



Launching a National Conversation on Disaster Resilience in America: Workshop Summary

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Peggy Tsai, Rapporteur; Committee on Increasing National Resilience to Hazards and Disasters; Committee on Science, Engineering, and Public Policy; The National Academies

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LAUNCHING A NATIONAL CONVERSATION ON
Disaster Resilience
IN AMERICA

WORKSHOP SUMMARY

Peggy Tsai, *Rapporteur*

Committee on Increasing National Resilience to Hazards and Disasters

Committee on Science, Engineering, and Public Policy

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Preface

Resilience is a word often used to describe people, cities, or nations who demonstrate strength and coping skills to recover from adverse conditions. With the increasing frequency of natural and human-induced disasters and the increasing magnitude of their consequences, it is clear that governments and communities need to become more resilient. The National Research Council brought together a committee of experts to address the importance of resilience, discuss different challenges and approaches for building resilience, and outline steps for implementing resilience efforts in communities and within government (see Box P-1 for the committee's statement of task for the consensus report and its recommendations). The committee's report *Disaster Resilience: A National Imperative* (The National Academies, 2012), serves as a central reference for understanding resilience, the current state of the nation's resilience to disasters, and ways in which the nation can move on a path toward greater resilience. The report was also a basis for a one-day workshop on November 30, 2012 in Washington, DC, that formally launched a national conversation on resilience designed to engage individuals, the public, and government officials in considering and implementing national disaster resilience (see Agenda in Appendix A). This document is a summary of that one-day workshop. This workshop consisted of a morning event to formally launch the release of the committee's report, and afternoon breakout sessions to further examine some of the committee's recommendations in detail. Although the one-day workshop could not cover all of the many aspects of disaster resilience important to the nation or the meeting participants, the effort to draw upon the expertise of a diverse set of speakers, panelists, and participants was designed to provide engaged and informed input to ongoing resilience discussions that could translate into resilience-building actions.

Box P-1

Increasing National Resilience to Hazards and Disasters Statement of Task

An ad hoc committee overseen collaboratively by the Committee on Science, Engineering, and Public Policy and the Disasters Roundtable will conduct a study and issue a consensus report that integrates information from the natural, physical, technical, economic, and social sciences to identify ways to increase national resilience to hazards and disasters in the United States. In this context, “national resilience” includes resilience at federal, state and local community levels. The committee will:

- Define “national resilience” and frame the primary issues related to increasing national resilience to hazards and disasters in the United States;
- Provide goals, baseline conditions, or performance metrics for resilience at the U.S. national level;
- Describe the state of knowledge about resilience to hazards and disasters in the United States;
- Outline additional information or data and gaps and obstacles to action that need to be addressed in order to increase resilience to hazards and disasters in the United States; and
- Present conclusions and recommendations about what approaches are needed to elevate national resilience to hazards and disasters in the United States.

Recommendations

Recommendation 1: Federal government agencies should incorporate national resilience as a guiding principle to inform the mission and actions of the federal government and the programs it supports at all levels.

Recommendation 2: The public and private sectors in a community should work cooperatively to encourage commitment to and investment in a risk management strategy that includes complementary structural and nonstructural risk-reduction and risk-spreading measures or tools. Such tools might include an essential framework (codes, standards, and guidelines) that drives the critical structural functions of resilience and investment in risk-based pricing of insurance.

Recommendation 3: A national resource of disaster-related data should be established that documents injuries, loss of life, property loss, and impacts on economic activity. Such a database will support efforts to develop more quantitative risk models and better understand structural and social vulnerability to disasters.

Recommendation 4: The Department of Homeland Security in conjunction with other federal agencies, state and local partners, and professional groups should develop a National Resilience Scorecard.

Recommendation 5: Federal, state, and local governments should support the creation and maintenance of broad-based community resilience coalitions at local and regional levels.

Recommendation 6: All federal agencies should ensure that they are promoting and coordinating national resilience in their programs and policies. A resilience policy review and self-assessment within agencies and strong communication among agencies are keys to achieving this kind of coordination.

The morning segment of the November 30 event included framing remarks, keynote presentations, and a series of panel discussions with nationally recognized experts in disaster resilience (Chapters 1 and 2). These experts discussed developing a culture of resilience, implementing resilience, and understanding federal perspectives about resilience in light of Superstorm Sandy, which had occurred just a few weeks before the November 30 meeting. Although interest in Sandy was very keen, the input to the meeting provided by the participants included a broad range of perspectives and experiences derived from many types of hazards and disasters in all parts of the country. Chapter 1 summarizes the opening and framing remarks of the event while Chapter 2 summarizes the morning keynote presentations and panel discussions.

For the afternoon discussions, attendees were invited for their expertise across the physical and social sciences, economics, engineering, and public health and their range of experiences from government, non-profit organizations, academia, and the private sector. These invited attendees participated in breakout sessions that focused on various topics that would build upon three of the recommendations from the National Academies (2012) report: development and implementation of a national resilience measurement tool; risk management; and building community coalitions to support resilience. Chapter 3 summarizes the workshop breakout sessions and provides possible next steps for realizing a national vision for resilience.

This report has been prepared by the workshop rapporteur as a factual summary of what occurred at the workshop. The planning committee's role was limited to planning and convening the workshop. The views contained in the report are those of individual workshop participants and do not necessarily represent the views of all workshop participants, the planning committee, or the National Research Council.

The webcast for the entire event is archived on this website: <http://nas-sites.org/resilience/Resilience-Events/>. The website also includes brief video interviews with keynote speakers, panelists, and committee members.

Acknowledgments

In addition to the expertise provided by the Committee on Increasing National Resilience to Hazards and Disasters in helping to organize the November 30 disaster resilience event, the committee relied on input from the study sponsors and other professionals interested in disaster resilience. We gratefully acknowledge these individuals and organizations for their assistance in helping to ensure that the plenary program and afternoon workshops were informative and dynamic. We thank the study committee members: Susan Cutter; Joseph “Bud” Ahearn; Bernard Amadei; Patrick Crawford; Gerald Galloway, Jr.; Michael Goodchild; Howard Kunreuther; Meredith Li-Vollmer; Monica Schoch-Spana; Susan Scrimshaw; Ellis Stanley, Sr.; Gene Whitney; and Mary Lou Zoback. The study’s sponsors were also of great help in putting plans in place for the event. We thank our study sponsors: the U.S. Army Corps of Engineers, U.S. Department of Agriculture Forest Service, U.S. Department of Energy, U.S. Department of Commerce National Oceanic and Atmospheric Administration, Department of Homeland Security and Federal Emergency Management Agency, Department of the Interior U.S. Geological Survey, National Aeronautics and Space Administration, and the Oak Ridge National Laboratory/Community and Regional Resilience Institute.

The program itself was filled with individuals who graciously contributed their time, thought, and expertise to helping the audience truly engage in the resilience conversation. The program would not have been a success without presentations from Richard Reed, Admiral Thad Allen, Natalie Jayroe, Stephen Flynn, Mayor Tom Tait, Debra Ballen, Linda Langston, Assistant Administrator Corey Gruber, Assistant Secretary Patricia Hoffman, Assistant Secretary Nicole Lurie, and Assistant Secretary Kathryn Sullivan. Direct contributions to the plenary session from committee members Susan Cutter, Gerald Galloway, Jr., Ellis Stanley, Sr., and Gene Whitney, as well as

from Richard Bissell, Executive Director of the National Research Council's Policy and Global Affairs Division, and Lauren Alexander Augustine, Director of the Disasters Roundtable and Associate Executive Director in the Division on Earth and Life Studies, were also essential. The success of the morning session was fully assured by the ease with which Miles O'Brien adeptly guided the panel discussion and audience engagement, injecting humor and critical thought to develop a real conversation about the important topic of national resilience.

A large undertaking like the November 30 event could not have occurred at all without the highly professional attention to numerous levels of detail from a National Research Council staff team. These individuals are gratefully acknowledged for their many contributions before, during, and after the event: Camilla Ables, John Brown, Richard-Duane Chambers, Maria Dahlberg, Edward Dunlea, Eric Edkin, Rebecca Fischler, Sherrie Forrest, Courtney Gibbs, Neeraj Gorkhaly, Chanda Ijames, William Kearney, Mark Lange, Claudia Mengelt, and Lauren Rugani.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Academies' Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for quality and objectivity. The review comments and draft manuscript remain confidential to protect the integrity of the process.

We wish to thank the following individuals for their review of this report: Arrietta Chakos, Urban Resilience Strategies; Ana Maria Jones, CARD (Collaborating Agencies Responding to Disasters); Christopher Poland, Degenkolb Engineers; and Gene Whitney, Independent consultant.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the content of the report, nor did they see the final draft before its release. The review of this report was overseen by Mary Clutter, National Science Foundation (Retired). Appointed by the National Academies, she was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the rapporteur and the institution.

Peggy Tsai, *Rapporteur*

Elizabeth Eide, *Study Director*

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Chapter 1

Framing the Conversation

Dr. Richard Bissell, director of the Policy and Global Affairs division at the National Research Council of the National Academies, opened the November 30, 2012 event “Disaster Resilience in America: Launching a National Conversation” by highlighting one of several challenges to increasing the nation’s resilience to disasters. He suggested that difficulties exist in sustaining resilience as a key public policy issue once media attention from disasters such as Superstorm Sandy begins to fade. Bissell offered the November 30 National Resilience Conversation as a first step in helping to establish resilience as a lasting action item for policy makers and the public. The event also served as a way to launch a year-long effort to disseminate the findings and recommendations of the National Academies report, *Disaster Resilience: A National Imperative* (National Academies, 2012), upon which the November 30 event was based. Envisioning the event as an encouragement for starting many additional conversations around disaster resilience, Bissell also outlined some broader long-term goals, such as “inspiring people at all levels of society to envision and enact initiatives to develop a more resilient nation.”

Susan Cutter, chair of the Committee on Increasing National Resilience to Hazards and Disasters that wrote the National Academies (2012) report, continued to frame the conversation by providing the committee’s definition of *resilience* as “the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events” (National Academies, 2012). It is a term increasingly used, she indicated, by local, state, and federal governments, community groups, businesses, and emergency responders to express the need for collective approaches to reduce the large human and economic losses that communities and the country face each year from disasters.

There are several reasons explaining why disaster events are occurring more often, Cutter suggested. More people are moving into areas that are prone to hurricanes, tornadoes, and drought. The U.S. population continues to expand and age, while the infrastructure to support the public is aging beyond its design

limits. Coastal wetlands and other habitats that typically act as natural defenses are shrinking. Extreme weather events are increasing in frequency and, with changing climate conditions, these events might become the “new normal.” As a consequence of these patterns and activities, costs are escalating so that disasters that cost billions of dollars are becoming more common. These developments are also occurring during a time when federal and state budgets are shrinking and resources are constrained from federal through to state, local, and individual levels.

Cutter noted that “disaster resilience is a shared responsibility by civic society, the private sector, government, and all citizens,” and therefore building resilience is also everybody’s business. The committee’s report represents a vision for a resilient nation and outlines the importance of long-term collective approaches, individual and community involvement (for example, individuals serving as first responders), national leadership, accessible risk information, and community action and commitment. Infrastructure investments and upgrades by public and private sectors can accelerate post-disaster recovery, and therefore the public and private sectors will each play a critical role in increasing the nation’s resilience. Cutter addressed several recommendations from the report that outline actions that could be taken at different levels to support greater resilience in the nation’s communities. For example, government support of community-based resilience coalitions, risk management strategies by the public and private sectors, and a national resilience scorecard were identified as actionable recommendations to enhance national resilience.¹ Many of the report’s recommendations formed the basis of the discussions held later that afternoon in a workshop setting.

One goal of the November 30 event was to build upon the committee’s work by initiating a new, meaningful, and continuous conversation about resilience that could be translated into bold actions and long-term thinking for increasing the nation’s ability to quickly recover from disasters. The presentations and consequent dialogues provide a basis for such conversations, and Chapter 2 attempts to capture the salient issues raised by presenters and participants in the morning session.

REFERENCE

National Academies. 2012. *Disaster Resilience: A National Imperative*. Washington, DC: The National Academies Press

¹ In the National Academies report *Disaster Resilience: A National Imperative* (2012), the committee provides six recommendations to help direct the nation in advancing resilience efforts.

Chapter 2

Resilience as a Complex National Endeavor

Two keynote addresses were provided by Richard Reed, the Deputy Assistant to the President for Homeland Security at the White House, and Admiral Thad Allen, Senior Vice President at Booz Allen Hamilton and former Commandant of the U.S. Coast Guard. Three panel discussions followed the keynote addresses: the first addressed the topic of developing a culture of resilience, the second built upon the first and addressed how to translate the concept of resilience into action, and the third panel provided federal agency perspectives about resilience in light of Superstorm Sandy which occurred just one month prior to the November 30, 2012 event. Miles O'Brien, science correspondent for the PBS NewsHour, moderated the three panel discussions including questions from the audience. Biographical sketches for the keynote speakers, panelists, and moderator are provided in Appendix B, while a list of audience participants is provided in Appendix C.

KEYNOTE ADDRESSES

Resilience as a National Imperative

Richard Reed opened his keynote address with the question: How do we foster and enhance disaster resilience? He suggested that the November 30 event is the type of national conversation that needs to take place, in part because the key to enhancing resilience in our nation will not be a one-size-fits-all plan for all communities. Resilience will need to move beyond being seen as a federal endeavor, Reed noted, and become a national endeavor that involves individuals, families, communities, nonprofit sectors, academia, and all levels of government. Reed defined resilience as the ability to withstand challenges, adapt rapidly to changing conditions, and recover rapidly from adverse events, and indicated that developing and sustaining this culture of resilience over time will require that resilience really becomes a national imperative (Figure 2-1).



