival research program is simply this: A fully organized response must have a Domain (D), Tasks (T), Resources (R), and Activities (A). A domain is an external representation of a self-contained unit and its reason for being. Tasks are an internal representation of a division of labor for the enactment of human activities. Resources are individual capacities and collective technologies of human populations. Activities are conjoined actions of individuals and social units in chronological time and physical space.

It is because “organization” is such a fundamental concept in Sociology that definitions of its core properties must be subjects of sustained academic discussion and debate (see, e.g. Kreps, 1989c, Chapters 7, 8, and 10; Kreps, 1994). While a series of theoretical and methodological issues remain critical, their consideration does not belie the necessity for disaster researchers and emergency management practitioners alike to know what, in fact, an organized response is, how an organized response is different from other types of collective action, and how organized and other types of collective action interrelate. It is not a matter of being organized or disorganized at community, regional, or societal levels. It is not a matter of being organized formally or informally at any level of societal response. It is a matter of systemic adaptation to disaster that includes both organized and many other forms of collective action that, depending on the circumstances at hand, are more or less efficient and effective.

We believe that disaster researchers and emergency management practitioners would agree that an organized response requires at some point external recognition as a purposive and self-contained entity (D), that an organized response requires clarity within that entity about a division of labor (T), and that an organized response cannot be contemplated without reference to human and material resources (R) and the conjoined actions of both individuals and small to larger social units. Simply put, a structural code of (D), (T), (R), and (A) builds on what is both basic to social scientists and highly familiar to emergency management practitioners about the concept of organization.

The second question is: What is the difference between formal organizing and collective behavior? Building on the DRC typology, the answer we have developed from our archival research program is that capturing how an organized response evolves during a disaster requires drawing simultaneously on classic sociological ideas about formal organizing and collective behavior. These ideas predate modern disaster research of the post-World War II era and they remain central to this research specialty and the social sciences generally (Kreps, 1985, 1989c; Quarantelli & Dynes, 1977; Weller & Quarantelli, 1973). Using the structural code described above, formal organizing begins with clear understandings about domains and tasks (i.e., what is being done, by whom, and how) before resources are mobilized and activities take place. The sequencing of organizational elements is D-T-R-A. With collective behavior, activities take place and resources are mobilized before such understandings exist. The sequencing of organizational elements is A-R-T-D. The structural differences between formal organizing and collective behavior are depicted graphically in Figure 17.1. These structural arrangements illustrate a continuum between formal organizing (D-T-R-A) and collective behavior (A-R-T-D) that captures the essential relationship between these two ideas. As each element comes into

TABLE 17.1. A Formal Organizing/Collective Behavior Continuum

Organizational Forms	Logical Continuum (0 midpoint)	Number of Forms	Organized Responses Identified Through Archival Analysis	
D-T-R-A	6 (+3)	(1)	167	(167)
D-T-A-R			5	
D-R-T-A	5 (+2)	(3)	53	(59)
T-D-R-A			1	
D-R-A-T			27	
D-A-T-R			2	
T-R-D-A	4 (+1)	(5)	4	(100)
T-D-A-R			—	
R-D-T-A			67	
D-A-R-T			1	
T-R-A-D			21	
T-A-D-R			—	
R-D-A-T	3 (0)	(6)	12	(39)
R-T-D-A			4	
A-D-T-R			1	
T-A-R-D			—	
R-A-D-T			15	
R-T-A-D	2 (−1)	(5)	13	(31)
A-D-R-T			1	
A-T-D-R			2	
R-A-T-D			13	
A-T-R-D	1 (−2)	(3)	4	(22)
A-R-D-T			5	
A-R-T-D	0 (−3)	(1)	5	(5)
	Totals	(24)	423	(423)

DOMAIN An external representation of a self-contained unit and its reason for being

TASKS An internal representation of a division of labor for the enactment of human activities

RESOURCES Individual capacities and collective technologies of human populations

ACTIVITIES Conjoined actions of individuals and social units in chronological time and physical space

place, an organized response reflects varying degrees of formal organizing and collective behavior. The continuum is more fully elaborated on Table 17.1 as a structural code and metric scale. The code and the metric scale depict all possible forms of organizing with D-T-R-A at one end and A-R-T-D at the other.

The key requirement in constructing the code and metric scale is to capture all of the transivities (i.e., gradations) between formal organizing (D-T-R-A) and collective behavior (A-R-T-D). This can be done in the following way: At the formal organizing end of the continuum D precedes T, R, and A (3 points), T precedes R and A (2 points), and R precedes A (1 point). By giving one point for each conforming transitivity (3 + 2 + 1), formal organizing (D-T-R-A) receives a score of 6 and its direct obverse, collective behavior (A-R-T-D), receives a score of 0. Thus, for example, an organization that begins with a clearly understood domain (D), followed by the implementation of activities (A) then the mobilization of resources (R), and finally the establishment of a task structure (T) is a D-A-R-T form of organizing. Using formal organizing (D-T-R-A) as a reference point in calculating the metric score for a D-A-R-T form, D precedes T, R, and A (3 points), T does not precede R or A (0 points), and R does not precede A (0 points). On the Logical Continuum of Table 17.1, the D-A-R-T form

receives three points. This sequencing of elements represents an organizational form that is a blend of formal organizing and collective behavior. Beginning at the collective behavior end of the continuum would simply reverse the scores but not change the distribution in any way. For the six forms that fall in the middle of the continuum, the score remains 3. These forms highlight the balance of formal organizing and collective behavior. By subtracting a constant three points from each derived level of formal organizing or collective behavior, the resulting metric is +3 to -3 with a 0 midpoint. A 0 midpoint is useful for highlighting where logically a balance between formal organizing and collective behavior is greatest. Note that each end of the continuum includes one form, but there are increasingly more forms as formal organizing and collective behavior become more balanced.

