

The Resilient Society

Innovation, Productivity, and the Art and Practice of Connectedness

Authors

Albert Cho
Simon Willis
Martin Stewart-Weeks

August 2011



Cisco Internet Business Solutions Group (IBSG)

The Resilient Society

Innovation, Productivity, and the Art and Practice of Connectedness

“The world is likely to experience more shocks and stresses in the future, on scarcity and on other fronts, with increasing intensity. At the same time as trying to capitalize on the windows of opportunities that such crises may offer, policymakers also need to try to ensure that moments of system breakdown lead to renewal, rather than to outright collapse. Resilience is the quality that will determine the difference between these two outcomes.”

—Taken from “Globalization and Scarcity: Multilateralism for a World with Limits,” Alex Evans, New York University Center on International Cooperation, November 2010

“Things fall apart; the centre cannot hold.”

— W. B. Yeats

Public sector decision makers are under enormous pressure to deliver results in difficult and uncertain times. This is the second in a series of white papers that explores ways in which public leaders can enable greater resilience and productivity using secure, distributed networks.

Introduction

The concept of resilience is hardly new. But it is taking on new significance at the heart of aspirations for good government in a period of disruption and wrenching transition. It’s an idea that combines two dimensions: (1) “bouncing back” from the last unexpected shock, emergency, or catastrophe; and (2) “bouncing forward” to anticipate, prepare for, and, as far as possible, avoid the worst excesses of the next disruption.

Both call on a combination of productivity (doing things better) and innovation (doing better things). And both productivity and innovation are capabilities increasingly dependent upon the art and practice of connectedness. Putting these pieces of the puzzle together in a new narrative of “connecting for resilience” is critical to governing well amidst unprecedented risk, change, and opportunity.

Transitions

This new narrative is motivated by an apparent contradiction. For the most part, government is working hard, perhaps harder, than ever before. In the face of rising demand and greater complexity, pensions and benefits are paid, passports are issued, traffic systems are managed, schools and hospitals teach children and treat patients, criminals are apprehended, and justice, more or less, gets dispensed. Similarly, in dire emergencies, people and resources are mobilized—often with impressive speed and scale—for response and recovery. In fact, in the face of the amazing levels of cooperation that tend to characterize these periods, citizens often remark, “If only government could work like that all the time!”

But beneath the evidence of “business as usual” is an unsettling sense that the gap is growing between the nature and scale of many of the economic, social, and environmental challenges that governments are trying to solve and the resources, institutions, and systems on which they can call. Perhaps of even greater concern, policy and operational leaders who stand on the front lines of public policy and public service delivery admit that this gap is widening at an increasing rate.

The context for this growing gap between need and capacity is a world in transition, reflecting big shifts in the underlying economic, political, environmental, and social architecture of large global systems. These shifts are well documented but bear repeating:

- **Political transitions.** The rapid ascents of China, the world’s most populous country, and India, the world’s most populous democracy, have precipitated a geopolitical transition to a multi-polar world in which Western countries exert relatively less influence and authority. At the national level, the past few years have seen novel forms of mass-mobilization and empowerment—from Barack Obama’s presidential campaign and the Tea Party in the United States, to the dramatic and largely self-organized uprisings of the “Arab Spring.”
- **Economic transitions.** The world’s financial system is still struggling with the continuing impacts of the global financial crisis, as the interconnected economies of Asia, Europe, and North America grapple with currency and current account imbalances, sensitivity to global energy prices, and the risk of financial contagion. At the national level, most developed countries are confronting years of fiscal adjustment and austerity, while large emerging markets—including Brazil, China, and India—struggle to manage the demands of rapid growth.
- **Demographic transitions.** Demographic trends introduce further pressures. In industrialized countries, rapidly aging populations, increased longevity, and falling birth rates are straining social safety nets. Conversely, many emerging markets, especially India and the Middle East, are struggling to create employment opportunities for a booming youth population. Globally, population growth and urbanization are driving explosive growth in unplanned and informal settlements.
- **Environmental transitions.** Global population growth to 9 billion people by 2050 will exacerbate pressures on ecosystems, agriculture, and water resources. The world is urbanizing at a growing rate; populations in cities and regions alike are confronting record food prices, while water basins are facing shortfalls. Natural disasters will take an increasing toll as economic growth puts greater value at risk. Meanwhile, climate change, ocean acidification, and biodiversity loss are decreasing the adaptive capacity of ecosystems on which people depend.
- **Technological transitions.** Rapidly declining IT costs, rising penetration of mobile phones, and increasingly pervasive broadband Internet access have fueled an information flood that has transformed the way people interact with the world and with each other. But intensive networking, which has enabled new and more powerful forms of connection and innovation, has spawned challenges of its own. The resulting “data deluge” is often not matched by a similarly rising capacity to discern, interpret, and act effectively. More ominously, cybersecurity and related questions of privacy have become omnipresent, even existential challenges. Cybercrime recently became the world’s most

lucrative illegal business activity; cyberwarfare among states and non-state actors is a *persistent and rising threat*.

Renowned management thinker and writer Gary Hamel, in making the case recently for reinventing management for the 21st century, sets out a clear sense of what it means to build organizations “that are fundamentally fit for the future—resilient, inventive, inspiring, and accountable.” He argues that modern management is one of humanity’s most important inventions, but much of it emerged in the Industrial Era, whose challenges required a response that maximized standardization, specialization, hierarchy, control, and shareholder interests.

