Disaster Preparedness: Concepts, Guidance, and Research

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Report prepared for the Fritz Institute Assessing Disaster Preparedness Conference
Sebastopol, California, November 3 and 4, 2006.

Table of Contents

Tables

Appendices

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Introduction

Preparedness for disasters is critical for households, businesses, and communities, but many remain unprepared. As recent disasters serve to highlight the need for individual responsibility, local coordination, and continuity plans to ensure the ability to respond to and recover from major events, the federal government has prioritized national preparedness as a goal without developing a system to achieve and maintain it. Furthermore, public entities have been charged with assessing their state of readiness and identifying strengths and areas of weakness as a requirement for receiving federal funding and Homeland Security grants. In response, some communities have chosen to utilize voluntary accreditation programs such as the Emergency Management Accreditation Program in order to assess their ability to respond to disaster while others have relied on internal resources. The end result is an inconsistent, non-standardized series of self-reports that may or may not reveal an entity's true state of disaster preparedness. In an effort to move toward the development of reliable, valid preparedness metrics, we provide a summary of the concepts, guidance, and research that informs an understanding of what it means to be prepared as a household, a business, and a community. This research will be useful for groups responsible for public education campaigns, business continuity programs, and emergency responders, as well as those who have an interest in developing a standardized index to measure disaster preparedness.

This report describes concepts and measures that social scientists and practitioners employ in assessing preparedness activities carried out by households, public agencies, private sector entities and communities. It also reviews key guidance on how to enhance preparedness efforts. The report is based on a systematic review of research instruments, preparedness guidance, and literature from a variety of sources, including archived research data, guidance from federal agencies, documents promoting best practices for preparedness in households, businesses, and communities, and the substantial scholarly literature that exists on preparedness and planning. We also conducted a survey of business journals published in the past five years in order to assess the extent to which research-based guidance is available to business continuity professionals (see Appendix A and B for methods related to these scans; see Appendix C for a complete listing of the articles in each of the business continuity journals surveyed).

In assessing surveys on preparedness practices, we used two major archives containing preparedness assessment surveys. The first archive, which was assembled by the UCLA Center for Public Health and Disasters, focuses on public preparedness for earthquakes in California; a second archival source included surveys that were conducted by the Disaster Research Center at the University of Delaware and that focused on businesses and disasters. In total we reviewed and compared items for 14 different surveys from these two sources (summaries of individual survey items, see Appendix J).

Preparedness guidance reviewed for this report included documents from federal agencies such as the Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA), as well as non-governmental agencies and other organizations, including the American Red Cross (ARC), the Business Executives for National Security (BENS), the National Fire Protection Agency (NFPA), and the Emergency Management Accreditation Program (EMAP). Many of these documents contain checklists designed to provide guidance on recommended preparedness measures for households, businesses, and communities.

We analyzed the survey questions and preparedness guidance by looking for key themes and recommended preparedness measures, in order to identify preparedness goals (referred to here as dimensions) and activities associated with preparedness. Major dimensions of preparedness were sometimes explicitly discussed in guidance documents on preparedness. We used these dimensions to further categorize the activities that were included in the checklists and survey questions that focused on preparedness.

The research instruments and the preparedness guidance used in this study are cataloged in the appendices of this document and are organized by unit of analysis—that is, households, businesses, and communities. Surveys are followed by guidance documents and are analyzed based upon dimensions and activities that appeared in the various documents surveyed. (See Appendices D-I.)

Organization of This Report

This report is organized into three sections. In the first section, we identify preparedness dimensions and activities that cross all three units of analysis. These broad descriptions serve as a framework to categorize the variety of activities commonly associated with disaster preparedness. Here we supply a number of definitions for preparedness and contrast preparedness with mitigation, in order to clarify overlapping borders of the two types of activities. We make use of these definitions to set boundaries for the various dimensions that are used to analyze the data found in the research instruments and the preparedness guidance.

In the second section we turn to a discussion on the metrics used to measure and evaluate preparedness activities identified in the survey instruments and preparedness guidance. Here we utilize the dimensions identified in the first section to categorize and discuss the specific preparedness activities that are associated with households, businesses, and communities and comment on the metrics used to assess preparedness at the various units of analysis. Throughout this section, we refer to a set of appendices which catalog the metrics found in the research instruments and preparedness guidance based upon the dimensions we identified in the first section.

In the third section we focus on general principles of preparedness that are applicable to any unit of analysis, for all types of hazards. In contrast with the two earlier sections of the report, the third section focuses on how preparedness activities should be carried out, as opposed to what should be done. We make use of the multiple dimensions

and activities described in sections one and two to develop a comprehensive picture of what it means to be prepared for disaster.

What is Disaster Preparedness?

Social scientists, emergency managers, and public policy makers generally organize both research and guidance around four phases of disaster loss reduction: mitigation, preparedness, response, and recovery. According to a newly-released report by the National Research Council (NRC 2006), the core topics of hazards and disaster research include: hazards research, which focuses on pre-disaster hazard vulnerability analysis and mitigation; and disaster research, which focuses on post-disaster emergency response and recovery. Preparedness intersects with both of these two areas, serving as a temporal connector between the pre-impact and post-impact phases of a disaster event. Preparedness is typically understood as consisting of measures that enable different units of analysis—individuals, households, organizations, communities, and societies—to respond effectively and recover more quickly when disasters strike. Preparedness efforts also aim at ensuring that the resources necessary for responding effectively in the event of a disaster are in place, and that those faced with having to respond know how to use those resources. The activities that are commonly associated with disaster preparedness include developing planning processes to ensure readiness; formulating disaster plans; stockpiling resources necessary for effective response; and developing skills and competencies to ensure effective performance of disaster-related tasks.

The concept of disaster preparedness encompasses measures aimed at enhancing life safety when a disaster occurs, such as protective actions during an earthquake, hazardous materials spill, or terrorist attack. It also includes actions designed to enhance the ability to undertake emergency actions in order to protect property and contain disaster damage and disruption, as well as the ability to engage in post-disaster restoration and early recovery activities.

Preparedness is commonly viewed as consisting of activities aimed at improving response activities and coping capabilities. However, emphasis is increasingly being placed on *recovery preparedness*—that is, on planning not only in order to respond effectively during and immediately after disasters but also in order to successfully navigate challenges associated with short- and longer-term recovery.

The Capability Assessment for Readiness (CAR), which was developed by FEMA and the National Emergency Management Association (NEMA) identifies thirteen elements that should be addresses by states in their preparedness efforts. Those elements are:

- Laws and Authorities
- Hazard Identification and Risk Assessment
- Hazard Mitigation
- Resource Management
- Direction, Control, and Coordination

- Communications and Warning
- Operations and Procedures
- Logistics and Facilities
- Training
- Exercises, Evaluations, and Corrective Actions
- Crisis Communications, Public Education, and Information
- Finance and Administration

Mitigation and preparedness are sometimes conflated with one another (as they are in the list above), in part because they are intertwined in practice. Indeed, definitions contained in key resource documents reviewed for this project illustrate this conceptual blurring. For instance, the National Fire Protection Association (NFPA) defines preparedness as:

> activities, programs, and systems developed and implemented prior to a disaster/emergency that are used to support and enhance mitigation of, response to, and recovery from disaster/emergencies (NFPA 1600).

FEMA defines preparedness as:

> the leadership, training, readiness and exercise support, and technical and financial assistance to strengthen citizens, communities, state, local, and tribal governments, and professional emergency workers as they prepare for disasters, mitigate the effects of disasters, respond to community needs after a disaster, and launch effective recovery efforts (www.fema.gov).

Both these definitions make reference to mitigation, but disaster scholars and emergency management professionals generally define mitigation as actions that are taken well in advance of disasters that are designed either to avoid or reduce disaster-related damage. Mitigation measures include appropriate land-use and coastal zone management practices, mandatory and voluntary building codes, and other long-term loss reduction efforts. In some cases, mitigation can also include moving neighborhoods and communities to other locations in order to avoid future losses. Mitigation activities can take the form of specific projects, such as elevating homes for flood protection, as well as *process*-related activities, such as hazard and vulnerability analyses, that are designed to lead to future mitigative actions. However, some discussions, such as those cited above, also use the term "mitigation" to refer to actions taken *after an event occurs* that are designed to contain impacts so that they do not become more severe. In this sense, some would see efforts to contain an oil spill as a "mitigative" measure, even though spill containment is commonly thought of as an element in oil spill emergency response.

Providing additional clarification, the National Research Council report states that "hazard mitigation consists of practices that are implemented before impact and provide *passive* protection at the time impact occurs. In contrast, emergency preparedness practices involve the development of plans and procedures, the recruitment and training of staff, and the acquisition of facilities, equipment, and materials needed to provide

active protection during emergency response" (NRC 2006, p. 86 emphasis in the original).

Passive mitigation activities can be further separated into categories such as "process mitigation" or "indirect" activities that lead to policies, practices and projects that reduce risk. Such activities might also be referred to as "non-structural" mitigation activities. These include: efforts to assess hazards, vulnerability and risk; conduct planning to identify projects, policies and practices and set priorities; educate decision-makers and build constituencies and political will; efforts to facilitate the selection, design, funding and construction of projects; land-use planning to limit or prevent development in floodplains, building codes to reduce losses from earthquake and hurricanes and fires, and designing buildings to facilitate surveillance. (NIBS/MMC; USACE; Waugh, 2000).

