EMERGENCY PLANNING

Ronald W. Perry | Michael K. Lindell

The Wiley Bicentennial–Knowledge for Generations

Each generation has its unique needs and aspirations. When Charles Wiley first opened his small printing shop in lower Manhattan in 1807, it was a generation of boundless potential searching for an identity. And we were there, helping to define a new American literary tradition. Over half a century later, in the midst of the Second Industrial Revolution, it was a generation focused on building the future. Once again, we were there, supplying the critical scientific, technical, and engineering knowledge that helped frame the world. Throughout the 20th Century, and into the new millennium, nations began to reach out beyond their own borders and a new international community was born. Wiley was there, expanding its operations around the world to enable a global exchange of ideas, opinions, and know-how.

For 200 years, Wiley has been an integral part of each generation's journey, enabling the flow of information and understanding necessary to meet their needs and fulfill their aspirations. Today, bold new technologies are changing the way we live and learn. Wiley will be there, providing you the must-have knowledge you need to imagine new worlds, new possibilities, and new opportunities.

Generations come and go, but you can always count on Wiley to provide you the knowledge you need, when and where you need it!

William J. Pesce
President and Chief Executive Officer

Peter Booth Wiley
Chairman of the Board

This page intentionally left blank

Emergency Planning

Ronald W. Perry, Ph.D. and
Michael K. Lindell, Ph.D.

BICENTENNIAL
1807
WILEY
2007
BICENTENNIAL

Credits

Publisher
Anne Smith

Development Editor
Laura Town

Marketing Manager
Jennifer Slomack

Senior Editorial Assistant
Tiara Kelly

Production Manager
Kelly Tavares

Production Assistant
Courtney Leshko

Creative Director
Harry Nolan

Cover Designer
Hope Miller

This book was set in Times New Roman, printed and bound by R.R. Donnelley. The cover was printed by Phoenix Color.

To order books or for customer service please, call 1-800-CALL WILEY (225-5945).

ISBN-13 978-0-471-92077-0

ISBN-10 0-471-92077-0

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data
Perry, Ronald W.
Emergency planning/Ronald W. Perry and Michael K. Lindell.
p. cm.
Includes bibliographical references and index.
ISBN-13: 978-0-471-92077-9 (pbk.)
1. Emergency management—United States. 2. Hazard mitigation—United States. I. Lindell, Michael K. II. Title.
HV551.3.P46 2007
363.34’5250973—dc22 2006023044

ABOUT THE AUTHOR

Ronald W. Perry joined Arizona State University in 1983 as Professor of Public Affairs. He has studied natural and technological hazards and terrorism since 1971. His principal interests are incident management systems, citizen warning behavior, public education and community preparedness. He has published more than a dozen books and many journal articles. Perry currently serves on the Steering Committees of the Phoenix Urban Areas Strategic Initiative and the Phoenix Metropolitan Medical Response System. He also serves on the Arizona Council for Earthquake Safety and on the Fire Chiefs' Advisory Committees for the Arizona Cities of Gilbert, Mesa, Phoenix and Tempe. He holds the Award for Excellence in Emergency Management from the Arizona Emergency Services Association and the Pearce Memorial Award for Contributions to Hazardous Incident Response from the Phoenix Fire Department. He also holds both the Award for Outstanding Environmental Achievement by a Team from the U.S. Environmental Protection Agency and a Certificate of Recognition from Vice President Gore's National Partnership for Reinventing Government.

Michael K. Lindell is the former Director of the Hazard Reduction & Recovery Center (HRRC) at Texas A&M University and has 30 years of experience in the field of emergency management, conducting research on community adjustment to floods, hurricanes, earthquakes, volcanic eruptions, and releases of radiological and toxic materials. He worked for many years as an emergency preparedness contractor to the U.S. Nuclear Regulatory Commission and has provided technical assistance on radiological emergency preparedness for the International Atomic Energy Agency, the Department of Energy, and nuclear utilities. In addition, he has trained as a Hazardous Materials Specialist at the Michigan Hazardous Materials Training Center and worked on hazardous materials emergency preparedness with state emergency response commissions, local emergency planning committees, and chemical companies. In the past few years, Lindell directed HRRC staff performing hurricane hazard analysis and evacuation planning for the entire Texas Gulf coast. He has made over 120 presentations before scientific societies and short courses for emergency planners, and he has been an invited participant in workshops on risk communication and emergency management in this country and abroad. Lindell has also written extensively on emergency management and is the author of over 120 technical reports and journal articles, as well as five books.

This page intentionally left blank

PREFACE

College classrooms bring together learners from many backgrounds with a variety of aspirations. Although the students are in the same course, they are not necessarily on the same path. This diversity, coupled with the reality that these learners often have jobs, families, and other commitments, requires a flexibility that our nation's higher education system is addressing. Distance learning, shorter course terms, new disciplines, evening courses, and certification programs are some of the approaches that colleges employ to reach as many students as possible and help them clarify and achieve their goals.

Wiley Pathways books, a new line of texts from John Wiley & Sons, Inc., are designed to help you address this diversity and the need for flexibility. These books focus on the fundamentals, identify core competencies and skills, and promote independent learning. The focus on the fundamentals helps students grasp the subject, bringing them all to the same basic understanding. These books use clear, everyday language, presented in an uncluttered format, making the reading experience more pleasurable. The core competencies and skills help students succeed in the classroom and beyond, whether in another course or in a professional setting. A variety of built-in learning resources promote independent learning and help instructors and students gauge students' understanding of the content. These resources enable students to think critically about their new knowledge, and apply their skills in any situation.

Our goal with *Wiley Pathways* books—with its brief, inviting format, clear language, and core competencies and skills focus—is to celebrate the many students in your courses, respect their needs, and help you guide them on their way.

CASE Learning System

To meet the needs of working college students, ***Emergency Planning*** uses a four-step process: the CASE Learning System. Based on Bloom's Taxonomy of Learning, CASE presents key emergency planning topics in easy-to-follow chapters. The text then prompts analysis, synthesis, and evaluation with a variety of learning aids and assessment tools. Students move efficiently from reviewing what they have learned, to acquiring new information and skills, to applying their new knowledge and skills to real-life scenarios. Each phase of the CASE system is signaled in-text by an icon:

▲ **C**ontent
▲ **A**nalysis
▲ **S**ynthesis
▲ **E**valuation

Using the CASE Learning System, students not only achieve academic mastery of emergency planning *topics*, but they master real-world emergency planning *skills*. The CASE Learning System also helps students become independent learners, giving them a distinct advantage whether they are starting out or seeking to advance in their careers.

Organization, Depth and Breadth of the Text

Emergency Planning offers the following features:

▲ ***Modular format.*** Research on college students shows that they access information from textbooks in a non-linear way. Instructors also often wish to reorder textbook content to suit the needs of a particular class. Therefore, although *Emergency Planning* proceeds logically from the basics to increasingly more challenging material, chapters are further organized into sections (four to six per chapter) that are self-contained for maximum teaching and learning flexibility.

▲ ***Numeric system of headings.*** *Emergency Planning* uses a numeric system for headings (for example, 2.3.4 identifies the fourth sub-section of section 3 of chapter 2). With this system, students and teachers can quickly and easily pinpoint topics in the table of contents and the text, keeping class time and study sessions focused.

▲ ***Core content.*** This volume is designed to introduce students to the process and practice of emergency planning. The work has an "all hazards" application to complement the traditional practice of comprehensive emergency management. Emergency planning is treated as a critical avenue to community emergency preparedness. Therefore, emergency planning is presented in its many contexts: the practice of emergency management, the community for which the planning is done—including the political, private business and nonprofit sectors—and the network of intergovernmental relationships in which planning must operate.

An important emphasis in the volume is the characterization of emergency planning as a process. This process view forms the framework from which specific strategies and techniques are drawn. We educate the planner in known patterns of human disaster behavior to create a vision of actions on the ground where plan implementation takes place. Similarly, time is given to sharing emergency plan information with the public, including the goals for sharing and the social psychology of the communication process. Building from this base, the student is given a picture of what the planning process must address: preparedness, vulnerability, the notion of resources inside and outside the community, and a view of outcomes for individuals and organizations.

The book addresses a range of strategies and skills that planners require to achieve a successful planning process. The student is taught the basics of generic protective actions (for example in place protection, expedient respiratory protection and evacuation) and the planning concepts supporting effective protective action recommendations. The accepted formats are given for the two principal types of written plans—emergency operations plans and continuity of operations plans. Then in short format, we present the milestones a planner must address for dealing with disasters in future time and those that one should consider when planning for implementation of the emergency plan at the time of disaster impact.

We acknowledge that the plan is a snapshot of the planning process at one point in time and discuss the ways that plans are translated into action. We discuss the local emergency operations center, not just to describe its functions and structure, but also to explain how one plans to build an emergency operations center. The volume closes with a discussion of credentialing for emergency planners and admonitions regarding preservation of the planning process.

This text begins with an introductory chapter entitled "Introduction to Emergency Planning." This chapter provides an introduction and overview of how emergency planning fits within the field of emergency management.

Chapter 2, "The Emergency Planning Process: Mandates, Structure, and Guidelines," outlines the components of an emergency plan, principles that guide the planning process, and resources that can be used in the planning process.

Chapter 3, "Patterned Human Behavior in Disasters: What a Planner Must Know," examines the impact of disasters on people's health, as well as people's likely psychological reactions to disasters. This chapter also discusses disaster myths and how to assess patterns of pro-social or positive behavior that can support emergency plans.

Chapter 4, “Fostering Successful Emergency Planning: A Planner’s Guide to Making It Work,” examines how to assemble an emergency planning team, how to motivate the team members, and how to train the team.

Chapter 5, “Classes of Protective Action Recommendations: Emergency Planning Conditions and Considerations,” discusses different recommendations the emergency planner can make for people to take to protect themselves from the impact of different types of disasters.

Chapter 6, “Analyzing and Selecting Protective Actions: How to Make Effective Choices,” continues this discussion on protective actions and how to estimate hazard exposure.

Chapter 7 is “The Content and Format of Emergency Plans: Framing a Picture of the Planning Process.” This chapter provides an outline of what information to include in an information plan and discusses how to write a plan including what appendices should be included.

Chapter 8, “Continuity of Operations Plans: Keeping the Organization Alive,” examines continuity plans for both government and businesses. This chapter provides information about how a community can continue to operate after a disaster.

Chapter 9, “Milestones That Structure Emergency Planning: Organizing Tasks for Emergency Planners,” examines the connection between relationship planning and mitigation planning.

Chapter 10, “Population Warning: Behavioral Foundations and Practical Applications,” discusses how to detect disasters and warn the population of the disaster. Risk communication and different protective action recommendations are discussed as well.

Chapter 11, “Planning for Hazard Adjustment: Protection Adoption, Hazard Awareness, and Risk Communication,” examines different hazard adjustments and how to communicate to the public the adjustments that they need to make. The strengths and limitations of different communication channels are discussed as well.

Chapter 12, “Structures for Managing Emergency Response: Executing Emergency Plan Provisions,” examines structures such as the emergency operations center (EOC) and the incident management system (IMS) that are used in managing emergency response.

Chapter 13, “Selected Federal Emergency Planning Mandates: Balancing Local Needs with Federal Requirements,” discusses the federal laws and requirements that govern emergency management.

Chapter 14, “Emergency Planning, Professionalism, and the Future: Professional Identity, Credentials, and Prospects,” discusses the profession of emergency planning and how emergency management is evolving into a profession.

Learning Aids

Each chapter of ***Emergency Planning*** features the following learning and study aids to activate students' prior knowledge of the topics and orient them to the material:

- **Pre-test.** This pre-reading assessment tool in multiple-choice format not only introduces chapter material, but it also helps students anticipate the chapter's learning outcomes. By focusing students' attention on what they do not know, the self-test provides students with a benchmark against which they can measure their own progress. The pre-test is available online at www.wiley.com/college/Perry.
- **"What You'll Learn in This Chapter" and "After Studying This Chapter."** These bulleted lists tell students what they will be learning in the chapter and why it is significant for their careers. They also explain why the chapter is important and how it relates to other chapters in the text. "What You'll Learn…" lists focus on the *subject matter* that will be taught (e.g., what emergency planning is). "After Studying This Chapter…" lists emphasize *capabilities and skills* students will learn (e.g., how to write an emergency plan).
- **Goals and Outcomes.** These lists identify specific student capabilities that will result from reading the chapter. They set students up to synthesize and evaluate the chapter material and relate it to the real world.
- **Figures and Tables**. Line art and photos have been carefully chosen to be truly instructional rather than filler. Tables distill and present information in a way that is easy to identify, access, and understand, enhancing the focus of the text on essential ideas.

Within-text Learning Aids

The following learning aids are designed to encourage analysis and synthesis of the material, and to support the learning process and ensure success during the evaluation phase:

- **Introduction**. This section orients the student by introducing the chapter and explaining its practical value and relevance to the book as a whole. Short summaries of chapter sections preview the topics to follow.

- **"For Example" Boxes.** Found within each section, these boxes tie section content to real-world organizations, scenarios, and applications.
- **Self-Check**. Related to the "What You'll Learn" bullets and found at the end of each section, this battery of short-answer questions emphasizes student understanding of concepts and mastery of section content. Though the questions may either be discussed in class or studied by students outside of class, students should not go on before they can answer all questions correctly. Each *Self-Check* question set includes a link to a section of the pre-test for further review and practice.
- **Summary.** Each chapter concludes with a summary paragraph that reviews the major concepts in the chapter and links back to the "What You'll Learn" list.
- **Key Terms and Glossary.** To help students develop a professional vocabulary, key terms are bolded in the introduction, summary and when they first appear in the chapter. A complete list of key terms with brief definitions appears at the end of each chapter and again in a glossary at the end of the book. Knowledge of key terms is assessed by all assessment tools (see below).

Evaluation and Assessment Tools

The evaluation phase of the CASE Learning System consists of a variety of within-chapter and end-of-chapter assessment tools that test how well students have learned the material. These tools also encourage students to extend their learning into different scenarios and higher levels of understanding and thinking. The following assessment tools appear in every chapter of ***Emergency Planning:***

- **Summary Questions** help students summarize the chapter's main points by asking a series of multiple choice and true/false questions that emphasize student understanding of concepts and mastery of chapter content. Students should be able to answer all of the *Summary Questions* correctly before moving on.
- **Review Questions** in short-answer format review the major points in each chapter, prompting analysis while reinforcing and confirming student understanding of concepts, and encouraging mastery of chapter content. They are somewhat

more difficult than the *Self-Check* and *Summary Questions*, and students should be able to answer most of them correctly before moving on.

- **Applying This Chapter Questions** drive home key ideas by asking students to synthesize and apply chapter concepts to new, real-life situations and scenarios.
- **You Try It Questions** are designed to extend students' thinking and are ideal for discussion or writing assignments. Using an open-ended format and sometimes based on Web sources, they encourage students to draw conclusions using chapter material applied to real-world situations, which fosters both mastery and independent learning.
- **Post-test** should be taken after students have completed the chapter. It includes all of the questions in the pre-test, so that students can see how their learning has progressed and improved.

Instructor and Student Package

Emergency Planning is available with the following teaching and learning supplements. All supplements are available online at the text's Book Companion Website, located at *www.wiley.com/college/Perry.*

- **Instructor's Resource Guide.** Provides the following aids and supplements for teaching:
  - *Diagnostic Evaluation of Grammar, Mechanics, and Spelling.* A useful tool that instructors may administer to the class at the beginning of the course to determine each student's basic writing skills. The Evaluation is accompanied by an Answer Key and a Marking Key. Instructors are encouraged to use the Marking Key when grading students' evaluations, and to duplicate and distribute it to students with their graded evaluations.
  - *Sample Syllabus.* A convenient template that instructors may use for creating their own course syllabi.
  - *Teaching Suggestions.* For each chapter, these include a chapter summary, learning objectives, definitions of key terms, lecture notes, answers to select text question sets, and at least three suggestions for classroom activities, such as ideas for speakers to invite, videos to show, and other projects.

- **Test Bank.** One test per chapter, as well as a mid-term and a final. Each includes true/false, multiple choice, and open-ended questions. Answers and page references are provided for the true/false and multiple choice questions, and page references are provided for the open-ended questions. Available in Microsoft Word and computerized formats.
- **PowerPoints.** Key information is summarized in 10 to 15 PowerPoints per chapter. Instructors may use these in class or choose to share them with students for class presentations or to provide additional study support.

ACKNOWLEDGMENTS

The field of emergency management and the practice of emergency planning have operated in a very turbulent environment since Hurricane Katrina in 2005. Much of the uncertainty and organizational stresses have centered at the national government level, producing a tentative policy environment. ***Emergency Planning*** was written to be science-based, drawing on the decades of research about human behavior related to disasters and hazards and the knowledge and technology of natural and physical science. The content also reflects the practitioner and applied knowledge base, particularly lessons learned at local and state government levels. Ultimately, we strived for ***Emergency Planning*** to balance science and practice to give career-oriented students a basis for learning what to do, how to do it, and, most important knowing why it should be done.

No book is solely the product of its authors. Books tend to be culminations of accumulated experience that grow from many influences. We are especially grateful to our many teachers and colleagues who have taught us over the years, and desire to mention several people whose knowledge and guidance influenced this volume in particular. First among these is Carla Prater, who not only contributed wisdom and perspective, but her wonderful sense of humor. In addition we wish to thank our teachers and colleagues E.L. Quarantelli, Tom Drabek, Bill Anderson, Bob Stallings, David Alexander, Danny Peterson, and Walt Peacock. We gratefully acknowledge the insights and willingness to share of three exceptional practicing emergency managers: Marcus Aurelius (Phoenix, Arizona), Sheri Gibbons (Gilbert, Arizona), and Warren Leek (Maricopa County, Arizona). Included with Tom Skowronski, a dedicated WMD/CBRNE specialist, these colleagues helped keep accurate focus on the most critical of emergency planning venues: local government. We remain grateful for the long friendship and guidance of four Arizona fire chiefs: Cliff Jones (Tempe), Collin DeWitt (Gilbert), Harry Beck (Mesa), and Alan Brunacini (Phoenix). Each of these leaders insured our attendance to connections between planning and operations. Finally, we wish to acknowledge our debt to the police and fire service command officers who shared their experience and knowledge: Tom Abbott, Jim Bloomer, Chris DeChant, Ron Dykes, G.T. Fowler, T.J. Martin, Blake McClelland, Wade Pew, and Steve Storment.

In addition, we would like to acknowledge the National Science Foundation for supporting most of our emergency management research over the past three decades. Most recently, our research has been supported by NSF grants CMS 0219155 and SES 0527699. None of the conclusions expressed here necessarily reflects views of that agency.

Finally, good advice is subject to the slings and arrows of the authors who use it. We simultaneously thank and absolve our colleagues from responsibility for our use and interpretations. We owe a special debt to our Wiley Editor, Laura Town, and her team. Laura's writing skills were transformative, her eye for organization vital and her good humor sustaining. We also thank the Wiley reviewers, Donna Fair-Klikus (State of Colorado) and Judy Jaeger (Central Georgia Technical College), for comments and suggestions. For more than three decades of collaboration, the authors have each blamed the other for errors, omissions and problems that readers may find in our work. With each admonishing the other to listen more carefully, we shall continue this tradition.

BRIEF CONTENTS

This page intentionally left blank

CONTENTS

This page intentionally left blank

1

INTRODUCTION TO EMERGENCY PLANNING

The Contexts of Emergency Planning

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of emergency planning basics.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

- ▲ The relationship of emergency planning to emergency management
- ▲ The public policy context of emergency planning
- ▲ The mission and organization of the local emergency management agency
- ▲ The differences among emergencies, disasters, and catastrophes
- ▲ The complementary role of government and business in emergency planning

After Studying This Chapter, You'll Be Able To

- ▲ Distinguish emergency planning from operations
- ▲ Evaluate the role of vulnerability as the driver of emergency planning
- ▲ Argue that hazards issues should be on the local policy agenda
- ▲ Assess critical tasks for implementing hazard policy
- ▲ Build local resources into an emergency planning system

Goals and Outcomes

- ▲ Design planning goals for mitigation, preparedness, response, and recovery
- ▲ Evaluate the political process and use it to support emergency planning
- ▲ Support the integration of government, business, and nonprofit assets into emergency planning
- ▲ Evaluate the place of legal and statutory mandates in local emergency planning
- ▲ Assess the importance of an intergovernmental, regional, and public/private view of the emergency planning process

INTRODUCTION

Emergency planning is important and complex. We plan to ensure that a business or government is prepared for emergencies and disasters. We plan to reduce losses, both in terms of human life and in damages to property. Emergency planning is designed to achieve community or organizational preparedness. Preparedness is the ability to marshal community and extracommunity resources to reduce or minimize vulnerability. The path to preparedness includes understanding vulnerability, making choices about which threats to plan for, creating teams to make plans, and testing and revising plans. The planning process is never complete. The threat environment changes. The tools to manage threats change. The ongoing planning process continues to identify new vulnerabilities. An effective planning process recognizes changes in old vulnerabilities. The planning process also monitors changes in knowledge and technology that affect the ways we respond to emergencies and disasters. The emergency plan—sometimes called the emergency operations plan or EOP—is a snapshot of the planning process at a single point in time. Like the planning process, the plan must evolve with the current needs to be useful.

As an emergency planner, you may lead or serve as a team member in the planning process. You don't need to be an expert on every issue addressed in planning. You must know the steps in the planning process; however, you can call on a wide range of specialists to help with specific tasks. These experts may be hazard vulnerability analysts, or they may be specialists in geographic information systems. Or they may be specialists in specific threats or in different types of response (hazardous materials technicians, evacuation planners, or others). The experts consulted and the composition of the planning team are unique to the community's vulnerability profile.

Planning takes place in a variety of contexts. This is true whether you are planning for a community or an organization. Three contexts are particularly important. The primary one is the emergency management context. The emergency management system defines the goals, structure, and strategy used to deal with extreme events that can generate losses. The second is the public policy context. Emergency planning addresses ways to gather resources. Planning also addresses ways to influence the behavior of others in ways that minimize risk. The expenditure of public money and the use of rules to control behavior fall within the purview of the public policy system. To achieve your goals, you must learn to work within the limits of government and the public policy system. Finally, most planners work in a specific jurisdictional context. This is true whether the planner is a government employee planning for an entire jurisdiction or working for a private organization. For each role, the local jurisdictional context defines the emergency management system and the public policy environment. It is important to understand each of these three contexts if you are to be effective.

1.1 The Emergency Management Context

Comprehensive emergency management (CEM) is the practice of handling emergency tasks in all phases for all types of disaster agents. The phases are mitigation, preparedness, response, and recovery. Disaster agents can range from flooding to nuclear power plants to terrorism. CEM is implemented through Integrated Emergency Management Systems (IEMS). This is a process of coordinating the efforts and resources of governments and private organizations to achieve goals. The emergency planner is critical to the success of CEM. Emergency planners study vulnerability. They assemble strategies for reducing vulnerability. They then prepare plans that can be implemented to manage all phases of emergency management for all types of hazards.

1.1.1 Emergencies, Disasters, and Catastrophes

CEM looks at tasks and types of threat. We must also confront the extent to which threats are predictable. We must understand their damage scope and their frequency. E. L. Quarantelli (2005) distinguishes three types of events: emergencies, disasters, and catastrophes. **Emergencies** are defined in two different ways. Emergencies are unforeseen but predictable, narrow-scope incidents that regularly occur. They include house fires, vehicle accidents, medical crises, and small hazardous materials releases. Fire departments, emergency medical services agencies, police departments, and public works employees respond to these events by using standard operating procedures. The term emergency is also used in a broader sense to mean a future event that is expected to cause significant damage and disruption. For example, meteorologists predicted that the 2005 hurricane season would begin early. They also predicted it would involve hurricanes of much greater strength than previous seasons. This is an emergency because we know that throughout the season multiple impacts will occur. They are not precisely identified by geographic place yet, but they will produce large losses. This type of emergency is distinguished by the need for vigilance, careful monitoring, and the expectation of high losses.

Quarantelli (2000:682) defines **disasters** as sudden onset occasions that seriously disrupt social routines, cause adoption of unplanned actions to adjust to the disruption, are designated in social space and time, and endanger valued social objects. Disasters are more rare than emergencies. They are defined by human casualties, property damage, and severe social disruption. A volcanic eruption can produce massive environmental disruption. This can occur through lava flows, ash falls, floods, and mud flows. It is not a disaster, however, unless it directly impacts people or the human use system in some fashion. Disasters disrupt social interaction. They interrupt the ability of major community systems to afford reasonable conditions of life. This means that significant subsystems in a community no longer work to allow people to pursue their work, recreation, and other activities. A town's public health protections (sewage treatment or fresh water systems) may fail. The utility system may no longer provide electricity. The hospital system may no longer be able to accommodate as many patients. And there may be other system failures. The aims of CEM are to create alternate mechanisms that bridge the time between the failure of systems and their restoration to some level of functioning. A disaster disrupts only a single community. This allows external resources to support the response and recovery.

A **catastrophe** is a large scope of impact event that crosses multiple communities, produces very high levels of damage and social disruption, and sharply and concurrently interrupts community and lifeline services. A broad scope of impact greatly limits extracommunity support. In 2005, for example, Hurricane Katrina severely impacted large coastal areas of Louisiana, Mississippi, and Alabama. In this setting, small towns that might otherwise count on help from larger urban centers simply found that all communities were unable to extend support. The levels of damage and social disruption are even greater than most disasters. Most of the buildings are damaged or destroyed. This includes common systems to maintain public health and safety. This destruction interrupts much preparedness and response planning. Plans for victim shelter and medical care in the community are rendered useless. Specific damage assessment is complex. It is difficult to get to the affected areas because of the debris on the roads and the destruction of roads. Catastrophic events also devastate responders and their facilities. Following the 2004 tsunami in Indonesia, more than 90% of the medical personnel in several towns were killed. In Florida, Hurricane Andrew seriously damaged or destroyed buildings housing police, fire, welfare, and medical workers. This severely reduced their ability to mobilize. Most community functions are sharply and concurrently interrupted. Lifeline infrastructures simultaneously fail. This interrupts electric power, fuel, water, sewer, transportation, and communication service. The effect is exacerbated because the failures are simultaneous and not sequential. Responders must prioritize or triage the restoration of critical services. Social life is simultaneously interrupted. Places of employment, recreation, worship, and education are gone. Recovery from catastrophe also requires that social institutions and activities be restored. Hurricane Hugo destroyed or heavily damaged more than 90% of the buildings on St. Croix. This took away not just physical protection, but also the social functions that were tied to those places.

Emergency managers must plan for emergencies, disasters, and catastrophes. Emergencies, such as vehicle accidents and house fires, are only sometimes targets of trained planners. Planning for these events is usually done directly by the fire or police or EMS department involved in response. This planning process is more about agency logistics than about CEM. The product of the process is usually called standard operating procedure (SOP). The planner focuses on disasters and catastrophes. Large-scale, high-impact events demand the broad scope of emergency management activities that are the province of the planner.

1.1.2 The Work of Emergency Management

The work of emergency management is characterized as mitigation, preparedness, response, and recovery for environmental hazards. Within any given year, any of these hazards could produce an emergency, disaster, or catastrophe. People might live for years on the slope of a volcano. However, there might only occasionally be an eruption that endangers people and property. Emergency managers conduct mitigation and preparedness activities even when a disaster is not imminent. Response and recovery activities occur when there is a specific disaster.

Emergency management activities can be described in different ways. We know that the four activity phases are both indistinct and interdependent. They are indistinct because there isn't an absolute "beginning" and "end" to each period. They are interdependent because actions undertaken in one phase affect the type and range of actions that can be undertaken in another phase. The four-activity framework is simple and widely accepted. Planning focuses primarily on preparedness. However, planners must understand all four activities. By examining each of these phases, we can present a picture of the emergency planner's role. We can examine basic strategies and tactics available to the planner.

Mitigation activities try to eliminate the causes of a disaster. This is done either by reducing the likelihood of its occurrence or limiting the magnitude of its negative effects. The aim is to prevent a disaster before it happens. The potential human impact of an extreme natural event, such as floods, hurricanes, or earthquakes, can be altered by modifying either the natural event system or the human use system or both. In floods, the loss of life or property can be reduced by dams or levees that confine the floodwaters. Land use restrictions (zoning) limit people's intrusion into the flood plain. Only limited control can be exercised over natural event systems. Many technological hazards are controllable by their very nature as human creations. Explosives, toxic chemicals, and radioactive materials can all be produced, stored, and transported in ways that avoid adverse effects on people. However, this control can be lost. This can result in releases into the soil, surface water or groundwater, or air. The level of human control exercised is directly related to the state of knowledge and the available technology. Disasters linked to human agents like terrorists are difficult to mitigate. However, they can be addressed through detection and intelligence systems. The choice of whether to mitigate hazards by controlling the hazard agent or by controlling the human use system depends on political and economic decisions about the costs and benefits of each. Specific questions include who has control over the hazards, what degree of control is maintained, and what incentives there are for the maintenance of control. Finding answers to these questions requires knowledge of science, technology, and public policy.

Preparedness activities protect lives and property when threats can't be controlled or when only partial protection can be achieved. These activities assume that a disaster will occur. Plans, procedures, and resources must be in place in advance to support an effective response to the threat. Preparedness measures fall into two general categories. The first category is alerting members of response organizations and the public about the timing and extent of a potential disaster. The second category includes actions designed to enhance the effectiveness of response.

To alert people, you must first be able to detect the threat. Detection and monitoring systems include rainfall and river gauges. They include radar detection and tracking of severe storms. Also included are sensors and computers designed to assess the magnitude of releases of toxic or radioactive materials. Warning dissemination systems convey information about threats from authorities to the public.

Preparedness measures include:

- ▲ Developing plans for the activation and coordination of response organizations.
- ▲ Devising SOPs to guide organizations in the performance of their functions.
- ▲ Training personnel in the use of those procedures.
- ▲ Conducting exercises to test the effectiveness of these plans, procedures, and training efforts.
- ▲ Stockpiling resources.
- ▲ Assembling inventories of community resources and determining their location.

A hallmark of planning for biological terrorism is the creation of programs that stockpile antibiotics and other pharmaceuticals that can be quickly available. The CHEMPACK program operated under the auspices of the U.S. Centers for Disease Control and Prevention places pharmaceutical stockpiles in major cities for local emergency use.

Response activities are the actions of officials just before and during the disaster impact that protect public safety and minimize physical damage. This response begins with the detection of a threat. Response ends with the stabilization of the situation following disaster impact. For earthquakes, detection of the event may be no more technically sophisticated than noticing that your high-rise office building is swaying. For floods along the lower Mississippi River, there is an extensive system of instrumentation. It is integrated into a model for forecasting the timing and magnitude of the flood crest. Detection depends on the state of knowledge and technology for the hazard. Stabilization means that the risk of loss of life and property is back to "normal" levels. Response focuses on protecting people first. Response attempts to limit damage from the initial impact. Response also seeks to limit damage from secondary or repeated impacts. Response activities to limit the primary impact include:

- ▲ Securing the impact area.
- ▲ Evacuating dangerous areas.
- ▲ Conducting search and rescue for the injured.
- ▲ Providing emergency medical care.
- ▲ Sheltering evacuees and other victims.
- ▲ Mounting operations to counter secondary threats.
  - ▲ Fighting urban fires and hazardous materials releases after earthquakes.
  - ▲ Identifying contaminated water supplies or other public health threats following floods.
  - ▲ Identifying contaminated wildlife or fish in connection with toxic chemicals spilled into a reservoir.

Response actions also assess damages and coordinate the arrival of converging equipment and supplies so they may be deployed to those areas most in need.

Recovery activities begin after disaster impact has been stabilized and seek to restore lost functions. Recovery extends until the community is restored to a reasonable level of functioning. This may require long periods of time. We assume that societies function and change over time. Disasters reduce that level of functioning. Disasters alter physical resources and human interaction patterns. The level of restored functioning will not match predisaster states. However, there will come a time when temporary housing and other temporary measures are no longer necessary. This point marks the close of the recovery period. The immediate objective of recovery measures is to restore the physical infrastructure of the community. In recovery, we seek to establish an acceptable quality of life. This may be improved upon as time passes. Recovery has been defined in terms of short-range measures versus longer-range measures. We refer to short-range measures as relief and rehabilitation. We refer to longer range measures as reconstruction. Relief and rehabilitation activities usually include:

- ▲ Clearance of debris and restoration of access to the impact area.
- ▲ Reestablishment of economic activities.
- ▲ Restoration of essential government or community services.
- ▲ Provision of an interim system for caring for victims, including housing, clothing, and food.

Reconstruction activities tend to be dominated by rebuilding major structures and by efforts to revitalize the area's economic system. In some communities, leaders may view the reconstruction phase as an opportunity to institute the plans for change that existed before the disaster. Leaders may introduce mitigation measures to promote sustainability.

1.1.3 Distinguishing Emergency Planning from Emergency Operations

Emergency planning is not to be confused with operations. Planning is preparing before the event. Planning includes developing training module content and identifying and acquiring the resources. Planning begins with the community vulnerability assessment. Planning identifies events to be managed. Planning identifies hazard agent- and response-generated demands. The planner examines the available resources and creates strategies and tactics for addressing disaster demands. Response operations focus on performance. Disaster operations require use of plan-based decision guidelines. They require resources and that responders assess demands as they arise. Responders must act to meet those demands in a creative way. Disaster operations can rarely be accomplished entirely by using pre-event checklists. However, such lists can be helpful when personnel must improvise.

Although emergency planning is distinct from response operations, the two must be linked. Integrating these functions decreases the chance that plans will:

- ▲ Fail to support operations.
- ▲ Be viewed by response personnel as irrelevant.
- ▲ Reside quietly on shelves, giving comfort only to the uninformed.

More constructively, response operations consist of actions taken by response personnel and emergency managers. The planning process establishes the framework for emergency response decision making and structures the options from which a decision maker can choose to address practical challenges. Emergency planners do the intensive work during times when disasters don't threaten to support response decisions during disasters. Politics affect both disaster planning and response operations. Emergency management exists in a political arena. It must accommodate elected and appointed officials. This political arena includes municipalities (towns and cities). It also includes county, state, and federal governments. The political process often defines which vulnerabilities will be addressed in planning and how resources will be allocated to manage them. During operations, decisions to establish quarantine or to implement mandatory evacuation are often made on technical grounds. However, they are strongly influenced by politics. Any attempt to engage in emergency management without an awareness of and responsiveness to the political context invites failure.

Planning aims to create preparedness. Planners influence response and recovery. The plans they build guide operational decisions when managing

FOR EXAMPLE

Hurricane Katrina

Late in August 2005, Hurricane Katrina struck the Gulf coast just east of New Orleans (see Figure 1-1). The National Hurricane Center placed Katrina at landfall as a Saffir-Simpson Category 3 storm with winds up to 131 miles per hour. Citizens with access to transportation were evacuated before the impact. However, many who had no access to transportation were trapped in the city. This left nearly 100,000 people to experience the impact. Many survivors had to be rescued in the immediate aftermath. Among other failures, the lack of adequate preparedness to evacuate citizens without their own transportation multiplied both the response challenges and the human suffering.

agent-generated and response-generated demands. **Agent-generated demands** are those imposed by the hazard agent itself. These might come from wind, water, ground shaking, heat, sulfuric acid, or influenza. They threaten human health and safety, property, and the environment. By contrast, **response-generated demands** are caused by the response to the incident. There is a need to coordinate the

Figure 1-1

The 2005 Hurricane Katrina devastated New Orleans with wind and surge and created secondary problems like this ignited leaking gas main.

activities of everyone who responds to the incident. Major disasters elicit a significant outpouring of assistance. For example, during the immediate aftermath of 9/11, people from all over the country rushed to the scene in New York to help. Foreign governments offered to send search and rescue teams. This outpouring creates convergence at an incident scene. When the incident demands deviate from your expectations, response organizations will improvise. In some cases, new groups emerge to meet unforeseen needs. The planning process identifies the availability of mitigation measures. The planning process also oversees the implementation of such measures. The process also determines the effect of mitigation. Planning has a critical role in all phases of emergency management.

SELF-CHECK

- Give an example of an **emergency** and explain how **emergencies** differ from disasters.
- Why do we say the emergency planning process is never complete?
- What **are mitigation activities?** Please give an example of how this works for a natural hazard.
- What is the difference between emergency planning and emergency operations?

1.2 The Public Policy Context

Emergency planning takes place within a system of policies. The policies are set by multiple and interacting governmental agencies. This policy system perspective is a device used to divide public policy into parts. Understanding the policy system allows us to know which tasks are the responsibility of which level of government and which agencies. This provides insights into the kinds of activities each level of government must perform to plan for and respond to disasters. The policy system is a conceptual tool. The intergovernmental system is a characteristic of the governmental process. It provides limits and opportunities for policy makers.

The policy system is often described as a series of stages. Together, the stages outline the tasks involved in making and implementing policy. Thomas Dye (1995) groups these activities into four categories. These categories are policy formulation, adoption, implementation, and evaluation.

- ▲ **Policy formulation** is planning and information gathering. This is needed for identifying policy options and gaining the attention of decision makers.
- ▲ **Policy adoption** is the approval of one or more of the options by an authority. This authority might be a city council, county board of supervisors, or state legislature. In turn, the authority can transform the option into a law or policy.
- ▲ **Policy implementation** refers to the actual execution of the policy. This stage involves putting the policy into effect. Implementation includes creating the rules by which the policy will be administered.
- ▲ **Policy evaluation** involves determining the effectiveness of the policy. This helps leaders to adjust the policy if needed, or if the policy has completely failed, a new policy can be devised.

1.2.1 The Intergovernmental System

Formulating and implementing community policy for mitigation, preparedness, response, and recovery involves actors and processes at multiple governmental levels. Federal, state, county, and local governments can be involved in all phases of the policy development process. The process can be sequential. However, the process also can be quite complex. First, all of these activities can occur at the same time within a single level of government. Second, governments or citizens at one level (city) may involve themselves in different stages at other levels (state or national). Keep in mind that no single level of government can control the entire process for all levels. The development of hazards policy in the United States is very much a product of all levels interacting together.

A rational, consistent policy is created only if all levels of government can work together. No level completely dominates hazard policy. Some levels do carry primary responsibility for particular tasks. For example, the creation and implementation of specific response protocols is a local function. By contrast, writing building codes with seismic provisions is a state function, but making sure these codes are adopted is the task of local government.

You will need to understand the role of citizens in the policy process before moving to the complexity of intergovernmental relations. Politicians often attach little importance to disaster issues. The exception to this is when (and just after) a major disaster occurs. It is not surprising that in many areas of hazards policy, citizens play a small role in public policy. One reason is that policies tend to be developed by experts in the field. They require special expertise to be implemented. You can play an important role as the go-between with experts and elected authorities. Constituent policies might define standards for disposing of toxic waste. Nonetheless, other policies clearly require citizen input. Those policies in which an actual service is delivered to the public are likely to demand some degree of citizen participation for success.

1.2.2 Hazards Management Policy at the Local Government Level

Local governments are crucial to the creation and implementation of hazards policy. Although states can make land use decisions and enact building codes, these powers are usually delegated to local governments. Local governments are expected to take the lead in plans for mitigation, preparedness, response, and recovery. Hazards policy may be created by either elected officials or by appointed administrative officials. Most hazard policy implementation is carried out by administrative and/or public safety departments at the local level. Despite the critical roles assigned to local governments, their performance has been spotty. Some local governments have strong, consistent, well-implemented hazard policyies. However, others appear to ignore the issue. They do this even to the peril of their citizens. This lack of a consistent record is due to systemic constraints.

Local government has far more constraints placed on its revenue than either the federal or state governments. Furthermore, local governments are closest to their citizens. Their expenses are subject to close public scrutiny. Emergency management requires spending money now for something that might happen in the future. This is a difficult sell. Since the terrorist attacks of 9/11, the federal government has made much more money available for hazards. This is not locally controlled money, however. Many federal rules and scrutiny are imposed. In addition, not all cities are eligible to obtain such funding. Ultimately, local governments give a tiny portion of their own revenue base to emergency management. Municipalities organize emergency planning and management in a wide variety of ways. Some cities have emergency management departments. Some cities vest this activity in a fire or police department. Other cities use a committee composed of city department officials serving part-time. Such diversity offers considerable difficulty to a state agency attempting to coordinate local efforts across all disaster events. The challenge to the federal government is, of course, even greater.

1.2.3 Adopting and Implementing Environmental Hazard Policy

The lack of money and the diverse structures of local systems are obstacles to emergency management. But there are three additional challenges. To successfully formulate, adopt, and implement effective responses to environmental hazards, a local government must:

1. Be aware a threat exists and consider it a community priority.
2. Believe that there are effective methods of coping with the threat.
3. Develop a politically and economically feasible policy to manage the hazard.

To have a natural hazards mitigation program, both citizens and officials must first be aware that hazards exist. They must believe that there is a risk of losses. Hazard researchers have long known that hazard or risk perception is a necessary step in obtaining action. In practice, most cities assign very low priority to emergency management. Some cities may take an interest in one particular hazard that creates seasonal disruptions. Rossi and his colleagues (1982) questioned people influential in state and local politics. They found that problems associated with five natural hazards (flooding, fire, hurricanes, tornadoes and earthquakes) were near the bottom in importance on a list of 18 problems confronting state and local governments. This study has been supported by others. These studies show that political influentials do not define natural hazards as pressing problems.

Local officials may have different risk perceptions than other officials or the public. Not knowing the effects of the hazard or when it will occur plays a major role in these different perceptions. Moreover, such perceptions vary with one's relationship to the hazard. Officials who have responsibility for public safety may take seriously a potential threat that could injure many community residents. Citizens might take such a threat much less seriously unless they feel they are at risk.

In some cases, citizens or interest groups are more concerned about a hazard than local officials. These groups often work to place issues on the local political agenda. Members of the public who are technical experts may also try to generate a political response to a hazard. For example, a local college professor who understands the meaning of the 100-year flood plain might seek restrictive zoning. Grassroots pressure for adoption of a hazard policy may also come from citizens who understand and are concerned about the hazard. You can seize these initiatives and actors as potential partners.

To formulate hazard policies, local officials must believe that there are effective ways for coping with the hazards. Mitigation can include any of a variety of activities. These range from controlling the hazard agent to adjusting the typical patterns of human activity that are likely to be affected by the hazard. It is essential that at least one individual or organizational action be identified as an effective adjustment to the hazard. When there are severe (and, equally important, well-publicized) disagreements among experts regarding the extent of or the strategies for coping with the threat, leaders will hesitate to act. In the absence of a consensus among experts, the management of a hazard moves into a political arena. It will be subject to the same kinds of forces as other political and social value questions. During the Cold War, the question of civil defense measures assumed a political dimension. This was due to disagreement among experts regarding the threat and the effectiveness of protective actions. There was a federal plan for crisis relocation. This involved massive evacuation of "risk area" counties to "host area" counties. It went on for decades. It failed when many counties decided there was no safety after a nuclear attack. They refused to continue to participate in the program.

Finally, for a local government to act, a politically feasible program must be available. That is, this program must not conflict with established elites or community values. Moreover, a policy must be economically feasible. The importance of having an acceptable proposal on which to act should not be underestimated. Crew (1992) argues that elected bodies work mostly as boards of review. Instead, they review the draft bills submitted by others. Members rarely write their own bills. Politicians will adopt a bill if the advocates convince them the premise is sound and they will not incur serious political vulnerabilities.

A hazard policy must be presented in a form that allows officials to act. In addition, the policy must minimize political and economic costs. Local officials can and do "fine-tune" proposals into a fully acceptable form in light of the political climate. If you are seeking political action, you must present the proposal to the decision-making body in a form that is understandable. No or minimal additional work should be required. The presentation should include advocates, costs, and a demonstration that the benefits exceed the costs.

Legal obligations and liabilities form an excellent argument that policies be established and funded. Obligations vary for the federal government, the states, and localities. Governments and emergency managers are given immunity from some legal restrictions under state and federal law. At the same time, governments and emergency managers can be held legally liable for incompetently performing established duties or for a failure to plan for a major hazard. Explaining that policy makers may be held legally liable for failures to act is often a quick route to the political agenda.

In summary, hazard policies come before local government via two primary avenues. First, broad public safety responsibilities may induce local authorities to place hazard policy on their agenda. Second, interest or constituent (professional) groups can lobby to have public officials address issues. Other routes are possible as well. Sometimes, legal obligations to address hazards generate policy attention. In still other cases, a community accepts grant funds from the federal government. The community will be required to use the money for hazard policy or specific activities. In practice, local officials, professional or client groups, and citizens interact to create and sustain hazard policy. Policy sometimes must be established for an emergency planning process to start or go forward. Emergency planners or their agencies can suggest items for the political agenda in some communities. Planners are sometimes called on to serve as "expert witnesses" when communities are considering proposed policies. In some cases, planners serve as a "point of contact" for citizens or advocate groups who desire the development of public policy. Emergency planners who understand the policy system can find many points of entry to the political process.

1.2.4 Local Agency Involvement in Hazards Policy Implementation

Emergency management and public safety (police and fire) departments rarely play a major direct role in policy formation. They become involved when they identify new threats or gaps in existing policy. You are responsible for interpreting hazard policy. You are also in charge of implementing hazard policy. You will need to focus on developing EOPs. You will also need to acquire the resources needed to coordinate the activities of different agencies.

The public safety mission of these departments focuses on action. They must mitigate, prepare for, respond to, and recover from acute threats. Recognizing a potential threat is the first step. This is true for each of these activities. If no one believes there is a threat, no action is likely to be taken. When managing hazards, administrators of other departments are more actively involved with preparedness than with response. These departments might include public works, transit, information technology, traffic control, public health, planning, and water. City and county administrators are responsible for the functioning of their jurisdiction. Because such officials have broad duties, they are limited in the amount of time they can devote to hazard management.

There are administrators whose duties include land-use planning, building regulation, public works, public health, information technology, transit, and utilities. They are most likely to be concerned with mitigation and recovery. However, the terrorist attacks of 9/11 changed this. The outcome of the attacks emphasized the importance of these departments in preparedness and response. These attacks demonstrated the potential danger to lifelines. Lifelines include utilities such as water and electricity. When these are disrupted, there are terrible consequences for the public. Many natural hazards have long been known to threaten lifelines. However, the damage to lifelines due to natural hazards received less attention. The degree of involvement in response varies. Transit, public works, sewer and water departments have a more direct involvement in plans. They also have a more direct involvement in response. However, mitigation decisions will have a great impact on which hazards you must address. City planning directors, attorneys, building code officers, and public health authorities often make these decisions. These decisions will affect how you address the hazards. These decisions will also determine the challenges faced by responders. Local administrators who successfully address mitigation and recovery have an indirect impact on preparedness.

Local governments require federal resource allocations to expand and maintain CEM. The federal drive to enhance national preparedness for terrorist attacks recently has produced significant resources for communities. Since 2002, the federal Urban Area Security Initiative and the Homeland Security Grant Program have given billions of dollars to communities. This money is to be used to initiate and sustain local emergency capabilities. This is the greatest infusion of disaster-related funding ever. Other forms of assistance have been given to communities as well. This assistance has included access to equipment, information systems, and highly specialized response teams and recovery specialists. Ironically, this support is what local officials have been requesting for decades. However, there is a price. There is a "top-down" model for distributing resources. Acceptance of funds depends on adopting the National Incident Management System (NIMS). NIMS specifies an incident command structure. It also specifies resource naming and planning protocols. Similarly, communities are required to adapt local plans to include many federally (centrally) devised protocols. These protocols include the national "Universal Task List," national "Target Capabilities List," and the "National Response Plan." These are constructive ideas. However, they can be problematic because they are devised at a distance from the jurisdictions being forced to implement them. To some extent, they represent a "one-size-fits-all" plan. This plan is not easily adapted to local needs for responding to local disasters that do not qualify for federal assistance. The emergency planning community has long resisted such "model planning" on the grounds that each community has distinctive characteristics. These must be accounted for in a plan. The imposition of an outside plan short-circuits the process that is so vital to effective planning. In this environment, you must carefully balance the benefits of federal support with the potential loss of local autonomy. Local governments can maximize their benefits in this situation by maintaining a proactive stance on management and planning. This requires local leaders to remain informed about local emergency management issues. The local planning process also should be nurtured and maintained. It should cement relationships among planners and responders. You should have a local plan. Revise the plan as the planning process proceeds. This gives you a firm base for engaging federal officials when local interests are not met by federal plans.

FOR EXAMPLE

Oakland, California, Seismic Safety

Unreinforced masonry (URM) buildings have a very high rate of collapse during earthquakes. Simple brick and block buildings are not flexible, and even small shocks produce failures of integrity. For years, officials in Oakland were aware of their earthquake risk and the high proportion of their buildings that were URM construction. In 1974, the problem was mentioned explicitly in the Oakland Comprehensive Plan. It was not until 1993, however, that Oakland finally passed an effective URM ordinance. The politics whirled for nearly 20 years, through repeated damaging earthquakes, pressure from the state to pass an ordinance, and many years of watching surrounding communities pass their own ordinances.

SELF-CHECK

- What is **policy evaluation** and why is it important?
- What are some of the roles citizens play in the policy process?
- Why is it difficult to get local governments to adopt and implement hazard policies?
- Through what routes or initiatives do hazard policies come to local government?

1.3 The Local Jurisdictional Context

Tip O'Neill, longtime Speaker of the U.S. House of Representatives, is reputed to have said "all politics is local." The same principle applies to disasters. Emergency planning and management is a *local* endeavor. We do not suggest that these activities cannot be or are not undertaken by county, state, and federal governments. Higher levels of government certainly have an important role to play in local success. However, most hazards have a critical geographic dimension that is tied to their management. In any large event, external support (particularly state and federal) of many forms is critical to local jurisdictions. This is especially the case when the disaster produces widespread destruction, when it strikes many adjacent areas simultaneously, or when many people are dead, injured, and trapped.

There is a time lag between disaster impact and the arrival of external resources. The National Response Plan alerts communities that they must plan to operate without help from the federal government for 72 hours. Federal and state resources can be "pre-staged" to locations near a potential disaster site. This is done in some large hurricanes. However, time is still required to deploy, position, and set up for operations. When external support does arrive, the response proceeds most efficiently and effectively if there is a strong, locally devised structure in place. The structure is found in an incident management system (IMS) and an emergency operations center (EOC). External resources can be integrated into this structure. Local responders, through planning, training, and experience know local terrain best. They also know the local needs best. These personnel will be best equipped to identify problems. They can set priorities. They can direct the effective and timely use of external resources. These factors emphasize that the most effective emergency management can be accomplished when the local planning process focuses on vulnerabilities and devises options for response that are vested in a local EOC and IMS. This structure is needed to evaluate, connect, and advantageously deploy external resources.

Still another issue reinforces the emphasis on local government. The quality of management in the crisis period is significantly enhanced if the losses caused by the impact are reduced. Carefully enforced measures for mitigation and preparedness that are enacted at the local level achieve these outcomes. An effectively implemented evacuation plan means that fewer citizens are injured and killed in the first place. Another important part of preparedness is a high level of hazard adjustment by households and organizations. It is critical to understand the role of emergency planners and the planning process at the local level.

All disasters are local. However, the planning process should be at least regional. Let's look at Arizona's Salt River Valley, where Phoenix is a principal city. It is the center of a complex of 26 cities and towns surrounded by desert in all directions. These communities are linked by location, economics, public interest, and many other features of life. What happens to one either happens to or, at least affects, the others. This is especially true for disasters. Even though all communities are not embedded in such large networks, the principle remains the same. Emergency planning needs to address the vulnerabilities, capabilities, and needs of each region. The regionalization is not merely a bureaucratic expansion. It means sharing and making joint efforts. The communities work together to achieve the milestones of mitigation, preparedness, response, and recovery. The first step in regionalization is common vulnerability assessment. Then, the common resources need to be counted. From this point, you can begin to structure common or complementary response plans. In the Phoenix urban area, all 26 fire and police departments are linked by mutual aid agreements. Mutual aid represents promises of specific support across jurisdictional lines in times of need. The fire departments have supplemented these strategies with automatic aid agreements negotiated for adjacent jurisdictions. Automatic aid is negotiated in advance and permits agreeing fire departments to respond to one another's jurisdiction on "as needed" basis at any time. Thus, a fire incident commander in Phoenix who is confronted with a need to immediately identify a potential biological agent can call the Phoenix dispatch center and be sent the Tempe Fire Department mobile laboratory at any time. Mutual aid agreements are not just tied to first responders. They can be constructed for a variety of jurisdictional needs related to any department. These departments include public works, information systems, traffic, or transit. Disasters routinely strike across community lines.

1.3.1 The Local Structure for Emergency Planning

Since the 1990s, there has been a movement to establish **local emergency management agencies (LEMAs).** This was especially the case for large communities. Historically, there have been many local structures charged with emergency planning and management. They have had highly variable success. In the 1950s and 1960s, a local office was often chartered under "civil defense" objectives. It usually housed a single person. This person often had few qualifications beyond experience in the military. Over time, hazards grew more complex. Advances in chemistry produced a wider range of hazardous materials threats both in the community and as they were used in manufacturing. Nuclear power plants also multiplied. The technology for dealing with these hazards as well as natural hazards introduced complexity that required special knowledge by those who plan for and respond to disasters. Fire and police departments had special knowledge and equipment. They began to be the homes for emergency planning. In many cases, the size of the community and the nature of its hazard vulnerability defined the scope of emergency planning and management. Larger, more vulnerable communities felt a need to devote specialized hazards personnel full-time to the task. They created departments of emergency services. These were renamed as departments of emergency management. Federal mandates, such as the Superfund Amendments and Reauthorization Act (SARA Title III), required the creation of Local Emergency Planning Committees (LEPCs). They also required the creation of State Emergency Response Commissions (SERCs). Most LEPCs are county based. They have responsibility for reviewing and developing emergency plans. They do this by working with local leaders. The SERC oversees such planning statewide. Other legislation like the Clean Air Act also required the development of local Risk Management plans. LEPCs and SERCs work with local emergency management agencies and are not an alternative to them.

Since 9/11, high levels of threat awareness and increased federal funding have encouraged the development of local emergency planning agencies. In some form, most jurisdictions now have a LEMA. This may be one coordinator with an administrative staff, or this may be or a full department with a staff of planners and analysts. The LEMA serves as the center of emergency management activities for the governmental unit. LEMAs are planning centers concerned with implementing measures to achieve mitigation, preparedness, response, and recovery. Their main role is planning. However, they also provide planning assistance and technical expertise to other departments. Emergency planners are responsible for:

- ▲ Monitoring hazards and vulnerability.
- ▲ Sustaining the planning process.
- ▲ Maintaining the EOP.
- ▲ Monitoring internal and external resource availability.
- ▲ Monitoring technological changes that impact vulnerability and response.
- ▲ Overseeing regional involvement in mutual aid systems.
- ▲ Ensuring that training for responders is scheduled and completed.
- ▲ Scheduling exercises to ensure acceptable levels of preparedness.

During response, LEMAs are primarily concerned with the collection and dissemination of emergency-relevant information and resources. They rarely serve as first-line responders. Their emergency role is executed in the jurisdictional EOC. In many capacities within the EOC, LEMA personnel:

- ▲ Coordinate the efforts of first responders in police, fire, and EMS.
- ▲ Support the incident scene(s) with accurate information and resources.
- ▲ Receive and collate damage assessment data.
- ▲ Locate resources from other governments and the nonprofit and private sectors.
- ▲ Maintain records of the incident for accountability.
- ▲ Oversee dissemination of public information.
- ▲ Inform local elected and administrative leaders of incident status.
- ▲ Monitor progress in meeting both agent-generated and response-generated demands.

After a disaster, the LEMA often takes a lead local role. The LEMA initiates and coordinates recovery planning and operations. This task usually requires much intergovernmental collaboration and joint efforts with the departments of land use and building construction as well as with the business community. The goals are set to shape the future of the community. The LEMA must assess the extent of the damage and its implications for the range of hazards the community faces. The community needs to decide if mitigation is better than simply repairing the damaged structures and restoring them to their previous states. These decisions require that you work with urban planners and others to develop the recovery operations plan (ROP). This document should define the process by which the options for recovery are developed and recommendations are brought before elected and appointed officials, business leaders, and citizens. This process should produce agreement on the vision for the recovery. It should also produce agreement on the strategy and tactics for achieving that vision. The next step is the creation of a schedule for the recovery process. This must specify the short- and long-term projects. It begins assembling the resources needed and includes oversight of the process.

You will work within the LEMA to plan. Emergency planning is a critical function. Planning cuts across the phases of mitigation, preparedness, response, and recovery. You will identify, consolidate, and make consistent all of the emergency plans in the jurisdiction. A jurisdiction may generate many distinct emergency plans. The jurisdictional EOP and the continuity of operations plan (COOP) are two plans usually created and administered by the LEMA itself. But there are also regional plans. For example, there are the Urban Area Security Initiative and the National Metropolitan Medical Response System. Other institutions and legislation may require plans. For example, school districts may have their own plans. Utility companies may have their own plans. A wide range of other government and private organizations may make their own plans. Furthermore, plans are required under the Clean Air Act and other legislation. City departments may also generate plans for their employees and operations in an emergency. Such plans and procedures may reflect an overall community vision. Still there is the possibility that they are poorly cross-referenced. This results in minimal coordination and great dependence on individual initiative in emergencies. You must identify these diverse plans and integrate them into one plan that can actually be implemented. Ideally, planners will help departments and organizations develop their individual plans to make them more compatible with the primary jurisdictional plans.

The LEMA performs many important functions for the jurisdiction. These functions are diverse. They address all emergency phases for all types of hazards. There is variety in the plans themselves and the processes that generate them, yet these local activities should be placed in the context of limited resources available to local governments. We should also remember that there is a low importance attributed to hazards policy by local leaders. Clearly, the current system is characterized by a sharing of responsibilities and governance. The state role is essential for coordination between the federal agencies and local governments. In addition, state governments must be active in the formulation of policy. They should not merely pass this function on to local units. The national government—the Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA)—can assist state and local governments. This is done through the provision of specialized equipment and technology (e.g., severe storm tracking), hazard knowledge, and specialized teams. The LEMA is certainly a central figure in achieving preparedness. However, the tasks of CEM require the cooperative efforts of all levels of government, the nonprofit sector, and the private sector.

1.3.2 Businesses and Emergency Planning

Disasters do not spare businesses. Many businesses are damaged and may temporarily close, or they may have to close permanently. FEMA (1998b) has estimated that more than 40% of disaster-damaged businesses will never reopen. Of those that are able to reopen, nearly one-third will fail within two years. When businesses shut down after disasters, they lose market share. They suffer technology losses. They give the appearance of failure to anticipate predictable events. Not only do they suffer, but the local economy also suffers. Employees may face losing their livelihood. Residents may find themselves searching for goods and services once readily available. The problems are compounded when an entire central business district is severely damaged or destroyed. Households suffer because their customary shopping patterns are disrupted. Businesses suffer because they rely on business-to-business sales or on other businesses to attract customers. Finally, local government suffers a loss of sales and property tax revenues.