Hamel admits that this model has delivered much. But the problem is that many of its values, which lie at the heart of some of our most powerful institutions, are fundamentally at odds with the world in which they now have to operate. As he describes it, zero-sum thinking, profit obsession, power, conformance, control, hierarchy, and obedience don’t stand a chance against community, interdependence, freedom, flexibility, transparency, meritocracy, and self-determination.¹ Hamel argues that, as we look for better ways to build resilient organizations that are fit for people to work in—and we could as easily be talking about resilient cities or resilient societies that are fit for people to live in—we should increasingly adopt the values of the web itself: open, merit-based, flexible, and collaborative.

The picture that emerges of a world of rapid and often volatile change, at whichever level you look, is unsettling. These transitions profoundly affect the people and communities that governments serve, challenging some aspects of the culture and often straining many of the available institutional tools and assets of public administration on which public leaders rely. By their very nature, these transitions create exposures to new risks that are complex in structure and distributed in their impacts. The public sector has few levers of control over these risks, limited authority and influence in the communities impacted, and declining resources to address new threats.

The rapid divergence of responsibility, authority, and capacity is fueling anxiety within and outside the public sector. Citizens look to governments to ensure their welfare against emerging threats, whether or not the public sector has direct control. Where threats go unanticipated and unaddressed, citizens begin to question the competence of public services and, more broadly, the efficacy of systems of public governance. Trust and legitimacy erode. The search for a new approach to governing grows more insistent even as the struggle to discover its new rhythms intensifies.

As much as transition brings risks, it also breeds opportunity. In many of the systems on which we rely for the public outcomes we want (for example, a safe and secure community, the right mix of skills and learning for work and participation, new levels of well-being and capability for older people, and more responsive, people-centered systems of healthcare), the time is ripe for change. New ways are emerging to design public services with and by the people who need and deliver them; to make the big systems of care, learning, and opportunity more effective at a human scale; and to give people better ways to participate in the decisions that most directly affect them. Resilience is as much about

¹ <http://www.managementexchange.com/video/gary-hamel-reinventing-technology-human-accomplishment>

investing in the human and institutional capabilities to capture emerging opportunities as it is about dealing effectively with risk and adversity.

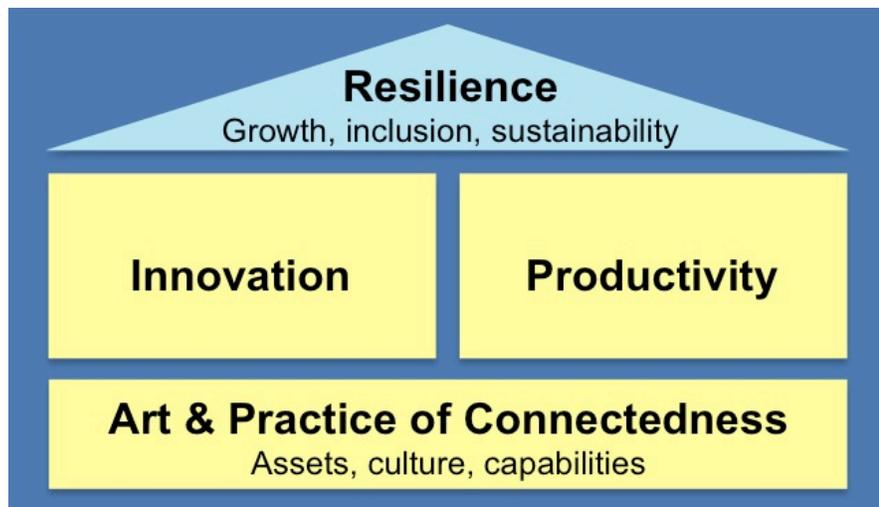
Many of the institutions expected to undertake this more complex and volatile public work are slow, cumbersome, and inflexible. They often find it difficult to recruit and retain a workforce with the skills and attitudes to match the new demands and expectations they confront. No government can realistically expect to own or even manage sufficient data, information, or know-how to unpack complexity rapidly enough to act strategically. Yet, while collaboration beyond the boundaries of government is a defining capability of governing well, few in the public or private sector have yet mastered the tools, technologies, and practices that can unlock the deep, authentic collaboration that complexity demands.

Dealing with Disruptive Transitions

In the face of these growing disruptions, governments and the communities to which they are accountable confront two persistent questions: (1) How can they make their societies and economies stronger and more resilient in the face of unpredictable shocks, whose disruptions are already rippling through economic, social, environmental, and political systems that are struggling to respond? (2) How can they effectively and dynamically reconfigure those systems to become more productive at a time when they are not only being asked to do more with less, but to do much better as well?

There are four pieces to the puzzle whose interaction will form part of the answer.

Figure 1. Building Blocks of a Resilient Society.



