

This study looked at the World Trade Center response and recovery process through the lenses of information, technology, and the people and organizations who used them to address a massive urban emergency. The interviews gathered first-person accounts of activities, decisions, problems and solutions from 29 representatives of city, state, and federal government agencies, private businesses, and nonprofit service organizations. This final section distills their experiences and advice into seven areas for future action that can enhance the prospects for long term learning and improvement in the structures and functions of government, businesses, and civic organizations. The main recommendations are listed below.

- Build enterprise thinking and action into mainstream programs and systems
- Invest in information quality
- Educate policy makers about the limitations and benefits of IT
- Plan comprehensively for business continuity
- Emphasize workforce planning
- Make selective investments in quick community mobilization
- Understand community capacities and limitations

Build enterprise thinking and action into mainstream programs and systems

"Things you want to do in an emergency need to be done every day."

Perhaps no theme from our interviews is potentially more valuable than the concept of "enterprise," the idea that organizations, levels of government, and economic sectors are deeply interdependent and need to work together as though part of an integrated unit. Many recommendations in this vein had to do with first understanding, and then coordinating and integrating information and processes across organizational and programmatic boundaries. However, interviewees often cited barriers such as the lack of a shared vision of how integrated work flow and information can support public functions, inadequate funding, disincentives to collaborate, and distrust of the motives and abilities of other organizations. Limited funding and inflexible practices for resource distribution reinforce traditional organizational imperatives, leaving little room for enterprise thinking or cooperation. These issues are not at all limited to emergency management functions. They pervade all the functions of government.

Interviewees agreed that deep and lasting improvements in the quality, flexibility, resilience, and coordination of mainstream **non-emergency** programs would not only contribute to better emergency response but would dramatically improve the quality and effectiveness of all public functions. Investments in coordination and integration within public health, social services, transportation, education, and other areas would all have this dual benefit. They would prepare us to respond more effectively, rapidly, and efficiently to unexpected events, while simultaneously improving everyday mission performance for these fundamental societal needs.

Enterprise concerns do not stop with government, however. With respect to physical infrastructures, for example, the crisis showed how separate programs of public and private investment have produced an infrastructure that, for all practical purposes, has become a single complex resource whose characteristics are not well understood, but whose performance (and failure) affects every sector simultaneously. The massive failures attending the WTC terrorist attack are ample evidence of vulnerabilities that must be addressed by not only better technology and engineering, but also by more comprehensive information and strategic public and private investments. Respondents recommended that public officials, business leaders, and utility providers all participate in a re-examination of existing and future infrastructure for communications and other crucial public services.

Invest in information quality

"[Each] field tends to be very closed in the way it deals with data and because of privacy concerns and a lot of other things there's no standardization. And that's a critical vulnerability for the country. The lack of a history and culture of data sharing . . . is going to be a tough nut for the country to crack."

During the WTC crisis, data issues (such as quality, access, use, sharing, security, standards) far outweighed technology problems, and they were (and remain) harder to solve. Data about all physical and social aspects of society are collected and used by myriad public and private organizations. But most of this information is captive within individual programs and held closely within organizational boundaries. It is captured and organized in program-specific ways using different, sometimes idiosyncratic, definitions, formats, and rules. Overall, government needs a high-level overview and understanding of the information needs of various domains. But it lacks even a rudimentary inventory of data sources that would at least reveal overlaps and gaps in needed

knowledge. We are still very far from fulfilling the often-repeated need to agree on data standards, quality controls, and information sharing protocols that reflect the idea of a broad national information infrastructure in which data from one place or organization meshes with and complements, rather than conflicts with or duplicates, data from others. Standards for data elements and presentation formats, quality controls, analytical tools, and meta data were often cited as the necessary, but often missing, underpinnings of shared and flexible data resources.

The potential benefit of a shared data infrastructure is best illustrated by the pivotal role played by geo-spatial analysis in the response and recovery efforts. The effectiveness of this effort rested on years of development in terms of working relationships, data standards, information sharing agreements, operational adjustments, and trust building involving scores of organizations both inside and outside government. Despite the obvious successes, however, interviewees often noted how poorly we understand the physical infrastructures that underlie our quality of life and the ways in which they are interconnected and vulnerable to cascading failure. These infrastructures cannot be built, maintained, or protected without a more explicit understanding of their detailed condition, overlapping features, and change over time. These needs call for better understanding and ongoing investments in spatial data development and analysis programs to support municipal, metropolitan, regional and wider purposes. Respondents often referred to the possibilities of making similar investments in the data resources that support public health reporting, environmental monitoring, human services, telecommunications, and other areas.