There are two reasons why business should be involved in preparedness. Government and business are dependent on each other during the response and recovery periods. There are special equipment and skills within the business community. This equipment and skills can support response and recovery strategies. Businesses themselves also need to be prepared. If they are prepared for a disaster, businesses will suffer less damage. This ensures businesses will better survive disasters. They will then continue to contribute to the local economy for a more effective recovery.

Businesses have a lot at stake in times of disaster. They could be damaged or destroyed. Despite potential losses, businesses are not prepared. Drabek (1994) found only 31% of the businesses in his survey of 185 tourist-oriented firms had adequate levels of evacuation preparedness. Fewer than half of the businesses in the San Francisco Bay Area had developed plans, trained employees, and conducted drills (Mileti et al., 1993) despite this area's experience in the Loma Prieta earthquake only a few years earlier. A study conducted in Memphis and Des Moines also found low levels of business preparedness (Dahlhamer and D'Souza, 1997).

The size of the business predicts the efforts the business will make to prepare. Larger businesses are more likely to have an extensive planning process. If a business has a lot of experience with a particular hazard, the business will also be more likely to plan (Webb et al., 2001). Other factors such as business age, scope (local versus national), and business type can be positive factors in planning behavior. However, studies of the effects of these factors are inconsistent.

In recognition of the importance of emergency planning by businesses, FEMA (2003a) developed an *Emergency Management Guide for Business and Industry.* This guide outlines a planning process. It identifies critical corporate emergency management functions. It provides information about a variety of hazards. The guide also lists sources to contact for further information. Governments at all levels can promote business planning. Urban areas do this by offering support. Help is given to businesses to do vulnerability assessments. Urban areas offer help in constructing plans. They also offer protection against terrorism. The federal government is able to reach very large businesses. However, the local government also has a key role. The local government has an interest and role in business preparedness. LEMAs have an even more pressing interest than the national government in promoting business emergency plans. Business disaster casualties have important local effects:

- ▲ Business technical skills and equipment are not available for response operations.
- ▲ Employees of damaged businesses become unemployed and community dependent.

- ▲ Cleanup and debris removal at damaged businesses must be done by government or contractors.
- ▲ Goods and services normally provided to citizens are not available.
- ▲ Business interruptions and bankruptcies endanger economic recovery.

For these reasons, even the smallest LEMAs should develop business liaison programs to promote emergency planning. The programs need not be extensive. They should, however, at least promote awareness of local hazards. They should send the message that planning can minimize disruptions. In large jurisdictions, it is common for LEMAs to share emergency planning expertise with local businesses.

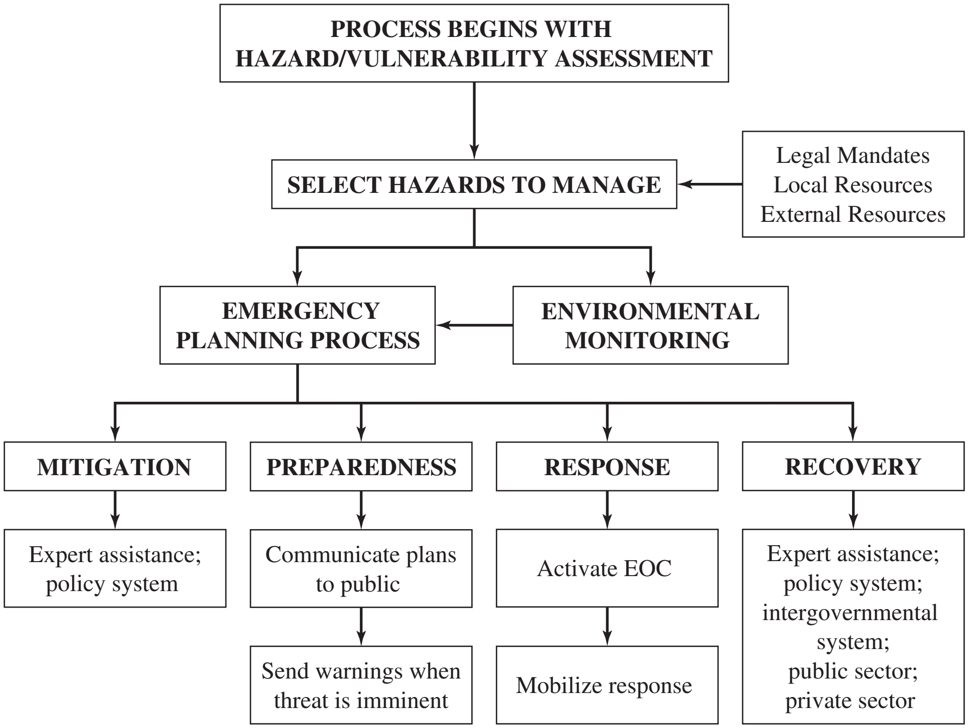
1.3.3 Connecting the Dots: A Picture of the Local Planning Process

The local emergency management system is many faceted. We have discussed the structure and responsibilities of the organizations that play a role in the local system. Figure 1-2 presents a flowchart showing an overview of the elements of such a system. The flowchart shows how the tasks and tools for emergency planning fit together. The chart is not intended to capture every detail mentioned in this chapter. Instead, it relates the key actions and processes in the local emergency management system. It is important to remember that emergency planning drives all the tasks of management. It must be responsive to external system demands too. The role of the emergency planner is to be the engine that drives the system from the perspective of the LEMA.

The process of emergency planning begins with a careful local **hazard/vulnerability assessment** (H/VA). H/VA identifies the hazards to which the jurisdiction is exposed, derives probabilities for impacts, and forecasts consequences. It is best to obtain special expertise. However, you can begin to picture your H/VA by looking at your environment. What hazards are present in the community? Is there a river, an ocean, a gasoline pipeline, an earthquake fault, a rail line, a major highway, or hazardous facilities? What is the history of disasters for your community? Are there seasonal floods, earthquakes, or tornadoes? Has there been land subsidence, land slides, pipeline accidents, or transportation incidents generating release of dangerous substances? These ideas convey the idea that H/VA is intended to be a comprehensive, all-hazard examination. H/VA is a beginning point for emergency planning. However, it is not a static activity because hazards are not static. Hazards change; threats change. Like the planning process, H/VA should never stop. H/VA is best conceptualized as an ongoing system that periodically reassesses the hazard environment (see Figure 1-2).

Based on a comprehensive H/VA, you can begin the challenging process of deciding which hazards require active management. This is a complex process. It involves many considerations. You will need input from a variety of actors. At a technical level, consideration must be given to both the probability and

Figure 1-2



A local emergency planning system.

consequences of hazard agent impacts. Probability refers to the chance that an impact will occur in any given time frame. The time frame is often one year. Consequences are usually estimated in terms of casualties (people killed or injured) and property damage. Jurisdictions typically select all high-probability events as planning targets. The exception to this is if the projected consequences are minimal. Low-probability threats that are coupled with low levels of negative consequences are usually not actively managed. Instead, you can rely on generic response functions—assessment, hazard operations, population protection, and incident management—planned for in the EOP. You can improvise as needed during response. Threats with a low probability, but which potentially generate severe negative consequences, are also usually planning targets. For example, the probability of a volcanic eruption is usually low at any given point in time. However, your community should be prepared if it is located in a valley that could be innundated by mudflows after an eruption. The process of deciding which threats to actively manage is partly based on technical data. Technical data from staff, consultants, LEPCs, and state emergency response commissions are important. Sometimes data from federal agencies are significant. However, there are other factors. Legal and statutory mandates sometimes require the development of emergency plans. U.S. Nuclear Regulatory Commission regulations require off-site EOPs for nuclear power plants. The Clean Air Act requires risk management plans for hazardous materials facilities. The decision to manage a threat is also influenced by local resources. It is influenced by the availability of external resources. It is also influenced by the LEMA's size and expertise. Finally, all of the decisions to select threats to be managed are subject to the policy processes of the local government. They are subject to the political process as well.

Once you select a threat to manage, two processes begin. One process is that of environmental monitoring. This process is related to and overlaps with the continuing H/VA. The continuing H/VA identifies new hazards and changes in ones already known. The purpose of monitoring is either to forecast a potential disaster or detect and monitor an imminent threat. Depending on the technology involved, these data may be generated locally. They also can be gathered by county, state, or federal agencies with special hazard expertise. For example, few local jurisdictions have the technology to track hurricanes. Instead, information is obtained from the National Hurricane Center in Florida. In many cases, your role is to interpret the meaning of aggregate data for the hurricanes' specific location.

The second process is planning for the threat. Every community faces a number of threats. The planning processes typically address them all. In practice, because the nature and consequences of different hazard agents differ, the planning process will take differences into account when devising management strategies. The planning process directly stimulates the four phases of emergency management. For mitigation, you assess the possibility and range of measures that are available. For this, you usually have help from experts. The goal is to prevent impacts where possible, and it is achieved largely within the public policy system. You will coordinate with other departments and nominate measures to the local policy system. For example, special zoning areas might be established to prevent people from building homes near rivers. Special zoning areas may also be established to prevent building on hillsides subject to landslides. Other mitigation measures are outside the role of local governments. Breach-proof packaging requirements for hazardous materials transportation is a federal task, for instance.

Preparedness activities are intended to reduce harm from threats that can't be mitigated. You need to consider the precise nature and consequences of the threat. Then you can identify appropriate protective measures. This process overlaps with the response phase because measures must be planned in terms of the local responder's ability (and resources) to implement them. Citizens might be protected by evacuating to a safer location or sheltering in place. Evacuation is particularly common when a threat can be forecast or detected with enough time to move an endangered population. It is commonly used in volcanic eruptions, floods, and hurricanes. Sheltering in place is used with threats that have little forewarning or where movement could result in danger from enhanced exposure. Such protective action recommendations, supplemented with improvised respiratory protection, are used in airborne hazardous materials releases. They are also used in some types of nuclear power plant accidents. Part of the preparedness process always involves communicating with the public. Lindell and Perry (2004) argue that the presence and basics of what planners want the public to do in a given emergency should be shared as part of routine risk communication. The other structure for communicating with the public is a warning system. This is used when disaster impact is imminent. The quality of the warning system depends on the state of technology associated with the given hazard. The system may produce specific forecasts, or it may simply detect the presence of a threat.

Both mitigation and preparedness planning processes generate adjustment strategies. These measures incorporate knowledge about hazards derived from many sources, including the scientific community and state and federal agencies. The scope of adjustment strategies must encompass households, public sector organizations, and private sector organizations. These strategies fall into three categories, including sanctions and incentives, technological fixes, and risk communication. The imposition of sanctions and incentives and their enforcement involve political processes and may be used with either mitigation or preparedness measures. Technological fixes, which usually serve as mitigation measures, also may involve political processes because of cost or complexity and may be paired with sanctions and incentives. Risk communication represents efforts to induce households and organizations to adopt adjustments that are either mitigation or preparedness measures. Warning during times of imminent threat is also a form of short-term risk communication.

Your role in the response process is multifaceted. Response operations are different from planning. Even though planners don't often go to the incident scene, you still have a role. The specifications in plans guide the timing of public warning. The plan also guides the timing for the mobilization of first responders. During the response phase, emergency management personnel typically operate the local EOC. This is the focal point for response strategy, policy, information collection and collation, and resource assembly and deployment. The local response usually centers on using the local emergency services under an agreed upon response plan. At the same time, the community activates mutual aid agreements. Both response and recovery activities are supported from external sources. These sources are normally specified in the emergency plan. Resources include regional assets from mutual aid agreements. Resources also include state assets. Help from the national government is also available under the National Response Plan.

Recovery issues should be addressed in the EOP. This is especially true in the transition between the response and recovery phases. The recovery planning processes are connected to mitigation. These mitigation measures may have been unavailable previously, or they may have been too expensive. Ultimately, recovery is itself a process that requires a vision of the restored community. You cannot be the only one with the vision. You can, however, play an important role in suggesting alternative ideas for the future of the community. The vision itself is the responsibility of the local leaders and citizens. What is ultimately implemented depends on compromise. The compromise is between the short-term goals of getting the community back on its feet as soon as possible and the long-term goal of reducing future losses. The implementation process requires the community to tap local resources. To do this, the community must negotiate a maze of state and federal agency requirements and funding options.

Emergency planning is a critical driver in preparedness. However, it plays a role in mitigation, response, and recovery as well. The purpose of the planning process is to create preparedness. Preparedness is the ability of a LEMA to successfully manage a community's vulnerability to threats in the environment. You may lead the planning process; however, it is accomplished by a team. The emergency planning team should include internal and external experts in a variety of fields. It should also include representatives of other departments. The team also needs administrative managers and nongovernmental organizations such as the Red Cross and Salvation Army. Citizens should also be involved in the planning process. Much intergovernmental consultation must take place. Consultation should take place with other local governments and with state and federal government agencies. A successful planning process promotes preparedness, and preparedness promotes the establishment of a resilient community.

FOR EXAMPLE

Hurricane Rita Evacuations

Before Hurricane Rita made landfall on September 24, 2005, nearly three million residents of the Gulf coast had evacuated inland. The city of Houston was successful in communicating the evacuation order. Many citizens complied. There followed a tremendous traffic snarl, punctuated by long delays, vehicle breakdowns, and a lack of gasoline to support the movement. The Texas state EOP tasked the Department of Transportation with placement of tank trucks along evacuation routes to make gasoline available to needy motorists. Unfortunately, the tankers did not materialize during the period of egress. Many vehicles ran out of gas. This further aggravated the traffic jams.

SELF-CHECK

- Why is a regional approach to emergency planning needed?
- What are the principal planning functions of the **LEMA?**
- Why are businesses important to local emergency planning efforts?
- Once a particular threat has been targeted for management, what two processes do planners engage?

SUMMARY

Emergency planners perform critical tasks in every community. Planning for disasters decreases potential losses. In this chapter, you learned the difference between emergency planning and emergency operations. You examined the roles of local, state, and federal governments in planning. You compared and defined emergencies, disasters, and catastrophes. You also evaluated what your role will be in preparing for such events. As an emergency planner, you also have to rely on government and businesses to be involved in planning. Thus, you evaluated the complementary roles of government and business in emergency planning.

KEY TERMS

Agent-Generated Demands Those imposed by the hazard agent itself that might come from wind, water, ground shaking, heat, sulfuric acid, or influenza. They threaten human health and safety, property, and the environment.

Catastrophe Large scope of impact event that crosses multiple communities, produces very high levels of damage and social disruption, and sharply and concurrently interrupts community and lifeline services.

Comprehensive Emergency Management (CBM) The process of simultaneously planning for all phases of all hazards that impinge on an individual, government, or organization.

Disaster Sudden onset occasions that seriously disrupt social routines, cause adoption of unplanned actions to adjust to the disruption,

	are designated in social space and time, and endanger valued social objects.
Emergency	Unforeseen but predictable, narrow-scope incidents that regularly occur.
Hazard/Vulnerability Assessment	Identifies the hazards to which a jurisdiction is exposed, derives probabilities for impacts, and forecasts consequences.
Local Emergency Management Agency	An organization of municipal or county government assigned to engage in emergency management for the jurisdiction.
Mitigation Activities	Attempts to eliminate the causes of a disaster by modifying the agent, introducing technological innovation, or modifying the human use system.
Policy Adoption	The approval of one or more policy options by an authority.
Policy Evaluation	Process that determines the effectiveness of a policy.
Policy Formulation	Planning and information gathering that identifies different options and forecasts likely outcomes.
Policy Implementation	The actual execution of a policy.
Preparedness Activities	Measures to protect lives and property when threats can't be controlled or when only partial protection can be achieved.
Recovery Activities	Activities beginning after disaster impact is stabilized that focus on restoring functions lost.
Response Activities	Official actions immediately before and during disaster impact designed to protect public safety and minimize physical damage.
Response-Generated Demands	Demands on authorities that arise from plans associated with responding to agent-generated demands. These include training, planning, public education, equipment, and others.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of emergency planning basics.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. The ultimate goal of disaster planning is to produce a written plan. True or False?
2. Emergency operations cease with the end of the response phase, whereas emergency planning processes never end. True or False?
3. Emergency planning and management are strictly *local;* other levels of government may help, but the responsibility and impacts are on local government. True or False?
4. Successful implementation of hazards policy requires the involvement of many government departments beyond just emergency management, fire, and police. True or False?
5. When you engage in both mitigation and preparedness planning, you are really identifying and figuring out how to implement hazard adjustment strategies. True or False?
6. Government and business depend on one another during response and recovery operations. True or False?
7. The process that determines if a policy is effective is:
   (a) policy implementation
   (b) policy evaluation
   (c) policy adoption
   (d) policy formulation
8. The actual execution of a policy is:
   (a) policy implementation
   (b) policy evaluation
   (c) policy adoption
   (d) policy formulation

Review Questions

1. What is the goal of emergency planning?
2. How is emergency planning different from emergency operations?
3. How do hazard policy issues get on the public agenda?

Applying This Chapter

1. You are an emergency planner in Longview, Washington, charged with reviewing the emergency plan for Mt. St. Helens volcano. A challenge you identify is that there is no state government policy mandating that cities develop volcanic eruption emergency plans. How can you go about changing or influencing this hazard policy?
2. You have been assigned to develop a hazard/vulnerability assessment for King's Mountain, North Carolina. You know the process will have to be extensive, but what questions would you ask first?
3. Wazoo, Washington, has just incorporated as a town. Your H/VA reveals that the principal hazard in spring is river floods. The most effective protective action is to create an evacuation plan. What issues would you want to address?

YOU TRY IT

Hurricane Sheltering

Less than 1 month following Hurricane Katrina, Hurricane Rita threatened the Gulf coast. This time the impact area was farther to the west, with principal landfall near Port Arthur, Texas. Major efforts to evacuate citizens were made in two states, moving people successfully from homes, hospitals, nursing homes, prisons, and other institutional arrangements. While more than 3 million people were moved away from the coast, the inland movement created a demand of its own: sheltering these evacuees. What measures can you identify for addressing such large-scale care needs?

New Orleans Levee System

Most of New Orleans is below sea level, but the levees and canal systems that protect New Orleans from Lake Ponchartrain and other sources of flooding have been in place for decades. Scientists and journalists have been pointing out the system's inadequacies for years. The problem was so well known that the *National Geographic* magazine had given the issue coverage and local newspapers regularly identified the danger. Yet no action was taken to strengthen or improve the levee system. If you lived in the city, what tactics could you have undertaken to get this issue on the political agenda?

Linking Private with Public Resources

The process of planning for terrorist attacks emphasizes cooperation between local governments and the business sector. Because high-value targets exist in each sector, LEMAs have been urged to develop outreach programs to private and nonprofit organizations to help with vulnerability assessment and the development of protective strategies. What kinds of protective measures do you think an emergency planner might recommend for a large chemical-manufacturing firm?

2

THE EMERGENCY PLANNING PROCESS

Mandates, Structure, and Guidelines

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of the emergency planning process.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

▲ The process used to develop a government emergency plan
▲ The elements of the private sector emergency planning process
▲ The professional standards and rules governing emergency planning
▲ The steps to conduct hazard/vulnerability analyses
▲ The principles that guide the process of emergency planning

After Studying This Chapter, You'll Be Able To

▲ Assemble and motivate a planning team
▲ Organize private and nonprofit agencies into the planning process
▲ Formulate specific government and professional mandates in the planning process
▲ Manage the planning process and ensure it is comprehensive
▲ Analyze the connection of planning to operations through the IMS, EOC, and consultation

Goals and Outcomes

▲ Assess the link between emergency planning process and community preparedness
▲ Assess a review of an emergency plan
▲ Assemble vulnerability and resource information into a definition of response needs
▲ Evaluate agent-generated and response-generated demands for the planning process
▲ Design the milestones for government and business planning processes

INTRODUCTION

Emergency planning is the critical path to community preparedness. It is a process achieved through consultation, equipping, training, exercises, and critiques. Emergency planning practices vary among communities. Some jurisdictions conduct a formal process, assigning specific tasks to a Local Emergency Management Agency (LEMA). In other communities, planning is done informally. In these settings, assigned tasks can be loosely defined, and a limited budget may be dispersed among many agencies within the jurisdiction.

The products of planning may be written or unwritten. The nature of the planning process often depends on the size of the community. Big communities, which have many governmental offices, resources, and personnel, tend to have formalized processes. These communities may rely more on written documentation and agreements. In smaller communities, the planning process may have few written products. These communities may rely on informal relationships. Formalization of the planning process also differs with the frequency of hazard impact. In communities that face the same threats often, emergency response may be a practiced skill. Thus, in a town subject to seasonal floods, citizens may be routinely warned and evacuated by fire and police. Their actions may not require documentation. Their knowledge and skills may be part of agency standard operating procedures (SOPs). Skills may be passed on to newer responders in training or simply by responding to events. Because threats happen often, responsibilities are known and practiced.

We advocate having a formal planning process even for small communities. There is value to formalization because it:

- ▲ Explicitly defines vulnerability and how it is to be monitored.
- ▲ Stabilizes response strategies and tactics.
- ▲ Defines responsibilities of internal and external agencies.
- ▲ Increases the likelihood that backup safety systems are developed.
- ▲ Decreases the likelihood of system breakdowns due to forgetting.
- ▲ Ensures important training and exercise functions will be implemented.
- ▲ Increases the probability of a successful emergency response.

A formal process helps ensure a continuing planning process. It also enhances compliance with administrative rules and statutory demands for emergency planning and plans (OSHA requirements, the Clean Air Act, and SARA Title III). Written documentation provides a record of a jurisdiction's planning progress. This information may be used in court.

Professional associations and governments set standards for formal planning processes. The top among these are the National Fire Protection Association (NFPA) and the Department of Homeland Security (DHS). The NFPA supports Standard 1600, "Recommended Practice for Disaster/Emergency Management and Business

Continuity Programs." NFPA standards are reviewed and revised on a five-year cycle. The Federal Emergency Management Agency, International Association of Emergency Managers, and the National Emergency Management Association participated in creating the standard. This standard covers private sector business programs. **NFPA 1600** sets criteria for creating and operating successful emergency management programs. The standard can be used to assess and improve existing programs. It can be used to create new programs. NFPA defines 11 program elements that look at mitigation, preparedness, response, and recovery.

NFPA 1600 emphasizes vulnerability analysis and mitigation. Programs should contain an element for hazard identification. Risk assessment should address a wide range of hazards. NFPA 1600 defines nine elements of vulnerability analysis. The analysis should include likely impacts on the health and safety of the public. It should also cover responders, infrastructure, and continuity of operations. The environment, economic viability, and regulatory and contractual obligations are also examined. A mitigation strategy is required. This strategy must consider building codes, land-use practices, retrofitting structures, and other mitigation tactics.

The standard addresses the need for current inventories of internal and external resources. LEMAs are encouraged to make mutual aid agreements. Programs are directed to establish and evaluate performance goals. The vulnerability analysis is outlined to include personnel, equipment, and facilities needed for each threat. These resources should be calculated in terms of quantity required, response times, and capabilities. NFPA 1600 also requires program elements that address the planning protocol and plan content. It delineates emergency management roles and tasks. NFPA 1600 assumes that a formal planning process supports the emergency management program.

This standard is important to you for several reasons. First, it was issued from a respected and established authority. Professionals in government and industry recognize the NFPA standard. Second, NFPA 1600 can be used to evaluate programs. The standard is a model for self-assessment and for use by external evaluators. Finally, NFPA 1600 can serve as a basis for planning. It can help create an emergency management program. It can also enhance an existing program. Government has limited resources. When emergency managers defend budgets or seek funds, NFPA 1600 compliance serves as a solid basis for claims.

The **National Incident Management System** (NIMS) is a government-issued guideline for emergency planning. All federal agencies must adopt NIMS. All state and local organizations must adopt NIMS as a condition for federal preparedness funding. NIMS addresses disaster response capabilities in the context of emergency planning. There are six components to NIMS:

- *Command and management* addresses the traditional part of Incident Command Systems (ICSs).
- *Preparedness* addresses the conduct of planning, training, exercises, equipment acquisition, and certification standards.

- *Resource management* creates a "resource-typing system" and sets rules for managing resources.
- *Communication and information management* sets standards for communications.
- *Supporting technologies for emergency response* addresses acquisition of new technology.
- *Ongoing management and maintenance* requires plan review and strategic assessments.

The planning community has serious doubts about NIMS. NIMS was devised using a top-down approach. Everything is centrally coordinated by DHS. Views differ on the scope and intent in developing NIMS (Hess and Gerard, 2004). The detail in which NIMS specifies resources, protocols, and processes concerns municipal agencies. More important is the question of whether such detailed specification promotes or retards the effective management of disasters. During Hurricane Katrina's 2005 assault on New Orleans, many federal agencies, as well as state and local agencies, were unable to successfully implement NIMS (Walker, 2006).

There is no doubt DHS has the legal authority to require adoption of NIMS. However, implementation is quite a different matter. NIMS adoption and the reality of an executable capability at the local level are by no means the same. There are many practical challenges for both DHS and local agencies. For DHS to produce standards, the agency requires many resources. For example, it must annually test and certify every command officer in the United States. DHS has created a **NIMS Integration Center** (www.fema.gov/nims) to oversee the implementation of NIMS, to issue NIMS standards, to test and certify NIMS skills, and to monitor system development. The Federal Emergency Management Agency (FEMA) Emergency Management Institute offers on-line classes on NIMS and basic ICSs. Unfortunately, computer system limitations have plagued these efforts. DHS has violated many established guidelines for planning processes. Nonetheless, making federal funding contingent on NIMS adoption exerts powerful pressure on local governments.

2.1 Planning Practice

Many people believe that written plans define preparedness, but it is important to avoid equating a plan with preparedness. Planning should be a continuing process. The plan itself represents a picture of that process at a specific point in time. A written plan does not guarantee the presence of hazard/vulnerability analyses, ongoing monitoring, personnel training, and system exercising that really define preparedness. Preparedness is a dynamic state. The planning process drives continual monitoring of the threat environment and technology. A written plan is an important part of community emergency preparedness. Being ready results from a process in which a community looks at its full range of weaknesses. Vulnerability, resources, and organizational structures can change over time. Performance skills may disappear when not trained and exercised. These actions maintain preparedness. The planning process is the only path to community preparedness.

Emergency planning is driven by two goals: hazard assessment and risk reduction. Hazard assessment involves documenting known threats and finding new threats. Hazard assessment help can come from intergovernmental partnerships. Federal agencies operate formal programs to share complex information with state and local jurisdictions. As we move from the federal to the municipal level, the availability of technology and expert resources generally decreases. By contrast, as one moves down the intergovernmental structure, knowledge of local risks and resources increases. The assessment of risks includes a technical study of the scale of the impacts on a community's safety, health, property, and social and economic activity. It also includes information about the likelihood of events. For example, FEMA flood maps show how flooding recurs in an area ("100-year flood"). However, the availability and accuracy of data are different between hazard types.

Risk reduction analysis is the specification of the actions necessary to decrease the known or projected levels of danger. It also identifies needed resources for effective action. Because no one has enough resources to eliminate all risks, this process defines the level of acceptable risk. **Acceptable risk** is the

Figure 2-1

FEMA maintains a mapping capability available to emergency planners who create visual representations of community vulnerability.

amount of risk exposure that individuals, organizations, or jurisdictions deem appropriate to tolerate. Local powers define the level of acceptable risk. It can vary between jurisdictions. Addressing a risk depends on the presence of technology and the amount of resources that are marshaled. Hazard assessment measures, monitors, and evaluates risks. Risk reduction balances the consequences of risk with the state of technology and the resources that can be devoted to abatement.

The practice of planning varies among governments and organizations. It is a fact of the profession. Like any other human activity, planning depends on those engaging in that activity. It is the resources available from state and national governments that level the playing field. These governments provide resources for planning that all local governments or private organizations can use. We are concerned with the planning practices of public and private organizations. Because emergency planning processes, authorities, and motivations differ between these types of organizations, each is addressed separately here.

2.1.1 Planning for Public Jurisdictions

The structure of the planning process can vary widely, yet many approaches can adequately address all the key issues in a timely manner. Most jurisdictions already have an emergency operations plan (EOP), or perhaps they have a set of plans for a few hazards. And many have set up an authority for such planning, usually a LEMA. Thus, you rarely start a process or a written plan from scratch. That's an advantage. Most often, emergency planners use the planning process to review an existing EOP. An effective planning process has seven milestones.

1. Assemble the planning group or team.
2. Examine hazard vulnerability.
3. Establish task assignments.
4. Conduct resource analysis.
5. Define roles and responsibilities under the plan.
6. Ensure the management structure is adequate.
7. Revise or prepare the written plan.

The first milestone is to make a planning group. Even in LEMAs, the planning team should be gathered in terms of anticipated agent-generated and response-generated demands. For any given threat, create a matrix (Table 2-1) that compares agent-generated with response-generated demands. By completing the matrix, you not only identify who should be part of the planning team, but also what resources are needed.

The table names a threat agent and lists demands on the emergency response system. By examining "Who is responsible?," you identify departments that

Table 2-1: Example Planning Table for Selected Agent- and Response-Generated Demands

Agent: Local River Flood Demands	What is the disaster demand?	Who is responsible?	How will the demand be met?
Warning Delivery	Warn residents.	Police dept	Mobile loudspeakers
Preimpact Preparations: Support for Evacuating Immobile, Infirm, Institutionalized Populations	Ensure ability to comply with evacuation movement.	Police dept, fire dept, transit dept, public works	Buses for those without transport; teams for non-ambulatory, institutionalized.
Search and Rescue	Find stranded, dead.	Fire dept, NGO teams	Search and Rescue team deployment
Care of the Injured	Medical/ behavioral health care.	Fire dept, EMS, NGO mental health teams.	Scene triage and treatment, shelter treatment; transport to hospitals
Welfare	Shelter and feeding.	Red Cross, Salvation Army	Standard operating procedures
Restore Basic Services	Restore electricity, gas; clear debris.	Public works department, utility companies	Standard operating procedures
Protection against Secondary Impacts	Monitor data on flood crest, duration. Assess public health issues.	LEMA, public health department	Standard operating procedures
Community Order	Enforce law, protect property.	Police dept	Standard operating procedures
Communications	Connect EOC with responders.	LEMA	Standard operating procedures

(continued)

Table 2-1: *(continued)*

Agent: Local River Flood Demands	What is the disaster demand?	Who is responsible?	How will the demand be met?
Damage Assessment	Accumulating impact data.	EOC	Reports from on-scene personnel
Mobilization	Initiate public warning; initiate response.	EOC	Standard operating procedures
Control and Authority	Manage the response.	EOC, IMS	Standard operating procedures

Adapted from: Dynes, R., Quarantelli, E. L., and Kreps, G. (1972.) *A Perspective on Disaster Planning.* Newark, DE: University of Delaware Disaster Research Center, page 43.

should be represented on the planning team. Answering "What is the disaster demand?" helps you define what must be accomplished, how, and by whom.

Defining vulnerability in communities with established plans begins with study of the most recent hazard/vulnerability assessment (H/VA). You look for changes in the aspects of identified threats. You also look for new threats. This process must also include study of the changes in the community that may increase or decrease vulnerability. Has a new levee system been constructed? Is the existing levee system weakening with age? Has the population grown? Are new developments built in hazard-prone areas? Stockton and Sacramento, California, are partly protected from flood inundation by an old levee system built when the populations were much smaller. The hurricane-caused collapse of the New Orleans levees led California authorities to carefully monitor their levees in the 2006 rainy season. Has the population changed in a way that affects response-generated demands? For example, communities in the Southwest have Hispanic populations with different cultural traditions. David Alexander (2003: 98) found that an H/VA should address five features:

1. Physical characteristics of the threat:
   - Seasonality, probability, speed of onset, duration of impact, identification of exposed areas, and issues associated with multiple impacts.
2. Predictability of the threat:
   - The state of prediction and detection technology, and the length of forewarning.
3. Controllability of the threat:
   - Are structural mitigations available and implemented? Can the force of impact be channeled into places or forms that are less dangerous?

4. Sociocultural factors related to the threat:
   - What is the level of citizen awareness? Has the population significantly changed in size or composition or distribution? Is population density increasing? Has the ethnic or cultural character of the area changed, which might produce cultural norms counter to normal emergency response or possibly language/communication difficulties?
5. Ecological factors related to the threat:
   - Is the impact of the focal agent likely to create other disasters? Floods cause public health dangers, whereas earthquakes cause hazardous materials releases. What is the likelihood that the threat or its secondary features will produce harm to the environment (water table contamination, soil contamination, dangers to wildlife)? What kinds of measures will be required to restore or protect a contaminated environment?

The third planning process milestone makes task assignments. The tasks arise from addressing agent- and response-generated demands. The tasks also depend on the threat issues. For example, one agent-generated demand is population warning. The vulnerability analysis shows that the Spanish-speaking groups have increased in the past year. Then, warning messages will also have to be in Spanish, and if the number of homes in danger areas has rapidly increased, the plan for evacuation must be changed to minimize evacuation times. A successful task assignment process accomplishes five activities:

1. Tasks must be assigned comprehensively, specifically to individuals or teams.
2. A time frame must be established for completion.
3. Modifications to needed training for response personnel must be identified.
4. Exercises must be scheduled to test effectiveness.
5. Each change must be incorporated into the revised EOP.

The fourth milestone is performing a resource analysis. This task is guided by the analysis of agent- and response-generated demands. It must record each resource required to meet demands. The vulnerability assessment characterizes the nature of the threat, and resource analysis identifies whether special training, equipment, or personnel are required. For example, citizens exposed to toxic chemicals might need to be cleansed (decontaminated), which would require cleaning solutions, water sources, privacy provision if possible, and dry clothing and foot protection. **Resource analysis** is the pairing of resources with estimated emergency response needs and planning for the acquisition and use of those resources. It is accomplished by answering six questions:

1. What is the strategy to abate the problem?
2. What specific tasks are required to implement the strategy?

3. What specific resources are required to implement each task?
4. What resources are currently available to implement each task?
5. Who controls or is responsible for the resources that are available?
6. How can these resources be integrated into the response strategy?

Be sensitive to any gaps between required and available resources. You must address these in the planning process. In some cases, the required resource will have to be found. For instance, the Occupational Safety and Health Administration (OSHA) requires that firefighters use specific clothing and breathing protection. When there are no laws to be met, a gap may be filled in many ways if it is deemed cost-effective or necessary. Sometimes private organizations or nearby jurisdictions (mutual aid agreements) provide needed resources.

The fifth planning milestone is definition of the roles of public and private agencies in the emergency response. Role definition can be built around specific tasks or by organization. Tasks are defined by specific agent- and response-generated demands of each threat. Tasks cross organizations, so a single group may do many tasks based on the scope of its services. As a rule, this approach yields a large matrix of functions. It also locates the subunits of organizations that do the functions. Another way to assign tasks and roles is by organization. You list the tasks the organization performs during an emergency response. Then managers of each organization assign tasks internally and set up means to ensure the job gets done. For example, a fire department may be assigned the handling of hazardous materials and technical rescues in addition to their other regular duties.

The sixth planning milestone specifies the command structure that guides the emergency response. The particular type of incident management system (IMS) used is explicitly defined in the EOP. This structure defines the authority and reporting relationships among the organizations engaged in the response. For most jurisdictions, the management structure for large or complex incidents is embodied in the emergency operations center (EOC). Smaller incidents use an IMS under an incident commander. The EOC and IMS identify and allocate resources during planning for response. At the same time, this command structure serves as points of contact for all participating organizations during nonemergency times. It is in this context that knowledge of strategies, tactics, and tasks are shared. Here too is where role conflicts between agencies are ironed out. With respect to field operations, the incident management systems provide command and control.

The last planning milestone is to document the planning process. This is done in the EOP and written agreements regarding organizational obligations. This works for both organizations within a government jurisdiction (city departments) and external agencies (a county or state public health department). Recall that the production of the EOP is *not* the end of the planning process. The EOP is simply a picture of the parties' agreements at one point in time. The planning process continues with H/VA, demographic monitoring of the community, and monitoring of new technology. At least once each year, the planners must revisit the EOP to ensure it remains effective, efficient, and current.

2.1.2 Planning for Industry

Industrial and business accidents also impose specific agent-generated and response-generated demands. Thus, private sector emergency preparedness (EP) coordinators need to develop emergency programs. Industrial facilities are subject to different mandates and rules than governments. They often follow a different planning process. EP coordinators must sometimes call on their communities for technical assistance for planning and response. At other times, they must warn surrounding communities of off-site impacts. Facility EP coordinators participate with government managers in communitywide emergency response planning, training, and exercising.

Developing an Emergency Preparedness Program

The capability for prompt and effective emergency response is based on the quality of the facility's EP program. Such programs need firm support from organizational managers. The responsibility for a facility EP is usually assigned to the Manager for Health, Safety, and Environment (HSE). The EP Coordinator must know the duties of his position. Specifically, to whom does the EP Coordinator report? Who reports to him or her? What duties must be accomplished?

Once basic expectations are known, EP coordinators develop program plans for their efforts over the course of each year. FEMA also advises local government managers to set annual goals. The EP coordinator uses organizational capability analyses to assign tasks to organization units with the right resources. There is little guidance on performing organizational capability analyses. The best method is to contact **subject matter experts (SMEs).** SMEs are people who cultivate special knowledge of hazard agents, hazard processes, human behavior relative to hazards, or any of the processes or analyses that support any phase of emergency management.

SMEs help define specific tasks for performing emergency functions tied to events (e.g., fire, explosion, or toxic chemical release). For each task, they list the personnel, facilities, equipment, and materials needed. You should be careful when asking SMEs about doing tasks under conditions they have not experienced. Firefighters, for example, might think their experience with small-scale fires and chemical spills will generalize to large-scale incidents. As a rule, larger events are not simply multiples of smaller events. Thus, when the risk analysis singles out disaster conditions that might be very different from prior experiences, the EP coordinator should seek outside experts.

This assessment may spot suitable levels of capability in some areas but not in others. The EP coordinator documents the capability shortfall and devises a plan to reduce it. Sometimes corrections will require more than one year. Planning is often a low priority for most industrial and business organizations, so limited funds are available at any particular time. EP coordinators often use a five-year plan for new resources. This plan will set specific annual goals so that the program moves steadily toward the ultimate goal.

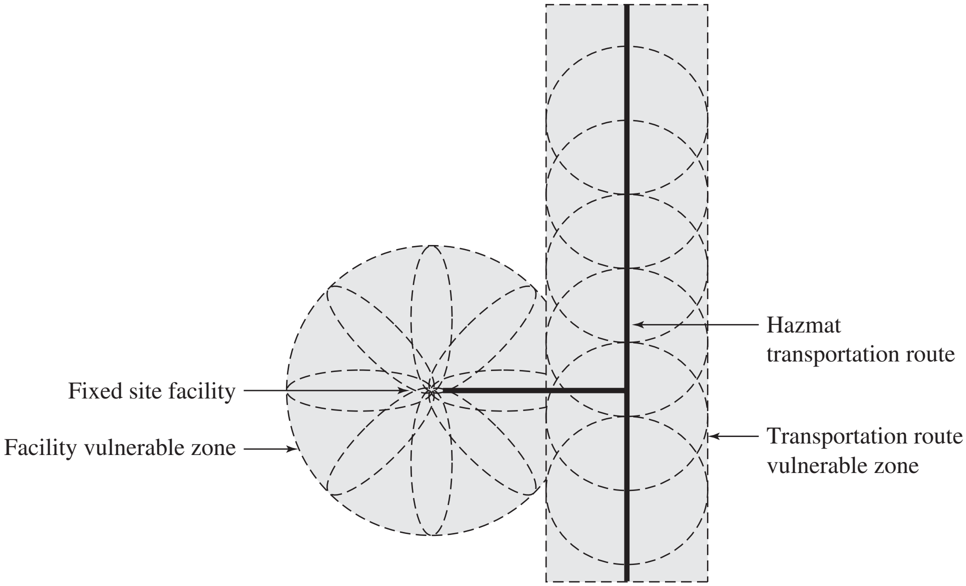
Coordinating with Facility Departments and External Organizations

A facility EP coordinator uses a planning process to develop an EP program, but the coordinator cannot do it alone. Emergency planning is the duty of the facility's operational departments. The EP coordinator must use and train the staff from operational departments. In addition, the EP coordinator should work with the local fire department, LEMA, and Local Emergency Planning Committee (LEPC). Working with the local fire department is essential to ensure off-site support and equipment. The structure of the on-site and off-site emergency response organizations must match. Working with the LEMA and LEPC also achieves an overall appraisal of the area at risk, the special facilities and populations that could be affected by incidents, and the ability of community agencies to provide the emergency response resources.

Conducting Hazard/Vulnerability/Risk Analyses

Internal (accident or sabotage) or external (geophysical, meteorological, or hydrological events, or terrorist attacks) causes can produce events involving fires, explosions, or chemical releases. The types of hazards, their initiating events, their consequences, and their likelihoods of occurrence are assessed using hazard analysis. This process begins with a **substance inventory** that identifies dangerous substances or processes. The threat locations and the quantities of substances at those locations are also identified. A substance inventory is used to assess the threats posed to the facility and its workers. It is also used to assess threats to its neighbors and the environment. Extremely Hazardous Substances (EHSs), defined under SARA Title III, have special requirements for defining Vulnerable Zones (VZs). A **vulnerable zone** is a geographic area within which people, structures, and the environment (agriculture, husbandry, soil, water, etc.) are subject to harm. VZs can be computed by using data on the chemical's toxicity, its quantity available for release, the type of spill (liquid or gaseous), the postulated release duration (e.g., 10 minutes), assumed meteorological conditions (wind speed and atmospheric stability), and terrain (urban or rural). Methods include manual computations or software-based or -assisted calculations such as *ALOHA* [see *CAMEO* at www.epa.gov/ceppo/cameo], and *RMP*Comp* (at www.yosemite.epa.gov/oswer/ceppoweb.nsf/content/rmp-comp.htm.)]. Figure 2-2 shows a rectangular VZ surrounding the transportation route to a facility and the facility itself. The VZ should be examined to identify areas of residential, commercial, and industrial land use. Be careful to identify the locations of special facilities that have limited ability to receive warnings or to take protective action. These facilities include schools, nursing homes, jails, recreation facilities, hospitals, and the like. In many cases, these facilities will have developed their

Figure 2-2



Vulnerable zones around a fixed-site facility and its transportation route.

own emergency plans with which private or public sector emergency planners can work.

Once a vulnerability analysis has been completed, the planner's attention turns to four generic emergency response functions. These are shown in Table 2-2. The emergency response functions of emergency assessment, hazard operations (expedient hazard mitigation), personnel and population protection, and incident management are performed using on-site and off-site actions.

Conducting Emergency Assessment Analyses

The facility's emergency response team must promptly and accurately assess the nature and magnitude of an emergency. These assessments include safely obtaining information about the product and container and monitoring environmental conditions. Conditions can affect the direction and extent of any fires, explosions, or product releases to air, water, or soil. Data from the survey should be integrated into an emergency classification system. A common type of classification system involves four levels:

- ▲ *Level I*: Threat to a single building
- ▲ *Level II*: Site-wide threat
- ▲ *Level III*: Minor off-site threat
- ▲ *Level IV*: Major off-site threat

Table 2-2: Generic Emergency Response Functions Addressed by the Planning Process

Response Function	*On-Site Actions*	*Off-Site Actions*
Emergency assessment	Threat detection, reconnaissance, and emergency classification Product monitoring Container monitoring Environmental monitoring Release monitoring Impact projection Damage assessment	Incident monitoring Environmental monitoring Population monitoring Impact projection Damage assessment
Hazard operations	Leak control (patching, plugging, overpacking, crimping, product shutoff/transfer/ displacement) Spill control (air ventilation, dissolution, dispersion, diversion; water damming, diverting, booming, absorption, diking, retention, adsorption, neutralization; surface blanketing) Fire control (extinguishment, controlled burn, exposure protection, withdrawal) Container stabilization	
Personnel and population protection	Impact ("hot/warm/cold") zone access control and security Personal protective equipment Medical monitoring	Protective action selection (evacuation, sheltering in place) Population warning Protective action implementation

Response Function	*On-Site Actions*	*Off-Site Actions*
Personnel and population protection (continued)	Hazard exposure control Search and rescue Decontamination First aid and transport of victims Emergency medical care and morgues	(transportation support, traffic management) Evacuation zone access control and security Search and rescue Reception and care of victims Emergency medical care and morgues Evacuation zone re-entry
Incident management	Agency notification and mobilization Mobilization of facilities and equipment Internal direction and control External coordination Public information Administrative and logistical support Documentation (incident data collection and after-action analysis) Incident recovery (resource assessment and replacement) Demobilization	Agency notification and mobilization Mobilization of facilities and equipment Internal direction and control External coordination Public information Administrative and logistical support Documentation (incident data collection and after-action analysis) Incident recovery (resource assessment and replacement) Demobilization

The facility's response team must be able to communicate the classification of an event. This allows *off-site* emergency response organizations to anticipate providing technical assistance to the facility. They may also need to undertake population protective actions. An emergency classification system using the information from the hazard/vulnerability/risk analysis is constructed by overlaying the radius of the VZ onto a facility site map. A chemical whose VZ is entirely within a single building produces only a Level I incident.

An **emergency damage assessment** gauges the immediate consequences of impact, projects the prospect for short-term further damage, estimates the chance of further primary impacts, and identifies likely secondary threat consequences. These features can increase the initial damages and require further emergency response, which includes reviewing potential impacts of fires or hazardous releases at off-site locations. These damage assessments should be relayed to off-site agencies. The EP coordinator ensures that there are resources to support an emergency assessment.

Conducting Operations: Expedient Hazard Mitigation

The facility's emergency response team must be prepared to prevent fires, explosions, or hazardous releases. The severity of such events is limited by the emergency response system. If severe events do occur, they must be terminated as soon as possible. Table 2-2 shows four principal methods of expedient hazard mitigation—leak control, spill control, fire control, and container stabilization. **Leak control** limits the rate at which chemical products escape from containment to the environment. In turn, there are two types of leak controls. Direct controls restore the integrity of a compromised container by patching, plugging, overpacking, or crimping. Indirect controls include product shutoff, product transfer, and product displacement.

Spill control limits the rate at which a chemical disperses through the environment. Gaseous releases can be controlled by ventilation, dissolution, dispersion, and diversion. Liquid releases to ground can be controlled by diking, retention, adsorption, and neutralization. Liquid releases to water can be controlled by damming, diverting, booming, and absorption. Solid releases to ground can be controlled by blanketing. By contrast, **fire control** involves extinguishment, exposure (adjacent structures) protection, and controlled burn. Finally, **container stabilization** restores an unstable container to a stable physical location or orientation. Container stabilization is principally used in transportation incidents. The EP coordinator must ensure the resources to support expedient hazard mitigation.

Conducting Personnel and Population Protection Analyses

All response organizations perform multiple protection tasks. On-site actions protect members of the on-site emergency response organization. Off-site actions focus on protective actions for the population at risk. On-site protection requires the use of personal protective equipment (PPE). Facility EP coordinators know that major incidents require protective action by local residents and special facility populations. Facility personnel may need to warn off-site populations at the same time they notify local officials of an emergency. Thus, EP coordinators must know measures for off-site population protection.

Many protective actions involve a choice between evacuation and sheltering in place. Getting everyone at risk to leave an area seems simple. A rapid evacuation is easy to achieve when the risk area population is small and safe areas are close. However, it can take many hours to clear the risk area if the population is large and the evacuation route system is substantial. Urbanik (2000) reports evacuation time estimates for some urban areas around commercial nuclear power plants require more than 30 hours. Sheltering in place is the most common protective action recommendation for some hazards (e.g., tornadoes), but choosing between evacuation and sheltering in place can be complex for chemical emergencies.

The risk area population must be warned about the hazard. There are seven primary warning mechanisms. These include face-to-face warnings, mobile loudspeakers, sirens, commercial radio and television, tone alert radio, newspapers, and telephones. Each mechanism differs in the way it might work in the community. EP coordinators consult with local emergency managers to select the best mechanism. The choice is based on the aspects of the jurisdiction (e.g., population density and wealth). It also depends on threat speed of onset, scope, and the amount of forewarning.

Conducting Incident Management Analyses

Incident management involves similar tasks for on-site and off-site emergency organizations. Incident management copes with the response-generated demands of the emergency. It is important to set apart internal direction and control from external coordination. It is also important to understand that population warnings spread crucial information to those at risk. In contrast, public information is directed toward those who are *not* at risk. As with other response functions, the EP coordinator must ensure that there are resources to support incident management.

Developing Plans and Procedures

Industry groups give technical guidance for the development of facility emergency response plans. For example, the Chemical Manufacturers Association published a handbook outlining Comunity Awareness and Emergency Response. The *CAER Program Handbook* defines 10 standards for a response plan:

1. Assignment of organizational responsibilities
2. Risk evaluation
3. Notification procedures and communication systems
4. Emergency equipment and facilities
5. Assessment capabilities
6. Protective action procedures
7. Public education and information
8. Post-emergency emergency procedures
9. Training and drills, and
10. Program maintenance

These standards are similar to the NFPA 1600 guidelines. The *CAER Program Handbook* also complements federal government guidance for local government agencies.

An industrial facility emergency plan should also consider the issue of command and control. An IMS should be adopted by private organizations as universal command structure for emergency response. This structure is under the authority of a single Incident Commander (IC). The IC can be supported by a unified command, which consists of members from other response organizations (e.g., local fire departments). The IC directs an emergency response organization consisting of five sections. Command consists of the IC and the information, safety, and liaison functions. The operations section is in charge of tactical operations. It operates a staging area for mobilizing personnel. It consists of divisions and functional groups (assigned to specific tasks such as leak control, evacuation management, and emergency medical services) or combinations of units in task forces and strike teams. The planning section has a resources unit, situation unit, demobilization unit, and documentation unit. The logistics section has a service branch and a support branch. The service branch contains a communications unit, a medical unit, and a food unit, whereas the support branch contains a supply unit, a facilities unit, and a ground support unit. Finally, there is a finance and administration section that has a time unit, a procurement unit, a compensation and claims unit, and a cost unit. facility EP coordinators should design their emergency response organizations to link with the version of IMS used by local government agencies to ensure that on-site and off-site organizations work well together.

2.1.3 Establishing Emergency Operations Centers

EOCs provide technical assistance and direct resources to emergency responders. EOCs are located in known safe areas. EOC personnel can quickly locate resources that are spread out across the organization (or elsewhere off-site) and direct them to the IC. EOCs distribute information and resources to the different organizations and governments involved in the response. This capability requires flexible and extensive telecommunications and information-processing equipment in the EOC.

2.1.4 Conducting and Evaluating Training, Drills, and Exercises

Training upgrades response capabilities, so the facility emergency response plan should describe the training required for all response personnel. Teaching should address each person's assigned tasks. Training also reviews procedures and duties of each person. To promote flexibility, everyone should know about the hazard. They should know how to protect themselves and the overview of the emergency response plan and its rationale. Cross-training allows people who perform one function to fill in or support other functions if the need arises.

Training must be evaluated by drills, exercises, and occasional responses to actual events. Drills usually involve the performance of one person or a small team over a period of minutes to hours. Exercises involve larger organizations and multiorganizational networks over a period of hours to days.

FOR EXAMPLE

Northridge Earthquake Hazardous Material Spills

The 1994 Northridge earthquake killed 57 people. It injured more than 9,000. It caused moderate or severe damage to more than 12,000 structures. The total cost was more than $20 billion. At the same time, there were hundreds of earthquake-initiated hazardous materials releases. These came from train derailment and petroleum and natural gas pipe ruptures. Many involved releases of hazardous chemicals used in hospitals and industrial firms. The local government had planned for earthquakes. Jurisdictions also had plans for responding to hazardous materials accidents. The challenge was that the plans did not assume that the two events took place at the same time. Because each type of incident involves very different response demands, more personnel, using overlapping equipment, were called into the response. Progress was significantly slowed by oversight or the fact that earthquakes can induce simultaneous hazardous materials accidents. Two effective planning processes, operating independently, can produce ineffective plans.

SELF-CHECK

- What are the principal benefits of a formalized emergency planning process?
- How can practicing emergency planners use NFPA 1600 in their job?
- What milestones must be accomplished by an effective emergency planning process?
- Define **leak control** and identify the mechanisms for achieving it.

2.2 Guidelines for the Emergency Planning Process

A highly formal planning process does not necessarily guarantee community or business emergency preparedness. The planning process is defined in terms of milestones to be accomplished. The *way* the process is implemented and the *environment* in which it is conducted also influence the level of preparedness that is produced. The consequences of the approach to accomplishing milestones and the impact of the environment can be captured in planning guidelines or principles. Quarantelli (1982) used 10 such principles, as did Alexander (2003) and

Lindell and Perry (1992), whereas Rockett (1994) proposed 19. Here we are concerned with eight features of the planning process that commonly arise and should be explicitly addressed to improve community preparedness:

1. Emergency planners should anticipate both active and passive resistance to the planning process and develop strategies to manage these obstacles.
2. Preimpact planning should address all hazards to which the community is exposed.
3. Preimpact planning should elicit participation, commitment, and clearly defined agreement among all response organizations.
4. Preimpact planning should be based on accurate assumptions about the threat, typical human behavior in disasters, and likely support from external sources such as state and federal agencies.
5. EOPs should identify the types of emergency response actions that are most likely to be appropriate but encourage improvisation based on continuing emergency assessment.
6. Emergency planning should address the linkage of emergency response to disaster recovery and hazard mitigation.
7. Preimpact planning should provide for training and evaluating the emergency response organization at all levels—individual, team, department, and community.
8. Emergency planning should be recognized as a continuing process.

These eight principles are based in the research literature but were found by observing what happens in local emergency planning processes. Being aware of these principles keeps the planner from being surprised by things that should be expected. Observing the guidelines increases the chances that EOPs will be effective and efficient.

2.2.1 Managing Resistance to the Planning Process

Emergency planning may face apathy from some and resistance from others (McEntire, 2003; Quarantelli, 1982). Apathy persists because most people—especially elected officials—don't like to think about disasters. A common objection to planning is that it takes resources. Federal and state laws mandating planning are not enough to stop resistance. Thus, planning activities need support from the jurisdiction's chief administrative officer, an issue champion (also known as a *policy entrepreneur*), or a disaster-planning committee that can mobilize support (Prater and Lindell, 2000). Even acceptance of the need for emergency planning does not stop conflict. Organizations seek to preserve their autonomy, security, and prestige, so they resist activities that threaten these goals. Planning involves the allocation of power and resources (especially personnel and budget), so every unit within an organization wants its role recognized and a budget for that role.

2.2.2 Adopt an All-Hazards Approach

The planning process should combine plans for each hazard. You should identify the types of environmental extremes (e.g., hurricanes and earthquakes), technological accidents (e.g., nuclear power plant accidents), and deliberate incidents (e.g., sabotage or terrorist attack). You then determine which hazard agents make similar demands on the emergency response organization. When two hazard agents have similar aspects, it is likely they will require a common pattern of response. Similar functions provide multiple-use opportunities for personnel, procedures, facilities, and equipment. Common or generic functions simplify training. In addition, it enhances reliability of performance during emergencies. Only when hazard agents require distinctly different responses will hazard-specific appendices in the emergency plan be required.

2.2.3 Promote Multiorganizational Participation

Good emergency planning promotes interorganizational coordination by finding ways to get managers and employees to actively commit to emergency response goals and responsibilities. There needs to be a clear agreement among all response organizations regarding responsibilities, priorities, and resources. This includes public safety agencies and organizations that may be hazard sources (e.g., nuclear power plants or chemical facilities). Schools, hospitals, and nursing homes are also involved. Each group has different capabilities, so they must work in concert to perform four functions: emergency assessment, hazard operations, population protection, and incident management. Each group must be aware of other organizational operations and limitations. This supports the distribution of resources to the different functional areas of the emergency response.

2.2.4 Rely on Accurate Assumptions

Emergency planning must be based on accurate knowledge of threats, consequences, and ways to manage them. Accurate knowledge results from access to or conduct of systematic analyses. Thus, you must identify hazards that affect your community and determine which areas are at risk. You must know the facilities and population segments in those risk areas and what can be done to reduce or eliminate vulnerability. Emergency managers need to grasp the basic aspects of these hazards such as speed of onset, scope, and duration of impact.

When it comes to identifying hazards, planners and public officials recognize the limits of their expertise. They recognize that they lack accurate knowledge about the behavior of geophysical (earthquake and volcano), meteorological (tornado and hurricane), or technological (hazardous materials) hazards. They see the need for contacting an expert. The same cannot usually be said about human behavior in a disaster. As a familiar saying goes, the problem is not so much that people don't know what is true, but that what they do "know" is false. Many studies describe **disaster myths**, incorrect beliefs about the way citizens behave under disaster conditions. These myths persist despite research showing otherwise. For example, disaster victims typically act rationally. They do not flee in panic. They do not wander aimlessly in shock, nor do they comply docilely with orders of authorities. Instead, victims are likely to make their own decisions. Following impact, they are the first to search for survivors. They care for the injured, and they help protect property from further damage. When they need help, victims are more likely to contact informal sources such as friends, relatives, and local groups. Moreover, looting in evacuated areas is rare. Crime rates tend to *decline* after disaster impact.

These disaster myths are not minor matters. They hamper emergency planning by influencing the allocation of resources. They also affect the flow of information. For example, officials sometimes cite expectations of panic as a justification for giving the public incomplete or no information. This kind of response is counterproductive. People are more reluctant to comply with suggested measures when they have vague or incomplete warning messages. Thus, the misconception that accurate information will cause panic can frustrate attempts to protect the public. For these reasons, the planning process must be firmly grounded in science literature.

All emergency plans must be based on accurate assumptions about aid from external sources. In major disasters, hospitals might be damaged or overloaded.

Figure 2-3

Citizens can be expected to help themselves in the absence of official response. These Hurricane Katrina survivors welcome Urban Search and Rescue Team members to their rooftop makeshift shelter.

Destruction of transportation systems could prevent outside assistance from arriving for days. Restoration of disrupted systems could take much longer. Thus, all social units must be prepared to be self-reliant for an extended period of time. FEMA's *National Response Plan* warns local jurisdictions not to expect federal resources to arrive until at least 72 hours after a disaster impact. The Comptroller General of the United States (Walker, 2006) studied the federal response to Hurricanes Katrina and Rita and reported that DHS failed to adequately execute the National Response Plan for weeks. (see Figure 2-3)

2.2.5 Identify Appropriate Actions While Encouraging Improvisation

Effective emergency planning should identify the response actions most likely to be appropriate in an emergency. However, it should also encourage improvisation based on continuing assessment of the emergency by response personnel. Careful planning can promote faster emergency response. Rapid response is important but not the only goal of emergency planning. In fact, the appropriateness of response is as important as the speed of response. Continuous and accurate emergency assessment ensures that the response is appropriate and that response actions are anticipated before they need to be accomplished. In the high-pressure decision atmosphere accompanying an imminent threat, it is difficult for an emergency manager to appear to be "doing nothing." However, the best action might be to actively monitor the situation for further information rather than start unnecessary or possibly wrong protective actions. Good planning prepares both responders and officials to understand this principle as a means of avoiding inappropriate criticism.

