

# 1 THE RISE OF RESILIENCE

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## The Advent of Resilience

Resilience has become a fashionable buzzword in recent years. The term is frequently found in many different discourses, ranging from the sports pages (resilient teams overcoming late-game deficits) to the international news (the war in Iraq), from reports of natural disasters (Hurricane Katrina) to policy papers on the protection of critical infrastructures (the 2001 California blackout). It appears that everything (organizations, cities, nations) and everybody (from schoolteachers to the U.S. president) can and should be resilient.

This advent of the resilience concept in popular and professional discourse can be viewed as a function of a rising need for resilience. If we accept that dominant trends such as globalization, increasing interdependence and complexity, the spread of potentially dangerous technologies, new forms of terrorism, and climate change create new and unimaginable threats to modern societies, it is only a small step to recognizing and accepting the inherent shortcomings of contemporary approaches to prevention and preparation. If we cannot predict or foresee the urgent threats we face, prevention and preparation become difficult. The concept of resilience holds the promise of an answer.

Hurricane Katrina and its aftermath demonstrated the need for such an answer. The televised sight of stranded masses, people utterly helpless and without assistance, hammered home the message that modern, large-scale sociotechnical systems have become vulnerable to shocks. The technical system of levees, pumping stations, and canals designed to protect the vulnerable city of New Orleans from the intrusion of water failed, and as a re-

sult the people depending on the stable functioning of the system suffered. In this case, the political-administrative system and the people it governs were unable to prepare for and cope with a *predicted* disaster. The toll of a *surprise* disaster, such as the Boxing Day tsunami of 2004 or the 2008 earthquake in China, can only be higher.

The Katrina disaster, in other words, exposed the lack of resilience in New Orleans, in its citizens, and in the wider disaster management system designed to mitigate such destructive events. This often-heard statement may seem fair, but it also begs the question: what is meant by resilience? The word *resilience* evokes images of governments that spring back into action after a blow, of resilient people who make the best of their situation with the little that they possess. These are without doubt the qualities a stricken society must possess if it is to rebound.

But is it really fair to expect this? How much can we expect after a devastating onslaught of natural or man-made forces of destruction? How fast and how far does a city have to rebound before it earns this honorary descriptor? We may broaden the inquiry by asking which factors cause some organizations or cities to be resilient, whereas others apparently are not (cf. Vale and Campanella 2005). We may even ask how important resilience really is—maybe the role of government or the state of the economy is a much more important determining factor for the fate of postcrisis systems. The blossoming literature with *resilience* in its titles does very little to answer these questions.

This book seeks to fill the void. The authors in this volume inquire into the characteristics, causes, consequences, and measurement of resilience. They plough very different conceptual and theoretical fields, but their collective harvest presents us with a clear understanding of what resilience is—and what it is not.

## Resilience and the Vulnerable Society

Terrorist attacks, water shortages, critical infrastructure failures, a looming energy crisis, a continuing flow of illegal immigrants, the effects of climate change, the threat of a pandemic: societies face an array of potentially devastating threats. These are not “routine emergencies” such as fires, traffic accidents, and hostage takings. These are so-called *low-chance, high-impact* events: urgent threats to societal core values and life-sustaining systems that typically require governmental intervention under conditions of deep uncertainty (Rosenthal, Boin, and Comfort 2001a; Boin et al. 2005).

The prevention and mitigation of these potential catastrophes have tradi-

tionally been a national government responsibility. It is a responsibility that has proven difficult to uphold: crises and disasters tend to pose “impossible” challenges to the political-administrative elites who are called upon to deal with them (Boin et al. 2005). To help us understand the scope and intensity of these challenges, the four-phase model that is used in practice proves analytically useful (Comfort 1988; Rosenthal, Charles, and t’Hart 1989).