FIGURE 2-1. Richard Reed provides the audience with some keys to enhancing disaster resilience in the United States. Photo credit: Neeraj Gorkhaly

The nature of the impacts of disasters is changing in our country as are the ways in which we respond to them. Reed noted that Superstorm Sandy was an example of a well-orchestrated and aggressive response effort at all levels. Nearly a month after the storm struck, the situation had progressed from one of emergency response to a long-term recovery effort. He cited other examples of the changing nature of the impacts of disasters by referring to the year 2011 which was itself a record-breaking year with nearly 100 presidentially declared disasters. Fourteen of those events exceeded \$1 billion each. The cost implications are significant, he said, when comparing the large cost of responding to disasters relative to what can be lower, front-end costs of investing in disaster mitigation and building resilience.

President Obama signed a presidential policy directive (PPD) on national preparedness (Box 2-1) which outlines his vision for strengthening the security and resilience of our country through systematic preparation against various kinds of threats, such as pandemics, terrorist attacks, and natural disasters.

BOX 2-1**Presidential Policy Directive 8 (PPD-8): National Preparedness**

This directive aims to strengthen the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the nation. PPD-8 outlines preparedness as a shared responsibility among all levels of government, the private and nonprofit sectors, and individuals. In addition to drawing together the collective capacities and activities of the federal government in building preparedness, the directive takes an integrated, “all-of-nation,” capabilities-based approach. The directive goes on to outline the need for direct federal engagement in developing a National Preparedness Goal, in outlining key capabilities needed to build and sustain disaster resilience, and in determining whether those investments in preparedness and building resilience are correctly targeted. The directive also sets forth the need for clearly defined and understood roles and responsibilities in developing national preparedness among the various agencies of the federal government.

SOURCE: <http://www.dhs.gov/presidential-policy-directive-8-national-preparedness>

Reed indicated that the Executive Branch of the government expects that responses to national disasters will be through comprehensive, aggressive, and well-coordinated approaches. This is elaborated in the three main principles of PPD-8: creating an all-nation response, building key capabilities to build and sustain resilience, and determining whether those investments are correctly targeted. The all-nation response is aimed at enhancing integration across all levels of government (federal, state, local, tribal) and all stakeholder groups (non-profit, private sector, individuals, families, communities) to produce closer collaboration and better coordination for prevention, preparedness, response, recovery, and mitigation. The goal is to incorporate national resilience as an organizing principle in which first responders during a disaster are family, neighbors, and community members who assist one another.

The second concept in the policy directive of building key capabilities to confront any challenges is akin to having a toolbox of capabilities that can be placed in different configurations to solve different problems. Reed described this toolbox by using the analogy of Lego[®] pieces (Box 2-2). The speaker emphasized the importance of having a set of common, simple capabilities that could be adapted by anyone to a particular disaster situation.

BOX 2-2**Adaptable and Interchangeable Disaster Capabilities: The Lego® Analogy**

Key capabilities in responding to a disaster can be envisioned in the same way that a person might approach a box of Legos®, Reed suggested. For example, a box of Legos® might be used to create a dinosaur by one person; using those same pieces, another person could build a truck. In taking this analogy to a modern case, Reed discussed the emergency landing of US Airways Flight 1549 in the Hudson River in January 2009. Upon takeoff from LaGuardia airport, the plane struck a flock of geese, and the plane lost power. The pilot could not reach any nearby airports and had to ditch the plane in the Hudson River. The skill exhibited by the pilot in the landing and the effectiveness of the crew in fulfilling their responsibilities were evidenced by the fact that all 155 occupants of the airplane evacuated safely onto the plane wings on the water. However, Reed noted, there were no plans in existence for exactly how to rescue all of those people from the wings of a plane in the middle of the river. Nonetheless, the core capabilities for that rescue existed and were swiftly implemented by local authorities and local boat pilots so that a potentially catastrophic event turned into a completely successful rescue effort with no loss of life.

Additional sources: NTSB (2010).

The third principle refers to determining whether and how key investments in prevention, protection, response, recovery, and mitigation are appropriately targeted. This last principle has been a challenge, and Reed posed the following questions: How do we know our efforts have been effective and that we are better prepared today? What assessments are needed to determine whether we have been effective? He emphasized that a challenge lies in being able to effectively use resources, to think in creative ways and not be constrained by previous thinking and approaches, and to leverage inherent resources including those in the nonprofit realm. An example is the Gulf of Mexico oil spill, where capabilities were leveraged from the oil industry, federal government, academic community, nongovernmental organizations, and others to generate a solution. The public plays a crucial role in enhancing and shaping our national resilience, and Reed noted that a goal is to empower the American people so they are informed of risks and actions to take. One challenge will be in making the most effective use of resources, which are constrained; however, our thinking need not be constrained and we can be innovative and creative, he said.

Strategic Intent at the National Level

Admiral Thad Allen began his keynote remarks by underscoring the important foundation laid by the National Academies (2012) report and by commending those involved in initiating and continuing these conversations. He drew upon his experiences in leading the federal disaster response efforts to Hurricane Katrina and the Gulf of Mexico oil spill to inform his remarks. He echoed Reed's point that the scale and scope of recent disasters have dwarfed those of past events, and he continued by highlighting a new reality: the nation is facing increasing levels of complexity and uncertainty with disasters. Allen mentioned that some of the root causes that contribute to greater complexity and uncertainty include, for example, interactions between the natural and human built environment, increasing population density, aging infrastructure, and changing environments and climates. In solving today's complex problems, Allen stated that no single entity—not the federal government, private sector firms, or nonprofit or voluntary organizations—has the scale, resources, competency, and authority necessary to bring about those solutions. Therefore, it is even more important for stakeholders at all levels to understand the critical role they will play in building a more resilient nation (Figure 2-2).



FIGURE 2-2 Admiral Thad Allen highlighted the importance of understanding the various roles and responsibilities of different stakeholders in supporting steps toward greater resilience. Photo credit: Neeraj Gorkhaly

Allen stressed two key aspects of resilience: strategic intent and reconciling opportunity and competency. Acting with strategic intent at all levels is necessary, Allen noted, because decisions made at the national level and in

individual homes can turn into actions that reverberate throughout communities. At the national level, Allen stated that the government has a “responsibility to act with strategic intent,” yet there are limitations to what the government is capable of doing based on authorization, appropriations, and policies. At the community level, there is responsibility to make these issues relevant for people and their families every day; and at the local and regional levels, there is a responsibility to develop collaborations and cooperative networks. Allen noted the importance of treating people like family and relating to them with values they can understand. At the local level, this kind of understanding needs to exist among family members, neighbors, and the community. Allen stated that in the end, “everybody has to understand that there is something in it for them.”

Allen echoed Reed’s Lego[®] analogy and suggested that another key aspect of resilience is the ability to reconcile opportunity and competency. A roadmap will not always be available when a problem arises, especially problems that are unpredictable and increasingly complex. However, precursors can create an opportunity to put competencies in place prior to an event. If an event should occur, various actors could then be more responsive and engage in adaptive and rapid learning. Allen cited the efforts of C. J. Huff, Superintendent of the Joplin School District, in investing in his community and creating those networks prior to the 2011 Joplin tornado as critical to the community’s rebuilding efforts and resilience after the tornado (Box 2-3). Allen’s greatest challenge in responding to both Hurricane Katrina and the Gulf of Mexico oil spill was creating a unity of efforts. Though unified efforts were critical, Allen noted that unity of effort needs to be preceded by a unity of thinking: of developing a culture of resilience within the community so that people are focused on key elements of resilience before an event occurs.

BOX 2-3

Community-based Resilience Efforts with the Joplin Tornado

Admiral Thad Allen described how the community-building efforts of C. J. Huff were vital in establishing a culture of resilience in the Joplin, Missouri community. C. J. Huff accepted the Superintendent position at the Joplin School District with the sole goal of reducing the dropout rate. In carrying out his plan to reduce the dropout rate, Huff established networks within the community and with families and students. By forming coalitions with the local community, raising money, and involving the private sector, Huff succeeded in dramatically reducing the dropout rate. As a result of these efforts, Huff also unknowingly enabled the community to establish trusted relationships, collaborations, and networks.

An EF5 tornado touched down in Joplin, Missouri on May 22, 2011 and resulted in loss of life and catastrophic damage. Even though the tornado destroyed the high school and parts of Joplin, it did not devastate their

community; Huff was even able to meet payroll the day following the tornado, to start the school year the following semester in a mall, and put a football team on the field even though they lacked formal facilities.

Social equity concerns can be even more apparent in the midst of disaster response efforts. Some at-risk populations may lack the ability to take part in their own recovery and response because of preexisting conditions (for example, low-income areas). Although the event does not create preexisting conditions, those conditions may be exacerbated by the event. Allen likened resilience at the community level to the human immune system: those who get sick and have a weaker immune system will not fare as well as those with a robust immune system.

PANEL DISCUSSIONS

Developing a Culture of Resilience

The first panel addressed the issue of developing a culture of resilience. Panelists included Natalie Jayroe of Second Harvest Food Bank, Stephen Flynn of the Kostas Research Institute for Homeland Security at Northeastern University, Gerald Galloway, Jr. of the University of Maryland, and Tom Tait, Mayor of Anaheim, California. The panel was moderated by Miles O'Brien.

O'Brien began the discussion by asking the question: How do you define resilience? Jayroe responded by stating that resilience in a community is defined by both tangible and intangible aspects. Some of the tangibles might include the communications that are needed between government, the private sector, and non-profits and all of the pre- and post-event planning that needs to take place. However, the first aspect of a resilient community is that it is a healthy community. Jayroe went on to indicate that "health" includes not only physical or mental health, but also the assurance that people in the community have assets, the ability to thrive, and a robust infrastructure. In discussing the intangible aspects of resilience, the story of New Orleans came to her mind. Jayroe indicated that the community there is one of will, passion, love, and a desire to rebuild and become stronger than before. These intangibles became very important for the community to rebuild after Katrina when faced with deficiencies in some of the tangible areas.

Stephen Flynn suggested that resilience is the capacity to respond to and confront adversity, and overcome it. He cited the American spirit: how pilgrims and ancestors took risks and were resilient. Flynn continued by characterizing resilience as including a continuity of critical services, functions, and values; as people having the ability to manage risk as a baseline; and as the ability to embrace challenges.

A question was posed to Mayor Tait as to whether politicians are disconnected from the concept of resilience. In response, Tait mentioned that politicians want to serve people, and that in Anaheim, those people are viewed as citizens rather than customers. Viewing people in that way, he indicated, empowers the individual with his or her responsibility to and in the community. This approach translates, Tait said, to knowing your neighbor and being able to help your neighbor if a disaster occurs. Tait also viewed kindness as another word for resilience, and suggested that people's kindness toward one another can function as a core value of a community. The campaign of kindness was a platform on which he ran his successful campaign for mayor. He indicated that people respond positively to kindness and that it involves not just being nice to others, but also the acts of doing something for others and for the community. Jayroe agreed that the terms resilience and kindness could be synonymous.

O'Brien asked about the issue of risk and where that belongs in the discussion about resilience (Figure 2-3). Flynn noted that culturally, people have come to expect that we can become a society that is nearly risk-free if we apply enough power and intellect to the issue. He suggested that an important step is needed to change the conversation and to develop a more resilient society, and that will occur when political leaders help the public understand and acknowledge that risk exists and that being resilient relates to our ability to deal with that existing risk. Galloway noted that we live in a world where bad news is unwelcome. Yet we need leaders who want to be informed about risks and our exposure to adverse events, and to be prepared to present risk to the American people. He suggested that people may be willing to respond once they understand the risk and are informed about what to do. The derecho that struck a section of the East Coast of the United States in the summer of 2012, Galloway said, provided an impetus for leaders to prepare for the future, and consequently, those leaders were more prepared for Superstorm Sandy. Jayroe said that we need to bring down the barriers between the various levels of government in working together, and specifically noted that the federal level is typically more risk averse.

The next question posed by O'Brien delved into how best to foster resilience. Flynn mentioned that resilience requires incentives to overcome barriers and passive expectations that recipients typically have during a disaster. For example, electricians could play a critical role in restoring services during widespread power outages, yet because of liability issues, there is a barrier to their involvement to help with efforts to ensure continuity of function. This kind of barrier to involvement is in contrast to defibrillators that are placed in common areas for anyone to use and assist in a medical emergency, Flynn said.



FIGURE 2-3 Miles O’Brien (far right), who moderated the panel discussions, poses a question to the first panel group comprising from left to right, Natalie Jayroe, Stephen Flynn, Gerald Galloway, Jr., and Mayor Tom Tait. Photo credit: Neeraj Gorkhaly

O’Brien asked Tait about New Jersey Governor Chris Christie’s criticisms of New Jersey mayors who ignored his evacuation orders. Tait, in attempting to explain it from a public servant’s point of view, said that politicians have a desire to serve. Part of the desire to serve is to treat people well, but there needs to be a change in culture from one where people see the role of government as their caretakers to a culture where individuals focus on preparedness and responsibility. Mayor Tait mentioned the important role of political leaders in having the courage to use common sense and be kind. A city can either help or hinder in bringing a community together. Jayroe further noted how important it is to understand demographics and data in order to respond appropriately to the needs of a community.