Source: Cisco IBSG, 2011

1. Resilience

In the traditional sense, resilience is a measure of how well a system—an organization or institution, an ecosystem, a city or region, or indeed a whole country—recovers from an unexpected shock or disaster. But it also has become invested with a larger and more important meaning of cultivating the assets, culture, and capabilities that render systems less vulnerable to

risk, more agile and adaptable, and therefore better prepared for successive waves of change and disruption. *It means not only bouncing back, but also bouncing forward.*

Public sector institutions need to become more resilient. As rising, complex, and distributed risks disrupt the public sector's ability to deliver services that protect and enable constituents, public welfare and security will depend increasingly on the public sector's ability to respond, adapt, and evolve. Public sector resilience entails ensuring continuity of operations and avoiding disruptions to critical services; it also means looking for different ways to lift both its own productivity and productivity across society and the economy, as well as create effective innovation systems in service delivery that take advantage of technological and other developments.

But perhaps the more urgent questions are: What can governments do, and how should governments behave, to make the societies they serve more resilient? How can they invest limited resources for the greatest impact on the skills, culture, and assets of a strong economy, an inclusive and confident community, and a more sustainable natural environment? The struggle for resilience will not be won within the walls of government agencies, but rather in the broadly distributed communities that they serve and with which they interact.

In the face of powerful, uncontrollable, exogenous shocks, developing a more resilient society becomes a principal objective of public policy. And yet, the rise of complex and distributed risk requires two significant shifts in the public sector.

First, decision makers must begin to understand resilience in a new way. Rather than a reactive posture of managing risks effectively once they materialize, resilience requires a much more prospective stance of forecasting risk and building the adaptive capacity to manage unforeseen disruptions.

Second, decision makers have to expand their view of how to cultivate resilience, focusing not only on increasing resilience of government institutions, but also on enabling communities to become adaptive. While improving efficiency of the limited set of levers and controls available to public institutions is a worthwhile objective, resilience as a policy objective requires new thinking and different ways of acting within government to drive innovation and productivity in the economy and in society more broadly. Central to that new task is to translate into policymaking and program design insights about the strength of diversified portfolios that improve overall risk-return trade-offs. In addition, governments need to acknowledge that much of the action needed to make societies more resilient happens at a granular level across an economy and can't easily be seen or influenced, except sometimes negatively, by many of the standardized and centralized tools or approaches of traditional public governance.

2. Innovation

Although innovation doesn't necessarily lead to greater resilience, resilience is impossible without innovation. Innovation is the inescapable imperative of "doing better things," the search for ways not only to improve programs, services, and systems of public value, but also to envision entirely new ways of achieving the public outcomes for which those systems were established.

With threats and transitions evolving at a rapid pace, resilience will also require speedy innovation in the way governments determine and define policy, and in the way public sector organizations design, organize, and deliver services. Governments need to do good, often new things differently, not just old things less badly. In many cases, systems of governance and public service need an overhaul based on new relationships between communities and networks on the one hand, and between formal organizations and institutions on the other.

This instinct for renewal will form the basis of novel forms of public action to generate public value—safety, happiness, prosperity, freedom, and opportunity. In many situations, squeezing a few percentage points of improvement will not disguise the deeper need to think again, often starting from new models of networked working and distributed participation. Imagining, designing, and then building the new platforms and tools that support this more complex, distributed model of large-scale innovation will themselves become hallmarks of effective government.

Agencies will need to adopt new technologies and the practices they enable and sometimes accelerate. Even more important, resilience will require encouraging, cultivating, and scaling innovation *outside* government to tackle new issues. The ability to increase foresight, innovation, and agility in the private and social sectors will become a critical function of public sector agencies—one that demands novel ways of engaging and governing society. Governments will, for example, have to become more skillful at designing markets and other processes whose aim is to encourage investment and action across markets and communities. The rules of those more open and connected innovation systems need to be certain enough to give people the confidence to become involved, either as business entrepreneurs or social innovators—but not so prescriptive that they end up stifling the very energy and risk taking they are meant to stimulate.

Similarly, governments will evolve better innovation models as part of a more robust innovation system. They will understand the difference between incremental and disruptive innovation, which attempt either to improve performance or reinvent models of service—but both working largely within the limits of existing organizations and institutions.

They will also explore different ways to engage the world outside existing institutions to drive innovation that puts new combinations of resources and expertise together or tries something completely different to transform the service or response completely.

Charlie Leadbeater's recent "learning from the extremes" research in education developed these distinctions as the basis for a model of public and social innovation.² It recognizes that sometimes the focus is on making existing schools work better and sometimes, with new ventures like Indian preschool social enterprise Pratham (<http://pratham.org/Default.aspx?id=1>) or the Harlem Children's Zone initiative in New York (<http://www.hcz.org/>), the focus is on inventing new models of creating services or connecting people to lift their capacity for change and opportunity.

² http://www.cisco.com/web/about/citizenship/socio-economic/docs/LearningfromExtremes_WhitePaper.pdf

3. Productivity

Doing innovation well won't avoid the equally pressing imperative to "do things better." Improving the way assets, infrastructure, and people work, with the least possible waste and cost, is just as important as the push for reform and innovation.

This is certainly true in the public sector, which in most countries faces binding budget constraints. Significantly greater productivity will be required not only to meet rising social demands with limited resources, but also to free up resources to enable investment in new capabilities for innovation. But the public sector also has a strong incentive to increase productivity and efficiency in society more generally. Put simply, rising productivity fuels economic growth and enhances opportunities for citizens, while wasteful resource use increases vulnerability to the price of materials, endangers supply chains, and undermines the resilience of communities.