The metric scale depicted in Table 17.1 has been used over the years during our research program to provide a quantitative measure for describing the process of organizing as we have been able to reconstruct alternative patterns from the DRC archives (see, e.g., Bosworth & Kreps, 1986; Kreps, 1985, 1989c, 1991a; Kreps & Bosworth, 1993; Noon, 2001; Saunders & Kreps, 1987; Webb, 1998, 2002a). The number of each organizational form we have identified through archival analysis is reported in the right column of Table 17.1. Disasters serve as catalysts for observing how individuals and units organize in response to a disaster. The types of organizational forms have been mapped to the DRC typology and have been used to describe and explain social response to disasters (see Kreps & Bosworth, 1993, 1994). A useful illustration of the relationship between an original DRC study and our archival research is Noon's recent (2001) application of the above structural code to the same set of interviews used in an earlier study by Forrest (1973) of an emergent organized response (type IV in the original DRC typology).

Empirical Case: Following a major urban riot in the United States what came to be called the Interfaith Emergency Center (IEC) evolved from an information hotline to serving as a broker distributing food, clothing, and other services to riot victims. As Noon (2001, pp. 493-497) describes the IEC from Forrest's original case study and his own reconstruction of the same transcribed field interviews used by Forrest, an informal group of local clergy wanted to create an information hotline service that people could access 24 hours a day, 7 days a week. The service was to be staffed by them and housed in a diocesan building offered by an Episcopalian representative of the group because of its adequate telephone set-up, parking, kitchen, and office space (Resources). A news release was prepared announcing the availability of the information service (called the Interfaith Information Center) and then broadcast on the evening news by local television stations (Resources-Domain). Shortly after the local television broadcast calls started coming into the hotline for processing (Resources-Domain-Activities). While it was originally assumed that the majority of calls would simply be requests for information, it quickly became apparent that what was required was a brokerage that could connect individual requests for assistance with community resources and services. With the assistance of a local AFL-CIO (a federation of national and international labor unions) council, an assistance distribution system was set up within the center to dispatch volunteer drivers to 25 collection centers and 21 distribution centers (Resources-Domain-Activities-Tasks). Further departments were also set up and the hotline changed its name (now the Interfaith Emergency Center) to more accurately describe what it was actually doing.

The IEC (an R-D-A-T form in the above structural code) was ad hoc rather than planned: Human and material resources were mobilized before there was clarity about what was going to be done, and activities drove the development of tasks rather than the other way around. The case therefore reveals classic features of collective behavior (Drabek, 1987a; Smelser, 1962; Turner, 1964; Weller & Quarantelli, 1973; Wenger, 1987). On the other hand, the emergence of the IEC was clearly influenced by existing social arrangements, revealing classic bureaucratic features of formal organizing (Drabek & Haas, 1974; Hall, 1962; Scott, 1991; Thompson, 1967; Weber, 1947). In other words, explicit and shared understandings of what was being done and

how it was being done evolved quite rapidly during the emergency period (see Thompson, 1967, pp. 51–53 on synthetic groups). The resulting balance between collective behavior and formal organizing represented by this emergent organized response (type IV) is reflected in its metric score. The existence of a domain precedes activities and tasks, but not resources (2 points), tasks follow rather than precede resources and activities (0 points), and resources precede activities (1 point). A total score of 3 minus the constant 3 (see Table 17.1) places the case appropriately at the precise midpoint of the formal organizing-collective behavior metric (R-D-A-T) represented on Table 17.1.

During our archival studies we documented 52 cases of emergent organized responses; the spread of these cases covers the entire range of the formal organizing-collective behavior continuum (14 of the 24 types identified one or more times); and the average score of the 52 cases, falls at the midpoint of the metric (see Saunders & Kreps, 1987). Thus for emergent organized responses (type IV), disaster researchers can rightly conclude that neither formal organizing nor collective behavior dominates the process. Emergency management practitioners can rightly conclude that flexibility is essential because there are many different ways organized collective actions can be improvised.

Both researchers and practitioners are well aware that emergent organized responses represent only a small albeit important part of what goes on during a disaster. In our own archival studies, for example, only about 13% of the well over 400 cases of organized responses we were able to reconstruct from field interviews and documents were emergent (type IV) in the original DRC typology. Another 22% were extending (type III) or expanding (type II), and the remaining 65% were established (type I). While the predominance of data on established organized responses in the DRC archives reflects the primary focus of the original field studies, it also reflects the importance and predetermined involvement of type I responses during disasters. Two conclusions are certain, however: first, describing the range of organized responses during a disaster requires attention to all four types in the DRC typology; second, capturing the interconnections among the four types of organized responses within broader networks of organized responses is essential. The above structural code provides a means of capturing the processual qualities of these multiorganizational response networks.

Multiorganizational Response Networks and the Process of Organizing

Empirical Case: With little forewarning a tornado cut a 7-mile swath through a Northwestern city. The State Air National Guard facilities and planes were badly damaged, as were several blocks of homes and a trailer park. Emergency personnel began responding even before the tornado left the city. Two voluntary agencies were both distributing food, and independently of each other. By the second day after impact their lack of coordination resulted in emergency personnel and victims missing meals. At this point a local emergency management official met with representatives of both agencies, suggesting that they develop a more cooperative effort. The two agencies then worked out an arrangement in which each would be responsible for food distribution on alternative days (Tasks). This resolution was successful and the two units continued to operate separately during the emergency.

Empirical Case: A major volcanic eruption in the northwestern United States created enormous damage from ash fall and flooding. Within minutes of the initial blast the sheriff's office of a less devastated region sent vehicles and deputies to assist the sheriff's office of a severely impacted county with roadblocks (Resources). There is no evidence that the two offices worked in the same locations of a quite large impact area. Several days later the two county sheriffs met with a third

county sheriff and officials from numerous local, state, and national organizations for the purpose of coordinating search and rescue regionally. A resulting division of labor linked the two sheriff's offices and other responding organizations engaged in ground search and rescue, flight search and rescue, ground security, debriefing, and developing missing persons lists (Resources-Tasks). Within a short period of time this broader social network became recognized as having responsibility for search and rescue operations in the region (Resources-Tasks-Domain). Despite some external criticism, this entity served as an authoritative decision-making body for 12 days.