An audience participant asked how social media is transforming how people have a voice in the culture of resilience. In harnessing the power of social media, Mayor Tait mentioned that the city of Anaheim is using Next Door to connect people together and to be better prepared. Flynn mentioned that one key barrier is that the “professionals” are slow to use social media because it does not follow traditional principles and protocols of crisis management. However, Flynn pointed out that even though social media is self-organizing and self-mobilizing, it is also self-correcting and it self-corrects more quickly than most official channels. Flynn mentioned that people want to quickly assess and organize efforts to respond. Social media allows a message to be quickly pushed within a network, and then those networks can interact with other networks.

Personal networks are where the people are. Jayroe stated that nonprofit organizations and grassroots-oriented and community groups can play an important role with social media and communications in funneling information to relevant decisionmakers.

A member of the audience posed the question of whether this national dialogue on developing a culture of resilience is being informed by international discourse on issues such as disaster risk reduction and climate change and adaptation. Galloway mentioned that even though it was not the focus of the committee's report, the committee was informed about international efforts (for example, the United Nations International Strategy on Disaster Reduction²). The committee chose to focus their resilience efforts on the United States because there were enough issues to consider just within this country. However, Galloway mentioned that we could benefit by learning from examples overseas, as issues faced by other countries could be informative for us. For example, learning how information about the tsunami was propagated in Cambodia by social media and how villages responded might be helpful for propagating emergency information and response in this country. Flynn mentioned that his institute at Northeastern University is creating an international resilience research network to connect research institutes and universities working on resilience across the world.

O'Brien raised the topic of socioeconomic issues and whether they are a factor in resilience. He asked whether a correlation exists between economic wealth and resilience, how much of the correlation is a function of infrastructure, and whether infrastructure capacity is crumbling and unable to support society. In responding to those questions, Flynn said that there are economic constraints in advancing individual resilience (for example, individuals with their own backup generators are more resilient during power outages), but we operate in a community (for example, backup generators operate using gas and gas stations serve a wide range of people). Flynn pointed out that we are not stepping up as a society to maintain infrastructure, and the disadvantaged tend to live in the most structurally vulnerable areas, which is not to say that lower-income people are individually less resilient. However, Flynn continued, the country needs healthy communities that are functional on a day-to-day basis so that extreme events can be handled well. Tait mentioned that it is important for people in a community to know each other so that they can take care of each other. With a city like Anaheim where 350,000 people live and there is suburban sprawl, building resilience has been challenging.

A member of the audience raised the question of whether the nation exhibits a culture of denial, meaning that people may find it easier not to confront

² The United Nations International Strategy on Disaster Reduction was adopted by the United Nations in December 1999 to coordinate disaster risk reduction and to implement an international blueprint for disaster risk reduction. For more information, see <http://www.unisdr.org/>.

a problem, and how that kind of culture fits in with efforts to increase accountability and resilience. Tait agreed that the packaging of the message is important; for example, the use of positive messages motivates people more than the message of doom. A culture of denial may exist, he said, in that people often do not believe that the worst situation is a possibility.

On the issue of holding communities and policymakers more accountable, Tait mentioned that accountability and kindness are not mutually exclusive, but are one in the same, citing the example of how a kind parent does not allow his or her child to run amok. Jayroe offered the idea that once people feel included as part of the process, they can more easily be held accountable. Flynn stated that the purpose of such accountability is to restore a critical function of society (for example, the ability to go back to school after a disaster). Galloway viewed resilience as being founded on trust and kindness. All four panelists agreed upon the need to establish and institutionalize relationships within a community and among people before a disaster, as these pre-existing relationships make it easier for all to identify and acknowledge their roles and responsibilities during and after a disaster event.

The Reality of Resilience: From Vision to Action

The second panel addressed how resilience could translate from vision to action and become a reality. Panelists included Debra Ballen of the Insurance Institute for Business and Home Safety, Linda Langston of the National Association of Counties, and Ellis Stanley, Sr. of Hammerman & Gainer International, Inc. Miles O'Brien also moderated this panel.

The first question posed by O'Brien to Ballen was about structural integrity and resilience. Ballen cited the importance of having resilience built into our structures—with the development and legislation of building codes—and the importance of science and the need for scientific accuracy in supporting the need to enhance structural integrity. Ballen also noted the tension with interested parties who want to live in risk-prone areas but who are unwilling to pay the corresponding value of insurance premiums for that risk. For example, with repeat flooding comes serious repetitive loss, which raises a concern politically of what happens when there is a denial of flood insurance because certain areas have flooded too many times.

As with the first panel, the theme of building relationships and trust emerged throughout this panel discussion. Ballen called on the importance of scientific accuracy and the need to trust the science behind decisions. Langston mentioned the significance of building relationships and trust before the disaster, as it will be important to be able to draw upon that trust in the immediacy of the critical event. Resilience is a community endeavor on all levels (local, regional, state, and federal), she continued, but elected officials do not always build those

necessary relationships (for example, to participate in drills) although these public officials will need to become the face of the community when disaster strikes. Resilience efforts, Langston said, have to be driven by the local community. Stanley emphasized the importance of listening, and of getting elected officials at the table and having them listen to the community because many of the solutions already exist in the community. Everyone has a role and responsibility in the issue of resilience, and there are roles for everyone at all levels of experience (Figure 2-4).



FIGURE 2-4 Linda Langston (second from left) addressed a question from Miles O’Brien (far right), as Debra Ballen (far left) and Ellis Stanley, Sr. (second from right) were poised to provide their own responses. Photo credit: Neeraj Gorkhaly

Another theme that emerged from the panel discussion was the importance of communication. Ballen mentioned a communication problem in framing risk. The panel concurred that risk is typically described in mathematical probabilities, which do not translate well with the public. Stanley raised the issue of social media serving as useful tools to communicate and build networks prior to an incident so that an audience already exists for receiving information and taking action when an event occurs. Langston emphasized how the use of language matters in these discussions, and that the language has to be consistent and to reflect core values.

Climate change was a topic that was also broached. Ballen mentioned that although we as a society are not fully prepared for climate change today, Superstorm Sandy reinforced that future climate scenarios will need to consider the issue of climate change. Langston noted that we would be conducting a

disservice if we do not discuss these issues, because these kinds of events now appear to be “the new normal.” She added that it will be important to engage people in these conversations so that they will be comfortable talking about these issues and making decisions based upon available resources.

The regionalization of disaster response and recovery was another important topic raised in the course of panel discussion. Langston discussed the challenge of authority and jurisdiction of federal and state authorities over a disaster. Stanley cited the importance of communicating across multiple levels (from neighborhood councils to elected officials) to empower people to action. He furthermore suggested an idea of a “resilience manager” and instituting this role for emergency managers or their equivalents in communities.

Federal Perspectives on Resilience in Light of Superstorm Sandy

This third and last panel, comprising high-level officials in four federal agencies, addressed resilience as it related to Superstorm Sandy. Panelists included Assistant Administrator Corey Gruber of the Federal Emergency Management Agency (FEMA), Assistant Secretary Patricia Hoffman of the Department of Energy, Assistant Secretary Nicole Lurie of the Department of Health and Human Services (HHS), and Assistant Secretary Kathryn Sullivan of the National Oceanic and Atmospheric Administration (NOAA). Miles O’Brien moderated this panel.

O’Brien opened the discussion by asking what each agency learned about its capabilities—what was good and what was “not so good”—through handling Superstorm Sandy (Figure 2-5). Gruber responded that a robust response was critical and that included all of the capacity across the federal government, as well as state and local governments, to mount a response to such an event. Gruber also indicated the importance, for agencies such as FEMA to continue to take into account the fact the people affected by a disaster are reacting to great stresses in a complex environment. Managing expectations becomes a key for agencies in these situations. From the perspective of the energy infrastructure in the affected area, Hoffman indicated that careful examination of the interdependencies between the energy system and the electric grid is important, particularly as the nation continues to address more events such as Sandy. Although work has been ongoing to modernize the electric grid in the country, Hoffman said, building resilience into the energy infrastructure also means incorporating an understanding of where telecommunications, homes, and other infrastructure are also being built and optimizing how these pieces of the network interact. The Department of Energy is examining the current infrastructure and looking at building them better in the future through, for example, better sensors on power systems to determine when and how power, or emergency power, can safely be synchronized and restored.



FIGURE 2-5 Miles O’Brien (far right) poses a question to the third panel. From left: Assistant Administrator Corey Gruber (FEMA), Assistant Secretary Patricia Sullivan (Department of Energy), Assistant Secretary Nicole Lurie (Department of Health and Human Services), and Assistant Secretary Kathryn Sullivan (National Oceanic and Atmospheric Administration). Photo credit: Neeraj Gorkhaly

Lurie emphasized the importance of knowing people’s needs and identifying vulnerable people (for example, those with disabilities or special needs) in advance of a disaster. This comment led to the importance of social connectedness to provide “lifelines” for those who need special assistance during a disaster event. Lurie said that the team of about 1200 people that the DHHS and other members of the national disaster medical system sent to assist in the area immediately after Sandy found that many people had helped their neighbors in need. A key in such circumstances is to have a layered approach, with a combination of individuals, neighbors, bystanders, government officials, and volunteers who are all part of the response, she said.

Sullivan mentioned that NOAA was spot-on for their forecast of Superstorm Sandy, which was due to many lessons learned from the severe weather events of 2011 and other years. Good communication of complex information to the public was a theme she emphasized. Effective communication involves not only explaining what the forecast means to others so that the public can act and respond appropriately, Sullivan stressed, but also having good relationships with stakeholders in the warning chain such as emergency managers, elected officials, TV broadcasters, nonprofit organizations, and others. Using the right kind of language is critical—for example, shampoo companies do

not sell shampoo by showing images of bad hair, but instead show images of who consumers want to be and provide an image of the benefits that would attract them to that brand of shampoo. Similarly, frightening people with regard to their vulnerability to disasters is not a good approach; rather, community leaders can help build the positive relationships in a community to help citizens understand and know what they will look like as a resilient community—one that is able to respond positively to an event and the good that resilience can do for a community every day. Hurricane Irene was a great example of communicating timely information using vivid and dramatic language that the public can understand. The panelists highlighted how help could be provided through a combination of social connections and better technologies.

When asked about the role of science in resilience, Gruber said that the Department of Homeland Security currently uses a threat and hazard identification and risk assessment process that can be shared with communities across the country, and the FEMA mitigation review is being issued soon. Lurie mentioned that the public health side conducts a lot of surveillance, and the principles of surveillance can be applied to social media as information is being gathered. Improving the response time for science information during and after an event is also a focus of HHS, whose vision includes trying to use science more effectively to influence the recovery from an event. As for the science response, Hoffman indicated that information and analytics are critical to make the right decisions at the right time. For example, when restoring electricity, it is important to communicate that it will take 5 days to restore power so people can plan for health needs. In the event of cascading failures over a long period of time, new sensors and capabilities are needed to modernize our infrastructure. In a related dialogue, Sullivan indicated real concern over the aging satellite infrastructure that currently provides environmental intelligence and data in advance of extreme weather events for the United States.

For the issue of pandemics, Lurie mentioned that the question goes back to capabilities: the same set of capabilities is needed to respond to a disaster, whether it is H1N1, a bioterror event, cyber attack, or flood. This approach is based on the principle that you can mix and match existing capabilities with 80/20: if 80 percent of what is needed is in place, then you can figure out the other 20 percent. There is still a need for public communication, situation awareness, and mitigation, but how these are conducted differs by the type of event.

O'Brien's last question to the panel was about what each agency needs from Congress. Gruber mentioned that Congress is already actively involved with the work FEMA is conducting, and the FEMA Administrator has been using a "maximum of maximums," which refers to scenarios at their peaks to determine potential consequences. Hoffman stressed the importance of developing a culture of resilience, and that Superstorm Sandy was the first time that utility workers were considered first responders. All panelists agreed that

cooperation and communication are needed at all levels, from the community to the interagency levels of the federal government.

SYNOPSIS OF THE MORNING SESSION

At the end of the public session, Gene Whitney, a member of the committee, provided a summary of the morning's keynote addresses and panel discussion (Figure 2-6). Whitney noted that the concept of resilience is quite complex, and it became evident as the morning session progressed that the term "resilience" can be "squishy" and not concrete, yet a lot of emphasis was placed on response and recovery. A better understanding is needed of what resilience means as a characteristic of our communities, he said, and building resilience before a disaster occurs is of great importance. The event itself reveals whether or not you are resilient. Questions remain as to what actions are required to build resilience in communities, he indicated.



FIGURE 2-6 Gene Whitney provides a summary of the discussions from the morning's plenary session. Photo credit: Neeraj Gorkhaly

From the keynote addresses and panel discussions, Whitney identified both good and bad news. The bad news is that losses from disasters are increasing and likely to get worse. Many citizens are in denial and believe that

addressing disasters is a job for professionals. Communities in vulnerable places continue to rebuild in these same places because people want their homes and communities as they were before a disaster. At the same time, people do not like being told what to do, and thereby can create conflicts in implementation of resilience-building actions. The good news is that awareness of and leadership in resilience across the country is evident. Local leaders are being educated about disaster resilience, and they are building trust in advance with citizens. All decisions in communities, Whitney emphasized, can and need to be guided by resilience.

Whitney mentioned that leadership is needed at all levels, within and outside of government, to build resilience. He also underscored the need for a national vision for resilience, including short- and long-term goals toward which the nation, at the community level, can work to increase our resilience.