In contrast, "project mitigation" or "structural" mitigation activities include measures to avoid or reduce damage resulting from hazard events. They include projects to elevate, acquire and/or relocate buildings, lifelines and structures threatened by floods, strengthen buildings to resist earthquake or wind forces, and to improve drainage and land conditions and the building of dams and levees to prevent flooding (NIBS/MMC; Waugh, 2000). (The USACE considers disaster-proofing buildings and removing buildings from hazard zones non-structural mitigation activities).

The NRC report highlights the importance of both emergency preparedness and disaster recovery preparedness and emphasizes that response and recovery preparedness involve distinct sets of activities. Emergency preparedness provides short-term solutions during an emergency response that will support the longer term efforts of disaster recovery. Disaster recovery preparedness practices involve participating in activities and gathering materials needed "to provide rapid and equitable disaster recovery after an incident no longer poses an imminent threat to health and safety" (NRC 2006, p. 86). Recognizing that the immediate post-disaster emergency period is not the time to begin developing disaster recovery strategies, the city of Los Angeles has included a "recovery and reconstruction" element in its emergency operations plan. One key resource for disaster recovery preparedness is "hazard insurance, designed to provide financial protection from economic losses caused by a disaster event" (NRC 2006, p. 19).

There are a few activities discussed in the disaster literature that appear to span both mitigation and preparedness phases. One example is the development of warning systems, evacuation plans, disaster communications, and public education, which some sources (USACE; Waugh, 2000) view as mitigative because such practices must be implemented long before a hazardous event. As systems or plans, they serve as passive protection to support emergency response and recovery. At the same time, warning systems and plans can also be seen as a key element in disaster preparedness, since part of being prepared involves knowing how to respond when warnings are issued.

Emergency preparedness activities differ according to which social unit, (households, businesses, communities, public or governmental entities) is involved. For

instance, for local emergency management agencies, disaster preparedness focuses on establishing authorities and responsibilities for emergency actions and resources to support those actions. Preparing for disasters includes leadership, training, readiness and exercise support as well as technical and financial assistance (www.fema.gov). For local emergency management agencies and other crisis-relevant organizations, preparedness means developing emergency operations plans and then training, exercising and testing in order to be ready to respond to a disaster, crisis, or other type of emergency situation (www.fema.gov, Haddow and Bullock 2006). Other aspects of preparedness include the designing, equipping, and managing emergency operations centers (EOCs); developing partnerships with various community sectors (e.g., businesses, community-based organizations); and educating the public on disaster loss reduction.

Disaster preparedness for business organizations often focuses on activities designed to prevent physical damage and inventory loss, protect critical business records, and avoid downtime. Common preparedness measures center on information security and continuity of operations following a hazardous event. Business continuity planners conduct impact analyses to identify supply chain vulnerabilities and to establish backup resources in order to continue the flow of products to customers and clients. For households, disaster preparedness includes a range of measures and activities, including developing household disaster response plans, learning about evacuation routes and procedures, and knowing how to undertake expedient emergency measures, such as boarding up windows when a hurricane threatens or shutting off gas lines when an earthquake strikes.

Elements and Dimensions of Disaster Preparedness

As used in the disaster literature, the concept of preparedness has a variety of dimensions that are in turn supported by a number of activities.[1] *Dimensions* of preparedness consist of the various goals or end-states that preparedness seeks to achieve. *Activities* are concrete actions that need to be taken in order to meet those goals. Sources vary in terms of how dimensions and activities are defined. Recommendations on public education campaigns for households emphasize four dimensions of preparedness; as noted above, FEMA's CAR specifies thirteen areas for targeted preparedness efforts; standards for business and industry focus on twelve different dimensions, while efforts to create accreditation standards for communities have highlighted fifteen, and the Department of Homeland Security (DHS) has identified 37 "target capabilities" for all-hazard preparedness.

[1] We use the terms "dimensions" and "activities" to discuss preparedness concepts. Other guidance and survey material examined in this work chose other ways to describe these concepts. For instance, in his research on Bay Area businesses, Mileti identifies preparedness as a "concept" and a number of activities such as planning, mutual aid, drills, and training are identified as "variables." The Emergency Management Accreditation Program (EMAP) discusses "program areas" in contrast with dimensions. FEMA's Capabilities Assessment for Readiness (CAR) describes "attributes" of preparedness and "characteristics" that fulfill these attributes.

Despite these differences, common themes appear both in research on preparedness and in guidance documents. In the following section, we will discuss key dimensions of preparedness and their associated activities, with an emphasis on dimensions and activities that cut across different units of analysis.

As shown in Table 1, at the most general level, it is possible to identify eight dimensions or desired end-states for preparedness activities: (1) hazard knowledge; (2) management, direction, and co-ordination of emergency operations; (3) formal and informal response agreements; (4) resource acquisition aimed at ensuring that emergency functions can be carried out smoothly; (5) life safety protection; (6) property protection; (7) emergency coping and restoration of key functions; and (8) initiation of recovery activities. Descriptions that follow focus on each of these key dimensions and their associated activities.

Hazard Knowledge: Hazard Identification and Risk, Impact, and Vulnerability Analysis

All preparedness activities must be based on knowledge about hazards, the likelihood of different types of disaster events, and likely impacts on the natural and built environment, households, organizations, community institutions and communities. Types of information that provide a focus for preparedness activities include the potential for detrimental impacts of the hazards on health and safety, continuity of operations and government, critical facilities and infrastructure, delivery of services, the environment, economic and financial conditions, and regulatory and contractual obligations. Loss estimation tools such as HAZUS and HAZUS-MH were designed specifically to help communities envision the potential impacts of future disasters and mitigate and prepare for such events. Community-based disaster scenarios also provide a solid basis for preparedness efforts.

Community outreach and the development of plans for crisis communications and public information are vital for the continuity of operations in businesses and to ensure public trust within a community. Partnerships between public and private entities that have been established and maintained prior to a disaster event will influence the sharing of resources through mutual aid and enable a capability to deliver emergency public information through previously identified channels. Activities include the identification of publics that will be in need of information and developing communications plans and identifying private resources that can be used in service to the community for response and recovery.

Table 1. Preparedness Dimensions and Activities

Dimensions of Preparedness	Associated Activities
Hazard Knowledge	Conducting hazard, impact, and vulnerability assessments; Using loss estimation software, scenarios, census data; Understanding potential impacts on facilities, structures, infrastructure, populations; Providing hazard information to diverse stakeholders
Management, Direction and Coordination	Assigning responsibilities; Developing a division of labor and a common vision of response-related roles and responsibilities; Forming preparedness committees, networks; Adopting required and recommended management procedures (e.g., National Incident Management System); Providing training experiences, conducting drills, educating the public
Formal and Informal Response Plans and Agreements	Developing disaster plans, evacuation plans, memoranda of understanding, mutual aid agreements, collaborative partnerships, resource-sharing agreements; Participating in broader and more general planning arrangements (e.g., neighborhood and community preparedness groups, Urban Area Security Initiative regional plans, industry-wide preparedness initiatives)
Supportive Resources	Acquiring equipment and supplies to support response activities; Ensuring coping capacity; Recruiting staff; Identifying previously unrecognized resources; Developing logistics capabilities
Life Safety Protection	Preparing family members, employees, others to take immediate action to prevent death and injury, e.g., through evacuating, sheltering in place, using "safe spaces" within structures, taking emergency actions to lessen disaster impacts on health and safety; Containing secondary threats, e.g. fire following earthquakes
Property Protection	Acting expediently to prevent loss or damage of property; protecting inventories, securing critical records; Ensuring that critical functions can be maintained during disaster; Containing secondary threats
Emergency Coping and Restoration of Key Functions	Developing the capacity to improvise and innovate; Developing the ability to be self-sustaining during disasters; Ensuring the capacity to undertake emergency restoration and early recovery measures
Initiation of Recovery	Preparing recovery plans; developing ordinances and other legal measures to be put into place following disasters; Acquiring adequate insurance; Identifying sources of recovery aid

Management, Direction, and Coordination (MDC)

This dimension of preparedness centers on strategies that make it possible for households, organizations, and other units of analysis to manage both preparatory activity and response processes. The MDC dimension includes identifying lines of authority and responsibility and specifying how resources will be managed, information analyzed, and decisions made. For example, guidance documents advise businesses to prepare for disaster by organizing an emergency management group that includes representation from the affected area, security, safety and health, environment, maintenance, human resources, planning and logistics, and public relations. Local emergency management agencies and crisis-relevant organizations must now adopt the National Incident Management System (NIMS) which requires the identification of organizational roles, titles, and responsibilities for each incident management function specified in the emergency operations and response plan.

The MDC dimension also includes activities that are designed to ensure that emergency operations will be carried out effectively when disaster strikes. These activities include training, drills and exercises, and educational activities for members of the public, households, and businesses.

MDC also includes developing policy, vision, and mission statements; developing and using enabling authorities; setting performance objectives; and assigning responsibilities in areas such as oversight and coordination.

Formal and Informal Response Agreements

This dimension of preparedness consists of activities targeting the development of disaster plans and other agreements. Such plans can be either informal or formal. Households, for example, can plan informally to address challenges such as evacuation, sheltering in place, and reunification of family members who are separated when disasters strike. A family disaster plan consists of elements such as communications between family members, identifying safe locations for shelter, determining evacuation routes and how to reconnect when separated from loved ones.

For organizations, multi-organizational response networks, and communities, preparedness activities center on the development and adoption of formal disaster plans, memoranda of understanding, mutual aid agreements, and other agreements that facilitate coordinated response activities. The concept of mutual aid, or the "sharing of personnel, equipment, and facilities…which occurs when local resources are inadequate to meet the needs of the disaster" (McEntire, p. 34-35) is applicable across a wide spectrum of groups, organizations, and jurisdictional levels.

