Combining Structural Forms in the Search for Policy Tools: Incident Command Systems in U.S. Crisis Management

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As governments search for policy tools to deliver public services, two choices—hierarchy or network—are portrayed as stark alternatives. The U.S. Department of Homeland Security has adopted a practitioner-based innovation known as the Incident Command System (ICS) that assumes that crises require a network of responders, but that these networks should be managed by a hierarchy. While the ICS illustrates the potential for mixing hierarchies and networks, it was mandated by policymakers willing to make broad assumptions about the applicability of the ICS on limited evidence. An overdependence on practitioner claims displaced careful analysis of the underlying logics vital to understanding the operation of the policy tool. A case study of the ICS in managing an exotic animal disease outbreak points to the importance of crisis characteristics and management factors as contingencies affecting the operation of the ICS.

Introduction

As governments search for policy tools to deliver public services, two choices—hierarchy or network—are portrayed as stark alternatives. Indeed, definitions of networks almost inevitably contrast them with hierarchies, suggesting that networks have distinct management characteristics and different challenges. This article examines a crisis management policy tool, the Incident Command System (ICS), which has combined hierarchy and network in the same structural form. Public policy instrumentation represents governance theory in action, and tells us about efforts to change governance regimes (Lascoumes and Le Gales 2007). In this case, the choice of instrument tells us something about the search process in a policy area characterized by intense pressure for successful policy tools and how that search relates to practice and theory.

With the ICS, policy officials drew on practitioner innovations designed to overcome a core problem of network theory—how to coordinate multiple organizations toward a common goal. Crises are complex because they are unpredictable and infrequent, requiring a range of skills and

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resources that no single organization will harbor. But unlike the functional context of most networks, crises also require a rapid and coordinated response. We therefore have a crisis management paradox: Crises not only require an interorganizational response but also require traits unusual in networks: rapid and decisive coordinated action.

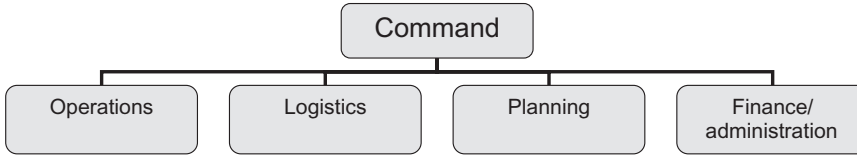
The ICS operates as an interorganizational hierarchy, using centralized command to manage a network of multiple organizations. Can hierarchical and network principles be melded together? If so, what factors give rise to and enable such a combination? This topic is important because the ICS suggests that portrayals of stark differences between hierarchies and networks rest on overstated ideal types and that governance structures can usefully exist between these two types. The subject is also important because it is at the heart of crisis management policy in the United States.

The next section examines in greater detail the adoption of the ICS as a policy tool. This section is followed by a summary of the ideal-type view of networks and hierarchies that argues that they are distinctly different forms of social coordination. But the particular environmental context of crisis response led to practitioner experimentation with organizational forms that resulted in the ICS. Other examples of mixing hierarchy and networks add understanding about why such experimentation takes place. Assessing the ICS as policy tool would be incomplete without a study of how it actually works in practice, and the balance of the article examines a taskforce applying the ICS as it sought to eliminate an exotic animal disease in California and other western U.S. states. The case highlights that while the practitioner-framed adoption of the ICS offered an innovative policy tool, it has largely overlooked contingencies critical to the success of this tool, such as the interaction of critical crisis factors (the experience of responders, the length of the crisis, and the diversity of the network) and management factors (standard operating procedures [SOPs], trust, and shared mental models). Throughout the article I offer a series of propositions suggested by case evidence.

Searching for Policy Tools in Crisis Management

Crisis management policy has received an extraordinary level of political attention in the aftermath of 9/11 and Hurricane Katrina (Moynihan 2005). Policymakers searching for useful crisis response tools face a difficult context. Crises engender political support for change but are also difficult phenomena to learn from (Boin et al. 2005; Moynihan 2008). Crises tend to be unusual events with high consequences, reducing the potential for trial and error learning (LaPorte and Consolini 1991). Because crises can differ significantly, it is hard to know if a lesson from one crisis applies to another. The ambiguity of cause and effect relationships makes the search for solutions difficult, and decision makers often recycle old solutions to new problems (Stern 1997).

FIGURE 1
The Basic Structure of the Incident Command System



Soon after its creation in 2002, the U.S. Department of Homeland Security unveiled two major policy documents. The National Response Plan (U.S. DHS 2004a) defined responsibilities for major crises. The National Incident Management Systems (NIMS) (U.S. DHS 2004b) promotes the use of particular crisis policy tools, most notably the ICS. NIMS describes the characteristics of the ICS (U.S. DHS 2004b, 9–12) and the logic for its application. The ICS is a particular structural arrangement intended to facilitate crisis response. It centralizes authority in an incident commander who directs multiple organizations around the critical management systems needed in an emergency: planning, operations, logistics, and administration/finance. If the geographic spread of the emergency requires multiple commands, incident commanders report to a single area commander. Figure 1 illustrates the hierarchical logic of the ICS. Authority and control are at the top, and the incident/area commander is the key decision maker. The chain of command is intended to ensure that all workers have an identified supervisor, each supervisor has a manageable span of control, and that lower-level actors follow orders.

While NIMS concedes that the ICS may need to be adapted to particular situations, it pushes practitioners to learn, accept, and use a hierarchical structure rather than developing a structural design of their own choosing. NIMS claims that the unified command offered by the ICS "overcomes much of the inefficiency and duplication of effort that can occur when agencies of different functional and geographic jurisdictions, or agencies at different levels of government, operate without a common system or organizational framework" (U.S. DHS 2004b, 14). A unified command is expected to foster the development of a single and common set of goals and strategies, facilitate coordination and the flow of information, clarify responsibilities and restrictions for each actor, and optimize network effectiveness (U.S. DHS 2004b, 15).