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Chapter 3

A National Vision for Resilience: Next Steps

INTRODUCTION

Format of Afternoon Breakout Sessions

The afternoon was set aside for breakout sessions that focused on steps toward building a more resilient nation, and more specifically around how to measure resilience progress and manage risk in our communities. Three of the committee's recommendations from the National Academies report *Disaster Resilience: A National Imperative* (National Academies, 2012) provided the basis for the four workshop breakout sessions: (1) measuring progress through scorecard development; (2) national resilience scorecard implementation; (3) managing risk in communities; (4) and supporting and developing community coalitions (Box 3-1). Participants were provided with a list of questions that would be used to guide the discussions for each of these breakout sessions (see Appendix C for a list of participants and Appendix D for a list of questions).

BOX 3-1

Breakout Session Topics Based on the Committee's Report Recommendations

Risk Management and Reduction

Recommendation 2: The public and private sectors in a community should work cooperatively to encourage commitment to and investment in a risk management strategy that includes complementary structural and nonstructural risk-reduction and risk-spreading measures or tools.

National Resilience Scorecard*

Recommendation 4: The Department of Homeland Security in conjunction with other federal agencies, state and local partners, and professional groups should develop a National Resilience Scorecard.

Support and Establish Community Coalitions

Recommendation 5: Federal, state, and local governments should support the creation and maintenance of broad-based community resilience coalitions at local and regional levels.

*Note that for the purpose of the afternoon workshop, the committee's scorecard recommendation was split into two different breakout sessions: one that addressed scorecard development and one that addressed scorecard implementation.

Approximately 60 attendees were invited to participate in the afternoon breakout sessions based on their expertise, experience, and perspectives. Each participant was placed in a group that rotated through three of the four topics (see Appendix A for afternoon workshop agenda), and each of the topic areas was moderated and recorded by National Research Council staff members. At the conclusion of the afternoon breakout sessions, a plenary session with all participants was held. Staff members reported back to the entire group on the main points from the breakout discussions on the four topics. This chapter summarizes discussions from the breakout and plenary sessions.

NATIONAL RESILIENCE SCORECARD

The committee's report called for the need to develop indicators to measure progress toward increasing resilience in communities and for such a basis of measurement to be initiated at a national level through a mechanism called a "national resilience scorecard." The committee envisioned that such a scorecard would identify areas that merit priority, provide a baseline from which to measure change, and offer a systematic approach for measuring progress in building resilient communities (National Academies, 2012). The report recommendation identified the process of developing a scorecard as one that would involve engagement by all levels of government (federal, state, local), the private sector, and community groups and individuals. In addressing a national resilience scorecard, the afternoon workshop held two separate discussion breakout groups: one that focused on issues for developing a scorecard, and another that focused on issues for implementing a scorecard (see also Box 3-1).

Scorecard Development

The initial questions about scorecard development that the participants were asked to consider revolved around scorecard content and structure, scorecard application and process, and ensuring scorecard development both in the short and long term. During the discussions, additional questions emerged surrounding the issue of how the scorecard would be used and whether it would be used to compare communities, identify problems, or measure the resilience of a given community. Participants initially spent time discussing an overall vision for a national scorecard, what it would measure, and whether it might be a “catch-all”, to address as many factors as possible, or might be specifically tailored to a few factors relevant to resilience in a particular community.

General Considerations for Scorecard Development

In discussing how to develop a national resilience scorecard, several key considerations were raised by participants. These considerations included (1) identifying the purpose of the scorecard and how it will be used; (2) obtaining community buy-in; (3) ensuring the availability of data; and (4) establishing possible incentives for implementing and using the scorecard.

Several participants also noted the importance of having a scorecard developed for and by the community, and not developed solely by federal or state governments. The discussions emphasized that a “national” scorecard could serve as a template from which communities could refine and establish scorecards relevant to local risks and circumstances. Community buy-in to develop and use a scorecard would be based on clear identification of and agreement upon the purpose of the scorecard.

In reflecting on how the scorecard could be developed, many participants stressed the importance of creating a scorecard around information that is already available in order to tap into existing data and resources. A two-way system of reporting was identified as being of significance in a scorecard; for example, by sharing information between the federal and community levels, information gaps at the community level could be filled by federal officials who may have such information. Similarly, information gaps at the federal level about local circumstances could be filled by community members who may have that information.

In discussing potential incentives for communities to develop and implement a scorecard, a number of workshop participants mentioned that countries around the world are periodically rated and given an index of competitiveness. Resilience could similarly be proposed and described as a positive aspect of a community that could make the community stronger and more attractive, for example, to private sector investment. They also noted the importance of private sector involvement in scorecard development.

Scorecard Content and Structure

Workshop attendees identified several elements, categories, and metrics to consider in a national resilience scorecard. Some thought that a national scorecard would need to be applicable across multiple types of hazards and disasters. Others noted that a national scorecard containing too many elements could be too cumbersome to implement; one participant suggested that the scorecard initially contain a maximum of 12 elements. Most participants observed that the final number of elements in a scorecard adapted for a specific community would need to reflect the values of the community so that it could serve as a useful self-assessment tool. Participants considered the following elements for measuring resilience:

- Social and civic engagement (such as voter registration and neighborhood watches)
- Community engagement (such as blood donors)
- Preparedness committees
- Community networks
- Timeframe for return (period of time in which the community returns to normal levels of operation after a disaster)
- Flexibility
- Financial fabric of a community

Participants discussed the importance of social engagement and connectedness. Those kinds of measures are reflected above in the first five bullets with the development of “community networks” potentially serving as an overarching feature that can strengthen a community. Community networks, some participants suggested, may also allow communities to connect with one another, providing opportunities to learn from the experiences of others. “Timeframe for return” highlights the significance of a community’s ability to return to their businesses, schools, and homes in a timely manner after a disaster. The ability to adapt and be flexible after an adverse event is an important element to consider in measuring resilience.

The strength of a community’s financial fabric is a factor in determining how quickly the community can recover and regain its footing after a disaster, many participants noted, and would be a critical factor to include on a scorecard. In ascertaining the financial health of a community, they raised an idea that is commonly used in the banking industry: conducting a “stress test” in which various scenarios and stressors can be used to determine how a community could respond post-disaster. Such a stress test could help to identify weak areas that need improvement. A stress test could also be conducted for preparedness and response so that local responders (such as police and fire departments) could be included in determining the resilience of a community. For example, the International City/County Management Association has assessments of this

nature underway, and it was suggested by workshop participants that these types of assessments could be a model for emergency management issues as part of building community resilience.

After discussing the potential content of and the measures applied to a national resilience scorecard, workshop participants addressed the need for scorecard content and measures to be carefully chosen. The incentive structures put in place can also encourage actions to increase resilience. One incentive structure proposed by a few participants was the concept of an accreditation process which would determine how communities measure up to certain requirements. For example, communities accredited as more socially engaged could receive a higher accreditation score, and those communities could be then have greater incentive to use the score to attract potential businesses and home buyers. The LEED certification process was raised in the committee's report (see Box 4-1 in National Academies, 2012) and noted by some participants as a potential model for developing a way to measure or rate resilience in a community.

Scorecard Implementation

Many participants stressed the importance of synergistic opportunities to maximize efficiency and effectiveness, and how developing and implementing a national resilience scorecard will require balancing complexity with simplicity. Developing a scorecard, they noted, is not about reinventing the wheel, but being able to use existing conduits, frameworks, and systems, and being able to involve the community through conversations about the scorecard and how it will be used. To ensure that the scorecard is implemented consistently across communities and across various levels, the language used in the scorecard will need to be simple, understandable, and meaningful. In continuing with the example of using a maximum of 12 elements for the scorecard, several participants noted that it would be helpful to break the elements into smaller groups (for example, examining four elements at a time) so that the scorecard would have a better chance of being implemented through gradual employment of specific elements. Also, gradually rolling out a group of elements and adding those to the scorecard after a period of time would allow baselines to be established and aid in making future adjustments.

Engaging Stakeholders and Actors

Scorecard implementation will require advanced planning, methodical execution, and involvement from relevant actors and stakeholders at all levels, including those at the local, state, and federal levels as well as private and nonprofit institutions, some participants said. Community involvement will be

essential for implementing a scorecard, and therefore it will be critical for many efforts to be focused at the local level. One participant suggested that lessons could be learned from examining how communities self-organize, and to mimic principles gleaned from community engagement strategies. For example, local chambers of commerce can provide critical insights into various aspects of their communities.

Workshop attendees noted that the federal government would be instrumental in implementing the scorecard. One role of the federal government would be to set a research agenda, sponsor such research, and determine qualified research grant recipients to carry out the research. The federal government also serves an important role in generating and validating research data. Both the Federal Emergency Management Agency (FEMA) and the Centers for Disease Control and Prevention (CDC) have provided monetary contributions for measuring resilience. One participant mentioned that FEMA has generated a 2012 National Preparedness Report (see <http://www.fema.gov/library/viewRecord.do?id=5914>), which includes a systematic matrix of data being collected that may be related to resilience. Another example was cited in which the U.S. Department of Health and Human Services (HHS) has provided hospital grants for preparedness. The question was raised as to whether or not an interagency mechanism exists to engage multiple federal agencies on resilience issues to increase coordination, cooperation, data sharing, and transparency.

Outreach to the private sector and nonprofit institutions is essential, some participants emphasized, to help nurture potential partner relationships for developing the scorecard and to establish conduits for resilience information. Some examples of nonprofit institutions that could be partners include: the Council of Foundations, the United Way, the National Emergency Management Association, International Association of Emergency Managers, the National Volunteer Organizations Active in Disaster, and the Federal Alliance for Safe Homes (FLASH) Coalition. One participant mentioned the National Mass Care Strategy as a possible approach for incorporating stakeholder input to identify and establish goals and strategies that meet the needs of their communities. Furthermore, the most effective incentives for a community to become more resilient will not come from the government, many attendees said, but from other actors such as insurance companies and the banking industry.

Short- and Long-Term Implementation

Implementing a resilience scorecard will require consideration of tasks for both the short and long term. Several workshop participants mentioned that implementation will require integration with other existing data networks. For example, agencies that meet biannually to coordinate resilience data—such as

HHS, FEMA, and the Environmental Protection Agency—might be one existing node of such a data network.

In rolling out a scorecard, a number of workshop participants suggested that a beta test with 5, 10, or even 20 cities or counties would allow various concepts (such as determining the level of community engagement) to be tested. A beta test would allow scorecard developers to evaluate certain elements of the scorecard, identify potential gaps and how they could be addressed, and further refine future iterations of the scorecard.

As previously mentioned, increased resilience can be an important selling point for a community and could be a valuable marketing and promotional tool for a community that has overcome particular hardships (for example, a resilient New Orleans community attracting tourists to return after Hurricane Katrina). Many participants also stressed the importance of language and how the scorecard will need to be simple and understandable.

A scorecard could enable cities and counties to promote their achievements, and could be viewed as a tool to encourage constructive competition among cities and counties. Such competition, participants noted, could be seen as either a carrot or a stick: competition could spur communities to engage in more resilient ways, or the comparison could incite a fear of failure. Therefore, feedback on how scorecard implementation is progressing and how it is affecting communities would be important. While standards should be fair, many concluded, they should not be too rigid or too accommodating so that no one passes or fails.

Possible Challenges

Participants discussed the need for both short- and long-term development of a resilience scorecard. Although there might be information gaps at present, many did not view these as limitations and conveyed urgency for proceeding forward even in the absence of available data. They also cautioned that the scorecard not be directly tied to disaster management or be placed on the disaster management track, as national resilience is much broader than merely disasters. Resilient communities can be reflected in their robust local economies, excellent schools, and high-quality healthcare, for example. Therefore, one way to demonstrate how resilience could be measured could be to determine such factors such as crime rates. A decreased crime rate in the presence of resilience-building strategies could indicate an improvement in a community's resilience, they suggested.

It also became clear during the discussions that the use of the term “scorecard” and how it was portrayed could affect its implementation and success. A few participants noted that the scorecard term could carry either a

positive or negative connotation, depending on the point of view: because scores can be tabulated and compared between communities and states, the terminology in and of itself could carry a negative connotation. Alternative names were suggested to “scorecard”: assessment card, engagement card, or check-up card. One participant noted that it would be helpful to tie the term back to the need for community involvement, and perhaps call it a “community health and wellness plan.” No single term emerged as the preferred term to replace the word “scorecard.” Also, to help bypass a pass/fail mentality that could emerge with any evaluation process, some participants suggested that the scorecard could be tied to an accreditation process or a credit rating model.

With a national scorecard that could be compared across various local and state jurisdictions, some communities or states may be hesitant to adopt a scorecard because of a fear that their jurisdictions could “fail” to make a certain grade. Furthermore, some participants noted that communities and states might engage in strategic behaviors to boost their scores, which could result in artificially inflated scores. It was also noted that it may be dangerous to attempt to quantify or place a metric on resilience because, as mentioned in Chapter 1, the exact definition of resilience could change over time.

RISK MANAGEMENT

Knowledge Base to Inform Risk

Collectively in the U.S. public and private sectors, a wealth of knowledge exists about disaster costs. Although this knowledge base is extensive in the United States, it has not been accessible, disseminated, or provided in a manner that is useful for the public, analysts, or decision-makers. Also, agreed-upon definitions and methodologies related to disaster costs are generally lacking, and a single national database of disaster costs currently does not exist to aggregate such data. Most workshop participants identified a need to develop a historical database on land use, building codes, and assets which can provide information about a community and how those assets relate to risk. Although they thought that creating such a database is important, it was unclear who would identify, collect, supply, and maintain such information. Equally challenging is the question of how the knowledge base of disaster-related data can be translated to be useful to decision-makers.