Also important are formal and informal arrangements that link households, community organizations, and businesses with broader and more comprehensive preparedness efforts. For households, this could include participation in CERT (Community Emergency Response Teams) teams, Citizens Corps, and volunteer

networks. Non-profits and community-based organizations may link with broader VOAD (Volunteer Organizations Active in Disaster) networks. In the Bay Area, CARD (Collaborating Agencies Responding to Disaster) performs this linking function for local community agencies. Individual businesses can also establish linkages with private sector and industry-based partnership networks.

Supportive Resources

Management activities and preparedness agreements are of little use unless resources are available to support response activities. The goal of resource management is to identify and establish internal and external resources necessary for disaster response and recovery. Identifying resource needs, acquiring resources, and storing and distributing resources are thus key preparedness dimensions. The resource management dimension of preparedness is closely tied to the planning dimension in that plans commonly involve strategies for resource sharing, such as mutual aid agreements.

Included in the concept of resources are human, material, and informational sources of support. Skilled, well-trained personnel and staff constitute critical resources. Communications resources are critical for all response activities at all levels of analysis, although communications media can vary from low-tech to very high-tech. Disaster response tasks—such as evacuation and other self-protective measures, search and rescue, emergency medical care, fire suppression, debris removal, emergency transportation, security and credentialing, and response coordination—have specific resource and logistical requirements that must be taken into account during the planning process.

Included in the concept of resources are human, material, and informational sources of support. Skilled, well-trained personnel and staff constitute critical resources. Technologies to assist with important crisis-relevant tasks such as public warning are also critical for effective response. Communications and warning systems are essential to any business operation or community emergency response. They are needed to report emergencies, warn personnel of the danger, keep families and off-duty employees informed about what's happening at a facility or within a department, coordinate response actions, and keep in contact with customers and suppliers. Preparedness for communications and warning include the development of a communications plan, the establishment of a warning system including developing protocols and procedures, regular testing and support, and addressing the interoperability of multiple responding organizations and personnel.

The resource dimension also includes efforts designed at mobilizing resources to continue with operations when key resources are destroyed. Businesses and communities must prepare for the possibility that an alternate facility, in addition to the primary facility, will be needed for recovery and resumption of services following a disaster event. Emergency preparedness for a community may include an alternate emergency operations center, efforts to introduce redundancy into key response systems, and procedures to locate, acquire, store, and test back-up resources.

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Life Safety Protection

Protecting the health and safety of family members, vulnerable populations, employees and customers, and community members is a top priority during an emergency or disaster. Preparing to take action includes the creation of a disaster supplies kit with items such as food, clothing, first aid supplies, tools, and key documents. It also includes the designation of evacuation routes and exits, shelter, training and information on safety procedures, incident stabilization, damage assessment, and the identification of resources needed to support response and recovery operations.

Property Protection

Property protection and hazard mitigation include preparedness activities to protect homes, buildings, facilities, equipment and vital records that are essential to restoring operations once an emergency has occurred. Activities include the use of applicable building construction standards; hazard avoidance through appropriate land-use practices; relocation, retrofitting, or removal of structures at risk; removal or elimination of the hazard; protection systems such as fire and smoke alarms or emergency power generation systems; records preservation; facility shutdown; and the establishment of hazard warning and communication procedures.

Emergency Coping and Restoration

At the organizational level, planning activities seek to develop strategies to address problems that are likely to develop when a disaster strikes, and training seeks to ensure that all those involved in the response are able to carry out their assigned duties. Household emergency plans seek to do the same thing at the household level. However, disasters almost invariably bring surprises, and for that reason preparedness activities must also focus on improving the ability to improvise, innovate, and think creatively. Preparing to improvise may seem like a contradiction, but in fact the two concepts are complementary. Preparations seeking to enhance adaptive capacity in disasters may include extensive “what if” explorations, various kinds of thought experiments, exercises in which players are required to assume others’ roles, and discussions centering on potential worst cases. Although a family may have an evacuation plan, it is also useful to consider what would be done if the plan cannot be executed or if evacuation is impossible. What if help does not arrive in 72 hours, or if the wait for assistance is even

longer? What if both main and back-up EOCs are unavailable, as was the case for New York City at the time of the terrorist attacks of September, 2001? What if an event is so severe that the local community is totally paralyzed, as New Orleans was following Hurricane Katrina? What if critical resources are unavailable? If recent disaster experiences have taught us anything it is that systems can and do fail and that disaster plans can provide wholly inadequate in the face of unexpected contingencies.

Emergency response activities also include measures to initiate restoration activities as soon as is feasible following a disaster. Restoration of critical services and facilities is essential, both to contain further losses and to serve as a basis for initial recovery activities. Utility restoration, for example, plays a key role in making dwellings habitable and containing business interruption losses. Transportation system restoration is crucial to ensure that needed supplies and personnel can reach the impact area.

Initiation of Early Recovery Activities

Business continuity planning focuses on avoiding costly downtime, lost revenue, and disaster-induced unemployment. Preparedness for business recovery includes such elements as making contractual arrangements with vendors for post-emergency services such as records preservation, equipment repair, and engineering inspection services. It also includes measures to get employees back to work as soon as possible—even if they must work at another location. Preparedness for recovery is also important for households and communities – especially with respect the purchase of hazard insurance designed to provide financial protection from disaster-related economic losses (NRC 2006).

Communities must also plan in advance for recovery. Such planning should include the use of hazard and vulnerability analyses to determine which neighborhoods, groups of residents, and businesses will be especially hard-hit in future disasters, and then, based on this information, to decide what should be done following those events. Decisions must be made regarding emergency ordinances (e.g., to restrict access to hazardous locations) as well as new measures that may need to be undertaken to acquire vacant land for redevelopment and to ensure that mitigation issues are addressed during the recovery process. Community recovery planning also includes support that communities can provide to businesses and households to help ensure that they recover as rapidly as possible.

Units of Analysis in Disaster Preparedness Research and Guidance

Households

The household is the smallest unit of analysis for preparedness. A household may consist of an individual, a family of two or more, extended families, single parents with children, persons who are co-residing in a single residential unit, or even those who are transient. Just as “every disaster is local,” preparedness begins in the home with some

simple steps that can be taken to improve life safety, property protection, and survival from hazardous events.

Households vary in many ways that are important for understanding both disaster vulnerability and disaster preparedness. Particularly in the aftermath of Hurricane Katrina, it is clear that while many households are able to prepare for disasters, others lack the wherewithal and resources. For households, vulnerability is associated with income, education, ethnicity, age, and linguistic isolation. Factors such as income influence access to safe housing options and to insurance. Other axes of stratification play a role in making households either more or less vulnerable, better or less well prepared (for discussions, see Tierney, Lindell, and Perry, 2001; Tierney, 2005).

Businesses

All businesses operate for a profit, but an individual business may be organized as a corporation, partnership, or owner-operated entity. Businesses range from the very small to the extremely large; in the U. S., most businesses are small ones. Businesses inhabit a range of sectors and niches. Businesses may operate at single or multiple locations. A business may be part of a chain, part of a franchise, or a stand-alone operation. Like residential properties, business properties may be owned or rented, located in safe or dangerous places, or in vulnerable or disaster-resistant structures. A business may employ a team of business continuity and security experts, or have a single individual responsible for compliance with regulations on safety for hazards. These different business characteristics are associated with differential vulnerability to disasters.

Business preparedness is important not only because businesses are the engines of local, regional, and national economies, but also because many business entities become directly involved in crisis-relevant activities at the time of disasters. Businesses that perform critical services include for-profit hospitals and private utilities. Businesses may also be directly involved in disaster response through contracts and mutual aid agreements.

Communities and Organizations

A community is a social unit that may or may not be contiguous with a local political jurisdiction. The boundaries of a community may be represented by neighborhoods with common ethnicity, interest-based associations, or other social groups. However, for purposes of this discussion, the community is represented by the local political jurisdiction (municipal government, city government, county government) responsible for emergency preparedness, emergency alert and notification, emergency response and recovery (this concept of community is borrowed from Sorensen and Rogers, 1988). Communities range from small rural towns with limited governmental resources for public safety and emergency management to large municipalities with emergency operations boards and city-wide preparedness initiatives. With an increasing emphasis on regional preparedness, we also take into account regional collaboration and multi-jurisdictional planning.

Much of the discussion here looks as communities through the lens of public-sector organizations that play key roles in preparing for disasters. A partial list of such organizations includes local emergency management agencies, homeland security agencies, fire and police departments, utility service providers, offices of building and safety, public hospitals, public health systems, and departments of public works and transportation.

Also critical are the vast array of non-profit organizations that sustain communities during non-disaster times as well as during disasters. Such organizations include the Red Cross, United Way organizations, voluntary associations, community-based organizations, and other civil society institutions. Disaster preparedness is, of course, just as essential for organizations in the non-profit sector as it is for other organizations.

Preparedness Measures Across Units of Analysis

In the first section of this report, we identified eight common dimensions of preparedness and described a variety of activities that fall under each dimension. In doing so, we developed a framework to analyze data from two sets of documents: research instruments used to measure preparedness for disaster; and preparedness guidance and checklists from federal and non-governmental sources (found in Appendices D-I).