The description of the ICS offered thus far makes it sound like a classic hierarchy, and both the discussion of the ICS in NIMS and previous scholarly research have largely ignored its network qualities (Bigley and Roberts 2001). However, the actors that fill out this hierarchical structure come from multiple organizations. Indeed, a basic assumption of the DHS is that "[t]he combined expertise and capabilities of government at all levels, the private sector, and nongovernmental organizations will be

required to prevent, prepare for, respond to, and recover from Incidents of National Significance" (U.S. DHS 2004a, 6). The ICS is, therefore, not a pure hierarchy but an effort to coordinate a network via a hierarchical form of governance.

This point becomes clearer when we consider the origins of the ICS. In the 1970s, emergency responders in California sought to improve forest firefighting coordination. Multiple jurisdictions had struggled to work together because of inconsistent communication systems, terminologies, and management approaches. The basic challenge that these responders sought to resolve is *the* basic network problem—coordination of multiple organizations—under a set of specific circumstances—decisional urgency, high uncertainty, and threat (Rosenthal et al. 1989). Their solution was to use a highly centralized governance structure to direct their network in times of crisis, while returning to a more loosely affiliated network in noncrisis periods. The ICS gradually became adapted to crises beyond forest fires, such as urban fires, search and rescue situations, earthquake response, and hazardous materials clean-up (Cole 2000). Practitioners continued to express confidence in the utility of the ICS in these new contexts, culminating in the 2004 mandate by NIMS that all responders relying on federal resources use the ICS.

The ICS arose from craft-based practitioner knowledge, and the policy framing of the ICS in NIMS and elsewhere presents it as a proven, noncontroversial, and common-sense best practice. While Hood (2007) notes that much argumentation for policy tools link to an overarching governance paradigm, such as the New Public Management, this is not true of the ICS. In fact, in its emphasis on hierarchies and central control, the implicit managerial ideology of the ICS seems quaintly antiquated and at odds with current trends. In NIMS there is no explicit acknowledgment of how the ICS experiments with structural forms in a way that challenges scholarly treatments of networks and hierarchies, examined in the next section.

Networks and Hierarchies as Ideal Types

Networks are usually defined and explained via a contrast with hierarchy. For example, O'Toole (1997, 45) defines networks as "structures of interdependence involving multiple organizations or parts thereof, where one unit is not merely the formal subordinate of the others in some larger hierarchical arrangement." According to Alter and Hage (1992, 78), a basic normative characteristic of networks is that they are not hierarchical, relying on lateral linkages and self-regulation. Alter and Hage (201) also hypothesize that networks with strong bureaucratic characteristics will perform poorly. Indeed, networks are praised for avoiding the pathologies associated with traditional hierarchies (Goldsmith and Eggers 2004).

Powell (1990) argues that networks have management traits distinct from hierarchies. Networks rely on the complementary strengths of members, whereas hierarchies are organized via employment relationship. Hierarchies rely on routines to communicate, whereas networks rely on relational forms of communication. The climate in hierarchies is formal and bureaucratic, while in networks it is characterized by flexibility, mutual benefit, and ongoing relationships. Networks also manage conflict and establish cooperation in different ways. In hierarchies, conflicts are resolved via administrative fiat or supervisory authority, while norms of reciprocity and a concern for long-term reputation foster cooperation in networks.

Not only are the management characteristics of networks different, so too are the capacities required of managers (Agranoff and McGuire 2001). Network managers stimulate and mediate interaction, rather than act as central directors (Koppenjan and Klijn 2004). Collaboration is characterized by social capital and trust, shared learning, and a culture of joint problem solving (Bardach 1998). But membership in networks is generally assumed to be voluntary, and consensus is essential to continuity, making networks less stable forms of social action (Milward and Provan 2000).

A Contrarian View: The Logic of the ICS

The ideal-types approach outlined above has been widely accepted: "the claim of 'network management is different' is becoming the standard refrain and is now accepted as the popular wisdom" (McGuire 2003, 1–2). McGuire suggests that this perspective has inhibited the search for knowledge about network management in the public sector. But it does not appear to have affected the development of the ICS as a policy tool, which is plainly at odds with the ideal-types approach. The actual design of the ICS represents a contrarian view on the question of whether hierarchies and networks can be combined. The ICS originated as a practitioner-based functional response to crises. To understand the logic driving the decisions of these practitioners, we need to better understand the characteristics of crises, specifically their asymmetric nature (requiring a network of responders that offer a variety of capacities) and the need for rapid, coordinated response (requiring central command).

Some emergencies are frequent and predictable enough that it makes sense to have an organization that specializes in dealing with them, for example, health emergencies. However, less frequent crises will not be met by specialized permanent organizations, and the particular skills required to manage the response will be spread across a range of organizations. Larger crises require more resources and skills, compelling a larger and more diverse network. A network response also helps to cope

with the operational uncertainty that is the one certainty in crises (Lagadec 1990), since pooled knowledge and resources increase the ability to deal with unconventional situations that would overwhelm any single organization (Koppenjan and Klijn 2004).

Boin and 't Hart (2003, 547) observe that "multiorganizational, transjurisdictional, polycentric response networks" have become the norm in crisis response. But networks must be coordinated (Provan and Kenis Forthcoming). The need for interorganizational coordination is a reoccurring theme in the crisis management literature and is hypothesized to foster a more effective emergency response (Pearson and Clair 1998, 72). As early as 1970, Dynes pointed to the use of ad hoc networks to respond to nonregular tasks, and Drabek's (1990, 222) study of emergency managers led him to conclude that "[t]he fundamental function they perform is to facilitate interagency coordination." Coordination in the midst of crisis is not easy. Officials at responding organizations may not be familiar with one another, disputes over authority and resources "almost inevitably arise" (Quarantelli 1988, 380), and there may be a lack of consensus on the nature of the problem and on what to do. Rosenthal et al. (1989, 459) argue that "it is time to do away with persistent myths about harmony and cooperation as the dominant trends in governmental reactions to crisis." It is overly optimistic to expect that agencies will voluntarily create coordination mechanisms under conditions of decisional urgency (Dror 1988, 265).