*Mitigation/prevention.* Most communities have experienced threats and hazards and have at least some knowledge of the risk to which they are exposed. Mitigation means moving that “common-sense” awareness of risk based on historical experience to a systematic assessment of the risks to which communities are exposed, engaging in scientific inquiry into the conditions that generate risk. It includes mapping the interdependencies among the physical environment that gives rise to destructive events; the built environment that may be vulnerable to risk; and the social environment, or populations and their practices that are affected by severe events. Mitigation was long considered a “bottom-up” approach, engaging citizens, businesses, nonprofit organizations, and communities in the shared task of increasing their capacity to reduce risk and respond effectively to potential hazards. This approach, recognized as fundamental in the 1990s, was overshadowed by the concept of prevention following the terrorist attacks of September 11, 2001.

The concept of prevention enhances the role of government in preventing disasters from happening.<sup>1</sup> In the United States, prevention traditionally justified a “top-down” approach to disaster in which governments are expected to design proper prevention mechanisms for known risks. These mechanisms typically include regulation and inspection regimes and detailed lists of tasks that are mandated for each level of government, building on lessons from previous disasters and emergencies. In putting such mechanisms into place, governments must weigh the potential benefits of strong prevention policies against the cost that excessive regulation may exert on social habits, economic activities, and civil liberties.

The difficulty is that not all incidents and breakdowns can be prevented, as this would require a level of foresight and understanding that governments simply do not possess (Wilensky 1967; Turner 1978; Kam 1988; Parker and Stern 2005). This tension between mitigation and prevention underlies the continuing debate regarding resilience and informs the various approaches toward disaster preparation. If all disasters cannot be prevented, preparation becomes essential. The question becomes whether policies of mitigation will increase the capacity for communities to reduce the scope of damage and recover quickly from damaging events. Developing

resilience to potential hazards offers a reasoned strategy to cope with uncertain threats.

*Preparation.* If incidents, breakdowns, and periodic catastrophes are inevitable, preparation for such disturbances becomes preeminent. The right policies, organizational structures, and resources must be in place to deal with emerging breakdowns. Responders must be trained and facilities ready. A major obstacle to planning and training, however, is the unknown nature of the next contingency. It is one thing to prepare for routine incidents (a fire, a hostage situation, a major traffic incident), but it is much more difficult to plan for biological weapons attacks, long-term energy failures, or extreme weather. The real challenge, as impossible as it sounds, is to prepare for the unknown (Weick and Sutcliffe 2001). Careful assessment of potential risks and informed calculation of the interdependencies among organizations that share those risks contribute significantly to effective investments in planning and preparedness actions. Yet society should also prepare for unimaginable contingencies.

*Response/consequence management.* Once a crisis or disaster occurs, administrative and governing elites are widely expected to avert or contain the threat, minimize the damage, and prevent critical systems from breaking down. Several problems are sure to emerge.<sup>2</sup> There will be deep uncertainty as to the causes of the incident and the immediacy of the necessary response strategies. Communication among actors in the response network will be hampered by time pressures and uncertainty. Coordination will be a problem: it is never clear who among the many actors involved should make which decisions (Brecher 1979; Drabek 1985; Janis 1989). The capacity to mobilize rapid response operations depends critically on the actions taken previously in the mitigation/prevention and preparedness/preparation phases and the degree to which a community has invested in the resources, training, and interorganizational skills necessary to muster a “surge capacity” in response to a major threat. After critical decisions are made, implementation hurdles pose yet another set of problems. All these challenges must be met under the glaring lights of an ever-present media.

*Recovery/aftermath politics.* The aftermath of an energy- and emotion-consuming event is marked by the desire for a quick return to normalcy. Lessons must be learned about the causes and effects of the chosen response (Stern 1997); governmental responses will likely be subjected to some sort of accountability process. Both learning and accountability processes tend to be heavily affected by the “politics of crisis management” (Boin, t’Hart, and McConnell 2008). Different stakeholders will seek to impose their defini-

tion of the situation upon the collective meaning-making process that takes place in the aftermath of any crisis. The stakes are high, as decisions made to avert recurrence of a specific crisis often lead to unintended consequences that create a different crisis. Political dynamics can prolong a crisis even after operational challenges have dissipated. If political-administrative elites fail to defend and explain their actions and intentions, the crisis aftermath can carry painful surprises.