In this section, we provide a survey of preparedness measures based upon both research instruments and preparedness guidance. In each of the sections that follow, we look first at metrics used to evaluate pre- and post-disaster preparedness activities that have been included in research instruments. Preparedness measures are discussed in connection with different units of analysis—households, businesses, community organizations—because metrics and guidance tend to differ from unit to unit. Further, while guidance documents for households and businesses tend to provide recommendations that are specific to each hazard, we take an all-hazard approach and describe measures based upon the dimensions of preparedness.

Household Preparedness

Behavioral metrics and normative guidance for household preparedness generally focus on six of the dimensions discussed earlier: hazard knowledge, formal and informal response plans and agreements, life safety protection, property protection, emergency coping and restoration of key functions, and initiation of recovery. The main emphases tend to fall in the area of hazard knowledge, life safety, and property protection, with specific attention placed on assembling a disaster supplies kit, mitigation activities, and developing a family communications plan.

Public education campaigns developed by various federal and non-governmental organizations such as FEMA and the American Red Cross (ARC) target households, businesses, civic and volunteer groups, neighborhood associations, etc. in order to educate, promote, and test preparedness, emphasize these common elements in varying degrees.

Research Instruments and Guidance

For this overview of household preparedness measures, we analyzed research instruments taken from the data archive at UCLA Center for Public Health and Disasters. The archive includes nine different surveys (several of which were designed to be used for comparative purposes) and covers a time period of two decades. Survey questions measure the activities engaged in and whether or not preparedness information had been received or heard through various education campaigns. (See Appendix J for survey descriptions and Appendix D for a comparison of survey items).

In addition, we reviewed guidance from the American Red Cross (www.redcross.org), FEMA (*Are You Ready: An In-Depth Guide to Citizen Preparedness*), the National Fire Protection Agency (*Risk Watch*; http://www.nfpa.org/riskwatch/RWND/genprep.html), and a checklist on disaster supplies and activities from ready.gov (a website hosted by the Department of Homeland Security and Citizen Corps). (See Appendix E for a comparison of guidance and checklists).

Guidance from the ARC and FEMA is hazard specific; that is, it suggests specific actions geared toward mitigating, preventing, and preparing for different natural and technological events. Guidance from the NFPA addresses general household preparedness activities for all hazards and directs individuals to consult the ARC and FEMA websites for hazard-specific information. Ready.gov suggests a range of activities for household preparedness which includes "be informed," "make a plan," and "get a kit." Here we focus only on the activity of developing a household disaster preparedness supplies kit for all hazards.

Common Metrics Utilized in Surveys

Hazard Knowledge

Each of the household preparedness surveys included activities that assessed information sought or received from official and unofficial sources about the earthquake hazard in their community. Sources of information included neighborhood or block meetings, friends, relatives, and neighbors, and government sources, as well as preparedness procedures in the workplace and at schools. In addition, Mileti (1989) included a series of questions asking respondents if they had *heard* or *been advised* to take specific actions in get ready for a predicted earthquake. These actions included building a disaster supplies kit, developing a family emergency plan, specific protective actions to take, property protection measures, and community outreach and engagement.

A question about structural vulnerability to earthquake hazards was included in one survey (Mileti, 1992).

Formal and Informal Response Plans and Agreements

Eight of the surveys reviewed included questions about emergency plans, with an emphasis on developing family plans for reunification following an earthquake. Questions were also included that measured whether or not the neighborhood had developed watch groups for emergency response or had created plans to care for more vulnerable community members such as children and the elderly.

Life Safety Protection

Consistently, across all surveys, there was an emphasis on asking whether or not respondents had prepared disaster supply kits that contained water, food, a battery operated radio, first aid kit or medical supplies, and a working flashlight. Several asked whether households had learned first aid or instructed children on what to do during an earthquake.

Property Protection

Property protection questions focused on both structural mitigation, such as structural support or reinforcement of the home, and non-structural activities such as rearranging contents of cupboards or storage cabinets, storing hazardous materials safely and securing water heaters or tall bookshelves to the wall.

Initiation of Recovery

All of the surveys, except Reeder (1971), asked if respondents had inquired about or purchased earthquake insurance in preparation for recovery.

Emergency Coping and Restoration of Key Functions

One survey (Mileti 1989) inquired whether households had prepared for a disaster by canceling or delaying large purchases, canceling or delaying investments, or saving more money.

Common Measures Suggested in Preparedness Guidance for Households

Hazard Knowledge

Across all of the guidance, there is an emphasis that household preparedness begins with knowing the facts. Households are encouraged to ask what types of disasters are most likely to happen, request information from emergency managers on how to prepare for hazards common to their communities, and learn about disaster plans in the workplace, school or child care centers, and other places where they spend time. They

are also encouraged to learn about resources available for animal care after disaster and to identify what they need to do to prepare for special needs within the family.

One key resource for staying updated about impending hazards is to purchase a weather radio and to listen for watches and warnings. In addition, household members are advised to learn about official communication channels, what directives for personal protection mean, and how to respond appropriately before a disaster, during a disaster, and after a disaster in order to preserve life and property.

Formal and Informal Response Plans and Agreements

Households are encouraged to talk to family members about the hazards they face and what they will do to protect themselves, to communicate with one another, and to rejoin each other post-impact. Importantly, they are instructed to identify a family friend outside of the potential disaster area who will serve as a point of contact for family members to reconnect.

Supportive Resources

Every guidance document suggests that households assemble a disaster supply kit. The common elements in a disaster kit include the following: flashlight with plenty of extra batteries; battery-powered radio with extra batteries; first aid kit; prescription medications in their original bottle, plus copies of the prescriptions; eyeglasses, with a copy of the prescription; water, at least one gallon per person; foods that do not require refrigeration or cooking; items that infants and elderly household members may require; medical equipment and devices, such as dentures, crutches, and prostheses; change of clothes for each household member; sleeping bag or bedroll and pillow for each household member checkbook, cash, and credit cards; travelers checks; map of the area; age appropriate toys and games; identification for each family member; extra set of car keys; phone numbers; pet food and extra water for pet.

Additional supplies such as tools (pliers, shut-off wrench, tape, compass, matches in a waterproof container, signal flare, whistle, plastic sheeting, and dust masks), sanitation (toilet paper, soap, personal hygiene items, and disinfectant), and important papers (insurance policies, birth and marriage certificates, stocks, bonds, and other negotiable certificates, wills, deeds, and copies of recent tax returns, and an inventory of home possessions) are suggested as well.

In addition to assembling a disaster supplies kit with personal items, tools, and important papers, households are instructed to maintain and update their supplies on a regular basis. For instance, they are advised to test their smoke detectors monthly, to change the batteries annually, to replace items in the disaster supplies kit that may expire and to conduct fire and emergency evacuation drills.

Life Safety and Property Protection

A variety of activities are encouraged to prepare for life safety within households. These include identifying safe spots to shelter in place, determining evacuation routes, learning how to use the fire extinguisher, installing smoke detectors, stocking emergency supplies, and taking a first aid and CPR class.

Life safety and property protection measures vary depending upon the hazard in question. Preparedness for earthquakes, for instance, includes activities such as bolting down and securing to the wall studs water heaters, refrigerators, furnaces, and gas appliances. Additionally large or heavy objects and breakables should be moved to lower shelves and high, top-heavy objects should be braced. In flood-prone areas, households should elevate the furnace, water heater, and electric panel and construct barriers to stop floodwater from entering the building. Households that are at risk for hurricanes and tornadoes, households should identify a safe room (a space inside the home that is resistant to high winds or provides protection from projectile objects), or consider building one.

The American Red Cross has also developed a guidance to prepare homes for different types of hazards that includes practical information such as how to use a fire extinguisher, and how to shut off gas, water, and electricity. It also has suggestions on how to prepare financially, commuter safety, animal safety, and seniors and people with disabilities.

Initiation of Recovery

Household preparedness for disaster recovery often focuses on insurance coverage. Households are encouraged to check to see if they have adequate coverage and to purchase the appropriate items in order to protect themselves and to be more capable of restoring their homes post-disaster.

Business Preparedness

The ultimate goal of business planning for disaster preparedness and recovery is "to ensure the survival of an organization" (Haddow and Bullock, 2006, p. 178). In recent years, Business Continuity Programs (BCP) have become key components of corporate risk management initiatives in order to "allow business operations to continue under adverse conditions, by the introduction of appropriate resilience strategies, recovery objectives, and business continuity and crisis management plans" (www.drii.org).

A scan of the business continuity literature over the past five years shows that there have been an increase in the number of practitioner-focused publications on business preparedness as well as a shift in focus from information security and recovery to business continuity and prevention. Articles supporting this shift are drawn from case

studies or descriptions of activities taken to recover from a business disruption, accounts of recent disaster events, legal analysis of laws and regulations such as the Sarbanes-Oxley, HIPAA, and Graham-Leach-Bliley Acts (Goldman, 2003), or industry standards such as the NFPA 1600 (Kirvan, 2004). Few articles are supported by empirical research outside of surveys which are regularly conducted with attendees at national business continuity conferences (see Continuity Journals Scan, Appendix G). Since 2001, there has been little focus on disaster or crisis management within the top ten circulating domestic business journals. Three events (9/11, Hurricanes Katrina and Rita, and pandemic influenza planning) have each spurred a selection of articles focusing on disaster recovery (See Appendices A and B).