Crises offer limited time to respond. The crisis cannot be ignored because of its consequentiality and political salience (Stern 1997, 73). The response cannot be slow or deliberate because a rapidly unfolding crisis can become exponentially worse very quickly. Some characteristics of networks (voluntary cooperation, decisions slowed by the need for consensus, a reliance on reciprocity norms) conflict with the need to deliver a rapid, coordinated crisis response.

Why Establish Interorganizational Hierarchies?

Beyond the ICS there are additional but less extreme examples of interorganizational hierarchies that support the contrarian view and provide further insights into the logic behind such policy tools. U.S. cabinet councils are well-studied examples, particularly the National Security Council (Hult and Walcott 1990). These councils are formal governing bodies, usually led by White House staff, which coordinate the policy of multiple federal organizations. Cabinet councils are distinct from the ICS in a number of ways. First, cabinet councils focus on federal actors only, ultimately falling under the single hierarchal authority of the president. The ICS, by contrast, is intergovernmental and likely to include nonpublic actors, increasing the chances of network tensions and coordination difficulties. Second, the ICS deals with relatively

specific issues of operational tactics, while the cabinet councils specialize in policy development and the use of political power (Walcott and Hult 1987, 112, 122). While the heads of cabinet councils are limited in their roles to that of an honest broker monitoring implementation (Patterson 1988), incident commanders have the authority to actually implement policy.

The growth of third-party government provides another venue to study interorganizational hierarchies. Service delivery networks feature nonprofit and/or private organizations but are typically led by the public actors who determine policies and structure accountability relationships (McGuire 2003). The work of Provan and Milward (2001) suggests that in the area of mental health, more centralized networks are more effective. Such centralization can come in the form of a strong lead actor or a network administrative organization. Network administrative organizations help to direct the network, allocate resources, manage administration and limit duplication, and ultimately reduce coordination costs (Provan and Kenis 2007). The ICS, as a specially created entity intended to foster network coordination, is much like a network administrative organization, although it is hierarchical in form and enjoys greater authority over basic operational decisions.

So why do governments experiment with combining hierarchies and networks? The various examples of interorganizational hierarchies offer some insights. A consistent theme that emerges is contingency in design. Complexity demands networks, as a single hierarchy lacks sufficient capacity to respond, and a network of relevant capacities needs to be created. Hult and Walcott (1990) emphasize the political aspects of complexity and argue for the need for alternatives to hierarchical control to foster legitimacy in areas where there is goal ambiguity and controversy. But other imperatives encourage some form of centralized control. Provan and Kenis (2007) suggest that such centralization is needed for networks that are larger, require a range of network competencies, and do not have high levels of trust. In the case of the National Security Council there was a clear desire for closer political control as the number of relevant actors in the policy network grew (Patterson 1988).

The development of the ICS not only suggests significant similarities in rationales for experimenting with hierarchical and network forms, but also points to an additional imperative for centralizing networks, which is the importance of time and the relative advantages of hierarchies for rapid decision making. Proponents of the ICS assume that centralized authority can foster coordination amid urgency, as a unified command provides clear direction to network members. When decisions must be made on an hourly or daily basis, a hierarchy is needed. Decisions can be made quickly by the incident commander, rather than waiting for consensus to occur among members, and in crises, rapid decisions, even if imperfect, may be superior to a more considered response. These decisions foster a certainty through a single line of

authority that all actors will abide by, reducing the institutional and strategic uncertainty that Koppenjan and Klijn (2004) identify as a characteristic of networks. The rationale for the ICS is summarized in the following proposition:

> Proposition 1: In the area of crisis management, interorganizational hierarchies are used to balance the need for rapid and coordinated action with the breadth of required capacities.

The ICS originated from practitioners designing a functional policy tool to solve a specific type of crisis. The results justified the contrarian approach—hierarchies and networks were successfully combined to fight forest fires. However, the conversion of the ICS into an all-hazards tool revealed weaknesses in the learning process. The DHS assumed that the ICS was suited for all types of crises, despite a dearth of analysis on its suitability outside of forest fires (Bigley and Roberts 2001; Cole 2000). The best-practice nature of the ICS argumentation has emphasized its successes but failed to offer compelling analytical logics for why it works and what contingencies are crucial to its operations. Most glaring is the failure to explicitly consider the network aspects of the ICS, in contrast to the heavy emphasis on hierarchical characteristics such as top-down authority, chain of command, and span of control (U.S. DHS 2004b). The remainder of this article examines a case study of the ICS outside of the forest fire setting. The case reveals that the ICS generally worked well but points to some essential and overlooked crisis characteristics and management functions that influenced its operations. This suggests a more nuanced and contingent view of the ICS than is portrayed in its framing as a policy tool.

Data and Methods

I employ a case-study approach, examining the use of the ICS to coordinate the response to the outbreak of a contagious avian disease known as Exotic Newcastle Disease (END) in California and other western U.S. states in 2003–2003. Case data come from three sources that provide detailed accounts of the outbreak. First, the Policy and Program and Development Unit of the Animal and Plant Health Inspection Service (APHIS, part of the U.S. Department of Agriculture [USDA]) undertook an after-action review, which drew on 75 individual interviews, six focus groups, and a survey of 2,400 taskforce participants (Werge 2004). Second, APHIS also commissioned an outside review, resulting in a four-volume report by the CNA Corporation (Howell 2004; Howell et al. 2004; Speers and Webb 2004; Speers et al. 2004). Finally, I interviewed 13 senior managers from the most influential organizations involved in the taskforce—APHIS, the Animal Health and Food Safety Services (AHFSS, part of California Department of Food and Agriculture [CDFA]), and state and federal forest service officials. Both after-action reports and

interviews transcripts were content analyzed using qualitative software that facilitated a mixture of deductive and inductive coding of factors associated with the operation of the ICS. In all, a total of 1,010 pages or 10,162 "chunks" of information were coded.