Language and Framing of Risk

Workshop participants noted the importance of language in terms of risk management and resilience (Figure 3-1). The way risk is conveyed is significant

because of how it could provide valuable information which could influence behavior and action. The use of the International Organization for Standardization (ISO) 31000 for risk management has been helpful in providing a nationally agreed upon methodology that provides standards and guidance for the risk management process. However, some participants commented that the current practice of using risk management jargon to convey risk has made it difficult for both decision-makers and the public to grasp the concept of risk and to determine what the possible responses should be. If the ability to manage risk is a goal in increasing resilience, the vocabulary of risk would need to change so that both decision makers and the public can better understand risk and its consequences. In particular, one participant mentioned the need to examine the risk discussions in the context of New York, New Jersey, and Connecticut's decisions and responses to Superstorm Sandy in order to more fully understand the rationale behind those decisions and responses. In that way, future decisions could benefit from lessons of those experiences. Individuals from one breakout group suggested that a new smartphone application could be developed to help users understand hazards and risks in terms that are easily grasped by the lay-public.



FIGURE 3-1 Discussions held by one of the risk management breakout groups. Photo credit: Neeraj Gorkhaly

The way that risk is framed is equally important, some workshop attendees noted. For instance, floodplain risk is typically presented in terms of percentage of risk per 100 years, which is a concept with which the public may not be familiar. Changing the range of information and how it is delivered can

affect decision-making capabilities. Also, the public prefers to discuss risk in terms of the benefits of action rather than the negative consequences of experiencing an adverse situation. Several workshop attendees suggested that the behavioral sciences need to be an integral part of risk analysis in order to understand how people react in a disaster. Participants then began a discussion that questioned whether the risk management framework is the right approach in terms of resilience. Risk focuses on protection against a threat, and while some attendees pointed out that resilience goes beyond the ability to bounce back from a specific disaster or adverse event, risk management will be one of many important parts of the resilience building process. In incorporating risk management practices, some attendees emphasized the need to develop a framework to outline the various levels of involvement and responsibility for various actors.

Role of the Public and Private Sectors

In the past, recognizing and delineating responsibilities as they relate to disaster management, determining whether those responsibilities belong with individuals or organizations, and identifying how those partnerships might function have been challenging. In moving forward, participants said that the public and private sectors will each need to play a critical part in helping to define roles, chains of command, and levels of responsibility so that actions can be more efficiently and effectively taken at various trigger points (for example, who is responsible when a house is on fire). The majority of workshop participants felt that a greater emphasis was needed on the public level of responsibility than on the private level, at the same time acknowledging that responsibility for identifying solutions to increasing resilience lies at every level.

Public Sector Involvement

The federal and state governments play a unique role in managing and mitigating risks for disaster events. The public sector could facilitate the risk management process in the private sector by integrating resilience into their strategic plans and by making a business case for resilience in risk management practices. The workshop attendees suggested a number of responsibilities that might be appropriate for the federal government to undertake:

- Provide a perspective on difficult or contentious local issues;
- Modify language to make risk management more engaging to the lay-public;
- Examine the role of government agencies and players that are best positioned to address the threats;

- Model what engagement would entail among the different state and federal agencies; and
- Conduct practice and exercise drills.

One participant put forth a cautionary note that federal and state governments not promise total recovery for private citizens, as that might lead to a situation where individuals could abdicate personal responsibility or involvement in recovery efforts.

Private Sector Involvement

Communities could suffer loss of revenue and capital as a result of damages and business interruptions caused by a disaster. Insurance companies were therefore noted by participants as serving a critical role in helping communities minimize and mitigate risk before a disaster and manage damages after a disaster. The local community itself already has a wealth of skills and resources into which it can tap during an emergency through groups such as the local chambers of commerce and volunteer fire departments.

Short- and Long-Term Strategies

Many workshop participants mentioned that both short- and long-term risk management strategies will need to be developed in the next 1-2 years and 5-10 years, respectively. A few items were considered immediate targets: determining appropriate language to better convey risk to the public; developing and establishing processes for disaster response; and incorporating behavioral sciences into risk analysis. For the short-term, they noted that some actions can be taken to define roles in collecting and translating the knowledge base, to develop a national database for assessing disaster costs, and to generate tools to help individuals self-assess personal risk. It would also be helpful to begin working with professional accrediting societies and their members (for example, emergency managers) to inform the next generation of professionals regarding risk management and resilience, the attendees noted.

Over the long term, several participants suggested that a paradigm shift was necessary in how resilience is viewed: rebuilding seems to be the status quo for the current definition of resilience, and the nation needs to move away from simply rebuilding and toward instilling a philosophy of resilience that includes change and adaptability. Long-term management strategies will need to consider short-term incentives to overcome obstacles. One example provided was to encourage insurance companies to engage their customers in an educational campaign to better understand and reduce risk, and to reward those who engage

in less risky behavior by reducing their insurance premiums. Long-term strategies for multiple sectors will need to involve well-defined responsibilities and incentives that can enable stakeholders to take action.

For both the short- and long-terms, a number of participants suggested that risk management strategies will need to be realistic and address the current infrastructure (both the built and natural environment) along with obstacles that will need to be overcome. For example, institutional barriers may impede rapid disaster recovery, and overcoming these barriers will require solutions that cut across administrative and political boundaries. Also, the current language of risk does not look across multi-hazard threats, which requires integration of elements and stakeholders who may not have interacted with one other in the past.

COMMUNITY COALITIONS

Community-based networks and efforts, which were referred to in this workshop session as community coalitions, will play an important role in strengthening resilience, many observed. Community coalitions are focused on certain interests and they have the ability to bring together a diverse group of people. By involving a variety of interest groups in resilience efforts (for example, those affiliated with schools, faith-based organizations, and local businesses), multiple generations of people from a diverse demographic within the community would also be brought together. Efforts taken by one local group can be duplicated in other localities, and the results could be magnified at the state and national levels. Therefore, several workshop participants noted the importance of taking advantage of these existing networks and tapping into existing local resources to implement resilience efforts on local, state, and national levels. They also noted the need to learn how to disseminate information and the importance of peer-to-peer networks and peer-to-peer learning.

Community Representation and Involvement

Attendees pointed out that everyone is a part of a community and is involved in some form of community in one way or another, whether through formal or informal mechanisms, and the number of existing community coalitions might actually be greater than originally thought. Several participants stressed the importance of not focusing efforts exclusively around “resilience” or “disasters”, as these existing groups have the ability to sustain themselves beyond an event-based effort. On the other hand, others suggested that there is a need to examine communities that have been through disaster scenarios in order to find examples of successful coalition efforts. Cataloging successful coalition efforts

can help communities to understand ways to effectively involve the entire community around resilience activities and can shed light on how these types of events galvanize a community to positive actions (for example, cataloging the various groups involved with post-Superstorm Sandy efforts).

Existing coalitions have the ability to express their needs and to identify some of the most appropriate incentives for making their communities more resilient. The private sector, a number of attendees noted, has not made more of an effort to support communities during and after a disaster, even though the private sector is a part of the community; one participant noted how companies large and small could be more actively involved in assisting individuals. They went on to suggest this lack of involvement might be due to lack of trust between the public and private entities and/or to the lack of incentives for private sector involvement. A need exists to show businesses how their efforts will benefit them over the long-term, and how companies of all sizes can be mobilized during a disaster. For example, in the aftermath of the 1994 Northridge earthquake in California, Disneyland saw the importance of working with the local government and other businesses (such as hotels and restaurants) to restore their business operations. One workshop participant suggested that a business case will need to be made for resilience, and that it might be useful to have a business school develop a business plan on the role of the private sector in a community's resilience efforts.

Partnerships and coalitions will need to be greater than a single community, as local, regional, and national coalitions are necessary. Some organizations are coordinated around a single purpose (for example, cancer awareness groups), and it would be important to learn from their success in terms of engaging interested parties and maintaining long-term participation. Several participants emphasized that a successful coalition would need to have a clear purpose, otherwise coalition members may become disengaged over time.

Organizational Leadership and Planning

Developing the appropriate leadership and organizational capacity will be vital for sustaining collaboration efforts, many participants said. Loosely structured organizational networks provide the flexibility necessary to remain sustainable, as long as they are connected to anchored institutions. Loose organizational networks can allow new nodes to form and develop with ties to a central foundation. Coalitions may start as small entities and grow organically to involve the local government, private sector, and others, but will require the capable leadership and direction of a convener. In the case of local communities, for example, the mayor has such convening power and is often seen as a leader. A number of attendees noted the importance of leveraging the existing leadership

and networks of a community, and to gain support from those with the ability to weave the resilience agenda into these existing coalitions. Another group that has typically been overlooked is the group of land-grant universities, whose original mission is based on information outreach into communities. These land-grant universities along with other non-land-grant universities can serve as a powerful mechanism for organizing and disseminating efforts to build resilience, some participants noted. Establishing the role of state and federal government is also needed. Several participants described the ability of the federal government to build capacity with small amounts of funding and to play a large role immediately after a disaster event. However, the federal government might best be viewed as having a supportive role in providing mentorship and guidance to communities, because establishing resilience at the local and state levels is critical.

Many participants emphasized that community leaders need to be engaged in both short- and long-term planning efforts. The community should inform the coalitions of their needs, and efforts like developing and implementing a national resilience scorecard would need to include community engagement.

One particular organizational challenge to overcome as coalitions rally around resilience might be the issue of learning how to work across organizational silos. For example, churches have established mechanisms for helping each other, but may not have such established relationships with other groups.

REFERENCE

National Academies. 2012. *Disaster Resilience: A National Imperative*. Washington, DC: The National Academies Press.

Appendix A

Agenda

DISASTER RESILIENCE IN AMERICA: LAUNCHING A NATIONAL CONVERSATION

**National Academy of Sciences Building
2101 Constitution Avenue, NW, Washington, DC 20418
Friday, November 30, 2012
NAS Auditorium**

8:15 – 9:00 a.m. **Registration**

9:00 – 9:10 a.m. **Welcome and Introductory Remarks**

Dr. Richard Bissell, Executive Director of Policy and
Global Affairs, National Research Council

9:10 – 9:20 a.m.

New National Research Council Report “Disaster Resilience: A National Imperative” and Overview of Agenda

Dr. Susan Cutter, University of South Carolina
Chair, Committee on Increasing National Resilience to
Hazards and Disasters

9:20 – 9:25 a.m. **Introduction of Keynote Speakers**

9:25 – 9:40 a.m.

Richard Reed, Deputy Assistant to the President for
Homeland Security, White House National Security
Staff

9:40 – 9:55 a.m.

Admiral Thad W. Allen, Booz Allen Hamilton, U.S.
Coast Guard (retired)

PANEL DISCUSSIONS

Moderator: Miles O’Brien, Science Correspondent for PBS NewsHour

- 10:00 – 10:45 a.m. **Panel 1: Developing a Culture of Resilience**
 Natalie Jayroe, Second Harvest Food Bank of Greater New Orleans
 Dr. Stephen Flynn, Kostas Research Institute at Northeastern University
 Dr. Gerald E. Galloway, Jr., University of Maryland
 The Honorable Tom Tait, Mayor of Anaheim, California

- 10:45 – 11:10 a.m. Break

- 11:10 – 11:50 p.m. **Panel 2: The Reality of Resilience: From Vision to Action**
 Debra T. Ballen, Insurance Institute for Business & Home Safety
 Linda Langston, Linn County Supervisor, Iowa
 Ellis M. Stanley, Sr., Hammerman & Gainer International, Inc.

- 11:50 – 11:55 a.m. Set up next panel

- 11:55 – 12:20 p.m. **Panel 3: Federal Perspectives on Resilience in Light of Superstorm Sandy**
 Corey Gruber, Assistant Administrator for National Preparedness, Federal Emergency Management Agency
 Patricia Hoffman, Assistant Secretary for the Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy
 Dr. Nicole Lurie, Assistant Secretary for Preparedness and Response, U.S. Department of Health and Human Services
 Dr. Kathryn D. Sullivan, Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator, National Oceanic and Atmospheric Administration

- 12:20 – 12:30 p.m. **Synthesis of Key Themes and Closing Remarks**
 Dr. Gene Whitney, Independent Consultant

- 12:30 p.m. **Adjourn Public Event**

AFTERNOON WORKSHOP SESSION (BY INVITATION ONLY)
Steps toward building a resilient nation: Interactive workshop on how to measure resilience progress and manage risk in our communities

1:00 – 1:30 p.m.

Lunch

Boxed lunches available in the North Court.
 Rooms 118 and 120 available for use during the lunch break.

1:30 – 1:45 p.m.

Workshop Overview and Instructions (Room 120)

Susan Cutter, Chair

- *provide synopsis of the committee’s report as it is related to the scorecard, risk management, and community coalitions*

Dr. Elizabeth Eide, Study Director, National Research Council

- *provide an overview of the afternoon breakout sessions*

Format

Workshop participants will be divided into 4 groups, with 12-15 participants in each group. Groups are denoted by colored dots (red, blue, orange, and green groups). Each group will discuss a topic for 30 minutes, and then will rotate to another topic for discussion. Each group will rotate through three total topics during the workshop. A schematic of the breakout session rotations by group color is available as a separate document.

