

Preparing governments for future shocks

A roadmap to resilience

In collaboration with



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Introduction

Since the turn of the millennium, pandemics, heat waves, wildfires, floods, cyberattacks, supply chain interruptions, and other crises have deeply stressed governments, communities, businesses, and individuals around the world. This cascade of catastrophic events raises fundamental questions about how governments can anticipate, prepare for, and respond to these and other shocks yet to come.

Shocks transcend geographic, jurisdictional, political, and organizational boundaries. Furthermore, adaptation, preparation, and response to shock events cannot be the responsibility of a single sector, program, agency, or level of government. Instead, the key to success—and the root cause of many failures—lies within the capabilities of individual network participants and the strength of the network before, during, and after an upheaval. Simply put, complex problems cannot be solved in silos.

What practical steps can governments take in the near term to better prepare for and respond to future shocks? IBM, working through the IBM Institute for Business Value (IBV), the IBM Center for The Business of Government (the IBM Center), and in partnership with the National Academy of Public Administration (the Academy), launched an initiative to help governments identify core capabilities critical to building resilience. The initiative also addressed priorities included in the “Grand Challenges for Public Administration” put forth by the Academy.¹

Global sessions were combined with regional and local sessions through partners including the Organisation for Economic Co-operation and Development (OECD), the Center for American Studies (CSA), and the American Chamber of Commerce in the Netherlands (AmCham).

The partners convened a series of international roundtable discussions with global leaders from the public, private, academic, and nonprofit sectors to capture lessons across five key domain areas: emergency preparedness and response, cybersecurity, supply chain, climate sustainability, and workforce development. Insights from the roundtables identified valuable strategies and solutions to drive governmental action. A roundtable on a sixth domain, international collaboration, is scheduled for 2024 and will be reported on separately. To learn more about the initiative, read the blog, ‘Preparing Governments for Future Shocks’² or listen to the podcast³ with Michael J. Keegan, IBM Center for The Business of Government.

Based on the common themes that emerged from the roundtable discussions, this compendium report lays out a roadmap of eight imperatives—a guide that governments at all levels can use to anticipate, prepare for, and respond to shocks of virtually any origin. These imperatives and related practices do not constitute an exhaustive list. Instead, they reflect expert insights presented in a roundtable discussion context. Finally, this compendium does not substitute for individual roundtable reports that provide more details and domain-specific recommendations.

Perspective

Shocks: Defining disruptive events

Shocks are regional or global events with severely disruptive consequences. They may occur rapidly or build slowly. While the scope and nature of a particular shock can vary, each shock event requires governmental preparedness to coordinate a response (see Figure 1).

Shock events typically begin locally, and their impacts spread rapidly through contamination or contagion across societies and economies. Regional shocks are limited to a specific geographic area or a sovereign state and include events such as climate-related or other natural disasters, armed conflict, and cyberattacks on economic activity or critical infrastructure.

FIGURE 1

Appropriate government response depends on the onset speed and scope of shock events

Regional

- Natural disasters
- Cyberattacks/events
- Domestic social unrest
- Outages in critical national infrastructure
- Regional economic/financial crisis

Global

- Pandemics
- Global economic crisis
- Wars

Rapid-onset

- Aging population
- Regional climate-related events

- Climate related events
- Resource scarcity
- Advances in technology

Slow-onset

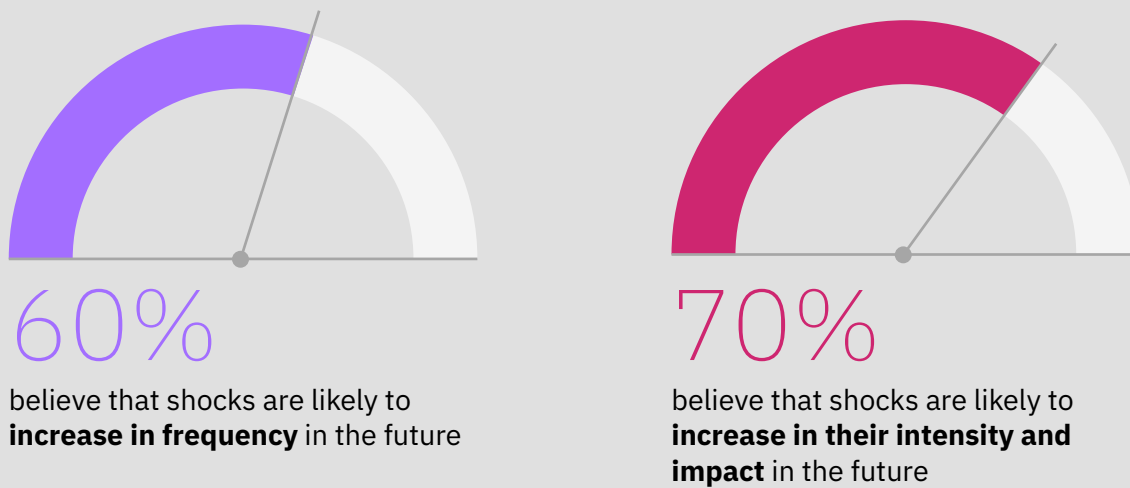
Perspective

What leaders anticipate: More intense shocks, more often

In the summer of 2023, IBM IBV surveyed 635 chief executive officers (CEOs) and heads of agencies as well as chief information officers (CIOs) and heads of IT departments. These leaders represented a broad range of government organizations from more than 40 countries (see Study approach and methodology on page 32). 60% of responding officials say that shocks, such as a global pandemic or an extreme climate event, are likely to increase in frequency in the future. In addition, 70% of these leaders say that shock impact and intensity are likely to increase in the future (see Figure 2).

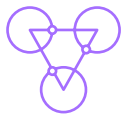
FIGURE 2

What government leaders say about the prevalence and impact of future shocks



Source: IBV Future Shocks 2023 Survey (N=635). Q: To what extent do you agree with the following statements? Shocks like a global pandemic or an extreme climate event are likely to increase in frequency in the future / Shocks like a global pandemic or an extreme climate event are likely to increase in their intensity and impact in the future.





Imperative 1

Build a governance mechanism for future shocks

In the IBM Center report, *Managing the Next Crisis: Twelve Principles for Dealing with Viral Uncertainty*, Katherine Barrett, Richard Green, and Don Kettl provided a succinct summary: “The key is networks—but they do not spontaneously organize themselves.”⁴ A successful network comprises more than boxes on an organizational chart. It must also include specifically designed governance to manage the network. No single governance mechanism exists for organizing a network and responding to disruptions that can impact many partners. And in practice, many mechanisms achieve more success when combined.