Because of the nature of both networks and crises, single-case analysis is a frequent research approach. Studying networks is time consuming because it involves multiple organizations, while crises are rare and usually quite distinct. A case-study approach is particularly suited to plausibility seeking and using the case as a heuristic (George and Bennett 2004). By illustrating an interorganizational hierarchy, the case provides a preliminary examination of the plausibility and validity of a relatively untested and hard-to-measure concept. The case approach provides a heuristic by inductively identifying new variables and complex causal paths not readily apparent. In the case of the ICS, such research is especially needed given the central prominence of the ICS in crisis management policy, the dearth of research on it, and the concentration of such research in the area of forest fires. The analytical approach clearly differs from the most prominent scholarly analysis of the ICS (Bigley and Roberts 2001) by focusing on the network elements of the ICS rather than the operations of a single organization within the ICS.

Given that the END taskforce lasted for approximately a year, one might ask if the case really constitutes a crisis, and whether it is suitable for judging the efficacy of the ICS as a policy tool. The answer is yes for two reasons. First, END fits with basic definitions of crises and is an example of a modern crisis we need to better understand. Rosenthal, 't Hart, and Charles (1989, 436) argue that crises include any situations that involve threat, urgency, and uncertainty and explicitly note that such a definition would incorporate outbreaks such as END. Lagadec (1990) notes that many contemporary crises last for a significant period. The END case is representative of a certain type of crisis, in a way that more time-limited crises are not. Exotic animal disease outbreaks, such as bovine spongiform encephalopathy (BSE) and foot-and-mouth disease, are an increasingly common and important type of crisis for which we lack adequate research (Beck, Beck, and Dickson 2005, 186, 190). The END case has particular relevance for the threat of avian influenza at a time when the Homeland Security Council (2005, 8) has called for "guidance for states, localities and industry on best practices to prevent the spread of avian influenza in commercial, domestic and wild birds, and other animals." Second, END was certainly considered a crisis by practitioners. Responding to exotic animal diseases has been classified as an appropriate function for crisis response under the National Response Plan (U.S. DHS 2004a 65, 90) and NIMS (U.S. DHS 2004b, 122). In the END case, state and federal emergency declarations were made, emergency funding was used, and crisis management practices were employed. The incident had serious risks for the national poultry industry, and the discovery of END in California prompted state trade bans by major export markets.

The ICS in Practice: END

This section provides evidence on the operations of the ICS relevant to understanding its prospects as a policy tool and the limitations of its policy framing. END is a highly contagious and generally fatal disease in birds with similar symptoms, modes of transmission, and rates of fatality as avian flu. An outbreak of END in the State of California was confirmed on October 1, 2002, and subsequently was found in Arizona, Nevada, and Texas. Quarantines were also placed in Colorado and New Mexico. A taskforce was created to eradicate the disease, employing more than 7,000 workers, although the maximum size at any one time was approximately 2,500. Once quarantines were established, taskforce teams visited private residences and commercial bird premises to diagnose whether an infection existed. Where END was suspected, the value of the birds was appraised, the birds euthanized, and the premises cleaned and disinfected. The taskforce found 932 infected premises. Appendix A provides more detail on ICS tasks.

The clearest hierarchical aspect of the END taskforce was the use of the ICS to establish command and control. Many of the taskforce members, particularly the vets from APHIS and AHFSS, were not experienced with ICS but concluded that it helped the taskforce succeed. Although the ICS resources were divided, thousands of employees were moved around the country, organized into teams, given specific tasks on a daily or weekly basis, and held accountable for their performance. The most obvious network element of the taskforce was the involvement of multiple interdependent organizations seeking a common goal (Hall and O' Toole 2000). These included private actors, most notably large-scale chicken producers, temporary workers, and temp agencies. The network provided a range of complementary skills beyond the capabilities of any single organization (described in Appendix B). Rather than enduring the time and costs to learn new skills, the taskforce could rely on network members who already possessed such capacities.

Classifying the Case Outcome

It is helpful to consider whether the case represents a success story. Given that unusual nature of crises, it is difficult and perhaps simplistic to come up with a definitive benchmark for success. Relatively minor differences in timing or location can make the outcomes of otherwise similar crisis responses appear quite distinct. More broadly, Bovens, 't Hart, and Peters (2001) point to the difficulty in placing policy implementation into simple categories of success and failure but suggest two relevant standards of successful governance, political and programmatic success. The political assessment of success examines how policies are represented in the political arena and how they affect policymakers. Crises are politically salient, emotive issues that bring the potential for critical press coverage, investi-

gations, political fatalities, or litigation. To the extent that political actors avoid such pitfalls, the outcome is a success. The END responders were politically successful because they generally avoided negative media attention, controlled the disease before it became a major political issue, and did not see any political fatalities.[1]

The programmatic standard of success focuses on the effectiveness, efficiency, and resilience of policy implementation. Does government solve an important problem? Here, the END taskforce did relatively well, eliminating END and limiting its impact on the poultry industry. By September 16, 2003, final quarantine restrictions were removed. The taskforce was more successful than the nearest parallel, the response to an outbreak of END in California from November 1971 to July 1974, a period of 33 months. The cost of the eradication effort was approximately $250 million in 2003 dollars and about 12 million birds were destroyed. This compares with an estimated cost of $176 million for the 11-month outbreak in 2002–2003, when about 4.5 million birds were killed.

Alter and Hage (1992, 197–198) suggest that network success can also be measured by the perception of participants. A common response from END participants was that while there were initial organizational problems, the taskforce was ultimately well-managed and successful. In the early stages, there was limited knowledge of how the disease was spreading and what techniques could be used to deal with it. This sometimes led to inconsistency in actions by responders in the field. The taskforce also struggled with large-scale turnover of staff. Supervisors and managers were rotated in and out, usually for periods of three weeks, because of employee burnout and the needs of their home organization. This constant rotation created a good deal of discontinuity in the operations of the taskforce.