The preceding empirical cases are part of a sample of 592 cases of multiorganizational response networks we have reconstructed from archival data, with 462 cases coming from the DRC archives and an additional 130 cases from archival data provided by Thomas Drabek (see Drabek et al., 1981). In the first example, and facilitated by a local emergency management official, two expanding organized responses (type II) reach agreement on a simple division of labor, but otherwise operate separately. With respect to the structural code, then, agreement about tasks (T) links the two units in social space but their activities are not conjoined in chronological time or physical space (absence of A), no joint resources are mobilized (absence of R), and the two units never merge (absence of D). In the second example, two established organized responses (type I) are linked initially by the need for and availability of resources, then become parts of a complex search and rescue domain (D), but operate separately in physical space (absence of A) before and after that operation is set up (T). Indeed, all of the units involved in search and rescue are linked in social space through the presence of a common domain and tasks, but in this case their respective activities are not conjoined in physical space. With respect to the structural code, social space is defined by what organized responses of whatever type do in relation to each other. This is quite different from ideas about conjoined actions in chronological time and physical space (Bates & Peacock, 1989a; Kreps, 1991a; Warriner, 1981).

Four structural questions can be asked about simple to larger and more complex multiorganizational response networks. Does the network involve conjoined action in chronological time and physical space (A)? Does the network evidence a mobilization of human and material resources (R)? Does the network evidence a division of labor that is agreed to by network members (T)? Are the units identified and legitimated externally as parts of an inclusive entity (D)? Our research suggests that affirmative answers to one or more of these four questions reflect different types of organizational adaptation during a disaster (i.e., one to three element types in the structural code), but not necessarily organization itself (i.e., four element types in the structural code).

Developing answers to these questions is not simply an academic exercise. Answers are essential if emergency management practitioners are to understand and plan for the involvement of discrete organized responses (of whatever DRC type), on the one hand, and broader response networks that connect them on the other. And just like the discrete organized responses themselves, while some response networks are predetermined, others are improvised during the emergency period. The more severe the disaster is, such as the September 11, 2001 terrorist attacks on New York and Washington, the more important do these improvisations become. Improvisation is specific to the definition of emergent and extending organized responses within the DRC typology and most certainly relevant to response networks linking all four types.

As graphically represented in Figure 17.2, the greater the number of elements present in a multiorganizational response network, the greater the evidence of organizing as a process. The vast majority of the almost 600 response networks we have reconstructed from the archives have only one or two elements present (about 90%), and the clear majority of these cases

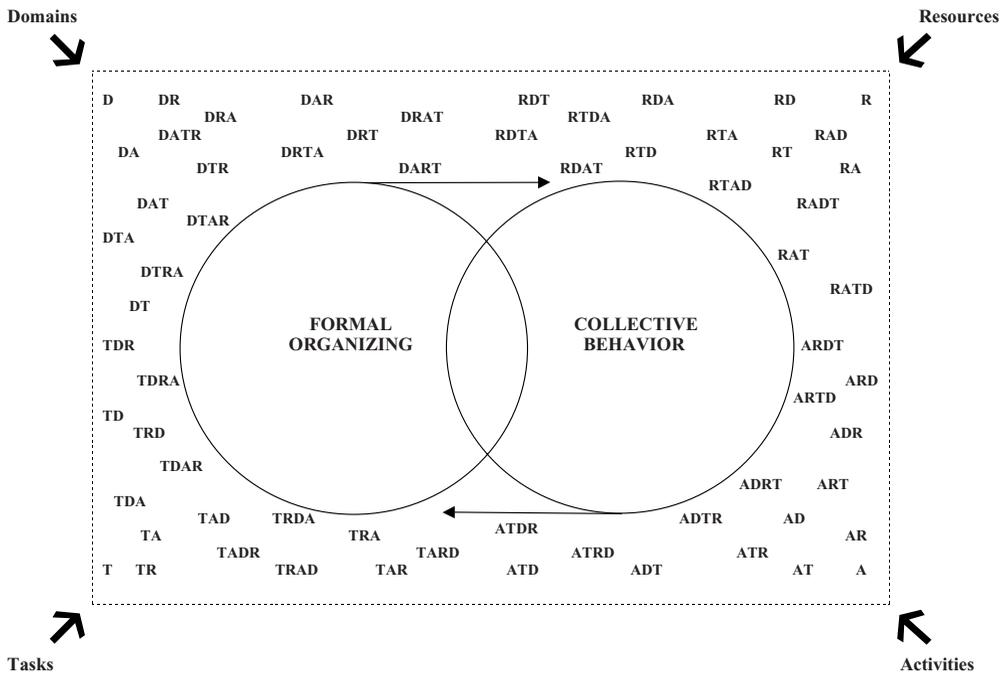


FIGURE 17.2. The process of organizing and reorganizing.

involve only resources and/or activities (about 85%). Thus the modal circumstances involve transfers of exchanges of resources (R), conjoined actions (A), or mobilization of resources in association with conjoined actions (R-A or A-R). Only a minority of the cases (about 25%) evidence (in most cases) an explicit division of labor (T) or (in a very few cases) an explicit merging or inclusion of network members within a self-contained entity (D). These findings suggest that there are potential parallels between response networks and collective behavior as both relate to the process of organizing (Kreps, 1991a). The various combinations of conjoined action and transfers or exchanges of resource (A, R, A-R, R-A) are elemental forms of collective action that create the potential for organization, however, in the vast majority of cases a fully developed organized response does not emerge from a multiorganizational response network. The structural code allows distinguishing when response networks become more fully organized and when they do not.