Breakout Session Topics (See questions on separate attachment)

(A) National Resilience Scorecard Development (Room 118)

Moderator: Sherrie Forrest; Rapporteur: Maria Dahlberg

(B) National Resilience Scorecard Implementation (Room 120)

Moderator: Elizabeth Eide; Rapporteur: Camilla Ables

(C) Risk Management (Board Room)

Moderator: Claudia Mengelt; Rapporteur: Richard-Duane Chambers

(D) Community Coalitions (Room 250)

Moderator: Mark Lange; Rapporteur: Janet Mulligan

BREAKOUT SESSIONS

1:45 – 2:15 p.m.

Breakout session 1

Discuss prepared questions

- staff moderator and rapporteur in each group with help from committee members

2:15 – 2:20 p.m.

Quick break to rotate to next topic

2:20 – 2:50 p.m.

Breakout session 2

Discuss prepared questions

- staff moderator and rapporteur in each group with help from committee members

2:50 – 2:55 p.m.

Quick break to rotate to next topic

2:55 – 3:25 p.m.

Breakout session 3

Discuss prepared questions

- staff moderator and rapporteur in each group with help from committee members

3:25 – 3:45 p.m.

Break

- Moderator and rapporteur in each breakout session group will develop 2-3 bullet points per question for report-out, and committee member(s) can provide feedback about summary towards the end of the break

PLENARY SESSION

3:45 – 4:45 p.m.

Reporting back from breakout groups (Room 120)
(10 min. per group, with 5 additional min. for clarification and general feedback)

4:45 – 4:55 p.m.

Future steps and Closing remarks

Dr. Elizabeth Eide, Study Director, National Research Council

5:00 p.m.

Adjourn meeting

Thank you for participating and helping to launch a national conversation about national resilience!

Appendix B

Biographical Information—Plenary Session Participants

Admiral Thad W. Allen (United States Coast Guard, Retired) is a Senior Vice President at Booz Allen Hamilton, and provides thought leadership and client engagement for the Justice and Homeland Security business and also contributes to other initiatives in energy, defense and international markets. He retired from the United States Coast Guard after serving as the 23rd Commandant in June 2010. Prior senior leadership assignments included Chief of Staff of the Coast Guard, Atlantic Area Commander, Commander of the Seventh Coast Guard District (Southeast US and Caribbean Region), and Coast Guard Director of Resources. In 2005, Allen was selected by President George W. Bush to lead the response to Hurricanes Katrina and Rita as the Principal Federal Official. In 2010 he was selected by President Obama to lead the response to the Deepwater Horizon oil spill as the National Incident Commander. In 39 years of service in the Coast Guard, Allen served in wide variety of operational assignments including commands at sea and ashore. He is a 1971 graduate of the Coast Guard Academy (BS in Management) and earned Masters Degrees at The George Washington University (Public Administration) and MIT Sloan School of Management (Management Science). Allen is a Fellow in the National Academy of Public Administration and a member of the Council on Foreign Relations. He serves as a Director with the Coast Guard Foundation and the Partnership for Public Service. From 2010 to 2011 he served as a Senior Fellow at the RAND Corporation. A native of Tucson, Arizona, Allen now resides in Vienna, Virginia, with his wife Pam. They have three grown children: Amanda, Meghan, and Lucas.

Debra T. Ballen is the general counsel and senior vice president of public policy at the Insurance Institute for Business & Home Safety (IBHS). In this capacity, she is responsible for managing all of the organization's legal matters and overseeing IBHS' public policy efforts. In addition, she also serves as the organization's corporate secretary. Prior to her work with IBHS, Ms. Ballen was

the executive vice president of public policy management for the American Insurance Association (AIA) in Washington, D.C. She developed and implemented policy for AIA's priority federal and state public policy issues. She also has served on the Organization for Economic Cooperation and Development (OECD) High Level Advisory Board on Financial Management of Large Scale Catastrophes, which includes a heavy emphasis on mitigation measures. Ms. Ballen graduated with a juris doctorate degree from Harvard Law School and an A.B. degree from Princeton University. She also has received the CPCU designation.

Susan Cutter chairs the National Research Council's Committee on Increasing National Resilience to Hazards and Disasters. She is a Carolina Distinguished Professor of Geography at the University of South Carolina, and director of the university's Hazards and Vulnerability Research Institute. Her primary research interests are in the area of vulnerability/resiliency science—what makes people and the places where they live vulnerable to extreme events and how vulnerability and resilience are measured, monitored, and assessed. Dr. Cutter has also led post-event field studies of the role of geographic information technologies in rescue and relief operations in the September 11th World Trade Center attack and studies of evacuation behavior from Three Mile Island (1979), Hurricane Floyd (1999), and the Graniteville, South Carolina, train derailment and chlorine spill (2005). She led a Hurricane Katrina post-event field team to coastal Mississippi (2006) and since then has been studying the community differences in long-term recovery of the Mississippi coast. She has provided expert testimony to Congress on hazards and vulnerability and was a member of the U.S. Army Corps of Engineers Interagency Performance Evaluation Taskforce that evaluated the social impacts of the New Orleans and Southeast Louisiana Hurricane Protection System in response to Hurricane Katrina. She has authored a Trends and Outlook report for the US Army Corps of Engineers on Natural and Human-Induced Disasters and other Factors Affecting Future Emergency Response and Hazard Management. Dr. Cutter serves on many national advisory boards and committees, including those of the National Research Council, American Association for the Advancement of Science, National Science Foundation, Natural Hazards Center, and the American Geophysical Union. She is a member of the International Council for Science's Integrated Research on Disaster Risk Scientific Committee. In 2011 she received the Lifetime Achievement award from the Association of American Geographers. Dr. Cutter holds the MunichRe Foundation Chair (2009-2012) on Social Vulnerability through the United Nations University-Institute for Environment and Human Security, in Bonn, Germany. She received her B.A. from California State University, East Bay and her M.A. and Ph.D. from the University of Chicago.

Stephen Flynn is a Professor of Political Science and the Founding Co-Director of the George J. Kostas Research Institute for Homeland Security at Northeastern University. Before arriving at Northeastern, he served as President of the Center for National Policy and spent a decade as a senior fellow for National Security Studies at the Council on Foreign Relations. Dr. Flynn was an active duty commissioned officer in the U.S. Coast Guard for 20 years, including two tours as commanding officer at sea. He is the author of *The Edge of Disaster: Rebuilding a Resilient Nation* (Random House, 2007), and *America the Vulnerable* (HarperCollins 2004). He is a Senior Research Fellow at the Wharton School's Risk Management and Decision Processes Center at the University of Pennsylvania and serves as a member of the Bipartisan Policy Center's Homeland Security Project, co-chaired by former 9/11 commissioners, Governor Tom Kean and Congressman Lee Hamilton. Flynn holds the M.A.L.D. and Ph.D. degrees from the Fletcher School of Law and Diplomacy, Tufts University. He is the principal for Stephen E. Flynn Associates LLC, where he provides independent advisory services on improving enterprise resilience and critical infrastructure protection, and transportation and maritime security.

Gerald E. Galloway, Jr. (member, National Academy of Engineering) is the Glenn L. Martin Institute Professor of Engineering and an affiliate professor of Public Policy at the University of Maryland, College Park. His 38-year career in the military included positions such as commander of the Army Corps of Engineers District in Vicksburg, Mississippi, and professor and founding head of the Department of Geography and Environmental Engineering and dean of the Academic Board at the U.S. Military Academy. He was promoted to brigadier general in 1990 and retired from active duty in 1995. A civil engineer, public administrator, and geographer, Dr. Galloway's current research focuses on the development of U.S. national water policy in general and national floodplain management policy in particular. He is currently a member of the National Research Council's Water Science and Technology Board and the Disasters Roundtable. A member of the National Academy of Engineering, Dr. Galloway earned his M.S.E. at Princeton and his Ph.D. in geography (specializing in water resources) from the University of North Carolina at Chapel Hill.

Corey Gruber serves as the Assistant Administrator, National Preparedness Directorate (NPD), in the Federal Emergency Management Agency (FEMA). The Directorate has six business units with over 400 personnel that are charged with providing guidance, programs, activities and services to prepare the Nation to prevent, protect from, respond to and recover from all hazards. The Directorate is currently charged with leading implementation of Presidential Policy Directive 8, "National Preparedness." In 2007, he served as Acting Deputy Administrator of the newly formed Directorate and led its integration into

the Agency. He previously served as Acting Assistant Secretary of Grants and Training (G&T) in the Department's former Preparedness Directorate. His other assignments within the Department include serving as the Executive Director, National Preparedness Task Force and Director, Office for Policy, Initiatives, and Analysis, Office of Grants and Training. Before joining the U.S. Federal government in 2001, Mr. Gruber served as Deputy Director, Emergency Management Division, Research Planning, Inc., where he supported planning, training, exercise and continuity needs for public and private sector clientele. He managed the Nunn-Lugar-Domenici Domestic Preparedness Exercise Program, overseeing conduct of exercises involving response to terrorist use of weapons of mass destruction for 120 major metropolitan areas across the Nation. Mr. Gruber's other assignments included serving as Chief of Plans in the Department of Defense's Director of Military Support, where he was responsible for Military Support to Civil Authorities, including planning and response to more than 50 major disasters and emergencies, and management of classified continuity of operations programs. He is a retired U.S. Army officer. Mr. Gruber received his bachelor's degree from Pennsylvania State University, and his master's degree from Chapman University.

Patricia Hoffman is the Assistant Secretary for the Office of Electricity Delivery and Energy Reliability at the U.S. Department of Energy. The Office of Electricity Delivery and Energy Reliability leads the Department of Energy's (DOE) efforts to modernize the electric grid through the development and implementation of national policy pertaining to electric grid reliability and the management of research, development, and demonstration activities for "next generation" electric grid infrastructure technologies. Hoffman is responsible for developing and implementing a long-term research strategy for modernizing and improving the resiliency of the electric grid. Hoffman directs research on visualization and controls, energy storage and power electronics, high temperature superconductivity and renewable/distributed systems integration. She also oversees the business management of the office including human resources, budget development, financial execution, and performance management. Before joining the Office of Electricity Delivery and Energy Reliability, Hoffman was the Program Director for the Federal Energy Management Program which implements efficiency measures in the federal sector and the Program Manager for the Distributed Energy Program that developed advanced natural gas power generation and combined heat and power systems. She also managed the Advanced Turbine System program resulting in a high-efficiency industrial gas turbine product. Hoffman holds a Bachelor of Science and a Master of Science in Ceramic Science and Engineering from Penn State University.

Natalie Jayroe joined Second Harvest Food Bank of Greater New Orleans and Acadiana as President and CEO in January 2006. The mission of Second Harvest is to lead the fight against hunger in south Louisiana through food distribution, advocacy, education and disaster response. Second Harvest currently distributes more than 22 million meals annually through more than 240 faith-based and nonprofit member agencies in 23 parishes across south Louisiana. Second Harvest continues to be a strong partner of local, state and federal agencies in disaster response, providing emergency food relief after Hurricanes Katrina, Rita, Gustav and Ike and most recently the Gulf Oil Spill. Second Harvest also worked with five Louisiana universities to produce a “farm to fork” food system analysis of post-Katrina and Rita south Louisiana. Under Natalie’s leadership, Second Harvest has distributed more than 164 million pounds of food, or 139 million meals, to people in need. In her 18 year career in food banking, she has since held several positions of leadership within the Feeding America network and served on many national, state and local boards and committees. In 2005, Natalie became a loaned executive for Feeding America, providing expertise to food banks with challenges. Following Hurricanes Katrina and Rita she was the Feeding America representative at the Joint Field Office in Baton Rouge. Currently, Natalie is the Chair of the Louisiana Food Bank Association, Co-chair of the Program Committee of the New Orleans Regional Leadership Institute and a member of Leadership Louisiana. She was named one of City Business’ Women of the Year in 2007, in 2008 was honored with MAZON’s Irving Cramer award, and in 2011 was named a role model for the Young Leadership Council in New Orleans and a CityBusiness Money Maker.

Linda Langston was elected First Vice President of the National Association of Counties (NACo) on July 17, 2012. She will be sworn in as President in July, 2013. Langston has been active in NACo since 2003 and has held many leadership positions, including chair of NACo’s Health Steering Committee, chair of the Healthy Counties Advisory Board, and chair of the Arts and Culture Commission. She is currently chair of the Finance Committee and executive committee liaison to the Large Urban County Caucus Steering Committee. She was an inaugural participant in the County Leadership Institute. Langston was first elected to the Linn County, Iowa Board of Supervisors in 2002. She serves on a variety of boards, commissions and community organizations including Chair of the East Central Iowa Council of Governments (ECICOG), the Linn County Public Health Board, Regional Workforce Development and the Arc of East Central Iowa. Prior to being elected to the Board of Supervisors, Langston was a museum director, a psychotherapist in private practice, a teacher as well as a small business owner. Born in Chicago, but raised in Iowa, Langston graduated from Knox College in Galesburg, Illinois with a degree in history and is a 2007

graduate of Harvard's Kennedy School of Government for State and Local Officials.