The taskforce also initially struggled to move from precrisis plans that had assumed that animal disease outbreaks would occur on commercial premises to the unanticipated reality that END was mostly found among backyard premises. This made the tasks of identifying and eliminating potentially infected birds slower and more complex. The ratio to effort payoff was lower: The average number of birds depopulated in a backyard premises was 59, while the equivalent number for commercial premises was more than 120,000 (Speers et al. 2004, 75). The pattern of the spread of END was harder to identify, predict, and control. There were also cultural difficulties. Many of the homes with backyard poultry were in Spanish-speaking neighborhoods, and some were involved in the illegal cockfighting industry and intensely suspicious of any government officials.

All of the above problems were reflected in initial difficulties in establishing management solutions, but the END experience was ultimately consistent with the observation of Stern and Sundelius (1992) that crisis responders may encounter serious operational problems and yet still be perceived as having fostered a successful outcome.

Understanding the Context of Crisis

Because no two crises are the same, it is critical to examine how the operation of the ICS was shaped by the characteristics of the END crisis—the paucity of experience of the responders (a function of how unusual the crisis is), the length of time over which the crisis unfolded, and the diversity of the response network (a function of the size of the response task).

Crises such as END, which are particularly infrequent, limit the ability to accumulate useful experience and techniques from the past. Responders suffer what Levitt and March (1988) refer to as a paucity of experience problem. This problem is exacerbated in crises where organizations need to both learn new tasks while coordinating the achievement of those tasks with other organizations (Quarantelli 1988, 382). Responders to more frequent crises, such as forest fires, have an advantage. They can employ tried and tested techniques learned through training and frequent application (Bigley and Roberts 2001). In such a context, an ICS will run more smoothly because it can rely on established routines, shared understandings, and preexisting working relationships. By contrast, the last major outbreak of END occurred three decades earlier and offered few relevant lessons. California had planned for animal disease outbreaks generally (CDFA 2002) but had not focused on END in particular, and had largely overlooked the potential for outbreaks in noncommercial populations. END taskforce members had to learn their tasks on the job, rather than employ established knowledge (Moynihan 2008).

Some crises allow for a relatively long response period, whereas other crises, such as natural disasters, allow little response time. The length of the crisis was a major factor in enabling the END taskforce to succeed. Decision makers faced urgency, understanding that delay led to the spread of the disease. However, multiple rounds of decisions occurred, which allowed learning. The taskforce could evaluate whether previous decisions were successful or not, diagnose and correct weaknesses in response, and establish new routines before major consequences ensued. Time allows responders to recover from the negative impacts of limited preplanning and to deal with unanticipated aspects of a crisis by changing strategy. END responders were able to depart from preplanning that failed to predict avian disease spread among a large backyard population.

As a crisis takes on a larger scale, more responders will be needed, and as the crisis creates more tasks, a greater variety of capacities will be required. An ICS seeking to foster coordination must overcome tensions between the organizations involved in the crisis (Lewis 1988, 167). Interorganizational tensions that arise from variety in institutional background and beliefs will increase as the network becomes larger and more diverse (Koppenjan and Klijn 2004). The type of highly diverse networks required

for large and complex crises are more difficult to coordinate. The END network was not terribly diverse, involving 10 primary organizations, including vets, forest-service officials, health and human service officials, highway patrol officers, lab technicians, environmental officials, and short-term hires (see Appendix B). This helps to account for the strong taskforce coordination. Even so, in the rare instances where conflict occurred, different disciplinary and organizational backgrounds played a role. For instance, the vets that led the taskforce placed a high value on the judgment and discretion of experts, while forest service officials (included because of their ICS experience) were used to more paramilitary-style hierarchies. These differences sometimes led to disagreements about how to run the ICS.

Management Factors as Supplementary Modes of Coordination

The END case illustrates that responders relied on means of coordination supplementary to the hierarchical structure of the ICS, in the form of SOPs, interagency trust, and shared meaning. These management factors were critical to the functioning of the ICS but have received little attention in existing discussion of how the ICS operates (U.S. DHS 2004b).[2]

SOPs. A basic challenge for the taskforce was to standardize its operations. In crises, SOPs provide structure, clarity, and knowledge that did not previously exist. This is something that both networks and hierarchies require, but SOPs are rarely specified ahead of time for networks (McGuire 2003) because SOPs depend upon a centralization of authority.

In organizational life, SOPs can become outdated. Appearing to serve no useful purpose, they come to be regarded as red tape (Feldman 1989). But this was not the case for the END taskforce. In the END crisis, SOPs established managerial order where very little existed. The main challenge for taskforce employees was not a lack of flexibility but a lack of stability. They needed to find answers to such basic questions as: What are my tasks? How do I achieve them? The lack of existing routines, the degree of uncertainty associated with the disease, the size of the taskforce, and the degree of employee rotation increased the need for SOPs.

Most employees were working in an unfamiliar area with new colleagues as they sought the most effective way to battle an unfamiliar disease. SOPs provided some basic guarantee of standardization and accountability, helping individuals understand their role in the organization and what specific actions they were to take in a given situation. An exit survey of taskforce participants found that the primary areas of concern were precisely the type of issues that hierarchies routinize in the form of management systems, that is, personnel planning and administration, general organization, overall planning, internal communication,

unclear lines of authority, and procurement (Werge 2004). The case underlines the value in crisis situations of creating the type of management systems normally taken for granted in hierarchies: tracking workers and other resources, reporting, communication, financial procedures, training, recruiting, hiring, and contracting.

The taskforce formalized knowledge and procedures into what became a 400-page SOP manual. The development of SOPs reveals a consistent pattern. Initial implementation problems were observed and procedural solutions were suggested and adopted. When required, the new procedure was further refined based on additional feedback. The development of SOPs was also tied to the growth of the taskforce and the desire of taskforce leaders to exert control and consistency via rules when interpersonal communication could no longer be relied on. In this respect, SOPs reinforced the centralized authority of the incident command. Since the SOPs were developed as a direct response to END, the taskforce avoided the pitfall of applying preexisting and constraining SOPs that were inappropriate to the crisis (Comfort 1989, 334).