It is reasonable to infer from these findings that the demand for self-containment and internal control by existing organizations constrains their merging with each other or being absorbed by more inclusive entities (Aldrich, 1979; Gillespie, 1991; Gillespie, Colignon, Banerjee, Murty, & Rogge, 1993; Kreps, 1991a; Starbuck, 1983; Stinchcombe, 1965). But such a result is not inevitable because emergent organized responses (type IV) of various forms and sizes do arise and are consequential. And even when the lives of these emergent organized responses are relatively short, once formed they exhibit all of the basic characteristics taken for granted about organizations that exist prior to disasters. Findings about organized responses and multiorganizational response networks are familiar to both experienced disaster researchers and emergency management practitioners. Such findings support a core principle: that planned and improvised disaster responses are core foundations of emergency management (Kreps, 1991b).

Internal demands for self-containment and control are arguably greater for established and expanding organizations, first, because their involvement during a disaster is anticipated, and second, because they have a preparedness mandate. The result for them is greater predictability about domains and tasks, the resources and activities that will be needed to implement them, and the relevance of other responding organizations to their missions. But that predictability is far from complete, and it decreases as the magnitude and scope of impact become greater.

The September 2001 terrorist attacks on the United States, the December 2004 international tsunami, and the August 2005 hurricane (Katrina) on the United States Gulf Coast are dramatic cases in point. Improvisation is an essential component of emergency management during these and other major events, not only in terms of what is being done and how by established and expanding organized responses, but also in terms of developing essential response networks with each other as well as extending and emergent organized responses. Fortunately, being prepared does not decrease the ability to improvise as conditions warrant. Indeed, disaster researchers and emergency management practitioners increasingly concur that disaster preparedness and prior experience increase the ability to improvise. What is needed, however, is the development of practical decision-making tools that support both preparedness and improvisation within the emergency management system (Kendra & Wachtendorf, 2003; Kendra et al., 2003; Mendonca, 2001, in press; Mendonca & Wallace, 2002, 2004; Wachtendorf, 2004; Webb, 1998, 2002a).

One need never worry about threatened communities being overprepared for disasters (Tierney, Lindell, & Perry, 2001, Chapter 2). The obstacles (e.g., lack of resources and technical expertise, concerns about organizational autonomy and control, limited and selective experience with major disasters as opposed to more routine emergencies) are formidable and they impact preparedness at both organizational and multiorganizational response network levels (Auf der Heide, 1989; Gillespie & Streeter, 1987; Gillespie, et al., 1992; Tierney, 2005; Waugh, 1988). Moreover, it is simply impossible to prepare for every possible contingency, and disaster plans that are too detailed become unworkable. But there is a more pressing constraint on preparedness: while most communities face multiple hazards, the resources needed for sustained disaster planning, training, and public education are more often than not diverted to what seem to be more pressing everyday concerns. In the face of limited resources and political commitment, particularly at the local level, only a modest level of preparedness is a reasonable expectation.

A growing consensus between disaster researchers and emergency management practitioners is that a modest yet sustained level of preparedness should not be based on an inflexible command and control model, but on a flexible resource coordination model. Prototypical examples of the resource coordination model are emergency operations centers which, whether planned or not, will emerge in some form (Dynes, Quarantelli, & Kreps, 1972; Kreps, 1991b; Wenger, Quarantelli, & Dynes, 1987). The various combinations and permutations of domains, tasks, resources, and activities documented in our archival studies of response networks clearly support the conclusion that they are as likely as not loosely coupled (Weick, 1981). Quite simply, loose coupling demands flexibility.

The Process of Reorganizing

Empirical Case: Located in the heart of the impact area, the reorganization of a counseling intervention agency began one hour after a major tornado struck the heart of a small Midwestern city.

The agency's predisaster major mission included drug education and treatment, suicide prevention, family counseling, and venereal disease and birth control counseling. The agency also maintained a small emergency hotline service related to these counseling intervention tasks. The agency's available staff began responding to disaster related information needs because, by chance, it was one of the few units in the immediate impact area that maintained telecommunications. That, combined with public knowledge of its hotline service, resulted in phone calls related to the disaster. The volume of calls was quite high and there was initial uncertainty about what to do about them. The result was a decision to suspend all routine counseling intervention activities (Activities), and to develop new procedures for monitoring calls, referring requests or offers of assistance to the proper authorities, and transmitting messages by phone or by messenger (Activities-Tasks). The agency then recruited volunteers to help staff the new hotline service (Activities-Tasks-Resources). The resulting message center and referral service continued for about 2 weeks, by which time most telecommunications in the impact area had been restored.

Here an Extending organized response (type III) reorganizes temporarily its operations in response to an immediate need for emergency related communications. When an existing organization restructures itself, the basic question becomes: What can change? Once again, answering this question requires a basic conception of what an organization is. Our conception is a structural code that can be used to define organization as both a thing and a process. Using that code earlier, it was shown how emergent organizations, on the one hand, and multiorganizational response networks among emergent and existing organizations, on the other, represent a more fundamental process of demonstrably more or less organizing. But as this example shows, various combinations of changes in activities, resources, tasks, and domains can also allow for descriptions of what happens when an existing entity restructures its routines. In this instance of reorganizing, the routine activities (A) of a counseling intervention agency are suspended temporarily, new tasks are developed (T), and additional resources are mobilized (R). Interestingly enough, this reorganization was only the first of several undertaken by the agency over a six month period, ultimately leading to its merger with another local mental health unit (see Linn & Kreps, 1989, pp. 115–119).

We have examined more than 500 cases of reorganizing by established, expanding, and extending types in the DRC typology, including more detailed analyses of 167 cases of reorganizing related to the above Midwestern tornado and an equally severe Northeastern flood. Within the smaller sample, about 60% of the reorganizations involved only one or two elements of the code, and of these the clear majority (more than 66%) were (A), (R), (A-R), or (R-A) types. Another 28% of the reorganizations involved three elements, and only changes in tasks were added to the mix in over 88% of these cases. The remaining 12% of the cases involved complete reorganizations, and it is only here where changes in domains became central. Thus the modal types of reorganizations were changes in activities, resources, tasks, and various combinations of these elements.