Business continuity programs and emergency preparedness for business and industry are likely to increase in the coming years. Haddow and Bullock (2006) suggest a number of changes that will likely take place in business continuity planning, including that:

> terrorism must be considered as a real threat to the survival of business;
> BCP will expand to include concern for the physical safety of employees;
> BCP may involve the decentralization of business operations;
> BCP may have to expand its sphere of concern to include the regional impacts of disaster (including economic impacts) in the area where a business is located;
> human relationships on which businesses depend for their survival should be a major concern.
> businesses will increasingly seek to bring recovery times as close to zero as possible;
> even greater importance will be assigned to critical data backup systems;

Professional practices for BCP have been adopted by the Disaster Recovery Institute International (DRII) and the Business Continuity Institute (BCI in the U.K.) in order to define the boundaries of the business continuity planning profession and the base of knowledge that indicates competence for DRII certification. These professional practices are a "generally accepted industry standard" (Weldon, 2005), and they serve as a summary of preparedness activities that are recognized as benchmarks for business continuity and a point of comparison with other planning guidance. Key professional practices include: project initiation and management; risk evaluation and control; business impact analysis; developing business continuity management strategies; emergency response and operations; developing and implementing business continuity plans; awareness and training programs; exercising and maintaining business continuity plans; crisis communications; and coordination with external agencies (www.drii.org).

Perhaps the most widely recognized standard on disaster/emergency management and business continuity programs is NFPA 1600. This standard has been endorsed by the National Emergency Management Association (NEMA) and has served as one of the foundational documents for the recently developed Emergency Management

Accreditation Program (EMAP) for communities and local governments. NFPA 1600 was also recommended by the American National Standards Institute (ANSI) to the 9/11 Commission as the national preparedness standard for businesses and jurisdictions. The Commission subsequently encouraged its adoption by U. S. businesses.

NFPA 1600 establishes a common set of criteria for disaster management, emergency management, and business continuity programs. It "recognizes ways to exercise plans and makes available a list of resources within the fields of disaster recovery, emergency management, and business continuity planning" (Nicholson, 2005). The standard provides criteria that those with the responsibility for BCP can use to assess current programs or to develop, implement, and maintain programs to mitigate, prepare for, respond to, and recover from disasters and emergencies. NFPA 1600 applies to both public and private programs.

Research Instruments and Guidance

For this research on business preparedness, we looked at surveys taken from the data archives at UCLA Center for Public Health and Disasters and the Disaster Research Center (DRC). They include six different surveys and include a variety of research approaches. Neither the Southern California Earthquake Preparedness Program survey nor the Bay Area Organizations survey, both of which were obtained from UCLA, were conducted in the context of a specific disaster event. Rather, these instruments sought to assess preparedness during "normal," non-disaster times. The SCEPP survey focused on how businesses were making use of educational materials to plan for disaster response and recovery. Specific questions in the SCEPP were directed to corporations, small businesses, or businesses in general. The Bay Area Organizations surveys were conducted as face-to-face interviews with public and private organizations.

The four DRC surveys analyzed here were conducted in the context of actual disaster events and included businesses in communities that were affected by earthquakes and flooding. (See Appendix J for survey descriptions and Appendix F for a comparison of survey items).

In addition, we looked at checklists and guidance from five organizations, each representing a different point of view or business emphasizing preparedness for a specific type of hazard. The following is a short summary of each document referenced (see Appendix G for a comparison of guidance from each document).

Open for Business was developed by the Institute for Business and Home Safety (IBHS) in partnership with the Public Entity Risk Institute (PERI). *Open for Business* outlines a step by step process designed to help businesses prepare for disaster response and recovery while ensuring businesses to develop business continuity.

The *Business Planning Pandemic Checklist* (www.pandemicflu.gov/) was created by the Centers for Disease Control and Prevention (CDC) to educate businesses about the

risks associated with pandemic influenza and areas of concern that should be included in business continuity programs.

Business Executives for National Security (BENS) is a nationwide organization comprised of senior business executives. We include the group's company primer (*Getting Ready*) on preparedness and response planning for terrorist and bioterrorist attacks, which was developed through a partnership between BENS and the State of Georgia office for Homeland Security.

We also included the *Emergency Management Guide for Business and Industry* (EMG), which was sponsored by a public-private partnership with the Federal Emergency Management Agency and which provides a step-by-step approach to emergency planning, response, and recovery for companies of all sizes. And finally, we included a disaster supply checklist for business preparedness for all hazards developed by the Department of Homeland Security called *ready.gov/business*[2].

Common Metrics Used in Surveys

Hazard Knowledge

Each of the business surveys reviewed include questions about hazard awareness, knowledge of civil authorities' plans and procedures, and awareness of state and federal assistance programs. The Bay Area surveys also included questions about public education campaigns and whether the respondent had recalled hearing about a variety of activities that could be taken to mitigate property damage and increase life safety. In addition, several surveys asked if businesses had conducted vulnerability assessments such as an inventory of hazardous buildings or specific areas and facilities that are at greater risk for hazards.

Management, Direction, and Coordination

Program management for hazard preparedness is prioritized in the SCEPP survey. Here, respondents are asked how they have used the guidance on earthquake preparedness especially in regards to sharing it with company leadership, obtaining support from management, and establishing a committee to initiate a preparedness program. Five of the surveys asked questions related to conducting drills, exercises or workshops for employee safety and disaster preparedness. The SCEPP survey also asked if emergency financial plans and procedures had been developed for business recovery.

Formal and Informal Response Plans and Agreements

[2] Ready.gov/business includes an online toolkit which offers planning guidance for businesses and includes sections on hazard analysis, continuity planning, emergency planning, emergency supplies, warning and evacuation, fire safety, and medical emergencies; communications plans; and preparedness for recovery through insurance, and property protection. Here we focus on the disaster supply checklist for business preparedness for all hazards.

Questions about planning included basic interest items such as [has your company] "developed a business emergency plan?" and [has your company] "developed a business disaster recovery plan?" Businesses are also asked if their plans have been incorporated into overall corporate emergency plans. In addition, the SCEPP survey and the Bay Area surveys asked respondents if inter-industry mutual aid procedures or community assistance programs have been developed.

Supportive Resources

Questions in the SCEPP survey asked if warning and communication systems are in place and if public information procedures are being developed. The other surveys didn't focus on communications between employees, between the business and the public, or on any warning systems within the facility. With respect to other resources, business surveys also focused on items such as generators, first aid kits for employees, and emergency supplies similar to those recommended for households.

Property Protection

Preparedness for property protection was addressed mainly in the SCEPP survey and the Bay Area survey. Metrics included questions on whether or not businesses had provided for protection of data and vital records, undertaken a program to make facilities more resistant to earthquake damage, as well as structural and non-structural mitigation such as storing hazardous materials and bracing shelves, equipment, or heavy objects.

Life Safety Protection

Metrics for fire safety protection focused on two aspects. One series of questions asked respondents if they had received any information on various life safety activities such as structural and non-structural mitigation and property protection measures, stockpiling food and emergency equipment, and taking a first aid class. Another series of questions asked respondents if they had actively participated in life safety measures such as storing extra fuel or batteries, stored food or water, or obtained a first aid kit.

Emergency Coping and Restoration of Key Functions

The DRC surveys and the Bay Area survey asked if businesses made prior arrangements to move to another location in case of damage, if they had stored office supplies for recovery or obtained an emergency generator as a back up energy source.

Initiation of Recovery

All of the surveys asked business respondents if they had insurance coverage, both for damage and lost inventories but also for business interruption.

Common Measures Suggested in Preparedness Guidance for Businesses

Hazard Knowledge

Across all hazard-specific guidance, businesses are instructed to assess their facility's vulnerability, ask local government agencies for information about hazards and risk, seek out recommendations for hazard prevention and protection measures, and to consider how the business would continue if the workplace or storage facilities were destroyed or inaccessible for a number of days.

Management, Direction, and Coordination

The CDC suggests that a pandemic coordinator and/or team as well as essential employees must be identified in order to develop a disaster plan and get prepared for pandemic influenza. Across all hazards, businesses are directed to develop disaster response plans for life safety, property protection, and business continuity and to instruct employees to develop household plans in order to ensure resumption of operations as quickly as possible post-disaster. Businesses are also encouraged to keep copies of design drawings accessible to assess the facility's safety post-event, establish procedures for evacuation, facility shutdown, and early release of employees, and plans for communicating with employees and their families pre- and post-disaster.

Regarding plans for communications during and following a disaster, the CDC specifies that emergency communications plans must be culturally and linguistically appropriate and that they can be enhanced through information technology infrastructures. The CDC also emphasizes that businesses develop "platforms for communicating pandemic status and actions to employees, vendors, suppliers, and customers inside and outside the worksite in a consistent and timely way, including redundancies in the emergency contact system."

Across all hazard types, employee training, exercising, and education is encouraged in order to promote life safety as well as business continuity. Activities include conducting evacuation and other safety drills and distributing safety information to employees about how to protect themselves in a disaster event.

Formal and Informal Response Plans and Agreements

Preparedness guidance emphasizes that businesses will be more effective and efficient in disaster response and recovery if multi-organizational collaboration takes place prior to the event. Businesses are encouraged to work with their community, public officials, and other businesses to promote disaster preparedness and plan for community recovery. They are also encouraged to identify community sources for timely and accurate information and to communicate with other organizations and public entities about their capability to respond internally and externally to a disaster.

Supportive Resources

The dimension of supportive resources includes activities that span several other areas. For instance, businesses are directed to develop plans to communicate with their employees during a disaster (planning is an activity of management, direction, and coordination as well as formal and informal response planning). Businesses are also directed to install smoke detectors, to establish a system for warning personnel of impending danger, and to make plans for assisting employees who may need transportation in the event of an evacuation (activities that are part of management, planning, and life safety protection).