Cumulatively, the role of SOPs helps to explain the widely made observation that the taskforce was initially disorganized but gradually became better at managing large numbers of individuals and tackling the disease. In part, this was due to the growing experience of taskforce members. But SOPs were also important, both in codifying this experience and in transferring the knowledge to those new to the taskforce (Levitt and March 1988; Moynihan 2008). One participant who joined the taskforce relatively late in the process was able to observe the benefits: "By the time I got there in April, everybody knew what they were doing. I mean, it had been pretty much if you were a part of survey crew you knew what your tasks were. If you were part of surveillance crew, you knew what your task was. . . . By that time, those things were pretty well established so I don't think that there was a lot of question about what it is that I was supposed to do." The case evidence suggests the following proposition about SOPs in crisis management:

> Proposition 2: Task-relevant SOPs reduce uncertainty, disseminate knowledge, and reinforce central control of interorganizational hierarchies.

Interorganizational Trust. Even though the hierarchical structures that characterize the ICS are designed to manage via authority, the END case shows that trust was still essential in facilitating coordination. Hierarchical structures and rules meant there was less reliance on trust than there would have been in a purely voluntary network, where actors must try to develop consensus (Agranoff and McGuire 2001). The ICS provides a structure to communicate and coerce who does what, how, and when. Research on private organizations suggests that centralized structures of authority are more likely to occur when low mutual trust exists (Gulati and Singh 1998). Similarly, Provan and Kenis (2007) hypothesize that public networks with low trust will seek to centralize governance struc-

tures. The design of the ICS is consistent with this logic, and findings from the END case support the following proposition:

Proposition 3a: Hierarchical structures reduce the need for trust in networks.

However, while trust was not necessary to form the END taskforce, participants argued that it was a critical factor in its success and that the absence of trust would have made operations more problematic. Even in a hierarchical setting, trust can reduce the need for formal control mechanisms and foster delegation. This reduces transaction costs, such as writing and enforcing formal agreements, seeking information about partners, and monitoring partner performance. Previous research emphasizes the importance of trust to facilitating cooperation during crises. During times of uncertainty, decision makers tend to rely on actors they trust (Rosenthal, 't Hart, and Charles 1989). As Comfort (1989, 335) notes, "In this environment where full knowledge of the operating conditions cannot be known but action must be taken, decision-makers are left with determining whose judgment they can trust. The factor of trust exerts an indefinable but crucial role in facilitating coordination between organizations." There were long periods when END operations were in a flux, authority was unclear, and taskforce members relied on members of other organizations to help them. Even with the centralized structure of the taskforce, trust was important enough to suggest the following proposition:

Proposition 3b: Trust facilitates cooperation in interorganizational hierarchies.

Network actors with prior interactions are more likely to trust one another (Gulati 1995). In crises, such prior relationships are even more important. During the END outbreak, participants were largely focused on the task at hand, and building interpersonal relationships was not an immediate priority. A positive preexisting working relationship facilitated cooperation and power sharing between federal and state animal health experts. A preoutbreak plan had identified the State Veterinarian from AHFSS (a state employee) and the Area Veterinarian in Charge (AVIC, a federal employee of APHIS permanently based in California) as jointly in charge (CDFA 2002, 9). The AVIC, Dr. Paul Ugstad, and his staff had strong relationships with the state veterinarian, Dr. Richard Breitmeyer, and his staff at AHFSS. Dr. Ugstad saw the preexisting relationship as "a huge advantage. . . . If there were problems with the working relationships to start with, that might have been magnified with the emergency response situation. At the same time, I think the fact we have a good relationship might have been magnified by the emergency response." Dr. Mark Davidson, a Deputy Incident Commander in the taskforce, said, "There are definite advantages in that ongoing relationship because they work together on a routine basis on the management of day-to-day programs. So when you are thrown in the crisis mode you are in, they already have those established working relationships and

don't have to develop them during the response." The case evidence suggests the following claim:

Proposition 3c: Positive preexisting working relationships increase trust in interorganizational hierarchies.

Preplanning, while of little use as an operational guide, helped to build working relationships and clarified roles (Lagadec 1990). The experience was consistent with the dictum attributed to Dwight Eisenhower that "Plans are nothing, planning is everything." Dr. Ugstad put it this way: "Even if you deviate what you have put together in that plan, you still have gained a lot by going through that planning process, just by knowing who or what agency you need to be in touch with. . . . If you do an adequate amount of planning you can save a lot of time spinning your wheels trying to find out who to talk to." The pattern of trust and cooperation between the AHFSS and APHIS leaders created an expectation of partnership. Dr. Annette Whiteford, who acted as an incident and area commander, argued that, "Any animal disease disaster is federal and state from day one. It is not that the state resources get outstripped and then we ask the federal government for help. Day one, we are in collaboration." The two agencies employed a joint command with a commander from each organization, an arrangement that worked because of the interpersonal trust between taskforce leaders.

Proposition 3d: Trust between organizational leaders fosters the coordination of interorganizational hierarchies.

A basic role of network leaders is to foster trust (Agranoff and McGuire 2001, 314), and the leaders of the END taskforce were critical in modeling trust to other participants. Some top positions were not subject to rotation, allowing network leaders to develop relationships with one another, and allowing lower-level members to consistently interact with the same leaders. A focus group of taskforce managers found that strong interagency working relationships between leaders not only facilitated coordination but also modeled norms of cooperation to lower-level managers (Werge 2004). Since the bulk of the federal responders were not based in California, they took cues from more senior staff on working with state employees. The sharing of decisions in the joint command established basic norms of cooperation at lower levels. One ICS participant noted, "The Area Commanders did a nice job of setting the tone for that. From the very beginning when I got there, if I drafted something, the first question out of the USDA Area Commander's mouth was 'Have you run this through the state folks? What do the state people think about this?' So I think they really set a nice tone of we're going to work this very cooperatively, and that's just the way it's going to be." The case findings support previous research that interpersonal trust between boundary spanners can foster trust between the organizations they represent (Zaheer, McEvily, and Perrone 1998) and supports the following proposition:

Proposition 3e: Leadership modeling of trust-based behavior encourages similar behavior among members of the interorganizational hierarchy, thereby improving coordination.