Similar to response networks that connect them, reorganizations of existing units are bounded largely by activities, resources, and to a much lesser extent tasks. While these findings point again to internal demands for self-containment and control (i.e., the constraining effects of existing domains and tasks), they suggest also the continuing importance of collective behavior (i.e., the momentum of changes in activities and resources on, in particular, the reorganization of tasks). Thus as depicted graphically in Figure 17.2, regardless of whether the research issue is the reorganization of existing organizations, multiorganizational response networks, or the emergence of new organizations from multiorganizational response networks, formal organizing and collective behavior are two sides of the same coin. Organizational adaptation during a disaster is most certainly complex, but that complexity is neither incomprehensible nor unmanageable.

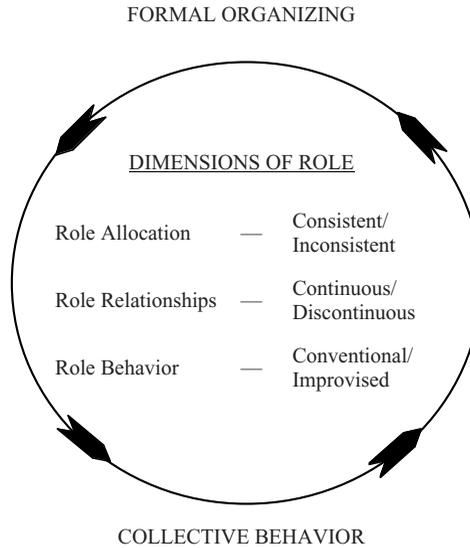


FIGURE 17.3. Role enactment within the context of organizational adaptation.

Role Enactment Within the Contexts of Organized Responses and Multiorganizational Response Networks

Organized responses and multiorganizational response networks are important on their own terms and, as noted in the lead statement of this paper, they provide structural contexts for the responses of individuals. We suggested in the preceding text that capturing these contexts requires dual reference to formal organizing and collective behavior. Capturing individual responses within and among organizations, however, requires focused research on how individual roles are enacted (Barton, 1969; Dynes, 1987). Figure 17.3 highlights three sociological dimensions of role enactment we have examined during our archival studies: role allocation, role relationships, and role behavior (Barton, 1969; Bates & Harvey, 1975; Bates & Peacock, 1989a; Merton, 1957; Turner, 1980a, 1989).

With role allocation, the question is whether disaster roles, (i.e., what people are actually doing during a disaster such as search and rescue workers as opposed to a search and rescue leader), are consistent or inconsistent with predisaster occupations of the individuals enacting them. Members of a fire department searching for survivors in damaged or destroyed buildings would have consistent role allocations, but an architect who happens to be at a disaster site leading a search and rescue operation would have an inconsistent role allocation. The relevant preparedness issue is the extent to which disaster roles can be formally assigned beforehand, or at least predictably assumed.

With role relationships, the question is whether direct links between individuals enacting disaster roles are, on a case-by-case basis, continuous or discontinuous in terms of their predisaster occupations. A police chief and a mayor having direct contact at an emergency operations center (EOC) would have a continuous role relationship, but a college professor and a director of public works having similar contact at an EOC would have a discontinuous relationship. The relevant preparedness issue is the extent to which it reasonably can be assumed that disaster

role links will be extensions of everyday relationships among occupations, or whether new role relationships are forged on an ad hoc basis.

With role behavior, the issue is whether disaster roles are performed in a conventional as opposed to an improvised manner. The performance of a disaster role (e.g., search and rescue leader or head of an EOC) is quite different from the role allocation issue outlined earlier. When a disaster role is performed conventionally there is familiarity with how it is to be accomplished and little or no departure from expected performance. When a disaster role is improvised, there is some to greater deviation from routine performance. As documented systematically by Webb on a broad range of disaster types (1998, 2002a), the deviation can range from procedural and equipment changes conventionally related to the role enactment, to changes in the conventional location of the role enactment, to expansion of a disaster role by taking on activities that are not authorized, to the issuing of orders to others over whom one has no formal authority, and to the commandeering of supplies and equipment without legal mandate. The relevant empirical issue here is the extent to which anticipated performances of disaster roles are complemented by improvised performances as they relate to unanticipated contingencies, response problems, or special opportunities to innovate.

In completing archival studies of well over 550 role enactments that occurred during natural, technological, or willful (e.g., urban riots like the example discussed earlier in the chapter) disasters, our core findings about role enactments across two large subsamples are as follows: first, at least two thirds of the role allocations were consistent rather than inconsistent; second, on average over two thirds of the role links of individuals enacting disaster roles were continuous rather than discontinuous; and third, the roles were performed conventionally in slightly more than half of the cases in one large subsample (Kreps & Bosworth, 1993) and about three quarters of the cases in a second large subsample (Webb, 1998). Where improvisations occurred in at least one or more behavioral components of disaster roles, most of them (about 80%) involved changes in procedures, equipment, or the location of the role performance. The remaining improvisations (about 20%) most often involved an expansion of the role or the issuing of orders that was not previously authorized. The primary reasons for these improvisations were human and material resource needs, intra- and interorganizational operational issues, time pressures to get things done, and frequently mixes among these kinds of problems and opportunities.

Because of oversampling of established and expanding organized responses in the original DRC field studies, disproportionately more cases of inconsistent role allocation, discontinuous role links, and improvised role behaviors occurred in these types. However, all three dimensions of role are strongly related to the DRC typology. Established and expanding organized responses, whose involvement during disasters is anticipated, are more likely to have consistent role allocations and continuous role relationships. Extending and emergent organized responses, whose involvement is not anticipated, are more likely to have inconsistent role allocations and discontinuous role relationships. We have also found that role improvisation is more likely to occur in extending and emergent organized responses, with the association being much stronger in one large subsample (Kreps & Bosworth, 1993) than in the other (Webb, 1998).