Conventional policy-making and bureaucratic organizations are not well designed to manage threats that emerge rapidly in unforeseen and often undetectable ways. The nongovernmental members of society—think of businesses, schools, and citizens—may be even less prepared to deal with these contingencies. In fact, it may be those modern societies enjoying rising levels of economic welfare whose members are least prepared (the so-called vulnerability paradox). Given the inadequacies of governmental performance in reducing the frequency, costs, and consequences of disaster, the call for “resilience” increases in volume as managers seek to balance the shortcomings of existing policies with the reality of increasing exposure to risk.

### Modern Challenges

A crisis—almost by definition—is difficult to manage. There are clear signs, however, that such challenges are becoming even harder to meet. Three trends seem particularly relevant. First, the transboundary nature of modern threats widens the range of the contingencies that can besiege a society. Second, modern societies have become increasingly vulnerable to threats new and old. Third, the changing political climate has made it harder for public leaders to deal with crises. These trends, which we briefly discuss below, add up to the “perfect storm” that can paralyze national governments and cause untold damages.

Nation-states have always confronted crises and disasters, most of which tend to visit in known guises and follow familiar if destructive patterns. Yet today’s threats appear to be fundamentally different in their disregard of geographical and functional borders. The classic, biblical threats that states have traditionally confronted now carry unprecedented capacity to wreak havoc because their potential “reach” has extended. Dealing with both the causes and the impact of these potential disasters is becoming increasingly impossible for national bureaucracies, as disasters lurk beyond reach and strike with overwhelming force.

To make things worse, nation-states have become ever more vulnerable

to these modern manifestations of old-fashioned threats. Modern states have become tightly linked economically, politically, and socially. People, goods, and services now cross borders with relative ease (Friedman 2005). The same pathways that convey people and goods also enable risks to travel across borders. Nation-states thus become susceptible to what were once considered “foreign” or “local” problems in distant places (Schwartz 2003; Sundelius 2005; Missiroli 2006). A crisis in one corner of Europe can now turn into a crisis for the entire continent: think of the Chernobyl explosion or the breakout of “mad cow” disease, which affected multiple countries. Hurricane Katrina originated as a “local” crisis but soon reached beyond geographical and functional boundaries to affect the nation and, indeed, many other countries and industries.

Today’s threats change shape as they jump from one system to another (OECD 2003; Missiroli 2005; Quarantelli, Lagadec, and Boin 2006). A glitch in one system can cross over to other systems, snowballing and cascading into a much bigger crisis (Turner 1978; Jervis 1997; Rochlin 1999). Integration is one force to blame: critical systems have become tightly coupled as the result of increasing cooperation (see Perrow 1999). The “life-supporting” systems that sustain basic societal functions (energy infrastructures, transport networks, financial flow structures) are no longer confined to national borders. Nor do they operate independently. The Internet relies on energy grids to power it; energy grid controls are accessed by the Internet.

Modern societies have also become more complex (see Perrow 1999). Cities have expanded rapidly, long-standing social traditions have disappeared, and large immigrant populations have structurally altered Western societies. Governments have retooled following New Public Management principles and have pooled decision sovereignty in certain policy areas. Nongovernmental organizations (NGOs) and multilateral organizations such as the European Union take a greater role in what were traditionally national policy competencies (Wallace 2005; Boin, Ekengren, and Rhinard 2006). As a result, it is harder to recognize an impending threat and unclear who “owns” a transboundary crisis.

There is, of course, a more optimistic note to sound about all this (Baer et al. 2005). It is true that modernization—the sum of technology development, improved infrastructure and transport systems, financial and information efficiencies, and globalization—increases the vulnerability of social systems. These same forces, however, also boost the capacity of social systems to deal with adversity. Because of these forces, many types of incidents that used to bring societies to a grinding halt—from city fires to smallpox epidemics—no longer pose a real threat in modern societies. The underlying

ing question, then, is whether the increased capacity to deal with modern contingencies is sufficient to offset their potential damage.