Shared Mental Models. In their study of the ICS, Bigley and Roberts (2001) identify the importance of shared mental models. Shared mental models assume that responders have a common conception of the nature of the problem and their respective roles in it. We find equivalents to the concept of shared mental models elsewhere in the study of crises (Boin et al. 2005, 13; Pearson and Clair 1998, 70) and broader public management scholarship via an emphasis on a common mission-oriented culture (Rainey and Steinbauer 1999) or the importance of establishing networks as a shared "psychological reality" (Bardach 2001, 152).

An ICS that succeeds in integrating multiple organizations, issuing direction, and establishing legitimate objectives fosters the "psychological reality" of collective effort toward common goals. In the END case, incident commanders sought to build shared mental models by applying the management by objectives (MBO) approach recommended by NIMS (U.S. DHS 2004b, 10). In daily and weekly meetings and plans, they established objectives and discussed progress toward these goals. Goals were directly related to tasks that frontline workers pursued, reducing the potential for goal displacement. The END ICS also employed a relatively flat hierarchical structure, meaning that the use of regular operational meetings and a real-time communications system allowed for objectives to be pursued in the field shortly after they were identified. According to Dr. Whiteford: "Probably the most important thing that the incident commander did, apart from managing people and handling personnel, was setting the priorities for the incident. So it's MBO. You set the objectives for incident and then the different sections come together to meet those objectives." The case evidence therefore supports the following proposition:

Proposition 4a: A sense of shared mission facilitates coordinated action in interorganizational hierarchies.

Such formal efforts to foster shared mental models were complemented by the nature of the task. The END case shows that crisis situations can foster a sense of shared meaning. Important tasks that demand intense collective action can speed the creation of a shared sense of mission, and crises foster such an action orientation (Lewis 1988, 167). Members of the END taskforce understood the importance and immediacy of the mission, the consequences of failure, and that they shared this challenge with members of other organizations. Their working experience often included 12-hour days, 7-day weeks, working away from their family or a familiar environment, and completing difficult and often unpleasant tasks. The ICS culture that emerged was characterized by a focus on mission and task, demanding work, a sense of shared crisis, and esprit de corps. The following quotes from taskforce members illustrate this point:

- Emergencies can be a very easy thing to manage because most people are so motivated to get the job done.
- There is a sense of urgency. . . . People who work for these state and federal agencies realize that these exotic diseases are something that are out of the ordinary. We know that the sooner we get our arms around it and get it stamped out, the better.
- So I think that there was this shared "we all know this is hard, we're all away from home, long days, long hours" where people really are trying to do the best they can to get things done.

The case findings therefore support the following proposition:

Proposition 4b: A crisis situation can foster a sense of shared mission.

The above proposition is contingent on member perceptions that other actors in the network are both competent and providing vital capacities. However, if other network members are perceived as incompetent, uncooperative, or lacking valuable skills, vicious circles of distrust can form, leading to multiple fractured perceptions rather than shared meaning.

The Interaction of Crisis Characteristics and Management Factors

This section briefly summarizes case findings relevant to the interaction of management factors (SOPs, trust, and shared mental models) and crisis characteristics (paucity of experience, the extended nature of the crisis, and the relatively small network).

How did the characteristics of the END crisis matter to SOPs? First, the paucity of experience problem meant that there was a lack of relevant SOPs that responders could draw from and a critical need for such rules to reduce uncertainty. The long-term nature of the crisis made it possible for the ICS to formally develop its own crisis-specific SOPs and to revise these SOPs consistent with feedback from implementers. The limited diversity of the network also reduced the potential for disagreement about the nature of the SOPs, enabling them to be rapidly adopted and implemented.

How did trust interact with the crisis characteristics? The paucity of experience factor meant that many of the actors involved had not worked with one another before. Trust increases over multiple interactions, communication of intentions and ideas, and the establishment of norms and reputations (Gulati 1995). Through these mechanisms, time aided the building of trust in the taskforce. The hub members of the ICS had an established working relationship and modeled norms of cooperation to taskforce employees, which were gradually adopted as network norms. The limited diversity of the network also facilitated the development of

shared experience and trust, but it is notable that the most significant areas of disagreements arose because of the diverging perspectives of forest service officials and veterinarians.

Shared mental models interacted with crisis characteristics in a number of relevant ways. Paucity of experience meant that the actors had a poor starting base for conceptualizing or making sense of the situation. Time allowed responders to develop a shared understanding of the crisis in the months that followed. The diversity of the responders was limited enough to enable a shared culture to emerge without significant contention. The clash of backgrounds and perspectives endemic in more diverse networks are likely to both undermine efforts to build and maintain a sense of shared meaning and make such efforts more important.

The case provides evidence that not only are crisis characteristics and management factors important to the ICS but that the interaction of the two also matters.

Proposition 5: The effectiveness of interorganizational hierarchies depends on task and management factors and the interaction of these factors.

Conclusion

A number of lessons emerge from the evolution of the ICS as a policy tool and from observing its use in the END case. As the DHS mandated the ICS, it adopted a practitioner-based innovation, paying little attention to theory that suggested that hierarchical and network structural forms represented distinct choices as policy instruments. The ICS suggests that it is possible for practitioner-based policy tools, designed to functionally overcome a specific problem, to demonstrate sophisticated (if implicit) rationales that break through or ignore highly stylized ideal types. The rationale for interorganizational hierarchies implied by the ICS and other real-world examples is that such structural experimentation arises from policy problems complex enough to demand the capacities of a network, combined with a compelling reason to use hierarchical means to coordinate the network, for example; the size of the network; a desire for political control; or the importance of timely response.