Distributions on the three dimensions of role enactment as well as findings relating them to the DRC typology point to an important theme about the emergency periods of disasters. While the allocation of roles, relationships among roles, and actual role behaviors tend to be patterned in terms of pre-disaster routines and anticipated involvement, there is compelling evidence that exceptions to these routines occur quite often (Stallings, 1998). These exceptions—in this case inconsistent role allocations, discontinuous role links, and improvised

role behaviors—happen in all four types of organized responses and they arise in response to very specific problems and opportunities (see also Mendonca, 2001; Wachtendorf, 2004). These problems and opportunities reflect the inherent complexity and fluidity of disaster situations.

Preparedness of established and expanding organized responses necessarily serves to increase predictability about what roles are to be performed, by whom, with whom, and how. In so doing, preparedness serves to enhance the resiliency of disaster-threatened communities, regions, and societies. That is why disaster planning, training, and public education are such important components of emergency management. But the ability to adjust and react flexibly as conditions warrant is also a core foundation of emergency management, one that is evidenced by all four types in the DRC typology as well as both preexisting and emergent multiorganizational response networks. The question is whether individuals who necessarily will or even may be involved in emergency situations can become better prepared to change their respective roles as conditions warrant. We think they can through the development of research based decision-making models that support role enactment preparedness and training (Mendonca, forthcoming; Mendonca & Wallace, 2004). We will suggest an integrated research strategy that highlights the importance of such models in the last section of the chapter.

DRC-BASED STUDIES AND BROADER RESEARCH ISSUES ON DISASTER PREPAREDNESS AND RESPONSE

Disasters are non-routine events in societies or their larger subsystems (e.g., regions, communities) that involve conjunctions of physical conditions with social definitions of human harm and social disruption. (Kreps, 2001, p. 3719)

The above entry from the latest edition of the *International Encyclopedia of the Social and Behavioral Sciences* draws on the rich traditions of hazards and disaster research within the social sciences since World War II. As defined previously, disasters are social catalysts that relate to community and societal adaptations before, during, and after they occur (Birkland, 1997; Dubin, 1978; Kreps, 1998; Kreps & Drabek, 1996). Those researchers focusing on potential disasters (hazards) study conditions of physical and social vulnerability, the risks associated with these conditions, and efforts to mitigate these conditions before they become disastrous. Those researchers focusing on actual events (disasters) study the dynamics of disaster preparedness, emergency response, and long-term recovery. Hazards and disaster researchers alike increasingly are taking an inclusive view of their subject matter. Over time they have become keenly interested in comparing adaptations to a broad range of natural, technological, or willful events (Cutter, 2001, 2003a; Tierney, Lindell, & Perry, 2001).

Our archival studies summarized above were stimulated by the DRC typology and bounded by the focus of the original DRC field work. Accordingly, they have been focused almost exclusively on emergency response and disaster preparedness topics and not on those related to hazard vulnerability, mitigation, and disaster recovery. Summarized most recently by Tierney, Lindell, and Perry (2001), early to more recent disaster response and preparedness studies have highlighted, on the one hand, major obstacles to achieving anything more than sporadic to modest levels of preparedness at all levels of analysis (household, organizational, community, regional, national), and on the other hand, the remarkable absorptive capacities

of communities and societies during and after natural, technological, and willful events. In so doing, research over decades has contradicted myths that during a disaster people will panic, that those expected to respond will abandon occupational and disaster roles, that community systems will break down, and that antisocial behavior will be rampant. Having systematically debunked such myths, the more interesting research questions have become where, when, how, and why communities, regions, and societies are able to leverage anticipated (and perhaps planned) and improvised post-impact responses in coping with the circumstances of disaster.

Building on the DRC typology and archives, our secondary research has tried to address systematically these questions. Anticipated and improvised organized responses, multiorganizational response networks, and disaster roles of various types and levels of complexity are the primary means through which communities respond to disasters on their own terms, and also are linked with response systems at regional, state, and national levels. Disasters are local events in the United States, and treated as such, but it is also clear that societal-wide adaptations become increasingly important as the magnitude and scope of impacts become greater (Birkland, 1997; Drabek, 1991a; Drabek, Mushkatel, & Kilijanek, 1983; Dynes, Quarantelli, & Wenger, 1990; Kreps, 1991a; May & Williams, 1986; Sylves, 1991; Wachtendorf, 2004). And while political and cultural differences must always be taken into account, the strength of community and societal adaptations of all nations directly contributes to their resiliency in the face of human harm and social disruption (Berke, Kartez, & Wenger, 1993; Mileti, 1999; Tierney, Lindell, & Perry, 2001; Wenger, 1978).

As documented in the preceding text and in a host of other studies, the adaptations of disaster relevant organizations and the performance of disaster roles have been important foci of disaster research for decades, such that the knowledge base on these topics is increasingly amenable to codification (e.g., Barton, 1969; Drabek, 1986; Dynes, 1970; Kreps & Bosworth, 1993; Webb, 1998, 2002a). Far less research has been completed on multiorganizational response networks. However, findings at the response network level of analysis have expanded rapidly during the past two decades, and they are based on state-of-the-art methods and models. Needed now are systematic comparisons of organized responses, multiorganizational response networks, and disaster roles across multiple types of disasters. Such comparisons will require the use of standardized data protocols, for which complete research designs are not yet available. Needed also are more sustained efforts to formally disseminate and use findings about anticipated and improvised post-impact responses of disaster relevant organizations.