Nicole Lurie is the Assistant Secretary for Preparedness and Response (ASPR) at the US Department of Health and Human Services (HHS). Dr. Lurie serves as the Secretary's principal advisor on matters related to bioterrorism and other public health emergencies. ASPR also coordinates interagency activities between HHS, other Federal departments, agencies, and offices, and State and local officials responsible for emergency preparedness and the protection of the civilian population from acts of bioterrorism and other public health emergencies. The mission of her office is to lead the nation in preventing, responding to and recovering from the adverse health effects of public health emergencies and disasters. Prior to that, she was Senior Natural Scientist and the Paul O' Neill Alcoa Professor of Health Policy at the RAND Corporation. There she directed RAND's public health and preparedness work as well as RAND's Center for Population Health and Health Disparities. She has previously served in federal government, as Principal Deputy Assistant Secretary of Health in the US Department of Health and Human Services; in state government, as Medical Advisor to the Commissioner at the Minnesota Department of Health; and in academia, as Professor in the University of Minnesota Schools of Medicine and Public Health. Dr. Lurie has a long history in the health services research field, primarily in the areas of access to and quality of care, managed care, mental health, prevention, public health infrastructure and preparedness and health disparities. Dr. Lurie attended college and medical school at the University of Pennsylvania, and completed her residency and MSPH at UCLA, where she was also a Robert Wood Johnson Foundation Clinical Scholar.

Miles O'Brien is a veteran, freelance broadcast and web journalist who focuses on science, technology and aerospace. He is the Science Correspondent for the *PBS NewsHour*, and a regular correspondent for the PBS documentary series *FRONTLINE* and the National Science Foundation *Science Nation* series. For nearly seventeen of his thirty years in the news business, he worked for CNN – as the Science and Space Correspondent and the anchor of various programs, including *American Morning*. While at CNN, he secured a deal with NASA to become the first journalist to fly on the space shuttle. The project ended with the loss of Columbia and her crew in 2003 – a story he told to the world in a critically acclaimed sixteen-hour marathon of live coverage. Mr. O'Brien is an accomplished aviator who often pilots his own airplane to assignments, and is frequently called upon to explain the vagaries of aviation to a mass audience. He has won numerous awards over the years, including a half-dozen Emmys, a Peabody and DuPont for his coverage of Climate Change, Hurricane Katrina and its aftermath, the Atlanta Olympic Park Bombing, space exploration and the

airline industry. Based in Washington, DC, he owns a company that produces great video journalism as well as content for corporate clients. Mr. O'Brien received his BA in history from Georgetown University.

Richard Reed is Deputy Assistant to the President for Homeland Security. In this role he leads the development of national policy related to resilience, transborder security, and community partnerships. With an experienced team of over 30 senior professionals, Richard covers a broad and deep homeland security portfolio that includes all-hazards preparedness, individual and community partnerships and resilience, critical infrastructure protection and resilience, domestic incident management, continuity of government, national exercises, transportation security (aviation, maritime, and ground), piracy, information sharing, border security, and immigration. Prior to his return to the White House, Richard served as Vice President for Preparedness and Resilience Strategy of the American Red Cross, where he led a comprehensive organizational assessment of all American Red Cross preparedness, resilience, and recovery programs, including domestic and international programs. Richard's prior White House tenure included service as Special Assistant to the President for Homeland Security and Director for Continuity (2006-2009) and Special Assistant to the President and Senior Director for Resilience Policy (2009-12). Richard is known for his adept leadership of the U.S. Government interagency through disasters and emergencies of all types, including the 2009 H1N1 pandemic, Haiti earthquake (during which he was deployed), the BP Deepwater Horizon oil spill, the Fukushima earthquake, tsunami, and nuclear emergency, and countless domestic natural disasters, including hurricanes, tornados, and flooding. In addition, he has been instrumental in the development of national policy on a range of matters, including continuity of government (National Security Presidential Directive-51/Homeland Security Presidential Directive-20), National Preparedness (Presidential Policy Directive-8), National Security and Emergency Preparedness Communications (Executive Order 13618), and Medical Countermeasures Following a Biological Attack (Executive Order 13527). Richard has Bachelor's degrees from Indiana University and Purdue University, and a Master's degree in social work from Indiana University.

Ellis M. Stanley, Sr. is the Executive Vice President of Hammerman & Gainer International in New Orleans, LA. Prior to this, he was Vice President for Emergency Management Services at Dewberry LLC. Ellis also served as General Manager of the City of Los Angeles Emergency Preparedness Department. Before that, he was director of the Atlanta-Fulton County Emergency Management Agency. In 2008, he served as Director of Democratic National Convention planning for the City and County of Denver, Colorado. With more than 35 years of experience in the emergency management field, Ellis

has worked at four national political conventions, the 1996 Olympic Games in Atlanta and the 1994 Papal visit and World Youth Conference in Denver. He is currently serving on the Board of Directors of Greater Los Angeles Red Cross Chapter and chairs the Response Committee. He served as Chair of the Emergency Management Accreditation Program and the Board of Directors of Operation Hope and the Disaster Recovery Institute International. Ellis is a past president of the International Association of Emergency Managers and has led delegations of emergency management professionals to China, Japan and other countries. He is currently a member of the IAEM Global Board of Directors. Ellis serves as an adjunct professor at American University teaching Senior Crisis Management and at Harvard University teaching Meta-Leadership. He is currently Chair of the National Research Council's Disasters Roundtable. He was elected a Fellow of the National Academy of Public Administration in 2007 and inducted into Contingency Planning and Management Hall of Fame's Public Servant in 2005. Ellis graduated from the University of North Carolina at Chapel Hill in 1973 with a degree in political science. He is a graduate of the Executive Leadership Program for Senior Homeland Security Officials for the Post Naval Graduate School in Monterey, California and a graduate of the John F. Kennedy School of Government's National Preparedness Leadership Initiative. Ellis was awarded an Honorary Doctoral Degree "Doctor of Public Service", University of Maryland Eastern Shore in 2009.

Kathryn D. Sullivan was appointed by President Obama on May 2, 2011 as assistant secretary of commerce for environmental observation and prediction and deputy administrator for the National Oceanic and Atmospheric Administration (NOAA). She is also performing the duties of NOAA's chief scientist. She is a distinguished scientist, renowned astronaut and intrepid explorer. As assistant secretary, Dr. Sullivan plays a central role in directing Administration and NOAA priority work in the areas of weather and water services, climate science and services, integrated mapping services and Earth-observing capabilities. She provides agency-wide direction with regard to satellites, space weather, water, and ocean observations and forecasts to best serve American communities and businesses. As Deputy Administrator, she oversees the smooth operation of the agency. Dr. Sullivan's impressive expertise spans the frontiers of space and sea. An accomplished oceanographer, she was appointed NOAA's chief scientist in 1993, where she oversaw a research and technology portfolio that included fisheries biology, climate change, satellite instrumentation and marine biodiversity. Dr. Sullivan was the inaugural director of the Battelle Center for Mathematics and Science Education Policy in the John Glenn School of Public Affairs at Ohio State University. Prior to joining Ohio State, she served a decade as President and CEO of the Center of Science and Industry (COSI) in Columbus, Ohio, one of the nation's leading science

museums. Dr. Sullivan joined COSI after three years' service as Chief Scientist. Dr. Sullivan was one of the first six women selected to join the NASA astronaut corps in 1978 and holds the distinction of being the first American woman to walk in space. She flew on three shuttle missions during her 15-year tenure, including the mission that deployed the Hubble Space Telescope. Dr. Sullivan has also served on the National Science Board (2004-2010) and as an oceanographer in the U.S. Navy Reserve (1988-2006). Dr. Sullivan holds a bachelor's degree in earth sciences from the University of California at Santa Cruz and a doctorate in geology from Dalhousie University in Canada.

Tom Tait was elected to serve as Mayor of Anaheim in November 2010, campaigning on a platform of bringing the core values of kindness and freedom to the culture of the city and upholding public safety and civic upkeep as the City of Anaheim's top priorities. Tait's election comes after two previous terms on the Anaheim City Council. In 1995, Tait was appointed to fill a vacancy and complete an unexpired term on the city council. He was subsequently elected by the voters in November 1996 to serve a full four-year term and was re-elected without a challenge in 2000 and served as Mayor Pro Tem from 2002-2003. Mayor Tait brings considerable experience to California's tenth largest city, having also served on the Anaheim Planning Commission and the Anaheim Budget Advisory Commission. He has also served as Anaheim's representative on board of the Metropolitan Water District of Southern California. Mayor Tait has been active in the community, serving as a board member for the Boys and Girls Clubs of Anaheim, GOALS, the Anaheim Family YMCA, the Salvation Army Adult Rehabilitation Center, and Catholic Charities. Mayor Tait is a member of the California State Bar, and is president of Tait & Associates, Inc. and Tait Environmental Services, an engineering and environmental services firm with offices throughout the western United States. Mayor Tait received his B.S. from the University of Wyoming, and his MBA and J.D. from Vanderbilt University. Tom and his wife Julie have lived in Anaheim for 25 years. They have four children.

Gene Whitney is a member of the National Research Council's Committee on Increasing National Resilience to Hazards and Disasters. Dr. Whitney recently retired as Energy Research Manager for the Congressional Research Service at the Library of Congress in Washington, D.C. Previously, he was Assistant Director for Environment at the White House Office of Science and Technology Policy (OSTP). His work at OSTP focused on the science and technology policy aspects of earth sciences, natural hazards and disasters, energy, water, land remote sensing, environment, and natural resources. He served as Co-Chair of the U.S. Group on Earth Observations and was OSTP liaison to the U.S. Climate Change Science Program. He directed the Future of Land Imaging Interagency

Working Group, and served as National Science Technology Council director for the Subcommittee on Disaster Reduction and the Subcommittee on Water Availability and Quality. Dr. Whitney coordinated the Federal interagency science and technology portfolio for the United States in UNESCO. He served as a member of the Joint U.S.–Canada Task Force investigating the massive electrical blackout of August 14, 2003 in the northeastern U.S. and southern Canada, and worked with the President's Council of Advisors on Science and Technology on national energy efficiency policy. Prior to OSTP Dr. Whitney was Chief Scientist for the USGS Energy Resources Team, where he managed the energy research and assessment group, conducting basic research on the geology, geochemistry, and geophysics of fossil fuels, conducting national and global assessments of oil, natural gas, and coal resources, and assessing availability and economics of fossil fuels. He has authored or co-authored numerous scientific papers and abstracts. He received an NRC postdoctoral fellowship at NASA/JPL and was awarded a senior postdoctoral fellowship at Ecole Normale Supérieure in Paris. His international experience includes working with the governments of China, Russia, Pakistan, Algeria, Bangladesh, and Japan on energy and mineral resource issues. Dr. Whitney received his Ph.D. in geology from the University of Illinois.

Appendix C

List of Registered Participants

ATTENDEES OF MORNING PUBLIC EVENT†

Joseph "Bud" Ahearn*, CH2M Hill Ltd. and U.S. Air Force (Retired)
Jaimy Alex, Arlington Office of Emergency Management
Ray Alexander, U.S. Army Corps of Engineers
Thad Allen, Booz Allen Hamilton
Bernard Amadei, University of Colorado
Rafael Ameller, StormCenter Communications
Kacky Andrews, The Nature Conservancy
David Applegate, U.S. Geological Survey
Elizabeth Armstrong, International Association of Emergency Managers
Adrienne Arsht, TotalBank
Debra Ballen, Insurance Institute for Business & Home Safety
Brad Belzak, Deloitte
Gerilee Bennett, Federal Emergency Management Agency
Laura Berkey-Ames, American Public Works Association
Linda Billings, George Washington University
William Billotte, National Institute of Standards and Technology
James Bohland, Virginia Polytechnic Institute and State University
Wilson Bonner, American Geosciences Institute
Nicole Boothman-Shepard, Jacobs Engineering
Peter Boynton, Northeastern University
Jerry Brashear, The Brashear Group LLC
Stephanie Bray, U.S. Army Corps of Engineers
Chrysanthe Broikos, National Building Museum
Dominic Brose, National Research Council
Andrew Bruzewicz, U.S. Army Corps of Engineers
Judson Bruzgul, American Meteorological Society Policy Program
Sean Burke, Northeastern University
Vanessa Burnett, U.S. Department of Homeland Security
Anselmo Canfora, University of Virginia
Carlos Castillo, Pricewaterhouse Coopers

Arrietta Chakos, Urban Resilience Strategies
 David Cleaves, USDA Forest Service
 Megan Clifford, Booz Allen Hamilton
 Nell Codner, National Oceanic and Atmospheric Administration
 Craig Conrad, Association of State Floodplain Managers
 Patrick Crawford*, Feeding America
 Christy Crosiar, National Geospatial-Intelligence Agency
 Susan Cutter*, University of South Carolina
 Michelle Dallafin, Department of Energy
 Margaret Davidson, National Oceanic and Atmospheric Administration
 Anjana Dayal de Prewitt, American Red Cross
 Laura Deutsch, Global Interconnections LLC
 Tamara Dickinson, White House Office of Science and Technology Policy
 Daniel Dodgen, Department of Health and Human Services
 Michael Dunaway, The Athena Group
 Warren Edwards, Community and Regional Resilience Institute
 Chris Elfring, National Research Council
 Sarah Ellis Peed, U.S. Department of Homeland Security
 Joseph Fiksel, Ohio State University
 Kevin Finneran, National Research Council
 William Flint, George Washington University
 Stephen Flynn, Northeastern University
 Charlotte Franklin, Arlington Office of Emergency Management
 Sara Frueh, National Academy of Sciences
 Christopher Furlow, Ridge Global LLC
 Gerald Galloway*, University of Maryland at College Park
 David Grier, National Oceanic and Atmospheric Administration
 Corey Gruber, Federal Emergency Management Agency
 Sara Allen Harper, University of Virginia School of Architecture
 Jack Harrald, Virginia Polytechnic Institute and State University
 Wendy Harrison, National Science Foundation
 Betty Hastings, Department of Health and Human Services
 Thomas Hayden, George Washington University
 Alan Hecht, U.S. Environmental Protection Agency
 Edward Hecker, U.S. Army Corps of Engineers
 Martin Hight, American Society of Civil Engineers
 Patricia Hoffman, Department of Energy
 Deborah Holbrook, Vacation Lane Group, Inc.
 Meghan Housewright, The National Fire Protection Association
 Peter Hunsberger, National Research Council
 Mary Ellen Hynes, U.S. Department of Homeland Security
 Meredith Inderfurth, Association of State Floodplain Managers