The EOP should emphasize flexibility so that responders can improvise as the situation demands. The planning process should focus on *principles* of response. It should not have overly specific procedures with too many details. Trying to create detailed emergency plans produces four undesirable outcomes:

1. Gaps exist because it is simply impossible to anticipate all contingencies.
2. Very specific details tend to get out of date very quickly.
3. Too many details produce confused priorities.
4. Greater detail produces a bulky and complex plan.

Plans that fail to acknowledge these principles are difficult to train and exercise. A large, complicated plan makes it hard for responders to understand their roles in the overall emergency response. Finally, bulky plans often sit on shelves instead of being a useful map for community preparedness.

2.2.6 Link Emergency Response to Disaster Recovery and Hazard Mitigation

No clear line separates emergency response and disaster recovery. Some portions of the community will be engaged in emergency response tasks while others conduct recovery tasks. Response planning should be linked to recovery planning, which will speed the process of disaster recovery. It will also ease the integration of hazard mitigation into disaster recovery (Wu and Lindell, 2004). The necessary coordination can be achieved through organizational contacts between officials and personnel responsible for these activities.

2.2.7 Training and Evaluation

Disaster planning requires training and evaluation. The training process explains the plan to the people who will be involved in the emergency response. Everyone in response roles must be trained to perform their duties. This includes fire personnel, police, emergency medical services personnel, public works employees, and others. There also should be training for personnel in hospitals, schools, nursing homes, and other facilities. Finally, the population at risk must be involved in the planning process. They need to be aware that planning for community threats is underway. They need to know what is expected of them under those plans and what is likely to happen in a disaster. They also need to understand what emergency organizations can and cannot do for them.

Proposed emergency response operations need to be tested globally. Emergency drills and exercises simulate an impact environment for testing operational procedures. They test knowledge retained from training. Drills and exercises also enhance the ways that different organizational personnel work together. They help members to better communicate, to become conversant with each other's SOPs, and to appreciate their joint role in response. Furthermore, multifunctional exercises constitute a simultaneous and comprehensive test of emergency plans and procedures. They also test personnel training, equipment, and materials. Finally, multifunctional exercises produce publicity for the emergency response organizations, which increases their credibility.

2.2.8 Adopt a Continuous Planning Process

The final principle for effective emergency planning is that it should be a continuing process. Changes in the threat environment, technology, and the community require that an emergency planning process detect and respond to these changes. This point is often overlooked. There is a tendency to view disaster planning as a product (the plan), not a process. This misconception confuses tangible products with the activities that produce them. Effective planning is made up of pieces that are difficult to document on paper. These include the development of emergency responders' knowledge about resources available from governmental and private organizations, the acquisition of knowledge about emergency demands and other agencies' capabilities, and the establishment of collaborative relationships across organizational boundaries. By treating written plans as final products, one risks creating an illusion of being prepared for an

FOR EXAMPLE

Mt. St. Helens Volcanic Eruption

When Mt. St. Helens violently erupted on May 18, 1980, the magnitude of the event was not anticipated. However, there had been distinct signs for weeks that volcanic activity had resumed. A restricted entry zone was established, which excluded citizens from nearby towns. This is because authorities thought an eruption was imminent but the technology for prediction did not afford much lead time. Despite the obvious threat, there was much pressure on the governor to rescind the restrictions to allow businesses to reopen and homeowners to return. There was special resistance in the town of Toutle where the economy depended on logging and tourism. When the eruption took place, the town was devastated by ash fall and mudflows down the adjacent Toutle River. If the restrictions had been lifted, much of the population could have been killed or injured.

emergency. As time passes, many changes take place. For example, reorganization may have changed the agencies responsible for emergency response. The potential for changes in hazard exposure, population vulnerability, and resources of emergency response organizations dictates that emergency plans and procedures be reviewed often, preferably annually.

SELF-CHECK

- Why is there resistance to emergency planning?
- What are **disaster myths** and why are they a problem?
- Why is developing a very detailed disaster plan more a problem than an asset?
- Why are emergency drills and exercises important in the planning process?

SUMMARY

Emergency planning is the process that defines how well a community can coexist with hazards. Only with well-crafted plans that have input from a variety of actors will you be able to reduce the potential loss of life and structural damage.

In this chapter, you learned how to assemble a planning team. You learned the steps in the planning process for both governments and private sector organizations. You also discovered how to ensure the planning process is comprehensive. You can now lead a review of an emergency plan. You can translate a vulnerability analysis into a definition of response needs. You can also identify agent- and response-generated demands for the planning process. You have learned what reactions to expect to the planning process, as well as specific guidelines for successfully accomplishing the milestones. These skills will serve you well in your career, and they will also serve your community well.

KEY TERMS

Acceptable Risk The amount of risk exposure that individuals, organizations, or jurisdictions deem appropriate to tolerate.

Container Stabilization Action that restores an unstable container to a stable physical location or orientation.

Disaster Myths Incorrect beliefs about the way citizens behave under disaster conditions.

Emergency Damage Assessment Measures the immediate consequences of impact, projects the prospect for short-term further damage, estimates the chance of further primary impacts, and identifies likely secondary threat consequences.

Fire Control Action that organizes extinguishment, exposure (adjacent structures) protection, and controlled burn.

Leak Control Action that limits the rate at which chemical products escape from containment to the environment.

National Incident Management System (NIMS) A government-issued guideline for emergency planning and incident management.

NIMS Integration Center Organization that oversees the implementation of NIMS, issues NIMS standards, tests and certifies NIMS skills, and monitors system development.

NFPA 1600 Professional association standard that sets criteria for creating and operating successful emergency management programs. NFPA is an acronym for the National Fire Protection Association.

Resource Analysis The pairing of resources with estimated emergency response needs and planning for the acquisition and use of those resources.

Risk Reduction Analysis	Analysis of the actions necessary to decrease known or projected levels of danger associated with a threat.
Spill Control	Action that limits the rate at which a chemical disperses through the environment.
Subject Matter Experts (SMEs)	People who cultivate special knowledge of hazard agents, hazard processes, human behavior relative to hazards, or any of the processes or analyses that support any phase of emergency management.
Substance Inventory	A listing of hazardous substances (usually defined in terms of federal or state statute), their quantities, and their location.
Vulnerable Zone	A geographic area within which people, structures, and environment (agriculture, husbandry, soil, water, etc.) are subject to harm.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of the emergency planning process.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. There is a single collection of steps for implementing an emergency planning process that must be used if the process is to be successful. True or False?
2. A government must adopt NIMS only if it chooses to accept federal homeland security funding. True or False?
3. A government-issued guideline for emergency planning and incident management is:
   (a) SOP.
   (b) NIMS.
   (c) NFPA 1600.
   (d) DHS Directive.
4. The H/VA identifies all risks; authorities define which risks are acceptable and which should be actively managed. True or False?
5. An emergency damage assessment tells you the actions necessary to decrease known or projected levels of danger associated with a threat. True or False?
6. Belief in disaster myths can cause emergency planners to misallocate response resources. True or False?
7. The standard that sets criteria for creating and operating successful emergency management programs is:
   (a) NFPA 1600.
   (b) NIMS.
   (c) DHS 1800.
   (d) SOP.
8. Response speed is the most important factor governing the success of disaster operations. True or False?

Review Questions

1. What is disaster preparedness and what creates it?
2. Why is the emergency planning process more important than the plan itself?
3. Why should the planning process address issues like training and exercising?

Applying This Chapter

1. You have recently completed the on-line emergency planning course offered by FEMA. Your LEMA supervisor decides to take advantage of this by assigning you to review the local hazard/vulnerability assessment for improvements. What are the critical issues that you will look at?
2. You have been assigned to work with the local fire department to assess whether resources allocated to hazardous materials response operations are adequate. What questions do you need to answer to determine resource needs for any plan operational element?
3. You have been assigned as the team leader for a planning effort to establish an emergency plan for mudslides in Orange County, California. In your first meeting with the county manager, you discover there is an informal lobbying effort to thwart your team. How can you overcome resistance to the planning process?

YOU TRY IT

Planning for Business

As a new member of the company emergency planning team, you notice that the emergency plan for earthquakes includes elements for "backing up" data currently running, activating the off-site "hot operating system," and protecting the computers themselves from damage. However, there is no plan to educate staff members regarding self-protection in the office during an earthquake or to instruct them about equipment protections. What arguments would you make to the EP coordinator to get such elements addressed by the planning process and included in the plan?

Initiating Earthquake Planning

You are an emergency planner newly hired in a local emergency management agency in southwest Arizona. In reviewing the jurisdiction vulnerability analysis, you notice that your town is within 50 miles of the San Andreas fault. You check further and discover that there were 180 moderate earthquake shocks (undamaging) that affected your town last year. The town emergency operations plan contains no mention of the earthquake threat. When you report this and point out the high level of planning in nearby California, the director hesitates. How will you go about convincing the LEMA that a planning process should begin for the earthquake threat?

The Cost of Disaster Exercises

You have been working for a week to organize the fire and police departments in your jurisdiction to participate in a countywide terrorism exercise. This morning an e-mail went out to all employees from the city manager saying that revenues are down and all efforts must be made to cut expenditures. This afternoon you were asked to justify jurisdictional participation in a county exercise. What reasons will you give?

3

PATTERNED HUMAN BEHAVIOR IN DISASTERS

What a Planner Must Know

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of human behavior in disasters.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

▲ The basis for myths about human disaster response
▲ The kinds of psychological reactions to expect in the short and long run
▲ The impact of disasters on physical health
▲ The nature of positive behaviors that arise in the disaster aftermath
▲ The special effects of exposure to terrorist threats and incidents

After Studying This Chapter, You'll Be Able To

▲ Appraise the disaster syndrome and its prognosis
▲ Examine the conditions under which panic flight will occur
▲ Examine protocols that support disaster responders and eliminate role abandonment
▲ Examine known behavioral response patterns with planning objectives

Goals and Outcomes

▲ Assess the conditions that foster antisocial behavior
▲ Evaluate citizen reactions to response tactics
▲ Assess patterns of prosocial or positive behavior that can support emergency plans
▲ Evaluate the conditions for safe and effective use of volunteers
▲ Assess psychological and behavioral principles and include them in terrorist incident planning

INTRODUCTION

Effective planning is not an activity conducted from the confines of an office. You must know the politics of your policy system. You must also know how your local office implements the bases of emergency management. The bases are: mitigation, preparedness, response, and recovery. You also need to grasp the practical side of the planning process, including team building and analysis, and the planning challenges. You must know federal and state mandates. You will also need to understand basic patterns of human behavior in disasters.

People began encountering disasters long before there were disaster planners. Consequently, predictable behavior patterns by the public have emerged over the years. They have been extensively documented by disaster researchers. Experienced planners know that citizen compliance with protective action recommendations (PARs) is much more likely if those protective actions are designed in a way that complements known human response. That is, effective emergency planning is based on accurate knowledge. Certainly, you need accurate knowledge of the hazard agent, its consequences, and human and structural vulnerabilities. Accurate knowledge of human response patterns also is needed. For example, emergency plans and planners routinely told citizens not to use their telephones during disasters. And for years, citizens routinely ignored this guidance. The products of this practice often left telephone lines and trunks overloaded. This interrupted phone communications for both citizens and emergency response personnel. The problem arose because planners ignored known patterns of human behavior: the need to define the situation by contacting others and the need for families to make contact and check on member safety. In recent years, planning approaches have changed to better accommodate the problem. With technological advancements, it has been possible to create "citizen hotline information numbers." These have enhanced telephone trunk services to carry a heavier call load. In addition, preimpact planning now urges families to develop a plan for linking up if separated during a crisis. These are only two of many measures, but they illustrate a point. If you know what to anticipate from citizens, it is much easier to design emergency measures that complement known behavior patterns rather than contradict them. When plans complement behavior patterns, spontaneous compliance levels are much higher.

We will review the literature on human behavior in disasters and isolate the issues that arise in the context of the emergency planning process. We will examine persistent myths about human response to disasters. We will look at the special case of terrorist incidents. Finally, we will discuss what types of behavior are to be expected in disaster situations.

3.1 Myths About Human Response to Disasters

Some policy makers, planners, and citizens expect people faced with disasters to behave in ways that are not supported by research. This is especially true of terrorist incidents. We can identify myths by carefully examining the research on patterned human disaster behavior. We report what is known about people's response to natural and technological disasters and extrapolate to terrorist incidents. Natural and technological disasters are not the same. They can produce unique impacts, they have unique hazard agents, and they require unique response measures. Terrorist incidents also produce impacts and demands that distinguish them from other disasters. Much of the variation among types is based in the nature and consequences of the disaster agent and the mechanisms through which losses are produced.

The different impacts of specific threats have been studied. Some agents generate higher and more acute levels of fear than other agents. An example of such a threat is radiation. An important finding from studies of the 1979 reactor accident at Three Mile Island (TMI) is that when facing a perceived radiation threat, citizens express higher levels of fear. Fear-generating agents often elicit much higher levels of warning compliance. The Pennsylvania Governor "recommended" evacuation for pregnant women and young children within 5 miles of TMI. Ultimately, more than 144,000 people within a 15-mile radius of the plant left the area. This accounted for 39% of the population. These people were clearly motivated by fear of an unfamiliar threat. Emergency managers were not able to calm those fears. When people evacuate who were not targeted by the warning, it is called an "evacuation shadow." Ignoring the evacuation shadow produces clogged routes of egress, stalled vehicles (breakdowns and no fuel), and clogged shelters. In 2005, Hurricane Rita evacuations followed the frightening events of Hurricane Katrina. Authorities failed to appreciate the size of the evacuation shadow in their warning process. This created problems in moving citizens. The problem here is not that nothing was "done" about the evacuation shadow but that response preparations did take it into consideration.

When examined in detail, each disaster has unique features. Nonetheless, there are general patterns that can be seen in human behavior. Systematic comparison across events makes it is possible to identify common behavioral response patterns. These patterns are meaningful guides for increasing accuracy of planning estimates for emergency response needs.

3.1.1 Patterns of Citizen Response

Many leaders, citizens and unfortunately, some emergency planners, appear to believe that people respond to disasters poorly. They believe citizens behave in a disorganized and disoriented way. Decades of "disaster" movies and novels emphasize this. The press coverage of disasters emphasizes this. The press often focuses on the dramatic exceptions to normal behavior. These movies, novels, and press coverage all have a theme:.A few "exceptional" individuals lead the masses of frightened and passive victims to safety. Thus, conventional wisdom holds that people respond to disasters with panic, shock, or passivity.

Social scientific studies have repeatedly shown that none of these behaviors represents the reaction of the majority of disaster victims. Most citizens do not develop shock reactions. **Panic flight**, high anxiety coupled with disoriented running to escape danger, occurs only rarely. People tend to act in what they believe is their best interest, *given their limited understanding of the situation*. Most citizens respond constructively to environmental threats. They bring as much information and as many resources as they can to bear on the problem of how to cope with an incident. Behavior in the disaster response period is generally prosocial as well as rational. Following impact, uninjured victims are often the first to search for survivors, care for those who are injured, and assist others in protecting property from further damage.

Antisocial behaviors such as looting are relatively rare. They appear most often in conflict-based situations. Significant looting was reported after Hurricane Katrina struck New Orleans in 2005. This seems to be peculiar to the conditions created in that city. Other cities also affected by Katrina did not report significant looting. In New Orleans, unique circumstances included a near collapse of local government functions for an extended period of time. Citizens were stranded without government contact. People were without food and water. Established gangs also remained in the impact area. It appears that at least some of the apparent "lawlessness" in New Orleans was a product of the normal level of "incorrect" information associated with the early period following disasters. Some reports were simply inaccurate information given out by local authorities. Much of the information was unsubstantiated rumors. Dwyer and Drew (2005), reporting for the *New York Times,* conducted extensive interviews. They concluded that there was much misery in the shelters and streets, but the fear of crime and looting "far exceeded the reality." Unfortunately, some of the rumors complicated response operations. Dwyer and Drew (2005) reported that a deputy sheriff who believed he was under sniper fire called a SWAT team who discovered that the sniper was actually a gas tank relief valve making a popping sound. Although only a fraction of the bodies recovered have been completely autopsied, medical examiners report that few murder victims have been found. No official reports of rape or sexual assault have been filed with authorities.

In general, crime rates tend to *decline* following disaster impact. Martial law has never been declared in response to natural disaster in the United States. The public-at-large tends to converge on disaster scenes to offer help. Even people who are geographically distant send money and supplies. The picture that emerges of disaster victims and most others is one of responsible activism. People try to take care of their own needs. They support their neighbors. They help the situation as best they understand it by using whatever resources are available. Victims are typically supported in these endeavors by official organizations and resources, and by contributions from others not directly affected by the event.

The myths of irrational and antisocial behavior in disaster are not just wrong. They reduce response efficacy, they can hamper the effectiveness of planning, they cause well-meaning authorities to misdirect resources. They also affect the dissemination of information. The myth that accurate information will cause panic sometimes leads officials to qualify and abbreviate messages. This response to the myth of panic is particularly troubling. It has been shown repeatedly that people are more reluctant to comply with PARs when they are given vague or incomplete information. This decreases the likelihood of citizen compliance. Consequently, an important part of the planning process involves review of the behavioral science literature describing the response patterns of affected populations. The behavioral record is very clear with respect to three patterns of disaster reactions. These patterns are shock and inactivity ("disaster syndrome"), panic flight, and socially integrative responses.

3.1.2 The Disaster Syndrome

There are documented reports of a condition characterized by a state of shock after disasters. Shock is associated with the **disaster syndrome** where people show apathy, confusion, and insensitivity to cues in the environment. The earliest research on this disaster syndrome lies in the work of Wallace (1957) and Menninger (1952). Wallace described the shock behavior of victims of assaults on American Indian settlements. These victims had family members and friends who were killed in the attacks. Menninger looked at flood victims. He reported on feelings of "apathy, confusion and disbelief."

Many clinical psychology studies identify cases in which disaster syndrome symptoms have appeared. Three important conclusions have emerged from research in this area. First, the disaster syndrome appears most frequently under certain conditions. These are sudden-onset, low forewarning, widespread physical destruction, traumatic injuries, or death (Melick, 1985). An example of such an event is the terrorist attacks of 9/11. Second, a small proportion of the disaster-stricken population is affected. In one of the few sound studies of the phenomenon, Fritz and Marks (1954) found that 14 % of their random sample showed evidence of the early symptoms of the disaster syndrome. Moore (1958) reported that between 17% and 30% of families exposed to the Waco tornado who lost at least one member (usually a child) experienced "emotional upset." Taylor's (1977) study of the Xenia, Ohio, tornado reported low rates of mental health problems. "Trouble sleeping" was the leading symptom with frequencies at 27%. The third conclusion is that the disaster syndrome is transient. It usually persists for a maximum of a few hours or days. It is rarely detected outside the immediate postimpact period (Murphy, 1984).

This is not to say that psychological consequences don't persist. Depending on the nature and severity of the event and various characteristics of the victim, studies have indicated that situational phobia and depression can persist for years

(Gleser et al., 1981). **Anxiety** is a feeling of unease, uncertainty, fear, and apprehension that is considered a normal reaction to disasters. There is much anecdotal evidence that both victims and observers of the 9/11 attack on the World Trade Center have experienced long-term negative psychological consequences. There are grief reactions, post-traumatic stress disorder, and other serious psychological problems. They are clearly distinct from disaster syndrome symptoms.

In general, disasters do not lead to substantial increases in mental health problems in the affected population. Following the 1978 floods in Rochester, it was reported that one-third of victims claimed they were able to function better after their disaster experiences (Ollendick and Hoffman, 1982). As you can see, the literature shows some mixed results. Disasters are capable of producing both minor and major psychological consequences. These consequences are both short and long term. For reasons not well understood, some people are more resilient than others. Singer (1982: 248) believes that most people respond in an adaptive and responsible way. However, he writes that some "show some signs of emotional disturbance as an immediate response." Disasters are significant life events. Reactions sometimes documented after disasters include:

- Sleep disruptions
- Anxiety
- Nausea
- Vomiting
- Bedwetting
- Irritability

In some cases, serious consequences, such as extended grief reactions, depression, and psychoses, ensue. We do not have systematic data on terrorist incidents. However, we can speculate that terrorist events are more likely to generate long-term impacts than other disasters. This is in part because they are designed to cause fear and because they fit the profile of being sudden. They create physical destruction and death, and they also lack an apparent "rational" explanation. Some of the common disaster syndrome symptoms, however, are probably associated with longer-term onset psychological problems. They are difficult to directly attribute to a disaster. Thus, the disaster experience itself may become a "trigger event" for symptoms with genesis outside the disaster context.

Most victims presenting disaster syndrome symptoms can successfully recover with minimum (if any) professional intervention. What is important for planning is that such short-term stress reactions do not seem to interfere with disaster victims' ability to act responsibly on their own. It also does not interfere with victims' ability to follow instructions. Isolated cases of immobilizing shock are reported among some citizens in some disasters. However, such reactions are rare. They are not typical of the population as a whole (Wert, 1979).

On the other hand, we know that some level of mental disorder exists in all populations. Authorities should at least screen for psychological consequences in the post-impact period. Disaster shock is a topic of theoretical interest to disaster researchers. It is of practical relevance to health professionals. You should also be aware that this reaction occurs infrequently. It is of negligible significance for operations.

3.1.3 Panic and Panic Flight

Perhaps the most stubborn disaster myth is the idea that panic flight is a major problem. In general, "panic can be defined as an acute fear reaction marked by a loss of self-control which is followed by nonsocial and nonrational flight behavior" (Quarantelli, 1954: 272). Such panic flight is a staple of horror books and movies, perhaps where stereotypic natives run wildly from an erupting volcano. Periodically, panic flight is observed in connection with crowd behavior. For example, it is observed in riots after soccer games. It remains a rare response to natural or technological disasters. It is important to also emphasize that "panic flight" is not the same as a "fear reaction" or anxiety. Anxiety can occur without flight. However, flight is preceded by anxiety.

The myth of panic flight is perpetuated by erroneous inferences from the available information. First, people tend to think that panic is common because victims often label their immediate reaction to the situation as one of "panic" when interviewed in the news. Careful scrutiny of these victims' statements—"When I saw the funnel cloud, I panicked"—indicates that they are referring *only* to the first of Quarantelli's conditions—the acute fear reaction. To be fearful in the face of an explosion, earthquake, or other unexpected event is normal. Subsequent statements from the victim describing rational protective responses often get lost in the interview. The victim may have concluded with: ". . . so, I grabbed the baby out of the upstairs bedroom and ran down to the basement just before the house collapsed." Such behavior is constructive. It is not panic flight.

A second reason for the panic myth is that observers misinterpret the state of mind of victims who took unsuccessful actions. For example, a news story may assert that the victims of a motel fire found dead in a hall storage closet got there because they "panicked." A more plausible explanation is that in crawling through the heavy smoke, the victims could not see. They then reasonably but wrongly concluded that the first unlocked door they encountered in this unfamiliar hallway was the door to the stairwell. Once they realized their mistake, it might have seemed safer to remain in the closet. Or the flames may have blocked their exit. In short, the fact that an error of judgment has produced fatal consequences does not provide *prima facie* evidence of panic.

Observers often interpret any attempt to flee the danger as evidence of panic. Yet, in light of Quarantelli's definition of panic, it is difficult to see why anyone would assume that it is *not rational* to want to put distance between oneself and a fire or why it is not rational to move quickly to leave the vicinity of crumbling buildings following an earthquake or terrorist bombing. In these cases, those affected are assessing a threat in the environment. They are coping with this threat (and their fear as well) by taking an immediate protective action.

All examples of panic flight cannot be explained away. Although it is indeed very rare, panic flight does occur under certain circumstances. In research dating back to the early 1950s, analysis of situations in which panic flight took place indicates that there are several conditions that must occur. For panic to occur there must be:

- The perception of immediate and extreme danger.
- The existence of a limited number of escape routes.
- The perception that the escape routes are closing, demanding quick action.
- A lack of communication that clarifies the danger in the situation.

We emphasize that these conditions are defined in terms of the individual's perceptions or beliefs. The conditions are based on *what those at risk believe to be true at the time,* not on what the emergency managers know *after the fact*. It is also important to distinguish between the occurrence of an event and the potential for dangerous consequences resulting from that event. Quarantelli (1954: 274) reports that trapped miners who realize that they will have sufficient air until rescue comes don't panic. It is the possibility that the air will be exhausted that causes panic. Just being trapped does not cause panic.

Panic flight has been documented in response to natural or technological disasters. However, it is not a frequently observed reaction to any type of disaster. When panic flight is observed, it seems to involve a small proportion of the people exposed to the threat. It does not usually persist for any period of time. It should be remembered that even in cases where conditions for panic flight exist, it does not always materialize. Johnson (1988) reported that during the 1977 Beverly Hills Supper Club fire in Kentucky (where 160 patrons died), the evacuation was orderly and altruistic responses were common. Furthermore, Aguirre, Wenger, and Vigo (1998) reported that the evacuation of the World Trade Center in 1993 was tense but orderly. There were no reports of panic flight. The same constructive behaviors were observed in the stairwells of the same buildings on 9/11.

3.1.4 Positive Patterns of Behavior

Disasters often produce a shift in values and norms. Wenger and his colleagues (1980) have documented these changes. There is a decline, almost a complete end, to socializing following disasters. There is also a decrease in the consumption of luxury goods during this time. Finally, there is a decline in social control problems following disasters. At the same time, there is usually an increase of mutual support functions among victims and others in stricken communities. The appearance of these conditions or behaviors produces what Barton (1969) has called the altruistic community response. Fritz (1968) defined the **therapeutic community** as the altruistic and supportive behaviors extended by victims and nonvictims to people affected by a disaster.

Disaster victims often initiate such activities as emergency first aid and search and rescue. They do not passively await intervention by governmental authorities. It is also known that people in the disaster impact area engage in helping behaviors directed at victims. Thus, at least in the immediate postimpact period, the experience of disaster has integrative effects on the "community of sufferers." In the short run, the disaster promotes cohesion among victims. It also promotes cohesion between victims and citizens in unaffected areas of the community. The experience following Hurricane Katrina in 2005 was remarkable. Thousands of evacuees were displaced. Many found refuge with families in the area. However, the level of physical destruction prevented the provision of adequate shelter. Thousands of people were moved to shelters in many other states. They often lived with local families whom they knew not at all. States also helped them with job search services and arrangements for temporary housing (beyond a shelter experience).

The therapeutic community response is related to convergence behavior. **Convergence** is the spontaneous flow of people, material, and other resources to a disaster impact area. It accompanies virtually all disasters. Convergence takes place when a stricken community becomes the focus of an aid-giving effort. Surrounding communities and individuals, larger political entities, and private organizations all get involved. The aid includes money, goods, services, and volunteers. This increases the local authorities' resources. It also helps the morale of victims, who interpret the presence of such help as evidence that others care and that catastrophe is something that can be overcome. It can, however, be a challenge to coordinate all the resources during the response.

The influx of people and materials can provide resources to respond to the agent-generated demands of the disaster. However, convergence also can produce communication and response difficulties. For example, Kartez and Lindell (1989) reported on a Louisiana air crash. Fire departments from distant communities appeared at the crash site. This created a serious strain for the local authorities. They had to handle the crash and also the logistics associated with additional responders. To complicate matters further, unsolicited materials may arrive unannounced. They may continue to arrive long after impact. Thus, you need to be aware of the challenges of handling unsolicited resources. When convergence processes inundate responders with unanticipated people and materials, a potential asset becomes a liability. Disaster plans must take this into account. Plans must allow for integration of volunteers into the response force. Plans must include procedures for managing volunteer labor. Plans must also include instructions on the logistics of receiving, storing, and deploying material and equipment. **Citizen Emergency Response Teams** (CERTs) are professionally trained civilian volunteers sponsored by local emergency-relevant organizations. These personnel can alleviate some of the convergence challenges. They are usually sponsored by police or fire departments, or they could be sponsored by county or municipal emergency management departments. CERT participants are given training and equipment. They are acquainted with local response plans. They can be deployed within incident management systems to accomplish a variety of response functions effectively. This includes managing untrained, well-meaning volunteers who appear at the scene.

CERTs are one of the only viable uses of volunteers in terrorist attacks. This is especially true when weapons of mass destruction (WMD) are used. **Weapons of Mass Destruction** are instruments adapted to produce mass casualties and include chemical, biological, radiological, nuclear, and explosive (CBRNE) agents. In these cases, there is a special concern with volunteers and their protection. Hazard exposure control for volunteers is usually achieved through keeping volunteers away from the impact area. You must provide personal protective equipment (PPE) for volunteers operating in any context of potential hazard

Figure 3-1

Housing assessment training is being provided to hired inspectors by FEMA's Larry Sommers.

exposure. **PPE** encompasses a range of protective gear from simple particulate masks and gloves, through self-contained breathing apparatus, to fully encapsulated, positive air pressure suits. Police, firefighters, and other first responders working in any hazardous environment use PPE. They follow safety protocols that are part of their standard operating procedures. They must meet standards and requirements of regulatory agencies (e.g., OSHA) and certifying organizations. In WMD incidents, regulatory agency concern for volunteer safety prevents you from using them in many roles. There also is a high level of required expertise for people working in the impact area after a terrorist attack. However, you should still plan for using civilian volunteers. You should include them in pre-event training. Volunteers may perform diverse activities safely. For example, they can:

- ▲ Reinforce levees with sandbags.
- ▲ Guide tours of EOC and "safe" zones of impact areas.
- ▲ Direct traffic.
- ▲ Work in shelter management.
- ▲ Deliver and place barricades.

However, volunteers should be overseen by professionals. They should be protected by frequent hazard and environmental monitoring. They should be able to easily communicate with emergency authorities. Additional specific protections depend on the nature of the hazard agent.

A second aspect of the positive social response is the sympathetic behavior on the part of non-victims. This is related to, but distinct from, the convergence response. We are referring to the volunteering of direct help to victims in the form of needed clothing, food, and lodging. Perhaps the earliest record of this response is found in Prince's (1920: 137) study of an explosion in Halifax, Nova Scotia. He documented a willingness of locals to invite victims from the damaged ship into their homes. Since Prince's time, research confirms the willingness of people not directly impacted to support the victims (Lindell and Perry, 2004). We saw this phenomenon with Hurricane Katrina. Particularly in Western societies, such helping behavior may be seen as a normative response. For you, the important lesson rests in understanding the consequences of the climate created by such altruism. In situations of great displacement, local shelters can be supplemented by temporary private sheltering. Both can serve as a bridge to temporary housing provided by authorities.

The result of these processes is a therapeutic social system. This unplanned outpouring of personal warmth and direct help provides support to many victims in a time of sorrow and stress. This is not to say that these social processes provide complete support for victims, nor do they entirely mitigate the negative psychological consequences of disaster impact. Disasters are calamitous experiences for many victims. Terrorist events also elicit extreme outpourings of help to the victims. The scale of giving following the September 11 attacks and Hurricane Katrina of 2005 are extreme examples. They were not routine outpourings. It is essential for you to recognize that disasters cause indirect positive effects as well as the more direct negative psychological impacts.

It is also important to appreciate the likely persistence of the therapeutic community response over time. Early researchers saw the therapeutic community as an "outpouring of altruistic feelings and behavior beginning with mass rescue work and *carrying on for days, weeks, possibly even months after the impact*" (Barton, 1969: 206, emphasis added). Regrettably, research on this has been insufficient. We do not know if Barton's hypothesis is correct. As Dynes and Quarantelli (1976) suggest, the therapeutic community may not be long-lasting. Their work does not directly test Barton's proposition. However, they have found that the decrease in community conflict is short-lived. The apparent increase in consensus is short-lived as well. The record and research are too sparse to support specific time estimates; however, we know that some conflict regarding the distribution of funds and materials began to arise within six months following the September 11 attacks. There is agreement that a therapeutic community develops in the short term, and this should be encouraged. It promotes positive outcomes for disaster victims. However, you should remember that this may be short-lived.

SELF-CHECK

- Why is it important to use accurate knowledge of human disaster response patterns to design protective action recommendations?
- When should you expect antisocial behaviors following a disaster?
- What is **convergence** and why should it interest you?
- What is **panic flight** and under what circumstances does it take place?

3.2 Expected Human Behavior in Emergencies

It is crucial that you understand that citizens confronted with disaster tend to *not* be frozen in fear. They do *not* engage in panic flight, and they do *not* engage in irrational behavior. A typical response when confronted with disaster—including certain death—is that of the passengers on United Airlines flight 93 on 9/11. The passengers called loved ones to get more news. They then understood that the hijackers probably wanted to crash a plane into a building in Washington, D.C. They then organized and attacked their hijackers. They chose to die in

FOR EXAMPLE

Panic at a Soccer Game

In Johannesburg at a 2001 Soccer game, 43 people were killed when panic flight erupted in the stadium. The stadium was filled beyond its capacity of 60,000, with people packed in every isle. Fans shut outside the filled stadium by police stormed the doors and poured into the stadium, forcing those already inside to be pushed against retaining gates. Police began shutting the metal field exit gates enclosing fans inside the stadium itself where the overcrowding was intense. Trying to gain control, a police officer fired a canister of tear gas into the back of the crowd. As the push to escape the gas began, fans in the front realized that the front retaining gates were being closed. They ran to escape before all were shut.

Pennsylvania rather than be a flying bomb and die with others in Washington, D.C. Interpreting the results of decades of disaster research permits the identification of three distinct patterns of expected citizen response to such events.

The first observation is to expect *fear*—not panic flight, debilitating shock, or senseless behavior. Fear is a normal human reaction to extreme conditions. It rarely results in the inability to act. However, it does degenerate people's ability to effectively reason through complex problems. Fear is enhanced by the unfamiliar. Technological hazards and terrorist events often involve chemical, biological, and radiological agents. These are unfamiliar to people. Many of these agents cannot be detected by normal human senses. They produce both immediate and delayed negative outcomes. People's knowledge about such agents is highly limited. They produce extreme concern; therefore, it is important for you to directly address these concerns in the planning process.

You can do this most effectively by using a strategy of information dissemination or education. This should be done prior to disaster impacts. You do not need to give citizens a university education on the subject, but you do need to provide direct, relevant information. In the case of warnings, the message should:

- Identify the threat and its characteristics.
- Explain its human consequences.
- Explain what can be done to minimize negative consequences.

If the actions to minimize the consequences cannot be undertaken by citizens but must be executed by authorities, then you need to explain what is being done. When dealing with victims in the immediate aftermath, explanation is less important than simple directions for appropriate response. You need to give reassurance that authorities are present. You need to let people know the threat is being reduced. You also need to let people know that care will be administered to the victims. Contrary to popular fiction, the path to fear reduction is achieved by providing—not withholding—information (Quarantelli and Dynes, 1977).

A second observation is to expect *action* on the part of citizens. Authorities need to understand that citizens—informed of a danger—will undertake *what they believe* are actions to reduce that danger. Official disaster warnings and other risk communications must include PARs. If authorities do not provide suggested protective actions, people will take action anyway. They will use the most "reasonable" protections they can imagine with the resources available to them. A message not accompanied by constructive suggestions for action simply enhances fear. Fear cannot be reduced without information and action. In providing PARs, it also might be necessary to explain briefly how the actions provide protection. Telling people *why* quarantine at home will reduce their exposure to smallpox, for example. Or telling people *why* evacuating a canyon will protect them from flooding. Or telling people *why* taking potassium iodide will reduce radiation exposure damage. Telling people the reasons for protective actions accomplishes two things. First, it gives them a rationale for compliance with instructions. Second, it discourages them from taking other "apparently reasonable" actions that may not protect them.

Finally, at some level, it is appropriate for authorities to expect *compliance* from citizens. Compliance is rarely automatic, however. It is accompanied by accountability. Levels of compliance vary by threat familiarity, urgency for response, and levels of credibility given to authorities. In cases like floods, where people are likely to be very familiar with the threat, compliance with PARs from authorities will be slower than with less familiar threats such as chlorine gas. When people are familiar with threat agents, they are more confident in their own ability to understand the danger. They believe they understand when and where it will materialize. They believe they know what cues signal onset of danger. They believe they know what should be done about it. Consequently, their personal beliefs may be at odds with official recommendations. At the very least, they will not quickly accept the recommendations.

Where threat familiarity is low (e.g., with some hazardous materials), there is little or no personal experience or knowledge of the threat. People are then more likely to accept (in the crisis period) the assessment of authorities. In addition, when the time for reflection or consideration is extremely short—the warning claims that impact is imminent or the threat is visible—people tend to more readily comply, simply because there is no time for reflection. The point is that people do not accept authority's suggestions blindly or act on them uncritically. Compliance does not mean that people will know what emergency managers want them to do and do it. It does mean they will consider the recommendation. If it makes sense to them, they will probably do it. The lower the threat familiarity, the shorter the lead time, the higher the emergency agency credibility, and the more appropriately structured the message, the more likely is compliance.

These expectations are research-based conclusions from the disaster literature, not wishful thinking. In times of extreme stress, citizens look to government for guidance. Citizen expectations for protection and help are especially strong when the hazard agent is unfamiliar or when the consequences appear overwhelming. Thus, compliance tends to be higher with some technological and terrorist threats. For example, national opinion polling following the September 11 attacks indicated substantial increases in levels of "trust in government." The combination of fear and a tendency to feel that taking action is important sets the stage for attention to messages from emergency authorities and enhances a positive attitude for compliance. People do tend to return to "normal" attitudes toward government and skepticism over time. However, in the height of crisis and for some period thereafter, there is a window of opportunity for emergency managers.

Particularly during the response phase, people comply with instructions from authorities. For example, in Phoenix, Arizona, in 1999, female office workers were believed to have been exposed to mailed anthrax. They agreed to nude decontamination by male hazardous materials technicians. They had to do this in a decontamination shelter without roof covering. In addition, news helicopters hovered above. One person mentioned concern with modesty. However, none of the victims hesitated to follow instructions. Since that time, Phoenix has acquired enhanced shelters. They can also deploy "all female" decontamination teams. However, the incident stands as an example of people's compliance with instructions when the threat is unfamiliar and time for action is limited.

The expectation of compliance also places a special responsibility upon local authorities. Namely, authorities must responsibly manage. They must have current, ongoing vulnerability assessment, they must have detection and prediction systems for threats when possible, and they must have response plans in place that they are capable of executing. In the absence of such plans, people will hold authorities responsible through the political process and possibly through the courts. This fact strongly underscores the importance of the role of professional emergency planners as leaders of the planning process.

3.2.1 Expectations Regarding Stress Effects

We know that psychological consequences rarely result in citizen inability to respond in the short term. However, we need to also remember that any disaster can create longer-term problems for some of the victims. The disaster syndrome sometimes persists beyond the immediate response period. Traumatic responses are possible. Even posttraumatic stress disorder can occur. Three years after the Oklahoma City bombing, a psychiatric evaluation revealed that 13% of male firefighters were suffering from posttraumatic stress syndrome (North et al., 2002). In addition, 23% of the female firefighters suffered from it as well. A longer-term study of the bombing victims (Shariat et al., 1999) showed that 26% suffered from depression, and 22% suffered from persistent anxiety. It was not diagnosed as posttraumatic stress disorder. Other difficulties can appear. Sometimes **survivor syndrome** appears when guilt and anxiety appear in people who live through a disaster exposure and others (perhaps friends or relatives) do not. The research shows that disaster-related stress effects are more likely to arise among people:

- ▲ Who have witnessed death or handled the dead.
- ▲ Who have been exposed to large-scale property destruction.
- ▲ Whose relatives, neighbors, or friends have been injured or killed.

Terrorist events are particularly difficult for people. One reason is that the victims often bear no obvious relationship to perpetrators. Even without the conditions mentioned above, such as the loss of loved ones, people can experience long-term anxiety, guilt, and depression. As authorities move from concern with response to issues of recovery, they should anticipate the potential for long-term psychological consequences. Thus, post impact plans should include provisions for referrals for "crisis" counseling. Other short-term therapeutic options should be included as well. This is one way of reducing long-term negative consequences for people. Attention can also be given to citizen needs for economic support. There will be a need for people to develop a sense of closure. There will also be a need for people to be able to fit the disaster experience into a worldview that allows a transition to a stable life.

3.2.2 Expectations for Physical Health Consequences

One of the least studied phenomena is the tendency of people to develop physical health symptoms after disasters (Bourque et al., 1993). More than two decades ago, Perry (1983) observed that studies dating back to Prince's (1920) research on the Halifax, Nova Scotia, explosion indicated that victims developed both psychological and physical health responses. A handful of studies over the decades have reported that people developed physical health problems following disasters. This occurred in victims and nonvictims. These were not related to the disaster agent. This also occurred in people who did not develop psychological problems. Silverstein (1985) reported that after one year, disaster survivors had more health problems than nonvictims. Taylor (1977) found that tornado victims sought hospital emergency care more often, and they had more headaches and nausea. The same thing occurred when people were exposed to hurricanes. There were also higher levels of gastritis, constipation, bladder problems, and headache (Tierney et al., 2001). Smith et al. (1986) reported higher levels of heart disease symptoms among flood victims. There were also higher levels of spontaneous abortions, leukemia, and lymphoma among flood victims (Goltz et al., 1992).

Medical researchers have not found a direct link between natural disasters and physical health problems. However, there is at least a link between the time of disaster and the onset of symptoms. This condition leaves open the possibility of either direct—but unknown—causality of physical health symptoms. Or, there could be an indirect—and unstudied—link through psychological processes (Logue et al., 1981). Melick (1985: 196) has acknowledged that victims experience poorer health after a disaster. However, the research evidence is anecdotal. To really establish a connection between disasters and health problems, one would have to establish a tightly controlled research project. Subjects would also have to be followed for many years. Because we do not have a lot of information on this, there are not any lessons you can take away from this and use in the planning process. What remains for you is the standard advice to attend to special populations in the plan. The research discussed above simply underscores that those who have predisaster illnesses and limitations will present similar, but probably more severe, health problems after a disaster. The minimal constructive planning response is to alert and coordinate with the local public health system.

3.2.3 Special Terrorism Expectations

The definition of terrorist acts varies among emergency managers. It also differs between emergency managers and social scientists. The important point is to acknowledge that there are numerous "unique" aspects to terrorist events. These are largely associated with the possible use of weapons of mass destruction (WMD). When emergency managers think of and plan for incidents, the standard practice is to envision a geographically identifiable risk or impact area. They also envision an event with a distinct beginning and end. This model has historically fit natural and technological disasters well. However, it only partially fits terrorist incidents. Terrorist events using incendiary explosives create a scene in the same sense of an explosion, fire, tornado, flood, or chemical release. It takes place in a bounded geographical space, and the onset and termination of an incident are identifiable. Thus, there is a place to which operational personnel respond. There is a definable location in which victims are found. There are areas that clearly are not affected by the disaster's impact.

Some terrorist acts, however, don't have single, geographically defined scene and have beginning and ending parameters that are hard to identify. Terrorist events involving the secret release of radioactivity or biological agents follow this model and present different challenges. In these cases, there might be no immediate environmental cues that can be detected easily. Detection of the incident may come only later when victims are identified through symptoms. For some biological agents, the time lag between dispersion and detection may be considerable. There may be a large number of symptomatic individuals at one point in time. This requires investigators to work backward to identify the original exposure site. They also have to identify the time of infection. At the same time, they have to track symptomatic individuals to project future exposures. Situations such as this do not present a single identifiable scene for hazard operations. The events also could defy all but the broadest definition of a beginning and end of an incident.

Still another challenge rests in mitigating or preventing WMD events. These actions are often labeled "threat assessment" by law enforcement and intelligence agencies. Determining the likelihood of exposure in natural and technological hazards has provided information useful in planning. These data come from examining and understanding past events. It also involves using properties of the hazard to forecast future events. It also includes defining techniques for prevention. In the realm of terrorism, determining the probability of an attack is more difficult and complex. In the first place, the origin of terrorist incidents lies with terrorists. These people have no set schedule and actively evade discovery, which makes it difficult to predict their plans. These acts are not dependent on the forces of nature or technology. Observation of past terrorist incidents does not help forecast the nature of (and planning response to) future events. For terrorism, there is no reasonable logic to suggest that the frequency or characteristics of past events will resemble future events.

For some WMD agents—incendiary, explosive, and toxic chemicals—past experiences can guide the design of response actions. For example, the Oklahoma City Bombing and the September 11 attacks have underscored the need for a capacity for local heavy rescue. Explosions and structural collapse create rubble from which victims must be extricated. They also underscored the need for handling large numbers of injured and dead victims. Decades of earthquake impacts have shown the same needs. For radiological incidents, no terrorist event examples exist. Moreover, nuclear power plant accidents and World War II experiences provide unlikely analogues to terrorist capabilities. There also have been few biological agent incidents, even though there is a large range of biological agents. An agent can be dispersed in many forms. These features of WMD threats make efforts at generalization very difficult.

Determining vulnerability is difficult for WMD. It is a task that demands that groups work together, even when they traditionally do not. Law enforcement and intelligence agencies have traditionally assumed the task of monitoring terrorist groups. Public health agencies typically control emergency assessment for biological or disease agents. To effectively create terrorism preparedness, the results of the assessments by all these groups must be communicated. Law enforcement, intelligence, and public health agencies must convey their assessments to emergency managers, fire departments and hospitals. These assessments must be translated into actions to eliminate or reduce deaths and casualties.

The nature of the information available for decision-making has additional implications for WMD emergency planning. Stopping or reducing damage from WMD is challenging. WMD agents vary widely in their toxicity, characteristics, and in our ability to protect against them. Emergency managers and first responders should adopt a conservative (and large) number of potential measures. This path produces increased cost and logistical demands on responders. It exposes people to a wide range of measures. Some of these will turn out to be appropriate and necessary; others will not be needed. For example, in 1995 the Aum Shinrikyo cult dispersed the nerve agent *sarin* in the Tokyo subway. This underscored the importance of agent quality and diffusion effectiveness. Cult members carried bags of the liquid form of the agent onto subway cars and cut the containers as a way to expose people. Although sarin is extremely lethal, the attack resulted in only 12 deaths. Approximately 1046 patients were admitted to hospitals (Reader, 2000). If the sarin had been effectively dispersed in aerosol form, the death and injury rates could have been extremely large. We cannot assume that future sarin attacks would also fail to achieve effective dispersion. Consequently, in structuring response to sarin incidents (or other WMD attacks), planning must be conservative. This approach entails planning for a large number of casualties.

WMD threats also present unique planning challenges for responder activities. You will want to make sure responders have PPE and adopt special tactics to protect their lives and to allow them to continue to save others. The specific protective measures themselves are less problematic than the conditions under which they must be executed. In terrorist events where a geographically defined scene does exist, a major distinction is that the area is officially a "crime scene." That is, once the human consequences are addressed and structural stability is achieved, the scene becomes the focus of law enforcement. There will be efforts to reconstruct the agent and seek clues to the identity of perpetrators. For this reason, responders must accomplish their lifesaving goals while being aware of the presence of potential evidence, alerting law enforcement to its presence and assisting with its preservation. These activities are not "normal" for firefighters or rescuers. They require preplanning on the part of non-law enforcement responders. They also require communication and integration of operations with law enforcement personnel.

A related challenge lies in the possibility that terrorists may use "secondary devices." A **secondary device** is any agent (usually explosives) that is designed and deployed with the intent of injuring and disrupting emergency responders. Some terrorist attacks outside the United States have involved a primary attack from an explosive, coupled with a secondary attack timed to detonate an hour after the first explosion. These tactics are aimed at increasing the magnitude of the attack by creating initial consequences followed by destruction of those who are trying to abate the first attack. Not every incident will involve secondary devises, but there is no reliable way to know in advance. Consequently, strategies for incident management must include searching, identifying, and "making safe" secondary devises at every scene. First responders are trained to react quickly. They often balk at such measures and perceive them as dangerous delays. Training and drills must be designed to create disciplined response rather than quick response.

Historically, in protecting the public at risk, disaster management has traditionally relied on one or more of three strategies:

1. Quickly contain and abate the threat at the scene.
2. Move those at risk away from the threat (evacuation).
3. Provide instruction so that those endangered may shelter in place.

The choice of which single strategy or combination of strategies is used depends on the state of technology relative to the threat. It also depends on characteristics of the threat. Terrorist threats might involve no scene. Or there may be many scenes. An infectious virus, for example, could contaminate many homes. This frustrates the goal of quick containment. Also, some terrorist incidents will use agents that are difficult or impossible to abate. The use of evacuation and shelter in place also raises issues of compliance. These issues have been addressed in connection with nuclear power plant accidents and chemical accidents. However, we do not know the answer to the questions of compliance. That is, will the public comply with protective measures suggested by authorities? This requires public confidence in authorities and their recommended protective measures. There may be an infectious biological threat with visible casualties in a community. In this case, will people ordered to quarantine in their homes believe this measure is better than leaving the apparent impact area? On the other hand, will people evacuating from a radiation hazard believe that traveling in an unprotected vehicle is safer than sheltering in their homes because the higher exposure rate (in vehicles) is offset by shorter exposure duration? In either case, there is considerable potential for public refusal to comply with measures suggested by authorities. Lindell and Perry (2004) have argued that even counterintuitive protective measures can be successfully implemented. To do this, however, requires substantial pre-event risk communication on the part of authorities. To date, public risk communication regarding biological, chemical, and radiological agents that might be used by terrorists has tended to be sporadic. It has not been well coordinated across agencies or levels of government. There is at least as much misleading and incorrect information in circulation as there is correct information.

Terrorist incidents involving WMD will quickly exceed the response capacity of the community in which they take place. This raises another important challenge. Namely, the local system must be designed to accumulate materiel to take care of initial needs. Local supplies will soon be outstripped by demand. The U.S. National Response Plan ensures federal support of local needs. An effective local system must be devised to receive, package, and deploy such outside resources. FEMA is not designed to be a first-responder organization. Its resources are controlled under the National Response Plan. They must be requested by local and state officials. Furthermore, even if federal resources arrive quickly, their successful deployment is contingent on a strong local incident management system. The meshing of local with outside supply systems has always been difficult in disasters. It becomes a critical element of successful response to terrorist incidents. Tactical preplanning must include coordination with federal resources. In the event federal resources are delayed or unavailable, plans must address regional resources through such mechanisms as mutual aid, automatic aid, and other agreements.

The unique agent demands arising from biological, chemical, and radiological threats also complicate emergency response. All of these agents potentially require *special treatments* for victims. There will also be a need for *special protections* for both the public and responders. Hence, for nerve gas (organophosphorus compounds) attacks, stores of drugs such as atropine, 2-pam chloride, and diazepam are needed as antidotes or treatments for symptomatic patients. Substantial PPE is required for emergency responders. Similarly, with some biological agents, antibiotics must be available both for symptomatic victims and nonsymptomatic but exposed members of the public. Particularly with contagious biological agents, demands for protective clothing for emergency responders are stringent. Similarly, responders working in high radiation environments may require PPE. They may need some preventive drugs (e.g., potassium iodide). Severe radiation exposure demands medically complex treatment. Furthermore, if the radiation is released or dispersed via an explosive device, traumatic injuries and particulate contamination can occur. In the case of all three classes of WMD (biological, radiological, and chemical agents), responders, equipment, victims, and exposed people may require extensive decontamination.

These conditions bring at least three challenges. First, pharmaceuticals require special credentials for acquisition and use. Also, they expire. Thus, authorities need medical support in the planning and response process. Special equipment must be acquired to safely and effectively store drugs. A comprehensive system must be devised to monitor, rotate, and replace expired drugs. These logistical and planning complications are further exacerbated by the high cost of pharmaceuticals. Second, the acquisition and maintenance of PPE creates serious logistical challenges. In WMD, biological and chemical events particularly, responders must be provided with PPE. It must offer a higher level of protection. This must be done to protect lives. For example, in a nerve gas incident, both hazmat technicians and law enforcement officers operating in a hot zone will require completely encapsulated suits (Level A PPE). However, responders operating outside the zone where the agent or device is isolated will also require additional protection. This ranges from self-contained breathing apparatus (SCBA), through other levels of protective clothing. Such personnel would include those performing decontamination, EMTs, law enforcement investigators, and law enforcement engaged in scene security. The concern is that more people need more elaborate protective gear. Some PPE is "single use." Fully encapsulated suits, for example, must continually be checked (for wear, leakage, etc.). Also, some body armor naturally deteriorates with time. Virtually all PPE requires special fitting. Only the individual to whom it is fitted can use it. Multiple responders cannot share equipment. PPE requirements are costly. They demand the creation of systems to monitor effectiveness, ensure fit, and manage periodic replacement.

A third complication that arises is in connection with the use of PPE. Although hazardous materials technicians and bomb technicians routinely train and execute their functions in bulky PPE, most response personnel do not. This is particularly true of law enforcement and medical personnel. This means that people conducting decontamination, medical care, scene security, and scene investigation must be trained to execute familiar tasks while wearing unfamiliar and constraining protective equipment.

3.2.4 Role Abandonment by Emergency Professionals

Emergency professionals are people too. They have families and want to protect them. Research has been done regarding their performance in disaster situations. Their performance has been examined in terms of their personal needs to take care of their families. **Role abandonment** is the persistent myth that instead of doing their disaster-related jobs, emergency responders will leave to attend to other responsibilities. They do this, according to the myth, to take care of their families. There are at least three classic disaster studies that are misinterpreted to find support for this myth. Samuel Prince, in his 1920 study of the Halifax, Nova Scotia, explosion, mentions role abandonment. Lewis Killian's (1952) work on group memberships in disaster mentions that faced with disasters, people may feel the conflict between performing their jobs versus protecting their families. The Holland flood studies in the 1950s reported that husbands tended to take care of wives and children before reporting to work (Instituut voor Sociaal Onderzoek Nederlandse Volk, 1955).

Recognition of two issues helps to place these studies in appropriate context. First, all three studies focus on group memberships. They do not focus on emergency role (job) performance. Second, the studies dealt with people who did not have clearly defined or official emergency roles. The roles abandoned had nothing to do with the official emergency response.

More recent social science research provides important information on role abandonment. Emergency professionals and civilians alike express great concern for their families during disasters. Furthermore, it is also evident that emergency responder job commitment persists despite other concerns and cross pressures. Fritz (1961) interpreted the disaster research literature on role abandonment. He drew three conclusions. People who have no official emergency response role and are not victims will render aid at the disaster scene. People who have no defined disaster role and who have been victims themselves will render aid to

FOR EXAMPLE

Oklahoma City Bombing

On April 19, 1995, a truck filled with 4800 pounds of explosives was detonated outside the Alfred P. Murrah Federal Building. The explosion killed 168 people. It injured scores of others. First responders were on-scene quickly. However, even after assistance arrived, most first responders refused to stop working. The record shows that many worked until they collapsed. They were assessed by medical personnel at hospitals and treatment areas. They then snuck away from care to return to their search and rescue work. The problem was so prevalent that Oklahoma City emergency planners added stipulations in the emergency plan to establish and enforce work shifts for first responders in emergencies.

closest primary groups first (family). They will then work outward in relationships to friends, neighbors, and strangers. Finally, people with officially defined disaster roles will execute those roles. They will do so under some level of stress until they obtain information about their primary groups.

The third conclusion requires some elaboration. All emergency response personnel, particularly first responders, are given formal training in their technical duties. They are also made aware that their work may require separation from family during a disaster. Almost all agencies encourage their response personnel to develop family disaster plans. This includes appropriate protective actions. This also includes arrangements for support with neighbors and friends. Procedures for reestablishing contact are also designed. Some response agencies have institutionalized such concerns. This is true of police and fire departments. They have protocols for agency contact with families. They make welfare reports to deployed employees. Many departments include in this process a report on the welfare of the responder to the other family members. Practices such as these limit the probability of role abandonment. Dynes and Quarantelli (1976) found "in over 100 disasters studied and in the course of interviewing over 2,500 organizational officials, role conflict was not a serious problem which creates a significant loss of manpower." Indeed, there have been no reports of role abandonment in the response to the World Trade Center attack or the Pentagon attack. Nor were there reports of role abandonment in the anthrax incidents that followed. There were reports of widespread role abandonment by police officers in New Orleans after Hurricane Katrina in 2005. These appear to have been related to the collapse of communications and failure of the local incident command system. Also, they are matched by anecdotal evidence of police and firefighters in New Orleans and other affected cities who stayed at their posts.

SELF-CHECK

- We know that victims and nonvictims tend to comply with authorities' instructions, particularly when the agent is unfamiliar or a terrorist attack in involved. What responsibility does this place on you?
- What is **role abandonment** and when should you worry about it?
- Over many years, professional emergency planners have relied on one of three strategies to manage human consequences of disasters. What are they?
- Both victims and nonvictims tend to take action in response to disasters. What can you do to ensure this action is constructive?

SUMMARY

As an emergency planner, it is important for you to know what to expect from the public during a disaster and what not to expect. As you learned in this chapter, there are disaster myths that simply are not true. For example, people rarely panic, they rarely loot, and responders do not abandon their roles during disasters. There will always be the exceptions to these, but these are exceptions and should not be treated as the norm. In general, in response to large-scale, unfamiliar agents and terrorists attacks, you can expect that citizens will feel anxiety, take action, and comply with officially recommended measures. You also know how to plan for the positive aspects of disasters; the outpouring of aid, and convergence of volunteers on the scene. You also defined the needs for responders during terrorist incidents and how to plan to accommodate these needs.

KEY TERMS

Anxiety — Feelings of unease, uncertainty, fear, and apprehension that is considered a normal reaction to disasters.

Citizen Emergency Response Team — Volunteers who have been given professional training in disaster response and management.

Convergence — The spontaneous flow of people, material, and resources to a disaster impact area.

Disaster Syndrome Refers to people who respond to disaster impact with apathy, confusion, and insensitivity to cues in the environment.

Panic Flight High anxiety accompanied by rushing or running to avoid a threat when escape routes are perceived to be closing.

Personal Protective Equipment (PPE) A range of protective gear from simple particulate masks and gloves, through self-contained breathing apparatus, to fully encapsulated, positive air pressure suits.

Role Abandonment The persistent myth that instead of doing their disaster-related jobs, emergency responders will leave to attend to other responsibilities.

Secondary Device Any agent (usually explosives) that is designed and deployed with the intent of injuring and disrupting emergency responders.

Survivor Syndrome The presence of guilt and anxiety among people who survive a disaster exposure when others (potentially friends and relatives) did not survive.

Therapeutic Community The altruistic and supportive behaviors extended by victims and nonvictims toward people affected by a disaster.