In this book, we study the societal capacity to deal with emerging contingencies in terms of resilience. As it is impossible to prevent or foresee each and every catastrophe, we assume that all societies will have to face one sooner or later. Their capacity to absorb these events and to emerge from them with their core institutions intact is at the core of resilience.

## The Concept of Resilience

The idea of resilience has a firm footing in the fields of engineering, biology, and psychiatry. Engineers apply the concept to materials and technical systems, biologists study resilience in organisms and life systems, and psychiatrists seek to understand the resilience of individuals and their interactions with social systems. In all these fields, the concept of resilience conveys the capacity of a material, person, or biotope to survive sudden shocks. Can a bridge withstand extreme cold and hurricane gales? How does a colony of rabbits deal with the invasion of a predatory species? How does someone reclaim life after the unexpected death of a loved one?

Aaron Wildavsky was one of the first to provide the resilience concept with firm footing in the social sciences. In his now-classic book, *Searching for Safety*, Wildavsky (1988) introduced the concept as an intellectual and instrumental counterweight to the obsession with risk prevention (a logical product of Cold War doom, intended to guard against the environmental and technological disasters that were prevalent during the 1970s and 1980s). The treatise earned much praise but never inspired much empirical work and generated only modest theoretically oriented discussion. It is fair to say that we have not moved very far beyond the territory staked out by Wildavsky.

In recent years, we have witnessed a surge in articles and books on what may be called societal resilience: these works consider how organizations, cities, and societies “bounce back” in the face of a disturbance. Once we begin to work with this rather generic definition, however, deep-running tensions manifest themselves in at least three dimensions (Boin and van Eeten 2007).

The first dimension pertains to the *moment* of resilience: does it come after or before the onset of a major occurrence? Students of disaster tend to “situate” the concept after the shock. This line of thought leads to questions such as, why did Chicago and San Francisco quickly recover after the Great Fire and the Great Earthquake (Vale and Campanella 2005), whereas

New Orleans has yet to emerge from the devastation wrought by Hurricane Katrina? In this conception, resilience is the last line of defense separating a stricken community from structural demise or even extinction.

Students of organizations in flux tend to place resilience before a disturbance. In this view, resilient organizations recognize, adapt to, and absorb variations, changes, disturbances, disruptions, and surprises (Hollnagel, Woods, and Leveson 2006, 3). A resilient organization scans its environment, monitors impending changes, and rolls with the punches. A true mark of resilience is thus the ability to negotiate flux without succumbing to it.

This tension between *speedy recovery* and *timely adaptation* helps us map the extreme poles of the continuum (Westrum 2006). One end is marked by the ability to prevent something bad from happening, the opposite end by the ability to recover once something bad has happened. Somewhere in the middle we find the capacity to prevent something bad from becoming worse. A strict definition of resilience pertains to one of the poles; a wide definition encompasses the entire dimension. In this book, we will adhere to the wider definition of resilience, which captures the capacity to adapt, improvise, and recover.

Before settling on a definition, we should consider a second tension that may divide common ground. This tension pertains to the *severity* of the disturbance. Should we consider resilience as the capacity to deal with rare but devastating events, or is it the capacity to deal with the much wider range of “disruptions that fall outside of the set of disturbances the system is designed to handle” (Hollnagel, Woods, and Leveson 2006, 3)? The first position reserves the term *resilience* for a clearly recognizable disturbance, whereas the second broadens the concept to include all types of routine (and foreseeable) disturbances. The first relegates resilience to the category of rare events, whereas the second waters the concept down to a sloppy synonym for flexibility (see Sheffi 2005). In this book, we begin by staking out the middle ground (although chapter authors may adopt more “extreme” positions).