Breakdowns in cross-organizational collaboration, such as the delayed response to Hurricane Katrina and overwhelmed public health systems during the COVID-19 pandemic, have been well documented. However, a set of successful network governance practices has emerged that can be adapted regardless of specific governance mechanisms.

Rob Handfield, Professor of Supply Chain Management at North Carolina State University, explains: “A Center of Excellence (CoE) is an ideal form of engagement to build supply chain resilience and garner multiagency support and cross-sector collaboration for quick response.”

Likewise, the US Federal Emergency Management Agency (FEMA) adopts a whole community approach “to engage the full capacity of the private and nonprofit sectors—including businesses, faith-based and disability organizations, and the American public—in conjunction with the participation of state, local, tribal, territorial, and federal governmental partners.”⁵

Using Memoranda of Agreement (MOA), continuous training, tabletop exercises, and wargaming, network participants can define and reinforce roles, responsibilities, and working relationships. Coordinated capacity development, mutual aid agreements, regional compacts, and financial incentives can also facilitate future shock response.

Ultimately, successful networks result from pre-existing relationships based on familiarity and trust. For example, local governments collaborate through the Southeast Florida Regional Climate Change Compact “to reduce regional greenhouse gas emissions, implement adaptation strategies, and build climate resilience across the Southeast Florida region.”⁶

“A Center of Excellence (CoE) is an ideal form of engagement to build supply chain resilience and garner multiagency support and cross-sector collaboration for quick response.”

Rob Handfield, Professor of Supply Chain Management at North Carolina State University

Global future shocks will require coordination and information sharing across national boundaries. For instance, C40 Cities is a network of mayors from 96 major cities around the world that are committed to cutting emissions, limiting global warming, and “building healthy, equitable and resilient communities.” C40 cities include almost 600 million people and make up more than 20% of the global economy.⁷

Designating a lead official to coordinate efforts across organizations is an often-used model. At the US federal level, these officials are typically referred to as “Czars” for their program or policy area. At the local level, Chief Resilience Officers (CROs) are increasingly being used to bridge organizational boundaries.

In building the network, government planners should recognize that private and nonprofit involvement is much more than merely helpful or additive—it can determine the success of the response to a future shock. These organizations contribute resources, relationships, capacities, and agility that governments often lack.

Working across sectors with different values, legal frameworks, operating models, and accountability mechanisms is not easy. The cyber roundtable highlighted the need to break organizational silos. Tony Scott, CEO of Intrusion, Inc., observed: “Threat actors are developing new technologies quickly to penetrate networks and thwart efforts to contain threats, which can be difficult to counter when those efforts depend on coordination across entities with differing standards, missions, and priorities.”

Key actions for leaders to take

- Create networks of key partners and stakeholders across government, civil society, and the business community that cut across sectors to address future shocks.
- Select a network governance mechanism, such as the Academy’s Modern Intergovernmental Toolkit, that fits the purpose of the network and the nature and scope of the shock to be addressed.⁸
- Define leadership roles and responsibilities, decision-making processes, and accountability mechanisms before a shock occurs.
- Build trusted relationships to limit misunderstandings and confusion during a crisis.
- Strengthen the capacities of networks and individual participants through joint exercises and knowledge sharing.
- Resolve structural and organizational cultural differences that impede collaboration.

Perspective

Building shared services on a Center of Excellence (CoE) model

A CoE includes multiple agencies and a data center with key information and predictive modeling capabilities, as well as an effective vendor-managed inventory (see Figure 3). Roundtable participants envisioned a multiagency shared service, with full-time subject matter experts contributing unique expertise and perspectives on supply chain disruption events. This team could also build out diagnostic data and organize more predictive models as foundations for “future state” planning scenarios.

Nevertheless, managing a shared service is a difficult task. Overseeing such an enterprise requires managing subject matter experts from multiple government agencies. A CoE should also include private sector representatives, including at the leadership level, to implement policies through the most effective channels.

FIGURE 3

Center of Excellence/shared services model for future shocks risk management







Imperative 2

Plan to mitigate crosscutting shocks

The *Eight Strategies for Transforming Government* report from the IBM Center observed: “Performance management initiatives over the past two decades helped shift the conversation within and across US government agencies—from a focus on measuring program activities and outputs to a focus on achieving mission outcomes. This represents a fundamental shift in thinking, acting, and managing within the public sector.”⁹

This focal change is particularly important—and difficult—in addressing shocks that cut across agencies, levels of government, and sectors. Crosscutting shocks require crosscutting responses that integrate efforts within a vast patchwork of actors. In response, outcome-oriented strategic planning for future shocks must be national in orientation, not merely a top-down federal approach.

At the state level, CIOs see themselves as playing a central role in cross-agency business continuity and resilience according to a new report published by IBM and the National Association of State Chief Information Officers (NASCIO).¹⁰ CIOs are also establishing cross-agency relationships before incidents occur and conducting joint training with private sector organizations and other government jurisdictions.

Tony Scott summarized: “Cyber roundtable participants noted a lack of transparency regarding the many interdependencies, complexities, and related risks of digitally connected services. As a result, the public often has difficulty understanding the fragility of systems and the cascading effects associated with service disruption, including the impacts on downstream suppliers and partners.”

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Tony Scott, CEO, Intrusion, Inc.

As a positive step forward, The US National Cybersecurity Strategy’s five pillars and related strategic objectives constitute a plan for not only federal but national cyber resilience.¹¹ For example, strengthening the cyber workforce is a strategic objective and demonstrates that acquiring and developing talent should be fully integrated with mission-related strategic planning.

Strategy mapping is a tool that can be used for addressing crosscutting issues. John Bryson and his colleagues stated in their IBM Center report: “New techniques and processes are needed to make sense of the challenging situations involving complex, interconnected issues in which multiple organizations must make contributions to make the changes needed to effectively confront the challenge.”¹²

Key actions for leaders to take

- Create whole-of-government and whole-of-society strategic plans to address future shocks.
- Rely on documented successful practices in developing these network-wide plans.
- Align individual agency plans, goals, performance measures, and strategies with network-wide strategic plans.
- Leverage technology, including AI, to facilitate decision-making.
- Integrate management capacity considerations, such as workforce talent needs, into strategic plans.



Imperative 3

Manage risks and extend opportunities

Risk management provides insights on the risks and consequences of future shocks as well as opportunities derived from improved resilience. Tools, techniques, and methods for risk management are well established, and internationally accepted standards exist. 65% of the respondents to the IBM IBV survey say they have a disciplined and formal process to create awareness of future shocks in their mission domain. Risk management takes on new dimensions—and importance—in response to future shocks.