Knowledge about crisis relevant organizations, multiorganizational response networks, and disaster roles must be placed side by side with findings on adaptations by households, firms, other community-based organizations, and government agencies at all levels. A fairly solid knowledge base has been developed at the household level of analysis with respect to such topics as risk communication, warning dissemination and response, evacuation, and other forms of protective action. But serious knowledge gaps remain on these topics and, just as with adaptations at the organizational level, there are essential requirements for standardized measurements of household responses across different types of events. Far less is known about the behavior of firms, other community-based organizations, and intergovernmental relationships during disasters. Most notably, very little work has been completed on how national government structures, policies, and political cultures influence preparedness and disaster responses at regional and local levels, and most of what little research that has been done is confined to the United States and other highly industrialized democracies (see Tierney, Lindell, & Perry, 2001, Chapter 6).

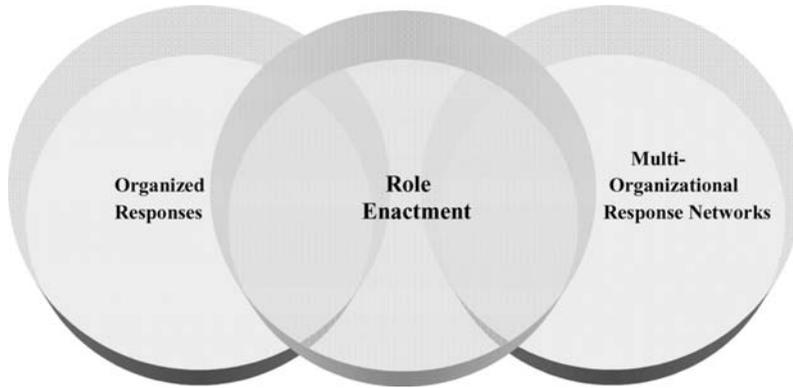


FIGURE 17.4. An integrated research strategy to increase readiness for anticipated and improvised post-disaster responses.

AN INTEGRATED RESEARCH STRATEGY TO INCREASE READINESS FOR ANTICIPATED AND IMPROVISED DISASTER RESPONSES

Organizational adaptations to disaster have enormous range and complexity. As depicted graphically in Figure 17.4, hazards and disaster researchers are attempting to unravel that complexity at essentially three distinct levels of analysis: within organized responses (emergence and reorganizing), among multiorganizational response networks, and in terms of disaster roles that are nested within organized responses and multiorganizational response networks. Anticipated and improvised disaster responses can be distinguished at all three levels of analysis. The above structural code and formal organizing–collective behavior continuum provides one way to make that distinction for organized responses and their associated response networks, and the above three dimensions of role serve the same purpose at the individual level of analysis. The result is that each of the three levels of organizational adaptation is important on its own terms and worthy of further research on an inclusive range of natural, technological, and willful disasters. Indeed, DRC-based and a host of other previous studies on organizational adaptation, broadly defined, have contributed greatly to the development and dissemination of knowledge about how communities and societies respond to disaster.

But much more research is needed. The conceptual tools summarized in this chapter (the DRC typology, a structural code, formal organizing–collective behavior continuum, and role enactment framework) can reduce the inherent complexity of organizational adaptation during disasters to a more intelligible research problem and a more solvable emergency management problem. For that to happen, however, disaster role enactments, organized responses, and multiorganizational response networks must be combined within a more highly structured approach to research and application.

With that goal in mind, we propose an integrated research and application strategy that is based most directly on Gary Webb’s (1998, 2002a) systematic research on role improvisations, a very powerful methodology being developed by David Mendonca to describe the broader structural contexts within which role improvisations occur, that is, what he terms organizationally situated improvisations (Mendonca, 2001; forthcoming; Mendonca & Wallace, 2002, 2004), and a superbly illustrated typology developed recently by Tricia Wachtendorf to describe

what she terms organizational improvisations (Wachtendorf, 2004; Kendra & Wachtendorf, 2003; Kendra et al., 2003). By blending the conceptual tools and empirical approaches of Webb, Mendonca, Wachtendorf, and their collaborators, we believe improvised disaster responses at the role, organizational, and multiorganizational levels can be isolated more precisely in future research from those responses that are anticipated. Once described and distinguished from each other, anticipated and improvised disaster responses can then become key dependent variables in, first, structural models of organizational adaptation to disasters, and second, complementary cognitive models of individual decision making in these same contexts. The application yield of the integrated research strategy we propose, we believe, will be preparedness support tools for emergency management practitioners.

As highlighted by its centrality in Figure 17.4, the core foundation of our proposed strategy should be studies of role enactments by key participants (at executive and operational levels) in established and expanding organizations. Selection of these two types does not mean that extending and emergent responses from the DRC typology are less important. It ensures, however, that expected involvement of individuals (and therefore direct disaster relevance) can be taken for granted. That being the case, any unexpected role allocations, or development of new role relationships, or improvised role behaviors by key participants in established and expanding organizations document changes in anticipated role enactments. While such role changes have been chronicled in greatest detail by Webb, of common theoretical interest to himself, Mendonca, and Wachtendorf are improvised role behaviors. Simply put, it is essential to the research strategies of all three scholars and their collaborators to document the following about such role behaviors: when improvised role behaviors occur relative to the time of impact; where they occur relative to the location(s) of impact; how they occur, namely, as nonconventional uses of resources, procedures, status, or authority; and why they occur, namely, as improvised responses to unanticipated contingencies, problems, or special opportunities.

Having located and documented short-term role changes within established and expanding organizations, with particular attention given to improvised role behaviors, there are two additional core data requirements. First, any evidence of reorganizing by established and expanding organizations studied can be documented with reference to either the above structural code or the typology of organizational improvisations (reproductive, adaptive, creative) developed by Wachtendorf to document organizational improvisations (discussed in another paper in this handbook). For Kreps and Bosworth, the more elements of the structural code (1-4) implicated by the substance of a respective reorganization (i.e., what was actually happening), the greater the degree of potential improvisation at the organizational level of analysis. But potential and actual improvisations must be distinguished analytically and empirically. For Wachtendorf, it is essential to isolate reorganizations that are planned from those that are improvised. The relative presence of reproductive, adaptive, and creative improvisation during any reorganization (however documented) clearly allows such determinations. Second, and using Mendonca's methodology, any documented improvisations at either role or organizational levels must then be colocated within the multiorganizational response networks of which established and expanding organizations are members. Documenting the niches and overall centrality of respective established and expanding organizations within these response networks requires use of state-of-the-art social network methods and detailed data on the flow of communications among network members. Assuming such data are collected and stored, the above structural code may be useful also for documenting the organizational qualities of the network itself. The more elements of the code (1-4) represented substantively within a multiorganizational response network, the greater the evidence of organizing in process at that

level of analysis. And once documented, Wachtendorf's typology can be used productively to distinguish between planned and improvised adaptations by the multiorganizational networks themselves.