Weapons of Mass Destruction (WMD) Instruments adapted to produce mass casualties and include chemical, biological, radiological, nuclear, and explosive (CBRNE) agents.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of human behavior in disasters.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. If you design protective action recommendations so that they are compatible with known patterns of human response, compliance rates will be higher. True or False?
2. Anxiety is a normal and expected human response to disasters. True or False?
3. Panic flight, as a response to disasters:
   (a) occurs very infrequently.
   (b) is associated with sudden onset events.
   (c) is more common when victims have handled or seen many dead.
   (d) is part of the disaster syndrome.
4. Some terrorist incidents do not have a geographic scene or a clear beginning and end. True or False?
5. When communications from authorities do not contain action recommendations, victims and others in an impact area can be expected to:
   (a) take action.
   (b) do nothing.
   (c) develop high anxiety.
   (d) engage in panic flight.
6. In terrorist attacks, the scene of operations is:
   (a) a hot zone.
   (b) a crime scene.
   (c) a warm zone.
   (d) a vulnerable zone.

Review Questions

1. When should an emergency planner anticipate that citizens will engage in panic flight?
2. What is convergence and how does it affect emergency operations?
3. Under what conditions should emergency planners expect that looting will be a problem during response operations?

Applying This Chapter

1. As a new emergency planner in San Diego—both a port city and a border city—you are assigned to make sure the terrorist plan is "state of the art." What measures can you incorporate to address mental health impacts on victims?
2. Walla Walla, Washington, has six active CERT groups but limited professional response personnel. What strategy can you adopt to effectively and safely use volunteers for response to a terrorist attack using a chemical, biological, or radiological agent?
3. After hearing of limited police role abandonment in the despair of New Orleans after Katrina, the LEMA director in Lighthouse Point, Florida, is reviewing response plans. What measures can be included in plans that will decrease the probability of role abandonment by emergency professionals?

YOU TRY IT

Sheltering and Settling Disaster Victims

Following Hurricane Katrina in 2005, thousands of evacuees were taken to shelters in distant states. Many of these were poor people, renters, and had only emotional—not family or economic—ties to New Orleans. Many expressed a desire to leave their former home. If you were a shelter manager in Phoenix, Arizona, with the ability to shelter people only for a few weeks, how would you deal with those who expressed a desire to stay in the community? What resources from government, private, and nonprofit organizations would you seek? What would be the basic elements of your transition plan?

Explosive Device with Sulfur Mustard

You are an emergency planner reviewing a fire department plan for dealing with people exposed to an explosion that disperses sulfur mustard. This product is a blister agent that comes in the form of an oily liquid. There are no immediate medical consequences but victims should be immediately decontaminated with hypochlorite solution. The plan assumes that those exposed will run away from hazardous materials technicians who are asking that they come to a decontamination line. The police department has offered to provide officers to corral the victims and force them to stand decontamination. Based on research regarding expected human reactions, are these assumptions valid? How would you advise the responders to restructure their operational procedure?

Mental Health Consequences

You are the lead emergency planner on a team reviewing terrorism plans for Chicago. Your assignment is to make recommendations about what measures to include that address psychological impacts. How will you proceed to gather information on what issues are important? Which populations (victims, families, nonvictims, response personnel) will you address? What programs will you recommend?

4

FOSTERING SUCCESSFUL EMERGENCY PLANNING

A Planner's Guide to Making It Work

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of how to foster successful emergency planning.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

- ▲ Factors that contribute to successful emergency planning
- ▲ Tactics available to obtain extracommunity-planning resources
- ▲ A framework for organizing the planning process for optimal outcomes
- ▲ Team leader qualities that increase productivity
- ▲ The critical relationship among planning, training, and exercising

After Studying This Chapter, You'll Be Able To

- ▲ Assemble a planning team
- ▲ Organize a planning team around a successful meeting strategy
- ▲ Examine the five components of organizational climate
- ▲ Prepare and motivate a planning team with positive leadership and team climates
- ▲ Use training and exercises to link planning to action

Goals and Outcomes

- ▲ Create positive climates for leadership, team effort, roles and jobs, and rewards
- ▲ Choose strategic goals for specific tactics
- ▲ Assess organizational structures that produce successful planning outcomes
- ▲ Assess functions and types of exercises
- ▲ Compare sources of expertise in universities, federal agencies, and the private sector

INTRODUCTION

Knowing the practical elements that make up the emergency planning process accomplishes only part of the task. There is always resistance to emergency planning. Resistance may come from the policy process, the budgeting process, and reluctant officials. There also is the challenge of implementing and sustaining the planning process. This is true for emergency planners in all environments. In each setting, you must organize a team, set planning goals, and get members to participate in the work. You must also monitor progress toward those planning goals.

Success doesn't stop with a sustained planning process and a written emergency operations plan (EOP). Achieving preparedness is based on translating the plan into action. Plans will not be effective without the participation of those who must implement them. Moreover, plans that are administratively devised can produce a sense of false security among both emergency planners and administrators. They may equate plans with preparedness and not recognize how hard it is to implement plans. Thus, such plans leave the community unprotected. A plan is translated into action through training and exercises. Without continuing attention to these activities, any planning process will fail.

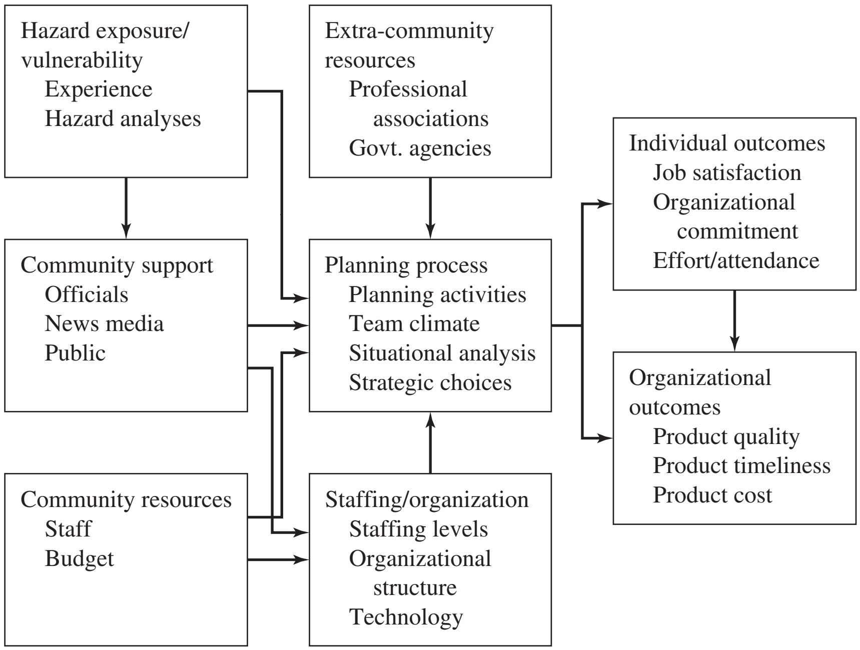
4.1 Successfully Implementing the Planning Process

Emergency planning is the path for creating emergency preparedness. The planning process is challenging because it expends resources and is spread over time. The planner must build both internal and external support. The process requires a team plan and environment that will sustain desired individual and organizational outcomes. It is only possible to organize a team if the planner acquires the organizational resources (including a budget). And the planner must find both technical expertise and community support for the planning team from external resources. Figure 4-1 shows six factors that have been identified as essential to success.

The factors in this section can be used to measure planning effectiveness. The planning process begins with hazard exposure and vulnerability. Community support, community resources, and extra-community resources are also factors that affect the emergency planning organization's staffing and organization. These factors determine the outcomes for individual members of the planning team. Outcomes include job satisfaction, team commitment, and individual effort. Staffing, organization, and the planning process also determine the quality, timeliness, and cost of community's hazard adjustments adopted and implemented by the community or organization.

In Figure 4-1, the arrows begin on the left and end on the right-hand side of the figure. The actual process is dynamic. Success produces increased levels

Figure 4-1



A model of effective emergency planning.

of *vicarious* experience with disaster demands through emergency training, drills, and exercises. We will discuss the research on each of these factors to explain how the process works and how you can influence each factor to promote success.

4.1.1 Hazard Exposure and Community Vulnerability

A disaster focuses the attention of the community on the need to be prepared. This awareness of hazards is a window of opportunity for emergency managers to initiate planning efforts. When disasters happen often, people's memories of destruction produce a disaster subculture. A **disaster subculture** is a collection of coping patterns or protective behaviors that people have successfully used in the past to deal with a recurrent disaster. For example, in communities with seasonal flooding, residents know about flood timing. They also know safe evacuation routes and destinations, and they know when they may safely return (Wenger, 1978).

When disasters are infrequent, hazard exposure gets little attention from the community. In these situations, you can try to make the risk more real by sharing the results of hazard assessments. But officials or citizens do not often read this kind of information. Vivid accounts of disasters are more persuasive than reports, especially peer accounts (Nisbett and Ross, 1980). For example, a local fire chief is most likely to be influenced by other fire chiefs' accounts of their experiences. A city manager is most likely to be influenced by another city manager. Citizens are most likely to respond to accounts from other citizens (Lindell, 1994).

Hazard exposure and vulnerability are factors in the perceived need for emergency preparedness. Caplow, Bahr, and Chadwick (1984) found that emergency management networks are more effective in communities with recent disaster experience, and a network's effectiveness increased when everyone agreed about which hazard was most important. Adams, Burns, and Handwerk (1994) found that one-third of *inactive* Local Emergency Planning Committees (LEPCs) blamed the absence of a clear danger for their lack of progress. Kartez and Lindell (1989) found that more experience with disaster demands creates good emergency preparedness practices. In their study, the good practices included using citizen emergency information hotlines and having equipment rate and use agreements with contractors. Effective emergency planning also depends on previous experiences with emergencies or disasters (Lindell et al., 1996; Lindell and Meier, 1994; Lindell and Whitney, 1995).

Thus, emergency planning requires the community to be aware of hazards. The emergency planning team leader ensures that team members understand the vulnerabilities for which they are preparing. The planning team can explain these hazards to the community. Typically, maintenance of effective hazard awareness and citizen adoption of hazard adjustments requires a long-term commitment of resources.

4.1.2 Community Support

Community support affects the resources for emergency management. Emergency preparedness is a low priority for officials who control budgets and staffing (Drabek, 1986; Sutphen and Bott, 1990). As Kartez and Lindell (1989: 13) quoted one police chief, "My number one priority is getting the uniforms out in response to calls." Police and fire departments are judged on daily performance. Because disasters don't happen every day, it is hard to get people to focus on general disaster- planning issues. The same is true for business leaders who deal with the everyday short-term demands of their offices. It is important to engage them. Business leaders have influence over critical resources. They can encourage cooperation and reward effective planning.

The broader community is also critical to the success of planning processes. Research shows the importance of community support for emergency planning. Inactive LEPCs cited community indifference and lack of funding for their failures (Adams et al., 1994). Lindell and Meier (1994) and Lindell and Whitney (1995) found that positive community support positively influenced emergency planning. Lindell et al. (1996) found that community support is more important for planning success than the frequency of community exposure to hazards.

Emergency planners can get support from various government officials. A planner can explain the dangers of vulnerability as a way to build support from officials. The legal consequences of having no plan often generate support from officials. Sometimes the liability issue is important for private organizations. When employees are at risk, an organization may be held accountable (particularly by the OSHA). To get support from business officials, economic issues provide a strong argument for support. Being unprepared will only increase the amount of harm for businesses.

Emergency managers must identify methods of generating support. Using the local emergency management agency (LEMA) resources, a planner might arrange to send speakers on a given issue to community organizations. Planning professionals can volunteer for media interviews. Planners can contact local organizations that support emergency planning. Planners can also gather information from experts about hazards.

4.1.3 Community Resources

LEMAs and LEPCs differ in their levels of effectiveness partly because of differences in their communities' resources. Adams et al. (1994) note that effectiveness was higher in larger jurisdictions. Places with higher median household incomes and those with large urban areas are also more effective. Lindell and his colleagues (1996) reported that jurisdictions with larger budgets are more successful. Bigger police and fire staffs also helped planning processes. Planning success depended on community resources more than community support.

In the short run, you can't do much about the size, budget, or staffing of the LEMA or the organization that makes plans. To some extent, you creatively work with what you have available. The City of Los Angeles can afford an emergency management department, but the City of Gilbert (Arizona) must make do with a coordinator and small staff. However, you can attempt to influence the distribution of resources. You can control the budget that supports the planning process. You must convince managers and administrators of the importance of emergency planning. More resources and the budget depend on their support. And they should know why they can't fail to plan for hazards. Emergency managers can show how the funds will reduce the risk levels.

4.1.4 Extracommunity Resources

Emergency planning effectiveness improves with resources from outside the community. Such resources may include guidance manuals. Other resources are training courses and computer resources (Lindell and Meier, 1994; Lindell and Whitney, 1995). Access to software and government agency technical reports can be used to improve LEMA and LEPC effectiveness. State technical support and industry association materials are also important (Lindell, et al., 1996). Planning effectiveness is higher with increased *vertical links* to federal agencies (U.S. Department of Transportation, Environmental Protection Agency, and Federal Emergency Management Agency). *Horizontal links* to private industry and neighboring jurisdictions also increase effectiveness (Caplow et al., 1984; Kartez and Lindell, 1987). Indirectly, these links provide systematic knowledge usually gained through experience. They help to define disaster demands. They also show the value of specific plans, procedures, and equipment.

Emergency managers increase external resources by using professional networks. The internet has immensely simplified this process. Special reports on hazards are on the internet. Technical information on hazards is online too. FEMA library documents are available through its internet site. The same is true for other federal agencies. FEMA's Emergency Management Institute operates specialty training on-line (http://www.training.FEMA.gov) or at its training center. Colleges offer course materials about planning and hazards. There are three major university-based disaster centers in the United States. The Natural Hazards Research Applications and Information Center at the University of Colorado, Boulder, is one. The Disaster Research Center at the University of Delaware and the Hazard Reduction & Recovery Center at Texas A&M University are others. They all have internet libraries and experts. In addition, there are government and private hazard-related programs. These programs are on-line. Some have controlled access. Some have searchable databases. There are chances to ask experts questions. And there are message boards with other emergency planners (https://www.llis.gov). The Center for State Homeland Security (www.cshs-us.org), the Partnership for Public Warning (www.partnershipforpublicwarning.org), and the Responder Knowledge Base (www.rkb.mipt.org) provide materials for emergency managers.

You can expand your horizontal networks. A membership in a professional association is helpful. And your participation in adjacent community-planning efforts is useful. The International Association of Emergency Manager's (IAEM—www.iaem.com) is the largest professional group that offers many connections. There are other private groups as well. You can share regional knowledge by participating in LEPCs and your State Emergency Response Commission.

4.1.5 Staffing and Organization

Planning effectiveness is linked with levels and types of staffing in planning organizations. Effective LEMAs have defined roles for elected officials. There is a clear internal hierarchy and good interpersonal relationships. They also continuously plan. They get members and citizens involved. Coordination among agencies and public-private sector cooperation are needed too (Lindell and Perry, 2001). Successful LEPCs have more members and paid staff. They have input from many agency people. They are also organized into task-specific subcommittees (Lindell and Meier, 1994). When elected officials are members of LEPCs, there is more success. Members who represent the news media are less important. For LEMAs, keeping elected officials informed clears internal roadblocks to the planning process.

The establishment of an organizational structure through subcommittees is very important for success. An internal division of labor allows LEMA and LEPC members to focus on specific tasks. Thus, they avoid feeling overwhelmed by all the work. The ratio of volunteer to paid staff is also important in planning success (Lindell et al., 1996). Success is linked to most of the work being done by paid, professional staff. This does not mean volunteers lack skill. Volunteers do, however, show high turnover rates. Paid staff members remain on the job longer. Their work assignments are more likely to be clearly defined and prioritized. They also are more likely to receive continuing education. Volunteers are usually best used to support the efforts of professional staff.

4.1.6 Planning Process

The way the planning process is conducted has an impact on planning outcomes. The conduct of the planning process usually falls under the leadership of an emergency manager. Some private organizations, LEMAs, and LEPCs have established protocols for resources, budget, and organization of planning processes. But the matter of concern here is leadership. You must be both a technical expert and skilled in people and process management. Planning activities, team climate, situational analysis, resource acquisition, and strategic choice ensure planning success you can control.

Planning Activities

Planning activities that mix key people from diverse departments increase the chance that jurisdictions and organizations achieve planning goals. These activities place people charged with response in direct contact with you. Table 4-1 reviews studies of planning tactics. Studies show that training and reviews with senior officials have the most effect on the planning process. Diverse task forces and a disaster assistance council are also critical for success. Exercises with after-action critiques, conducting vulnerability analyses, and news media contacts are also beneficial. Procedure revisions, plan revisions, and reviews of mutual aid agreements had small effects on the success of planning efforts.

Another important feature of success relates to the way that planning process meetings are organized and held. Planning success depends on devising a **meeting strategy,** a means of scheduling, conducting, and following up after planning meetings that promotes further participation and positive outcomes. Studies indicate (Lindell and Meier, 1994) that a successful planning team engages a meeting strategy that includes:

- Frequent meetings.
- Formal orientation for members.

Table 4-1: Planning Activities Producing the Largest and Smallest Differences in Achieving Preparedness Objectives

Largest Differences Created by:	*Smallest Differences Caused by:*
Interdepartmental training	Procedure updates
Reviews with senior officials	Plan updates
Interdepartmental task force	Review mutual aid agreements with neighboring cities
Community disaster assistance council	
After-action critiques	
Exercises	
Vulnerability analyses	
Meetings with TV/radio managers	

- Regular scheduling of meetings.
- Advance circulation of written agendas.
- Keeping of written minutes.
- Formally defining team objectives.
- Conducting frequent assessments of progress in attaining objectives.

These findings are consistent with research by Gillespie and his colleagues (Gillespie and Colignon, 1993; Gillespie et al., 1993; Gillespie and Streeter, 1987). They found a need for easing relations between organizations with full-time staff members and organizations with part-time staff and volunteers. They suggested scheduling meetings at times good for all staff (full-time, part-time, and voluntary). The meetings focus on common interests, and agendas provide a guide for the meetings. Failure to consider these points often results in the end of the project from neglect.

The planning team and its organizational sponsor must link to the preparedness network. This network includes other LEMAs in the region, LEPCs, and response agencies. Failure to save such links usually shows deficiencies in emergency managers' and planners' strategies for social environment analysis and management. Gillespie and his colleagues (1993) clarified research on social management strategies. They note that missing interorganizational links can be created. Informal contacts, verbal agreements, and written agreements create these links.

Making contacts alone does not ensure good planning outcomes. These outcomes include having information, services, or resources in hand. To have good interorganizational relationships, there must be an understanding of the link between social environment analysis and getting resources. The low priority given to emergency planning in communities and organizations often makes it impossible for LEMAs or planning teams to purchase needed resources outright. Thus, you must incrementally acquire resources over time. At the same time, you must build instant response capacity by working with other organizations. These are organizations in the local network that have more influence to get funding for more resources.

Internal and external organizations are more likely to work with a LEMA if there are good reasons to do so. Thus, quality interorganizational linkages are made when organizations become aware of the scale of disaster demands. Or they see the need to avoid gaps in services or doubling up on effort. Timely access to information, services, or resources is a good reason for creating links between organizations. Strong organizational links boost internal organizational response capability. And such links strengthen political influence. This creates organizational autonomy, security, and prestige. Motivated and likable individuals contribute to successful interorganizational linkages. Personal and professional contacts are also important for success. These factors include routine interagency and interjurisdictional meetings, drills, and exercises. Factors that limit the success of interorganizational relationships are:

- Geographical distance between organizations.
- Lack of funds to support initiatives.
- Lack of staff, making frequent meetings and contacts burdensome.
- Incompatible professional perspectives and terminology between organizations.
- Lack of trust in an organization or its representative.
- Overconfidence in one's personal or organizational capability.
- Unequal rewards and costs of participation for those in different organizations.

You must recognize these points as likely barriers. You can make adjustments in your approach to overcome these barriers.

Team Climate Development

Most of the research on team climate as a success factor has focused on LEPCs. Emergency planning effectiveness is greatest in LEPCs that had positive **organizational climates,** which can be defined as:

> *Distinctive patterns of collective beliefs that are communicated to new group members through the socialization process and are further developed through members' interaction with their physical and social environments. (Lindell and Brandt, 2000: 331).*

Organizational climate affects LEPC effectiveness by influencing the degree to which members' motivation is aroused, maintained, and directed toward group goals. Organizational climate quality has five components:

1. Leadership Climate
2. Team Climate
3. Role Climate
4. Job Climate
5. Reward Climate

A **leadership climate** is the atmosphere in which work is overseen by organizational or team leaders. A positive climate is created by being clear about the work, the workers' assignments, and desirable outcomes. What tasks are to be performed? How can you recognize everyone's strengths and weaknesses? How can you support their needs? Leader-initiating structure and leader consideration are two aspects of leader behavior. These aspects aid LEPC effectiveness. Focus team member attention on the tasks to be performed for a positive team climate. Encourage information sharing and coordinate individual efforts. When leaders do these functions, members tend to trust each other. Members feel that they are included (team cohesion). They have confidence in the ability of their team (team pride). Leaders promote a positive role climate. They define clear relationships and communication. Team members must understand what tasks are to be performed and how to perform them. This avoids the stress caused by role ambiguity. Leaders and members must agree on what tasks are to be performed. Doing so avoids the stress caused by role conflict. Finally, members must have enough time to perform the tasks. Then they avoid the stress caused by role overload (James and Sells, 1981).

A positive job climate arises when members have enough independence to do their work (personal autonomy). Team members should perform a whole piece of work that provides a meaningful contribution to the group product (task identity). They should perform tasks that exercise a variety of special skills (skill variety). Successful outcomes are also produced when there is a positive *reward climate*. Give members chances to perform new tasks (member challenge). People also need chances to work with other people (social contacts). And everyone likes to know their work is appreciated (social recognition).

When the leadership, team, role, job, and reward components of organizational climate are positive, there are positive outcomes at the individual and organizational levels. The payoff includes higher job satisfaction and attendance. People give more effort. They display citizenship behavior (working beyond minimum standards). Thus, there is lower turnover. These positive outcomes at the individual level also produce greater organizational stability (due to decreased turnover). There is greater productivity (due to greater effort). A high level of climate quality is often due to support from elected officials. Climate quality also helps other aspects of a successful planning process. These aspects are the organization of LEPCs into subcommittees, meeting formalization, and meeting frequency. Studies show that climate quality is unrelated to LEPC size. This means that it can be achieved by large and small organizations alike. More members increase the range of knowledge and skills on the LEPC without impairing group performance.

Situational Analysis and Resource Acquisition

Situational analysis is a managerial assessment of organizational strengths, weaknesses, and opportunities both internally and with respect to the organizational environment. It is important for the strategic management of organizations (Thompson and Strickland, 1996) and forms the basis for making strategic choices. Unfortunately, there is no research that looks at situational analysis in LEMAs or LEPCs. You will need a grasp of the planning environment. Thus, you must document the threats and weaknesses of an area through hazard analyses. You must see potential countermeasures through population protection analyses. And you must understand local ability to take countermeasures through organizational capability analyses. Planning success is promoted by balancing these three points.

Resource acquisition involves getting emergency planning staff, equipment, and information of many different types from many sources. The main source of emergency planning staff is the LEMA. There are other local government agencies too. Private organizations and nongovernmental organizations (NGOs) can help staff the planning process. Also, the microcomputer is usually available at the LEMA. But high-speed and storage capacity computers for conducting hazard and vulnerability analyses are more often found in the Land Use Planning Departments where geographical information systems (GISs) are routinely used (Lindell, Sanderson, and Hwang, 2002).

Strategic Choice

Drabek (1987, 1990) showed that emergency managers use all kinds of strategies and structures. **Strategic choice** is the selection of goals, means of organizing, and measures to ensure success that an emergency manager believes are particularly suited to the community contexts. Some successful managers back strategies that other successful managers don't use. There is no single best way of organizing a LEMA, an LEPC, or a planning process. The strategy for organizing should be based on the contextual conditions in the community. Some structures and strategies are likely to improve the success of all emergency organizations regardless of context. And they may do so without a lot of expense. The purpose of a LEMA or LEPC is to foster a collaborative planning process. They foster horizontal linkages with colleagues in similar organizations and vertical linkages with local officials.

Mulford, Klonglan, and Kopachevsky (1973) found that effective managers and planners use six strategies for effective administration. One is a *resource-building strategy*. This strategy stresses getting human, technical, and capital resources for effective agency performance. There is also an *emergency resource strategy*. This strategy gets emergency-relevant organizations involved in emergency planning and response. The *elite representation strategy* involves placing members of a LEMA or LEPC within emergency-relevant organizations. The *constituency strategy* allows two organizations to benefit from cooperation. The *cooptation strategy* consists of absorbing key personnel from other organizations into the focal organization's formal structure as directors or advisors. The *audience strategy* focuses on educating the public about emergency preparedness. Mulford, Klonglan, and Kopachevsky (1973) believed that strategies should account for environmental, organizational (funding and staffing levels), and personal (education and training of focal actors) points. A practicing emergency manager or planner uses all or most of these strategies. Naming the strategies makes emergency personnel aware of their options and systematic in their approach.

Studies at the Disaster Research Center show that successful disaster planning requires emergency organizations to understand the difference between communitywide disasters and emergencies that can be handled by one agency (Dynes et al., 1972). Successful local disaster planners foster good predisaster relationships among organizations that must respond to a disaster (Anderson, 1969). Dynes and Quarantelli (1975) devised nine models of interorganizational orientation. These models define specific strategies and tactics that leaders can use to structure emergency management and planning. These models, with their constituent activities, are:

- ▲ **Maintenance:** acquiring and maintaining human, material, and financial resources.
- ▲ **Disaster expert:** developing knowledge and skills about disaster agents.
- ▲ **Abstract planner:** constructing contingency plans based on generic principles.
- ▲ **Military:** developing a well-defined hierarchical organization.
- ▲ **Administrative staff:** developing managerial knowledge and skill.
- ▲ **Disaster simulation:** implementing disaster plans through drills and exercises.
- ▲ **Derived political power:** acting as the representative of the jurisdiction's CEO.
- ▲ **Interpersonal broker:** establishing contacts with emergency-relevant agencies.
- ▲ **Community educator:** overcoming indifference through hazard awareness.

These models describe different approaches to issues that often come up. They clarify different roles a planner can adopt when dealing with internal and external organizational issues.

These models become useful for planning when we associate each one with practical tasks that must be accomplished either in LEMA or LEPC administration or in the planning process. Table 4-2 shows the models in terms of their usefulness in achieving four important strategic goals. The first category of strategic goals is organizational development. The military and administrative staff

Table 4-2: Emergency Management Development Strategies

Strategy Goal	*Iowa State University*	*Disaster Research Center*
Organizational development		Administrative staff Military Abstract planner Disaster simulation
Resource acquisition	Resource building	Maintenance
Physical environment analysis and management		Disaster expert
Social environment analysis and management	Emergency resource constituency Elite representation Cooptation Audience	Derived political power Interpersonal broker Community educator

models define clear roles and lines of authority. The abstract planner model emphasizes development of coordinated emergency response plans. The disaster simulation model addresses the importance of testing the performance of the emergency response organization.

Resource acquisition uses both the resource-building strategy and the maintenance model. Both ensure the acquisition of resources to develop competent emergency management. For an analysis of the physical environment, use the disaster expert model. Finally, successful management of the social environment is enhanced by securing legitimacy from the chief administrative official (derived political power model). It is helped by the collaboration among emergency organizations (emergency resource strategy and interpersonal broker model). It is also helped by placing LEMA or planning process staff in positions to influence important groups (the constituency, elite representation, and cooptation strategies). Organizational influence is magnified by engaging in outreach to community groups and news media (the audience strategy and community educator model). Emergency managers and planners can choose from the various model options that are compatible with each unique community.

Recent studies identify the ways that local emergency managers act on these strategies to create constituency support. Drabek (1987, 1990) found that the best managers created support. They increased the resource base of all local agencies. To do this, they used committees and joint ventures. Doing so involved other community organizations. Some of them managed conflict before it got out of control. They created consensus with other agencies on the LEMAs mission. The extent to which emergency managers rely on these strategies varies with community size. Successful managers in small communities used them less often. They also had more frequent contacts and used interagency agreements [e.g., memoranda of understanding (MOUs)]. All successful emergency managers coordinated with other emergency agencies. Managers gave the least time to ties in the business community and (except in the smallest communities) to elected officials.

4.1.7 Individual Outcomes

Individual outcomes for members of planning teams include job satisfaction and organizational commitment. Creating attachment behaviors (effort, attendance, and continued membership) and organizational citizenship behaviors are also important goals. Whitney and Lindell (2000) argue that teamwork and motivation control the achievement of these goals. Teamwork and motivation are highest when members recognize emergency planning targets (social and environmental problems) as valid, significant issues. Motivation is high when they are committed to the success of vulnerability reduction. And they are also more successful when they believe it is possible to achieve their goals (Chavis and Wandersman, 1990; Florin and Wandersman, 1984). Team members' sense of accomplishment is enhanced when they help the community. Leadership behaviors create these beliefs among team members.

The concept of commitment is a critical element. **Organizational commitment** is "the strength of an individual's identification with and involvement in a particular organization" (Porter et al., 1974: 604). Mankin and Perry (2004) described two types of commitment. Affective commitment is an emotional tie to the organization. It is correlated with higher levels of employee performance (Meyer et al., 1989). In contrast, continuance commitment reflects the individual's thoughts on the consequences of leaving an organization. Continuance commitment gets people to stay in the job. But it fails to raise performance beyond the minimum level. Research shows that LEPC members' attachment behaviors enhance affective commitment. They do not enhance continuance commitment (Whitney and Lindell, 2000). Effective LEPC leadership influences member affective commitment. The leader has the ability to structure team tasks. The leader communicates clearly. Consideration is shown to team members. It is also important that LEPC members know that they do a good job. They should be clear about their roles. Another factor affecting commitment was the members' link to the LEPC's goals.

4.1.8 Organizational Outcomes

Organizational outcomes include the quality, timeliness, and cost of plans and procedures. These goals are the results of individual outcomes and the planning process. Lindell and Whitney (1995) and Lindell and Meier (1994) studied the milestones accomplished and the plans completed by LEPCs. Lindell et al. (1996) found that LEPC performance differed from one type of activity to another. LEPCs were effective in collecting and filing hazard data. LEPCs were also able to list local emergency response resources. They got emergency communications equipment. And they had training for local emergency responders. In contrast, LEPCs were ineffective in developing protective action guides. They were not good at analyzing air infiltration rates for local structures, nor could they analyze evacuation times for vulnerable areas. And they did not do enough to promote community toxic chemical hazard awareness.

There is little research on the tie between individual and organizational outcomes. Whitney and Lindell (2000) found no support for the idea that member actions are related to the tie between commitment and LEPC effectiveness. One might think that a person's increased attendance and effort, as well as reduced turnover intentions, would increase the achievement of group outcomes in a small organization. However, leadership that is high in initiating structure, consideration, and communication increases chances for reward and reduces role conflict. In turn, these two aspects of the organization had direct effects on LEPC effectiveness.

Lindell and Brandt (2000) found that individual outcomes helped organizational outcomes. Organizational outcomes are improved with increased community resources, disaster experience, and elected official support. LEPC size, subcommittee structure, meeting formalization, meeting frequency, role formalization, and computer technology contributed to positive outcomes. In addition, positive organizational outcomes depended on leader, team, role, and job climates.

The inconsistent relationships between individual and organizational outcomes are surprising. Some of the problems may come from research measurement issues. It is possible that inconsistencies arise because member participation was calculated from average ratings on the attendance, effort, and turnover intention scales. However, other research shows that the overall performance of small voluntary organizations is often determined by a few members: "80% of the work is done by 20% of the members." If this is true, then success is influenced by the average attendance, effort, and turnover intention scores of the *most active* members rather than *all* members. An important challenge for local emergency managers is to identify the most active members. These members then become the core for implementing and sustaining the planning process.

SELF-CHECK

- What are the primary factors (conditions) that retard the establishment of successful interorganizational relationships in the planning process?
- Why create a big planning process with exercises and the like?
- What is strategic choice and what does it do for you?
- What is **organizational commitment** and what role does it play in planning success?

FOR EXAMPLE

Urban Area Security Initiative Planning

In 2003, Phoenix (Arizona) was selected as a core city under the federal Urban Area Security Initiative (UASI). Joining UASI required that Phoenix develop a concept of operations for emergency response in the urban area. The urban area contains more than 26 cities and towns and parts of two Indian communities. The planning process goals addressed all hazards. The goals included all possible response agencies across all jurisdictions. A large committee structure developed and maintained the plan. A steering committee oversaw the planning process. People from all agencies were on this committee. Nine subcommittees addressed major areas of concern for the planning process. These areas included rapid response teams, incident support teams, interoperable communications, threat prevention, citizen emergency response teams, jurisdiction assessment teams, UASI communications with government and private organizations, training and exercise planning, and urban medical response systems. Each subcommittee had one person from law enforcement and one from the fire services. Each subcommittee was given a specific goal. The goals had five objectives: organizing, planning, equipping, training, and exercising. Each subcommittee devised specific steps to meet each goal on time.

4.2 Transitioning from Plans to Action

The disaster plan is a map for disaster management. It is written for a political jurisdiction or private organization. Written plans vary widely. The disaster plan is a product of the planning process. It is the written link between planning activity and the disaster response. The expected disaster demands are analyzed and documented. The plan looks at actions that can be undertaken. It is the basis for collaboration between the LEMA and other response organizations to develop a training protocol and calendar. It also identifies resources to support those actions. Training and resource acquisition support the exercise process and the three together prepare the emergency response organization to deal with threat environments.

Conducting exercises cements the critical connection between plans and action. In Canada, Australia, and the United States, exercises are sometimes called drills. In Europe and Great Britain, they also may be called simulations. The EOP often requires such activities. The planning process defines the knowledge, skills, equipment, and protections needed for a disaster response. Emergency response-training programs build on these requirements. Exercises test overall responses and personnel training. You can’t overstate the importance of exercises to create successful disaster operations (see Figure 4-2).

Figure 4-2

Dr. Danny Peterson, Director of the Arizona State University Polytechnic Emergency Management Program, applies makeup (moulage) to exercise participants for realism.

4.2.1 Functions of Exercises

Disaster exercises serve many functions. The main function is to detect problems in the plan's strategy or tactics. An exercise might show problems in the EOP, implementing procedures, or personnel training. For example, one might learn during an exercise that hazardous materials technicians in full gear are unable to read an instrument. Or one might learn that an interagency agreement to share ambulances did not work. Another function of exercises is that they create working relationships. Good inter- and intraorganizational ties promote successful performances during the response phase. Exercises develop a history of interaction and cooperation. Thus, people work together more effectively when disaster strikes.

Exercises are a type of public information. Publicity associated with an exercise informs the public that there is a plan. The exercise public information may inform citizens about threats of which they were previously unaware. Citizens may learn of government plans. Exercises can stimulate information searches by citizens that produce threat awareness and knowledge of protective actions. All this is useful in both familiar and unfamiliar threats, but particularly for terrorist threats. The public recognizes the dangers of terrorism. But they know less about the specific hazard agents—incendiary devices, explosives, radioactive materials, toxic chemicals, and biological agents. These agents are not just less familiar. They are often difficult to detect. They can produce immediate death. These agents may create unseen negative consequences. All of this produces intense fear.

A single exercise can increase the public's grasp of at least one agent or hazard. Media coverage of successful exercises adds to the standing of emergency management agencies. In turn, that increases the odds that people will comply with emergency measures during a disaster. Exercises also give emergency managers practice dealing with the press. Press interaction also refines the role of the public information officer. At the same time, exercises help the press to value emergency operations. This improves relationships with emergency managers.

Finally, exercises teach response personnel. They get "hands-on" practice with all procedures. Public officials also learn from the exercises. Exercises test the rapport between emergency managers and political decision makers.

4.2.2 Plans, Training, Exercises, and Disaster Preparedness

Emergency planners and researchers expend much effort to understand and define disaster preparedness. Planning is treated here in the narrowest sense of that term. We assume that the broader functions are complete. This means all analyses are finished. The hazard/vulnerability analysis is complete, hazards to manage have been chosen, and response measures have been selected. Given these assumptions, *planning* involves the construction of strategy and tactics. These must be workable series of actions or tasks. Plans address all aspects of the response, including personnel, equipment, contingency issues, policy issues, and interorganizational and intergovernmental relations. The EOP is a map for addressing all aspects of one or more threats.

Once an EOP is established, discharge of the plan begins with a detailed assessment of jurisdictional capacity. **Jurisdictional capacity assessment** measures the functions that are required in the EOP for threat mitigation, preparedness, emergency response, and recovery and determines whether the system of departments, agencies, and mutual aid agreements can execute these functions. Agencies must show that they can comply with the plan. Personnel complements and equipment must meet the plan's needs. This review also notes the need for training personnel. They need to know about the hazards facing the community. They must see the overall structure of the emergency response organization. And they must know their emergency response procedures.

Exercises are made to test the EOP protocols and equipment. Exercises add to training by asking responders to rehearse for an actual emergency. Most of all, exercises provide a context to test the effectiveness of both the training program and the EOP.

Meaningful disaster exercises test personnel, protocol, and equipment. An exercise needs a scenario designed to be like the threat. Set goals for the exercise. These may be broad or narrow. For example, let's look at exercising a response plan for a smallpox agent. The goal might be to test the jurisdiction's population protection capabilities. Thus, the exercise scenario would require local emergency managers to assess medical data. They would make decisions about evacuations. They would create a warning message. And they would use agencies to get that message to the public.

Once the exercise goals have been set, an event scenario is created. The creation of the scenario is complex. It involves the simulation of the details of an event. There are also simulated victims and simulated physical damage. The management of an exercise is similar to a major stage production. There must be realistic actors and props. Stage direction is detailed. The exercise often succeeds if it is believable.

4.2.3 Types of Exercises

There are three basic types of exercise: tabletop, functional, and full-scale exercises. A **tabletop exercise** is conducted in the classroom or conference room, is based on a limited scenario, and allows participants to verbally describe their response to contingencies. It is the least complex exercise type and is often used to acquaint participants with plans or changes in plans. Participants in tabletops listen to an event narrative. They are assigned roles in the exercise. Participants respond verbally to the scenario. Each person describes their actions. Exercise managers (or controllers) monitor the responses of participants. Sometimes they change event details to test specific exercise goals. Evaluation and self-critique are conducted after the exercise. Tabletop exercises are the least formal type of exercise. They achieve very basic, cost-effective assessments. They are useful to introduce new protocols. It is also helpful for reviewing new threats. However, tabletop exercises don't achieve the realism of execution in the field.

A **functional exercise** tests one or more functions in an emergency plan in a field setting designed to realistically approximate disaster conditions. The functions tested may cross agency participation (police and fire) or engage a particular activity (evacuation, sheltering, or medical treatment) in detail. These are complex events. For example, to test the response to a dirty bomb, emergency managers can conduct a functional exercise to test the emergency medical services (EMS) part of a response plan. The functions tested might be victim decontamination, triage, scene treatment, and transportation to hospital. This kind of exercise can use the same scenario to focus on law enforcement. Then scene isolation and control, evidence collection, and perpetrator identification can be addressed. Depending on the nature of the plan, a functional exercise could involve a single response agency or many. Usually, functional exercises are conducted in real time in the field. Personnel execute their jobs by using the right equipment. This normally demands that the exercise staff include actors, such as simulated victims in an EMS exercise. The scenario also needs the right props consistent with the threat. Realism is very important.

Finally, the **full-scale exercise** tests all aspects and all organizational participants in an EOP in a realistic field setting. It is the most complex form of test. The full-scale exercise tests all or most of the functions specified in an EOP. By definition, testing multiple functions requires setting many exercise goals. Multiple

FOR EXAMPLE

New Orleans Hurricane Exercise

The year before Hurricane Katrina struck New Orleans in 2005, FEMA sponsored a tabletop exercise for hurricane response. By all accounts, the exercise was successful. Participants reported that they better understood the threat and the issues in response. Yet the impact of Katrina was met with a far less than successful local response. This demonstrates the importance of developing an EOP that includes training and exercising components. It also underscores that the role of tabletops is to create awareness. Tabletops inform further planning rather than test response operations. There is a natural progression for exercises that relates them to community preparedness. Tabletop exercises must be supplemented with functional exercises and full-scale exercises to realize the full benefits of the process.

responder agencies participate. And there is a high level of realism in the scenario. As a result, full-scale exercises are major enterprises. They demand many resources and a full staff of controllers. They also need evaluators, actors (victims and other event-impacted personnel), and realistic simulations of the physical damage and other consequences of the event.

No EOP is ever final. The planning process emphasizes that plans change as the threat environment changes. Technologies change as well as the experience with the response system. Experience with disaster impacts is another important factor. Disaster responses are tests of the EOP and the operational system. They should be formally critiqued and the results recorded and distributed. Plans must change to accommodate all of these factors. Exercises at all levels provide simulated experience. In each case, an after-action report should recount lessons learned that can be incorporated in EOP. Performance in an incident or an exercise reveals how well the critical tasks and relationships are executed in the stressful conditions under which the EOP is designed to perform. There is no way to overstate the importance of critique and sharing of lessons learned in these events.

SELF-CHECK

- Trace the links from emergency planning and plans to emergency response.
- What is the impact of a well-publicized disaster exercise on citizens at large?
- What is a **tabletop exercise** and why should you care?
- What is **jurisdictional capacity** assessment?

SUMMARY

As with any task, emergency planning does not rely on one person but on a team. In this chapter, you have learned what qualities are needed in a team. You assessed the climate and atmosphere that is needed to make a team more productive as well. You have determined how to staff and organize a team, how to motivate a team, and how to prepare a team to respond well in emergencies. You have identified the organization structures that produce successful planning processes. You have also learned what resources are available to you.

KEY TERMS

Disaster Subculture	A collection of coping patterns or protective behaviors that people have successfully used in the past to deal with a recurrent disaster.
Full-scale Exercise	Exercise that tests all aspects and all organizational participants in an EOP in a realistic field setting.
Functional Exercise	Exercise that tests one or more functions in an emergency plan in a field setting designed to realistically approximate disaster conditions.
Jurisdictional Capacity Assessment	Assessment that measures the functions that are required in the EOP for threat mitigation, preparedness, emergency response, and recovery and determines whether the system of departments, agencies, and mutual aid agreements can execute these functions.
Leadership Climate	The atmosphere in which work is overseen by organizational or team leaders.
Meeting Strategy	A means of scheduling, conducting, and following up after planning meetings that promotes further participation and positive outcomes.
Organizational Climate	Distinctive patterns of shared beliefs to which group members are socialized and that are reinforced by group interactions.
Organizational Commitment	The strength of an individual's identification with and involvement in a particular organization.
Situational Analysis	A managerial assessment of organizational strengths, weaknesses, and opportunities both internally and with respect to the organizational environment.
Strategic Choice	The selection of goals, means of organizing, and measures to ensure success that an emergency manager believes are particularly suited to the community contexts.
Tabletop Exercise	A test conducted in the classroom or conference room, based on a limited scenario, that allows participants to verbally describe their response to contingencies.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of the basics of fostering successful emergency planning.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. A full-scale exercise is an inexpensive way to test new planning protocols. True or False?
2. Emergency responders are the people who really learn from exercises; they are of little value to the public. True or False?
3. Effective management of a major disaster exercise is similar to stage managing a play. True or False?
4. The creation of organizational commitment among planning team members is one way to ensure their sustained participation in the planning process. True or False?
5. A test conducted in the classroom or conference room, based on a limited scenario, that allows participants to verbally describe their response to contingencies is a:
   (a) table-top exercise.
   (b) full-scale exercise.
   (c) functional exercise.
   (d) EOP exercise.
6. Strategic choice is a managerial assessment of the organization's strengths, weaknesses, and opportunities for future development. True or False?
7. Extra resources for emergency planning can be obtained by presenting arguments to officials regarding vulnerability, statutory responsibility, and political responsibility. True or False?

Review Questions

1. What is a disaster subculture?
2. What strategies can be used by emergency planners to obtain support for the planning process from jurisdictional officials?
3. What are the three types of exercises?

Applying This Chapter

1. You are a planning team member on the Sierra Vista, Arizona, LEMA. Sierra Vista is a former mining community where the nearest towns are

50 miles away. How will you identify and marshal support from extracommunity resources?

2. In Daylight, Tennessee, the city budget is tight. You are in charge of reviewing and improving the comprehensive emergency plan. What measures can you take to convince other city departments and external organizations to participate in a planning process?
3. Nebulus, Montana, has an opportunity to involve both the police and fire departments in a statewide disaster exercise. All is going smoothly until the town manager is told how much participation will cost in overtime and equipment expended. What information about the positive outcomes of exercises can you use to change his mind?

YOU TRY IT

Motivating a Team

You are the team leader for a planning group assigned to review your jurisdiction's earthquake response plan. You know that leadership climate is an important influence on team success. What specific measures will you take to address the components of leadership climate: leader-initiating structure, leader consideration, and leader communication?

Establishing the Importance of Exercises

You are an emergency planner working in a local emergency management agency charged with encouraging participation of city departments in a full-scale disaster exercise. Although the fire and police department chiefs are enthusiastic about participation, the jurisdiction's Public Health Officer (PHO) is reticent to have his department participate. How will you explain the importance of exercise participation to the PHO? What reasons will you offer to encourage participation?

Citizens and Exercises

You are an emergency planner temporarily assigned as liaison to the city public information officer. Your LEMA, fire department, and police department are participating in a statewide full-scale exercise of the state plan for WMD-incendiary explosive agents. The PIO doesn't want to cover the event or facilitate the presence of news media. How will you convince him that this is a significant public information event? What can you do for news teams that would increase their interest in covering the exercise and make their coverage more interesting to the public?

5

CLASSES OF PROTECTIVE ACTION RECOMMENDATIONS

Emergency Planning Conditions and Considerations

Starting Point

Go to www.wiley.com/college/Perry to assess your understanding of the classes of protective action recommendations.
Determine where you need to concentrate your knowledge.

What You'll Learn in This Chapter

- ▲ The three principal types of protective action recommendation
- ▲ The principal mechanisms of harm for disaster agents
- ▲ The correlation of hazard exposure mechanisms with appropriate protections
- ▲ The safety risks associated with generic protective actions
- ▲ The measures for protecting against radiation and toxic gases

After Studying This Chapter, You'll Be Able To

- ▲ Assess the protective dimensions of structures for wind, earth shaking, and water
- ▲ Compare exposure mechanisms for inhalation hazards
- ▲ Assess the protective value of structures for inhalation hazards
- ▲ Choose effective materials for expedient respiratory protection
- ▲ Evaluate the components of an effective evacuation plan

Goals and Outcomes

- ▲ Design a plan for effective shelter in place against wind and water threats
- ▲ Estimate leakage rates of structures for protection against toxic plumes
- ▲ Create a safe plan for citizen-expedient respiratory protection
- ▲ Choose planning targets for evacuations, including special populations and facilities
- ▲ Compare the risks of protective actions against the risks of the threat

INTRODUCTION

There must be sufficient flexibility in emergency operations plans (EOPs) so response personnel can adapt and improvise when needed. This does not diminish the value of preplanned strategies. Many hazards present diverse threats to the public health and safety. Sometimes these threats can be detected by using sophisticated technology. This makes time so officials can forewarn the public at risk. This offers an opportunity to reduce losses. However, there is always uncertainty about the time, exact place, and severity of impact. Therefore, an unnecessarily extensive and structured response could “miss” the impact area, timing, or magnitude and incur large costs without saving lives or property. Emergency responders use plans as guides, but on the basis of fast, accurate, and complete information, they can determine what protective action is best.

Choosing a specific protective action recommendation (PAR) takes place in the response phase. This is when emergency responders have the best and most accurate threat information. However, options for protective actions must be anticipated during the preparedness phase. This is because successful implementation of any protective action requires a thorough analysis of the task demands. It also requires having the personnel and equipment needed to implement that protective action. Consequently, planners must be familiar with the generic options for population protection, the conditions under which they are effective, and the trade-offs in using one strategy rather than another. In all cases, it is important for emergency planners to appreciate the public safety risks associated with each type of PAR.

The timeliness and quality of the protective actions are affected by a number of factors. These include the staffing, structure, and training of the members of the response organizations. The EOP must clearly identify those people who have the responsibility for these decisions. They must create a decision-making process with criteria that will guide priorities. They must establish coordination among agencies involved in the response (Sorensen, 1988). At the same time, the EOP must also guide the PAR implementation process (Mannan and Kirkpatrick, 2000).

Population protective responses are actions taken by persons at risk to reduce their hazard exposure. The responses usually addressed in planning are:

- ▲ Evacuation
- ▲ In place protection
- ▲ Expedient respiratory protection (used simultaneously with another measure)

These actions are different from other response measures that are directed toward the hazard agent such as building temporary dikes to confine an oil spill. Evacuation, sheltering, and expedient respiratory protection deal with direct people protection and each requires preimpact planning. They will be most effective if both emergency personnel and people at risk are trained to implement them.

- **Evacuation** is the relocation of threatened populations to places outside the hazard impact area. It provides protection by increasing distance from the agent.
- **In place protection** directs people to seek refuge within structures inside the impact area. This may be done after measures to harden or seal these structures are undertaken. It is also known as "sheltering in place." In place protection relies on the structures shielding people from inhalation, ingestion, and contact with hazardous materials.
- **Expedient respiratory protection** is breathing through an improvised filter such as a wet towel. It can be quite effective in filtering out dangerous particles and toxic chemicals.

The primary attributes on which the protective actions differ include their:

- Hazard-induced risks
- Response-induced risks
- Direct and indirect economic costs of the action
- Expected level of compliance by the affected population

When examining alternative protective actions, you must consider how much time each one would take. Some protective actions take a lot of time. For example, hospital patients, nursing home residents, or jail inmates may require lengthy preparation for evacuation. Evacuation transit times could be slowed by obstructed roadways. There is also a connection to response activity. When protective action implementation time is long, the process is often initiated soon after hazard onset is detected. Unfortunately, early detection is when authorities are least certain about when, where, and with what force the impact will take place. Hurricanes often change direction just prior to landfall. Hurricanes sometimes leave areas initially threatened and move onto others. In a toxic chemical release, precise measurements of release rate are most useful in calculating levels of toxic exposure. However, by the time that release rates are actually available, it may be too late to evacuate a nearby hospital or school. Consequently, conditions at the hazard source may be the only feasible basis for making a decision.

Uncertainty about hazard impact has an important effect on protective action selection. However, it is not the only factor that should be considered in the planning process. The speed of onset and the scope of impact also need to be considered. If a train derailment were to progress rapidly to a large release of toxic chemicals, quick decisions would have to be made. This is true even in the presence of uncertainty. If the scope of the impact were large, PARs might have to be coordinated with a large number of jurisdictions. In each case, the probability of successful implementation is very low if the issues of evacuation or protection in place are not well addressed in the planning, training, and exercising process.

5.1 In Place Protection

The protection provided by sheltering within a structure varies from one hazard agent to another. The adequacy of the protection depends on balancing two features:

1. The protective features of the structure.
2. The kinds of agent-generated demands.

The critical planning issue is how the hazard threatens human health and safety. For example, let's look at river flooding and hurricane storm surges. Structures with well-anchored foundations provide height to escape rising water. They provide a shield against wind-blown or rushing water. The critical feature for other hazards might be the strength of construction in resisting wind loads, blast forces, and ground shaking. For chemical, radiological, and volcanic ash threats, it is the tightness of construction that protects people. This is done by preventing the infiltration of outside air into the structure. Finally, in the case of exposure to a cloud of radioactive material, building construction material can provide shielding from penetrating radiation and from surface contamination. In place sheltering has been advocated as an effective means of protection in high-rise building fires. However, these incidents don't meet the criteria of communitywide disasters. We will review sheltering against two classes of agent-generated threats. These include wind, ground shaking, and water, and exposure to dangerous chemicals.

5.1.1 Sheltering Against Wind, Ground Shaking, and Water

In explosions and severe storms, danger arises from overpressure and high winds that produce injury and structural weakening. Victims caught in open areas can be injured by being picked up and thrown against the ground. Also the debris turns into deadly missiles. Stories abound of straws that have been driven like nails into trees and wooden fences by the force of hurricane wind or volcanic eruptions. Even when seeking protection indoors, victims can suffer injury from the collapse of the structure itself.

Because of the destructive power of explosions, hurricane wind, and tornadoes, sheltering below the ground level is usually advised. Of course, in some areas of the country, this source of refuge is unavailable. This is due to high water tables or unfavorable soil conditions that preclude basement construction.

Emergency plans usually advise people in homes to take refuge against an interior wall, in an interior doorway, or in interior rooms or hallways of a lower floor. Steel reinforced concrete structures are likely to provide protection wind threats. Structures, such as gymnasiums, that have wide, free-span roofs are avoided because of their high likelihood of collapse. The collapse of a roof span of a major public shelter during Hurricane Katrina in 2005, exposing victims to further danger, is a memorable illustration. In wind hazards, evacuations are either used only well in advance of impact (with hurricanes) or not all (for tornadoes). The error of attempting to evacuate in cars was illustrated when a tornado struck in Minnesota. The tornado swept an 83-ton railroad coach and its 117 passengers into the air. It deposited them in a ditch. This example also indicates why even anchored mobile homes should be preevacuated. Protection should be sought in a community shelter.

Similar recommendations apply to sheltering in an earthquake. This is because building collapse is a major threat. Earthquake building damage typically results from the lateral pressures such as ground shaking, surface faulting, and soil failure. Pressures are exerted against a structure that was designed principally to resist the **vertical load.** Vertical load is the weight or force resulting from the weight of the occupants, furniture, upper stories, and roof (Bolt, 1999). For ground shaking, rigid structures built with unreinforced masonry make poor shelters. More flexible wood frame dwellings are much less collapse prone. Emergency managers should recognize that even in wood frame buildings, rigid portions of the structure could separate and collapse into living areas. In addition, glass from broken windows, falling pictures and mirrors, the toppling of unsecured furniture, and other flying debris are significant safety hazards. The best protection against these dangers is getting under a sturdy desk, bed, or table. As dangerous as it may seem to be indoors, outdoor exposure in urban areas may be even greater. This is due to ruptured gas and water lines, falling power lines, power poles, glass, masonry, and tile. The fact that a structure has survived an initial shock without apparent damage does not mean that it will be equally successful in resisting a fire. A fire could result from downed electric lines, or an explosion caused by severed gas pipes, or even the aftershocks. Thus, gas and electric utilities, and indeed the entire structure, should be carefully examined before reoccupation. This should be done to ensure that these secondary hazards do not materialize.

The safety threat from river flooding and hurricane storm surge is the risk of drowning. Indeed, drowning produces the greatest loss of life in hurricanes by a factor of nine to one over other agent-generated dangers (Kramer and Bahme, 1992). In place protection is effective if the structures provide sufficient height to escape the rising water. Both suitably constructed high-rise buildings and low-rise public structures sited on earthen mounds form suitable shelters. The ideal is to shelter in a public structure that provides structural integrity and height against water. **Vertical evacuation** (Ruch et al., 1991) refers to the movement of hurricane evacuees to resistant high-rise structures inside the impact area. To successfully implement vertical evacuations, emergency managers need to take into account the:

▲ Strength of the structure.
▲ Capacity of the structure to contain people.
▲ Provision of informed "shelter supervisors" for each site.
▲ Length of time protection will be necessary.
▲ Ways to implement an orderly movement of appropriate numbers of people from threatened areas to the safe havens.

For hurricanes, structures must be able to resist the direct impact of storm surge as well as the force of extremely high winds. However, both river flooding and hurricane storm surge also require the structure to have well-anchored foundations. This is to resist scouring by water currents that undermine building foundations and cause structural collapse. Additional protection can be provided by flood proofing. This requires:

▲ Using waterproof construction materials.
▲ Sealing cracks.
▲ Providing valves on sewer lines.
▲ Using steel bulkheads for lower-level openings and sump pumps to eject seepage (FEMA, 1993a).

Volcanic mudflows and floods present the challenge of maintaining the integrity of buildings and their foundation. Flooding generated by a volcanic eruption commonly contains a large volume of rock, ash, and other debris. These mudflows have substantial force (Chester, 1993). Fortunately, mudflows are at least predictable because they tend to follow established river systems. They move away from the volcanic cone. There are also secondary threats with volcanic mudflows. The 1980 eruption of Mt. St. Helens showed that silt buildup can raise the bed of river channel and bodies of water. This created both immediate and future flood threats (Perry and Lindell, 1990). Accumulated debris could also create a dam to divert river water. This makes sheltering in buildings a less desirable option for volcanoes. Because volcanoes are located in mountainous terrain, high ground is readily accessible. High ground gives a better level of protection than in place sheltering in buildings. This assumes that the population to be protected is distant enough from the volcanic cone that problems don't arise from pyroclastic flows, ejecta (hot materials), clouds, and eruptive blast waves (Geophysics Study Committee, 1984). Fortunately, most pyroclastic flows are not a threat beyond a mile from the eruption site itself. The World Organization of Volcano Observatories (http://www.volcano.und.edu) provides both planning and warning information for volcanoes.

Tsunami impact poses an even greater threat than inland flooding, hurricanes, or volcanoes. These seismic sea waves can threaten areas up to 50 feet above sea level for tsunamis of distant origin. They can threaten areas up to 100 feet above sea level for those of local origin. In such cases, sheltering in place is not effective. The protective recommendation of choice is preimpact evacuation to distant areas. Tsunamis are usually associated with large earthquakes or landslides. They can be detected and tracked along predictable paths toward populated areas. The U.S. National Weather Service operates the West Coast and Alaska Tsunami Warning Center (http://wcatwc.arh.noaa.gov). It also operates the Pacific Tsunami Warning System (http://www.prh.noaa.gov). Each of these centers provides detection, tracking, and warning systems for tsunamis. The practical challenge for emergency managers is that local (threatened) areas must have the capability to receive and interpret such warnings. They must be able to deliver messages to local authorities to initiate protective actions. The tsunami of December 26, 2004, produced a sea wave 80 feet high. It killed nearly 300,000 people in 18 countries in the Indian Ocean area. The high death rate has been attributed in part to the lack of local warning systems. In the absence of evacuation, the local structures offered virtually no protection to inhabitants. More than 5 million families were left homeless.