The *Eight Strategies for Transforming Government* report identified the challenge: “Today’s risk landscape requires a unified, coordinated, disciplined, and consistent approach, no longer focused on risk management as a compliance exercise or perceiving risks solely as problems to avoid. Research is needed on reconceiving risk management as a value-creating activity integral to strategic planning, decision-making, and organizational resiliency.”¹³

Rob Handfield explained: “To build supply chain immunity and resiliency, a government shared service needs to implement robust technology platforms for supply chain visibility and planning. These platforms need to include AI tools, data analytics, intelligent workflows, and supply chain mapping information to inform decision-making and resource deployment. With predictive analytical tools, governments can build on insights gained from wargaming to develop more accurate ‘what-if’ scenarios and contingency plans.”

The US federal government has a central role in fostering consistent risk management across all members of a future shock network. For example, the cyber roundtable observed that a seemingly isolated cyber event can escalate quickly into a full-blown national or global crisis. Cyber roundtable participants stressed the need to prioritize standard cyber risk assessment frameworks to facilitate more efficient collaboration.

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IBM IBV 2023 CEO Study, CEO decision-making in the age of AI

The US federal government can also assist other organizations, particularly localities, in strengthening their own risk management programs. Local communities have vastly different capacities, needs, and risks that require distinct responses to future shocks. In the IBM Center report, *Managing the Next Crisis*, experts noted: “All crises are local—but there is wide variation in how localities respond.”¹⁴ While variation is appropriate, it should result from differing circumstances on the ground and not differences in understanding the nature and scope of a shock.

Finally, each roundtable noted that risk must be continuously monitored and reassessed as risk evolves and risk appetites and response strategies change. For example, according to the March 2023 report of The Intergovernmental Panel on Climate Change (IPCC): “The feasibility and effectiveness of options increase with integrated, multisectoral solutions that differentiate responses based on climate risk, cut across systems, and address social inequities. As adaptation options often have long implementation times, long-term planning increases their efficiency.”¹³

Key actions for leaders to take

- Embed risk management in strategic and operational decisions and avoid making risk management a stand-alone, compliance-driven exercise.
- Focus beyond negative consequences and address shock events in ways that create opportunities for a better future.
- Use data-driven modeling, generative AI, and other tools to assist risk management.
- Standardize risk assessment frameworks across the network.
- Establish federal leadership for overall risk assessments, share results and methods, and provide technical assistance across the network.

Perspective

Reinforcing resilience with generative AI

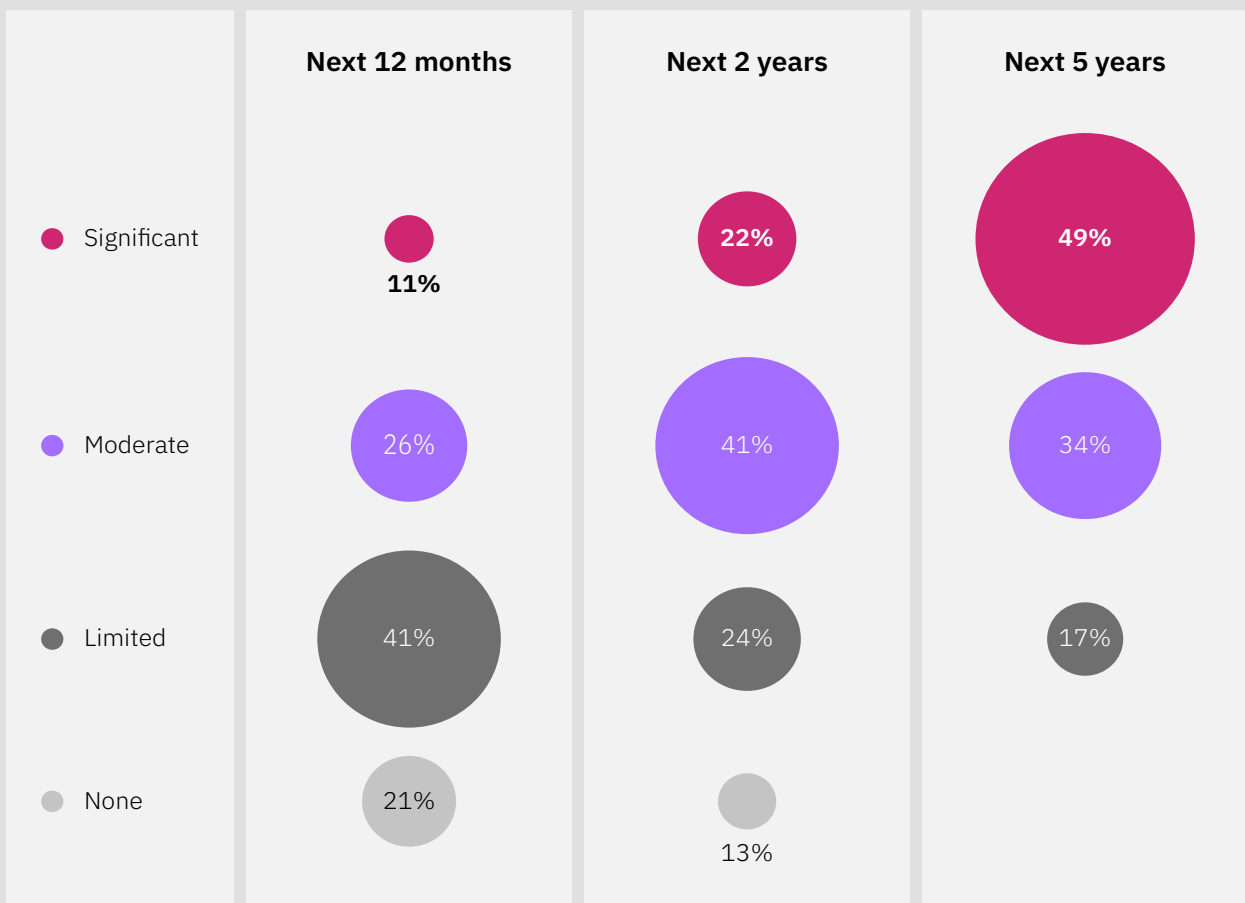
Along with corporate executives, the leaders of governmental organizations are closely following the development of generative AI and how this technology is transforming the workplace. During the next 12 months, 38% of government leaders report in the IBM IBV survey conducted for this report that they anticipate generative AI will moderately or significantly impact workplace capabilities. Looking ahead five years, the percentage climbs to 93% (see Figure 4).