However, the experience of the ICS also suggests some weaknesses with the adoption of practitioner-based innovations. First, policymakers were willing to make broad assumptions about the applicability of the policy tool on limited evidence. Second, an overdependence on practitioner insights and an unquestioning acceptance of perceived "best practices" blinkered policymakers from underlying logics and critical contingencies vital to understanding the operation of the ICS. The DHS assumed that a policy tool developed for one type of crisis was suitable as an all-hazards approach, based on little evidence beyond practitioner testimonials that it had worked in some settings outside of forest fires and could be applied to even more diverse settings. It remains an open

question whether the ICS should be pursued in such settings. To answer this question requires a comparison with a viable alternate model of crisis response, and the mandated status of the ICS largely precludes such a comparison.

Rather than offer such a model, this article identifies crisis characteristics that affect the operation of the ICS, and management factors not organic to the ICS but which can improve its operation. The END case reveals shortcomings in the framing and underlying logic of the argumentation for the ICS. The assumption of the ICS as an all-hazards policy overlooks how crisis characteristics matter. In the END case, the novel nature of the crisis affected how the ICS operated as responders had to establish a store of new knowledge. However, the extended period of time enjoyed by responders and the limited scope of the crisis, which in turn limited network diversity, were favorable conditions that enabled the ICS to succeed. Similarly, the management factors utilized by responders affected how the ICS operated. The policy framing of the ICS overemphasizes hierarchy, and underestimates supplementary modes of coordination such as SOPs, trust, and shared mental models and more generally neglects the network components of the ICS.

A superficial reading of the case would be that the apparent success of the ICS with END provides additional support to the claims that it is an all-hazards approach. The more nuanced approach taken by this article points to the contingent nature of success, the importance of both crisis and management variables, and the interaction of these variables. For those interested in the potential of the ICS in crisis management, and of interorganizational hierarchies more generally, the case illustrates the need to classify the variables that affect how the ICS operates. While the article identifies the innovative nature of the ICS as a policy tool, it also underlines the need for a more structured analysis of practitioner insights to identify why they succeed. Researchers who have carefully studied the practice of managing potentially disastrous errors to develop a theory of high reliability organizations are an exemplar of such an approach (LaPorte and Consolini 1991). It is only through such research that we can move beyond both overly stylized scholarly portrayals of structural forms that are out of touch with practice and practitioner innovations insufficiently attuned to the underlying logic and contingencies that affect their applicability in different settings.

Notes

1. It is partly because of this success, and partly because the key decision makers in the case were technocratic rather than political actors, that the case analysis gives little further consideration of the political aspects of END. However, it is worth noting that in many crises the role of political actors is essential to understanding outcomes (Boin and t'Hart 2003; Boin et al. 2005; George 1991; Stern and Sundelius 1992).

2. One exception is Bigley and Roberts' (2001) examination of SOPs and shared mental models, but their analysis is limited to the distinctly different context of forest fires.

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Appendix A: Network Tasks in Dealing with END

Disease diagnosis and detection. Veterinarians visited premises to diagnose clinical signs of END, collect samples for laboratory testing, and impose quarantine restrictions as appropriate.

Conducting appraisals. Appraisers estimated the value of birds for indemnity payments. This involved determining the fair value of backyard game fowl, pets, and exotic birds, in addition to commercial poultry.

Euthanization and disposal. This involved the humane killing of birds on infected and dangerous contact premises and appropriately disposing of all carcasses.

Cleaning and disinfection. Cleaning and disinfection teams worked on-site at infected and dangerous-contact premises after carcass disposal, eliminating all materials that could harbor END virus.

Epidemiology. This task involved identifying the means by which END had spread to infected premises, identifying all premises with possible links to infected birds and the means by which END could spread further.

Surveillance and monitoring. Taskforce personnel canvassed neighborhoods threatened by the disease to identify all bird owners and birds at risk. They also placed sentinel birds on premises previously affected by END until disease-free status could be confirmed.

Regulatory enforcement and quarantine. Law enforcement officials enforced quarantine restrictions to prevent the spread of END by illegal means.

Movement and permitting. This involved reviewing special requests for movement of birds or equipment, examining the circumstances that applied, and granting permits as appropriate.

Biosecurity enhancement. This included (1) working with bird owners, feed producers, distributors, and other local groups to ensure that adequate biosecurity procedures were adopted, and (2) establishing internal biosecurity measures for the END taskforce itself.

Outreach and public information. Taskforce personnel disseminated information about END and their efforts in a variety of outreach activities, including meetings with bird owners, bird clubs and swap-meet organizers, and pet store and feed store owners.

Adapted from Howell (2004, 24–25).

Appendix B: Main Network Participants and Skills/Resources

Agency	Skills/Resources
Animal Health and Food Safety Services (part of CDFA)	• Veterinary expertise • Understanding of END: how to identify disease, cleaning and disinfectant procedures • Local knowledge • Preplanning for animal disease response in California
Veterinary Services (part of APHIS, part of USDA)	• Veterinary expertise • Understanding of END: how to identify disease, cleaning and disinfectant procedures • Experience with other types of animal disease outbreaks
California Department of Forestry and Fire Prevention	• Applied ICS in previous emergencies • Hiring flexibility • Emergency logistics
US Forest Service (part of USDA)	• Training and managing large number of emergency workers • Emergency planning experience
California Office of Emergency Services	• Awareness of California emergency resources • Coordinate state agencies for emergency response • Preplanning for animal disease response in California
Temporary agencies	• Personnel management of temporary workers • Hiring flexibility
Temporary employees	• Volume of work support • Continuity at frontlines • Knowledge of local environment, language, and customs
California Animal Health and Food Safety Lab and National Veterinary Services Laboratory	• Disease identification • Development of rapid diagnostic test
National Response Management Team (NMRT, part of USDA)	• Coordination of federal agencies • Interagency cooperation agreements with other USDA agencies • Financial requests and reports for U.S. Office of Management and Budget
California Highway Patrol	• Enforce quarantine
California Environmental Protection Agency	• Disposal and decontamination procedures
California Department of Health Services	• Health risks to humans • Risk communication to the public