5.1.2 Sheltering from Inhalation Exposure

Many disaster agents generate gases or particles that are dangerous if inhaled. Radiological and toxic chemicals are among the most obvious. Volcanic ash is also a threat. It produces a silicate seal that stops engines and mechanical processes. It also can produce serious lung problems if inhaled (Perry and Godchaux, 2005). Volcanic eruptions are capable of emitting toxic gas clouds that hover near volcanic cones. They can also be blown downwind. In August 1986, the Oku volcanic field in the West African county of Cameroon, produced a (heavier than air) hydrogen sulfide cloud that drifted across three villages. This left 1700 dead and more than 800 injured. Inhalation exposures can also result from the dispersion of airborne debris that often accompanies building collapses and explosions. Following the collapse of the World Trade Center Towers on 9/11, rescue workers and residents of the area were exposed to clouds of finely pulverized materials. These include glass, masonry, and products of combustion. Early in the process of response, many personnel wore no respiratory protective devices. For those who did, the level of protection provided by the devices they used was not adequate. The U.S. Centers for Disease Control and Prevention has tracked a sample of responders, recovery workers, and volunteers. They found that exposures produced new-onset pulmonary conditions. In some cases, they exacerbated pre-existing conditions. The reports are available at http://www.cdc.gov. Emergency managers should identify possible exposures and examine the degree of protection afforded against the hazard agents.

Exposure Mechanisms

Any material released into the atmosphere tends to disperse according to physical laws. However, physical laws cannot be used to make very precise predictions in an actual emergency. The problem arises from the large number of changing factors that affect dispersion. Precise predictions require information about the chemical. Atmospheric conditions usually cannot be obtained immediately. The quality of the available information is increasing with improved technology. For example, the APD2000 Chemical Analyzer is both a detection and analysis tool. It is a handheld device. It detects a wide range of chemical agents. It provides molecular identification. It functions as a continuous sampling monitor. The difficulty is that the technology is expensive. It requires highly trained technicians to operate. It also has a nonzero measurement error. There are a variety of other air-monitoring instrumentations available for use at incident scenes. However, each device involves investment in equipment, training, and exercising. Also, each has error rates (Maslansky and Maslansky, 1993). In the absence of such equipment, it is possible to make useful approximations of the presence and likely behavior of toxic chemicals. This is true both with and without benefit of technology. Such approximations are normally sufficient to guide planning.

Because of the health and safety threat they pose, hazardous materials are normally confined within a protective container for storage and transportation. If the container is breached, some of the material that is released or spilled will become airborne. If the material is a gas, it will rapidly form a hazardous cloud. A **plume** is a "cloud" or airborne mixture of particles or vapors. If it is a liquid, it will form a vapor at a rate that is governed by the material's vapor pressure, molecular weight, and handling temperature, the surface area of the spill and the wind speed at the time of the spill (Greenway, 1998). Solids are likely to become airborne only if very hot or propelled by air movements caused by explosions, high winds, or fires. If the material is lightweight or hot, it will tend to rise. If the material is heavy or cold, it will tend to fall to the ground. In extremely calm atmospheric conditions, the material disperses symmetrically in all directions. Thus, a contour of constant concentration takes the shape of a circle with the center being the release point. When a light, steady wind is present, the cloud of material forms a cigar-shaped plume that travels according to the direction and speed of the prevailing wind.

It is very difficult to make precise on-the-spot predictions during an emergency. It is difficult to project the levels of concentration at various distances from the source of the release. The reason is that even a simplified approach may require information that is not available at the scene. Important factors in determining the release rate include the temperature of the material. Another important factor is the size of the opening that permits the release. In some emergencies it is not possible to determine if the release is taking place through a failed valve, broken pipe, or breached vessel. Sometimes even the identity of the material is often uncertain. Moreover, the behavior of the atmosphere and the nature of the terrain around the release point introduce additional complexities. Winds frequently gust and drop. They do not always maintain a steady speed. They also shift direction. This variability in meteorological conditions is compounded by local features such as hills, valleys, wooded areas, bodies of water, and buildings.

All of these factors can create fluctuations in the concentration of hazardous material. Short-term peak concentrations can differ from the average concentration over a longer period of time. This does not make a difference in responding to hazards where the adverse health effect is a function of the cumulative exposure. However, it is a major issue when the health effect is caused by the peak exposure. The planning process uses vulnerability assessments to anticipate data needs for estimating exposures at the time of release. These include identifying stored and transported products and their behavior under different conditions.

In Place Protection for Toxic Chemicals and Gasses

Evacuation takes advantage of the fact that the hazardous material becomes increasingly diluted (and less dangerous) with distance. Protection in place is based on the idea of taking refuge within a temporary "safe haven" of clean air. Ideally, a space will provide a barrier if it can be closed tightly enough to keep out the hazardous material. It must also retain enough oxygen to sustain those within it until the danger has passed. If such structures were readily available, the many disadvantages associated with evacuation from chemicals and gasses could be avoided. Unfortunately, protection in place also is not the perfect solution. Most structures are leaky. They allow contaminated air to infiltrate even when the doors and windows are closed. Nonetheless, there are cases in which protection in place is more effective than evacuation. This creates the need for emergency managers and responders to understand how in place sheltering works and when it is most effective. They must know how to decide whether those at risk should shelter in place or evacuate. They must also know how to ensure that the public will understand the advantage of in place sheltering and will comply with such a recommendation when it is made.

The **air exchange** or clearance of indoor and outdoor air is the rate at which air exchanges between a contaminated space and one that is not contaminated. This rate is commonly measured in air changes per hour (ACH). It results from exfiltration of indoor air to the outdoors and infiltration of outdoor to the indoor area. The principal points of exfiltration are usually the furnace flue, ventilation fans, and leakage sites near the ceiling. Air infiltration is typically dispersed over a large number of small openings. These include cracks around windows and doors, electrical outlets, and gaps between building walls and foundations. The rate of air exchange increases with the amount of leakage area, the wind speed, and the temperature differential between the indoor and outdoor air.

It is useful to think of air exchange in terms of **turnover time**, the mathematical reciprocal of the air exchange rate, and the time required for an enclosed space to either become contaminated or to clear. To obtain an estimate of the turnover time, divide the number of air changes per hour (ACH) into 1.0. This tells you what proportion of contaminated air has replaced clean air. A calculated infiltration rate of 1.0 ACH does not mean that all the clean air will be gone in 1 hour (Wilson, 1989). Instead, contaminated air gradually increases until 63% of the original air has been replaced with it at the end of 1.0 times the turnover rate. Approximately 95% of the original air has been replaced by the end of 3.0 times the turnover rate. Thus, for the case of 1.0 ACH, it will take over 3 hours for the indoor air to become almost completely contaminated.

Correctly interpreting turnover rates is important for planning. The interpretation above shows that in place sheltering is more effective than most people think. The correct calculation of turnover rate reports higher time periods of relative safety in structures than the number of air exchanges. This is because of the difference between the apparent, but incorrect, mechanism of air exchange and the actual mechanism. It would only take 1 hour to replace the clean air if the contaminated air somehow "pushed out" the clean air. However, this is not what happens. Rather, the contaminated air *mixes* with the clean air. Clearly, exfiltration of a mixture of clean air and contaminated air will take longer to exhaust the clean air in a structure than will exfiltration of ("pushing out") clean air alone. Consequently, sheltering in place is at least three times as effective in reducing inhalation exposure as it appears to be using exchange rates.

The time delay in contamination produced by the air-mixing effect is important. However, it is not the only way sheltering in place can reduce adverse health effects. We also recognize the impact of a *damping* effect in reducing the fluctuations in plume concentrations. These fluctuations arise from irregularities in weather and local terrain. **Peak concentration** refers to the highest level of impurities present in air. One measure of peak concentration estimates the value (impurity level) that is exceeded approximately 1% of the time. Wilson (1987) reports that in the outdoor (contaminated) air, such 1% peak concentrations are 400% as large as the average overall concentration outdoors. For indoor air, the equivalent peak concentration is only 50% larger than the mean concentration. For example, perhaps the indoor concentration has risen after 6 hours to match the outdoor concentration. Then the indoor peaks would be expected to be 150 parts per million (ppm) when the outdoor peaks would be 400 ppm. This knowledge is critical when you know that peak concentrations are the main health threats and are used to estimate exposure effects.

Some hazardous materials have peak concentration exposures that harm people. Others, however, produce negative effects just as bad as the accumulated exposure. **Accumulated exposure** is the total amount of toxic or radiological dose an individual receives over a defined period of time. When concern is with health and safety effects from cumulative exposures, we change the way sheltering in place is implemented. People who shelter in place remain indoors after the plume has passed and continue to be exposed to the contaminated air that has been infiltrated but not yet exfiltrated (Rogers et al., 1990). Inside structures, once the plume has passed, the paths of the contaminated and uncontaminated air are reversed. Now it is the clean air infiltrating into the structure that mixes with the contaminated air. Exfiltration of a *mixture* of clean air and contaminated air will take longer to exhaust the contaminated air in a structure than exfiltration of contaminated air alone. Protection in place after plume passage prolongs inhalation exposure. It results in a cumulative exposure that is identical to the exposure that would have been received by remaining outdoors unprotected. Emergency managers can avoid this problem by providing an “all clear” signal. The alert lets those in the hazard area know it is safe to come out. People should open their doors and windows to ventilate the building rapidly.

Emergency managers will continue to face challenges regarding the decision to recommend sheltering in place. The question of whether indoor air concentrations will remain sufficiently low for a sufficiently long period of time must be resolved before people are safe. This question can be answered definitively only if the protective action decision maker has adequate information about the hazardous material being released. They need to know the rate and duration of the release. They need to know the meteorological data needed for a computerized plume dispersion model. They also need to know the air exchange rates for the structures in the impact area. Any emergency manager should have access to the meteorological data. However, there are many situations in which the rate and duration of the release is unknown. Even the type of material being released may be uncertain. On top of this, it would appear to be hopeless to obtain precise information on leakage areas.

It is definitely true that there are some cases when this information is not available. Most notable are fires in chemical storage areas or train derailments. These incidents prevent responders from getting close enough to identify the leaking containers. However, there are many cases in which the identity is known and the release rate and duration can be measured or estimated. Examples include valve or pipe breaks on tanks of known capacity at fixed sites. This is also true in transportation incidents.

Exact data on leakage characteristics of homes in hazard impact areas are not likely to be available. However, there are data that can be used to estimate the efficacy of sheltering in place. Rogers et al. (1990) reported that energy conservation research estimates air exchange in most U.S. dwellings ranges from 0.5 to 1.5 ACH. There have been changes in building codes and construction practices over the years (Sorenson et al., 2002). This means that residences built since the early 1970s have lower infiltration rates. Buildings erected before 1950 do not provide protection unless they have been refitted with weatherization materials. Engelman (1992) found that office buildings and other high-rise buildings show an average air exchange per hour of .66. The air exchange is .31 for industrial buildings with heating, ventilating, and air conditioning (HVAC) off. Air vapor barriers in structure walls and ceilings are the most important factor affecting leakage (Wilson, 1989). Vapor barriers are very common in houses built in cold climates after 1960. Thus, you can estimate the effectiveness of protection in place by knowing when homes were built. You can consult with local utilities for information on structure air exchange rates for residences, schools, and commercial buildings in their communities. Special facilities should be examined individually to determine their air exchange rates.

In Place Shelter for Radiological Threats

Toxic and radiological materials both present an inhalation hazard. A plume of radioactive material can also cause harm by means of external radiation from the cloud and from ground contamination. Terrorists threaten to use “dirty bombs.” These are improvised explosives that distribute radioactive particles. They can produce a particle plume. Radioactive plumes are quite easily detected. However, authorities are unlikely to detect it in time to complete a preimpact protective response. There are three principal types of radiation emitted from radioactive atoms. They are alpha, beta, and gamma. Alpha particles are heavy. They rarely travel more than a few feet from the source (Babcock and Rose, 2005: 5). Beta particles are lighter. They travel farther. However, they have little penetrating power (stopped by even light materials such as aluminum). They pose little threat to human internal organs (Emergency Management Institute, 2003). Gamma radiation is light. It travels a significant distance from the source. It has substantial penetrating power. It is likely to be part of a plume composed of radioactive gases, particles, and vapors. This is particularly true if a nuclear power plant accident is the source (Emergency Management Institute, 2003: 17). Under these threat mechanisms, protection in place is designed primarily to protect people against the contents of a plume and particularly from gamma radiation. The Centers for Disease Control and Prevention offer an on-line tool for planners concerned with in place shelter in nuclear or radiological emergencies: http://www.bt.cdc.gov/radiation/shelter.asp.

Dense building materials, such as concrete, brick, and stone, provide shielding from external gamma radiation. They form the basis for protection in place during radiological emergencies. The effectiveness of structures for radiological protection differs by type of building material (Aldrich et al., 1982). The bulk of research on nuclear and radiological effects on structures was conducted during the Cold War era. It still remains the standard for determining resistance or protection. Studies of radiological resistance calculate the dose reduction factors for three exposure routes. These are external gamma radiation from the cloud, external gamma radiation from ground contamination, and inhalation of radioactive materials infiltrating into the structure. Burson and Profio (1977) found that sheltering in a wood frame dwelling provides little more protection from cloud and ground exposure than “sheltering” in a vehicle. Sheltering on the ground floor of a masonry home with no basement or in the basement of a wood frame home reduces exposures to a cloud to about half of the levels expected if you stood in the open. The same arrangements reduce exposure to ground contamination to 20% of unprotected levels. Sheltering in the basement of a masonry structure reduces radiation cloud exposure to 40% of unprotected levels. It reduced contaminated ground exposure to only 5% of unprotected levels. A large office building was the most effective shelter of all. It reduced cloud exposure to about 20% and ground exposure to 1% of the unprotected levels.

The cloud exposure produces most of the whole body radiation dose received by people sheltering in a home. Infiltration into the structure would account for only about 5% of the gamma radiation dose. The acceptable range is 0.125 to 3 air changes per hour for structures to be used as temporary shelters (Anno and Dore, 1978). For homes, whole body dose reduction factors for low air exchange rates (0.125 ACH) were calculated to be 0.33 to 0.40. For large structures, whole body dose reduction factors for low air change rates were calculated to be 0.08. These investigators also estimated thyroid (inhalation) dose reduction factors to be about 0.05 to 0.01 for low air change rates for either single-family homes or large structures.

Protection against a radiological threat may include use of pharmaceuticals. Potassium Iodide tablets can be used to reduce the thyroid gland's absorption of radioactive iodine. Such tablets are most effective if taken before exposure. Some nuclear power plant emergency plans include stockpiling this drug. They may even predistribute it to risk area residents. The difficulty is that it protects a single organ or gland. However, people may be exposed to full body radiation. Another drug called Prussian Blue was approved by the FDA in 2005. It protects additional body systems from radiation exposure. It is expensive. There is incomplete research on its long-term effects. Also, its availability is limited. These factors have prevented it from being widely adopted. Ultimately, protection in place in a building that is adequately sealed and constructed of protective materials should afford sufficient protection (Centers for Disease Control and Prevention, 2004).

5.1.3 Safety Risks for Protection In Place

There are not many risks of sheltering as long as there are not other hazards taking place at the same time. If evacuation is the best course of action for the hazard, as in the case of hurricanes, sheltering is a less protective alternative. These hazards include flooding, fires, and some releases from hazardous materials accidents. There are other hazards that could elevate the risks of remaining indoors with doors and windows sealed. These include extreme levels of air pollution, high temperature/relative humidity, and extremely low indoor temperatures.

FOR EXAMPLE

Tampa Bay Terrorist Attacks

Tampa Bay (Florida) has developed a plan for terrorist attacks. Authorities there have issued a citizens' guide for response to terrorist attacks using chemical, biological, or radiological agents. The plan includes a detection strategy. It also includes a warning system to share PARs with the population at risk. One of the protective options listed for outdoor releases of hazardous chemicals is protection in place. The guide includes instructions on how to seal a home or office with material likely to be available to most people. The guide includes instructions on what to do when the authorities issue an "all clear" signal.

SELF-CHECK

- Why is response improvisation and flexibility in EOPs important?
- If a final decision about implementing a protection is made during emergency response, why do planners give the issue attention in the preparedness phase?
- Suppose you want to evaluate a structure for its potential to protect against radiation plumes or hazardous chemical gasses. What features would you consider?
- How do you assess or evaluate the protective power of structures against radiation threats?

5.2 Expedient Respiratory Protection

Expedient respiratory protection is one of a number of protective actions that falls into the technical category of "specialized protective clothing." The Occupational Safety and Health Administration (OSHA) governs these standards that protect workers. Expedient protection is not the same as the respiratory protection worn by emergency responders. These professional types of respiratory protection are rarely considered viable for public protection. This is because of problems with storage, inspections against environmental degradation of the equipment, complexity of use, and technical difficulties in obtaining a proper seal for face pieces. Protection for responders is an issue of occupational health and safety. It is not one of public health and safety.

Expedient respiratory protection is recommended for citizens at risk who must protect quickly and with whatever material is available. This is a way of reducing the probability of inhalation or ingestion of airborne particles. Usually, these measures are implemented as an adjunct to protection in place or evacuation. Those at risk would use expedient respiratory protection to reduce inhalation hazards when engaged in evacuation. They would also use this protection to supplement the protection provided by a structure (Sorenson and Vogt, 2001).

This measure is versatile and can protect from a wide range of threats. For example, inhalation of soot and smoke and other large particles is reduced in fires when people cover faces with wet towels while evacuating. This protection can be effective with some types of toxic or radiological materials. For example, after the chemical accident at Bhopal, many lives could have been saved had the victims only known to breathe through a water-saturated cloth. The reason for this is that the methyl isocyanate (MIC) released there is water soluble. The MIC vapor would have dissolved in the saturated cloth rather than in the fluids of victims' eyes and respiratory systems. In a radiological emergency, expedient respiratory protection reduces the inhalation exposure to radioiodines. The effectiveness of expedient respiratory protection for different hazard agents varies. Also, different materials affect the effectiveness.

Expedient respiratory protection appears to have no effect on noble gases (Blewett et al., 1996). Guyton, Decker, and Anton (1959) found that expedient measures could filter out more than 90% of 1- to 5-micron particles in some instances. In a later study, Cooper, Hinds, and Price (1981) tested several materials for penetration of 0.4-, 1-, and 5-micron-diameter particles and iodine vapor (I_2). Results of the tests are shown in Table 5-1. The standard of comparison is a commercial dust.

Respirator which is highly effective in filtering particulates of all sizes. A wet high-quality towel (six layers) is noticeably less effective than the standard only for the 0.4-micron-diameter particles. At the other extreme, the use of two layers of wetted handkerchief was almost totally ineffective with the smallest size particles but did achieve a significant reduction in the larger particles. An important consideration in using expedient respiratory protection methods is the pressure drop caused by breathing through these materials. Pressure drops greater than 100 pascals (0.4 in. of H_2O) cause difficulty in breathing and would generally prohibit use during an emergency. Pressure drops of 50 pascals (0.2 in. of H_2O) were used for the materials evaluated in Table 5-1, which would allow unimpaired breathing. Wetting materials can increase their filtering effectiveness as shown by the higher-quality towel. However, wet materials also can cause greater pressure drops resulting in breathing difficulties. It is difficult to reach any general conclusion regarding the use of wet materials during an emergency because the available experimental data do not show that all materials are more effective filters when wet. It does appear that, for the same pressure drop, thick materials are more effective when wetted than are thin materials.

The Harvard University School of Public Health designed a series of studies in an effort to clarify the filtering properties of the expedient materials (Price et al., 1985). These experiments confirmed that wet materials were more effective than the same substance used dry. Also, all of the materials became less effective as the size of the particle to be filtered grew smaller. Full penetration was achieved by vapors for all of the dry expedient materials. It was found that a primary source of penetration came from leakage around the protective materials. The source was the seal to the face. Cooper and his colleagues (1983) found that leakage was reduced when a mesh nylon product—pantyhose—was placed over the face. Pantyhose was used as a base for the protective material. In connection with terrorist use of nerve gas, Pal and his colleagues (1993) found that expedient respiratory protection could not be achieved by using all materials readily available to citizens. They did determine that duct tape at door bases and around windows did form an effective nerve gas barrier.

Table 5-1: Effectiveness of Expedient Respiratory Protection[1]

Material[2]	*No. of Layers*	*Particle Diameter* 0.4 micron	1.0 micron	5.0 microns	***Iodine Vapor***
Dust-type respirator	2	0.03	0.01	0.01	
High-quality towel (wet)	4	0.20	0.01	0.01	0.21
with baking soda[3]					0.10
Higher-quality towel	6	0.24	0.13	0.01	
Lower-quality towel	20	0.53	0.42	0.01	
Sheet	20	0.67	0.63	0.02	1.0
Sheet (wet)	6	0.91	0.91	0.22	0.45
with baking soda					0.15
Handkerchief	14	0.63	0.53	0.03	
Handkerchief (wet)	2	1.00	0.91	0.37	
Shirt	15	0.53	0.59	0.07	
Shirt (wet)	6	1.00	0.50	0.02	

1. Data adapted from Cooper, Hinds, and Price (1981). Data based on a pressure drop of 50 Pa (0.2 in. of H_2O) and 1.5 cm/s face velocity.

2. Description of materials used in the study:

- ▲ Dust-type respirator—3M brand dust respirator
- ▲ Higher-quality towel—wash cloth—terry weave (88% cotton, 12% polyester dacron)
- ▲ Lower-quality towel—Broadway terry weave (90% cotton, 10% polyester dacron)
- ▲ Sheet—100% cotton, thread count—161/in.
- ▲ Handkerchief—white broadcloth, 100% cotton, thread count 121/in.
- ▲ Shirt—40% fortrel polyester, 60% cotton, thread count—91/in.

3. Wetted with 5% by weight baking soda solution (approximately 3/4 cup of baking soda per gallon of water).

Expedient respiratory protection significantly reduces the inhalation risk compared with no protection. People should use the highest-quality towels. High-quality towels are those that would be the most effective in absorbing water. They are the most effective in reducing inhalation exposures. Effectiveness against radioiodines is greatest when the towel is wetted with a 5% solution of baking

FOR EXAMPLE

Mt. St. Helens Volcanic Ash

On May 18, 1980, Mt. St. Helens volcano erupted ferociously. The blast pulverized nearly a cubic mile of the volcano and shot the material as high as 63,000 feet in the air. The ash cloud was blown nearly around the earth by prevailing winds, but it dropped several feet of ash onto the area around the cone. Ash accumulated on houses, roads, and in river systems. At first, the ash was wet and some structures collapsed under its weight. Over time, the ash dried and became a wind-blown hazard. Local citizens adopted various types of expedient respiratory protection: painter's masks, wet cloths, dry bandanas. To venture into a cloud of ash without respiratory protection was to invite choking, coughing, and very difficult breathing. Eventually, much of the ash was scooped up with construction equipment and buried in pits to inhibit the dry clouds.

soda. This ratio is approximately ¾ cup of baking soda in 1 gallon of water. Expedient respiratory protection is not appropriate if a radioactive release included only noble gases or any very small particles. You must always consider the challenges associated with protection before incorporating it into a plan. First, wetting, heavier layering, and some materials inhibit breathing. People might compensate by temporarily removing the material. Or they may hold it loosely to the face. This would create leakage. This would render the protection useless. Use of any mask material also inhibits a person's ability to communicate with others. Finally, holding materials to their face will reduce their ability to take other protective action. These actions include duct taping doors and windows. And these added actions might afford significantly greater protection.

SELF-CHECK

- If there is a persistent problem with likely respiratory hazards—like for people who live near nuclear power plants—why not just issue them the same material we give hazardous materials technicians?
- Why do we need to supplement **expedient respiratory protection** with other protective measures?
- What are the limitations you impose when you ask people to use **expedient respiratory protection**?
- When is **expedient respiratory protection** most useful as a protective action?

5.3 Evacuation

Evacuation can protect citizens against a wide range of emergencies. These include wartime bombings, hurricanes, nuclear power plant accidents, floods, hazardous materials accidents, and fires. Evacuation can become complex for large-scale events. For small-scale emergencies, a safe location is usually readily accessible. A grease fire in a kitchen requires only that the occupants leave the house. In other hazards, the nearest safe location might be much farther away. In the case of a derailed and breached railroad tank car containing chlorine, areas as distant as 10 miles downwind might be in danger. For hurricanes, the distance to be traveled can be 20 miles or more. As the number of people to move and the distance moved become greater, the planning attention demanded for successful evacuation increases. This is especially true when communitywide emergencies require cars, trucks, and buses to evacuate the impact area.

An evacuation plan will be successful only if four basic conditions are met. First, there must be enough forewarning to clear the risk area before hazard impact. For most hazard agents, it is more dangerous for people to experience impact in a vehicle than in a building. Second, authorities must have access to an effective warning system. This will be used to alert those at risk that they should evacuate. A persuasive warning message must be constructed and disseminated. It must identify both routes of egress and safe destinations. Third, emergency managers must provide transportation support for those lacking access to a vehicle. There are many segments of the population who do not have ready access to personal transportation. These include:

- Those who depend on public transit.
- Children at school.
- Residents of institutions such as hospitals, nursing homes, and jail.
- Some portions of the nonresident (tourists and other transients) population.

Special arrangements are needed for buses or other multioccupant vehicles to drive special routes to pick up these evacuees and take them to reception centers outside the impact area. Fourth, emergency managers must provide traffic management on evacuation routes in events with many vehicles traveling great distances.

Factors that might increase the time required to clear the impact zone include obstructions caused by the hazard (debris), obstructions that coincide with the hazard, and unintentional obstructions (roads under construction). The planning process should address the need for fuel. It should also address the probability of vehicle malfunctions in route. It should also address health and safety emergencies that might occur in route. The sheer number of evacuees may be an impediment if the safe routes out of the hazard impact area are limited in capacity and there are many evacuees attempting to leave at the same time. In such a case, movement could become so slow that those who are caught in traffic may not be able to reach safety prior to hazard impact. More than 1 million people evacuated the Houston, Texas, area ahead of Hurricane Rita in 2005. The road system capacity was quickly exceeded and evacuation times ran to hours. As a result, authorities had to quickly improvise responses to low fuel supplies. They had to handle traffic accidents. They also had to respond to other health emergencies. The wheel bearings failed on one bus carrying nursing home evacuees and the ensuing fire killed 23 people (Korosec, 2005).

You can avoid these problems. You need to use hazard analysis, followed by evacuation analysis. The hazard analysis identifies the areas in the community that are susceptible to hazard impact. Evacuation analyses are used to assess the size of the affected population. It assesses people's capabilities for personal transportation. It also looks at the adequacy of the roadways. You must also consider the impediments to evacuation and methods for removing impediments and expediting traffic flow. It is appropriate to consider four criteria. These are the:

1. Completeness (number of people involved) of the evacuation.
2. Timeliness of the evacuation.
3. Degree of reliance on existing resources.
4. Flexibility of the methods available for moving people.

Evacuation completeness refers to the proportion of the residents that can be evacuated. Timeliness refers to the length of time required to complete an evacuation relative to anticipated impact time. Reliance on existing resources refers to not needing additional personnel or vehicles. Flexibility refers to the availability of a mode regardless of when it's needed, weather, or other logistical considerations. Each of these criteria should be examined for each of the three categories of vehicles used. These are private automobiles, buses, and special purpose vehicles. The goal is not to identify a single "best" mode for movement. Instead, the task is to evaluate the limitations of each mode. Following this evaluation, you can identify potential barriers to evacuation implementation and how they can be overcome.

5.3.1 Private Vehicles

Evacuations during most U.S. disasters have relied on the use of personal vehicles. With the exception of some urban areas, most American households own or can access automobiles. Because these vehicles are already at the scene of the emergency, they can leave prior to impact. This is particularly true for situations involving little or no advance warning (30 minutes or less). Even when more forewarning is available, evacuees prefer their own cars. This is because they like flexibility in evacuation timing, routing, and destination. Also, use of a personal vehicle permits evacuees to take more personal possessions. These include clothing, medication, important papers, and pets. Finally, the family vehicle(s) may be the most significant financial asset other than the home. Thus, evacuating by car is a way to protect property.

Personal vehicles often can achieve a nearly complete evacuation. They are also a very timely method. However, not everyone has his or her own car. You cannot be assured that those who do not have a car can obtain rides with friends, relatives, or neighbors. During the 2005 Hurricane Katrina evacuation in New Orleans, approximately 100,000 people without transportation were left in the hurricane's path (McQuaid and Schleifstein, 2005). All evacuation planning should include estimates of those without access to cars. On the basis of such estimates, you can examine the types of large-capacity transport available. You can prepare a strategy for pickup. Disseminate this strategy both before and during emergency periods.

5.3.2 Mass Transit Users

You can use buses or other high-occupancy vehicles, such as trains or boats, to evacuate those who do not have cars. Moving people who normally rely on mass transit requires a significant planning effort. When the amount of forewarning is sufficient, it is possible for you to make *ad hoc* arrangements for the transportation of those without personal vehicles. Two of the largest successful evacuations conducted were with the Three Mile Island nuclear plant accident (Perry, 1985) and the Mississauga, Canada, train derailment (Whyte, 1980). In both cases, incidents escalated gradually. This gave officials time to improvise plans. They were able to evacuate the transit dependent by using a wide range of measures.

A rapid-onset disaster, however, requires preimpact planning to implement a timely evacuation. A detailed plan requires accurate estimates of persons dependent on public transit. If the numbers exceed the capacity of the bus system, you must contract for additional vehicles and drivers (to be made available on demand). Special routing would be needed. Times, stops, and occupancy limits must be communicated to the public. The ability to achieve timely evacuation depends on a number of factors. These vary from site to site. One factor is the number and location of evacuees needing mass transit. Another factor is the time required to evacuate. This will depend on how quickly the buses can arrive at the pickup points and then depart for reception centers. The time spent in movement depends on the availability of buses and drivers. An evacuation initiated during evening or weekend hours could use school buses for evacuation. During school hours, buses would have to be drawn from public and private organizations.

5.3.3 Schoolchildren

Moving schoolchildren introduces the challenge of reuniting them with their families. Three different means of addressing these problems have been considered. One is to evacuate schools directly to reception centers outside the hazard impact area. A second approach is to close schools. Return the students to supervised locations close to their homes. A third option is to return schoolchildren directly to their homes. All three methods rely on school buses to transport students from their schools.

The effectiveness of each of these alternatives depends on local conditions. Direct evacuation to reception centers outside the hazard impact area is likely to be the quickest and the most reliable way to ensure that schoolchildren are evacuated. This tactic is advantageous when parents work outside the home and, therefore, might not be home when the children arrive. It has the disadvantage that some parents may lack confidence in the school's ability to implement an evacuation without error. Parents may not know where the reception centers are. They are likely to go directly to the school seeking their children. The significance of this point is underscored by data from a survey (Lindell and Perry, 1992) of residents within one nuclear power plant Emergency Planning Zone (EPZ). It showed that 92% of those questioned did not know the reception centers to which their children would be taken in an emergency. It also showed that 86% did not know if they would comply with plans for direct bus evacuation.

Returning students directly to their homes is consistent with the preference of families to evacuate as a unit. However, it also consumes much time. It causes delays in clearing a dangerous area. It would not be satisfactory in the absence of a responsible adult at the home. The absence of a responsible adult can be addressed by dispersing the children to supervised locations. However, this strategy might do nothing more than redistribute children from schools. They may go from one location within the danger area to other locations also in the danger area. Neither means of evacuating schoolchildren would be appropriate if the time until hazard onset was less than the time required for the children to be returned to their homes, united with their families, and evacuated from the risk area. If schoolchildren could be promptly returned home to families who are ready to leave, it is possible that even the most rapid-onset releases would not lead to undesirable delays. If prompt evacuation of schoolchildren cannot be achieved by this means, public safety requires that they evacuate from schools to reception centers outside the risk area. Or schools should be closed to return the children home prior to hazard impact.

Some local authorities have resolved this issue by electing to return students to their homes. Some state laws require parents to make arrangements for students who are sent home. School closings in response to a variety of hazards also require preparation of the part of families with no responsible adult at home during the day. An evacuation imposes similar preparation requirements. The decision regarding school evacuations must be made on the basis of the location of the schools. It also must be based on the availability of buses and drivers. And finally, you must take into account the number of children who have no adult at home during the day. To ensure parents' compliance with official plans, it is extremely important that Local Emergency Management Agency (LEMA) officials provide the public with timely and credible information about the status of the hazard. They must provide an overview of plans for evacuating the schools. They must also provide instructions on the location of reception centers where local residents can pick up their children. Threats to children generate the highest levels of concern in parents. However, parents don't often think about disasters until the moment is at hand. For these reasons, LEMAs routinely coordinate with school district officials and parent-teacher associations to periodically disseminate information about emergency measures. These meetings provide the basic information for people to remember when LEMAs implement their evacuation plans. Even with such meetings, it is critical that the LEMA follows the plan when an emergency arises. They must supplement this with on-the-spot communication of alerts, procedures, school reception centers, and all clear signals.

5.3.4 Special Facilities Residents

Only a fraction of any community's residents live in facilities that require special consideration. The exception might be in retirement communities of the southern United States. There is a high concentration of nursing homes, assisted living facilities, and hospitals. Nonetheless, this small fraction might demand significant advance preparations. They might also demand a lot of time to evacuate. The term "special population" used for occupants of these facilities is somewhat misleading. It suggests a homogeneous group. In fact, there are many different types of special populations. These facilities typically include hospitals, nursing homes, and jails. They may also include military installations or seminaries. Table 5-2 provides a list of facilities. Some of these are permanently occupied by residents who are not able to drive. It also includes facilities that are temporarily occupied by people lacking vehicles. In the case of hospitals and nursing homes, many residents are nonambulatory as well.

The mobility of users is another important characteristic to consider. Lack of mobility requires specialized transportation—ambulances, armored buses—that must be prearranged and moved into the risk area before evacuation can begin. Other relevant issues include whether the residents are permanently present or if the facility is day use. You should take into account whether the facility is safe for in place sheltering of residents and what protection is lost if evacuation is not attempted. If the protection of in place shelter is roughly equal to evacuation, movement is unnecessary.

Table 5-2: Reference List of Special Facilities for Evacuation Planning

Health Related	Hospitals
	Nursing homes
	Halfway houses (drug, alcohol, mental retardation)
	Mental institutions
Penal	Jails
	Prisons
	Detention camps
	Reformatories
Assembly & Athletic	Auditoriums
	Theaters
	Exhibition halls
	Gymnasiums
	Athletic stadiums or fields
	Shopping centers
Amusement & Recreation	Beaches
	Camp/conference centers
	Amusement parks/fairgrounds/ race courses
	Campgrounds/RV parks
	Parks/lakes/rivers
	Golf courses
	Ski resorts
	Community recreation centers
Religious	Churches/synagogues
	Evangelical group centers
High-Density Residential	Hotels/motels
	Apartment/condominium complexes
	Mobile home parks
	Dormitories
	Military bases
	Convent/monastery
Transportation	Rivers/lakes
	Dam locks/toll booths
	Ferry/railroad/bus terminals
Commercial	Central business districts
	Commercial/industrial parks
Educational	Day care centers
	Preschools/kindergartens
	Elementary/secondary schools
	Vocational/business/specialty school
	Colleges/universities

If movement is required, special facilities are challenging. They often require special vehicles to evacuate residents. Ambulances are required for evacuees who have special life support requirements. High-security buses may be needed for prisoners. For those confined to wheelchairs, you will need buses with seats removed. These special vehicles usually require trained attendants. Thus, personnel and equipment availability both enter into the determination of the timeliness of the response. You will need to estimate the location and number of people needing special purpose vehicles. The number, capacity, and location of these vehicles should also be reviewed. You will need to determine if locally available resources are sufficient. If not, you should identify supplementary sources or personnel and equipment required. Contractual arrangements should be made for their use. Procedures should be developed for the rapid activation of personnel and equipment.

It is common for LEMAs to conduct “outreach” planning with major special facilities. The goal is to ensure that facility operators are familiar with the community vulnerability profile. They also need to understand how it affects their facility. LEMA personnel discuss PARs that may affect them. In some cases, regulatory agencies or accreditation agencies require facilities to have an emergency plan. Most facility managers are willing to engage in private or joint planning with the LEMA to safely address their residents during disasters.

5.3.5 Transients

Transients are a very heterogeneous population segment. In many likely hazard impact areas, transients would be very few in number. Most transient recreationists will have immediate access to personal vehicles. Others—urban hotel visitors—must be considered transit dependent. In a few hazard impact areas, the number of transients could be quite large, depending on the season. Tourism is a significant source of transients in many American communities. This is especially true in coastal communities vulnerable to hurricanes and mountain communities prone to wildfires. Potential hazard impact areas containing major recreational areas, such as campgrounds, summer camps, and beaches, also must deal with transients. Transients may be in residence only for a portion of the year. This is typically during the summer months.

Tourists and other visitors to an area often have some anchor point that can be addressed through the planning process. Usually without special arrangements by emergency managers, tourist facilities assume responsibility for their guests during emergencies. Outreach programs by LEMAs are useful insurance that such transients are covered by warning and response networks. Similarly, people staying in private homes can adopt the protective action taken by their hosts. The principal means of addressing tourists is the warning system and preimpact planning.

5.3.6 Dispersed Groups with Special Needs

Some residents have special needs for assistance but do not live in a group setting. In many cases, the identity and location of these individuals can be established. This can be done through their membership in nonresidential groups or through their reliance on special support services. It is infeasible for you to assemble lists or individually identify most dispersed residents with special needs. In many cases, family and other support groups will assume responsibility for such individuals. Community organizations and voluntary associations often serve special needs community members and know their identity and location. These include Visiting Nurses Association, Lutheran or Catholic Social Services, churches, and other organizations. You can establish outreach programs. You can work with organizations that know of people without help and can report the situation to authorities during an emergency. Let's look at Phoenix as an example. The City of Phoenix (Arizona) EOP calls for the operation of special, multitrunk telephone hotlines through the emergency operations center. These lines are not just for rumor control. They are also used for risk area residents or their neighbors or friends who call to request assistance in evacuating or sheltering. The availability of the hotlines is routinely mentioned in fire department mailings and public service announcements. They are listed in phone books and on the city Web site. They are announced via radio and television during emergencies.

5.3.7 Safety Hazards in Evacuation

There are safety hazards in evacuations. There are more hazards with evacuations than in place sheltering. Potential hazards of evacuation include deaths and injuries. These could be due to automobile accidents as well as deaths or delayed recovery due to the interruption of health care services.

Traffic Accident Risks

Four classic studies have been made of traffic accidents during large-scale evacuations. Hans and Sell (1974) studied 54 evacuations of over 1 million people for the Environmental Protection Agency. Bastien and colleagues (1983) studied evacuations in volcanic eruptions. Whyte (1980) examined the Mississauga (Ontario) train derailment evacuation. Mileti, Hartsough, and Madson (1982) investigated accident patterns following the Three Mile Island (TMI) nuclear power plant accident.

Hans and Sell's data revealed that deaths associated with the evacuation process were reported in only three of the incidents. There was one death due to a heart attack, two deaths due to drowning, and seven deaths due to a helicopter crash. The drowning deaths took place in an automobile. The investigators estimated that the number of deaths per person-mile during the evacuation was higher than the rate during normal driving conditions, but both numbers are very small. Because the number of deaths in the evacuation sample was so small, Hans and Sell concluded that the risk of death due to evacuation was not statistically greater than during normal driving conditions.

Investigations of more recent evacuations have supported these conclusions. Whyte (1981) reported that no deaths or major injuries were caused by the evacuation of 250,000 people after the Mississauga train derailment. The total area evacuated was approximately 44 square miles. Bastien and colleagues (1983) cited reports of two evacuations of an approximately 10-kilometer radius on Guadalupe Island following the eruptions of a volcano. The first evacuation involved 25,000 persons who had to drive with headlights on because of the ashfall. In the second evacuation, 73,000 persons were involved. In neither case were there any road accidents. Mileti and his colleagues (1982) examined traffic fatalities, injuries, and property damage during the evacuation of approximately 300,000 people from the area around TMI. There were no fatal accidents reported within 10 miles of TMI during the weekend of the evacuation. These researchers compared the accident and property damage rates experienced in the evacuation with pre-event rates. They determined that there was no statistically significant increase in accident injuries or property damage during the evacuation. These data are compatible with the evacuations in connection with Hurricanes Katrina and Rita in 2005. No deaths or significant vehicle accidents involving personal injury were reported in connection with the Katrina evacuations in Louisiana, Alabama, or Mississippi. The available data on Hurricane Rita evacuations in Texas indicate 23 passengers were killed in a single-vehicle incident, although the accident was caused by maintenance failure, not traffic. There were also a variety of small accidents producing no significant injuries.

The accident rate for private vehicles in evacuations is almost certain to be no higher and is quite likely to be lower than during normal driving periods. Evacuation traffic tends to be slow. In the Hurricane Rita evacuations from Houston, slightly more than half of those evacuating reported spending more than 10 hours in transit (Stein and Murray, 2005). Traffic flows in a mass evacuation are predominately one way (outbound). Any accidents that would occur would be less serious. Therefore, they are less likely to produce deaths or injuries or to severely obstruct traffic flow. There are insufficient data to determine whether this finding can be generalized to adverse road conditions. Bastien et al. (1983) reported that no traffic accidents were reported during an evacuation through a volcanic ash fall. This suggests that a moderate degradation of road conditions does not alter accident rates. Under some circumstances, road conditions could be dangerous. Then the traffic accident risks of the evacuation might become an important consideration. Indeed, the risk of accidents due to slick road surfaces, reduced visibility, high winds, or fire could exceed the risks from disasters such as hurricane landfall.

Aggravation of Existing Health Conditions

A variety of health problems could be aggravated by the psychological or physical effects of an evacuation. Hans and Sell reported one individual who suffered a heart attack and died. Unfortunately, there are no systematic data on the impact of evacuations on the health of evacuees. A case might be made for attributing adverse health effects to evacuation or other protective action if it disrupted required treatment. There is anecdotal evidence that the evacuations following Hurricane Katrina removed physicians from the area. This created difficulties later for patients under treatment or who needed prescriptions. Such evacuations of medical personnel also drain the personnel resources for medical facilities. During the Mississauga evacuation, Whyte reported that none of the 600 patients transferred to other hospitals experienced adverse health effects. Over 900 nursing home residents were also relocated during this time. This was done without any significant adverse health effects.

Even mass evacuations of medical patients can be accomplished quickly with minimum safety risks. There are important logistical barriers that must be overcome. Traffic management and a normal level of medical precaution are sufficient to ensure the safety of the evacuating population. The major planning element that emerges is the recommendation to form a central registry of evacuated physicians. It should list contact information or alternate physicians. Local radio and television broadcasts can publicize the availability of the registry.

FOR EXAMPLE

Houston, Texas, Evacuation

In advance of the 2005 Hurricane Rita, authorities ordered the evacuation of most of Galveston County and a large part of Harris County (see Figure 5-1). Harris County includes the city of Houston. There was gridlock on the freeways leading inland to the north and west. More than half of the evacuees reported being on the road more than 10 hours. There were gasoline shortages. There were a few instances of price gouging at service stations. Volunteers distributed snacks and water to cars passing on the freeways. The hurricane later shifted its track eastward and ultimately produced a minimal impact on Houston. A probability sample of evacuees revealed that, despite the difficulties, 62% would evacuate again under a similar threat. Also, 70% rated the performance of local government as good or excellent.

Figure 5-1

The 2005 Hurricane Rita required a massive evacuation of Houston and Galveston residents north on U.S. Highway 45.

SELF-CHECK

- What two factors control the complexity of an evacuation effort?
- If an evacuation is to be successful, four conditions must be met. What are they?
- When you are considering the use of risk area evacuation to protect against a given threat, what four criteria do you consider?
- There are lots of special facilities that are potentially in evacuation areas. As part of preimpact planning, how can you involve them in preparations?

SUMMARY

As a planner, you need to take many things into consideration when issuing protective action recommendations. In this chapter, you defined criteria used for determining when in place shelter is effective. You estimated leakage rates of structures for protection against toxic fumes. You assessed the safety risks of evacuating populations. And you also assessed the safety risks of evaluation. You identified special facilities and populations that have special needs as well. All of this information will help you successfully issue the correct recommendations to the public and save lives.

KEY TERMS

Accumulated Exposure	The total amount of toxic or radiological dose an individual receives over a defined period of time.
Air Exchange	The rate at which air exchanges between a contaminated space and one that is not contaminated.
Evacuation	The relocation of threatened populations to places outside the hazard impact area.
Evacuation Completeness	Refers to the proportion of the risk area residents that can be evacuated prior to impact.
Expedient Respiratory Protection	Breathing through an improvised filter to reduce exposure to dangerous particles and toxic chemicals.
In Place Protection	Directs people to seek refuge within structures inside the impact area.
Peak Concentration	Refers to the highest level of impurities present in air.
Plume	A "cloud" or airborne mixture of particles or vapors.
Turnover Time	The mathematical reciprocal of the air exchange rate and the time required for an enclosed space to either become contaminated or to clear.
Vertical Evacuation	The movement of hurricane evacuees to resistant high-rise structures inside the impact area.
Vertical Load	The weight or force resulting from the weight of the occupants, furniture, upper stories, and roof.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of classes of protective action recommendations.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. Which of the following types of protective action are usually done only in conjunction with other measures?
   (a) Evacuation
   (b) In place protection
   (c) Expedient respiratory protection
   (d) Mitigation
2. The usefulness of structures for in place protection is judged in terms of the structural rigidity and the forces of the disaster agent. True or False?
3. The peak concentration is the total amount of toxic exposure a person receives over a defined time period. True or False?
4. Expedient respiratory protections recommended for citizens give the same levels of protection as the protective gear worn by firefighters. True or False?
5. You can substantially increase the protection against large airborne particles by asking risk area residents to breathe through a high-quality towel wet with:
   (a) baking soda and water.
   (b) iodine diluted 5% in water.
   (c) 1 potassium iodide tablet dissolved in a quart of water.
   (d) orange juice.
6. Because you can never be certain every risk area resident has access to transportation, you must always plan on—and communicate the availability of—officially supplied transportation. True or False?
7. Relatively speaking, more safety hazards (unrelated to the disaster agent) arise with evacuations than with in place sheltering. True or False?

Review Questions

1. Why do emergency managers explicitly only address protection in place, expedient respiratory protection, and evacuation as principal protective actions?
2. What is expedient respiratory protection and when it is effective?
3. Define evacuation and describe the principal challenges for the emergency manager when developing an evacuation plan that involves vehicles.

Applying This Chapter

1. You are an emergency manager in Salt Lake City. You are reviewing an established emergency response plan that includes several hazards. What considerations will you take into account when evaluating which, if any, of the three protective action recommendations discussed here should be given attention in the planning process?
2. You've just become an emergency planner in the coastal town of Lakeland, Texas. With the Gulf Coast Hurricane season a month away, you've been asked to do an assessment of the town evacuation plan, which requires evacuation of the entire population. Because large-scale evacuations involve risks to those evacuating, the city manager has asked about safety. Is it likely that more people would be killed and injured in the mass exodus from a hurricane than if they stayed in their community and experienced a direct hit?
3. Pompano Beach, Florida is a town with many young families. It is joked that there are more children per square foot here than anyplace else in the country. In creating a plan for hurricane evacuations that might take place during school hours, what type of special measures will you consider for the planning process?

YOU TRY IT

Citizen Emergency Response Teams (CERTs)

You are an emergency manager charged with liaison to your jurisdictional CERT manager. There are three large chemical-processing plants in your community. Your task is to support the CERT manager and consult with fire department hazardous materials incident commanders to determine where CERT members can support the response to a chemical leak. It is decided that CERT members will be deployed to victim treatment areas to help with decontamination processes and do equipment setup for paramedics. What issues will you consider about the threat agent itself and the demands of the response to decide what PPE CERT volunteers should wear and when they should wear it?

Nuclear Power Plant Radioactive Plumes

LEMA vulnerability analysts and plant authorities have decided that the emergency plan for your local power plant should focus on protection in place for the residences within a 3-mile radius of the plant. The protection in place is to be supplemented by expedient respiratory protection. The LEMA has also predistributed potassium iodide tablets to each household, business, and other facility within the 10-mile Plume Inhalation Emergency Planning Zone. Your job is to identify the steps that should be taken to guide these citizens when a plume is moving in their direction. You know that the steps must be preplanned. Beginning with an alert and ending with an all clear signal, what are the steps that you recommend?

Organizing an Evacuation Plan

Evacuations that involve a small number of people traveling a short distance to safety are straightforward and require only a simple planning process. Indeed, incident commanders can successfully improvise such evacuations by using only resources at the scene. Suppose your community is a low-lying area on a seaport, well known for tourism and a nasty hurricane threat. The low-lying terrain means that you would have to move people as much as 20 miles inland for safety. The permanent population is only about 50,000, but during tourist season, this may double. What elements and operational features will you address in creating an evacuation plan?

6

ANALYZING AND SELECTING PROTECTIVE ACTIONS

How to Make Effective Choices

Starting Point

Go to www.wiley.com/college/Perry to assess your understanding of analyzing and selecting protective actions.
Determine where you need to concentrate your effort.

What You'll Learn In This Chapter

- ▲ The techniques for estimating hazard exposure
- ▲ The principal components of vulnerability
- ▲ The sources of technical assistance for hazard/vulnerability analysis
- ▲ The technical requirements and analyses for using in place protection
- ▲ The technical requirements and analyses that support evacuations

After Studying This Chapter, You'll Be Able To

- ▲ Write a plan that documents threat exposures
- ▲ Appraise the vulnerability for multiple community sectors
- ▲ Examine and plot social vulnerabilities
- ▲ Examine secondary hazards and their consequences
- ▲ Examine and use computer software and manual mapping protocols

Goals and Outcomes

- ▲ Evaluate the elements considered when defining exposures and vulnerability
- ▲ Estimate resource and time requirements for protective actions
- ▲ Propose effective decisions regarding the use of evacuation versus in place shelter
- ▲ Evaluate the management tasks required for successful evacuation and in place protection
- ▲ Assess the limits within which hazard/vulnerability assessments are reliable

INTRODUCTION

You can use evacuation, expedient respiratory protection, and sheltering in place to guard against public health and safety threats. Expedient respiratory protection involves simple measures to avoid inhalation hazards. This is usually done in conjunction with sheltering in place or evacuation. Evacuation and in place shelter are measures that can be used in a very wide range of hazards. They often provide definitive protection. The effectiveness of these protective actions comes at a price. Both cause disruption of normal activities. Evacuation also costs money for travel, food, and lodging. Thus, hazards must be carefully examined to confirm the applicability of these measures. Successful implementation requires more substantial predisaster planning. It is important to recognize that authorities *recommend* these protective actions to those at risk. In some jurisdictions, public officials lack the authority to order citizens to take certain protective actions. Even with statutory authority, there probably are not enough police to force people to take these actions against their will. And moving more people into a danger area—even to evacuate others—makes little practical sense. Planners must convince citizens to comply with official protective action recommendations (PARs).

We will survey the aspects of the planning process that are required to make decisions about the adoption of evacuation and protection in place as PARs for the public. Local Emergency Management Agencies (LEMAs) can be held liable by the public and in court if they fail to plan for known hazards. LEMAs can also be held liable if they are judged to have managed a particular impact incompetently. These facts, together with a sense of professional pride, demand that PARs be based on defensible, research-based reasoning. Specific issues must be addressed in the planning process. Assessments must consider unique agent-generated demands. There must be technical analyses to support the efficacy of any recommendation. We will close this chapter with a discussion of critical features in choosing and implementing PARs.

6.1 Critical Elements to Include in the Planning Process

The planning process is never completed. At least once a year an emergency plan is prepared or revised. Three principal issues related to PARs need to be incorporated explicitly into the planning process: hazard exposures and physical and social vulnerabilities. This is the first step to making decisions about PARs.

6.1.1 Hazard Exposure

Every PAR selection should begin with careful scrutiny of the hazard/vulnerability assessment (H/VA). This will determine hazard exposures. **Hazard exposure** arises when people live or work in areas that place them in the path of environmental threats. When a hazard agent comes in contact with people, their activities, homes, or places of work, there is potential for disaster. Natural hazards become a problem when people live in floodplains, near seismic faults, in tornado zones, or in coastal areas subject to hurricanes. Technological hazards can create disasters when people live close to facilities where hazardous substances are produced or stored. Disasters can also occur near transportation routes where hazardous materials are moved.

You should be able to identify hazard exposure by investigating the history of disasters in your community. You can then estimate the probability that a hazard will turn into a disaster. There are hazards that operate in very long cycles. Records may not be available on some past disasters. Systematic meteorological and hydrological data have been available in America for only about a century. Therefore, when you evaluate the chance of extreme events, accuracy is compromised. This is because there is a lack of information over long enough periods. To complicate the process more, people intervene. Over a century, natural silting processes, creating artificial river channels, and urbanization of the watersheds produce changes to 100-year floodplains. The hazard itself is an issue because rivers don't remain static. Rivers change course. Rivers adapt to terrain over the years. All of these changes make it difficult for physical scientists to assess disaster probabilities. It is equally difficult for you to conduct risk assessments.

Exposure to technological hazards presents additional challenges. With new technology, a similar "no accident data" issue arises. Technical estimates in this case must be derived from other hazard-relevant data. You will need to know the failure rates of engineering systems or products (e.g., valves, pipes, or connectors) that might be part of a new technology but have a history of use. Another complication in estimating exposure to technological disasters is that, to a certain extent, each one is unique. We can group facilities by type. For example, the nuclear power plant is one type of facility. However, there is still much variation within this type. This condition further restricts the data available for calculating exposures. The data must be collected on individual plants or categories of plants. For almost all of these hazards, the determination of exposures is an engineering problem. You can engage specialists. Together, you can determine a probabilistic safety analysis to model these systems. You can attach probabilities to the failure of system components. You can determine the probability of overall system failure.

When terrorism is included as an exposure to be calculated, the process is exceptionally difficult. Exposure in these events is defined by social system dynamics that cannot presently be modeled in the same way as physical systems. Furthermore, unlike natural or technological hazards, terrorists are people. They have a purpose. They can calculate opportunities. They can change the timing and mode of attack at will. Emergency planners are concerned not with processes or social conditions that might make people adopt terrorist ways. Rather, we must assume that our communities are vulnerable (without knowing the real accuracy of that assumption). We must try to assess meaningful exposures. The federal government and most state governments have systems for surveillance of known or potential terrorists. These programs are useful to you only when they detect a specific act being prepared for a particular place. And even then, the issue is one for law enforcement and not emergency management.

Terrorism is a threat that can't be easily mitigated. It is difficult to detect rapidly and accurately. You usually don't *estimate* exposure for terrorism as much as you are forced to *assume* exposure. Under this assumption, we tend to look for likely terrorist targets. This leads us to a protective strategy that is characterized by identifying facilities such as chemical plants, nuclear power plants, government buildings, bridges, office buildings, and the like. Believing a terrorist's goal is to gain attention through public death, injury, and destruction, we look for "big targets." We either harden the structure or guard access to it. We look for potential agents of destruction—bomb materials, airplanes, trucks, buses—and we control access to them. We also identify facilities where many people gather—large-venue theaters, ballparks, amusement parks, and the like—and control access to them. We must do all this because the potential negative consequences are so large. To fail in an attempt would compromise our mission to protect the public. But we must do it without really ever knowing the probabilities involved or the real exposure. Terrorism planning is extremely expensive and resource intensive and might never happen in any given community. This makes terrorism an attractive tool in the hands of people who see such attacks as an avenue to power or influence.

You can begin the process of coupling hazard exposure with disaster consequences by looking at the characteristics of the hazard agent. Once we have identified the mechanisms of harm used by different disaster agents, we are still faced with a long, complex list of consequences for which to plan. It is possible to reduce this complexity by categorizing the circumstances of disaster impacts. Lindell and Perry (1992) summarized these critical characteristics in six groups:

1. *Speed of onset*. How fast is the threat going to reach vulnerable people, property, or livestock?
2. Availability of *perceptual cues* such as wind, rain, smoke, or ground movement.
3. *Intensity* of impact. What is the magnitude of the force of the threat?
4. *Scope* of impact. What geographic area is involved?
5. *Duration* of impact. How long will the risk be present?
6. The *probability* of impact. Are we confident that the impact will happen?

These attributes determine the likely extent of casualties among the population and the degree of structural damage in the affected area. By examining them together, you can begin the most basic decisions about the type of protective actions that are appropriate.

6.1.2 Physical Vulnerability

The planning process must balance hazard exposure with conditions and resources as a way of assessing vulnerability. The mere presence of a hazard is not necessarily a problem. If there are no people who reside in the floodplain, floods are not a problem because no one is vulnerable. Because of the ways we live and develop our human use system, we manufacture vulnerability to many hazards. When making decisions about protective actions, you must consider three aspects of physical vulnerability. These are for humans, for agriculture, and for structures.

6.1.3 Human Vulnerability

Humans are vulnerable to environmental extremes of temperature, pressure, and chemical exposures. Extreme environmental conditions can cause death, injury, and illness. For any hazard agent, people will react differently. Under the same level of exposure, some people will die. Others will be severely injured. Others will be slightly injured. The rest will survive unscathed. The most susceptible people to any hazard are the very young, the very old, the physically or mentally handicapped, and those with weakened immune systems. Because of the variations in response, human vulnerability to disasters is calculated specifically for an agent. **Human vulnerability** is the extent to which exposure to a given hazard agent is likely to produce short- or long-term injury or death. This is done by knowing that one hazard agent may produce different forces that bear on human vulnerability. Hurricanes are wind threats that include flood threats. Hazardous materials threats include ruptured railroad tankers and trucks, breached stationary storage tanks, and damaged industrial plants. Public health threats include broken lifelines for water, sewer, and electricity, to name only a few. Consider each potential source of human vulnerability individually when planning.

Patterns of casualties caused by historic events in the local community can also define human vulnerability. According to Noji (1997), hurricanes produced 16 of the 65 highest death rate disasters of the 20th century. They produced the greatest number of total deaths from 1947 to 1980. Earthquakes produced 28 of the greatest disasters and 450,000 deaths. Floods produced four of the greatest disasters and 194,000 deaths. Other significant natural disasters include volcanic eruptions with nine of the greatest disasters and 9000 deaths. Landslides were four of the greatest disasters and 5000 deaths. Tsunamis were three of the greatest disasters and 5000 deaths. There is significant variation by community. Records need to be centered on local experience. Jonkman and Kelman (2005) offer the guidelines that most fatalities and injuries are among those citizens who fail to undertake recommended protections, who have lower incomes, suffer from chronic diseases, are elderly or very young, are ethnic minorities, or do not fluently speak the predominant language used by emergency authorities.