Although adoption is in the early stages, here are four use cases where generative AI could significantly contribute to how governments prepare for and respond to shock-level disruptions:

- Automate budgeting by analyzing spending patterns, forecasting needs according to trends, and improving how decision-makers allocate resources.
- Expedite citizen services by making natural language processing more conversational to improve inquiry response, as well as directing more complex inquiries to appropriate agencies and departments.
- Enhance decision-making by using predictive analytics to deliver insights based on historical data points and current conditions, enabling government leaders to make informed decisions beyond experience or intuition.
- Optimize emergency response through the analysis of large data sets to predict and respond to emergencies more effectively, helping agencies allocate resources more efficiently during crisis situations.

FIGURE 4

Extent of impact of generative AI on government workforce capabilities



Source: IBV Future Shocks 2023 Survey (N=635). Q: To what extent will generative AI impact your workforce capabilities over the next 12 months, the next 2 years or the next 5 years? Not at all / to a limited extent / to a moderate extent / to a significant extent / I don't know.



Imperative 4

Increase public participation and improve communication

The Edelman Trust Barometer has documented a crisis in trust in government over the last decade. Lack of trust stems from multiple causes. The most worrisome might be the inability of most governments and politicians around the world to cast a credible vision for the future—one that would be rooted in ethics and enabled by competence, accounting for the challenges and fears experienced by constituents.¹⁶

Broad public participation helps guard against what E. Lisa F. Schipper, Professor of Development Geography at the University of Bonn, refers to as “maladaptation”—adaptation efforts that are not genuine improvements and may even increase vulnerabilities. According to Schipper: “More deliberate, inclusive planning could introduce ideas for adaptation strategies that outsiders have not even thought of. Local participation, development, and implementation will give individuals more of a stake and help bring about successful outcomes.”¹⁷

Fortunately, well-established public engagement strategies help ensure that voice, access, and representation are afforded to virtually all segments of a community, especially those who have historically been left behind. The IBM Center report, *A Manager’s Guide to Evaluating Citizen Participation*, made a compelling case for expanding citizen participation in government decisions—both to strengthen democratic principles and practices as well as to improve the quality and public acceptance of decisions.¹⁸

Roundtable participants suggested that governments at all levels need to improve how they communicate about future shocks. This begins with recognizing that different parts of a community have vastly dissimilar needs and capabilities during an emergency. For example, physical or financial barriers, pressing medical needs, disabilities, and relocation fears are among the reasons why people may not evacuate from harm’s way during a climate disaster.

“More deliberate, inclusive planning could introduce ideas for adaptation strategies that outsiders have not even thought of. Local participation, development, and implementation will give individuals more of a stake and help bring about successful outcomes.”

E. Lisa F. Schipper, Professor of Development Geography, The University of Bonn

Communication strategies need to be delivered in language that leads to action. For example, references to “100-year floods” may give a false sense of security rather than promote resilience efforts. Using compelling stories and trusted voices from the community for resilience communication makes climate change and other future shocks personal and identifiable rather than abstract and technical.

The key is communication that prompts action—to make the shock real and personal while not contributing to inaction because the problem is seen as overwhelming, or to apathy because the shock is accepted as the new normal.

Roundtable participants underscored the need to build awareness into educational systems. They suggested establishing multisector partnerships, including with academia, to develop more robust curricula on sustainability for primary, secondary, and postsecondary students.

Efforts to address future shocks should not reinforce existing inequalities. For example, it is widely recognized that those communities contributing the least to the climate crisis tend to suffer the most from climate disasters. The roundtable participants said that the needs and views of those communities must be at the center of resilience discussions. Overcoming trust deficits, based on historical mistreatment and neglect, requires active listening, sensitivity, and a genuine commitment to address equity concerns.

Key actions for leaders to take

- Understand the great challenges posed by public distrust in government and how disinformation campaigns can fuel public mistrust.
- Create robust opportunities for public participation during planning, response, and recovery stages to address future shocks.
- Ensure all members of the community are included and create opportunities for all voices to be heard and respected.
- Carefully design communication strategies using trusted voices, storytelling, and other approaches that lead to greater public understanding and more effective actions.
- Build age-appropriate awareness of future shocks into educational materials.



Imperative 5

Fast-track government innovation and transformation

The issues associated with the Academy’s “Grand Challenges to Public Administration” and future shocks no longer fit within organizational structures, work processes, and cultures. Future shocks will not wait for governments to react according to official priorities and prerogatives. Rather, government leaders need to create cultures and processes that continuously improve competence and innovation throughout their organizations.

As the world recovers from the COVID-19 pandemic, most countries are seeking to build resilience. A recent IBM Center report indicated that “many governments, even those caught off-guard by the pandemic, quickly shifted to rapid innovation and modernization.” Fostering rapid innovation and agility will be a core theme as governments prepare for the next round of future shocks.¹⁹

A central part of the solution is applying best practices from agile software development to the full range of policy and program domains. A white paper published by the Academy and the Project Management Institute defined agile as: “a new management paradigm, where the top priority is end-user satisfaction. Small teams do the work in multiple short periods of time. Individuals operate within a focused set of networks. Innovative tools and working approaches that facilitate innovation and support problem solving are used. Risk is identified and addressed early. And the focus is on doing, not documenting.”²⁰

These themes are further explored in publications coming from the Agile Government Center, an Academy initiative in partnership with the IBM Center led by and featuring multiple reports by former government leader G. Edward DeSeve.²¹

Future shocks will not wait for governments to react according to official priorities and prerogatives. Rather, government leaders need to create cultures and processes that continuously improve competence and innovation throughout their organizations.

Agile methods prioritize end-user satisfaction. Efforts are underway to deliver federal services along the lines of life experiences rather than federal program stovepipes and administrative processes. Human-centered design approaches are major aspects of efforts to reduce the administrative burdens on program recipients.

Fully embracing AI and other technological advances is essential to build future shock resilience. For example, the government of India introduced an electronic vaccine intelligence platform (CoWIN) that has improved the efficiency of vaccine registration, immunizations, and appointments throughout the country. Since CoWIN's deployment in January 2021, more than 1.1 billion people have been vaccinated against COVID-19 across more than 5,000 sites—most of which were in rural and hard-to-reach areas.²²

Key actions for leaders to take

- Drive innovation throughout the organization to replace traditional program approaches that are inadequate in an era of cascading future shocks.
- Expand the use of agile principles and agile management methodologies.
- Put citizens, customers, and program recipients at the center through human-centered design and make concerted efforts to reduce administrative burdens.
- Manage the disruptive potential of AI and other technologies while harnessing their tremendous potential.