Deborah Ingram, Federal Emergency Management Agency
 Natalie Jayroe, Second Harvest Food Bank of Greater New Orleans
 Brian Kamoie, The White House National Security Staff
 Lisa Kaplowitz, Department of Health and Human Services
 Coral Keegan, White House Council on Environmental Quality
 Kevin Kelley, American Red Cross
 Kathleen Kirsch, Council on Environmental Quality
 Kelly Klima, Center for Clean Air Policy
 Sandra Knight, Federal Emergency Management Agency
 Scott Knowles, Drexel University
 Robert Kolasky, U.S. Department of Homeland Security
 Keelin Kuipers, National Oceanic and Atmospheric Administration
 Howard Kunreuther*, University of Pennsylvania
 Stacy Langsdale, U.S. Army Corps of Engineers
 Linda Langston, Linn County Supervisor, Iowa
 Debbie Larson, U.S. Army Corps of Engineers
 Evan Lehmann, Environment & Energy Publishing
 Lauren Leuck, U.S. Army Corps of Engineers
 Paul Lewis, National Geospatial-Intelligence Agency
 Onora Lien, Public Health - Seattle & King County
 Meredith Li-Vollmer*, Public Health - Seattle & King County
 Camille Lloyd, Gallup, Inc.
 Josh Lott, National Oceanic and Atmospheric Administration
 Michael Love, University of Delaware Cooperative Extension
 Marianne Luhrs, Federal Emergency Management Agency
 Nicole Lurie, Department of Health and Human Services
 John Lyons, U.S. Department of Homeland Security
 Roshni Mahtani, University of Virginia
 Harry Mayfield, Lewis Burke Associates
 Miho Mazereeuw, Massachusetts Institute of Technology
 Alex McLellan, Resilience Thinking Institute
 John McShane, U.S. Environmental Protection Agency
 Gerald McSwiggan, Business Civic Leadership Center
 Samantha Medlock, Association of State Floodplain Managers
 Ryan Meres, Institute for Market Transformation
 Robert Meyer, University of Pennsylvania
 Erwann Michel-Kerjan, University of Pennsylvania
 Judith Mitrani-Reiser, Johns Hopkins University
 Jessica Monahan, Patton Boggs
 Kevin Morley, American Water Works Association
 Warren Muir, National Research Council
 Scott Nicholson, U.S. Army Corps of Engineers

Miles O'Brien, PBS NewsHour
 Titilayo Ogunyale, Department of Energy
 Stacy Okutani, Homeland Security Studies and Analysis Institute
 Juan Ortiz, City of Fort Worth
 Cynthia Palmer, Federal Emergency Management Agency
 Stephan Parker, National Research Council
 Phillip Parrish, University of Virginia
 Matthew Payne, Federal Emergency Management Agency
 Nancy Pomerleau, U.S. Department of Homeland Security
 Patrick Powell, Golden Triangle Business Improvement District
 Joseph O Prewitt Diaz, Disaster Law Center, University of Puerto Rico
 Nick Prins, Oak Ridge National Laboratory
 Peter Rabbon, U.S. Army Corps of Engineers
 Christa Rabenold, National Oceanic and Atmospheric Administration
 Richard Reed, White House National Security Staff
 Megan Reeve, Institute of Medicine
 Elizabeth Reinhardt, USDA Forest Service
 Deborah Robinson, International Possibilities Unlimited Consulting
 Jamesine Rogers, Office of Senator John Kerry
 Matthew Rollins, U.S. Geological Survey
 James Rossberg, American Society of Civil Engineers
 Catherine Rothacker, American Geophysical Union
 Claire Rubin, Claire B. Rubin & Associates, LLC
 Monica Schoch-Spana*, University of Pittsburgh Medical Center
 Candie Schwartz, George Washington University
 John Scott, Center for Public Service Communications
 Susan Scrimshaw*, The Sage Colleges
 Rachel Sears, Federal Emergency Management Agency
 Rajan Sen, Jefferson Science Fellow
 Dana Smith, National Institute of Building Sciences
 Brett Smith, a.i. solutions
 Shepard Smith, National Oceanic and Atmospheric Administration
 Ellis Stanley*, Hammerman & Gainer International, Inc.
 Jeffrey Stiefel, U.S. Department of Homeland Security
 Daniel Stoecker, National Voluntary Organizations Active in Disaster
 Christopher Strager, National Oceanic and Atmospheric Administration
 Kathryn Sullivan, National Oceanic and Atmospheric Administration
 Gregory Symmes, National Research Council
 Tom Tait, City of Anaheim, California
 Catherine Tehan, U.S. Army Corps of Engineers
 Steven Thai, Department of Energy
 Adam Thiel, Alexandria Fire Department

Wendy Marie Thomas, National Oceanic and Atmospheric Administration
 Jeff Tollefson, Nature Magazine
 Thomas Torgersen, National Science Foundation
 Christopher Tulcea, CT Associates
 Shana Udvardy, Udvardy Consulting
 Michael Useem, University of Pennsylvania
 Katie Volsch, Federal Housing Finance Agency
 Matthew Von Hendy, Green Heron Information Services
 Roger Wakimoto, The National Center for Atmospheric Research
 Maggie Walser, National Research Council
 Tom Watson, U.S. Department of Homeland Security
 John Wertman, Association of American Geographers
 Gene Whitney*, Independent Consultant
 Len Willitts, Department of State
 Foreign Consequence Management Program
 Katya Wowk, National Oceanic and Atmospheric Administration
 Whitney Wyckoff, E & E Publishing / Greenwire
 Jacqueline Yamasi, Federal Emergency Management Agency
 Wen-huei (Phil) Yen, Federal Highway Administration
 Warren Youngblood, Federal Emergency Management Agency
 Dorothy Zolandz, National Research Council

* Denotes study committee member

† An additional 440 people registered from across the nation and around the world to view the morning event via live webcast. In order to try to draw in as many diverse perspectives as possible to this event within available resources, announcements about the event with registration information were sent to more than 1,000 individuals nationally and internationally with the encouragement to share the meeting information with their networks and on their blogs.

ATTENDEES OF AFTERNOON WORKSHOP

Joseph "Bud" Ahearn, CH2M Hill Ltd. and U.S. Air Force (Retired)
 Ray Alexander, U.S. Army Corps of Engineers
 David Applegate, U.S. Geological Survey
 James Bohland, Virginia Polytechnic Institute and State University
 Nicole Boothman-Shepard, Jacobs Engineering
 Peter Boynton, Northeastern University
 Stephanie Bray, U.S. Army Corps of Engineers
 Andrew Bruzewicz, U.S. Army Corps of Engineers
 Arrietta Chakos, Urban Resilience Strategies
 David Cleaves, USDA Forest Service

Nell Codner, National Oceanic and Atmospheric Administration
 Patrick Crawford, Feeding America
 Susan Cutter, University of South Carolina
 Margaret Davidson, National Oceanic and Atmospheric Administration
 Tamara Dickinson, White House Office of Science and Technology Policy
 Daniel Dodgen, Department of Health and Human Services
 Warren Edwards, Community and Regional Resilience Institute
 Stephen Flynn, Northeastern University
 Christopher Furlow, Ridge Global LLC
 Gerald Galloway, University of Maryland at College Park
 Corey Gruber, Federal Emergency Management Agency
 Jack Harrald, Virginia Polytechnic Institute and State University
 Edward Hecker, U.S. Army Corps of Engineers
 Natalie Jayroe, Second Harvest Food Bank of Greater New Orleans
 Kevin Kelley, American Red Cross
 Scott Knowles, Drexel University
 Robert Kolasky, U.S. Department of Homeland Security
 Howard Kunreuther, University of Pennsylvania
 Kayed Lakhia, Federal Insurance Mitigation Administration
 Linda Langston, Linn County Supervisor, Iowa
 Lauren Leuck, U.S. Army Corps of Engineers
 Brian Lewis, Department of State
 Onora Lien, Public Health - Seattle & King County
 Meredith Li-Vollmer, Public Health - Seattle & King County
 John Lyons, U.S. Department of Homeland Security
 Harry Mayfield, Lewis Burke Associates
 Robert Meyer, University of Pennsylvania
 Erwann Michel-Kerjan, University of Pennsylvania
 Matthew Payne, Federal Emergency Management Agency
 Patrick Powell, Golden Triangle Business Improvement District
 Nick Prins, Oak Ridge National Laboratory
 Claire Rubin, Claire B. Rubin & Associates, LLC
 Monica Schoch-Spana, University of Pittsburgh Medical Center
 Susan Scrimshaw, The Sage Colleges
 Ellis Stanley, Hammerman & Gainer International, Inc.
 Jeffrey Stiefel, U.S. Department of Homeland Security
 Daniel Stoecker, National Voluntary Organizations Active in Disaster
 Tom Tait, City of Anaheim, California
 Michael Useem, University of Pennsylvania
 Gene Whitney, Independent Consultant
 Len Willitts, Department of State
 Warren Youngblood, Federal Emergency Management Agency

Appendix D

List of Questions for Afternoon Breakout Sessions

National Resilience Scorecard Development

(1) Scorecard content and structure

- What broad categories of information are important to include in a scorecard (e.g. health, infrastructure, emergency management structure, socioeconomic context, building codes)?
- How would we measure these? Are there specific indicators for each of these and which ones are most important?
- Which data are/are not available at the community level to measure these specific indicators?
- How should these indicators and data be incorporated in one scorecard (quantitative, qualitative, some combination of these) to maximize use and effect?

(2) Scorecard application and process (group learning and goal setting)

- Are there any measurement “best practices” or operating principles that communities should use when setting goals and evaluating progress over time?
- How can the federal and community coalition roles in scorecard development be linked for best result?

(3) Ensure scorecard development in the short and long term

- What are two steps that we can take (at federal, state, or local levels, including the private sector) in the next 1-2 years to move the scorecard forward?
- What are two steps that we can take (at federal, state, or local levels, including the private sector) in the next 3-5 years to move the scorecard forward?

National Resilience Scorecard Implementation

(1) Scorecard engagement—involving communities

- How can federal agencies successfully engage with communities, including the private sector, to develop a general scorecard framework and who should be engaged at the non-federal level? What are the challenges to this kind of engagement?
- Once a national scorecard framework is established (or while it is being established), what mechanisms can be used by local leaders to engage their communities in tailoring the scorecard to their specific circumstances?
- How will community scorecards help the federal government to tailor their approaches and policies to increase national resilience?

(2) Ensure scorecard implementation in the short and long term

- What incentives can be used by local leaders to encourage citizens, neighborhoods, communities to employ the scorecard and become engaged in building their own resilience?
- How can the federal and community coalition roles be linked for best result in scorecard development and implementation?
- What support will local communities require from state and federal levels in order to be able to use the scorecards effectively?
- What types of guidance should accompany the scorecard to support its adoption and application by local and regional communities?
- What are two steps that we can take (at federal, state, or local levels, including the private sector) in the next 1-2 years to move the scorecard forward?
- What are two steps that we can take (at federal, state, or local levels, including the private sector) in the next 3-5 years to move the scorecard forward?

Risk Management

- (1) What knowledge base is required for developing risk management strategies to make communities and the nation more resilient with respect to natural disasters?
- (2) What roles should the private sector and the public sector (federal, state, local government and communities) play in the development of these risk management strategies?
- (3) In developing risk management strategies, how does one incorporate behavioral factors that impact on the decision-making process?

Two questions that could be posed to the breakout groups that they will want to address at the end of the session are:

- (1) What actions should be taken in the next year or two in developing risk management options?
- (2) What are viable long-term risk management strategies that have a good chance of being implemented over the next 5-10 years?

Community Coalitions

- (1) Weave the full fabric of the community into the coalition
 - Who are the critical partners in establishing community coalitions at the local level? Who should be included as members of a coalition?
 - What concrete incentives can be established to entice the private sector, CBOs and FBOs, and representatives of vulnerable populations to join the coalition?
 - What are some examples of community partnerships that have successfully brought all the key stakeholders to the table? How can their experience be replicated?
- (2) Develop organizational capacity and leadership to sustain the collaboration
 - What short-term, low-cost actions can be taken to foster development and maintenance of community coalitions?
 - What roles can federal and state governments play to help nurture and sustain community coalitions?
 - How could a block-by-block approach to resilience (including planning, response, and recovery) be incorporated by communities to establish and maintain coalitions?
- (3) Ensure the coalition's short- and long-term commitment to planning and risk management
 - How could the coalition best ensure that resilience to disasters is integrated into the community's other strategic objectives?
 - What role could a National Resilience Scorecard (or other measurement tool) play in supporting community resilience planning?