Life Safety Protection and Property Protection

Across guidance for all hazard-types, life safety and property protection for businesses emphasize three activities: assembling a disaster supplies kit (with a NOAA weather radio); performing structural mitigation activities such as retrofitting buildings, ensuring good roof condition, and clearing buildings of any flammable or combustible materials; and non-structural mitigation activities such as bolting heavy objects to walls, moving stored items to lower shelves, and establishing preventive maintenance schedules for all systems and equipment. The CDC includes unique policy recommendations for life safety in the event of pandemic such as establishing policies for flexible worksite and flexible work hours, establishing policies for preventing influenza spread at the worksite, and establishing policies for employees who have been exposed to pandemic influenza, are suspected to be ill, or become ill at the worksite. Policy establishment falls under the dimensions of life safety protection as well as management, direction, and coordination.

Emergency Coping and Restoration of Key Functions

Businesses are advised to keep lists of key documents such as: employee contact lists, key supplier/vendor information, critical business functions, and key resources to restore damaged and destroyed items and systems. Access to each of these information items will enable an organization to resume services quickly and to move toward an early recovery.

Initiation of Recovery

Across all hazard types, businesses are advised to consult with insurance professionals to determine if insurance coverage is adequate to help them resume operations following a disaster.

Public Sector/Government Agency Preparedness

Documents containing normative guidance for public sector government agencies responsible for community preparedness for disasters are complex and multi-dimensional, often emphasizing the planning process as a key to developing collaborations and commitments between jurisdictional entities that hold disaster-related

responsibilities. In fact, the FEMA training manual on emergency management explains that "the key element of preparedness is the development of plans that link the many aspects of a jurisdiction's commitment to emergency management" (The Emergency Manager 4-2). Guidance from federal agencies, accrediting bodies, and task forces include similar dimensions and activities with differing emphasis placed on identified priority areas. Research on public sector preparedness (while limited to two surveys in this scan) addresses a variety of preparedness goals including hazard knowledge; management, direction, and coordination; response plans and agreements; life safety protection; property protection; and initiation of recovery.

Research Instruments and Guidance

For this research on public sector preparedness we examine survey instruments taken from the data archives at the UCLA Center for Public Health and Disasters. These include the Southern California Earthquake Preparedness Program (SCEPP) survey and the Bay Area Project Organization survey. As noted earlier, neither of these surveys was conducted in the context of a specific disaster event. The SCEPP survey included questions directed to public officials about the extent to which an educational document on earthquake preparedness was being used in their agencies. The Bay Area survey included face-to-face interviews with public officials with responsibilities in the areas of disaster preparedness and response (See Appendix H for a comparison of surveys).

In addition, we looked at checklists and guidance from five organizations; two federal (FEMA's *Capability Assessment for Readiness* and the DHS *Target Capabilities List*); one voluntary accreditation program for emergency management (EMAP); one taskforce on critical infrastructure (The Infrastructure Security Partnership, known as TISP), and one planning guide for rural communities (JCAHO). The following is a short summary of each document referenced (see Appendix I for a comparison of guidance from each document).

The Capability Assessment for Readiness (CAR) instrument was developed by FEMA and NEMA in 1997 as a self-assessment tool for use by states, territories, and insular areas to evaluate their own operational readiness and capabilities in emergency management. The Emergency Management Assessment Program (EMAP) is a voluntary assessment and accreditation process for state/territorial, tribal, and local government emergency management programs. The standards are based upon the National Fire Protection Association (NFPA) 1600 Standard on Disaster/Emergency Management and Business Continuity Programs, which was discussed earlier, and are tailored for state and local emergency management programs.

The Infrastructure Security Partnership (TISP) was established following 9/11 as a national forum for public and private-sector organizations to collaborate on issues regarding resilience of the nation's critical infrastructure against the adverse impacts of natural and man-made disasters. Their *Regional Disaster Resilience* guide was created to be a flexible, dynamic framework for use by all levels of government, key service providers, and other organizations in providing regional preparedness.

The Joint Commission on the Accreditation of Hospitals and Healthcare Organizations (JCAHO) is responsible for accrediting healthcare organizations across the United States. JCAHO partnered with the Illinois Department of Public Health, the Maryland Institute for Emergency Medical Services systems, and the National Center for Disaster Preparedness at Columbia University to develop *Standing Together: An Emergency Planning Guide for America's Communities* as a guide for small and rural communities.

The Department of Homeland Security has developed many planning guides and position papers on preparedness, such as *The National Preparedness Goal (HSPD-8)* and *The National Infrastructure Protection Plan.* In 2005 and 2006, DHS conducted a Nationwide Plan Review that examined preparedness planning measures across the United States. We have chosen to look at the DHS *Target Capabilities List* as a proxy for a preparedness checklist because of the specific tasks identified by DHS that Federal, State, local, and tribal entities will be expected to develop and maintain (see Appendix H for a comparison of public sector preparedness guidance).

Common Metrics Used in Surveys

Hazard Knowledge

The SCEPP survey and the Bay Area Organizations surveys both ask if the city/county has undertaken a hazard assessment, resource vulnerability analysis, structural assessment, or mapping activities for especially hazardous areas. They do not include any questions about vulnerable populations or the use of loss-estimation programs to identify potential areas of greater need in a disaster response.

Management, Direction, and Coordination

Program management is prioritized in the SCEPP survey; community leaders in city- and county-level organizations are asked if official appointments have been made for coordinating groups or committee membership for hazard planning and preparedness. The SCEPP survey also asks if any resolutions from the city/county board of supervisors have been made to enable hazard preparedness activities. In contrast, the Bay Area Organizations survey includes questions on training, drills, and exercises for public sector personnel.

Formal and Informal Response Plans and Agreements

Both surveys measure the extent to which public sector agencies have developed formal response plans and agreements. The Bay Area Organization survey asks about existing plans which the SCEPP survey inquires about the process being used (and the educational materials distributed as part of the SCEPP program) about preparing a new plan, preparing a strategy and timeline for accomplishing the planning effort, and preparing briefings or making planning committee assignments. In addition, community

outreach in the form of mutual aid between neighboring counties, cities, corporations, industry, state, and federal agencies is addressed in both surveys.

Life Safety Protection

The Bay Area Organizations survey includes a question on life safety protection with a focus and stockpiled emergency supplies.

Property Protection

Property protection is a subject covered by the Bay Area Organization survey, but not in the SCEPP survey. Respondents are asked about structural and non-structural mitigation measures that might be taken by an individual organization within a city to reduce property damage and protect lives. Also included are questions about programs to make governmental facilities more resistant to earthquake damage through activities such as structural rehabilitation, non-structural rehabilitation, and hazardous materials storage. Questions are also asked about how an agency would rate its ability to prevent losses and damages from an earthquake and how an agency would rate its ability to respond to an earthquake.

Initiation of Recovery

The Bay Area Organization survey asks if an agency has purchased earthquake insurance in order to prepare to recover from a damaging earthquake.

Common Measures Suggested in Preparedness Guidance

For each of the previous social units (households and businesses), we analyzed guidance documents and preparedness checklists based upon the dimensions outlined in the first section of this report. Public sector preparedness guidance reviewed for this report tends to be extremely detailed in the variety of activities and measures suggested to reach the end goal of preparedness. Also, in contrast with the preparedness guidance reviewed for the other units of analysis, there were no easily identifiable checklists that could be used for a comparison of measures. Therefore, we have chosen to provide a description of each document, the preparedness dimensions identified in each (extending far beyond the eight common dimensions identified in the first section of this report), and measures they promote to reach a state of preparedness.

The CAR (Capability Assessment for Readiness) is divided into thirteen Emergency Management Functions (EMF) common to emergency management programs: laws and authorities; hazard identification and risk assessment; mitigation; resource management; planning; direction, control, and coordination; communications and warning; operations and procedures; logistics and facilities; training; exercises, evaluation, and corrective actions; crisis communications, public education, and information; and finance and administration.

The CAR process seeks to answer three basic questions: Is the emergency management program comprehensive for the needs of the states? Are the goals, objectives, and mission of the organization being achieved? Is the state able to direct strategic deployment of resources and help communities and citizens avoid becoming disaster victims? (Haddow and Bullock, 2006). Using the CAR, states develop a self-profile of strengths and weaknesses in their emergency management programs that then can be used for strategic planning and budgeting. FEMA uses the aggregate data from this process to produce a national report.

Imbedded in the CAR are the dimensions of preparedness and recovery planning developed by the National Fire Protection Association (NFPA 1600). The NFPA 1600 standards were also used as a basis for the EMAP assessment and accreditation process. The EMAP combines self-assessment, documentation of compliance, independent evaluation by trained assessors, and committee and commission review in its accreditation process. The program provides an evaluation of a jurisdiction's emergency preparedness and response system; a structure for identifying areas in need of improvement and benchmarking progress; a methodology for organizing strategic planning and corrective actions and accountability in prioritizing resources; a catalyst for improved interoperability and continuity; and strengthened state, territorial, and local preparedness (www.emaponline.org). The U.S. Department of Homeland Security, Office of the Inspector General has recommended that DHS develop a system based on the EMAP standard to assess state capabilities to respond to disaster (www.emaponline.org)

EMAP preparedness dimensions are called "standards" and are organized into fifteen "program areas" each having a series of suggested tasks, activities, or capabilities: program management; laws and authorities; hazard identification, risk assessment, and impact analysis; hazard mitigation; resource management; mutual aid; planning; direction, control, and coordination; communications and warning; operations and procedures; logistics and facilities; training; exercises, evaluations, and corrective action; crisis communications, public education and information; finance and administration.