There is a risk, though, that the pursuit of narrowly defined efficiency and productivity can lead to better performance in the short term, but to less-resilient outcomes in the medium to longer term. Diversity and redundancy are essential components of resilient systems, creating enough of a "buffer" to cope with sudden change when it happens. Making systems so efficient that they end up brittle and exposed—such as just-in-time supply chains that turn out to be unexpectedly fragile in the face of earthquakes or social unrest—virtually assures that they will be less likely to cope. In some cases, it means systems will not solve citizen or customer problems, perhaps even building up what U.K. writer John Seddon calls "failure demand" that ends up being more expensive to fix later.

Interactions among resilience, innovation, and productivity are neither simple nor straightforward. Sometimes they can be in tension or even contradiction. But increasingly, these two attributes—innovation and productivity, both inside and outside the public sector—are the twin, interdependent pillars on which the cultivation of resilience depends. As it turns out, both are intimately related to distributed networks.

4. Connecting Communities and Networks

Increasingly, the key to effective strategies for innovation and productivity is the capacity to navigate more complex, distributed communities and networks of information, people, and things at unprecedented scale and scope. Tapping the power of these distributed networks allows people to share ideas and expertise much more quickly and effectively, to create and share information and knowledge, and to empower much richer patterns of participation and engagement. If resilience—fueled by equal measures of innovation and productivity—is increasingly the purpose of public leadership and governance, the ability to connect highly distributed networks of people, expertise, and assets for common and shared action is becoming critical in a world of complex and distributed risk. "Connecting for resilience" is part of a new narrative of governing well.

The knowledge, insights, expertise, and investments necessary to imagine and then innovate better responses to new risks and opportunities are widely dispersed in society. The ability to find and connect those distributed resources will therefore become more important. The role of entrepreneurship is going to be key. Entrepreneurs either in the market, in the community, or sometimes in the public sector itself will spark new thinking and new practice, fueled by frustration perhaps, or by lack of progress in trying to solve a problem for a particular community.

Government will increasingly have the task of shaping the context and influencing the circumstances that make it easier for those people to work and have an impact. Government will also often assume the task of telling an engaging and appealing story about this approach to innovation and why its values fuel both momentum and credibility.

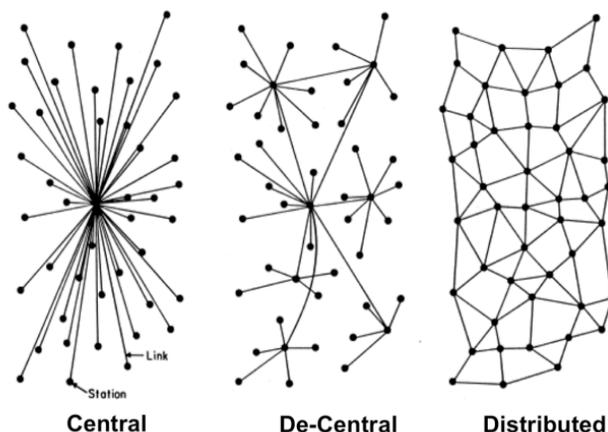
These features of our emerging world place a new premium on making it easy and attractive for people to engage and contribute. After all, the point of resilience is enabling people to maintain and improve the quality of lives they lead and the strength and capability of their communities in times of transition and risk. Resilience, in those conditions, relies heavily on the widespread capacity to connect for deep and authentic collaboration. It implies access to, and familiarity with, the tools, platforms, and behavior of connectedness at scale, and to demanding standards of quality. In 2010, when NATO conducted its first “policy jam,” some 4,000 people in more than 120 countries engaged in a facilitated conversation over five days to identify priorities and initiatives for the new strategic policy framework. Provisioning the assets, culture, and capability of pervasive connectedness for that kind of collaboration becomes a defining characteristic of good government and the hallmark of a modern, effective public sector.

The Art and Practice of Connectedness

The Internet’s distributed architecture was designed for resilience. As a researcher at RAND Corporation, engineer Paul Baran was asked to devise new ways to make communication networks more resilient. He concluded that a distributed network—one without a fixed center of control—is strong, adaptable, and ultimately generative because it allows information and knowledge to flow across the network in the most efficient way, including routing around blockages or disruptions. It is designed to avoid a single point of failure.

It empowers the edge of the network and, in effect, positions all nodes in the network as equally useful and potentially powerful (even though, as in life, some nodes will always be more equal than others). The distributed model enables users anywhere in the network to connect, innovate, and share.

Figure 2. Paul Baran’s Network Models.



Source: “On Distributed Communications: XI: Summary Overview,” prepared for United States Air Force Project RAND, Memorandum RM-3767-PR, August 1964.

Today, rapidly evolving and distributed information networks represent a transition in their own right. As they become more mobile and pervasive, distributed information networks are creating new social capabilities and resources that governments, citizens, civil society organizations, and businesses are already using to change the way they work, relate to their customers and partners, and drive innovation. Rich and broad connections between different systems and domains—businesses, universities and think tanks, social sector organizations, government agencies—will be as important as the connections and collaboration within those domains.