A third tension that needs to be negotiated is the *state of return* that resilience would need to accomplish (or at least aspire to). What may we reasonably expect from a resilient system that is facing a relatively outsized disturbance? Is a system resilient when it returns to its preshock state? This would amount to backtracking in time, which is, of course, impossible (a return to the status quo is really the emergence of a *new* status quo). Or is it good enough to make the system function again? (New Orleans may then be more resilient than we assumed.) Does resilience refer to the capacity to

remain functioning in the face of a serious disturbance? Or should a system emerge stronger and better before we can speak of resilience?

This discussion should take into account the severity of the disturbance in question (the second dimension). If we focus on catastrophic events, a rapid resumption of key functions would be impressive. Routine disturbances, on the other hand, should inform and enhance societal functions before we can speak of resilience.

By staking out an integrative and middle ground along the three conceptual continuums, we can formulate a first definition of resilience:

*Resilience is the capacity of a social system (e.g., an organization, city, or society) to proactively adapt to and recover from disturbances that are perceived within the system to fall outside the range of normal and expected disturbances.*<sup>3</sup>

It is clear that this definition does not solve all our problems, but it does allow us to bring together empirical chapters that deal with the various dimensions of resilience. After settling on this definition for the time being, we will now consider which research questions flow from our definition.

### Questions about Resilience and Theories for Answering Them

The issue of resilience may be connected with other fields of inquiry by formulating a set of research questions that carry both academic and practical relevance and identifying the most promising research perspectives that might allow us to answer these research questions. It should be reiterated that the following list of research questions and perspectives is not an exhaustive one. It merely helps us organize the chapters in this book and allows us to assess the findings presented by the chapter authors.

The first research challenge involves the identification of resilient systems. What are the characteristics of a resilient system? How do we recognize one? This challenge is harder to meet than it might at first seem. It is, after all, easier to recognize the *absence* of resilience, clearly demonstrated by breakdown and long-term demise. But how do we recognize a resilient system that—because of its vaunted qualities—does persist in the face of disturbance and continues unperturbed? How do we separate “lucky” systems that came away with a near-miss from resilient systems that steered clear of an impending breakdown? To complicate matters, how do we recognize a system that has done reasonably well in light of the shock (because of its resilient nature) but has suffered a breakdown all the same?

These questions regularly emerge—but are rarely addressed—in discus-

sions about the quality of crisis management (the reports of postdisaster committees of inquiry provide countless examples). The very fact that a disaster has occurred tends to predispose members of inquiry committees to search for the factors that caused the disaster. Tracing the disaster back to its possible sources, the event easily comes to be perceived as an inevitable outcome of factors that are endogenous to the system (Turner 1978; Perrow 1994). It then becomes difficult to assess whether the organization or city in question really could have prevented the event or was the victim of an unprecedented set of interacting factors. Resilience can then denote the valiant efforts of otherwise failing organizations to recover quickly; it can also become the tombstone epitaph of a city heroically battling the forces of nature (hundreds of people died, but the figure would have been much higher if it were not for the resilient characteristics of the city government).

Once the characteristics of resilient systems have been properly defined, the question of origin imposes itself. How does a system become resilient (and why are so many organizations and cities not resilient)? This question is known in other fields as one of institutional design (Goodin 1996). Is resilience the outcome of smart architecture, heroic leadership, evolutionary adaptation processes, abundant resources, external regulation, sheer coincidence, or a combination of the above?

This is an urgent question, especially for those who believe that modern systems need a dose of resilience in light of contemporary and future threats. If resilience can be engineered into social systems, research should be focused on identifying the variables, strategies, and constraints that can help bring this about. If resilience is a characteristic developed over time and through the seemingly random processes of trial and error, we may have to divest our interest in resilience (focusing instead on risk management and prevention). Taking our cues from the research on public and private institutions, it seems fair to conclude that core characteristics of resilient organizations (e.g., values, ways of working, reputation) can be affected by long-term leadership strategies—for better or worse (Selznick 1957; Wilson 1989). For those who seek to build resilient systems, there is hope.