Recently, EMAP produced *A White Paper on Applying Emergency Preparedness Standards to Multi-jurisdictional Areas* in which it argued that the EMAP assessment methodology is useful not just for individual emergency management programs, but for regional preparedness efforts as well. The EMAP assessment will provide assistance to regional areas in the following areas: governance and planning-related needs, leverage resources, mitigation and protective measures, exercises, public information and media relations, inter-jurisdictional issues, consistency and interoperability.

A task force of The Infrastructure Security Partnership worked with the American Society of Civil Engineers to develop *Regional Disaster Resilience: A Guide for Developing an Action Plan* in order to to specifically address issues of critical infrastructure, communications, and collaboration regionally. The TISP guide focuses on the following areas to strengthen regional disaster resilience: awareness and understanding of interdependencies; appreciation of cyber threats and incidents; resilient and interoperable communications and information systems; risk assessment and

mitigation; cooperation and coordination; roles and responsibilities; response challenges; recovery and restoration; business continuity and continuity of operations; logistics and supply chain management; public information/risk communications; and exercises, training, and education.

As discussed earlier, JCAHO and its partner developed *Standing Together: An Emergency Planning Guide for America's Communities*, in order to assist local leaders – including elected or appointed officials, health care providers and practitioners, public health leaders, and other who are responsible for initiating and coordinating the emergency management planning effort in towns, suburbs, and rural areas throughout the United States. Several aspects set this planning guidance for preparedness apart from the other documents examined: it was developed for small, rural communities, it was written by an organization responsible for accrediting hospitals across the United States, and it includes a focus on health preparedness and vulnerable populations. The guidance identifies thirteen components, or dimensions, and suggests a number of tasks or activities to accomplish each.

The thirteen components described in the report include: define the community; identify and establish the emergency management preparedness and response team; determine the risks and hazards the community aces; set goals for preparedness and response planning; determine current capacities and capabilities; develop the integrated plan; ensure thorough communication planning; ensure thorough mental health planning; ensure thorough planning related to vulnerable populations; identify, cultivate, and sustain funding sources; train, exercise, and drill collaboratively; critique and improve the integrated community plan; and sustain collaboration, communication, and coordination.

Regional preparedness has become a national priority under *The National Preparedness Goal* (HSPD-8). One Federal initiative supporting this priority is the Urban Areas Security Initiative (UASI) managed by DHS. The implementation of a National Infrastructure Protection Plan is another national priority that seeks to enhance coordinated development of critical infrastructure protection capabilities (HSPD-7). HSPD-8 also set directives to "strengthen information sharing and collaboration capabilities" and "strengthen interoperable communications capabilities."

The purpose of HSPD-8 is to "establish policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved delivery of Federal preparedness assistance to Sate and local governments, and outlining actions to strengthen preparedness capabilities of Federal, State, and local entities." It does so by utilizing a "Capabilities-Based Planning" approach, which consists of planning, under uncertainty, to provide capabilities suitable for a wide range of threats and hazards, within an economic framework that necessitates prioritization and choice. The Capabilities-Based Planning tools and products are:

National Planning Scenarios: Planning documents that provide parameters for 15 different scenarios involving various types of terrorist attacks and other extreme events, including natural disasters, which are designed to serve as the basis for defining prevention, protection, response, and recovery tasks and identifying the capabilities needed to perform them

Universal Task List (UTL): A reference tool that provides a comprehensive menu of tasks to be performed by different disciplines at all levels of government to address major events.

Target Capabilities List (TCL): A list and description of the capabilities needed to perform critical homeland security tasks found in the UTL. The TCL identifies 36 target capabilities and is designed to assist jurisdictions and agencies in understanding and defining their respective roles in a major event, the capabilities required to perform a specified set of tasks, and where to obtain additional resources if needed. (http://www.ojp.usdoj.gov/odp/assessments/hspd8.htm)

The TCL is divided into four mission areas and one common area. These mission areas are: prevent, protect, respond, and recover. Each mission area and the associated capabilities can be seen in Table 2. The TCL mission areas expand beyond preparedness for disaster and recovery; however each target capability requires preparedness activities in order to meet the needs identified by DHS. Capabilities can be subsumed under the eight preparedness dimensions that have been identified in this report. For instance, the capabilities within the "prevent" mission area entail activities in the hazard identification and risk assessment preparedness dimension; capabilities in the "protect" mission area are similar to other activities found in the preparedness dimension of property protection.

Table 2. DHS Target Capabilities List

Common Mission Area
Planning
Communications
Risk Management
Community Preparedness and Participation
Prevent Mission Area
Information Gathering and Recognition of Indicators and Warnings
Intelligence Analysis and Production
Intelligence / Information Sharing and Dissemination
Law Enforcement Investigation and Operations
CBRNE Detection
Protect Mission Area
Critical Infrastructure Protection
Food and Agriculture Safety and Defense
Epidemiological Surveillance and Investigation
Public Health Laboratory Testing
Respond Mission Area
Onsite Incident Management
Emergency Operations Center Management

Critical Resource Logistics and Distribution
Volunteer Management and Donations
Responder Safety and Health
Public Safety and Security Response
Animal Health Emergency Support
Environmental Health
Explosive Device Response Operations
Firefighting Operations/Support
WMD/Hazardous Materials Response and Decontamination
Citizen Protection: Evacuation and/or In-Place Protection
Isolation and Quarantine
Urban Search and Rescue
Emergency Public Information and Warning
Triage and Pre-Hospital Treatment
Medical Surge
Medical Supplies Management and Distribution
Mass Care (Sheltering, Feeding, and Related Services)
Fatality Management
Recover Mission Area
Structural Damage and Mitigation Assessment
Restoration of Lifelines
Economic and Community Recovery

General Principles of Preparedness

The sections above have discussed dimensions, activities, and measures associated with disaster preparedness at the household, business, and organizational levels. The focus thus far has been on what activities should be undertaken, rather than on how to prepare. We turn next to a discussion of general preparedness strategies. We argue here that some of these recommendations can themselves serve as a basis for measurements of the quality of preparedness efforts.

Research on preparedness has resulted in general principles of preparedness that are applicable to any unit of analysis, including households, businesses, public sector agencies, networks, communities, and intergovernmental alliances. Importantly, the same general principles apply *for all types of hazards*: natural hazards, technological hazards, and intentional attacks. As seen above, the concept of preparedness is multi-dimensional and includes elements such as hazard awareness and analysis, formal plans, mutual aid agreements, enduring social and institutional relationships, resource acquisition, training and education, drills and exercises, and methods for institutionalizing lessons learned. The following process-related principles are also fundamental to our understanding of what it means to be prepared for disaster.[3]

[3] Some of these ideas are literally decades old—see, for example Dynes, Russell R., E.L. Quarantelli, and Gary A. Kreps. 1972 *A Perspective on Disaster Planning*. Disaster Research Center Report Series, No. 11.

1. Formal plans are only one element in comprehensive preparedness strategies.

Plans can be placed into a notebook and shelved until a disaster occurs and necessitates their use. "To assume that planning is complete when a written disaster plan is produced is to court trouble" (Dynes et al., 1972). Unless plans are trained, practiced, and improved upon, emergency response agencies, businesses, and households will not be ready for an emergency.

Also implicit in this guidance is the notion that households, businesses, and community agencies must continually find ways of improving their plans. Approaches for improving plans include identifying lessons learned from disaster events and adjusting plans accordingly; learning from the experiences of other communities; and seeking other sources of information, such as government and private sector guidance, that can be used to refine plans.

2. Plans mean little in the absence of other elements of preparedness.

Plans may be nothing more than "fantasy documents" (Clarke, 1999) designed to provide assurance that organizations or communities are ready for disasters or "wish lists" indicating what should happen when a major event occurs. Formal plans mean little unless resources exist to actually carry out planned activities and unless those assigned responsibility know what to do—and are able to do it—when disasters strike. One problem with the "paper plan syndrome" is that those involved may tend to think all potential problems are solved once the plan is formalized.

3. Preparedness is a process, not a product.

Obtaining a disaster supply kit, retrofitting a building, developing a business plan, or consulting with experts about potential hazards in the community are only steps in larger processes associated with preparedness. Effective planning can only take place when multiple agencies and stakeholders are directly involved on an ongoing basis in formulating plans and undertaking activities that ensure that plans can actually be carried out in a coordinated fashion. Effective response is based on prior knowledge of the capabilities and competencies of all entities designated as having tasks to perform when a disaster occurs. Such knowledge can only be developed through extensive engagement among partners. For businesses for example, site-based planning is a key process, but so is collaborating with supply-chain partners to ensure continuity in operations. One key objective of the planning process is to broaden and deepen both formal and informal connections among responding entities. Another is to identify and address gaps in preparedness and capability within and across partnership networks.