The aggressive digitization of a wide variety of content and data streams, their convergence onto interoperable Internet Protocol-based networks, rising access to increasingly pervasive connectivity, and the consumerization of technologies such as the smartphone, laptop, and tablet have combined to provision new capabilities for collaboration and communication that, in turn, are changing or even inventing social and economic institutions.

In his recent book *What Technology Wants*, Kevin Kelly notes that “the manipulation, storage, and processing of information is a central theme of life.”³ Kelly argues that evolution uses information and knowledge to drive progress and creativity as much in the technical world (or the “technium,” as he describes it) as it does in the natural world. In both, the core instinct is learning and change, both of which lie at the heart of resilience or the capacity to adapt and grow in the face of uncertainty and risk. And in both, the ability to connect and collaborate—to form and use robust networks, in other words—becomes a core capability. His provocative thesis is that technology and nature are increasingly intertwined, and our collective ability to imagine, invent, and then make things that try to add value and make life better is itself becoming a driving evolutionary force, and is evolving in its capabilities and instinct for learning and adaptability.

But knowledge, Kelly suggests, “is a network phenomenon, with each fact a node.” It is the “relatedness” of one node of knowledge to the others that gives knowledge its power, and that relatedness keeps growing in scale, scope, and power.

Hinting strongly at the significance of rising networked knowledge for institutions and organizations, Kelly quotes mathematician and computer pioneer John von Neumann, who predicted that “technology will in the near and in the farther future increasingly turn from problems of intensity, substance, and energy to problems of structure, organization, information, and control.”

These networks will become an increasingly central part of governing well. They are both technological and social, and generate genuinely novel possibilities for engagement, productivity, and innovation. Indeed, innovation and productivity depend on networks that connect people, ideas, assets, and knowledge to strengthen and streamline services, sharpen insight and foresight, and engage ecosystems of stakeholders to improve judgment and decision making. The generative spirit of distributed networking is what animated the engineers whose imagination spawned the Internet, which in turn has enabled and accelerated the transitions facing modern governments. Some of the emerging networks of people, computers, and other devices will operate within the formal structures of government. Many—likely most—will not. The

³ *What Technology Wants*, Kevin Kelly, Viking, 2010, p327.

ability to harness existing networks and to develop and encourage new platforms (and the networks that connect them), combined with knowledge of the decision contexts they enable, will become indispensable components of governance.

Questions of feedback and accountability inevitably arise in more open, networked systems. Part of the magic of networks is that they empower the nodes—for example, a school, a hospital, a city, a region, or an individual citizen and his or her family—to find solutions that suit particular circumstances and needs. The point is to fuel difference and therefore adaptability. To some extent, the value of the solutions that emerge—perhaps to create a better learning pathway to job-related skills or to manage a person’s healthcare more effectively—is significant to individuals, families, or a community, regardless of the network.

But the differentiated, highly local results invariably are a consequence of the larger system of services and resources from which these people and communities seek help, and which has to be designed and provisioned. And what people learn as they seek solutions that suit their needs and circumstances can then be fed back into the larger system or network to lift learning and knowledge from which others can benefit. In addition, issues of scale, authority, and control have to be confronted across larger systems of public service. Joining those “small pieces” in more coherent networks is another feature of “connecting for resilience.”

The persistent challenge is how governments enable all of this distributed, entrepreneurial activity and make this sprawling world of necessarily distributed and agile action both coherent and “sensible.” There are three ways that governments should prepare to take advantage of these transitions to enhance resilience, both within and outside the public sector.

1. Mobility and Resilience

One of the most striking global phenomena over the last decade has been the speed at which information technology has reached the remotest places on the planet. Rapidly rising access to mobile telephony is the most obvious of these trends. Expanded Internet access and its wealth of online services is another. The delivery of virtually any information—including computing power, virtual machines, and software—through the cloud is only the newest wave of this evolution.

These trends—all of which can delocalize and dematerialize experiences—have powerful implications for resilience. A mobile phone frees individuals from fixed-line communications, making them reachable when away from home. The Internet frees individuals from the communication and socioeconomic context in which they are embedded, giving them access to ideas and markets that aren’t constrained by location. Cloud computing makes all of this content accessible anywhere, anytime, on any device, at substantially lower costs. The progressive march of abstraction—with its ability to delocalize access to information—creates a platform for resilience. Perhaps counterintuitively, these same forces have rendered the intensely local as a critical arena for engagement and action. The new dynamic for effective governance and public work is both expansively global and relentlessly “hyperlocal” at the same time.

The growing independence of access from place creates new opportunities for governments to build resilience both inside the public sector and in the broader community. A government worker who can work closer to home using mobility tools is more productive than one who spends hours each day in a long-distance commute. The same is true for mobility in the community, which can decrease traffic and transportation-related greenhouse gas emissions, and boost inclusion of less physically mobile workers, such as the disabled or elderly.