Educate policy makers about the limitations and benefits of IT

"We never really articulated the cost-benefit for better aligning or integrating programs."

One significant problem during the WTC response was described by interviewees as a naïve assumption by leaders in some organizations that technology could overcome underlying organizational and data quality problems that prevented effective information sharing and integration. One person characterized this as a wish for an "IT Band-Aid" that would somehow solve problems that were not technological but, instead, were deeply rooted in data and programmatic differences that had never been reconciled across agencies. According to several interviewees, these policy makers lacked a sophisticated understanding of both IT capabilities and its limitations. They were therefore faced with stark lessons about incompatible systems and lack of data and system redundancy and back up. Conversely, the WTC crisis prompted for some a new-found understanding of the benefits that can be derived from more powerful and flexible technologies such as GIS, mobile computing, and wireless communications. Nevertheless, many interviewees said the usual assessment of the risks and benefits of IT continues to be inadequate and noted that few strategic new investments are being made in information and technology.

Plan comprehensively for business continuity

"The other obvious outcome of all this is heightened interest in business continuity ...historically it's something that's every year on the mind of IT directors. And every year it tries to find its way into the budget process. And I would say, in most cases, it never makes it."

The results of September 11 have shown organizations of all kinds that contingency planning is not only important, it must involve top leaders and encompass the entire organization. Preparation and contingency planning for the Y2K date change gave many organizations their first serious experience with the concept of business continuity, because the potential problems associated with the date change were so deeply embedded in their programs, services, and operations. Many cited this experience as invaluable to their ability to respond to the WTC crisis. They had identified and prioritized their business functions, modernized their systems, and established detailed plans to react to problems and resolve them. Nevertheless, the scale and scope of the WTC event was so great that even those who worked in the best-prepared organizations emphasized the need for greater investment in business continuity and disaster recovery plans. In one case, for example, all the people who knew the passwords to activate off-site back-up systems worked in the same office and were killed in the collapse of the Towers. Recommendations included investment in the resiliency and redundancy of key enterprise systems, much more detailed information about the resources and capabilities of suppliers and partners, and attention to routine administrative functions such as purchasing, scheduling, and payroll that are often cumbersome and hinder an otherwise nimble response.

In addition, all organizations need well-maintained and readily accessible alternative channels for communicating with staff. Any contingency plan assumes the availability of people to carry it out. However, during the WTC crisis,

all kinds of organizations learned that they lacked sufficient information about the availability, whereabouts, knowledge, and experience of their employees. For some organizations, the first concern was accounting for staff members who were or may have been in the Trade Center, were elsewhere in the City, or were in travel status. For most, this was more difficult than expected due to the lack of up-to-date, detailed contact information for employee locations other than the workplace. Respondents emphasized that such information is an essential part of business continuity planning, and should be maintained off-site in a form that is readily accessible during an emergency.

Emphasize workforce planning

"One of the most important things that you overlook in other stories discussing the response and recovery, is the human element in terms of the knowledge base that was available during the recovery effort. . . People just forget that the institutional knowledge and the knowledge of city operations was critical."

Competence and experience in all organizations played crucial roles. In several instances, the main difference between an organization's routine operations and crisis operations was only in the scale of the effort. In these cases, necessary processes and competencies were in place and readily deployable. However, for other organizations innovation was needed. In these places long-term, experienced staff used their knowledge of programs, processes, partners, and institutional history as the basis for fast and flexible action. Interviewees often explained that in the early days of the crisis there was no time to refer to procedures or manuals or to develop action plans. Experienced people acted on their core professional knowledge and long-standing relationships within and across organizations as well as across sectors. For the future, one City official described an effort now underway to create a "reserve corps" of expert data analysts who are well-trained and ready to be reassigned from their regular agency jobs to emergency operations whenever needed.