Imperative 6

Support data-driven decision-making strategies

Decision-makers at all levels require high quality and credible data. The authors of the IBM Center report, *Emerge Stronger and More Resilient: Responding to COVID-19 and Preparing for Future Shocks*, said: “Public sector leaders must build a robust analytic foundation for increasing situational awareness, predicting potential policy impacts, and providing citizen transparency. In this way, data serves as the new raw material that institutions need to mine and refine to rebuild trust.”²³

Successful networks find agreement on key elements of a data strategy long before an emergency occurs. They start with consistent definitions for data elements across the network. They agree on what data will be needed in real time—including disaggregated data that offers insights on how future shocks affect different populations. They identify how data will be collected and made available to those who need it in usable formats, as well as how privacy will be protected. The network’s data strategy also includes a technology assessment to determine where gaps in technology need to be filled.

Designing and implementing a data strategy across a network is extremely challenging. For example, the Pandemic Response Accountability Committee (PRAC), made up of 10 federal Offices of Inspectors General, attempted to track US federal COVID-19 relief funding. Looking at a small subset of all funding, the PRAC reported in July 2023 that “Tracking pandemic funds to the community level required the use of multiple federal, state, and local data systems, and ultimately, we had to contact state and local entities directly to gain a better understanding and fill data gaps. In the end, complete data was either unavailable or insufficient and did not allow PRAC to definitively identify the total funding provided to the six communities studied.”²⁴

Successful networks find agreement on key elements of a data strategy long before an emergency occurs. The network's data strategy also includes a technology assessment to determine where gaps in technology need to be filled.

Given the wide range of data and diverse sources often needed to address a future shock, strong privacy and confidentiality protections need to be built in from the outset. This guards against the inappropriate disclosure of sensitive and confidential data including business, personal, government, operational, and classified information.

Overall, even the best data is valuable only to the extent that it helps guide decisions. The roundtables suggested that public-facing dashboards and metrics should show progress, pinpoint improvement opportunities, and provide public transparency.

The US federal government also has a central role in conducting and supporting research on future shocks. For example, the climate resilience roundtable participants said that the US federal government is best positioned to organize national research that identifies good practices across the public and private sector and how they can be scaled. The US Climate Resilience Toolkit and the case studies it has gathered are a good example of information sharing that spurs innovation.²⁵

Key actions for leaders to take

- Determine what data will be collected, who will collect it, where and when it will be stored and reported, and how it will be used—well before a crisis occurs.
- Disaggregate data to provide a comprehensive understanding of how a future shock can affect all parts of a community.
- Build in privacy and confidentiality safeguards.
- Encourage network participants to be forthcoming in reporting, especially when they may perceive it is not in their interests to do so.
- Provide transparency through public reporting and public-facing dashboards.



Imperative 7

Dedicate the proper resources and get the incentives right

Future shocks can be mass casualty events and impose significant economic losses to individuals, organizations, and communities. Since 1980, the cumulative costs of US major disasters (defined as at least \$1 billion in cost) are over \$2 trillion.²⁶ Further, IBM's annual *Cost of a Data Breach Report* showed that the cost of data breaches to organizations reached an all-time high in 2022: on average, over \$4.5 million per breach.²⁷

Given these significant costs, the US National Cybersecurity Strategy calls for a “fundamental shift in how the United States allocates roles, responsibilities, and resources in cyberspace.” This includes “increasing incentives to favor long-term investments into cybersecurity.” One of the strategy’s five pillars is to “shape market forces to drive security and resilience.”

The US federal government can deploy a range of policy tools to incentivize and inculcate future shock resilience. For example, Washington annually spends almost \$694 billion on contracts.²⁸ Billions more are spent by state and local governments. This enormous buying power presents a powerful opportunity to embed future shock resilience in procurement decisions and contracts.

Bolstering the resilience of 130 million commercial and residential buildings in the US is another opportunity for action. Although building codes are generally a local responsibility, the US federal government can help spur improvements.²⁹ For example, the US Government Accountability Office (GAO) reported in 2019 on potentially “requiring building codes and design standards based on the best available information for infrastructure built or repaired with federal funds.”³⁰ These updated standards reflect lessons learned from previous disasters and are designed to mitigate damage from future events.

Washington annually spends almost \$694 billion on contracts. Billions more are spent by state and local governments. This enormous buying power presents a powerful opportunity to embed future shock resilience in procurement decisions and contracts.

The US federal government should likewise aggressively use its grants and regulatory waiver authority to encourage experimentation and flexibility among the states and local governments.

Roundtable participants said the US federal government also must limit disincentives to resilience. Efforts to reduce administrative burdens on grantees need to be strongly encouraged. Local governments, especially smaller ones, often lack the staff and the knowledge needed to apply for federal grants. Resource-constrained local governments must consider the time and effort needed to apply for a grant, the likelihood of approval, and the wasted costs if a grant application is not approved.

The Academy, in its *Grand Challenge to Steward Natural Resources and Address Climate Change*, observed “Public agencies at all levels of government have a role in funding clean energy R&D and spinning new technologies off to the private sector. These technologies can help reduce carbon dioxide emissions and mitigate climate change risks.”³¹ The private sector can be a constructive partner in transitioning to clean energy and strengthening resilience.

Roundtable participants said that governments need to improve budgeting to reflect risk. However, building resilience to cyberattacks, supply chain disruptions, climate disasters, and other shocks will be costly and difficult. The challenge, as one expert noted, is that we do a much better job in addressing acute problems than we do chronic problems. When immediate priorities dominate the agenda, it is easier to put off chronic concerns until another time.

Key actions for leaders to take

- Use government spending, procurement, grants, R&D funding, tax incentives, regulations, and other tools to incentivize initiatives for future shock preparation.
- Recognize the uneven capacities of local governments and other grantees by streamlining grant procedures and reducing administrative burdens.
- Promote grant and regulatory waivers—with appropriate safeguards and outcome reporting—to enhance flexibility and address the differing local impacts of future shocks.
- Budget for future shocks by continuing to increase the explicit recognition of future shock risks in government budget processes.



Imperative 8

Invest in a future shock-ready workforce

Persistent mission-critical skills shortages undermine the capacity of governments to prepare for, and respond to, future shocks. For example:

- Mission-critical skills shortages have been on the GAO High Risk List since 2001, with limited progress reported.³²
- More than 600,000 workers left positions in US federal, state, and local governments between the start of the pandemic and June 2022, impacting the ability of those governments to maintain basic services and respond to critical situations.³³
- The overwhelming stress faced by front-line workers and first responders—who in many cases are also disaster survivors—underscores the importance of attention to staff physical and mental health.