A complementary research question addresses the potential consequences of resilience and resilient systems. In the fields of crisis and disaster management, resilience is overwhelmingly viewed as a desirable characteristic of social systems. There is another, potentially less attractive side to resilience, however, as organization sociologists have pointed out (Perrow 1986). Resilience may come at a severe cost. Moreover, it may protect a system from external stimuli such as democratic oversight and accountability. This realization urges researchers to consider the normative implications of resilience.

## Four Theoretical Perspectives

Our proposed definition and set of core research questions can be addressed with the benefit of many theories. Given the relatively young age of this budding field of inquiry, variety in theoretical approach may not be a bad thing.

The bodies of literature we will discuss here are the emerging field of resilience studies, the slightly more seasoned field of crisis and disaster studies, the very mature field of organization and policy theory, and an interdisciplinary approach to measurement of performance in sociotechnical systems. These fields are, of course, very broadly defined, consisting of many schools and subschools. It is not our intention to provide an authoritative overview of these fields; we simply want to highlight the potential that can be found in each.

An obvious start is the emerging field of resilience studies (Longstaff 2005). We refer here to the work of scholars who, while operating from a variety of academic disciplines, are making an interdisciplinary effort to further our knowledge about resilience. This literature is brimming with ideas on how to conceptualize resilience. It harbors a distinct theoretical approach that is inspired by biological-systems thinking and complexity theory. This literature provides us with a good sense of how resilience functions in complex systems.

The crisis and disaster literature, perhaps surprisingly, has paid little attention to resilience. Much of the research effort has been invested in understanding the causes of these adverse events, their dynamics, and the challenges they pose to political-administrative elites and citizens. One of the key findings in this field, however, helps us explain why resilience is crucial: crisis and disaster researchers have consistently shown that there is very little political leaders and public administrators can do during the immediate aftermath of a catastrophe (especially when they lack accurate knowledge of the unfolding event). It turns out that disaster plans do not work, communication fails, and command-and-control doctrines backfire—only after some time can skilled or talented crisis managers impose some kind of order. Ultimately, the quality of response critically depends on the capacity to enhance improvisation, coordination, flexibility, and endurance—qualities that we typically associate with resilience.

We can draw on the fields of organization theory and policy studies (especially the nexus between the two disciplines) to understand the possibilities and constraints when it comes to building resilience into social systems. Policy scholars explain how hard it is to elevate these types of issues to the top of the decision-making agenda (Baumgartner and Jones 1993; Birkland 2006). Organization theorists offer helpful insights with regard to

creating cultures that may enhance and sustain resilience (LaPorte 2007; Schulman and Roe 2007).

A critical approach that distinguishes this book from other discussions of resilience is its inquiry into sociotechnical systems. The literature on social cognition (Hermann et al. 2007), cognitive anthropology (Hutchins 1995), and sociotechnical systems (Coakes, Willis, and Clark 2002) carefully examines what humans do and how they do it in relation to the technical systems they operate. In this perspective, the transition from perception to action at individual, group, organizational, and systemic scales of operation is critical to understanding the dynamics of resilience. Developing metrics of resilience in actual environments exposed to risk represents a critical task that is only beginning.

The interaction between increasingly advanced technical systems and the human organizations that design, build, operate, and manage them has been studied by researchers at the Tavistock Institute for Social Research since it opened in 1946 (Trist, Emery, and Murray 1997). The impact of technology on social organizations is, of course, continually unfolding (Coakes, Willis, and Lloyd-Jones 2000). The modern-day exponential increase in the use of information technology across the world is presenting ever more complex and surprising dynamics in social action and organizational performance (Coakes, Willis, and Clarke 2002). Such changing conditions require considerable integrative efforts to understand the dual nature of these technologies. They can be harnessed to effective decision support in large-scale events, but they also impose new or enhanced constraints on organizational action.