More fundamentally, mobility decreases risk exposures. To the extent that threats, risks, and disruptions are spatially localized, mobility enhances resilience by rerouting, reconfiguring, and relocating around problems. If a blizzard closes down a city, workers can ensure continuity of operations from home, using virtual desktops and video collaboration tools. If a tsunami heads toward a coastal zone, emergency broadcasts can be distributed widely over mobile phones, emails, and social networks, such as the U.S. Federal Emergency Management Agency's Twitter feed or the use of Facebook by Queensland's police service in the recent floods. After an earthquake, survivors can access emergency notifications and broadcast their own location on smartphone-based services such as Buddyguard. If local markets are impaired by a recession, distant markets are accessible using the web. Moreover, mobility can stimulate innovation. Equipping individuals with mobile communications tools, or providing access to cloud services in public libraries, means that people can perform tasks they could not undertake before, opening the door for new service delivery models and ways of engaging the public.

These can be jarring trends for governments, which have traditionally maintained a strong relationship to spatial boundaries and fixed locations. And yet resilience in the future will likely require mastery of technologies that enable governments (and the people they serve) to be more effective locally by transcending the limitations of place.

2. Decision Support and the Internet of Things

Even as people and institutions become more mobile and geographically abstracted, our knowledge of the material world is becoming more temporally and spatially explicit. The rapidly growing flow of data generated by the "Internet of Things"—the increasingly pervasive network of sensors embedded in physical objects or places—creates a new relationship between connectedness and resilience.

Sensors are gathering, communicating, and storing information about the physical world at a rising pace. These include satellite images of the earth, devices such as phasor measurement units and smart meters in our electric power infrastructure, GPS devices on cellular phones, RFID tags on consumer products, and weather stations. These data are interpreted using advanced statistics and data mining tools, incorporated into increasingly sophisticated systems models, and translated into insights by web-based visualization and control tools. This fusion of sensor data, analytics, and human insight is creating unprecedented situational awareness, as well as scenario analysis and forecasting capabilities critical to resilience. In some cases, the Internet of Things even affords capacity for remote control, enabling responses in near real time.

The proliferation of, and interaction among, all of these dimensions of connectivity—people, knowledge, things—puts a premium on better ways to make sense of the

resulting stocks and flows of data to create useful knowledge. Distributed networks and new cloud-based computing infrastructures can connect more effectively people and machines to “crunch the data” and understand its significance to support better judgment and right action.

The Internet of things can enable tighter management of resources and earlier identification of risks. It also unlocks new possibilities for innovation. With new data sources, scientists can use real-time information to refine models and forecasts at various timescales, contributing to better weather prediction in the short term and climate modeling in the long term. Critical supply chains can be monitored and adjusted in times of stress. Phones can turn people into sensors, tracking phenomena as diverse as disease incidence or market prices in rural areas, and can provide users with useful information in return.

The Grameen Foundation, for example, has used mobile phones in India and Africa to empower Community Knowledge Workers with “relevant, timely agricultural information, including caring for animals, planting crops, treating pests and diseases, and getting fair market prices for produce and livestock.”⁴ Kenya’s Safaricom has used its network to enable the large numbers of Kenya’s unbanked to transfer money safely and easily. In the United States, mobile payments startup Square uses the network to enable small retailers to tap into payment networks and accept credit cards, with potentially transformative implications for small business, individual entrepreneurs, and charities.

The Internet of Things and the decision-support tools that derive from it can be seen as a complement to human mobility and delocalization in strategies for resilience. As people use networks to distance themselves from geographically specific risks, they can also use spatially and temporally explicit data from sensors and communications devices to measure, forecast, and ultimately mitigate those risks.

One implication of these examples is that encouraging investment in distributed networks can emancipate individuals from the limitations of place and provide a more granular understanding of the social and material world. Moreover, because distributed networks tend to be generative, enabling users to innovate on top of network infrastructures, such investments tend to yield fortuitous and unforeseen gains. Because they provision new levels of connectedness and fuel innovation, distributed networks are becoming critical to boosting resilience in the face of complex and distributed risk.

3. Redefining the Relationship Between the Center and the Edge

If resilience requires thinking differently about the role of the public sector as an enabler of networks, an important transition is about how technology transforms the practice of governance itself. In short, this transition involves a shift from a “unicast model” of center-to-edge communication to a new dialogue between the center and the broadly distributed nodes at the “edge.”

The “center,” of course, comprises the official agencies and organs of government. The “edge,” by contrast, represents the network of people and organizations distributed throughout society. It represents those spaces and places where customer or citizen needs are first detected, where there is freedom to experiment about the best way to

⁴ <http://www.grameenfoundation.org/what-we-do/mobile-phone-solutions/agriculture>

respond, and where, as a result, successive waves of innovation are likely to be sparked. The “edge” is the citizen innovator’s garage laboratory, the computer guru’s home workstation, the front-line service delivery workers of a government agency, the local community meeting: basically, wherever people are in touch with highly local concerns and needs, have a willingness to invent and experiment, and are unwilling to wait for direction from the center.

In a world of broadly distributed transitions and risks, more of the insights, knowledge, and resources that governments and societies need to become more resilient are at the “edge” of systems and communities, not the center. Increasingly, the problems and challenges that governments are trying to fix don’t fit neat institutional boundaries or rely on a flow of information and expertise well beyond the confines of any single agency or set of organizations. Actively seeking out and nurturing the edge can help decision makers sense trends and issues, identify potential solutions, and accelerate the innovation they sorely need to tackle new challenges. Indeed, in the face of uncertainty and change, failing to empower the edge results in fewer of those attributes—engagement, autonomy, agility—from which resilience grows and on which communities rely to respond to risk and opportunity. Trusting the edge reduces risk and increases confidence and capacity.