6.1.4 Agricultural Vulnerability

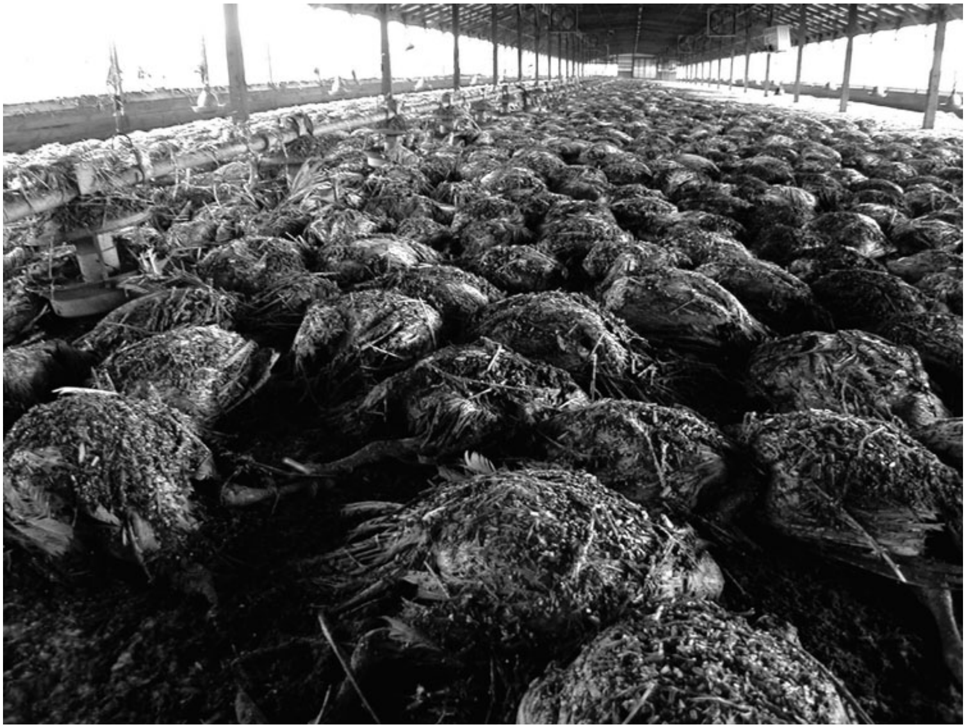
Agricultural vulnerability refers to the consequences of disaster impact for any agricultural product including crops or animals or for the production and distribution chains associated with them. These assessments are tied to community location. The need is obvious if your community is clustered with farms or orchards. Agricultural products travel. They are not tied to their source community. Hence, communities that are transportation and distribution hubs often have large stored quantities of vulnerable agricultural products. The vulnerability must be calculated differently in these different cases. At the source community, not only is the product itself vulnerable but likewise the plants on which they grew. Animal husbandry is also vulnerable at both source and transportation points. Agricultural plants and animals are vulnerable to environmental extremes. Such extremes include temperature, pressure, chemicals, radiation, and infectious agents. Like humans, there are differences among individuals within each plant and animal population. However, agricultural vulnerability is more complex. This is because of the greater number of species to be assessed. Each of these has its own characteristic response to each environmental stressor. For the most part, vulnerabilities are determined and addressed by owners of the products. But their concern is with issues of business and preservation of the product itself. You should examine agricultural vulnerabilities to determine if they present special threats to people, public commerce, or social systems. A very large swine farm is a secondary threat to the community in a variety of natural hazards. You must account for the threats it poses as you would for other hazardous facilities. For example, floodwaters could overcome sewage systems and carry farm waste into communities.

Disasters not only damage but can also contaminate land. Contamination consequences are well understood for some hazard agents but not for others. Authorities and scientists initially believed that volcanic ash fall from the 1980 Mt. St. Helens eruption would devastate crops and livestock in downwind areas. Ultimately, no significant losses materialized. In fact, the nitrogen content of the ash served as a fertilizer. The major threat was to plants broken by the weight of ash. Also roofs not swept clean of ash collapsed. A wide range of disasters causes damage or contamination to areas such as wildlands or wetlands. These areas serve valuable protective functions such as damping the extremes of river discharge, hurricane storm surge, and providing habitat for wildlife. The potential for indirect consequences, such as increased runoff and silting of downstream riverbeds, means that emergency planners can find concerned partners among preservationist and recreational groups.

6.1.5 Structural Vulnerability

Structural vulnerability arises when buildings are constructed by using designs and materials that are incapable of resisting stresses imposed by disaster agents.

Figure 6-1



Dupin County North Carolina poultry farms lost 750,000 turkeys to 1999 flooding.

Vulnerability also comes from buildings that allow hazardous materials to infiltrate. The construction of most buildings is governed by building codes. The codes are intended to protect the life safety of building occupants from structural collapse. These codes do not provide protection from extreme natural forces or technological threats. You should routinely survey the construction stock of the community. You will need to attend to issues of structural strength and penetrability. Assessments that are specific to each hazard agent can be used to determine the levels of protection that might be achieved by protection in place.

Here too, local damage estimates from previous disasters provide a way of estimating the losses. Destruction of structures, animals, and crops are important measures of physical impacts. Such losses usually result from physical damage or destruction. They can also be caused by other losses of use, such as contamination by chemical, biological, or radiological agents, or loss of the land itself to subsidence or erosion. Damage to the built environment can be classified as affecting residential, commercial, industrial, infrastructure, or community services sectors. Moreover, damage within each of these sectors can be divided into damage to structures and damage to contents. Destruction to contents results from collapsing structures. Ground shaking typically scrambles contents and breaks unsecured cabinets and furniture from walls. These then act as projectiles. Hurricanes and tornadoes cause the building envelope to fail. This exposes contents directly to wind, rain, and flying debris. Collapsing buildings are a major cause of human and animal injuries and casualties. However, some hazard agents can damage building contents without affecting the structure. An earthquake that strikes a seismically resistant building might not do structural damage. It will, however, still scramble the unsecured contents.

The most significant structural impact of disasters is the destruction of homes. The destruction of businesses introduces equally big challenges, but their problem is only to rebuild the structure, restock, and resume operations. When homes are destroyed, they too must be restored but people are displaced. The displaced people must be supported (housed, clothed, and fed) until permanent housing is available. In 2005, both Hurricane Katrina and Hurricane Rita completely erased many structures on the Gulf coast. This type of widespread destruction means that there must be a planned but potentially very long recovery process. For example, assessments are normally required to determine if it is safe or appropriate to rebuild structures where they originally stood. It is common to reexamine vulnerability assessments to see if mitigation measures can be included in the rebuilding process. In cases of contaminated buildings and soil, entire areas may have to be abandoned. Or they may need elaborate cleanup.

When the PAR is to evacuate, you must consider the possibility that populations may have no place to safely return. You must keep this in mind across the preparedness, response, and recovery phases of emergency management. Plans must address a series of stages of housing recovery.

- ▲ **Emergency shelter** consists of unplanned and spontaneously sought locations. These are intended only to provide protection from the elements. They are typically open yards and cars after earthquakes or high ground for flooding.
- ▲ **Temporary shelters** include food preparation and sleeping facilities. Such shelter is typically sought from friends and relatives. Shelter can be found in commercial lodging. Shelter can be located in "mass care" facilities operated by government, the Red Cross, Salvation Army, or similar groups.
- ▲ **Temporary housing** allows victims to reestablish household routines in nonpreferred locations or structures. The system of trailers often provided by FEMA for Gulf coast hurricane victims is a type of temporary housing.
- ▲ **Permanent housing** reestablishes household routines in preferred locations and structures.

Provisions for temporary shelters are usually established in the EOP. They are supported by known and dedicated community resources such as the Red Cross and Salvation Army. Research has shown that given the option, evacuees prefer to stay in private homes. Or, if cash is available, evacuees will stay in hotels or motels. The deciding factor when projecting needs for LEMA-supported shelter is usually the scope of impact. The larger the proportion of the community that is affected by the disaster, the more difficult it is for victims to find social contacts whose homes have remained intact. Also, fewer motel and hotel rooms are available. The provision of temporary housing is normally an intergovernmental activity. Local government does not have the resources to accomplish such measures alone. State and federal agencies take the lead. Local emergency planners, however, remain involved with citizens in temporary housing. They participate in planning of permanent housing.

Preimpact estimates of losses to buildings are prone to error. Damage estimates are most accurate when trained damage assessors enter each building to assess the percent of damage to each of the major structural systems. Early approximate estimates are obtained by conducting "windshield surveys." This is done by trained damage assessors. They drive through the impact area and estimate the extent of damage that is visible from the street. These approximate estimates are important in major disasters. This is because Presidential Disaster Declarations are contingent on damages. It is important to obtain the resources released by such a declaration as soon as possible. Detailed assessments are time intensive to conduct and are not needed until the response and recovery phases.

6.1.6 Social Vulnerability

The physical impacts of a disaster are usually the most obvious. They are easily measured. They are the first effects reported by the news media. Destroyed and damaged homes and businesses can easily be seen. Social impacts can develop over a long period of time. They can be difficult to assess when they occur. **Social vulnerability** is a person's or group's ability to anticipate, prepare for, cope with, resist, and recover from disasters. Physical vulnerability refers to people's susceptibility to biological changes. Social vulnerability captures their susceptibility to behavioral changes.

Social vulnerability is not randomly distributed geographically or demographically. Social vulnerability varies across communities. It also varies across households within communities. It is the variation that is likely to be of greatest concern to you. You will have to identify the areas within your community that have population segments having the highest levels of social vulnerability. For example, you will need to know where there are pockets of elderly, poor, and minorities. These data should be recorded in the hazard and vulnerability analysis (H/VA). You will be able to identify areas of where there is the highest

FOR EXAMPLE

Mt. St. Helens Eruptive History

Mt. St. Helens produced several small steam and ash eruptions in March of 1980. This was almost 2 months before the cataclysmic eruption on May 18. Planners had not labeled the volcano a high priority. This is because it had been inactive for so many years. On its return to life, there was concern about estimating population exposures for the threat. Unfortunately, past volcano behavior was of little value. The most recent eruption had been more than a century earlier, before written records were kept. Archeological records of past eruptive behaviors (mudflow, ash fall, and lava flow behavior) were considered along with current geological analyses to project the likely exposures. These methods yielded the conclusion that the exposure was likely to be a summit eruption down the south face that would overflow a series of reservoirs. On the morning of May 18, a large earthquake initiated an eruption. It collapsed the north face of the cone and produced a horizontal blast toward the communities on the north side.

level of vulnerability. You can do this before a disaster. You can then pass this information into response planning through partnership with operational personnel.

SELF-CHECK

- What are the six critical characteristics of threats that are used to estimate consequences?
- Why not reduce the problem of complex warning messages by simply making a law that people must comply with evacuations and send in police to enforce it?
- What groups have the highest levels of **human vulnerability** across most environmental threats?
- What are the four stages of housing recovery?

6.2 Analysis Supporting PARs

You must often estimate community vulnerability, rather than find it recorded in books or documents. To do this, you will need data. The available data vary greatly in precision, accuracy, and technical sophistication. Professional standards, not to mention legal liability, require that whatever process is used, it must be systematic. It must be capable of replication. It must represent the best available information. Both the H/VA and the choice of PARs are products of the experience and judgment of planners who are engaged in a collaborative process. Any analysis supporting protective actions can be classified as a mapping strategy or a computer-based software strategy.

6.2.1 Mapping Community Hazard Exposures

Mapping is tracing hazard exposures and likely impacts onto community maps. The resulting visual portrayal then guides decisions about what PARs should be issued for different hazards. It also shows which areas of the community are appropriate for different types of protective action. Mapping can be "low-tech" attempts to draw and overlay by hand. They can also be "high-tech" maps produced by Geographical Information Systems (GISs). Your goals are to assess the communities' exposure to specific hazards and calculate vulnerability. You will then use this information to choose protective actions to recommend.

6.2.2 Mapping Natural Hazard Exposure

There are many useful sources of information about the regional incidence of natural hazards. A primary emergency planning source is the set of maps contained in the FEMA (1997) *Multi Hazard Identification and Risk Assessment*. This document contains exposure maps for known natural hazards as well as some technological hazards. These exposure maps can be supplemented with additional technical information available from the FEMA (www.fema.gov), the U.S. Geological Survey (www.usgs.gov), and the National Weather Service (www.nws.noaa.gov). These maps afford a constructive (and low-cost) way of assessing potential disaster impact in a community, but they have three limitations.

- ▲ The maps compare the relative risk of large geographical areas. You can use the information to identify the hazards that could strike. These maps do not provide enough detail to see which parts *within* the jurisdiction are most likely to be affected. Smaller-scale maps (which sometimes must be purchased) are needed to assess exposure of different areas to storm surge, inland flooding, and high wind.
- ▲ Some maps define risk areas by probable disaster impact magnitude. Others use the frequency of the event to define risk areas. Sometimes, different definitions are used for different hazards.
- ▲ The maps don't allow you to compare the relative risk of different hazards. You need to identify levels of known risk for individual hazards. You also need to know the likelihood of a flood *in comparison with* a tornado, an earthquake, and a toxic chemical release.

None of these limitations are "showstoppers" that prevent using the maps for local planning. Certainly, the free map data from government agencies can be supplemented. You can buy specific maps from some government agencies. You can also buy maps from many private sector agencies. It is true that use of these maps can make you dependent on qualitative comparisons of the relative risk of different hazards. In lieu of precise numbers, the probability of disaster impact gets put into broad categories like high, medium, or low. These classifications are an approximate guide for deciding which hazards require the most planning attention.

6.2.3 Mapping Hazardous Materials Exposures

Incidents involving fires, explosions, or chemical releases can be initiated by internal or external causes. The types of hazards associated with a chemical facility, their initiating events, their consequences, and their likelihoods of occurrence can be assessed by using H/VA. This process begins by identifying dangerous chemicals, their locations, and the quantities stored. Local fire departments, especially large full-service departments, routinely do hazardous materials surveys. They produce maps of dangerous chemical sites, the chemicals stored, and their locations in the buildings. These maps are very useful in the planning process. Once a community chemical inventory has been created, you can determine risks that are posed to the facility, its workers, its neighbors, and the environment. For Extremely Hazardous Substances (defined under SARA Title III legislation) vulnerable zones (VZs) are identified by using information about the:

- ▲ Chemical's toxicity.
- ▲ Amount available for release.
- ▲ Type of spill (liquid or gas).
- ▲ Likely release duration.
- ▲ Assumed meteorological conditions (wind speed and atmospheric stability).
- ▲ Terrain (urban or rural) surrounding the plant.

You can calculate VZs by hand (U.S. Environmental Protection Agency, 1987) or by using specially designed computer software such as *ALOHA*, *CAMEO* (www.epa.gov/ceppo/cameo), or *RMP*Comp* (www.yosemite.epa.gov/oswer/ceppoweb.nsf/content/rmp-comp.htm). Once the danger radius of the VZ is computed for each chemical of interest, the information can be superimposed on local maps.

You can identify local highway, rail, water, and air routes though which hazardous materials are transported. Local Emergency Planning Committees (LEPCs) are charged under SARA Title III with keeping such information. They share these data with Local Emergency Management Agencies (LEMAs). These travel routes must be identified. Then the number of tank trucks, railroad tank cars, barges, or other carriers of different hazardous materials can be counted. This practice is called a *commodity flow study* and helps to specify the magnitude of the hazardous materials transportation threat. The U.S. Department of Transportation provides information on hazardous materials transportation plans (www.hazmat.dot.gov). They also provide as specific guidance for conducting commodity flow studies (www.hazmat.dot.gov/hmep/guide_flow_surveys.pdf).

Chemical threats must be identified. Then you can define VZs for transportation by using the same procedures for fixed-site facilities. The transportation route VZs are examined to identify threatened areas of residential, commercial, and industrial land use. The *North American Emergency Response Guidebook* (www.hazmat.dot.gov/ohmform.htm#erg) can be used to approximate transportation VZs.

Nuclear power plant releases constitute a special case of hazardous materials (hazmat) exposures. The U.S. Nuclear Regulatory Commission (1978) has conducted extensive research to define the size of the emergency planning zones (EPZs). These are essentially the same as toxic chemical VZs. The NRC has established a 10-mile radius *plume inhalation EPZ*. State and local emergency- planning authorities are required to develop plans to evacuate or shelter in place. This is to avoid inhalation exposure and direct radiation from a radioactive plume. In addition, there is a 50-mile radius *ingestion pathway EPZ*. In this EPZ, authorities must monitor water, milk, and food for contamination.

6.2.4 Mapping Exposure to Secondary Hazards

You must incorporate secondary hazards into planning. **Secondary hazards** are risks that are caused by or associated with a primary hazard. Lindell and Perry (1997) documented that earthquakes can initiate surface faulting, ground failure, landslides, fires, dam failures, and hazmat releases. Hurricanes can cause flooding, power failures, communications failures, and hazmat incidents. They can also cause public health threats from inundation and failure of sewer systems. As the magnitude of the primary hazard increases, there is usually a greater probability and range of secondary hazards. One method of identifying areas exposed to multiple hazards is to use a GIS to overlay maps of the areas exposed to different hazards. This is done by entering data on primary and secondary hazard exposures into a GIS. This creates separate map layers for fault lines; areas prone to the highest levels of ground shaking, subsidence, and landslides; hazardous facility, and transportation VZs. This also creates map layers for the locations of sensitive facilities. The software can generate composite maps displaying the areas subject to multiple hazards. The most common secondary hazards associated with 11 natural hazards are shown in Table 6-1.

When you map hazards to identify exposures and vulnerabilities, it is important to remember that vulnerability is always changing. A map provides a picture

Table 6-1: Secondary Hazards Associated with Hazard Agents

Primary Hazard	*Principal Secondary Hazards*
Severe storms	Floods, tornadoes, landslides
Extreme summer weather	Wildfires
Tornadoes	Toxic chemical or radiological materials releases
Hurricane wind	Toxic chemical or radiological materials releases
Wildfires	Landslides (on hillsides in later rains)
Floods	Toxic chemical or radiological materials releases
Storm surge	Toxic chemical or radiological materials releases
Tsunamis	Toxic chemical or radiological materials releases
Volcanic eruptions	Floods, wildfires, tsunami
Earthquakes	Fires, floods (dam failures), tsunami, landslides, toxic chemical or radiological materials releases
Landslides	Tsunami

of vulnerability at one point in time that is based on one set of assumptions and data. We emphasize that mapping is a tool, not an end in itself. Like emergency plans, H/VA maps lose accuracy over time. Both maps and plans should be seen as one product of a continuing planning process that makes periodic reassessments of the hazard environment.

6.2.5 Conducting Hazard/Vulnerability Analysis with HAZUS-MH

There are a variety of computer programs available to you that produce community H/VAs. These programs relieve you from making hand calculations and drawing maps. They use preset criteria for identifying threats and VZs. They have the disadvantage of being costly. They also require extensive data input if they are to be accurate. **Hazards US-Multi Hazard (HAZUS-MH)** is a software program that models potential losses from earthquakes, floods, and hurricane winds. HAZUS-MH uses a GIS to analyze and display data on estimated structural damage and losses for buildings and infrastructure. It also provides estimates of the casualties resulting from earthquakes. HAZUS-MH can be used to conduct analyses in support of mitigation, response, and recovery planning. In addition, HAZUS-MH can be used to conduct rapid analyses to support postimpact response and recovery operations.

HAZUS-MH supports three levels of analysis for planning. A Level 1 analysis uses national average data to produce approximate results. Consequently, a Level 1 analysis is an initial screen that identifies the areas at highest risk. A

Level 2 analysis takes refined data and hazard maps. These data can be entered by you, an urban planner, or a GIS professional. This produces more accurate estimates. A Level 3 analysis uses community-specific parameters. This produces the most accurate estimate of loss and vulnerability. Data for a Level 3 analysis are obtained from structural and geotechnical engineers. It is also obtained from other technical experts who examine threats such as dam breaks and tsunamis.

HAZUS-MH has separate models for earthquakes, floods, and hurricane winds. The earthquake model accounts for ground motion and ground failure. The flood model accounts for flood frequency, depth, and discharge velocity. The hurricane model accounts for wind pressure, missile (flying object) damage, and rain. Direct damage can be calculated for the general building stock, essential facilities, high potential loss facilities, transportation facilities, and lifelines (electrical, gas, water, and sewer lines). Secondary hazards are also addressed. Induced damage can be estimated for fire following hazmat release and debris generation. Direct losses can be estimated for the cost of repair/replacement, income loss, crop damage, casualties, shelter occupancies, and recovery needs. Indirect losses include supply shortages, sales declines, opportunity costs, and economic losses. The impact modules are almost complete for earthquake. The crop loss module, however, is unavailable. The impact modules are also almost complete for floods. Only the fire and casualties modules are unavailable. The hurricane model has the fewest features.

HAZUS-MH can provide average annualized loss and probabilistic results from the three hazard models. HAZUS-MH can also link to external models for blast, radiological, chemical, and biological hazards. Information on the acquisition and use of HAZUS-MH is available from the HAZUS Resource Center (www.fema.gov/hazus). This source includes data on HAZUS-MH hardware and software requirements. It also includes manuals, case studies, and contacts for membership in Users Groups. HAZUS-MH is an effective and powerful tool. It does have the limitation that it only addresses a limited number of hazards faced by communities.

6.2.6 The Community Vulnerability Assessment Tool

The National Oceanic and Atmospheric Administration's (NOAA) Coastal Services Center made the Community Vulnerability Assessment Tool (www.csc.noaa.gov/products/nchaz/startup.htm). **CVAT** is composed of a series of seven modules that a planner completes to produce your own local vulnerability assessment. Each module addresses a single issue in vulnerability analysis, and they accumulate information for a full assessment.

- ▲ The *hazard identification module* asks you to list the community hazards. You must rate each in terms of its frequency, scope of impact, and potential damage magnitude. This information is used to calculate a threat score for each hazard.

- The *hazard analysis module* recommends using risk maps to identify local areas. These have differing degrees of risk from each hazard and to accumulate a risk score reflecting the number and magnitude of risks.
- The *critical facilities analysis module* prompts you to identify critical facilities. You must develop an inventory listing for each one. The module then identifies facilities located in the highest-risk areas.
- The *societal analysis module* identifies neighborhoods that are high in social vulnerability. It indicates which are located in the highest hazard risk areas. The module generates an inventory of the special consideration/high-risk locations. They can include specific information on special needs. For example, they can include evacuation assistance for the handicapped.
- The *economic analysis module* identifies the principal economic sectors in the community. It identifies their location in high-risk areas. The module creates an inventory of local businesses, their resources, their vulnerabilities, and their needs.
- The *environmental analysis module* identifies secondary hazards and key environmental resources that lie in high-risk areas.
- The *mitigation opportunities analysis* inventories undeveloped land in high-hazard areas. This supports mitigation strategies that can be focused on new development.

The CVAT is a broad-based, labor-intensive instrument. You can use it to produce a local hazard vulnerability analysis. It lacks the precision of the HAZUS-MH tool. This is because levels of hazard frequency, scope of impact, and damage

FOR EXAMPLE

Flood Planning in Tempe, Arizona

The City of Tempe occupies a desert environment. However, it sits in the floodplain of the Salt River. The river is dry most of the year due to upstream dams that regulate water for the region. Tempe captures runoff from the dam system to sustain a Town Lake which serves as a business center. There is potential for seasonal flooding from rain and planned releases from upstream dams to ensure their integrity. A major hazard exists in the risk of multiple upstream dam failures that would literally inundate the city. Because of the complexity of the multifaceted flood threat, Tempe Fire Department emergency planners have adopted the Hazards US-Multi Hazard (HAZUS-MH) software for preparing vulnerability analyses. The program is used as a tool in the planning process. It is implemented once each year or whenever any significant change takes place in the threat environment.

magnitude are collected as five categories rather than more specific probabilities. Particularly for small communities subject to a narrow range of hazards, the CVAT can produce a low-cost product that is useful.

The NOAA Coastal Services Center also provides some technical analysis tools. These include an overview of LIDAR (LIght Detection And Ranging) beach mapping to obtain highly accurate elevation data. There is also a damage assessment tool for rapid postimpact reporting. This allows you to retrieve parcel data in a geographic information system database and integrate it with FEMA damage assessment forms.

SELF-CHECK

- What are the three problems you encounter when you use predrawn hazard maps from federal agencies?
- What is a **secondary hazard?** Give an example and tell how is it identified.
- When you are determining a vulnerable zone for a fixed chemical hazard (facility), what factors are included in your calculation?
- Why should you regularly recalculate hazard exposure maps?

6.3 Selecting PARs

Identification and selection of PARs may take place at two points in time. The first is as part of the planning process, when no hazard is imminent. You may do this as part of reviewing the H/VA for the range of hazards confronting their community. There are particular protective actions that you can anticipate might be used with particular hazards. Chemical plants and nuclear power plants create conditions where protection in place should be an option. Each of these threats, plus flooding and hurricanes, can produce incidents for which evacuation is appropriate. The logistics of each protective action and supporting measures to address response-related demands can be preplanned. The second setting in which recommendations may be made is during the response phase for an unanticipated threat with no forewarning. For example, a terrorist attack with a dirty bomb is an unanticipated threat. An incident commander, based on personal experience and knowledge of the EOP, could recommend either protection in place or evacuation for different areas of the city. These actions would rapidly protect the population.

Two practical issues are important in selecting PARs. The first is to appreciate the limits of the H/VA and how to intelligently act on its results. The second is to provide a framework that allows both you and operational responders to rationally select evacuation or protection in place in connection with specific hazards.

6.3.1 The Limits and Functions of H/VAs

Risk and uncertainty are the major problems encountered by planners performing H/VAs. FEMA's (1997) *Multi-Hazard Identification and Risk Analysis,* together with information from state and federal agency Web sites, can be used to identify local hazard agent exposures. This is a good start, but only that. You should consider the *probability* of a disaster, not just that it is possible. An event with a 50% chance of occurrence should be given more attention than one that has only a 1% chance of occurrence. Unfortunately, the desired probabilities frequently have not been calculated. Or they have highly uncertain accuracy. Or they are not disclosed. For example, statistics on the probabilities of failures in chemical plants are kept private by owners.

Even if you knew the exact probability of a disaster, there is uncertainty about impact magnitude. Knowing there is a 20% probability of a hurricane strike this year is of limited value. You must know its intensity at landfall. Even if we knew the category, it would tell us little about the amount of inland flooding or when to evacuate people from threatened areas (because the storm's forward movement speed is independent of its magnitude). For example, Tropical Storm Allison had a devastating impact on Houston. This is because it stalled over the city and rained for days. It still did damage even though it never reached hurricane wind speed. Finally, even knowing the probability of an event's physical impacts tells you little about the social impacts. Some communities recover rapidly from disaster impact. Other communities, however, may have less damage and fewer casualties and never recover.

You can't currently obtain precise information about your communities' hazard vulnerability. Such information is unlikely to be available in the near future. This might seem to be a very pessimistic view of the usefulness of H/VA, but it is not. It simply recognizes the current limitations in the state of technology. It also recognizes the limitations in the resources you can devote to this activity. The positive message is that you can still do effective work without precise data. You only need enough information to accomplish a few objectives. The objectives are to:

- Make decisions about the allocation of the resources under their control.
- Make a case for obtaining more resources to do their jobs better.
- Motivate citizens to engage in hazard adjustment.
- Enhance the awareness of elected and administrative authorities.
- Make informed choices when recommending protective actions.

6.3.2 A Framework for Selecting PARs

There are many ways to frame the reasoning that goes into selecting a protective action (Sorenson et al., 2002). Selection guides are most efficiently presented as a series of steps.

Step 1: Anticipate the hazard demands. You need to know the quality of the information available during an emergency. This information is gleaned from the local H/VAs.

Step 2: The identification of available protective actions and the attributes on which those actions differ. The main choices are evacuation, protection in place, and no action. Expedient respiratory protection is effective in some emergencies. For example, it is effective in chemical, radiological, or volcanic emergencies. It can be used with either protection in place or evacuation. However, it is a supplement to evacuation or protection in place, not an alternative.

The primary attributes on which the target protective actions differ are related to effectiveness and cost. We can measure these issues with a simple rating system. In Table 6-2, three levels are used for effectiveness. These levels are as follows: high = ++, moderate = +, and low = 0. These same levels are used for economic cost (C). The ratings can be used with four protective options: doing nothing (no intervention), shelter in place, normal evacuation, or expedited evacuation. These alternatives are compared with respect to the hazard impact severity (low versus high) and speed of onset (slow versus rapid).

The table makes it clear what alternatives are equal to or worse than another alternative on all dimensions and where the trade-offs lie. For example, the first column shows that for an impact of *low severity* and *slow onset,* protection in place would be preferred to either an expedited or normal evacuation. This is

Table 6-2: Protective Action Payoff Matrix

	Severity of Impact							
	Low				*High*			
	Speed of Onset				*Speed of Onset*			
Protective Action	*Slow*		*Rapid*		*Slow*		*Rapid*	
No intervention	E (0)	C (0)	E (0)	C (0)	E (0)	C (0)	E (0)	C (0)
Shelter in place	E (++)	C (+)	E (++)	C (+)	E (+)	C (+)	E (+)	C (+)
Expedited evacuation	E (++)	C (++)	E (++)	C (++)	E (++)	C (++)	E (++)	C (++)
Normal evacuation	E (++)	C (++)	E (+)	C (++)	E (++)	C (++)	E (0)	C (++)

because the same high effectiveness can be achieved at lower cost. Evacuation is preferred over no intervention because the trade-off between risk and cost is generally resolved in favor of avoiding risk at a reasonable cost.

Step 3: Consider the relationship between the alternative actions. Protection in place and evacuation are different options. However, there is no reason that only one would be used in a particular emergency. Protection in place may be appropriate at one time or place and evacuation at another time or place in the same incident. For example, a release form a nuclear plant may require evacuation within a 2-mile radius and 2 to 5 miles downwind. At the same time, you can use protection in place for areas located 2 miles crosswind from the plant. Alternatively, one area might initially be instructed to protection in place. This might be followed an hour later by an evacuation order. A decision to escalate the PAR for a given geographical area—or even a particular facility—addresses the constraints imposed by response time requirements. When the time required to evacuate is large, decision makers may face a time when evacuation cannot be accomplished before impact. In this situation, a decision maker may recommend evacuation if the exposures were smaller than those resulting from protection in place.

Step 4: Allocate responsibility for acquiring relevant information and selecting PARs. Sources of emergency assessments must be identified. Requirements for the quality and timeliness of these assessments must be identified as well. You can designate communications channels over which the assessments will be transmitted to operational responders.

The selection of an appropriate PAR is complicated. You must balance the threat characteristics, time required to implement each protective action, and the reduction in risk achieved. The complexity makes it desirable that a team make decisions about PARs. One person should not make the decisions alone, except under special circumstances. Hazard conditions sometimes demand a quick decision by an incident commander. When forewarning is available, a preliminary PAR is likely to be formulated jointly by local emergency management and public safety staff.

When hazard onset is slow and the location of impact is uncertain yet large in scope (from 2 to 10 miles in radius), PARs are made and examined by an emergency management team. They are approved by the local chief executive. Faced with an emergency whose scope is so large that it crosses multiple jurisdictions, the recommendation may be reviewed at multiple government levels. It is implemented only after approval by a state governor.

6.3.3 Technical Considerations in Protective Action Assessment

Technical tasks are inherent in choosing and implementing PARs. You must have a procedure for determining the amount of time required before a PAR produces protection. Implementation time estimates tell us when there is enough time to consider a broader range of protections. There has been much research on the process of making implementation time estimates. It has shown that often a working estimate will allow for a reasonably effective PAR selection. Related to time issues, you also need quickly executable assessments of the steps and outcomes for both evacuation and protection in place.

A Population Response Time Worksheet

Population response time estimates can be done in several ways. One simple procedure can be adapted from the work of Urbanik and his colleagues (1980). This procedure emphasizes the protective actions for the focal and fringe areas of a VZ. In the case of nuclear power plants, the guidance provided by federal agencies defines the focal area as a 2-mile facility radius. The downwind segment is determined by atmospheric conditions and the severity of the release. The fringe areas would consist of the crosswind segments having the same radius as the downwind segment. The peripheral area would be the remainder of the plume inhalation (10 mile) EPZ. The same process works for almost any hazard.

To estimate the response time for the focal area, you must estimate evacuation time components. They must then be added together. This produces an overall evacuation time estimate. This means that you must estimate and add together the time needed for making a protective decision, notifying the population at risk, preparing for evacuation, and traveling out of the area. Table 6-3 provides a basic worksheet that can be used for these time estimates. The worksheet is divided into five sections. The first part of the worksheet addresses time requirements associated with decision, notification, preparation, and travel times for different population segments in different zones. The longest of the time estimates shows the time required to complete an evacuation. This assumes no prior actions are taken to start the process. This estimate is the sum of decision time plus notification time, plus preparation time plus travel time. The total time involved depends on preimpact-planning outcomes. If a PAR has already been selected, then that time estimate contributes zero to the total.

Also, you can select the PAR and notify the population ahead of time. Then both decision and notification times are zero. The remaining time estimates represent the time required to complete an evacuation under different combinations of pre-planning for decisions, notification, and preparations.

What if no response actions have been taken and the evacuation time components totaled 3 hours? Then no reevaluation is needed if hazard arrival time is 3 hours or more. On the other hand, if tracking for a nuclear power plant plume indicates it will arrive in 2 hours, action must be taken. If population preparation time plus evacuation travel time is 2.5 hours, evacuation is no longer an option. Vulnerable zone residents would be traveling in vehicles when the plume engulfs them. In this case, select the PAR and notify the population ahead of time. Then both decision and notification times are zero. The remaining time

Table 6.3: Worksheet for Estimating Population Response Times

1. Determine the evacuation estimate for the most limiting population in each of the two vulnerable zones: close (0–2 miles) and intermediate (2–5 miles). If possible, times for decision, notification, preparation and travel should be technically obtained and adjusted to local conditions.

Close Zone	*Decision*	*Notification*	*Preparation*	*Travel*	*TOTAL*
General Population					
Transit Dependent					
Special Facilities					
Schools					
Intermediate Zone	*Decision*	*Notification*	*Preparation*	*Travel*	*TOTAL*
General Population					
Transit Dependent					
Special Facilities					
Schools					

2. Enter the time component estimates for the most limiting (highest time) population segment from either vulnerable zone.
   (a) Decision ____________hour(s)
   (b) Notification ____________hour(s)
   (c) Preparation ____________hour(s)
   (d) Evacuation Travel ____________hour(s)
3. Compute time required to complete evacuation from initiation of:
   (a) Evacuation ____________hour(s) [enter component 2b above]
   (b) Preparation ____________hour(s) [add components 2c + 2d]
   (c) Notification ____________hour(s) [add 2b + 2c + 2d]
   (d) Decision ____________hour(s) [add 2a + 2b + 2c + 2d]
4. Plot evacuation time components on the time line:

Hours Elapsed

-------- 1 ------ 2 ------ 3 ------ 4 ------ 5 ------ 6 ------ 7

(a) Evacuation ---

(b) Preparation ---

(c) Notification ---

(d) Decision ---

(e) Hazard onset ---

estimates represent the time required to complete an evacuation under different combinations of preplanning for decisions, notification, and preparations.

To estimate the total time to protect the entire area threatened, you must first combine the figures from the first two tables. These are then transferred to the component estimates in sections 2 and 3 of the worksheet. These permit estimation of the time required for the most limiting population segment. It also enables estimation of the time required to complete evacuation from different starting points in the decision-notification-preparation-evacuation process. The next task is to estimate the time remaining until hazard impact. This information is supplied by a specialist. For example, flood arrival time estimates are calculated by the rate the crest travels downstream. Hurricane arrival time estimates come from the storm's forward movement speed. For hazardous materials enclosed in containment, the hourly rate of increase in pressure can be calculated to determine the amount of time until the container fails. The alternate protective measure is to notify residents to shelter in place. You could also recommend that residents supplement either primary measure with expedient respiratory protection.

Management Considerations for Protection In Place

Protection in place is used when structures provide adequate safety from impact forces. For toxic plumes, this means that structures provide a sufficient seal prior to release or that structures can be quickly made to provide sufficient seal to minimize exposure. The time feature is critical. The toxic exposure might last for hours or days. Then you must determine that those sheltering will have sufficient breathable air, water, and food to survive this period. Once protection in place has begun, emergency managers must be certain that those in shelter will not eventually accumulate excessive exposures. This is because of the long duration of shelter. If this doesn't work, preimpact evacuation is indicated. Where forewarning time is too short for an evacuation without exposure, you must determine the likely level of exposure during travel and compare it with levels of exposure in long duration shelter. The protective strategy would be adjusted according to the relative risk. In some cases, protection in place becomes a measure of last resort yielding the greatest level of possible protection (even small) under a variety of threat conditions. For nontoxic sheltering against volcanic ash or hurricane winds and surge, the same need exists to calculate in place survivability versus risks incurred in evacuation. Vulnerable populations, such as those who are very sick, have different needs. They might be advised to seek protection in place while others are evacuating because their medical conditions put them at much higher risk during evacuation. Thus, the specific choice of PAR can vary across different sections of the VZ. They also can vary by the characteristics of the population at risk.

You can use checklists of decision criteria for implementing protection in place. These milestones include:

- ▲ Ensure that protection in place affords better protection to vulnerable populations than evacuation under the prevailing conditions.

- ▲ Determine the area to be designated for protection in place. Do this by using easily identifiable geographical or political boundaries.
- ▲ Create and disseminate a warning message with specific instructions to the area that is to seek protection in place.
- ▲ Address the problem of livestock and crops in the VZ. Advise owners regarding simple protections if possible. At minimum, provide information on how animals and plants should be assessed postexposure for viability.
- ▲ When giving instructions, make them clear and concise.
    - Stay inside a house or other building.
    - Close windows and doors. Turn off air-conditioning and heating systems. Close fireplace dampers.
    - Give sealing instructions if appropriate.
    - Gather radio, flashlight, food, water, and medicines.
    - Use expedient respiratory protection, if appropriate.
    - Identify the room or basement location that is most protective.
    - Monitor radio and local television for LEMA announcements.
    - Account for sheltering transient populations.
    - Provide specific instructions to operators of special facilities.
    - Provide special instructions and assistance for handicapped or elderly.
    - Monitor hazard conditions in VZs with experts. Determine when threat has passed.
    - Issue an all clear signal to sheltered populations when appropriate.

There are a variety of advantages to protection in place as a PAR. These include:

- ▲ There is a very short time lag between citizens receiving the warning to protect in place and the achievement of protection.
- ▲ The warning message can be short and simple. They should focus on the danger, the vulnerable area, and instructions for protection in place.
- ▲ Very little preparation time is required. People are instructed to shelter and seal by using materials they already have.
- ▲ People's homes contain most of the necessities that authorities would have to provide in public shelter. This includes food, water, sanitation, and medications. They are in a familiar environment. They have communications capabilities (telephone, television, radio). This is true only if electricity is available.
- ▲ Response-related demands on emergency authorities are reduced. No traffic management, public shelter, and other services are needed.

As with all actions an emergency manager might undertake, there are also disadvantages. Limitations on protection in place include:

- ▲ Protection in place works best when preimpact planning and information dissemination to the public has been effective. Such planning is mandatory for nuclear power plant EPZs. However, it should also be done if protection in place is to be used for other technological or natural hazards.
- ▲ You must have a good understanding of the hazard exposure process. You must know about the community's building stock. Unless structures can actually afford protection, protection in place is dangerous.
- ▲ In place protection is best for short-duration exposures. It is less appropriate as the duration of exposure increases. If protection requires confinement of 12 hours or more, evacuation might be better even if it takes place during hazard impact.
- ▲ Protection in place is not recommended when the threat involves release of either explosive or flammable gases. Gas seeping into structures could ignite. This would destroy the shelter and those inside it.
- ▲ Transient populations not based in hotels, motels, or other supervised institutions are very difficult to protect in place. Evacuation may be the only option for such populations, either to an area of no exposure or to a shelter sanctioned by authorities.

The ability of a VZ population to achieve protection in place is a critical part of an EOP. It should be a major training topic for emergency operations personnel. Its successful use depends on an accurate assessment of the air exchange rates of community structures and the prevailing environmental conditions at the time an incident occurs. Protection in place is an option that can be used alone. It can also be used in combination with other protective measures.

Evacuation Management Considerations

Evacuation is moving people out of harm's way. It is one of the oldest tactics for protecting citizens. It is particularly attractive because removing people from vulnerable areas reduces their hazard exposure substantially. It frequently reduces their vulnerability to zero. The advantages of evacuation should be weighed against its potential disadvantages. Emergency managers must also assess the risk of hazard impact occurring while people are evacuating. They must compare that exposure with what could be expected from protection in place. Evacuation requires people to have enough time to prepare and travel out of the impact area. The use of evacuation forces authorities to consider the practical aspects of movement. For example, how will transit-dependent people be evacuated? Will you have buses take them out of town? How will handicapped, transient, or special institution populations be moved? You must consider the logistics of evacuation. Successful evacuation demands:

- ▲ Transportation must be available to all in the VZ.
- ▲ Egress routes must be defined and monitored.
- ▲ Consideration must be given to fuel supply and breakdowns.
- ▲ Reception centers (possibly shelters) must be available to meet basic evacuee needs.

The complexity of an evacuation depends on the number of people who must be moved and the distance to safety. Nonetheless, evacuation is not a difficult protective action to implement. With an adequate level of preimpact planning, very large evacuations have been accomplished in the United States. You can create a checklist for conducting evacuations that addresses 16 elements.

1. Ensure that there is enough time to complete an evacuation. Ensure that prevailing conditions allow evacuation to provide a greater level of protection for those in the VZ than protection in place.
2. Define the areas to be evacuated in the VZs. Use available technical analyses. Identify these areas by using commonly recognized geographical and political landmarks.
3. If necessary, obtain the authority to order an evacuation. Most general emergency powers grant emergency managers the authority to direct evacuations. In some areas, this authority might be vested only in a mayor or city manager.
4. Select evacuation routes. You need to assign traffic control responsibility. You also need to ensure fuel availability and quick response to impediments such as accidents and mechanical breakdowns. Emergency medical services should be available.
5. Identify and activate a reception center system in safe areas. Evacuations that involve very large community segments or great distances for travel force greater evacuee reliance on mass care facilities.
6. Address the problem of pet evacuation. If shelters can accommodate pets of defined size and number, that information should be provided in warning messages. If pets cannot be accommodated at shelters, offer instructions on safe procedures for leaving pets behind.
7. Implement procedures for access control and internal security within evacuated areas.
8. Be prepared to accommodate “evacuation shadow.” People in areas outside the VZ defined by authorities should be expected to evacuate. Evacuation shadow is greatest in high fear-generating events.

9. For daytime evacuations, provisions need to be made that facilitate reuniting families. For schoolchildren, these provisions must be preplanned to be effective.
10. Decide how special populations will be managed before any warnings are issued. These include transit-dependent, transients, hospitals, nursing homes, group homes, prisons, schools, large businesses during operating hours, sports facilities, and handicapped people dispersed in neighborhoods. Special warning messages and procedures may be needed for these groups.
11. Address the problem of livestock in the VZs. Preplan to advise owners regarding simple methods of protection, if possible.
12. Deliver the warning message to those in the VZ.
13. Develop a process for evaluating the completeness of the evacuation. One tactic is to drive through VZs for sight recognition of nonevacuees. Devise a policy for addressing refusals to comply with evacuation.
14. Monitor the threat. Inspect evacuated areas to determine timing of safe reoccupation.
15. When appropriate, issue an "all clear" and permission to return.
16. Attempts to control the timing of returns usually fail. Be prepared to activate the same procedures as were used to evacuate the areas. For example, assign routes. Be sure to ensure fuel availability. Manage traffic.

If not many people need to be evacuated and the distance is short, many of the 16 elements become minor points. Large-scale evacuations are those moving many people over great distances. They involve multiple special populations and facilities. The complete success of large-scale evacuations is largely dependent on careful preimpact planning. Where vulnerability assessments indicate a need for large-scale evacuations, you should establish a planning group. You can then work with the group to devise specific evacuation plans.

When an evacuation effort has been preceded by appropriate preimpact planning, evacuation presents several advantages as a PAR.

- Evacuation is a highly effective way of protecting people from exposure to threats. It removes them from the VZ altogether.
- Evacuating gives people the comfort of actually doing something to protect themselves. They are emotionally reassured by taking action. This is true even when evacuees express concern about the possible destruction of their home and other possessions left behind.
- Except in the largest urban areas, many people have transportation of their own. Or they can arrange transportation with little intervention by authorities.

- Night evacuations, in particular, find most families together. They can evacuate quickly as a unit.
- Evacuations are usually initiated before disaster strikes. The exposure is to risks associated with the movement (e.g., traffic accidents) and not the hazard agent.
- The protection afforded by an evacuation can be extended if the threat lasts longer than expected. Unlike protection in place, this will not increase the risk from exposure to the hazard agent.
- The load on mass care facilities is often modest. This is especially true in short-distance evacuations. Evacuees prefer to stay in the homes of friends and relatives. They can then have both shelter and social support during a stressful time.
- If the vulnerability is made clear to evacuees, few of them complain about an "unnecessary" evacuation if the disaster doesn't materialize. Most evacuees in such situations expect to comply with future evacuation requests.

Evacuation is a potentially labor- and resource-intensive activity. Small-scale evacuations can be successfully implemented with little preimpact planning. However, large-scale evacuations require extensive preparation and the involvement of multiple agencies. They often involve agencies from differing levels of government. Among the challenges associated with evacuations are:

- Multijurisdictional coordination problems are endemic to large evacuations. If a large citysegment or entire city must be evacuated, safe locations and routes to them are likely to be outside that area. Large evacuations demand that planning be conducted on a regional, not local, basis.
- Evacuations require time for selection as a PAR. There must be time to notify those in the VZ. There must be time for people to prepare to leave. And there must be travel time. If the estimated time to hazard impact is less than or equal to the time to complete an evacuation, another protective action should be considered.
- Evacuations are logistically intensive. Reception centers and mass care facilities must be staffed and overseen. Traffic must be managed. The evacuated area must be monitored and managed. Transportation must be provided for the transit-dependent and special populations. Special facilities must be coordinated.
- Transient populations are difficult to reach through normal warning systems. They almost always require special provisions.
- Special provisions need to be planned for uniting families for daytime evacuations. This is particularly true when children are at school.
- When evacuees return after an all-clear signal, the authorities must exert the same level of management effort as they did when evacuating them.

FOR EXAMPLE

Hurricane Planning in Texas

For many years, the Texas A&M University Hazard Reduction & Recovery Center conducted hurricane vulnerability analyses. This was done for the Governor's Division of Emergency Management. These results were published in several forms. The forms included hurricane storm atlases, contingency planning guides, and evacuation maps. These are highly detailed information sources. Jurisdictions anywhere on the Texas coast can use these to create protective strategies. The maps reflect threat projections. The maps include data on coastal topography, political boundaries, physical features (rivers and lakes), census data, and special facility locations. They also take into account highway capacity. They take into account population size and distribution. They also take into account coastal residents' evacuation expectations. These variables were used to produce evacuation time estimates. Estimates are produced for different hurricane categories. You can use this information to identify populations and facilities at risk. Based on storm surge and wind contours, local exposure zones were identified in terms of their levels of danger. The information provided allows local emergency managers to take advantage of resources their own communities may not possess. They can then create and execute effective hurricane response plans.

The challenges associated with either evacuations or protection in place are not bases for inaction. You must instead identify the challenges and address them in the preimpact-planning process. The choice of evacuation or protection in place is made solely on the basis of the amount of protection offered from a threat.

SELF-CHECK

- What are the two most important practical issues you must address when selecting a protective action recommendation?
- When you are making decisions about protection in place for a toxic cloud, what are the primary points of concern?
- Why should you consider accommodating people's pets when you issue an evacuation warning?
- Name one reason why **evacuation**—if appropriate for the threat—is a desirable protective action.

SUMMARY

Determining a community's vulnerability to threats and analyzing the best protective actions is a complex process. It is also a very important one. As the emergency planner, the choices you make impact lives and entire communities. You need to understand the basis for estimating hazard exposure. You need to identify and define the principal components of vulnerability. You will also need to understand the requirements for each protective action. This knowledge will help you make the best decisions for the community and help protect citizens from hazards.

KEY TERMS

Agricultural Vulnerability — The consequences of disaster impact for any agricultural product including crops or animals or for the production and distribution chains associated with that product.

Community Vulnerability Assessment Tool (CVAT) — A series of seven modules that a planner completes to produce a local vulnerability assessment.

Emergency Shelters — Unplanned and spontaneously sought locations that provide protection from the elements.

Hazard Exposure — Exposure that arises when people live or work in areas that place them in the path of threats.

Hazards US-Multi Hazard (HAZUS-MH) — A software program that models potential losses from earthquakes, floods, and hurricane winds.

Human Vulnerability — The extent to which exposure to a given hazard agent is likely to produce short- or long-term injury or death.

Mapping — Process of tracing hazard exposures and likely impacts onto community maps.

Permanent Housing — Reestablishment of disaster victim household routines in preferred locations and structures.

Secondary Hazards — Risks that are caused by or associated with a primary hazard.

Social Vulnerability — A person's or group's ability to anticipate, prepare for, cope with, resist, and recover from disasters.

Structural Vulnerability — Vulnerability that arises when buildings are constructed using designs and materials that are incapable of resisting stresses imposed by disaster agents.

Temporary Housing Housing that achieves food and sleeping provisions and allows victims to reestablish household routines in nonpreferred locations or structures.

Temporary Shelter Shelter that provides protection from the elements and that includes food and sleeping facilities.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of analyzing and selecting protective actions.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. Shelter arrangements that include food and sleeping accommodations are called:
   (a) Emergency shelter
   (b) Temporary shelter
   (c) Temporary housing
   (d) Expedient shelter
2. The ability to prepare for, cope with, and generally resist disasters is called:
   (a) Structural vulnerability
   (b) Social vulnerability
   (c) Personal risk
   (d) Personal capacity
3. Maps that you can directly obtain without charge from different federal agencies completely solve the problem of mapping local community exposures. True or False?
4. The Community Vulnerability Assessment Tool is a software program for completing a local hazard/vulnerability analysis. True or False?
5. One advantage that promotes compliance with evacuation warnings given at night is that families are usually together. True or False?
6. Attempts to control evacuation return (even numbered license plates come back on Monday) usually fail. True or False?

Review Questions

1. What characteristics of the hazard agent are important in determining risks and making protective action choices?
2. Hazard vulnerability analyses only need enough precision to allow emergency planners to accomplish what objectives?
3. What are the three principal technical analyses that an emergency planner must use in making a decision regarding appropriate protection actions?

Applying This Chapter

1. You have just landed your dream job as an emergency planner in Miami, Florida, after working for several years in Miami, Ohio. Both places require evacuation plans. Why are the large-scale evacuations in Florida so much more logistically complex?
2. As a Hopeville, Arizona, emergency planner, you must address issues related to the Palo Verde Nuclear Generating Station located 4 miles from your office in the center of town. In developing protective actions, when is it appropriate to use in place protection and what are the critical issues considered when making that decision?
3. In Riverdale, Tennessee, there are threats associated with flooding, chemical facilities, and hazardous materials transportation on both nearby highways and rail lines. Under what conditions is evacuation an appropriate protective action, and what issues are important in making this decision?

YOU TRY IT

Estimating Toxic Exposures

You are an emergency manager in a community that lies at the intersection of a rail system and a highway over which hazardous materials are routinely transported. What process would you use, what information would you gather, and which experts would you consult when you put together an H/VA for the potential threats?

Hazard Identification

You are an emergency planner in a small community that does not use software to generate hazard/vulnerability assessment. Instead, you are using the modules of the CVAT. As part of module one, you want to identify the hazards to which your community is subject, their frequencies, and possible magnitudes. How will you go about doing this? What sources will you consult?

Planning to Shelter In Place

You are an emergency planner in a community where a large chemical-processing facility is located. It is located on the outskirts of town, about 3 miles from the closest housing. There is an in-facility risk of explosion, but the off-site risk for which you must prepare is a toxic chemical plume originating from breaches of containment. You have already completed an evacuation-planning process. How will you go about drafting a strategy for protection in place? Where will you find technical data on hazard exposure? What information will you need to formulate a plan for protection in place?

7

THE CONTENT AND FORMAT OF EMERGENCY PLANS

Framing a Picture of the Planning Process

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of the content and format of emergency plans.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

▲ The relationship between the planning process and the written plan
▲ The appropriate use of model plans or templates
▲ The right expectations regarding what a plan can and cannot accomplish
▲ The process and milestones for assembling a written plan
▲ The importance of integrating all jurisdictional plans under the emergency operations plan (EOP)

After Studying This Chapter, You'll Be Able To

▲ Distinguish plans from standard operating procedures
▲ Examine all plan sections to define planning team assignments
▲ Analyze generic emergency functions for writing functional annexes
▲ Examine on-line sources of assistance for writing plans
▲ Appraise supporting analyses for a written plan

Goals and Outcomes

▲ Evaluate the Hazard/Vulnerability Assessment to determine the need for hazard-specific annexes
▲ Write a basic plan, including mission statements, objectives, and authority
▲ Write a functional annex and a hazard-specific annex
▲ Write the plan assumptions and concept of operations based on the emergency organization
▲ Select the protocol for activating and terminating an emergency operations plan

INTRODUCTION

There is no universally accepted outline for emergency operations plans (EOPs) that lists the required contents or format. An EOP's content depends on the:

- Hazards faced by a community
- Levels of vulnerability
- Community culture and demography
- How emergency management is organized locally
- Organization of emergency management at higher levels of government

EOP content also differs because plans are written to fulfill different purposes. There are EOPs that are required by law and administered by regulatory agencies. These may or may not require that the written product submitted be in a particular format. Required plans are part of the provisions of the Clean Air Act, the Emergency Planning and Community Right to Know Act, and the Occupational Safety and Health Administration (OSHA) standard on Hazardous Waste and Emergency Response Organizations (HAZWOPER). Communities and organizations also create EOPs. They create continuity of government (COG) and continuity of operations (COO) plans. They also create business continuity plans. All of these are created to ensure preparedness for all types of disasters. Each of these plans has a different purpose. Each takes a different form.

Our goal is to describe the contents for a jurisdictional EOP. This is the type of master plan that collects other plans and describes the efforts of the community to address the full range of threats to which it is vulnerable. The production of an EOP first requires the planner to be clear about the product itself. The planner must adopt a systematic approach to product development. The planner must also ensure that critical outcomes of the planning process are included as content for the EOP.

7.1 Understanding and Producing the EOP

A **jurisdictional EOP** is a response blueprint with details on vulnerability, resources, and appropriate actions. It is not a detailed description of response. It is related to the planning process. In the planning process, you should focus on:

- Hazard vulnerability.
- Defining target threats for action.
- Inventories of internal and external resources.
- Strategy, tactics, and tasks associated with action.

The EOP documents the outcomes of the planning process. It codifies means of addressing agent-related and response-related demands for a given time, reflecting the state of technology and knowledge regarding each threat.

7.1.1 Distinguishing a Written Emergency Plan

An EOP should not be confused with standard operating procedures (SOPs). **SOPs** are very detailed guides for specific tasks operational personnel perform in the field. SOPs typically are written and maintained by agencies or departments. They are used to standardize task performance and ensure a high level of quality and consistency. For example, victims exposed to chemical agents are routinely decontaminated. There are professional standards for decontamination processes. These are reflected in SOPs. Table 7-1 shows a decontamination SOP often used by hazardous materials technicians. SOPs are created as guides for the accomplishment of specific tasks. The process of responding to any particular disaster incident may require operational personnel to execute hundreds of tasks. Each responding agency or organization may have many tasks, and each task may have an SOP to guide execution. If all of these procedures were included in an emergency plan, it would be very long and very difficult to use. We would be unable to see the forest (the response strategy) because the trees (hundreds of task details) would block our vision. SOPs are kept by operational agencies in their organizational and training manuals. Emergency Operations Centers (EOCs) also keep SOPs to guide their personnel in operating the facility. These SOPs might be referenced in the community's EOP, but none of the SOPs are printed in the EOP.

The EOP addresses strategy, tactics, responsibilities, and resources. These are the pillars of emergency operations systems. Strategy refers to how threats are addressed. Tactics are the specific tools and actions that are used to carry out the strategy. EOPs assign responsibility to organizations and other groups for executing chosen tactics and for supporting those engaged in execution. Resources consist of the facilities, equipment, vehicles, and trained personnel available. These resources can be available on shift. They can be available on call within the jurisdiction. The resources can also be through a Mutual Aid or other type of resource-sharing agreement.

The EOP can't form a viable guide for specific operations. EOPs that address operational details risk frustrating the objectives of the response organization by constraining or even confusing personnel in the field. It is impossible for the planning process to identify every condition that might be generated by a specific hazard. There are simply too many unknowns even to make the attempt worthwhile. Consequently, specific operational decisions are left to those in field. They must confront a dynamic threat environment. These trained personnel are guided by SOPs. They should be sufficiently empowered to adapt the procedures to the situation at hand.

Table 7-1: Technical Decontamination Line SOP (Personnel)
Three shelters will be constructed for grouped victims: (l) females, staffed by an all female support group; (2) males, staffed by an all male support group; and (3) special needs staffed by a male and female support group. Each shelter will be staffed with a minimum of 5 personnel, processing victims through the stations described below.
Station #1 - Personal Belongings Drop/Victim Accountability
Personnel requirements: 2 station attendants *Equipment requirements*: 1 large container, plastic bags, tags and markers, and a container with a soap solution, 5% bleach solution, clipboard, and pen. Attendant #1 will tag and deposit all critical personal belongings into the large container. Attendant #2 will transfer the critical personal belongings into plastic bags and place them in the personal belongings decontamination area. For victim accountability, attendant #1 will record names as individuals enter the technical decontamination procedure.
Station #2 - Clothing Removal
Personnel requirements: 1 station attendant *Equipment requirements*: 1 large container and plastic bags. Attendant #3 will have personnel remove all clothing and deposit it into the lined container. Once all clothing has been removed, the bags will be sealed. These bags will be stored in the personal belongings decontamination area until all victims are processed.
Station #3 - Shower
Personnel requirements: 1 station attendant *Equipment requirements*: 2 shower systems, decontamination solution, and sponge. Attendant will have personnel enter the shower and ensure they wash all parts of their body with soap and sponge and then rerinse.
Station #4 - Clothing Issue/Redress
Personnel requirements: 1 station attendant *Equipment requirements*: Appropriate number of hospital scrubs and thongs for all personnel processing through decontamination. Attendant will issue the appropriate sized hospital scrubs and thongs to each person and have them redress. The Decontamination Sector Officer will release individuals to the Medical Sector for evaluation. The Decontamination Sector Officer will determine when it is appropriate to release custody of clothing and personal effects after consulting the Medical Sector Officer.