4. Preparedness efforts must be based on realistic assumptions concerning social behavior during crises.

Plans should be developed based upon what is likely to happen in a disaster, rather than on myths and misunderstandings about disaster behavior. For instance, based

on research, it is known that public panic is not a problem during disasters, but also that public information-seeking will greatly increase. Factors associated with the receipt of warning information and with public warning responses are also well understood. It is important to plan, educate, train, and focus preparedness activities in ways that have a positive effect on influencing publics to take protective actions when warnings are given. Preparedness activities should not aim at controlling behavior, but rather on understanding and accommodating normal public responses during disasters. The disaster literature is replete with examples of misguided actions based on incorrect assumptions about disaster behavior. Officials have avoided issuing warnings for fear of causing panic and have allocated public safety resources based on erroneous fears of looting. It makes little sense to develop plans that attempt to discourage members of the public from volunteering to assist in disaster response activities, because the public will inevitably seek to be involved. Rather, plans should emphasize how to incorporate volunteers into the overall response effort. Similarly, rather than planning to deal with unruly and uncooperative disaster victims, officials should assume that members of the public will be cooperative and helpful when disasters strike. Episodes of looting such as those that occurred during Hurricane Katrina, should be recognized as anomalies, rather than common patterns of public response following disasters.

5. Preparedness requires collaboration, not top-down direction – although clear guidance does help.

As in any other endeavor that seeks to enhance collaboration and cooperation, the disaster planning process must be carried out in ways that encourage "ownership" of the planning process. People are highly unlikely to feel that sense of ownership if plans are developed without the input of those who are supposed to carry them out. Guidance is essential for encouraging preparedness, but guidance should be sufficiently flexible that those who will be responsible for response and recovery activities can plan in ways that reflect their own distinctive local concerns. Overly specific, top-down directives will likely encourage a compliance-oriented rather than a collaborative mindset for those with planning responsibilities. Particularly now, when many preparedness activities are initiated at the federal government level, there is a strong need for preparedness strategies that are tied to place-specific hazard and vulnerability analyses and that are consistent with the needs of local communities, businesses, and households.

6. Planning activities should be guided by those who will actually carry out plans.

For individuals and organizations that are pressed for time and short on resources, there is a great temptation "borrow" disaster plans from other jurisdictions or hire an individual or a consulting company to write a plan. This tendency has no doubt increased as regulations and requirements regarding extreme event planning have become more stringent. However, understanding planning as a process means also understanding that there are no short-cuts to effective preparedness. As noted in the section above, preparedness measures work best when they are collaboratively developed by those who will actually be involved in responding when disasters occur. Effective planning requires

a sense of ownership of the planning process—something that is unlikely to develop if outsiders are given major responsibility for developing the plan. This is not to say that consultants should never be used in developing plans. Rather, this is an argument for using consultants and other outsiders as facilitators in a process that is owned by those who will ultimately be responsible for implementing plans.

7. Efforts should be comprehensive and inclusive, and should promote multi-organizational participation.

Disasters require inter-organizational coordination and cooperation for an effective response; therefore preparedness efforts should include all of the groups responsible for the various emergency management functions. Preparedness efforts should include representation from emergency management, law enforcement, fire, city management, public health, citizen and voluntary groups, schools, nursing homes, hospitals and health care organizations, the business community, and other sectors in order to create a network of organizations to support essential functions in a disaster event.

It is important to devise preparedness strategies that are intentionally broad in part because of the tendency for preparedness activities to be vertically integrated—or stovepiped—rather than horizontally integrated, across community organizations and sectors. Sector-based preparedness efforts are important. Law enforcement agencies, hospitals, and businesses need to plan extensively. However, effective planning efforts are those that span different organizations and sectors and that are guided by a common vision of community resilience in the face of disasters.

8. Preparedness advocates must overcome constraints, limitations, and sometimes outright opposition.

Emergency planning and preparedness efforts may face apathy from some and resistance from others (Lindell and Perry 2006). Reasons why support is generally lacking range from a resistance to thinking about disasters, to reluctance to allocate limited resources, to conflicts among organizations responsible for planning and preparedness activities. At a more general level, disaster-related issues must always compete with other concerns that are considered equally or more important. Household members who live in fear of crime and struggle daily to get by on low incomes may find it impossible spare time and resources for disaster preparedness, even if they are aware of its importance. More affluent community residents may be too busy juggling their varied responsibilities to pay much attention to a disaster that may or may not happen. Disaster preparedness may rank low on corporate and community agendas compared to pressing day-to-day problems. An enterprise that is struggling to stay afloat may not have the luxury of thinking about future disasters. Expenditures on disaster loss reduction must be weighed in light of other investments that may bring more immediate return. Planning horizons for both businesses and local governments may be short.

Preparedness efforts are quite often difficult to sustain over time. Public officials are educated and become advocates for disaster loss reduction, but then they leave office owing to term limits. If no disasters occur over a period of time, members of the public, officials, and business owners become less vigilant. Except in very unusual cases, disaster preparedness is typically "a policy without a public" (May and Williams, 1986). What this means is that strong advocacy is required to sustain preparedness efforts. Advocates typically include scientists, engineers, individual activists and groups that focus specifically on hazards and disasters, and public officials who have decided to make loss reduction one of their key priorities. Disaster preparedness must always compete with other issues, including those that enjoy more widespread public, corporate, and government support.

9. Preparedness should be risk- and vulnerability-based, but should also consider low probability/high consequence events.

Implicit in many discussions in this section is the idea that preparedness activities should be geared to local concerns—which include scientifically-based assessments of what events are likely to occur in a given community, state, or other jurisdictional area. This perspective stands in contrast with current guidance that emphasizes the need for every community to prepare for terrorist attack. While it is of course conceivable that any community may become the target of terrorism—Oklahoma City is a case in point here—the fact remains that historical disasters to some extent predict future ones. Different regions of the country are zoned according to the likelihood of earthquake-induced damage because the historical record makes that kind of zoning possible. New flood plain maps should do a better job of indicating where future floods will be most severe. Efforts to assess long-term vulnerability by taking into account future development patterns may serve as a basis for mitigation and preparedness efforts. These are examples of the types of information communities need to take into account when undertaking their own preparedness efforts and communicating about vulnerability and preparedness with households and businesses.

At the same time, preparedness efforts must address all potential disaster events. Too many communities center their preparedness activities on the last disaster, rather than on those that are likely to occur in the future. Limited resources require communities to prioritize among the events for which they will plan, but at the same time communities should not neglect to plan for low probability events, including catastrophic and near-catastrophic disasters.

10. Preparedness efforts must be designed in ways that help responders and victims anticipate surprise – e.g. through fostering the ability to adapt, improvise, and innovate.

In earlier sections of this report, we emphasized the importance of systematic planning that recognizes that disasters always contain an element of surprise. Improvisation is one of the foundations of emergency management (Kreps 1991). The ability to adapt to an unfolding situation requires both flexibility within plans and broad

permission to respond creatively to the unfolding of events that do not 'fit' well within existing planning frameworks (McEntire 2006).

Here again, Hurricane Katrina is a case in point. Many responding agencies, especially those at the state and federal levels, simply did not recognize until it was too late that Katrina was a catastrophe, rather than a garden-variety disaster. Adherence to bureaucratic rules and regulations slowed down response efforts, as key decision-makers simply refused to see that Katrina was not a disaster that could be managed through the use of standard emergency measures. Rather than encouraging creativity and improvisation, the preparedness strategies that were in place at the time Katrina struck appear to have instead discouraged decision-makers from seeking creative solutions—even though that was exactly what the situation called for.

11. Preparedness efforts should have an "all hazards" focus, while also incorporating special considerations associated with individual hazards. Preparedness activities should not be organized around specific perils.

It is well established in the disaster literature that preparedness efforts should focus on generic challenges associated with all disasters, rather than on the specific demands of different kinds of disaster events. The concept of all-hazard preparedness recognizes that, regardless of the agent causing the disaster, households, businesses, and community organizations must respond in roughly similar ways. This is not done by compartmentalizing various disaster agents and addressing each separately. Rather, the approach is to begin first by assessing what various agents have in common with respect to response demands, and only later focusing on specific contingencies. For example, responsibility for management, direction, and control (MDC) must be assumed no matter what type of disaster agent is involved. For businesses, challenges associated with business interruption are extremely important regardless of whether the source of disruption is a hurricane, an earthquake, or a technological disaster. For communities and crisis-relevant organizations, sheltering, feeding, and providing health care services to victims, restoring essential services, overcoming transportation system disruption, and removing debris are critical regardless of what type of disaster is involved. Depending on where they are located, families may need to develop evacuation plans for multiple hazards, ranging from floods to fires to nuclear plant accidents. Addressing the need for appropriate and sufficient resources is a generic preparedness task, even though specific resources needed to deal with different types of disasters vary. In cases in which hazard agents require distinctly different responses, hazard-specific planning, training, and resources are required (Perry and Lindell 2006). For example, while hurricane preparedness stresses evacuation over all other self-protective measures, preparedness for some types of hazardous materials releases may emphasize sheltering in place. Similarly, exotic disaster agents such as dirty bombs and blister agents, which are addressed in some DHS planning scenarios, present challenges that are common to other extreme events but also require special training and equipment.

Communities and organizations typically address this two-fold challenge by dividing disaster plans into generic sections that are applicable to all disasters and hazard-

specific annexes. Criteria for judging preparedness efforts apply both to generic and specific preparedness activities.

Concluding Comments

This report has sought to provide a foundation for the development of comprehensive disaster preparedness metrics spanning measures that should be undertaken by households, businesses, and community organizations. Discussions have been organized around key dimensions of preparedness, activities associated with those components of preparedness, and specific measures that have been focused on in research on preparedness and in preparedness guidance documents. Based on our review, it appears that the development of broadly applicable preparedness metrics is quite feasible. At the same time, it is important to engage multiple stakeholder groups in formulating metrics that they consider most appropriate. The discussions contained in the report are intended to serve as a first step in the collaborative development of assessment strategies for household, community, and organizational preparedness.

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