To address the gap between supply and demand for cybersecurity professionals, roundtable participants stressed the importance of increasing the cyber talent resource base and putting it at the top of the priority list.

The point made about private sector organizations in the IBM IBV report, *The enterprise guide to closing the skills gap*, applies equally well to government: “As business platforms mature and companies continue to introduce new intelligent workflows to succeed on those platforms, the need for continuous reskilling in the workforce will be paramount to remaining competitive. Hiring alone is not a sustainable solution to the talent crisis.”³⁴

The need for continuous reskilling in the workforce will be paramount to remaining competitive. Hiring alone is not a sustainable solution to the talent crisis.

Fortunately, the Academy's report, *No Time to Wait Part 2*, provides a path forward and recommends a talent management model that:

- Identifies the core competencies of occupational and professional groups
- Trains employees in required competencies and certifies their skills
- Creates flexible teams that match competencies to missions
- Fosters continuous learning through occupational and professional communities of practice
- Reskills the government's workforce to match mission requirements with employee skills and helps ensure that these skills keep up with hyper-fast mission changes.³⁵

Government agencies need inclusive cultures. For example, the cyber roundtable suggested that agencies “foster a culture within the cybersecurity field that welcomes new voices and diverse sources of talent to create an inclusive workplace culture, attracting those who may not conform to a traditional security-focused mission.”

The complex future shocks that governments seek to address span the boundaries of agency jurisdictions, levels of government, sectors, and professional disciplines. How government leaders consider the workforce must also reach beyond boundaries.

Key actions for leaders to take

- Develop strategies to address current mission-critical skills gaps.
- Support the health and well-being of first responders.
- Use scenario planning and strategic foresight to identify skills that may be needed as future shocks continue to evolve.
- Commit to continuous learning and reskilling.
- Recruit and develop skills across agencies, levels of government, and sectors.
- Expand the use of skills-based hiring to create a more diverse workforce.
- Foster inclusive organizational cultures to make full use of new talent.
- Build HR management capacity by filling vacant positions and serving line managers as strategic partners.
- Seek transparency over workforce issues to address critical skills deficiencies.

Perspective

Future trends: Investing in a workforce resilient to future shocks

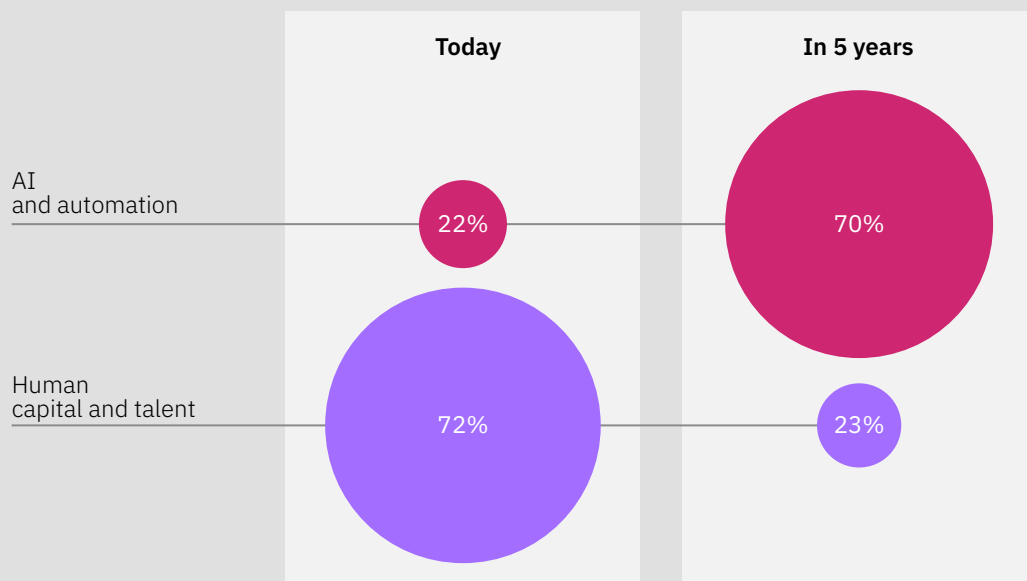
Government leaders recognize that developing human capital and talent is a key factor in optimizing organizational resilience to future shocks. According to the IBV survey, the mean average that these leaders say they would invest today in human capital and talent was 55 out of 100 generic investment units. Alternatively, these leaders would spend only 45 investment units on AI and automation, as of today.

Five years from now, a reversal is seen in these priorities. Surveyed government leaders anticipate a mean average of 43 out of 100 investment units spent on developing human capital and talent, with a much higher 57 investment units spent on AI and automation.