There are specific expectations for what an EOP should accomplish. These expectations don't define the content or format of a plan. They are a way of showing what planners hope to accomplish. They reflect the needs of the jurisdiction and make explicit the demands that are placed on emergency planners and all components of the emergency response organization. The expectations are as follows:

- ▲ **EOPs establish the intent and authority for managing threats.** They communicate a commitment to address threats to public safety. Their authority is based on laws or obligations to residents. They are public declarations of the planning process and outcomes of that process.
- ▲ **EOPs address management.** The plan establishes the relationship between the jurisdictional EOC and the field-based incident management system (IMS). Rules are given for when the EOC is activated. Rules are given for who is responsible for activation. Rules are given for how it connects to the IMS. The plan also establishes guides for communicating with other EOCs in the regional and intergovernmental system.
- ▲ **EOPs identify vulnerabilities and decisions regarding which vulnerabilities will be actively managed.** Communities are exposed to many hazards. Hazards can lead to human losses. Hazards can also damage buildings and infrastructure. Plans identify which hazards require active protective measures. This is a technical process. It is strongly influenced by politics and budget.
- ▲ **EOPs identify resources within and outside the community that can be used in the protective response.** Resources include knowledge, personnel, equipment, vehicles, and special teams. Additional resources are outside the community but are provided through agreements. These include mutual aid agreements and memoranda of understanding. These can be among governments, organizations, or private groups.
- ▲ **EOPs lay out the strategy and tactics (not tasks) for emergency response.** The planning process brings together local specialists and subject matter experts. Together, they select effective and efficient approaches to the demands of specific hazard agents. These general approaches are recounted in the plan. Specifics of accomplishing them are left to the jurisdictional specialists. These include fire departments, police departments, public works, transit, public health, and others.
- ▲ **EOPs assign responsibility for executing strategy and tactics.** Many different departments have response capabilities. Some departments address agent-generated demands. Others address response-generated demands. You can make assignments to each department. This helps organize the response. Then participants know which departments have lead functions.
- ▲ **EOPs capture the way response capabilities are marshaled.** The plan addresses the means to mobilize and deploy the resources in

response. This includes the protocol for activating resources outside the community.

- **EOPs address communications.** This includes all communications with the public, the media, elected officials, decision makers, and between response organizations. A constant problem with field communications is interoperability. Response agencies need to communicate with one another. Yet they often face problems with incompatible equipment or communication frequencies. EOPs typically assign special equipment and communications vehicles to address interoperability.
- **EOPs should integrate.** The jurisdictional EOP ensures that all EOPs are coordinated. These include continuity plans for government. It includes continuity plans for departments like public works or information technology.
- **EOPs reflect the effectiveness of the ongoing emergency planning process.** EOPs set time schedules for revisions. They record revision dates and materials. Revision keeps the plan in date and ensures that knowledge generated in the planning process is transferred to the written plan.
- **EOPs set goals for exercises and encourage training.** EOPs acknowledge the need to ensure that the plan is translated into action. This is accomplished by training of personnel in both response agencies and the EOC. The plan establishes goals. This ensures that local authorities and response organizations can work together effectively to accomplish plan outcomes.

The EOP serves as documentation of the aspirations reflected in these desired accomplishments. The desired accomplishments don't precisely define the contents of a plan. They do serve as a framework for the issues to be addressed in a plan.

7.1.2 Model EOPs

The planning process makes many demands on you and the local emergency management agency (LEMA). Similarly, the process of writing down the plan requires a systematic approach and resources for successful completion. These conditions can tempt planners and jurisdictions to adopt a prewritten EOP. The adoption usually involves some retooling to fit local characteristics and needs. It might appear to well-meaning planners and authorities that this adoption process saves much money and effort and still yields a plan. And that is certainly true, but the savings come with tremendous costs. To adopt and revise a model plan means that:

- The unique hazard environment of *your* jurisdiction is represented only to the extent that it exactly matches the one assumed in the model plan. Model EOPs can be administratively devised. The likelihood is very low that a borrowed plan would match *your community* well.

- The vulnerability assessments on which a model plan is based will not match *your* community. These assessments will not represent the same distribution of population or their exposures. They will also not represent the agricultural risk environment. They will not represent the hazard-relevant characteristics of the built environment. All of these features are critical in deciding what parts of the community will require what types of protection.
- The model plan must address resources in a general way. Or it may make assumptions about what capabilities, equipment, personnel, vehicles, or special teams are available. You may be tempted to eliminate resources from consideration that aren't locally available. Or you may place stress on just those that are available. Either practice can introduce constraints on the design of strategy and tactics for response. Effective resource acquisition and mobilization demand that *you* creatively think about what's needed and what's possible. Limiting the creative process also limits creative response.
- The interaction among planners, department personnel, operational personnel, and representatives of other organizations that contribute to the response is either lost or greatly diminished. This interaction generates jurisdictional acceptance and support for the plan. It is also the source of effective strategy and tactics for response.
- The planning *process* is subverted. All of the parts of the planning process that establish the uniqueness of the community are lost. Model plans can't appreciate how local response is organized. There is no opportunity to work with local subject matter experts.

Although a model plan is a quick route to getting something on paper, the product is questionably useful. A written plan is *not* the goal of planning. Planning is aimed at creating and fostering community preparedness.

This is not to say that you can't obtain help in preparing a plan. Use other jurisdiction's plans to get ideas about writing and structure. It is most useful when the plan comes from the same region or from an adjacent jurisdiction. There are also many forms of software that can assist you in assembling a local plan based on local supporting analyses. The California Preservation Clearinghouse (www.cpc.stanford.edu/disasters/generic) offers a generic disaster plan workbook to assist in writing a plan. The advantage of such workbooks is that they usually require you to engage in a dialogue about their specific needs and characteristics and issues for response. Sometimes the issues raised in the dialogue were not included in the planning process. You are then alerted to their importance. Then the planning process can be revisited.

There is also specific software that supports the process of writing the plan. Fire Programs Software (www.fireprograms.com) produces and licenses a range of computer programs. These support plan writing and different aspects of the planning process. Software can also be obtained from Firehouse (www.firehousesoftware.com). This company specializes in training as well as software sales. Firehouse offers a range of software that can be used for planning, training, and management, including a package for EOCs. Finally, it is possible to contract with specialty firms to produce a written plan. The Disaster Survival Planning Network (www.disastersurvival.com) contracts to teach workshops. They conduct planning processes, write plans, and perform a variety of other planning-related services. Disaster centers in universities have faculty who specialize in plan preparation.

It is helpful for you to look at the EOPs of other jurisdictions, use software, and hire contractors. These approaches vary widely in ease of use and cost and degree of customization to local planner needs. Each tactic constitutes a source of information, ideas, structure, and guidance. It remains critical you not adopt any of these support mechanisms as an *alternative to a planning process*. The preparedness cost of not engaging a planning process will substantially outweigh any temporary savings that might be realized.

7.1.3 The Relationship Between the Plan and the Planning Process

Effective construction of a plan requires understanding of the relationship between the planning process and the construction of an EOP. The planning process is the source of the analyses and strategic decisions in the plan. The plan may condense the results of these analyses and decisions for presentation. Or it may simply reference the documents in which the results are reported. But the planning process generates the consultations and conclusions regarding response that compose the content of the plan. The planning process is scrutinized to identify the milestones that will be written down as a plan.

To write a plan, you must know the resources, goals, and the interactions of different units within the community. The first goal is the protection of the public health and safety. The second goal is the protection of property. Together these factors determine how normal social and economic activity in the community will be maintained or restored. The resources include trained personnel and relevant facilities, equipment, and materials. The units considered by the planning process are the elements that take action such as households and businesses. Functions are defined as the strategy, tactics, and tasks that are undertaken by the units. Response organizations translate the functions into SOPs and component processes. Component processes encompass the job descriptions and assignments. Also included are the organizing, training, equipping, and exercising needed for proficiency. The early phases of planning allow you to define broad constraints that human and resource limitations pose. The continued planning process refines requirements for the response.

The planning process allows you to examine the vulnerabilities, resources, and appropriate actions. These assessments are made in the calm atmosphere of planning meetings. Although the planning process appreciates the challenge of the disaster response environment, it doesn't take place in that environment. The environment confronts responders with confusing and apparently conflicting cues. It is difficult to accurately assess the current status of the hazard agent and its impacts. It is equally difficult to chart the future behavior of the hazard agent. Response-generated demands must be simultaneously addressed with agent-generated demands. For example, the 1979 reactor accident at Three Mile Island was a case of responder failures in the uncertain impact environment. Plant personnel inaccurately assessed the status of the emergency. This failure severely impeded their ability to communicate appropriate protective action recommendations for the public to off-site emergency managers. A similar failure to conduct timely and accurate assessments took place before the eruption of Mt. St. Helens volcano. The eruption impacted the "wrong" side of the mountain compared with pre-eruption estimates. Each case saw an emergency escalate rapidly from the time of first detection into a major community disaster. The potential complexity of the event can be expected to act together with time pressures and the severity of the consequences. This creates a situation that is unforgiving of individual or organizational error. It is highly stressful for response personnel.

The EOP connects planning knowledge to the response environment. This relieves pressure on emergency operations personnel. The immediate goal is to guide response personnel through the uncertainty and stress of an emergency. This is done by providing the preplanned resources needed for a prompt and effective response. The EOP guides assessment of impact nature and magnitude. Guides are also given for corrective actions to alter the magnitude or likelihood of negative community impacts. There are guides for protective actions to maintain responder safety and that of community residents. The response environment is not conducive to "researching a problem." Response is not the time to locate a resource not previously identified. Response is not the time to determine or debate which agency is "really in charge" or has exactly what functional responsibilities. These issues are solved in the planning process. They are conveyed to the EOP. Time is available in the response environment for creative implementation and improvisation. However, decisions must be made quickly. The EOP provides the framework that establishes parameters on strategy and tactics to guide activities. It allows response personnel to concentrate on agent-generated and response-generated demands.

Threat assessments, damage assessments, corrective actions, and protective actions form the basis for the strategy and tactics described in the EOP. These activities are coordinated and monitored by incident commanders and EOCs. This is done to ensure their performance in a timely and effective manner. EOPs also address deployment and mobilization to provide adequate personnel and support resources to disaster scene operations. The effectiveness of all of these functions is contingent not on the plan but on the planning process. It is the planning process that organizes the response. It ensures that personnel are trained and exercised. It establishes deployment protocol. It ensures that the full range of needed equipment is available for operations.

Specific types of equipment marshaled in the planning process include measures for direct attack on the agent. An example is using sandbags for floods and hurricane surge. The plan also isolates needs for personnel protection. For example, protective clothing will be needed for exposure to toxic materials. The plan also identifies equipment needed for environmental monitoring such as wind gauges. Equipment needed for data processing and communications is listed as well. All special facilities (e.g., public shelters) are addressed in the written plan.

The planning process is one of consultation, research, analysis, and choice regarding threats, vulnerabilities, resources, and specific strategy and tactics. The plan is a written document. It draws on the outcomes of the planning process. It forms a blueprint for confronting hazard agents during the crisis period. The written plan codifies agreements made in the planning process. The planning process is driven by a team. The process of writing down the jurisdiction EOP is also accomplished by a team. Typically, EOPs pass through a process of drafting and review before they are finalized for distribution. A small team of planners drafts the plan, and it is circulated among participants to ensure accuracy. A critical part of the review process comes when the plan is passed to operation personnel who support the response functions. This last review ensures that the planning process is reflected in the plan, but also that the plan can be an operational reality.

FOR EXAMPLE

Boston's Planning Process

Following the 9/11 attacks, Boston was the host of the 2004 Democratic National Convention. To prepare, Boston enhanced EOPs to evacuate and relocate residents. Much of the evacuation plan relies on citizens leaving willingly. It also relies on citizens using their own transportation. The later experience in New Orleans with Hurricane Katrina in 2005 challenged these assumptions. Boston authorities had to rethink their plan. In November 2005, Boston reinitiated a planning process to revise their evacuation plan. The planning process is focusing on issues associated with people who refuse to comply with evacuation warnings. It also looks at how to provide transportation to transients and to transit-dependent people. It also considers the logistics of creating shelters in the western part of the state. These measures emphasize that both the planning process and the plan should be dynamic. They should change as knowledge changes about threats and human response.

SELF-CHECK

- What are the five factors on which the form and content of a community EOP depend?
- Standard operating procedures are not printed in EOPs. What are they and why are they important?
- What are the four critical issues addressed in a written plan?
- How do you connect planning knowledge to the emergency operations environment?

7.2 The Content of an EOP

There many views about what elements make up an EOP. These views come from government agencies, private sector organizations, professional associations, and researchers. FEMA issued its *Guide for All-Hazard Emergency Operations Planning* (SLG-101) in 1996. FEMA has also issued guidance for continuity of operations EOPs for state and local governments (2004). In 2005, The U.S. Department of Homeland Security (DHS) produced the *Universal Task List: Version 2.1* (2005a). DHS also published the *Target Capabilities List: Version 1.1* (2005b). These documents aim to define the tasks associated with response. These tasks should be part of the planning process and reflected in EOPs. The 145-page *Universal Task List,* combined with the 169-page *Target Capabilities List,* are unwieldy documents. Together, they describe literally hundreds of potential functions and tasks. FEMA (www.fema.gov/EMI) offers internet-based classes on planning. These contain guidance for plan content and structure. Neither FEMA nor DHS has set these guides or instructional rules as required content for state or local EOPs. DHS has not explained how the task and capabilities lists are to be related to EOPs or the planning process.

Other guidance on EOPs has been issued by several different agencies and associations. Most of these guides represent suggested content, although some, such as the Nuclear Regulatory Commission's *Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities,* establish minimum content (1992). The National Fire Protection Association has issued Standard 1600 establishing minimum requirements for planning, business continuity planning, and plan content. The *9-11 Commission Report* (2004) contains suggestions for planning and plans. FEMA (2002) documents do this as well. Perry and Lindell (2003a) and McEntire and Myers (2004) have sought to bring the results of disaster studies to bear on the planning process and the content of EOPs. Recommendations for planning and plan content are routinely issued by state governments and private sector associations.

There is no shortage of guidance about plan content and structure. There is so much guidance that you can become lost in the sometimes contradictory claims and confusing lists. We will present a framework meant to serve as a manageable menu for you. We will also identify features of plan content that have proved important over many years of experience. It is not our intent to create fodder for a model plan. A local planning process is vitally important. We will seek to capture the best practices from published advice and to capture any common points across the many formats for EOPs. It is important that most jurisdictions have EOPs on record. The format for future EOPs will, with some innovation, follow the format of past EOPs. All planning guidance should recognize the ways normal jurisdiction functioning is altered to meet the demands of the emergency. The EOP is a blueprint for this temporary reorganization. It lasts only for the duration of the emergency. It is contingent on conditions. It is implemented only when an emergency surfaces.

Our EOP framework is based on two distinct but interrelated issues plans must address. One issue is the development and maintenance of the emergency preparedness organization, which supports the planning process and generates the plan. The other issue is the activation and operation of the *emergency response organization,* which trains, equips, and exercises under the plan. This gives us three essential components of a disaster plan. Developing and maintaining the preparedness organization is part of the basic plan. The **basic plan** captures the authority for planning, the goal of planning, and the concept of operations for response. The basic plan also describes the emergency response organization and defines conditions for activating, conducting, and terminating operations. **Functional annexes** focus on generic functions or tasks that must be accomplished across many types of disaster. Functional annexes deal with the mechanics of disaster response. These include command and control, population warning, communications, and other objectives for managing the response.

We embrace all hazard planning and EOPs. However, keep in mind that there are agent-generated demands that are unique to particular hazards. Or in some hazards, the same function may be performed differently to achieve maximum public safety. **Hazard-specific annexes** are sections of the plan that describe procedures, protocols, and special demands associated with a specific type of disaster agent. The goal of these is to capture different conditions that occur in different hazards and to tie these to generic functions. A terrorism annex establishes that the impact area is treated as a crime scene. This is done after the specific threat is gone and casualties are treated. Similarly, a nuclear power plant annex may modify decision making and processes associated with the use of evacuation as a protective measure. Hazard-specific annexes are highly specific to both the threat and the local jurisdiction.

The format discussed here also reflects the reality that some information should not be included in an EOP. EOPs should not contain very specific details and exhaustive discussions of functions and hazards. These make the plan very long and confusing. This is the opposite of a plan's goal. Long, unwieldy EOPs tend to become shelf documents. These are useless as guides in emergency times. Consequently, extensive background material about hazard agents and vulnerability calculations are referenced in EOPs but located in separate reports. Detailed instructions for performing specific functions can be referenced in the plan but should be located in SOPs and training manuals maintained by the agencies that implement them. The EOP should function as a guide to strategy, tactics, and resources. The Basic Plan contains provisions identifying the legal and technical bases for the jurisdictional EOP. It also includes administrative aspects of the plan. These provisions are captured under 11 separate headings.

7.2.1 Mission, Goals, and Objectives

EOPs typically contain a brief section that identifies the mission, goals, and objectives of the plan. These are short statements. They are designed to convey the intent and scope of the process that generated the plan and the outcomes desired from plan implementation. They are specific to the type of plan. Table 7-2 shows the goals and objectives presented in the Continuity of Operations Plan for the town of Gilbert, Arizona. The statement establishes that the mission of the plan is to increase the ability of authorities to deliver city services to citizens during and following disasters. There is also a description of the classes of events the plan is expected to address. The objectives are intended to communicate particular outcomes that are in the plan.

7.2.2 Plan Authority and Responsibility

The authority for the plan is derived from a variety of sources. These include laws, general police powers, and special statutes. The statement of authority can be an abbreviated listing. It can also be a simple citation of the legal bases of the plan and the planning process. EOPs usually cite authority hierarchically. This is done by beginning with federal authority and descending through state statutes. You would then list county authorities and municipal or town codes. The typical federal authorities cited as justification in state and local government EOPs include:

- ▲ Public Law 99-499, Superfund Amendments, and Reauthorization Act of 1986, Title III, Emergency Planning and Community Right-to-Know.
- ▲ Public Law 93-288, Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (as amended by Public Law 100-707).
- ▲ Presidential Decision Directive 39, United States Policy on Counterterrorism, 21 June 1995.
- ▲ Public Law 104-201, Defense Against Weapons of Mass Destruction Act of 1996, 23 September 1996.

Table 7-2: Goals and Objectives from Gilbert, Arizona, Continuity of Operations Plan

Goal and Objectives

The goal of the Gilbert, Arizona, Continuity of Operations Plan (COOP) is to enhance the ability of town authorities to continue to deliver essential services through city departments under conditions of extraordinary threat and destruction attendant to natural disasters, technological disasters, workplace violence, or terrorist attacks. The Gilbert COOP may also be activated in the event a public health emergency (epidemic disease or contamination) renders a sufficient number of employees too ill to continue normal work schedules and functions. The Continuity of Operations Plan seeks to ensure continuity of government services during an emergency by achieving predesigned coordination among public safety elements (Fire Department and Police Department) charged with emergency response, Public Works and other Departments providing essential services to citizens and the elected and administrative authorities of the Town.

The specific objectives of the plan include:

- ▲ Ensure the safety of Town employees and visitors.
- ▲ Identification of Essential Services and Departmental strategies for delivery of such services.
- ▲ Identification of alternative sites for continuing essential services if existing sites are physically damaged or otherwise rendered unsuitable for occupation.
- ▲ Identification of a structure to link the COOP with the Town Emergency Operations Plan, the Information Technology Continuity of Business Plan, and the Water and Wastewater Systems Emergency Operations Plan.
- ▲ Encourage development of Departmental plans for protecting critical equipment, records and other assets.
- ▲ Provide a foundation for the sustained exercise of leadership by elected and administrative authorities during and following large-scale disasters.
- ▲ Support an effective, efficient, and orderly response to large-scale disasters.
- ▲ Support an effective, efficient, and orderly transition from response measures to recovery measures following large-scale disasters.

- Public Law 81-920 (44 Code of Federal Regulations, part 205), Disaster Assistance.
- 40 Code of Federal Regulations (CFR), Part 300 and Part 355, Final Rule, Extremely Hazardous Substances List and Threshold Planning Notification Requirements.
- President of the United States, National Security Decision Directive Number 259.
- President of the United States, Presidential Decision Directive 39.
- President of the United States, Presidential Directive Number 3, Homeland Security Advisory System.
- President of the United States, Homeland Security Presidential Directive Number 5, Management of Domestic Incidents.
- President of the United States, Homeland Security Presidential Directive Number 8, National Preparedness.
- Homeland Security Act of 2002.

At the state and local government levels, bases for plan authority vary widely. The authority for a plan is different from legal liabilities that might arise from the planning or response. Legal liabilities are not usually addressed in the plan authority. However, it is common to see a statement of the emergency powers of the chief executive. The plan usually gives the conditions for a chief executive to declare an emergency. It also details a process that a chief executive should follow in declaring an emergency. It also explains how to deal with public and private property and citizens under emergency powers. The plan usually describes the steps followed to request a “Presidential Disaster Declaration.” Local, state, and Presidential disaster declarations are important. They activate special provisions in government and law to provide special functions, resources, and benefits.

7.2.3 Plan Activation and Termination

EOPs must be officially activated by the jurisdictions that maintain them. Activation indicates that the provisions of the plan are in effect. This directs response organizations to mobilize. EOPs may be activated in whole or in part. This depends on the nature and extent of the environmental threat. The activation of an EOP does not depend on or require an official declaration of emergency. It also does not depend on the chief executive’s invocation of emergency powers. Activation is a judgment of the person or persons with the authority to activate. The decision is usually made on the basis of environmental monitoring and interpretations of threats by local authorities.

EOPs name the roles and sometimes the people responsible for activation. In a municipality, the power to activate a plan usually rests with several positions simultaneously. These include a Fire Chief, Police Chief, Public Works Director, Emergency Management Coordinator, City Manager, or Mayor (see Figure 7-1). Such designations are often part of municipal codes. To ensure constant coverage

Figure 7-1

Phoenix, Arizona, Fire Chief Alan Brunacini (L) confers with Urban Search & Rescue commanders in New Orleans for the Hurricane Katrina deployment. Fire and Police Chiefs are among officials with authority to activate emergency plans.

of the activation function, each of these positions also includes an authorized representative. The activation of a plan almost always automatically activates the jurisdictional EOC. Activation also initiates the notification process for all persons and organizations with responsibility under the plan. Intergovernmental protocol dictates that when a municipal plan is activated, surrounding municipalities as well as the next highest level of government are notified.

EOPs and the responses they initiate must also be officially ended. Normally, the same positions that can activate a plan share the responsibility to terminate the activation. Timing for deactivation of EOPs varies by the type of disaster. It also varies by the rules of the jurisdiction. In some jurisdictions, the activation of an EOP, the activation of the EOC, and response operations in the field are handled separately. An incident commander may terminate scene response when the agent has been abated and victims have been treated and removed. Operations at the scene may or may not terminate at the same time. For hazardous materials spills, response operations at the scene can be terminated while environmental monitoring and damage assessment continue. To manage these functions, the EOC may remain activated until all functions at the scene are complete. At the same time, the disaster plan may terminate with the close of response operations. Or it could terminate with the deactivation of the EOC. Or it may only terminate after a recovery operations plan is implemented.

7.2.4 Increased Readiness Conditions

The plan should record when there should be an increase in readiness conditions. Usually, these are undertaken when a specific disaster is imminent. You might have partial or complete activation of the jurisdictional EOC. One universal readiness condition is imposed by Presidential Decision Directive 3. This requires the U.S. DHS to operate the **Homeland Security Advisory System.** The advisory system is based on DHS determination of the level of terrorist threat and uses six categories:

- Condition green (low); low risk of terrorist attacks.
- Condition blue (guarded); general risk of terrorist attacks.
- Condition yellow (elevated); significant risk of terrorist attacks.
- Condition orange (high); high risk of terrorist attacks.
- Condition red National (severe); severe risk of terrorist attacks.
- Condition red Local (severe); severe risk of local terrorist attacks.

The assignment of threat condition is based on analysis by the DHS. They use a variety of sources of information regarding activity and communications of known or suspected terrorists. There has been much criticism of this alert system by disaster researchers. They argue that the basis for vulnerability assessment is weak. They also point out that there are no clear action implications associated with different conditions. The system remains in place. The levels of alert are set by the U.S. Attorney General.

Citizens can treat the different conditions as advisory in any way they choose. State and local governments are required, beginning at threat level orange, to take actions. These range from surveillance to facility lockdown. These actions especially impact law enforcement and fire services. The local impact is largely in personnel overtime costs and inconvenience. The EOP must acknowledge the alert system. This is because it may require the activation of local terrorism plans. The EOP usually states the federal requirements associated with different condition levels. It assigns departmental responsibility for meeting the requirements. Local jurisdictions must assume the level of alert when it is announced. However, there is flexibility in when local authorities return to lower levels of alert. That is, when the federal government terminates level orange to return to yellow, a local jurisdiction may elect to remain at orange. Decision rules for such deviations are specified as part of the local EOP.

7.2.5 Plan Assumptions

The plan makes many assumptions. One assumption is the vulnerable of a community. Vulnerability information includes disaster incidence, average severity of impact, and the probability of occurrence. Some EOPs list hazardous materials that are located at fixed sites within the community. It may

Table 7-3: Municipal Situation and Assumptions Statement

A. Situation

An emergency or disaster requiring rapid mobilization and maximum coordination of all agencies could occur within the Town. Conditions that could cause such an event include severe storms, river flooding, conflagrations (brush fires), aircraft or train accidents, terrorism, national security emergencies, extreme air pollution, hazardous materials releases (including pipeline), epidemics, riots, extreme heat, or any combination thereof.

B. Assumptions

1. The Town has primary responsibility for emergency actions within its jurisdictional limits and will commit all available resources to save lives, minimize injuries, and minimize property destruction (including agricultural plants and animals).
2. Outside assistance is available in large-scale incidents. The *National Response Plan* defines the availability and timing of federal support. The Town has established mutual aid agreements and automatic aid agreements for law enforcement, fire services, ambulance, and private sector assistance.
3. The Town emergency plan assumes that there is a capacity to operate solely on internal resources for a period of 72 hours.
4. Disasters may occur at any time with little warning or no warning. The Town participates in public health surveillance systems, weather surveillance systems, geophysical monitoring systems, and terrorism-monitoring systems in an effort to obtain sufficient forewarning to mount preimpact operations when technology permits.

also identify routes where hazardous materials travel by road, rail, water, or air. Most EOPs include area maps that show threat-specific vulnerabilities. Table 7-3 shows an example situation and assumptions statement for a municipal plan.

Extracommunity assistance assumptions are usually time based. They are estimates of the time required under emergency conditions for federal help or aid from state and regions to arrive at the scene. Under the U.S. *National Response Plan*, jurisdictions are instructed that they must be completely self-sufficient for the first 72 hours of an emergency. Federal help is structured to arrive as quickly as possible but is likely no sooner than 72 hours. The slow arrival may be less troublesome in slow developing disasters. These permit the prepositioning of resources close to a projected impact area for rapid dispersal following impact. The time required to obtain regional and state aid is usually shorter than the federal lapse. However, it depends on conditions following the disaster and the scope of the disaster. Disasters that impact several adjacent communities at once require that local resources be used locally. Sharing may be limited if possible at all. Some types of disasters create large debris fields. This disrupts transportation routes, slowing incoming aid.

7.2.6 Concept of Operations

The **concept of operations** establishes the strategic rules under which the response is to proceed. The technical literature refers to this as “conops.” The EOC is the locus of control for communitywide disasters. This section of the plan includes listing of those with authority to activate and deactivate the EOC. Usually, these are the same positions: Police Chief, Fire Chief, Emergency Management Coordinator, Public Works Director, City Manager, and Mayor. They have the authority to activate an EOP. You need to designate both plan activators and EOC activators. This is because the EOC can be opened under a wider range of conditions than those that require plan activation. The concept of operations further specifies the staffing level for the EOC under contingent conditions. It sets notification processes to call personnel to the EOC.

EOPs describe the EOC organization and staffing for different threats. Minimally, the plan specifies the responsibilities of the EOC commander and major sections of the EOC. These include administration, logistics, planning, operations, and public information. General functional responsibilities are described under concept of operations. They are repeated in greater detail in functional annexes. A fire department may be responsible for more than fire suppression. For example, they may be responsible for emergency medical treatment and patient transport from a scene. A police department may be charged with more than security as well. Table 7-4 shows a sample concept of operations statement. It is for a large urban area’s mobile response forces.

7.2.7 Integration with Other EOPs

You may have many EOPs. Information technology departments develop specialized plans for protecting computer systems, and city clerk’s ensure protection of public records against a variety of threats. Most governments and organizations operate on computer-based systems for most records. Such systems can be threatened by communitywide disasters. They can also be threatened by site-specific disasters such as broken pipes and electricity interruption. These departments develop highly specialized plans to protect their systems. The same is true for public works or water departments. Specific contingency plans are routinely generated for threats to utilities. Continuity of operations plans are another type of specialized plan that could be activated outside a community-wide disaster.

Table 7-4: Concept of Operations for Mobile Response in an Urban Area

The vulnerability to terrorism and other disasters in the county is concentrated in the metropolitan area but extends to surrounding cities. To be effective, emergency response should be completely mobile. Three cities have developed Metropolitan Medical Response Systems under federal sponsorship. Each city has a mobile capability for delivery of a variety of hazmat, law enforcement, mass casualty, and environmental surety operations within their borders and to surrounding communities. To bring these MMRS capabilities into line with the threat from terrorist attacks, it is necessary to develop mobile resources to accomplish structural rescue and enhanced hazardous materials capability, as well as unified bomb and SWAT, and forensic investigations.

The Urban Area strategy envelops existing MMRS capabilities within a framework of hazardous materials/heavy rescue command. The concept of operations involves the creation of multiple, mobile teams (rapid-response teams) that can be dispatched rapidly after assessment by a mobile command/assessment team (incident support team). The teams are geographically dispersed through the urban area, reducing travel time, and achieving dispersal of equipment, personnel, and response vehicles. A total of eight teams are dispersed through the urban area. The teams can be called on by any jurisdiction in the county faced with an incident that is likely to or has overwhelmed local response capability. The teams can quickly deliver expertise, response vehicles, and equipment to any jurisdiction, while simultaneously maintaining a reserve to ensure the security of the larger county area.

This concept of operations is compliant with the federal guidelines for emergency operations but on a more local scale. This structure ultimately enables the easy integration of state or federal assets if needed in consequence management. It also combines the strengths of the incident management system (IMS) as an organized means of incident command and emergency operations centers (EOC) as strategic and resource centers.

The jurisdictional EOP also addresses participation in any regional EOPs. DHS implemented the Urban Area Security Initiative (UASI) in 2003. Approximately 100 urban areas were identified and given special funding to develop regional strategic plans for response. This was especially for terrorist incidents. These plans, along with transit and port plans that are developed with them, involve mutual aid agreements and other regional response cooperation. The National Metropolitan Medical Response System (MMRS) Program began in 1997 under the U.S. Department of Health and Human Services. It is now administered by FEMA. It is a regional mass casualty management system that covers more than 120 jurisdictions nationwide. FEMA also administers the National Urban Search and Rescue Program with teams in 28 jurisdictions. The Centers for Disease Control and Prevention operates the National CHEMPAK program. This places stores of pharmaceutical antidotes for chemical, biological, and radiological exposures in selected cities. The U.S. Department of Health and Human Services operates BIOWATCH. This is a surveillance program for early warning of biological attacks. Other special planning initiatives should also be addressed. This includes the use of the Strategic National Stockpile—for medical equipment and pharmaceuticals. This can be through a local MMRS or UASI or Public Health Department plan. Each of these response initiatives require the generation of specific local utilization and action plans. Each program is consequently intertwined with local planning and preparedness. Both provide resources and make demands on jurisdictions for resources.

All of the departmental and community plans should be referenced in the jurisdictional EOP. The conditions under which each plan is activated should be specified. There should also be guidelines regarding the activation of different plans at the same time as when the EOP is activated. Activation of the plan may not require use of subplans. For example, a plan to address a river flood that doesn't threaten city facilities, services, or personnel doesn't require activation of the continuity of operations plan.

7.2.8 Documentation of Agreements

Documentation of agreements ensures that potential questions have been resolved for all parties. Problems usually addressed focus on the exchange of aid or support during the period of operations. This includes aid from neighboring local governments, private sector parties, and state agencies. The general plan should recount all reciprocal agreements. These include memoranda of understanding (MOU), mutual aid agreements, and automatic aid agreements. EOPs do not normally include such agreements verbatim or as appendices. The plan instead lists five milestones for each agreement.

- The conditions under which the agreement is activated. This should include the title and instructions for contacting the persons who have the authority to activate the assisting organization.
- The specific nature of the assistance to be rendered is documented. This includes whether the agreement promises personnel, special teams, equipment, vehicles, or other resources.
- Resources for loan are identified by their location. Also included is any special procedure or credential needed at the location for release.

- There should be instructions of how personnel from an assisting organization will be deployed. It should also specify to whom they will report.
- Any payments necessary for the use of responding personnel and equipment should be specified. Also specified should be the bearer of liability for injury or damage incurred during the response.

7.2.9 Training, Exercises, and Critiques

The basic plan should provide a brief description of the jurisdictional training programs. It must also include who is responsible for the different types of training. Training of EOC personnel is usually conducted by the local emergency management coordinator or the LEMA staff. Training for functions and specific SOPs is performed by the department responsible for the function. The basic plan should also address the methods for assessing training needs and the primary sources of training content. The frequency for refresher training should also be included.

The basic plan identifies procedures for verifying the competence of individuals and teams. This is done through tabletop, functional, and full-scale exercises. Full-scale exercises are externally evaluated tests of the overall response system. The basic plan sets standards for exercise type and frequency, scenario development, evaluator selection, and feedback about exercise performance. The responsibility for conducting after-exercise briefings and written reports is assigned in the basic plan. The basic plan also establishes requirements for critiques following incidents in which the response organization is activated. Responsibility should be assigned and procedures specified for ensuring that lessons learned are included in updates to the EOP.

7.2.10 Administrative Responsibility for the Plan

An effective jurisdictional EOP is a living document. It must be managed. This requires you to attend to five procedural issues:

- Specify the procedures for revising and updating the plan. It is a good practice to review plans twice each year for changes.
- A formal record should be kept of plan distribution. Plan copies are numbered with holder names and contact information recorded. This practice facilitates making updates to plans and ensures that every copy in circulation is the latest version.
- Records are kept of all previous plan amendments with the date they were undertaken. Normally, the first page following the cover page of a plan is the listing of changes.
- Plans should include current charts for authority, delegations, and organization structure. The chain of command that prevails during emergencies must be easily accessible.

- Specify the process for soliciting evaluations of the plan or its components. This process should include the protocol for making plan revisions based on such comments.

7.2.11 Postimpact Recovery Initiation

After a disaster, many tasks must be accomplished at the same time. This is why preimpact planning for recovery is as critical as planning for response. Response and recovery frequently overlap. This is because some sectors of the community are in response mode while others are moving into disaster recovery. Some organizations might be carrying on both types of activity at the same time. Coordinated planning for response and recovery can avoid delays. Coordinated preimpact planning can also decrease conflicts arising because of competition over scarce resources. However, such coordinated planning involves significant challenges. This is because the agencies that are most often involved with the development of the EOP are different from those involved in the recovery plan.

The EOP is not a recovery operations plan. Because recovery gears up as response gears down, there is a need to provide initial links to the recovery process. For example, terrorist incident sites are crime scenes. The first link to recovery takes place when the operational incident commander passes command to law enforcement. Many natural hazards create public health risks. They also create environmental risks. The severest of these risks come with hazardous materials releases, radiological releases, and biological contaminations. The EOP can identify functions and protocols that bridge the operations and recovery phases. For chemical, biological, and radiological releases, EOPs can specify deployment of personnel and equipment during the response period, which

FOR EXAMPLE

Supporting Municipal Emergency Planning

The Maricopa County (Arizona) Department of Emergency Management (DES) contracts with all cities and towns in the county to support planning processes. The DES assigns a professional planner to facilitate and coordinate the planning process in each city and town. As the planning process reaches a 1-year anniversary (if it is a new process), the DES planner drafts the written plan. In cities and towns that already have a written plan, the DES facilitates a plan review, and a planner drafts a draft revised plan. Then the draft is finalized after review and scrutiny by the local jurisdiction. This process not only ensures good emergency planning but it promotes conversation among jurisdictions about concepts of operations and establishes a common framework for plan content.

achieve environmental investigation and sampling, tracking, and documentation functions that can be continued into the recovery phase. The EOP can support early phases of recovery. This can be done by creating inventories of resources available for supporting or initiating remediation of a contaminated environment. This includes contact information for local contractors as well as state and county agencies.

SELF-CHECK

- The planning process must support two different types of organization and how this is accomplished defines much of plan content. What are the two types of organization?
- Disaster research professionals have severely criticized the Homeland Security Advisory System. Why should anyone pay attention to it?
- What are some of the advantages to linking an emergency operations plan with a recovery plan?
- Why do emergency operations plans require explicit termination? Can't people figure out when it's over?

7.3 Plan Annexes and Supporting Analyses

The basic plan relates valuable information. The contents of a basic plan are very similar across most jurisdictions. The plan annexes, functional and hazard-specific, are the features that "customize" a plan for a particular jurisdiction. The functional annexes survey the important generic disaster functions and explain how they are accomplished in the focal jurisdiction. The hazard-specific annexes have their genesis in the community's unique threat and vulnerability profile. Supporting analyses are drawn from both analyses done in the planning process and specific analyses required for particular hazards.

7.3.1 Functional Annexes

Functional annexes should address the critical functions that must be performed in responding to disaster demands. FEMA's official plan guidance lists eight:

- Direction and control
- Communications
- Warning

- Emergency public information
- Evacuation
- Mass care
- Health and medical
- Resource management

These should each be addressed in local jurisdiction EOPs (FEMA, 1996). This list is a shorter version of 16 annexes recommended in previous guidance (FEMA, 1990). The DHS issuance in 2005 of the *Universal Task List* and the *Target Capabilities List* has further confused the question. These lists cite dozens of tasks and capabilities that LEMAs should possess. However, the ties to the planning process and to EOPs are not made clear. Furthermore, there is no clear set of rules that instruct when these tasks should be operational. Federal guidance is thorough and appropriate in identifying important tasks. However, it is of marginal utility in defining functions that might be addressed in an EOP.

In planning, the number and nature of the annexes must reflect a compromise among three considerations:

1. It is desirable to minimize the number of annexes. This is to simplify the structure of the written plan. The fewer the number of annexes, the clearer is the overall structure of the plan.
2. It is important to clearly identify the right number of functions in local terms. This enables identification of the interrelationships among all tactics and tasks. It thereby increases the chance that successful organizational mechanisms are developed to coordinate the allocation of resources and the performance of tasks.
3. Each agency with response duties wants to own an annex that defines its particular responsibilities in response. This is because it makes it easier for them to develop and maintain the annexes. The problem is that these objectives will not produce the same annex titles, or even the same number of annexes, in all jurisdictions.

The number of annexes that clarifies task interdependencies is usually smaller than the number of responding agencies. Many state and local jurisdictions continue to use earlier FEMA guidelines for either 8 or 16 emergency functions. In most cases, federal evaluations of local EOPs accept any local rationale offered for any reasonable number of functions.

The problem remains that local jurisdictions need to devise an appropriate workable list of functions. Any list should reflect the particular jurisdictional configuration for emergency response operations (i.e., which organizations and agencies are involved). The local system is linked downward through the EOC to the response organizations. The response organizations are operating under the Incident Command System (ICS) or Incident Management System (IMS). The EOC provides the upward link to state and federal emergency resources. These connections are defined by the National Response Plan. The implementation of the *National Incident Management System* (NIMS) by FEMA has attempted to standardize incident command across the country. NIMS tries to clarify the links between local and federal response. The difficulty is that in practice it is impossible to determine which communities have actually implemented NIMS. It is also difficult to estimate local proficiency. It is difficult to know the frequency of use among those that have formally adopted the national system.

You will develop functional annexes based on local needs. To some extent, the list of critical functions for annexes will depend on vulnerability. They will also depend on resources and the structure of the local emergency operations system. One approach is to begin with a menu of functions. Through the planning process, you can consult with personnel to determine which ones demand special attention in the annexes. Lindell and Perry (1992) identified four basic emergency response functions with several subfunctions. These are depicted in Table 7-5.

This list of functions is generic. It is intended to capture most issues that might arise in response. Some of these issues are addressed in SOPs. These functions can be eliminated from the functional annexes. You can determine this based on capability and emergency response. For example, hazard agent source control is usually assigned to agencies in the Basic Plan. The task details are covered in agency SOPs. Similarly, functions in Figure 7-5 that are dependent on specific hazard agents or environments can be addressed in hazard annexes. They are not covered in functional annexes. After consultation with personnel, you may determine that it is appropriate to develop an abbreviated functional annex. This one will overview operations and simply reference agency SOPs. Functional annexes are most often written for generic functions that are appropriate across a variety of threat agents and threat environments. Typically, such generic functions include:

- ▲ Emergency assessment
- ▲ Population warning
- ▲ Evacuation
- ▲ Protection in place
- ▲ Search and rescue
- ▲ Reception and care of victims
- ▲ Communications
- ▲ Public information
- ▲ Internal direction and control

Table 7-5: Generic All Hazard Emergency Response Functions (adapted from Lindell and Perry, 1992)

1. Emergency Assessment
Threat detection and emergency classification
Hazard and environmental monitoring
Population monitoring and assessment
Damage assessment
2. Hazard Agent
Hazard source control
Impact abatement
3. Protective Response
Protective action selection and population warning
Protective action implementation
Evacuation transportation support
Evacuation traffic management
Sheltering (in place protection)
Impact zone access control and security
Reception and care of victims
Search and rescue
Emergency medical care and morgues
Hazard exposure control
4. Emergency Management
Agency notification and mobilization
Communications (with interoperability)
Mobilization of emergency facilities and equipment
Internal direction and control external coordination
Public information
Administrative and logistic support
Documentation

Table 7-6 shows a functional annex addressing evacuation. This example demonstrates that an annex does not need to be elaborate. A functional annex usually identifies the function. It identifies the organization (normally the EOC) that initiates and coordinates the function. It identifies the agencies that perform tasks that enable its execution. Functional annex task listings for specific agencies define a set of milestones. The EOC or other command personnel can use these to define progress, diagnose problems, and recommend corrective actions.

Table 7-6: Evacuation Functional Annex for a Municipality

Functional Annex 6: Evacuation

1. An incident commander can order an evacuation of immediately threatened areas in the course of an incident. The Municipal EOC Staff may recommend evacuation of endangered areas. The Mayor can use emergency powers to establish mandatory evacuation.
2. When evacuation is recommended or ordered, the exact area affected will be defined. A safe area will be identified. The EOC staff will engage the American Red Cross to open congregate care shelters in the safe area. Designated information officers assigned by the City Emergency Management Coordinator will proceed to each shelter to serve as public information and liaison with evacuees. EOC staff will alert Humane Society to coordinate pet care at shelter and potential handling of animal evacuations.
3. The Fire Department will deploy one paramedic unit to each shelter, with an ambulance on standby. Additional EMS resources—including behavioral health teams—are requested by the Company Officer. Fire Department Command Officers will obtain personnel and units through automatic aid first and then mutual aid agreements.
4. The Police Department will assume the lead for evacuation operations. Specific tasks are:
   - **(a)** Coordinate with the EOC regarding warning message and warning mode. When warning is delivered face-to-face or mobile speaker systems, police units will deliver.
   - **(b)** Establish police command post for coordination of agencies authorized to operate in affected area.
   - **(c)** Contact transit for buses to provide transportation and arrange routes and pickup points.
   - **(d)** Provide units for traffic management and control between evacuated area and designated shelters.
   - **(e)** Coordinate with EOC for evacuation of pets and farm animals.
   - **(f)** Coordinate with EOC for evacuation of special facilities (including jail).
   - **(g)** Coordinate with EOC for evacuation of handicapped.
   - **(h)** Assign Park Ranger staff vehicles to address gasoline and breakdown needs.
   - **(i)** Establish security perimeter for evacuated area, with special attention to critical facilities.
   - **(j)** Sweep evacuated area with assessment of level of clearance for EOC.
   - **(k)** After all clear, manage traffic returning to evacuated area.

It is critical to remember that the purpose of functional annexes is to provide a command overview of operations. It is not a substitute for agency training and SOPs. Functional annexes are most often used to quickly assess operational capabilities. They are used to assess mobilization issues. They are used to assess response- and agent-generated demands.

7.3.2 Hazard-Specific Annexes

Hazard-specific annexes provide information about the ways in which the response to a particular agent is distinctive. Response to the hazard agent may use strategies from the functional annexes in different ways. Or it may use them under different situations. Hazard annexes may elaborate specific agent-generated demands. These may require a different management or decision-making structure. Hazard-specific annexes are not intended to teach principles of a given threat. They are also not to fully elaborate the response strategy and tactics. Hazard-specific annexes are guides to response variations. These are used for unique agent- and response-generated demands. Table 7-7 shows an example hazard annex for heat wave threats. Key information for the annex relates to the definition of the hazard. It includes the mission of the response system. It also includes the concept of operations. It includes an assignment of responsibility for operations. This annex adopts the definition of heat wave used by the National Weather Service. Other threats, such as terrorist attacks, may require elaboration to define the threat. The mission is a short statement of the principal goals of the annex. Concept of operations sets responsibility for operational lead. It includes definitions of start and end of operations. It also includes public information needs. It includes special complications such as severe storms and loss of electricity. The assignments of responsibility explain what agencies will be activated and what duties they have.

You will need to avoid confusing specific types of threats in hazard-specific annexes with general response functions. Terrorist attacks can involve any one of four classes of hazard agents. These include explosives, chemicals, radiological or nuclear effects, or biohazards. Each of these is a specific hazard that will require substantial adjustments to some response procedures. It will also require much smaller adjustments to others. Thus, terrorist attacks should be addressed in hazard-specific appendixes. They should not be addressed in functional annexes.

7.3.3 Supporting Analyses

An EOP reflects a variety of analyses that are conducted as part of the planning process. These form the critical link between the planning process and the plan. These **supporting analyses** provide information about the community's hazards, vulnerable populations, and response capabilities. It might appear that all supporting analyses must be *completed* before the plan is written. This is not the case.

Table 7-7: Specimen Specific Hazard Annex

Hazard Annex K: Heat Wave Emergencies

Mission: *Initiate Population Protection and Guidance for Citizens Vulnerable to Severe Heat.*

Concept of Operations:

1. Excessive heat is a problem alone but is compounded when electricity is interrupted and severe storms increase humidity levels.
2. This annex is activated when the National Weather Service issues a high-heat warning for the metropolitan area.
3. Upon NWS warning, the City Emergency Operations Center is activated under partial staffing (see Basic Plan, Emergency Operations Center). EOC command will determine initial number of shelters needed and supplement them as the heat wave develops. EOC coordinates with hospitals, nursing homes, and group homes to monitor conditions and needs.
4. The EOC public information officer (PIO) will begin issuing news releases and public announcements. Information disseminated: (1) hotline numbers for citizens who need help; (2) locations of City Senior Centers that can be used as cool shelter; (3) locations of Red Cross and/or Salvation Army cool shelters.

Organization of Response:

1. The EOC serves as central control. EOC handles notification of fire department, police department, community services department, Red Cross, and Salvation Army. EOC staff will prepare messages to be disseminated by PIO and define frequency of delivery. The EOC staff in consultation with the NWS determines the timing of declaration of heat emergency and termination of emergency.
2. Fire department will provide one paramedic unit with ambulance standby to each senior shelter, city haven and shelter operated by Red Cross or Salvation Army. Fire company officer will serve as information contact for the shelter and call medical resources as needed. Fire department will respond as needed to EMS calls for heat-related incidents and as directed by EOC call-ins and police department personnel transporting call-ins.
3. Community services department will prepare senior centers to operate extended hours (up to 24 hours) with staff support, feeding support, water needs, and entertainment options.
4. Public Works department will provide portable generators to all shelters as needed for electricity.
5. Police department will coordinate with EOC to transport call-ins to shelters. Police, supported by Park Rangers, will manage security at shelters.

You will need some analyses to begin plan development. As the planning process and plan writing proceed, you can gather additional information. Conversely, writing the plan often identifies areas where more refined supporting analyses need to be conducted. We have already discussed the role of the hazard vulnerability analysis. We have examined human exposures and vulnerabilities and physical structure vulnerabilities. We have also examined vulnerabilities associated with crops and livestock. There are four additional areas that we should consider for supporting analyses.

Population Protection Analysis

Major emergencies require local officials to initiate protective actions for the population at risk. **Population protection analysis** is the process of defining the available warning mechanisms, defining threat circumstances to maximize effectiveness of different mechanisms, and appropriate protective recommendations. The first task is that all citizens occupying the risk area must be warned about the threat. This can be accomplished easily in some situations. However, it can be challenging in other situations. The seven primary warning mechanisms are:

- ▲ Face-to-face warnings
- ▲ Mobile loudspeakers
- ▲ Sirens
- ▲ Commercial radio and television
- ▲ National Weather Service Weather Radio
- ▲ Newspapers
- ▲ Telephones

These warning mechanisms differ with respect to their:

- ▲ Precision of dissemination
- ▲ Penetration of normal activities
- ▲ Specificity of the message
- ▲ Likelihood of message distortion
- ▲ Rate of dissemination over time
- ▲ Receiver requirements
- ▲ Sender requirements
- ▲ Feedback (verification of receipt)

Planners select the most appropriate warning mechanisms based on the characteristics of the hazards and the characteristics of the jurisdiction.

Warnings also must provide guidance about appropriate protective actions. The most common protective action for environmental hazards is evacuation.

It appears deceptively simple. You just need to warn everyone in the risk area to leave. A rapid evacuation of the risk area is relatively easy to achieve when its population density is low, all households are united and have their own vehicles, and the capacity of the route system is high. However, evacuation can require many hours to clear the risk area when the population density is high. Sheltering in place is preferable to evacuation when exposure to the hazard conditions is more dangerous than remaining inside. Sheltering in place is the most common PAR for hazardous plumes. It is also the most common PAR for tornadoes. But the type of protective measure requires careful review of the threat agent and environment. You will need to analyze the population and how efficient each PAR would be.

Organizational Capability Analysis

Organizational capability analysis is a systematic review of any organizations personnel, training, equipment, and vehicles in terms of their ability to perform plan-specified response functions. You conduct these analyses, with input from the organization, for two reasons. First, to ensure the organization can perform what it claims. And second to decide how to assign plan-related tasks to the jurisdictional departments, nongovernmental organizations, and other voluntary participants in the response system. The participants also may include local businesses. There is little government-issued guidance on performing this analysis. You will want to seek out subject matter experts to assemble information on the needed functions. They then help write task lists. These are for performing response functions under different scenarios defined by the hazard agent. Subject matter experts then identify the personnel, facilities, equipment, and materials that are needed for the task. At the task level, this information can be translated into SOPs, training, and exercises. The capability analyses are used to identify appropriate response agencies and teams.

Acquisition and Maintenance of Emergency Response Resources

You will structure program plans that define your efforts over the course of the year. FEMA (1993b) has advised emergency managers to set annual goals. Once these goals have been set, you conduct reviews of the ability of the LEMA to achieve these goals. This capability assessment aims at identifying the areas for which progress is satisfactory. It is especially for those where capability is lacking. The **capability shortfall** is the difference between the capabilities (personnel, equipment, and apparatus) needed to perform functions under the plan and those currently available to an organization. These shortfalls should be documented. You then create a multiyear development plan to reduce the shortfall. Limited funds often make it certain that shortfalls can't be eliminated within a single year. The **planning horizon** is a defined time period over which one spreads defined tasks, culminating with goal accomplishment. To solve resource problems, planners often define a multi-year time frame. This is typically 5 years. The multiyear development plan identifies specific annual milestones to monitor progress.

7.3.4 Equipment Inventories

Equipment inventories are not part of a written plan. They are crucial, however, in making assessments of the response readiness of the jurisdiction. Equipment lists also serve to identify shortfalls. They identify the substitutions that must take place to enable a safe, effective response within the boundaries of the shortfalls. You use equipment lists to correct shortfalls. You can do this through the process of long-term equipment planning. Each agency with response tasks works with subject matter experts to identify the equipment it needs to perform its assigned tasks. You must pay special attention to those tasks that are only performed during emergencies. Special purpose equipment that is not used routinely requires that personnel be trained. They must also be periodically tested in its proper use. For example, decontamination teams that must wear self-contained breathing apparatus when working must have a face shield fitting each year as required by OSHA. They should have refresher courses and exercises at least once a year. Listings form the basis for inventory and maintenance requirements such as periodic preventive maintenance, battery checks, and recalibration. Each LEMA should maintain a computer database of emergency-relevant equipment that is owned by the jurisdiction. This list should include equipment that is obligated under mutual and automatic aid agreements.

FOR EXAMPLE

Municipal Planning for Mutual Aid

Most agreements for mutual aid are regional in scope. It is uncommon but possible to engage mutual aid when very large geographically isolated cities address potential disasters that may uniquely affect them. In 2005, the City of Phoenix, Arizona, entered into a pact with the City of Los Angeles, California. Los Angeles is the second largest city in the United States. Phoenix is moving into the fifth largest position. Los Angeles is subject to large earthquakes. These could damage their infrastructure and building stock significantly. Phoenix is subject to a range of threats, especially terrorist attacks. These could lead to a need for large-scale evacuations. Under the agreement, each city will undertake planning to develop a capacity to aid the other in evacuating citizens. Each city will also prepare congregate care facilities for large numbers of evacuees.

SELF-CHECK

- If equipment lists are not part of the written plan, why are they important?
- What is **organizational capability analysis** and why do you do it?
- What is a **hazard-specific annex** and what information does it contain?
- What is a **capability shortfall** and what do you do about it?

SUMMARY

Knowing what to include in an emergency operations plan is an important part of planning. In this chapter, you have listed all the elements of a basic plan. You have made decisions about appropriate functional and hazard-specific annexes. You have listed desired outcomes and accomplishments for plans. You have identified emergency response functions. You have determined the milestones for assembling a written plan. You also defined the importance of integrating all jurisdictional plans under the EOP. All of these skills were serve you well in preparing your community to handle hazards.

KEY TERMS

Basic Plan Captures the authority for planning, the goal of planning, and the concept of operations for response, as well as describing the emergency response organization.

Capability Shortfall The difference between the capabilities (personnel, equipment, and apparatus) needed to perform functions under a plan and those currently available to an organization.

Concept of Operations The strategic rules under which emergency response operations are to proceed.

Functional Annexes Annex that lists generic functions or tasks that must be accomplished across many types of disaster.

Hazard-Specific Annexes Annexes that describe procedures, protocols, and special demands associated with a specific type of disaster agent.

Homeland Security Advisory System	Color-coded system created by the Department of Homeland Security to reflect the DHS's determination of the level of terrorist threat to the United States.
Jurisdictional Emergency Operations Plan (EOP)	A response blueprint with details on vulnerability, resources, and appropriate actions.
Organizational Capability Analysis	A systematic review of any organizations' personnel, training, equipment, and vehicles in terms of their ability to perform plan-specified response functions.
Planning Horizon	A defined time period over which one spreads defined tasks, culminating with goal accomplishment.
Population Protection Analysis	The process of defining the available warning mechanisms, defining threat circumstances to maximize the effectiveness of different mechanisms and making appropriate protective recommendations.
Standard Operating Procedures (SOP)	Very detailed guides for specific tasks operational personnel perform in the field.
Supporting Analyses	A variety of formal analyses conducted as part of the planning process that inform plan writing, including information about the community's hazards, vulnerable populations, and response capabilities.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of the basics of the content and format of emergency plans.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. There is one universally accepted format and list of topics to be addressed for emergency plans. True or False?
2. The EOP should explicitly address the communications function, including interoperability. True or False?
3. The majority of supporting analyses are completed:
   (a) In the planning process.
   (b) When writing the plan.
   (c) When priority is clear during response.
   (d) By federal personnel.
4. A jurisdictional EOP contains three parts: the basic plan, functional annexes, and hazard-specific annexes. True or False?
5. All emergency response plans should be linked with the recovery operations plan. True or False?
6. A description of the responsible agencies and protocols for evacuation is found in:
   (a) The continuity of operations plan.
   (b) A functional annex.
   (c) A hazard-specific annex.
   (d) The basic plan.

Review Questions

1. How is a jurisdictional EOP different from a SOP?
2. It is much less work to find someone else's plan and copy it for your community. Why is this not a good practice?
3. How is the emergency planning process connected to the EOP?

Applying This Chapter

1. You are a LEMA planner in the established community of Blacksburg, South Carolina. Cherokee County and the towns within it have just completed discussions of the functions that will need to be performed in the

event of a flu pandemic. Your job is to begin assigning agency response tasks under this threat. What analysis will you use to accomplish task assignments and how does this type of analysis contribute to planning success?

2. Canton Village, Connecticut, has just completed a new H/VA and determined that upstream development has created a flood hazard that was not present when the plan was originally developed. What must you add to the existing plan and why are these important?
3. Because you are new and have no seniority, the Rapid City LEMA Director has given you the task of redrafting and updating all of the functional annexes in the EOP. What information should be included in a functional annex?

YOU TRY IT

Building a Cheap Plan

You are an emergency planner for a small local emergency management agency with a severely tight budget. A large chemical-plating firm has just opened in your small town, intent on becoming the largest rechroming operation for automobile parts in your state. Because it's the only chemical facility, your LEMA must address it in the planning process and create a plan. The Town Manager is very cost conscious and suggests that he can get you an EOP to copy from a town in another state with lots of chemical facilities. As a professional emergency planner, you know this is a bad idea. What arguments will you advance to convince the Town Manger that you need to initiate your own planning process even though it requires resources?

Assembling a Written Plan

You are serving as the lead planner directing the team that will create your jurisdiction's EOP. The planning process is mature and you are deciding how many and what type of functional annexes are to be included in the plan. How will you go about making these choices? What internal and outside agencies should be consulted? Will you use subject matter experts? How will you use the jurisdictional hazard vulnerability assessment in this process?

Writing a Hazard-Specific Annex

Imagine that you have been participating in a 7-month planning process addressing terrorism in your community. You have been assigned to write the first draft of the hazard-specific annex on terrorism. Normally, you would begin writing with all the information assembled during the planning process. For this exercise, search the internet. Based on what you find, make an outline of the topics that a terrorism annex should address.