Although “connecting for resilience” means governments will increasingly privilege the edge, they can’t live on, and by, the edge alone. The center—and its prerogatives and responsibilities—remains important. The center still needs to act as an orchestrator, integrator, and governor of fair and inclusive process, balancing competing signals and demands to set strategic direction. The center needs to define strategic intent and direction. It remains accountable for maintaining procedural and substantive norms, institutions, and public goods that can hold together large, distributed, and complex networks of largely autonomous organizations that have something to contribute to shared outcomes.

There are no hard-and-fast rules for how to incorporate the edge. And it’s also true that the edge isn’t always about physical distance or remoteness. In many cases, the insights and expertise of the edge are not used because they emerge at a scale and speed the center can’t process, or from people and organizations without the power and authority to make themselves visible. But there are promising new examples of more systematic ways to avoid that outcome, including open data, prize competitions, and crowdsourcing tools. Common to all of these is the observation that creating platforms, tools, and skills that those networks can use for common purpose is an essential investment by the center in the productivity and effectiveness of the edge.

Moreover, for at least some of the big dilemmas to which government is seeking answers, the need to nurture or create more complex communities of people and institutions to design services, create policy, or solve problems will become inescapable. Those communities will work often in close cooperation with formal structures and institutions inside and outside government. As well as building their core knowledge and characteristic expertise, and without reference to a commanding center, they will be comfortable with the rules and rhythms of self-organization.

In India, for example, entrepreneur Madhav Chavan pioneered a simple, effective way to work with young women in some of Mumbai’s poorest areas to set up preschool centers in

their own homes. With some basic training, a minimum of rules and structure, and incentives to build quality and growth, the network has now grown to the point where the Pratham preschools look after millions of Indian children (<http://pratham.org/Default.aspx?id=1>).

In a different context and at a different scale altogether, the Southwark Circle initiative emerged as a response to concerns about local aged-care services in south London. The initiative (<http://www.southwarkcircle.org.uk/>) discovered that the services themselves were not the problem; instead, the real issues were loneliness and a lack of participation in, and connection to, the communities in which these older people were living.

A final example is the collaboration between the United Nations and the Standby Task Force, a community of software developers and other technologists who rapidly develop platforms on which people and organizations involved in a disaster or emergency can post information and intelligence.⁵ Within a couple of days, a working solution to gather and present easily accessible, real-time intelligence about rapidly changing conditions was up and running for those that needed it most.

The speed with which new insights emerge and new solutions start to make a difference is a function of how easily people can connect their expertise and assets with the expertise and assets of other people. The experience with “crisis commons” responses to emergencies like the Haiti earthquake is a case in point. Web designers, network engineers, and IT specialists create a platform with their expertise that those with the knowledge of what is going on in specific locations can easily use so they can make the most of their expertise and knowledge. They make, in effect, common cause for a shared outcome. In this case, it is a quick and effective information base to aid emergency response and recovery, but it could be for other public outcomes — a better policy, a new service designed to better meet the needs of its users, or a smarter, more flexible way to create rules and regulations. For more and more of the large problems and opportunities with which public policy grapples, the key to success is the quality of connections among diverse sets of ideas, people, and organizations.

In some situations, such as paying pensions and benefits, or aspects of security and safety (for example, border control or quarantine systems), the traditional and more transactional role of government will remain important. But in many contexts, such as improving the lives and opportunities of older people, people with disabilities, or strategies to make cities more attractive and sustainable, the quality of transactions won't be enough. What will matter most is the quality of the relationships between citizens and government, and often among citizens themselves.

The Limits of Networks

Accepting resilience as a central preoccupation of government in times of uncertainty does not mean blindly adopting the model of distributed networks as a guide to governance. In fact, there are several dimensions of distributed networks about which decision makers may feel uncomfortable.

⁵ <http://www.undispatch.com/disaster-relief-2-0-what-the-un-could-not-have-done-without-the-volunteer-technical-community>

Distributed networks undermine older notions of controlling content generation, curation, and interpretation. Unlocking the creative power of network participants requires letting go of traditional controls over process, objectives, agendas, and, ultimately, quality. It is difficult, and sometimes dangerous, to dictate that the network or its participants follow the same processes and standards that govern the public sector.

A second challenge is that by promoting connection and interdependence, networks can accelerate contagion or lead to disruptions of their own. Recent disruptions to interconnected global supply chains, contagion risk in the world's interconnected financial markets, and debates over food security in a world of increasingly export-oriented agriculture all reinforce the role that interdependence (which is basically networks doing their work) plays in augmenting risk.

A third challenge is that distributed networks can open up vulnerabilities of their own. Network security is not only a problem for the Internet; the same issues of trust, validation, identity, and integrity apply to human systems as well. Exposure to damage from cyberattacks grows as networks become more pervasive. As critical infrastructure such as electricity grids, water utilities, public health surveillance systems, banking and financial systems, and satellite communication systems converge, security risks will grow. The recent rash of cyberattacks, ranging from hackers' attacks on the Central Intelligence Agency's website, to Stuxnet's successful exploitation of several zero-day vulnerabilities in Iran's power infrastructure, to the breach of consumer data at several banks and entertainment companies, demonstrates the range of uncertainties governments are now called upon to confront.