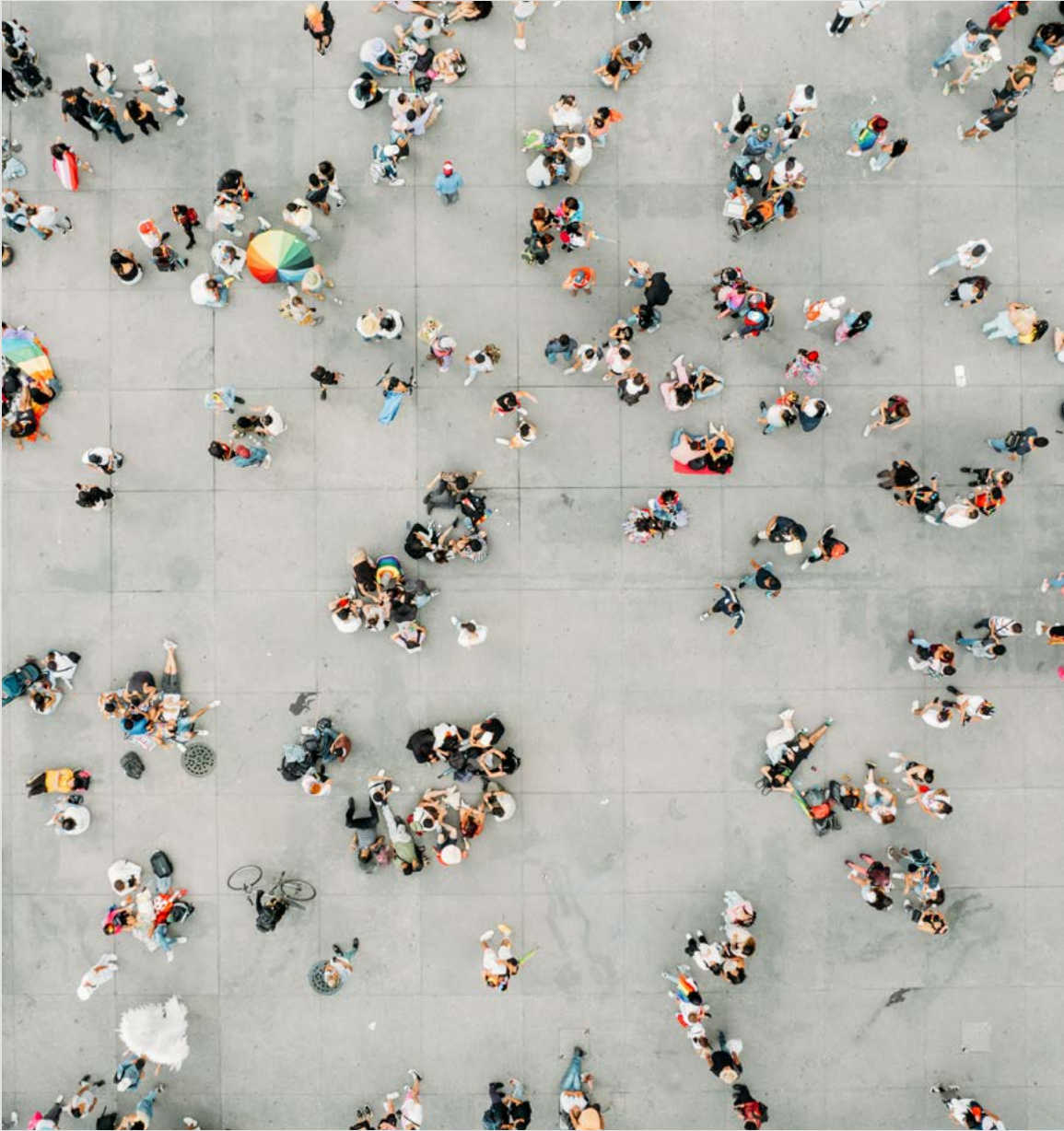
Further analysis of survey results indicates that government leaders may not fully appreciate the level of training investment required to enable current employees to effectively augment their work with AI and automation tools. Up-front training in these technology accelerators has the potential to significantly increase the impact of additional AI and automation investments expected to be made in the future.

FIGURE 5

Investment in human capital and talent versus AI and automation in the next 5 years



Source: IBV Future Shocks 2023 Survey (N=635). Q: How would you allocate 100 investment units to help optimize your organization's resilience to global shocks? The percentage of government leaders indicates a greater investment in either human capital/talent or AI/automation today and in five years.



Conclusion:

Sustaining governments and societies in a world of future shocks

Societies and their governments face escalating and increasingly interrelated shocks that place enormous stress on communities and citizens. As isolated events quickly metastasize into mega-crises, governments must prepare for, respond to, and recover from these shocks, and develop the strategies to meet the mission. The key is not only to maintain a vulnerable status quo or adjust to an unsatisfactory “new normal” but to also build more equitable and sustainable governments and societies.

Crosscutting shocks are challenging governments to adopt new ways to think, operate, and collaborate. These changes will require new organizational cultures that embrace agility, expand beyond bureaucratic boundaries, and attract and retain talent that can thrive and capitalize on transformative technologies such as generative AI.

In short, a government entity will need to be as impactful, broad-based, and fast-changing as the complex shocks it will need to address.

Governments must build sustainability in an era of profound disruption—but also in an era when resources for resilience are becoming more sophisticated. Taken together, the imperatives of this report, the roundtable discussions, and the Academy’s “Grand Challenges in Public Administration” offer practical insights and options that governments can use today, through public-private partnerships and networked environments, to be ready for the next future shock—now gathering on an unforeseen, but inevitable timetable.

Perspective

Top five resilience-building priorities of government executives

1. **Invest in technology** and infrastructure to enhance communication and output.
2. **Develop plans and strategies** to respond to emergencies and crises effectively.
3. **Ensure strong and adaptable governance structures** to make timely decisions and lead effectively during crises.
4. **Invest in workforce upskilling** and training to increase efficiency and productivity.
5. **Promote sustainability** and adopt renewable energy sources to prepare resources for the future.

*Source: IBV Future Shocks 2023 Survey (N=635). Summarization of open text response.
Q: What do you believe should be your organization's top priority in building resilience?*

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Study approach and methodology

From September 2022 through June 2023, the IBM Institute for Business Value, the IBM Center for the Business of Government, and the National Academy of Public Administration convened a series of international roundtables. Participants included governmental experts and stakeholders who discussed the challenges and opportunities faced by organizations preparing for future shocks. These roundtable discussions provided significant input and context for this report.

Also in 2023, the IBM Institute for Business Value, in cooperation with Oxford Economics, surveyed 635 executives from global government organizations. Respondents included 319 CEOs and 316 CIOs from 44 countries representing local, state, and national government entities in each nation. Executive respondents were screened to ensure that they were in leadership positions at their organizations during the COVID-19 pandemic, starting in 2020, and could provide information on the performance and resilience of their organization during this global shock event. These leaders represent organizations from a broad range of mission functions, including public services, defense, public safety, economic affairs, environmental protection, housing, health, culture, education, and social protection.