The primary research objective, in effect, is to document and nest individual role behaviors within established and expanding organizations and their associated response networks. In so doing, both improvised role behaviors and other organizational adaptations can be distinguished from those that are anticipated. Associated structural models can then be developed to predict discrete and contingent probabilities of improvised and anticipated role behaviors and organizational adaptations as a function of disaster events characteristics as well as any number of standard variables that have been used to measure structural characteristics of organizations and social networks. There is no question that building these structural models has major associated data requirements. The DRC archives that have been analyzed in detail only scratch the surface in meeting these data requirements (see, e.g., Kreps & Bosworth, 1994, Chapter 7 and Appendix C). But the respective studies of Webb, Mendonca, and Wachtendorf illustrate beautifully the rich descriptions of organizational adaptation that ultimately will be required. We therefore conclude that the conceptual and empirical foundation has been established for developing standardized data protocols to distinguish planned and improvised post-impact role enactments, organized responses, and multiorganizational response networks.

While research at the individual level of analysis is arguably easier, conventional and improvised role behaviors never occur in a social vacuum. That is why it is essential to document also disaster role allocations and role relationships and then, in effect, situate data on all three dimensions of role enactment within both broader organizational and response network contexts (Gillespie, 1991; Gillespie & Streeter, 1987). Only then can powerful structural models of improvised and conventional role behaviors be produced. Such models can and we think should be complemented by cognitive models of decision making by individuals who are enacting disaster roles. Cognitive models of decision-making are also of common interest to Webb, Mendonca, Wachtendorf, and their collaborators. Building them, however, is a major research problem in its own right, one with associated conceptual issues and essential data requirements.

Cognitive models require measurement of what those enacting disaster roles are thinking about in relationship to their behaviors. We concur with our above colleagues that conventional or improvised role behaviors relate directly to how people make sense about what is happening around them during a disaster and what they themselves are doing. Weick (1993) argues that making sense of things during crisis situations is a muddy process that involves vague questions, vague answers, and negotiated agreements to reduce confusion. One way individuals make sense of things is by drawing on prior knowledge of or experience with the roles they are enacting either from routine circumstances or (perhaps) from comparable crisis situations. The biographies of role incumbents are, therefore, essential to document in the development of cognitive models of decision making. Another way people make sense of things is through communications with other participants enacting similar or related disaster roles. That is why role relationships are one of the three core dimension of roles we have identified. Still another way people make sense of things is by observing what their respective organizations are doing independently and in relationship with what other organizations are doing. That is why role enactments must be nested within the contexts of organized responses and multiorganizational response networks.

In effect, decisions to enact disaster roles conventionally, by improvising, or by some combination of convention and improvisation serve as individual adaptations that reduce ambiguity about what is happening, what needs to be done, where, when, how, and why. Sometimes these

adaptations are compelled by contingencies and problems over which people performing disaster roles have very little control. Other times they result from proactive decision-making wherein role incumbents exercise considerable control. While the former circumstances are no less important to document than the latter, the labeling of proactive decision-making as novel, opportunistic, creative, or entrepreneurial seems particularly apt (e.g., Mendonca, forthcoming; Wachtendorf, 2004; Weick, 1998). Rest assured, however, that both compelled and proactive decisions and actions do not arise out of thin air; they are contextually based within organizations and social networks.

Like structural models of improvised and conventional role behaviors, cognitive models are feasible to develop, particularly if there is a standardized cataloguing of data on the decision-making processes of individuals enacting disaster roles. Once constructed, structural and cognitive models are highly complementary and have two important applications to emergency management. First, the models can provide logical preparedness frameworks to increase readiness for conventional and improvised role behaviors during a disaster. Second, findings from the models allow for the development of empirically based training simulations on conventional and improvised role behaviors. Existing emergency operations centers are very appropriate for either of these modeling applications, first, because they are routine venues for preparedness and training activities, and second, because they have strong representation from established and expanding organizations. Some limited modeling application is possible now using current frameworks and findings on organizational adaptation. But maximizing the use of structural and cognitive models requires more highly structured data protocols, more adequate data, and more readily retrievable data. The increasing use of state-of-the-art computer technologies is essential for these data management activities.

A CLOSING COMMENT

When the Disaster Research Center was established during the mid-1960s, its research program included both field studies and laboratory simulations of organizational adaptation to crisis events. The field studies have continued for decades and over time there has been increasing use of survey research techniques. But after a very creative early application (see Drabek & Haas, 1969), the simulation work was largely suspended because of its related cost and complexity. At its founding, DRC's leadership (Russell Dynes, Henry Quarantelli, and J. Eugene Haas) made the wise decision to create a data archives and a rudimentary system of cataloguing and retrieving data collected on specific events. The early combination at the DRC of field work, disaster simulation, and data archiving serves as a template for what is needed for future research and knowledge application on organizational adaptation. Developing standardized data protocols, building structural and cognitive models, using these models as preparedness and training tools, and maintaining an effective data management system are all non-trivial problems. Solving these problems will require interdisciplinary teams that include (at the very least) social scientists, cognitive and decision scientists, and computer scientists. Given the growing global importance of natural, technological, and willful hazards and disasters, work on and support for the collaborative effort that is needed should begin now.