The response to these risks and challenges cannot be to eschew connectivity. Whether governments like it or not, a world of complex and distributed risk and opportunity is unfolding. Information networks are proliferating, creating rapid flows and rising stocks of data, information, and knowledge. Human networks are forming, dissolving, and coalescing in novel institutional forms. Seeking resilience in the face of transition is not about whether to engage the network, but how. Navigating the risks and accommodating the new contours of connectedness are both imperatives of a new governance model in today's increasingly open and connected world.

A New Narrative

The Internet and a raft of new communication tools and collaboration platforms have enabled new connections between people and information, and between people and communities. In a relatively short time, we have evolved some of the most powerful tools for finding, collating, and analyzing information about pretty much anything, anywhere, anytime. Our ability to "pull" data and knowledge, when and where we need it, contrasts starkly with industrial models of knowledge gathering, in which producers "pushed" information in a form and time frame that suited them.⁶

Mastering the art and practice of this "human network" demands a combination of bold vision, steady investment in new skills and capabilities, and patient, competent provisioning of the underlying platforms and infrastructure. The emergence of the

⁶ *The Power of Pull: How Small Moves, Smartly Made, Can Set Big Things in Motion*, John Hagel III, John Seely Brown, and Lang Davison, Basic Books, NY, 2010.

connected world—a distributed network of “small pieces, loosely joined”—offers the possibility of transforming the public sector, changing the role of government, and enabling citizens to be more actively involved in shaping services and public sector decision making.⁷

Governing will assume a more collaborative and flexible approach to getting things done using a range of new platforms and spaces (often highly informal, rapidly developed, and flexible) for empowerment, choice, and personalization. Public sector organizations can build new kinds of relationships with citizens, putting skills and resources (especially information) directly at their disposal.

The more formal structures of government and the public sector need to develop an instinct for connection, relationships, and community to counter a reflexive reliance on hierarchy and transactions. In that context, the network becomes much more than just a way to transport packets of data, sound, or images. It becomes the indispensable platform that makes it easier for people and ideas to come together for common cause, shared commitment, and effective action.

As these new patterns of work and engagement emerge, governments will also have to become more comfortable with having dispersed patterns of authority and control. They will need to align their institutional power and renovated traditions of control and authority with the disruptive but more creative potential of networks and self-organizing communities. They will have to learn the rhythms of systematic serendipity, recognizing that new and often disruptive ways to solve a problem or provide a service will come from the “collision of the unfamiliar”—unexpected combinations of people and expertise whose impact can’t always be predicted at the start. When Sugata Mitra put a couple of computers in a hole in the wall in a New Delhi slum and watched how young children with little education and no familiarity with computers would react, he had no idea what to expect. As it turned out, they reacted with unbridled enthusiasm and rapid, self-organized learning. Mitra and others involved in that experiment combined some unexpected and unusual elements and, in the process, made some important insights about learning and skills.⁸

At the same time, governments cannot escape the imperative for scale, coherence, and accountability.

Deep resilience will emerge not only from networks and communities seeking new combinations of innovation and productivity. Just as important will be enduring attributes such as civic engagement, high levels of trust and legitimacy in and around our public institutions, rising social capital and the full range of individual liberties, flexibility and long-term planning, and the careful, equitable management of data and knowledge.

Next Steps

To explore these ideas, three areas emerge for further thinking, research, and action:

1. *Design, build, and test* some of the new systems, platforms, and practices that need to be provisioned so that governments and communities can learn the practice of

⁷ *Small Pieces, Loosely Joined: A Unified Theory of the Web*, David Weinberger, Basic Books, 2002.

⁸ http://www.ted.com/talks/sugata_mitra_shows_how_kids_teach_themselves.html

connectedness as a way of achieving their social, economic, and environmental aspirations.

2. *Grow the community of influence and practice* in countries around the world—thinkers, practitioners, senior public leaders, innovators, and entrepreneurs—so that the conversation about, and the practice of, these new models of open and connected government become “thicker” and more collaborative.
3. *Monitor* and measure the transitions implied in the new narrative of connection and understand how well governments and public sector institutions are performing as they combine innovation and productivity in the search for resilience.

Turning the idea of a resilient society into practical initiatives that governments and communities can adopt will now rely on testing what works in each of these three areas, and how these areas interact.

Acknowledgements

This paper draws on wide collaboration across the Global Public Sector Practice of Cisco’s Internet Business Solutions Group. It also reflects our collaboration with many thinkers and practitioners in innovation, government, and the changing role and performance of the public sector, including Jocelyne Bourgon, Rod Glover, John Kao, Charlie Leadbeater, Geoff Mulgan, Beth Noveck, Peter Shergold, and David Weinberger. The authors are grateful for their input and continuing support, but assume all responsibility for this paper.

More Information

Cisco Internet Business Solutions Group (IBSG), the company’s global consultancy, helps CXOs from the world’s largest public and private organizations solve critical business challenges. By connecting strategy, process, and technology, Cisco IBSG industry experts enable customers to turn visionary ideas into value.

For further information about IBSG, visit <http://www.cisco.com/go/ibsg>.



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.