Given the essential role of experienced staff, the quality and stability of the future public workforce was a concern expressed by several respondents. One person told us, "You need veteran people who are flexible and have wide enough experience that they can adapt what they know to unexpected situations. . . I think this incident probably drove a lot of people to want to do public service. . . I hope government takes advantage of that [but] more important is keeping good people." However, interviewees worried that the burgeoning trends toward outsourcing and privatization had two negative effects. These activities turn content experts into contract managers or they push experienced, high-performing people entirely out of government. Both consequences remove knowledge and experience from the public service in ways that weaken the underlying capabilities of public agencies. In addition, the wave of retirements now beginning as the Baby Boom generation starts to leave the workforce presents important additional challenges for attracting and retaining younger people in public service.

Make selective investments in quick community mobilization

"You could envision a generic case management system . . . and define what the pieces are, where it needs an imaging component, a workflow component, a correspondence component, where it needs to be tied to some investigating tools . . ."

Many recommendations were made for "templates" that could be reused in future emergencies, no matter their cause or location. These ideas are sometimes no more than recommendations to document what was done in New York in the form of detailed checklists, such as the necessary components of a family relief center. One interviewee described the process of inventing the center: defining its multi-faceted mission (comfort, information gathering, crime investigation, assistance applications), sending people all over the City to gather material and resources including comfortable furniture, increasingly scarce American flags (donated by sports teams and museums), tablecloths (obtained from hotels), carpeting, plants, toys, and other items that would make the center as positive an environment as possible for the families forced to be there. In addition, they needed to support the many organizations working in the center and had to secure computers, networks and telephone services, build software, and manage an extensive array of records and information.

An inventory of the existence and capabilities of public spaces was another modest recommendation with potentially big benefits. New York was initiating a bio-terrorism drill at Pier 92 when the Trade Center was struck. The fact that this unencumbered public space was available made it possible to quickly recreate the EOC at that location. Interviewees advised all communities to identify public spaces that could be used in flexible ways, and for high-risk communities to invest in basic communications and computing infrastructure in those facilities that could be activated immediately.

Other recommendations require a larger investment, but could have high payoff when they are needed. For example, the case management system that emerged at the Family Assistance Center was invented on the fly. In hindsight, it is clear that the generic key components of such a system could be built in advance. Core data needs, logical components and workflow, use of various data capture technologies such as imaging of documents, network requirements, security features, and data access protocols could all be created in the shell of a system that could be rapidly deployed when needed.

Understand community capacities and limitations

"People had seen just horrible things and it gave everybody a way to channel their energies into something that was helping, a personal [way] to apply talents that you're good at to something that's productive. . . "

By community capacity we mean the collective ability of a human community, such as a city or a region, to sustain itself through crises that challenge its physical environment and social fabric. This includes the capacities to plan and protect, and to respond and recover a full range of functions. This kind of capacity goes well beyond emergency planning and management to include all the normal functions of the community.

Community capacity was evident in the wide range of activities and actors involved in the WTC response and recovery. Individuals and organizations used every available local resource and created new and slack resources by putting routine functions on hold and harnessing the outpouring of assistance that came from other places. Many kinds of information technology were provided voluntarily by the City's contract suppliers or others with no ties to City government. Sometimes these resources were requested by government agencies, often they were volunteered without request. At times more resources came forward than could possibly be put to use. For long periods, businesses hosted government agencies that had lost their buildings or access to their buildings. Individual professionals such as translators, psychologists, and counselors volunteered in the Family Assistance Center. Union members worked as volunteers to sift and remove the debris from the WTC site. Government employees and their business and nonprofit counterparts worked around the clock for weeks at time. Traditional procedures were cut short, often replaced by emergency processes and supplemented by temporary authorizations to allow the rapid acquisition of goods and services. And while this last item posed headaches for strict accountability in later months, there were very few instances of fraudulent activity by any person or organization.

Interviewees also emphasized that size makes a difference. One emergency management director in another large city said that in terms of local resources no other city in America was better able to respond to the crisis. In terms of first response capability alone, he noted that "the NYPD is larger than some standing armies." In addition, the City's public utilities are many orders of magnitude larger and more self-sufficient than in most other places.

By contrast, most local governments remain "have-nots" in terms of resources, technology, preparedness, and response and recovery capability. Small businesses and most nonprofit organizations have similar characteristics. These smaller jurisdictions and organizations seldom have the expertise, tools, or depth of staff that their larger counterparts do. As a result their capacity to respond and to sustain a response is relatively weaker and slower. Some, especially small businesses, cannot survive. The disparate capabilities of larger and smaller organizations and jurisdictions raise public policy concerns regarding the investment programs or infrastructures that might cushion smaller organizations from the worst effects of extreme crisis.