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Notes and sources

1. “Grand Challenges in Public Administration.” National Academy of Public Administration. <https://napawash.org/grand-challenges/the-12-grand-challenges>
2. “Preparing governments for future shocks.” IBM Institute for Business Value blog. July 13, 2022. <https://www.ibm.com/thought-leadership/institute-business-value/blog/government-prepare-future-shocks>
3. “Emerge Stronger and More Resilient: Responding to COVID-19 and Preparing for Future Shocks.” July 11, 2022. IBM Center for The Business of Government podcast. <https://www.businessofgovernment.org/node/4547>
4. Barrett, Katherine, Green, Richard, and Kettl, Don. *Managing the Next Crisis: Twelve Principles For Dealing with Viral Uncertainty*. IBM Center for the Business of Government. 2021. https://www.businessofgovernment.org/sites/default/files/Managing%20the%20Next%20Crisis_0.pdf
5. *A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action*. US Federal Emergency Management Agency. FDOC 104-008-1. December 2011. https://www.fema.gov/sites/default/files/2020-07/whole_community_dec2011__2.pdf
6. “About the Compact.” Southeast Florida Regional Climate Change Compact website. Accessed on September 1, 2023. <https://southeastfloridaclimatecompact.org/>
7. “About C40.” C40 Cities website. Accessed on September 1, 2023. <https://www.c40.org>
8. “Modern Intergovernmental Models for the 21st Century.” National Academy of Public Administration. July 2023. <https://napawash.org/academy-studies/intergovernmental-governance-models-for-the-21st-century>
9. Chenok, Dan. *Eight Strategies for Transforming Government*. IBM Center for The Business of Government. October 26, 2022. <https://www.businessofgovernment.org/blog/eight-strategies-transforming-government>
10. “Preparing for Future Shocks in State Government.” Center for Digital Government, National Association of State Chief Information Officers, and IBM. September 2023. <https://www.nascio.org/resource-center/resources/preparing-for-future-shocks-in-state-government-state-cios-play-an-important-and-expanding-role-in-resilience/>
11. *National Cybersecurity Strategy*. The White House. March 2023. <https://www.whitehouse.gov/wp-content/uploads/2023/03/National-Cybersecurity-Strategy-2023.pdf>
12. Bryson, John. *Addressing Complex and Cross-Boundary Challenges in Government: The Value of Strategy Mapping*. IBM Center for The Business of Government. January 5, 2023. <https://www.businessofgovernment.org/report/addressing-complex-and-cross-boundary-challenges-government-value-strategy-mapping>
13. Chenok, Dan. *Eight Strategies for Transforming Government*. IBM Center for The Business of Government. October 26, 2022. <https://www.businessofgovernment.org/blog/eight-strategies-transforming-government>
14. Barrett, Katherine, Richard Green, and Don Kettl. *Managing the Next Crisis: Twelve Principles for Dealing with Viral Uncertainty*. The IBM Center for The Business of Government. 2021. https://www.businessofgovernment.org/sites/default/files/Managing%20the%20Next%20Crisis_0.pdf
15. *AR6 Synthesis Report: Climate Change 2023*. The Intergovernmental Panel on Climate Change. March 2023. <https://www.ipcc.ch/report/ar6/syr/>
16. Harary, Antoine. “Rebuilding Trust Demands Articulating a Credible Vision for the Future.” Edelman. January 26, 2023. <https://www.edelman.com/trust/2023/Trust-barometer/rebuilding-trust-demands-articulating-credible-vision-future>
17. E. Lisa F. Schipper. “Maladapted: Ill-conceived attempts at climate adaptation threaten to make a bad situation even worse.” *Open Mind*. July 14, 2022. <https://www.openmindmag.org/articles/maladapted/#top>
18. Nabatchi, Tina. *A Manager’s Guide to Evaluating Citizen Participation*. IBM Center for The Business of Government. 2012. <https://www.businessofgovernment.org/sites/default/files/A%20Managers%20Guide%20to%20Evaluating%20Citizen%20Participation.pdf>
19. Paydos, Tim and Mike Stone. *Emerge Stronger and More Resilient: Responding to COVID-19 and Preparing for Future Shocks*. IBM Center for the Business of Government. 2022. <https://www.businessofgovernment.org/sites/default/files/Emerge%20Stronger%20and%20More%20Resilient.pdf>
20. *Building an Agile Federal Government*. National Academy of Public Administration and the Project Management Institute. December 2020. https://s3.us-west-2.amazonaws.com/napa-2021/studies/increasing-the-agility-of-the-federal-government/Agile_Gov_whitepaper_v4.pdf
21. “An Introduction to the Agile Government Center.” National Academy of Public Administration. November 2019. <https://napawash.org/articles-from-our-partners/an-introduction-to-the-agile-government-center>
22. CoWIN in India: *The Digital Backbone for the COVID-19 Vaccination Program*. Exemplars in Global Health. 2023. <https://www.exemplars.health/emerging-topics/epidemic-preparedness-and-response/digital-health-tools/cowin-in-india>
23. Paydos, Tim and Mike Stone. *Emerge Stronger and More Resilient: Responding to COVID-19 and Preparing for Future Shocks*. IBM Center for the Business of Government. 2022. <https://www.businessofgovernment.org/sites/default/files/Emerge%20Stronger%20and%20More%20Resilient.pdf>

24. *Tracking Pandemic Relief Funds that Went to Local Communities Reveals Persistent Data Gaps and Data Reliability Issues*. Pandemic Response Accountability Committee. July 2023. <https://www.oversight.gov/sites/default/files/oig-reports/PRAC/PRACTracking-Pandemic-Relief-FundsIMPACT-Phase-I.pdf>
25. *US Climate Resilience Toolkit*. Version 1.5. July 2016. <https://toolkit.climate.gov/steps-to-resilience/steps-resilience-overview>
26. “US Billion-Dollar Weather and Climate Disasters.” National Centers for Environmental Information, US National Oceanic and Atmospheric Administration. October 2022. <https://www.ncei.noaa.gov/access/billions/>
27. *Cost of a Data Breach Report 2023*. Ponemon Institute and IBM Security. July 2023. <https://www.ibm.com/reports/data-breach>
28. A Snapshot of Government-Wide Contracting for FY 2022. U.S. Government Accountability Office. August 15, 2023. <https://www.gao.gov/blog/snapshot-government-wide-contracting-fy-2022>
29. *Disaster Resilience Framework: Principles for Analyzing Federal Efforts to Facilitate and Promote Resilience to Natural Disasters*. US Government Accountability Office. GAO-20-100SP, October 2019. <https://www.gao.gov/products/gao-20-100sp>
30. Joselow, Maxine. “Why a \$90 million push could help U.S. buildings withstand climate disasters.” *The Washington Post*. July 12, 2023. <https://www.washingtonpost.com/climate-solutions/2023/07/12/energy-building-codes-infrastructure-law/>
31. “Roundtable: Steward Natural Resources and Address Climate Change.” National Academy of Public Administration. April 20, 2020. <https://napawash.org/grand-challenges-blog/roundtable-steward-natural-resources-and-address-climate-change>
32. *High Risk List: Strategic Human Capital Management*. US Government Accountability Office. <https://files.gao.gov/reports/GAO-23-106203/index.html#appendix5>
33. Brey, Jared. “Government Worker Shortages Worsen Crisis Response.” *Governing: The Future of States and Localities*. October 3, 2022. <https://www.governing.com/work/government-worker-shortages-worsen-crisis-response>
34. Laprade, Annette, Amy Wright, and Dave Zaharchuk. *The enterprise guide to closing the skills gap*. IBM Institute for Business Value. February 2021. <https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/closing-skills-gap>
35. *No Time to Wait Part 2. Building a Public Service for the 21st Century*. National Academy of Public Administration. September 2018. https://napawash.org/uploads/Academy_Studies/NTTW2_09192018_WebVersion.pdf

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