8

CONTINUITY OF OPERATIONS PLANS

Keeping the Organization Alive

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of continuity of operations plans.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

▲ The goals and benefits of operational continuity planning
▲ The difference between continuity of operations and continuity of government
▲ The history of continuity planning in the United States
▲ The relationship between emergency plans and operational continuity plans
▲ The relationship of continuity of operations plans to business continuity plans

After Studying This Chapter, You'll Be Able To

▲ Examine standards and guidelines for operational continuity plans
▲ Choose appropriate content for an effective operational continuity plan
▲ Prepare the supporting analyses required for continuity planning
▲ Develop a concept of operations statement
▲ Provide support for local businesses making business continuity plans

Goals and Outcomes

▲ Assess the reasons for government and business operational continuity plans
▲ Assemble an effective jurisdictional continuity of operations planning team
▲ Create task assignments for developing a continuity of operations plan
▲ Evaluate the planning process for operational continuity
▲ Perform essential organizational functions
▲ Assess barriers to government and business continuity planning

INTRODUCTION

Local Emergency Management Agencies (LEMAs) work to protect the public from disasters. The fate of citizens dominates and motivates emergency management personnel. Sometimes these overriding concerns with the public obscure the need to protect the structures and organizations that serve the public. Ward (2003) recounts the experience of the Chief Financial Officer for West New York, New Jersey. He watched the collapse of the World Trade Towers. He realized that, despite the disaster, citizens would expect New York City to continue to deliver the everyday services that make life possible. Planners devote major attention to the public safety aspects of disasters in the planning process. However, often there is less appreciation of the magnitude of the task of keeping local government operating. A central tenet of operations among police and fire departments is a deployment plan. This allows for addressing the disaster while also handling routine business in areas that escape direct impact.

Preparation for service provision during and after the disaster is called continuity of operations (COO) planning. The federal government has conducted this type of planning since the Cold War. Local governments have begun to adopt the practice. Private organizations have also long promoted business continuity planning. Terrorist threats have highlighted the need for continuity planning. However, any disaster can shut down an organization or government. During March 2003, a severe snowstorm in Denver caused all local federal offices to close.

8.1 Government Continuity Plans

The offices of the New York City Mayor's Office of Emergency Management were located in Building 7 of the World Trade Towers. It was destroyed on September 11, 2001. It was gone when it was needed the most. This was a dramatic loss. However, lost capacity in other offices can also be catastrophic. After the Northridge earthquake, victims inundated local governments with service demands. Citizens not directly affected by the earthquake also had many service demands (California Governor's Office of Emergency Services, 1994). Both disaster-related demands and more routine service requests were directed at many government offices. These offices did not normally provide emergency response (Cooke, 1995). The demands related to housing, welfare, and schools. Anthony (1994) found that when people became frustrated with the state or federal governments, they often appealed to local governments. Local governments can also have damage to facilities. This can result in interference with lifeline and citizen services. It also affects other government functions such as accounts receivable and payable. Even during disasters, people expect all services to operate. Operational continuity plans seek to ensure stable government performance through a variety of objectives. These are:

- ▲ Protect the safety of government employees (and visitors).
- ▲ Protect the ability to continue essential functions or operations.
- ▲ Protect critical buildings, equipment, and records.
- ▲ Minimize damage and losses through mitigation.
- ▲ Increase the effectiveness of transition from response to recovery operations.
- ▲ Ensure that representative government is not interrupted.

There has been little research on COO planning by local governments. It is difficult to estimate how many communities have such plans. Drabek (1993: 5) concluded "the extent of disaster planning has increased sharply" by both government and private organizations. However, the baseline planning efforts are known to be low. Tierney, Lindell, and Perry (2001) report that governments and organizations *without* a specific disaster response mission have been seldom studied. Especially little is known about small jurisdictions. They are usually not eligible or able to mount proposals for federal emergency management grants and aid. Bruno (2005) collected emergency plans from 75 small jurisdictions in Pennsylvania. More than half of them lacked basic emergency planning information. Only one-third were specific enough to be meaningfully evaluated by using criteria devised by the Federal Emergency Management Agency (FEMA). The absence of systematic performance data requires that jurisdictions make adoption decisions based on the consequences for the community and on the technical analyses of specialists.

8.1.1 Continuity of Government and Continuity of Operations

There is a distinction between continuity of government (COG) and continuity of operations (COO). This distinction has roots in the differing composition of federal and state versus local governments.

- ▲ **Continuity of Government** deals with measures that ensure government survives during and after a disaster. Survival of the government is the critical focus of COG planning. For example, will elected officials survive? How will those dead or lost be replaced? What measures provide safe haven for the deliberation and decisions that underlie American democracy?
- ▲ **Continuity of Operations** addresses the measures that ensure that government departments can deliver essential services during and after a disaster.

COO planning preserves the ability to perform functions and deliver services. This is in contrast to preserving the government itself. Because governments perform such a wide range of services, COO plans (COOPs) typically address those considered to be essential. The definition of essential functions is usually tied to the duration of service suspension and the criticality of the service to public safety. For example, if the water system was affected, you would need to know the number of hours the public could survive. Even essential functions are prioritized.

COO and COG are different. However, it is difficult to imagine that one would be successful without the other. The separation of the two types of plan is more evident at the federal and state levels. At these levels, elected bodies, appointed officials, and processes are more numerous and complex. The earliest federal concerns about COG arose during the Truman administration. Questions arose about how the government could continue to operate if many members of the U.S. House of Representatives were killed or missing. It was believed that the U.S. Senate could be quickly reconstituted under existing law, but the House could not. Senate Joint Resolution 145 (81st Congress) passed in 1950. It was the first law to specify a process for protecting members of the House and reconstituting that body. This issue was revisited throughout the Cold War period. It was extended to all three branches of government. It was also extended to specific departments of the federal executive branch.

Following the Cold War, the priority of COG among federal officials and planners waxed and waned. In October 1998, President Clinton issued Top Secret Presidential Decision Directive 67 assigning FEMA the lead responsibility in an intensive 12-month effort to establish COOPs for every agency in the executive branch. FEMA issued Federal Preparedness Circular (FPC) 65 in July 1999. This clarified the process and content of continuity planning by agencies. The U.S. General Accounting Office (2004a) completed a post 9/11 study documenting that compliance with FPC 65 was inadequate. Many plans were incomplete. FEMA responded by issuing a revised FPC 65 in June 2004, which detailed COOPs. It assigned specific responsibilities to agency directors. Federal COG planning and operations continue at the same time as COO planning. Both have been high priorities since the 9/11 attacks. Some COG plans are secret and some are not. They include enhanced protective personnel, special facilities and equipment, and life-sustaining provisions.

State and local governments experience fewer challenges with continuity. This is because there are fewer officials. There are also less ambiguous powers regarding appointment and succession. Also, both officials and services are less geographically dispersed. It is common for state and local governments to combine the COG and COO functions into a single planning effort (California Governor's Office of Emergency Services, 2003). This integrated approach is facilitated because COG and COO plans share at least nine common elements:

- ▲ Concepts of operations are guided by the jurisdiction emergency plan (EOP).
- ▲ Essential functions must be identified and prioritized.

- ▲ Unambiguous lines of succession for executives are specified.
- ▲ Authority delegations and emergency decision makers are preidentified.
- ▲ Emergency Operations Centers (EOCs) and alternate work facilities are identified.
- ▲ Interoperable communications must be established.
- ▲ Security is enhanced for personnel, facilities, and critical resources.
- ▲ Vital records and databases are protected.
- ▲ Schedules of training and exercises are maintained.

One of the critical tasks you have is to *integrate* all jurisdiction emergency plans. The integration of COO and COG plans usually takes the form of a single plan. It addresses the goals of each approach. It is common to refer to these integrated plans as COOPs. The COOP also integrates other plans aimed at continuing operations. Because of their critical functions, most information technology (IT) and public works departments have developed individualized COOPs. Governments and organizations cannot function effectively even for short periods without IT support. This need led to an almost universal concern with the adoption of business continuity plans similar to those used by IT professionals in the private sector (Perry and Lindell, 1997a). Most public works departments oversee critical services such as water and wastewater. They also have internal COOPs. The jurisdictional COOP does not replace these departmental plans. Instead, it incorporates their preimpact planning measures into the jurisdictional strategy. A final critical feature of the jurisdictional COOP is that it must reflect and be integrated into the jurisdictional emergency operations plan (EOP). Integration of jurisdictional emergency plans is explicitly addressed in each plan under the scope statement.

8.1.2 Guidance for Creating and Maintaining Continuity of Operations Plans

Federal agencies and the federal government are required by statute, Presidential Decision Directive 67, and Executive Order 12656 to establish both COG and COO plans. Federal Preparedness Circulars 65, 66, and 67 (http://www.fema.gov/txt/government/coop/fpc65_0604.txt) lay out specific guidance for executives and emergency planners regarding plan development and content, training, and exercise requirements and the acquisition of alternate facilities for continuity of operations. The U.S. General Services Administration (2002) maintains a COOP template (http://gsa.gov) for use by federal planners. Continuity planning at the federal level is both highly specialized and becoming an entrenched practice (U.S. Government Accounting Office, 2004b).

The creation of COO plans at the state and local levels has moved more slowly than in the federal government, but attention to continuity planning is rapidly increasing (Hoene, Baldassare, and Brennan, 2002). Most states have adopted COO requirements, and both state and federal authorities are urging municipalities to do the same. There is a tremendous amount of guidance and material available for developing state and local government COOPs. Among the most detailed guidance is the *Interim Guidance on Continuity of Operations Planning for State and Local Governments* prepared by FEMA (2004a). This exhaustive documentation addresses the planning process, plan content, and plan implementation, including templates for assessing risks and identifying essential functions, and a COO planning toolkit. Many states have also developed detailed guidance for state agencies and local governments. These include Wisconsin, Washington, Delaware, North Dakota, Florida, and Maryland. National Fire Protection Association (2004) Standard 1600 also details the elements of business continuity programs.

The most comprehensive support is maintained by the Lessons Learned Information Sharing Network (www.LLIS.gov). It is operated by the National Memorial Institute for the Prevention of Terrorism and the Department of Homeland Security (DHS). This site provides more than 100 "best practices" documents for COO planning. It provides example plans and downloadable templates. The network also sustains interactive features that allow you to submit specific technical questions. You can also communicate via message board with other local planners. This site also contains information you can use to apply for federal funding for COO planning.

8.1.3 Continuity of Operations Planning

The process of creating a COOP is like the process for creating the jurisdictional EOP. Both plans begin with vulnerability assessments. They include technical analyses. They include assessments of which hazards can be mitigated. They also include assessments of the ability to prepare and respond to hazards that can't be prevented. Each type of plan requires an emphasis on organizing, planning, equipping, training, and exercising. The same emergency-relevant departments are involved in the COO planning process. COOPs, however, target the government and its functions for preservation. This requires a much wider scope of involvement of jurisdictional departments in the planning process.

There are at least three phases for creating a COOP. The first phase is getting ready to plan by creating a team. You have to make decisions about plan strategy. You also need to collect data to support the planning process. The second phase requires the planning team to address the primary elements of continuity. These include essential functions, authority and succession, alternate facilities, communications, records and databases, and logistics. The last phase addresses the practical aspects of making the plan work. The implementation includes activation rules, personnel, plan review, training, and exercises.

Jurisdictional Focus and Planning Team

The most critical feature that promotes COO planning success is a strong commitment by the chief executive (Kaplan, 1996). For local governments, this means that the LEMA must obtain the vocal and visible support of elected officials and top administrators. There is always resistance to change. Many government departments that lack emergency missions will view COO planning as a diversion from their real duties. It requires an intensive expenditure of personnel and resources believed to be better used elsewhere. Firm commitment by leadership is an effective argument for departmental participation. It is also a good motivation for taking the process seriously. You can make this commitment clear by circulating memos of support from both jurisdiction leadership and department heads. You can also have all of these officials announce "continuity planning kickoff" in meetings. The message is that continuity planning is important. This message should reach not just managers but every employee.

Each jurisdiction is unique. Every planning process must be adapted to the culture, tradition, and context of an organization. Each jurisdiction also has identified hazard vulnerabilities, a distinctive system of mitigation measures, and a specific capability to mount response operations. The jurisdiction COOP reflects all of these features. It also has a unique linkage to the community disaster recovery operations plan (ROP) and process. For these reasons, the COOP is a product of a planning process. It is integrated into the jurisdictional planning process. Thus, emergency planners need to emphasize the process rather than the plan. You can take advantage of the literature and plan templates available to support the process. It is critical that a COOP process be established, emphasized, and maintained over time.

The COO planning team should be led by a technical specialist. This is usually an emergency planner. It should include broad representation from the jurisdiction. Many jurisdictions enhance the credibility and expertise of the team by assigning co-chairs. It is desirable to use an official from the city or county manager's office. This ensures the team has both access and political clout. The size and composition of the planning team will depend on the jurisdiction's operations, requirements, and resources. COO planning teams usually include members from each department that provides essential services. In large jurisdictions, the team might include advisory members from management. The team might also include technical members who provide specific expertise about essential functions. Membership should be formal with members appointed in writing by senior administration. Essential functions departments with COOP representation commonly include:

- ▲ Emergency management.
- ▲ Fiscal management.
- ▲ Legal department.
- ▲ Law enforcement.
- ▲ Public health.
- ▲ Building maintenance.

- Fire protection.
- City/county manager.
- IT personnel.
- Utilities.
- Medical services.
- Engineering.
- Public information.
- Clerk's office.
- Social services/ housing.
- Public works.
- Transportation.

Many of these representatives will provide expert advice. They will not take the lead for developing a COOP. There are many ways to organize COOP preparations around essential functions. Often, these are identified and the department in charge of each function becomes the planning base for that function. Public works departments are usually charged with water systems and sewer systems. These are almost always essential functions. Basing efforts to ensure operational continuity at the department level is important. It helps to reduce external administrative intrusion. It takes advantage of a department's existing management structure. It also takes advantage of the plans and procedures for routine operations. Furthermore, this protocol means the COO planning team can concentrate its expertise, motivating power, and resources on supporting department efforts, rather than appearing to be autocratic "COOP cops."

The target departments for COOP preparedness are fewer in number than one might expect. Most attention will focus on fire departments, police departments, and emergency management agencies. Because these departments normally respond to emergencies, they already have continuity elements in their structures. They rarely require more than a minimum of additional COO planning. They can serve as sources of expert guidance for the other departments. Similarly, IT departments and public works departments handle essential functions. They are routinely subject to special types of emergencies. These include electrical outages, heavy rain, and pipe failures. These can interrupt the work of other departments. Because loss of computer systems or loss of freshwater constitutes serious matters, IT and public works maintain both plans and SOPs to ensure continuity of operations. It is not uncommon for IT departments to have business continuity plans. Many public works departments operate their own EOCs. They have delegated responsibilities for maintenance of critical functions. The challenge for continuity planning in these departments is to link their established command structures and EOC procedures with the jurisdictional COOP.

Jurisdictional COO planning teams have two tasks. The team's first task is to establish the COOP based on technical analyses and broad consultation among departments. The second task is to ensure the operational function of the COOP. This is done by defining a structure for COOP coordination and operation within the departments delivering essential functions. For the first task, teams operate largely as a committee of the whole. They make initial decisions and assessments required to start the planning process. Once the assessments are made, a subcommittee structure is developed. The subcommittees reflect the seven critical elements of a plan. These are: essential functions, succession, alternate facilities, communications, records and databases, logistics and administration, and security. The subcommittees are usually chaired by members of the COO planning team. However, they also include members from departments that house essential functions. If possible, members from departments should be those who will finally be chosen as departmental COOP coordinators.

The second task requires the COO planning team to guide departments with essential functions in developing an organizational structure for ensuring service delivery. This involves deciding how the jurisdictional COO structure will interface with department structures. COO Leadership is usually embodied in a COOP Coordinator. The COOP Coordinator is the central contact for departmental COOP Coordinators. Departmental COOP coordinators oversee team members within the departments designated as supplying essential functions. These are important personnel. They will have operational roles when the COOP is activated. COOP team members may support training for their individual COOP efforts. However, flexibility should be given departments in shaping the content of the training and the operations of COOP teams.

Creating a COOP is not a linear process. It requires collaboration at each stage of development. It requires members to work together on each of the goals or tasks. Initial collaborations may be based on preliminary data analyses and on assumptions that are later found to be not true. Thus, a COOP process should build in multiple reviews. The reviews should be by experts and by operational departments. They should be over time and allow frequent comment and change. The goal is progressive development embracing a flexible, evolving process and document.

Initial Decisions and Assessments

Every planning process seems daunting. This is especially true if it is approached only in terms of the final product and the magnitude of the tasks needed to produce that product. There are two products of planning processes. The first is a structure for continuing planning. The second is a document that captures the details of that process at a given time. The COO planning team is the initial structure for the planning process and assigns responsibilities for writing different sections of the COOP. The COO planning process requires that multiple strategic decisions be made as a basis for structuring tasks that will create the elements of the plan. There are four issues that the COO planning team must address as they begin the planning process.

Concept of Operations

The COOP concept of operations (conops) addresses the way that the jurisdiction will maintain essential functions. The conops addresses three aspects of operations. The first aspect is the management structure. The second aspect is the concept of operations itself. The third aspect is the assumptions on which the COOP is based. The management structure describes the organization that implements the plan. This is a basic incident management system (IMS). It identifies critical roles in COOP implementation. The management structure can also be organized as NIMS-ICS or traditional IMS. It is usually less elaborate. The management structure must afford response flexibility to COOP personnel. It must also effectively interface with the EOP and field IMS.

Most jurisdictions identify a single person as responsible for overseeing the ongoing COO planning process. This is a jurisdictional COOP coordinator. This person also directs COOP operations when the plan is activated. Between emergencies, the coordinator schedules periodic plan reviews. The coordinator ensures appropriate personnel are trained in and informed of plan contents. The coordinator schedules tests and drills as appropriate. The coordinator also conducts after-action performance reviews. This role is usually filled by a planner who is assigned no other responsibilities during emergencies.

All positions in the COOP organization should be assigned to permanent employees. They should have designated and trained backups to enable continuous coverage of responsibilities. A staff member from the city or county manager's office can be assigned the role of Assistant Jurisdictional COOP Coordinator to institutionalize the connection between COO response personnel and jurisdictional leadership. Under these personnel, each department with essential functions appoints a Departmental COOP Coordinator. This coordinator is responsible for maintaining that department's COOP Team. This is done by ensuring that it has proper training, organizing, and equipping. The departmental COOP Coordinator handles communications with department management, the Jurisdictional COOP Coordinator, and the department personnel who deliver essential services. Within a department, COOP teams are created for each essential function. Each of these teams is assigned a team leader. Each team is composed of members who perform the essential function when the COOP is activated. The size and composition of each team depends on the complexity and demands associated with its assigned function.

The management structure also specifies where the personnel work. The jurisdiction COOP Coordinator usually operates from the EOC. This ensures rapid access to information. This also insures access to damage assessments, public information, and other specialized functions and personnel. Department COOP coordinators, team leaders, and members operate in one of two locations. If the disaster leaves buildings and infrastructure intact, they can work from their assigned work areas. If the building or support features are unable to sustain operations, they will relocate essential functions to a predesignated alternate site.

Table 8-1: Example Concept of Operations Statement

Concept of Operations
▲ The Anytown Emergency Management Coordinator or the COOP Coordinator (acting for the Emergency Management Coordinator) operates from the Town EOC, assisted with additional personnel as needed. The COOP Coordinator is assigned to the Administration and Planning Section and reports to the Town Manager or designee as head of that section. The EOC Commander continues to direct all emergency operations under the Town EOP, including the COOP.
▲ Each department that executes essential functions operates within its own plan and procedures for emergencies. The management and implementation of departmental plans is accomplished by the Department COOP Coordinators who serve as primary contacts for the Town COOP Coordinator operating from the EOC. Each primary contact is located at the site of departmental operations or at a pre-selected alternate facility. Each department COOP coordinator oversees and maintains communications with the COOP Team Leaders for each essential function delivered in the department. Each Team Leader supervises their COOP Team members to re-establish, preserve and execute essential functions. Team Leaders communicate needs for personnel, special teams and equipment to the departmental COOP coordinator who communicates with the EOC.
▲ The Public Works Department operates from its Command Post (or back up) and all communications from the Town EOC for Public Works (Water Production, Water Distribution, Wastewater Collection, Streets, Facility Management, Fleet Management, Reclaimed Water and Solid Waste Collection) are directed to the Public Works Command Post. The Technology Services Business Continuity Plan is managed by a Command Team located at the Public Works Command Post; Town EOC communications regarding essential technology services are directed to this Command Post.

An example concept of operations is shown in Table 8-1. The conops defines the COOP organization. It defines the relationship between the Jurisdictional COOP Coordinator and the EOC. It also defines the link between the Jurisdictional and Department COOP Coordinators.

The Anytown Public Works Department operates from its command post. The Technology Services Business Continuity Plan is managed by its Command Team.

Both jurisdictions and threat environments change over time. It is important to establish a continuing COOP planning process. It should have a multiyear planning horizon. This underscores the idea that the plan represents the planning process at one point in time. It is based on the available assessments of the jurisdiction and its threat environment. Plans make assumptions about business operations, the hazard environment and vulnerability, and information systems. You can include assumptions in the COOP that explain the criteria on which decisions were made. Planning assumptions often address:

- ▲ Availability and timing of outside assistance.
- ▲ Viability and nature of regional and special mutual aid.
- ▲ Expectations about state capabilities and intervention.
- ▲ Relationship of the COOP to other jurisdictional and regional plans.
- ▲ Expectations about the period for which the COOP will operate.
- ▲ Expectations about the timing and circumstances for COOP activation.
- ▲ How scene security and evidence preservation are achieved in suspected terrorist incidents (see Figure 8-1 to see a hazmat team at work).

Figure 8-1

Mesa (Arizona) firefighters demonstrate the process for conducting gross decontamination for numbers of the local Citizens Emergency Response Team.

Definition of Time and Criteria for Essential Functions

FEMA (2004a: A-16) guidance directs that identifying essential functions begins with making a list of *all* functions performed by the agency. This approach may be unnecessarily elaborate. In practice, attention focuses on those functions that threaten health and safety if suspended. An important first step is to specifically define which criteria will be used to define "essential function" and to determine how long it can be lost before damage occurs.

Criteria and time period decisions should be specific to the jurisdiction developing the plan. You can define criteria in relation to likely outcomes. You can do this for specific audiences. There are many guidelines and possibilities. There are sample plans available at (http://www.LLIS.gov). Some of the outcomes addressed include:

- Loss of life
- Serious injury
- Threats to public health
- Loss of confidence in government
- Ability to keep civil order
- Loss of economic viability
- Failure of infrastructure

The criteria selected by each jurisdiction must be consistent with its response capability. The criteria must be consistent with regional support agreements. The criteria must also be consistent with the political environment. You can identify a set of criteria on technical bases. You can then make recommendations to elected and appointed officials. The final decision regarding criteria should rest with the elected officials. This is because they are the ones held responsible legally and by citizens.

After the criteria have been selected, you then have the more technical problem of deciding on a time horizon. The basic question is "what period of time can pass without these functions before the undesirable outcomes appear?" This depends in part on inherent features of services. It also depends on the extensiveness of the response network in which the jurisdiction is immersed. One strategic issue is the length of time that the jurisdiction can cope with the outcomes without external help. The second strategic issue is the lag between a jurisdiction's call for help and the arrival of support. The determination of these times hinge on specific jurisdictional characteristics:

- Vulnerability of infrastructure and buildings to specific threats.
- Extent to which mitigation measures reduce disaster impacts.
- Mobilization speed and effectiveness of the local emergency response system.
- Level of external mutual aid support.
- Extent to which a wide scope of impact event reduces mutual aid availability.

- Geographic isolation of a jurisdiction from available external aid.
- Jurisdiction integration into multiple planning efforts.
- Time availability of direct aid from state agencies.

You must balance these factors to derive an estimate of what time periods are significant. Virtually all COOPs select as a first time horizon the time period when a disaster continues to produce the impacts after 24 hours. A second commonly used time horizon is 72 hours. A third one is 2 weeks. Different terms may be used for functions that cause negative outcomes in different time frames.

- **Essential functions** are those whose absence produces negative outcomes after curtailment for 24 hours.
- **Vital or critical functions** produce negative outcomes after 72 hours.
- **Necessary functions** are problematic only after being unavailable for 2 weeks.

By weighing the time horizon for negative outcomes against specific services, you can classify services into categories. This practice establishes a priority system. Lost service capabilities should be addressed first during the response period and can be extended into recovery operations for restoration of government services.

You must make the decisions associated with outcome and time horizons on data specific to your own community. Definitions of criteria and time horizons should not be taken from "model" plans. This is because criteria depend on both the political decisions and technical data for each community. A sample statement of essential function selection is given in Table 8-2. The community in this example is one that has a strong local and regional emergency management and response network. It is clear that this definition began with the local hazard vulnerability statement. It made worst case assumptions in judging the availability of outside resources. The *National Response Plan* advises that federal support is at lest 72 hours away. Federal assets are not mentioned in this example. This is because the regionally available assets will arrive much more quickly. It is important that estimates of arrival time for outside resources are based on actual experience in *emergency exercises*. They should not be based on best or worst case estimates. The accuracy of time estimates is critical to COO success. It justifies the expense and effort of conducting exercises to insure correctness.

A final issue is the expected maximum duration of COOP implementation. This is relevant because you will need to provide personnel and operating resources during this period. Guidance from state and local governments on the duration of COOP implementation varies from a few days to 30 days after disaster impact (FEMA, 2004a). Most local government jurisdictions judge operating durations on expected availability of outside support and internal ability to

Table 8-2: Example Criteria for Defining Essential Functions
Definition of Essential Functions
An *essential function* is any service which, if not delivered or interrupted for a specified time period, may result in significant hardships or danger for citizens or employees, or may significantly interfere with disaster response or recovery operations.
COOP guidance from the U.S. Department of Homeland Security specifies a variety of timelines for defining essential functions. Anytown follows a conservative interpretation of time guidelines, acknowledging that the most vital services need to be addressed first, but all essential services will eventually require attention in a large-scale emergency. Essential services are prioritized in terms of their potential consequences following interruption. Highest priority (a Tier 1 function) is given to restoration of essential services which, if not delivered within 24 hours, may result in significant negative health and welfare consequences for citizens or employees. Tier 2 functions produce significant negative health and welfare consequences if interrupted for 72 hours. Tier 3 functions are those that produce significant negative health and welfare consequences if interrupted for more than 72 hours. In all cases of COOP activation, essential functions at all levels will receive attention during the period of activation. In the event of widespread damage or contamination of Anytown facilities that threatens the delivery of all essential function, the priority order assignment will be followed as services are restored.
Anytown has mutual and automatic aid agreements with the 25 surrounding cities and towns. Anytown participates in the Regional Urban Area Security Initiative response plan, the State MMRS response plan and the local regional MMRS. In a wide-scope disaster that affects 15 of the towns, exercises demonstrate that Anytown can expect emergency support services to arrive in 90 minutes, with function support arriving in 24 hours.
Functions and services that would not produce significant negative health and welfare consequences unless interrupted for 14 days or longer are not considered essential functions under the COOP. The functions of all departments and programs are important; designation as essential indicates shortterm provision sensitivity.

repair projected damage. COOP implementation is for the emergency period. It is not expected to extend into weeks or months. COOP implementation initiates restoration of essential functions disrupted by using nonroutine or emergency measures. The COOP focuses on specific functions. It devises extraordinary methods to deliver them. This is done while restoration of the normal methods of service delivery is underway. COOP implementation is a *bridge*. It is not an end in itself. First, COOP implementation bridges the time between service interruption and the resumption of that service. This can be done on its original basis. Or it can be done on a temporary but stable interim basis. Second, the COOP is a bridge to the recovery process. It is during the recovery that the major structural failures generating service interruptions will be corrected. The COOP is not intended as a substitute for either a jurisdictional EOP or a recovery operations plan (ROP). In this context, you should expect the COOP to operate until substantial external support can arrive. This expectation is adjusted by how long you think it will take to move from delivering essential functions on an emergency basis to delivery on a stable basis. These projections will be unique to each community.

It is best to think of COOP implementation in terms of flexible beginnings and conclusions. The activation of the COOP takes place at a single definable point in time. The essential functions addressed at initial COOP activation is limited to only those directly interrupted. As the disaster develops, more essential function teams may be activated. Over the course of the disaster, essential functions are restored. Then, those elements of COOP implementation will be terminated. When all essential services have been restored, the jurisdictional COOP Coordinator will advise the EOC Commander that COOP operations can be terminated.

Staffing Adequacy/Jurisdiction Capability for Essential Functions

Establishing time and outcome definitions permits you to specify functions likely to be defined as essential. These can then be assessed further in terms of the current capacity to deliver the services. COOPs are frameworks for delivering some of the same services a jurisdiction normally provides, but during and after a disaster impact. The problems with normal service delivery will be magnified during a disaster. In conducting assessments, you can document existing problems. You can ask that the problems be fixed. Ability to fix the problems usually depends on the availability of funds. COOP efforts often uncover long-standing problems in resource and personnel management. These are usually expensive to correct. Such deficiencies have an impact on the way the planning process addresses service delivery maintenance under the COOP because they limit the level of service that can be achieved. These problems must be resolved by temporary shifting resources. Special arrangements for outside aid during the COOP implementation may be made.

Another aspect of finding and documenting deficiencies is related to longer-term planning processes. As deficiencies are identified, the COO planning team can develop a strategy for corrective actions. This can be done through a multiyear phasing and planning operation. The planning team is in an opportune position to identify specific problems. They can describe the consequences for overall preparedness. They can project the personnel, equipment, and facilities for these problems. They can also estimate the needed funding. These documents can be used as concrete proposals. They can be presented to senior elected and appointed officials.

Assess Alternative Facility Needs and Capabilities

The planning team also examines the need for delivering essential functions from alternate locations. The objective is to begin defining likely alternate facility and relocation demands so that the information can be passed to a work group for more detailed planning. An **alternate facility** is a structure that has been tested and can survive maximum likely disaster agent forces and provides all necessities for delivering an essential service. Most of the data for this assessment are available from hazard/vulnerability analyses (H/VAs). H/VAs were probably conducted to produce the EOP. The main concern for the COOP is the probable disaster impact on the jurisdiction's employees, facilities, and infrastructure. The ability of government buildings to resist disasters is critical. Relocation is necessary when buildings and infrastructure cannot provide a base for safe service delivery. Data on building and infrastructure resistance should be available in local and state assessments. Resistance data are also found in the jurisdiction reports for the *Interim National Infrastructure Protection Plan* (U.S. Department of Homeland Security, 2005c). The co-location of many essential functions in the same structure may multiply the number and size of alternative sites.

Another concern is the extent to which essential functions depend on other functions and the location of dependent functions. Ultimately, all functions that support delivery of essential services must be considered part of a *production chain*. The **production chain** is the sequence of actions by individuals and organizations, with added resources, that ends with successful service delivery. The more support functions that are needed, the more complex the plan must be. The more alternate facility space will be required. The challenge is simplified if the functions are all internal to the jurisdiction. If external contractors or agreements with other jurisdictions are involved, there is a need to ensure the protection of these processes and services outside the jurisdiction's authority. These arrangements must be addressed in contracts and memoranda of agreement.

You must also address the equipment and technology needed to deliver essential services. All of the support equipment and technology must move when a function is relocated. The movement may be very difficult logistically. Or the movement may impose severe nonresponse demands in the response period. If either of these is true, then the planning team may make a proposal. They can propose to elected and appointed officials that the function be relocated immediately to a more safe and secure permanent site. This would probably have to become part of a multiyear COOP process. However, it can be justified in several ways:

- ▲ Citing the criticality of the function for preserving the jurisdiction's ability to prevent harm to citizens.

- ▲ Emphasizing the importance of the function for the effective delivery of citizen services.
- ▲ Establishing that the effectiveness of emergency response depends on the function.
- ▲ Establishing the danger to functionality incurred by quickly moving sensitive technical equipment.
- ▲ Calling attention to the need for reassigning personnel from emergency response to relocation duties during a disaster.

Even costly adjustments can be made if compelling reasons and a phased approach are used. The challenge is that relocation imposes great demands at the same time that disaster agent- and response-generated demands must be met. Relocation slows the restoration of essential functions. This is because they can't begin until after movement and setup are complete. Relocation may not remove personnel or resources from the response. However, it still imposes additional communications, information, and coordination demands on the EOC. The alternatives to relocation during COOP implementation are to choose safe structures for placement of departments. Another alternative is to engage in structural strengthening. A third alternative is to take other measures to make existing department locations hazard-resistant.

A brief survey of possible sites should be undertaken. The preferred relocation sites are those that belong to the jurisdiction. Suitability of potential sites is judged in terms of structural strength. They should also be judged in terms of ease of access by employees. Other factors to look for are the ability to accommodate security and access controls, appropriate space requirements, and the presence of infrastructure systems to support the relocated function. If the available jurisdiction-owned facilities are inadequate, other appropriate structures

FOR EXAMPLE

Phoenix, Arizona IT Changes

For many years, Phoenix Arizona's IT department and mainframe were located in the basement of a leak-prone building. Although many people were aware of the problem, the funding to correct it was simply not available. To address the concern with less money, the IT department developed an innovative "business continuity plan" for itself. When the city began Y2K planning, the notion of COOP was enlarged and the IT threat was targeted for structural correction. Although a costly and multiple-phase process, it was moved to a new location.

must be identified. Structures not part of the jurisdiction will require prewritten contracts or agreements with owners. These must include provisions for quick access and occupancy as long as the COOP remains active.

SELF-CHECK

- There is simply no reliable research on how many local governments have a COOP. We, therefore, have few examples and no data about which forms work best. Given this, how do you determine if your town needs a COOP?
- What are the three phases or components of COOP preparation?
- When making decisions about services that will be called "essential," we normally pair time lines with the appearance of negative consequences for the public. Although every jurisdiction is unique, what are some of the negative outcomes that we seek to avoid with a COOP?
- COOP team-planning assessments of local government services often uncover problems. Sometimes the problems are operational and sometimes there are too few resources. When this happens, what can you, as a jurisdictional COOP Coordinator do?

8.2 Critical Continuity of Operations Plan Elements

Once the COOP team has been established and has completed the preliminary assessments, attention turns to writing down the decisions made in the planning process. The information from preliminary assessments becomes a starting base for establishing the essential elements of the plan. The COOP team normally develops a structure based on work groups. Each plan element is assigned to a single work group. This is so there is accountability for outcomes. The co-chairs of the planning team select leaders for each work group. The leaders provide oversight, motivation, and logistical support. As with the larger COOP team, it is advisable to have work group leadership consist of one person with relevant technical skills. You should also have one representative from jurisdictional administration. The size and composition of work group membership will vary with jurisdictional resources. However, the essential functions work group must have representatives from each department in which these functions are located. The leadership of each work group should meet regularly with the COO-planning team leaders. This will facilitate coordination and communication and address problems that involve multiple groups.

8.2.1 Essential Functions

Most COOPs delegate the details of providing essential functions to department specialists. The main goal of the essential functions work group is to specify an organization through which functions can be executed. This is facilitated if the work group establishes subgroups. Subgroups can address each essential function. The work group functions are divided into those that are collective and those that are associated with planning for a particular essential function.

The first task of the work group is to review the criteria established for defining timing and outcomes used to select essential functions. Once confirmed, this framework is used to elaborate the essential functions. A tentative list of essential functions may be supplied by the COO-planning team. However, specific information should be gathered. This will ensure that the listing is complete. Information gathering strategies may include:

- ▲ **Surveys/questionnaires.** The work group might construct a questionnaire for employees to identify what they believe are the essential functions they or their unit perform. A probability sampling process can be used to select employees. E-mail is an effective method of distribution.
- ▲ **Interviews with key informants.** Work group members can interview experts, key employees, supervisors, and former employees. This is done to obtain detailed descriptions of functions deemed to be essential.
- ▲ **Review historical disaster experience.** Although past experience is not a perfect predictor of the future, functions that have been lost in historical disasters are prime targets for assessments. The work group examines the consequences of lost functions. They assess the criticality and the benefits provided by specific functions that were not lost in the disaster.
- ▲ **Review documents and plans.** The jurisdiction's EOP can identify department functions that support response. The EOP can highlight functions that support the jurisdiction. Annual reports, training manuals, standard operating procedures, organization charts, and other department-specific materials can also help identify essential functions.

These data are used to finalize a listing of essential functions. The information also helps classify them in terms of time sensitivity for creating negative outcomes.

The second task is to set a priority for each essential function. The mitigation plan and EOP are in part designed to ensure that these functions can withstand most disasters. Many functions may fail at the same time. The purpose of priority setting is to move decisions about the priority of essential functions *from* the emergency period. Decisions must be moved *to* the preimpact planning process for more careful analysis. Attention priorities are set on the basis of two factors. The first factor is the speed at which serious negative outcomes occur. The second factor is the repair capability of the affected department. Typically, the functions assigned highest priority are those that, when interrupted, affect citizens health. Functions such as providing freshwater and sewer capacity are given high priorities. COOP priorities also should reflect the EOP and the ROP priorities for restoring services.

After these decisions are made, planning addresses each essential function and the unique issues associated with it. The technical expertise of the work group members is most important here. Each group must examine the dependencies of essential functions on other internal or external processes or organizations. The COOP team identified generic areas of interdependence early in the planning process. Now each work group must conduct detailed analyses to confirm and possibly extend the original results. Departments that execute public safety roles are described in the EOP. When essential functions are provided by departments that have no response mission, the work group will need to determine what is required for the function to be performed. These supporting technologies, functions, and outputs will be tied to the target essential function. They will be included in the plan for restoring and continuing that function.

Work groups must identify resource requirements for each essential function. The personnel, data, equipment, and supplies needed to support each essential function should be specified. These concerns are usually addressed by reviewing five features for each essential function.

- **Personnel.** Those needed to perform a given function should be specified in terms of their special skills, knowledge, and training. It is important to list only people directly performing the function.
- **Information technology.** What central computer systems, personal computers, and workstations are essential to continuing service? It is critical here to link the COOP measures with the business continuity plan developed by the IT department. If IT specialists must keep an essential function operating, they should be mentioned as critical personnel. Consideration should also be given to what records or data are needed to support the essential function. These might include contact lists, SOPs, or agreements with external agencies.
- **Communications.** Essential functions are likely to require voice and data communications. Some departments routinely use radios. Other departments frequently rely on e-mail or telephones. Planning addresses what new systems are needed, backup systems for insurance, and interoperability.
- **Supplies.** Work groups should address the acquisition and resupply of any necessary equipment and office supplies, tools, or other materials required with restoring or maintaining an essential function.
- **Physical infrastructure.** You will need to specify the amount of space needed for function delivery and any special requirements for that space.

This includes furniture and infrastructure such as water, electricity, sanitary facilities, and provisions for sleeping and eating.

Definition of the organizational structure needed for each essential function is a critical job for the work group. The COOP structure is organizationwide. It typically links the jurisdictional COOP Coordinator to the EOC and to each department. In turn, each department must specify the organizational structure it will use to execute its essential functions. Specific responsibilities are assigned to specific roles. Each essential function within a department is assigned a COO-planning team leader and COO personnel. The number of personnel and their skill levels will be unique to each function. The department COOP coordinator and team leaders should ensure there are sufficient personnel to staff multiple shifts.

Order of Succession/Delegation of Authority

Order of succession and delegation of authority are usually specified in local government code and organization charts.

- ▲ **Order of succession** defines the sequence of role incumbents who replace a higher level position incumbent who permanently cannot serve.
- ▲ **Delegation of authority** sets rules for which lower officials assume the authority of higher officials temporarily unable to serve.

Municipal code or county statutes set the order of succession to chief executive. They do this with all other elected positions as well. Within administrative departments, the organization chart usually designates the incumbent. It also designates at least one successor. Police and fire departments have command structures. These define succession down to the last department member. Business ROPs, like those commonly used in public works and IT departments, typically specify succession "three deep." Each incumbent has two backup personnel for that position. Where there is a director, associate director, and assistant director, there is a total of nine people who can assume the position of director. There is a sequence of succession. For other departments participating in a COOP, this strategy of three deep is usually also required. These practices ensure that all departments have predesignated authorities for decision making and policy setting whenever a COOP is activated. Authority delegations are officially documented, including any limits on the authority of any successor. Table 8-3 shows an example order of succession for the COOP of a small community. The listing of the succession itself is brief and deals with statute and position titles. Contact information is likely to change over time. It is maintained in the EOC and communications center.

Table 8-3: COOP Order of Succession Statement
1. Elected Officials and Town Manager
Elected authority, under State Revised Statutes, county resolutions and town resolutions, has multiple responsibilities, vested in the Mayor and Town Council, including the power to declare a Local Emergency. Such declaration permits Town Government and Town Management to set aside normal procedures of government in deference to the emergency. Declaration of a Local Emergency is the first stage in the process of progressive declarations at the county, state, and federal government levels that supply special aid to the Town (see EOP, Annex A, Appendix 9, sections 3 to 5).
The line of succession (authority delegation) for elected officials is set in Town Code Section 1-64. The line is (1) Mayor; (2) Vice Mayor; (3) Council Designee for Mayor [if both Mayor and Vice Mayor are incapacitated or unavailable]. The line of succession (authority delegation) for the Town Manager is set in Town Code Section 2-57. The line is (1) Town Manager; (2) Assistant Town Manager; (3) Public Works Director; (4) Police Chief.
2. Departments with Essential Functions or Records (and Public Safety)
The listing below enumerates lines of succession to the position of Department Director or Chief. They may overlap with department COOP responsibility and backup contacts.
Fire Department: Fire Chief, Assistant Fire Chief, First Division Fire Chief
Police Department: Police Chief, Commander-Patrol Division; Commander-Support Services Division
Technology Services: Director of Technology Services, GIS Director, Network Director
Public Works Department: Public Works Director, Field Operations Manager, Water Superintendent
COOP implementation: Emergency Management Coordinator, Town COOP Supervisor, Town COOP Coordinator

Orders of succession should always designate position titles. Individual names should not be listed. All position and contact lists for succession orders should be formally included in the written COOP. Also included should be procedures for promptly notifying participants of any changes in succession. For each department and for each essential function, orders of succession should:

- Set rules and procedures for conditions of succession, means of notification, and any specific limits on authority.
- Define any authorities that cannot be delegated and how they are to be exercised.
- Include position training for successors.
- Set rules for termination or transfer of authority to persons outside the designated order of succession.

Alternate Facilities

The decision to use alternate facilities for delivering essential services produces many challenges. This decision should be made only after careful analysis. When possible, mitigation planning should be used to improve the hazard resistance of structures. Or the essential functions should be permanently relocated to an existing facility that is safe. Sometimes essential functions can be supported by telecommuting. This allows personnel to work from home. Or they can use distributed computer resources. When feasible, these practices can reduce the need for alternate sites. At the least, they can reduce the space requirements. You should develop procedures for relocating to alternate facilities during an emergency period *only after all other measures have failed*. The alternate facilities work group uses the preimpact planning analysis of the COOP team as a basis. The work group's first goal is to confirm the analysis regarding required alternate facilities for each essential function. A full reassessment may require obtaining the services of many subject matter experts.

Alternate sites must be evaluated and selected. The most cost-effective alternate sites are buildings that are part of the jurisdiction's infrastructure. Structures belonging to other governments located in or close to the jurisdiction are also preferred alternate facility sites. The alternate facility must either be resistant to the forces of hazards or outside of the risk area. Among safe structures, the choice should be based on several criteria:

- Availability of required infrastructure: electric power, fuel (e.g., natural gas), water, sewer, telecommunications, and transportation.
- Availability of the space defined by the essential functions work group.
- Presence of any special wiring or other configurations for IT functions.
- Capability for meeting any special communications needs.
- Amenability to security and access control.
- Location relative to essential functions not relocated.
- Ability to sustain relocated function through the COOP activation period.
- Ability to allow immediate resumption of essential service delivery following relocation.

- Ease of access to site by employees and emergency teams.
- Accommodation of the personal health, safety, and mental health well-being of relocated employees.

It may be that no facilities owned by the jurisdiction can be adapted to these needs. Then the work group must identify acceptable sites. They must work with the COO-planning team and administrative leadership to contract with the private sector. It is critical to establish that possession can be taken with no notice. The facility must be ready for operation with few or no alterations. Possession must be retained for an indeterminate period. It is appropriate to place as many essential services at one alternate site as the facility can accommodate.

The process of relocating essential services is a major demand when the COOP is implemented. You can establish contracts for relocation support with private firms. However, you should confirm that the contracted firm is not itself vulnerable to disaster impact. In addition, you should establish contracts with backup vendors. You should demand that a minimum time standard be set for contractors to begin work after the contract has been activated. The same standards apply when relocation is to be accomplished by jurisdiction personnel. This means the relocation teams should draw on personnel assigned to departmental COOP teams. When alternate sites are required, work on restoration or continuation of services cannot begin until relocation is complete.

The use of alternate facilities requires you to determine when to move. Relocation plans should identify an assessment process. There should be rules for deciding to abandon primary sites is made. Initial determinations may be made on the basis of visible damage to buildings or lifeline support. However, you should devise a protocol for building inspectors to verify safe occupancy. Plans for relocation should be formalized and address several features:

- Notification process for the relocation (moving) teams.
- Notification of personnel to be relocated.
- Teams to reconfigure the alternate facility to receive any relocated staff and equipment.
- Sufficient relocation teams to move all essential functions simultaneously.
- Breakdown and setup teams operating simultaneously at main and alternate sites.
- Instructions for essential function personnel for personal records and equipment that should be personally moved (“go kits”).
- Employee check-in and credentialing at the alternate facility.

Relocation plans should be exercised like any other plan. Those who will operate from the alternate site should be familiar with the site and its layout.

When the normal operating facilities can be safely used, the entire relocation process will be done in reverse order.

Communications

The role of the communications work group is to ensure available communications are sufficient. During COOP implementation, people should be able to communicate. People should be able to reach staff in the EOC, alternate facilities, and response agencies as well. Private contractors must also be able to communicate with staff. COO communications planning should follow assignments and protocols specified in the EOP. This eliminates duplicative planning. It keeps the COOP flexible and manageably short. Public Information functions, for example, are defined in the EOP not the COOP.

The communications group reviews strategies developed by each essential function planning team. Special issues for review are planned communication links among the teams delivering essential functions, department employees not delivering essential functions, department COOP leaders and department managers, and the EOC. The goal is to specify primary and *multiple* backup modes of communication. It is difficult to identify which modes will be interrupted in a given disaster. Volcanic eruptions with high ash content block most communications. Hurricanes and floods can disable cellular towers. Earthquakes disrupt land telephone lines, cellular towers, and electrical grids. Loss of electricity knocks out internet and e-mail. Communication plans can specify primary and backup communications via many sources:

- Telephone
- Cellular
- Satellite Telephone
- Fax
- Data Links
- Paging Systems
- Internet
- Instant Messaging
- Blackberry/PDA
- Electronic Mail
- Radio
- Mass Media
- Emergency Systems (Emergency Alert System, secure communications)

Especially when alternative facilities are to be used, the communications work group should consider the availability of features to protect communications systems. These include:

- Uninterruptible power supplies (short-term backup power).
- Cooling adequacy of air conditioning relative to needs of imported or existing computer facilities.
- Gasoline- or diesel-powered generators for long-term power.
- Smoke detectors and fire suppression (sprinkler) systems.

A critical issue that arises in both the response and COOP implementation is interoperability. Interoperability refers to the ability of different departments and agencies to contact one another by using wireless communication. The U.S.

Conference of Mayors (2004a) studied 192 cities in 41 states. They found that 77% of cities are interoperable across police and fire departments. Only 50% share this capability across police, fire, public works, and emergency medical functions. Lack of interoperability has the same consequences as not being able to communicate at all. You can best address this issue through equipment changes and additions. In 2001, the U.S. Office of Management and Budget established the Wireless Public Safety Interoperable Communications Program (SAFECOM). This program uses federal efforts to fund and promote interoperability in federal, state, local, and tribal governments. Medium-term solutions can be achieved by using special mobile communications equipment. This equipment can intercept, interpret, and resend signals on common frequencies. Short-term interoperability can be ensured through multiple backup systems.

These issues increase as communications move from contacts between local agencies to contacts among local, state, and federal agencies. Only 12% of the cities studied were interoperable with U.S. Department of Homeland Security. Approximately 60% of the cities were not interoperable with their state EOC or state emergency management agency. Medium- and short-range solutions to these problems are the same as those for internal problems. The barrier is funding. The SAFECOM program is one federal effort to remedy the challenges. The long-term solution will require substantial changes in equipment and frequency availability for wireless communications.

Vital Records and Databases

All local governments operate computer systems. They maintain records of vital statistics. **Vital records** are government documentation of significant events in the lives of citizens. They vary by jurisdiction but include marriages, births, deaths, divorces, and other events. Governments retain archives and libraries. They also routinely generate legal and financial records for citizens, businesses, and employees. Few of these records are directly relevant to the response system. However, all of them must be preserved. They must be accessible to those who need them. Most of these records are kept in computer databases that should be addressed by the IT department's COO planning. During normal operations, these systems are backed up. Their contents are preserved in long-term storage media. In addition to IT protections, individual departments may evolve less systematic solutions for protecting operating records, such as:

- ▲ Procedures for daily backup of personal computer drives to disk/CD.
- ▲ Scanning paper records for electronic storage.
- ▲ Converting paper records to microfilm for off-site storage.
- ▲ Duplicating all records at time of creation on a backup medium.

Libraries, for example, keep collection preservation plans. These address how their possessions are preserved during on-site emergencies and communitywide disasters. Planning guidance is available through the Northeast Document Conservation Center (www.nedcc.org). It is also available from the Smithsonian Institution (www.si.edu). Guidance on vital records preservation for municipal clerks' offices and county vital statistics departments is available from the U.S. National Archives and Records Administration (www.archives.gov/preservation/emergency-prep/disaster-prep-primer.html).

COO planners are interested in a subset of data and systems during emergencies. The objective of the vital records and databases work group is to preserve functionality that supports the emergency response, as well as essential functions. Most local governments operate on a central mainframe service or multiple LANs that have central daily file backup. Those systems become critical targets for COO planning. The complexity of this task is reduced when IT departments maintain business ROPs for system protection. Common access drives are the preferred site for storage of operational records for all departments. They fall under ROP protection. In the event of system failures, IT departments retain both cold site and hot site input/output operations.

- ▲ **Cold sites** store disk-based restart information for computer systems.
- ▲ **Hot sites** run local systems on daily updates at remote locations.

A major COOP problem for such business continuity operations arises if employees keep information on local computer drives that are not backed up by the main system. The COO-planning team should also document jurisdiction operated radio systems, GISs, GPSs, and cellular systems that support response or essential functions.

COO preparations should identify the records needed to support operations. They must be addressed in procedures for data preservation. Data and records needed for emergency response are maintained and protected by the agencies that use them. General emergency operating records are ordinarily stored and secured in EOCs. These records include:

- ▲ Emergency plans and directives, including departmental business continuity plans, the EOP, and the COOP.
- ▲ Delegations of authority and orders of succession.
- ▲ Emergency staffing assignments and backup listings for critical personnel.
- ▲ Command post and EOC access codes and credentials.
- ▲ Building plans and systems operation manuals.
- ▲ Equipment inventories.
- ▲ Inventories of vital records.
- ▲ Records of resource-related mutual aid pacts and MOAs.
- ▲ Documentation for electronic information systems for emergency and essential functions.

Some records should be targeted for preservation. This should be done without regard to their relationship to emergency or essential functions. These include:

- Accounts-receivable records.
- Records of social security numbers.
- Payroll records.
- Retirement records.
- Insurance records.
- System documentation for electronic storage and retrieval of records related to rights and identity.

8.2.2 Security

In the post 9/11 environment, most local governments have established security and access controls for all primary physical facilities, critical infrastructure, and critical operations. The Florida Division of Emergency Management (2005: 43) describes four types of security:

- Operational Security, which protects access to plans, SOPs, and written information.
- Cyber Security, which protects against or detects attempts to access information systems.
- Physical Security, which presents physical barriers (hardening) or personnel intervention (guard staff) to block unauthorized access.
- Access Controls, often in the form of special identification, that allow entry to different areas contingent upon role and function.

The security work group reviews the vulnerability of primary and alternate facilities. They ensure adequate security is maintained for personnel, equipment, and software systems. Security needs are normally met by sworn law enforcement officers. Details of security procedures are specified in departmental SOPs. Security provided for essential functions should include facilities and processes that support the delivery of the function.

8.2.3 Operation and Maintenance of Continuity of Operations Plans

The COOP, like any emergency plan, must contain elements related to plan initiation, plan implementation, and planning process preservation. These issues are generic. They should be addressed by the full COOP team rather than by work groups. The jurisdiction COOP coordinator assumes responsibility for the COO program. This person is usually an emergency planner. This responsibility requires activation and termination in terms of plan specifications. This includes personnel notifications and callback if the plan is initiated outside normal working hours. Maintaining the planning process requires that the COOP coordinator establish periodic plan reviews. There must also be a training and exercise program. Plan maintenance also includes activities such as maintaining links to the mitigation plan, EOP, and ROP. Plan maintenance also includes setting short- and long-term goals for the program. These include budget projections and oversight.

Activation and Termination

All plans require rules for determining appropriate activation. Plans also include a listing of personnel with the authority to initiate action. A COOP is integrated under the EOP. The rules for activating a COOP are invested in the EOP. They are tied to the jurisdictional EOC and IMS (Rogoff et al., 2003). All personnel who have authority to activate a jurisdictional EOC also carry authority to activate the COOP. In cities, these personnel are usually the mayor, city manager, fire chief, police chief, and emergency management coordinator. It sometimes includes the public works director. The COOP Coordinator (and backup personnel) also has the authority to activate the COOP. In all IMS-based jurisdictions, incident commanders have the authority to request activation of an EOC and a COOP.

A COOP can be fully or partially activated. A local government may house different functions in many structures and locations. Disaster impact may interfere with some essential functions and not others. COOPs should provide for activation at the level of each department or each essential function. In this way, only the portion of the COOP related to the interrupted functions is activated. This minimizes unnecessary mobilization of personnel and equipment for unthreatened functions. The determination of which COOP processes to activate rests with the COOP Coordinator or the EOC Commander.

The decision to activate a COOP should be based on assessment of the situation. When disaster forewarning is short, the period of assessment is brief. You will need to rely on conservative, pre-defined standards. The COOP can be activated without activation of the EOP or the EOC if the essential functions are threatened by local problems rather than a disaster. Decisions to activate the COOP usually also include activation of other departmental business continuity plans. Jurisdictions vary in their criteria for plan activation. In general, a COOP is partially or fully activated when:

- A detected (forecast) disaster impact will greatly exceed the resistance of structures in which essential functions are located.
- Detected or projected loss of lifeline support will interrupt essential functions.
- Disaster- or terrorist-caused deaths and injuries among critical personnel have reached levels that endanger essential functions.
- Visual damage assessment indicates that structural damage or lifeline interruption exists that affects essential functions and cannot be repaired or temporarily restored within 12 hours.

- Building inspectors using instrumentation determine that structures in which essential functions are located cannot be occupied.
- Illness rates (with or without suspected terrorism) among critical personnel reach levels that endanger essential services.
- Localized incidents (fires, power failure, water leaks, or sewer failures) are affecting structures in which essential functions are located and the problem cannot be repaired in 12 hours.

The decision to activate a COOP requires assessment of the need to relocate functions to alternate facilities. Decisions to relocate are based on structural damage. Or they may be based on loss of electric power or other critical lifeline services. Or the decision may be based on other conditions that deny resources for their existing locations. The decision to move requires informing relocation teams. The decision might also require asking contractors to begin operations. When relocation is necessary, the COOP Coordinator also determines where essential function personnel will move. They will either report directly to an alternate site or to a staging area. Moving to a staging area allows additional time for site preparation.

Table 8-4 shows an example COOP activation statement. This statement designates personnel with activation authority. This statement lists criteria for activation. The statement also lists the contact procedure for implementing activation. This plan allows that the COOP may be activated from the EOC. It may be activated from the field by an incident commander. It can also be activated remotely by the COOP Coordinator on the advice of incident commanders or other authorities. The base for COOP implementation is the EOC. The activation rules also specify where those notified report for duty.

COOP implementation may not end at the same time as disaster operations. Conditions such as building damage or lifeline interruption may persist after operations are terminated. This extends the time when essential services are interrupted. COOP implementation closes when it is determined that essential functions can resume normal operations from their normal locations. The return to normal service involves an order to close the alternate facility. Functions must relocate to a primary or other designated facility. Then services are resumed on a normal schedule.

Personnel Notification and Callback

Departments that routinely provide emergency services have measures for personnel accounting and deployment. Fire and police departments maintain procedures for callbacks for personnel, specific teams, or entire shifts when demands exceed current staffing levels. Public works departments have similar protocols for supplementing personnel levels in emergencies. Other departments that deliver essential services under a COOP might not have established such measures. All departments delivering essential functions must have systems for personnel notification and callback. These systems will use communication modes

Table 8-4: COOP Activation Statement

Activation of the Continuity of Operations Plan
The COOP is implemented when a disaster or terrorist attack results in the interruption or potential interruption of the delivery of essential services. Such interruptions are likely to be produced by a large-scale event that will impact more than one department or essential service. In the presence of a large-scale event, the Anytown EOC will be activated and the COOP will be activated from the EOC.
A localized emergency (such as a building fire, water pipe rupture, explosion, or similar event) may affect a single or small number of departments or essential services. In such situations, it may be judged that the COOP should be implemented for selected departments (or the Technology Services or the Public Works EOCs should be activated). *The on-scene Incident Commander will determine the need to activate the COOP and if appropriate, notify the Emergency Management Coordinator to begin the notification process.* If conditions warrant, the Emergency Management Coordinator may delegate this notification to the COOP Supervisor. The EOC may or may not be activated in such situations. If the EOC is not activated, the Emergency Management Coordinator or the COOP Supervisor will select an appropriate base of operations and notify departmental COOP personnel.
The EOC may be activated by the Mayor, City Manager, Police Chief, Fire Chief, or Emergency Management Coordinator. Activation is initiated by notifying the Police Department Alarm Room Supervisor. The EOC Chief will determine the need to activate (fully or partially) the COOP. To activate the COOP from the EOC, the Emergency Management Coordinator or the COOP Supervisor will notify the Police Department Alarm Room Supervisor to activate the COOP Page Group notification. The Page Group is based on Microsoft Outlook technology and is a multiple-device (pager, Nextel, Cellular) system. The COOP notification goes to all department heads and COOP representatives from each department that provides essential services. On notification that the COOP has been activated, each departmental representative will proceed to their assigned work area or alternate site and begin the departmental notification process.
If an on-scene Incident Commander determines that the COOP should be activated, the Emergency Management Coordinator is notified through the Fire Department or Police Department Alarm Room. The Emergency Management Coordinator will initiate COOP activation through the Police Department Alarm Room Supervisor. If the Emergency Paging System is not functional, the Police Department Dispatch Supervisor will notify departmental representatives via telephone, satellite phone, cell phone, or other appropriate means.

planned by the communications work group of the COOP team. The definition of personnel to be notified divides employees into two broad groupings. One group is those directly involved in essential function delivery. The other group is those who are not. Systems must have the capability of notifying all employees that the COOP has been activated. As part of that communication or from training, each employee must know appropriate actions. COOP-relevant employees report to their assigned stations to deliver essential services. Other employees may support that effort. Or they may proceed with a different assignment. Table 8-5 shows an example notification and callback section for a COOP. This statement addresses the concern with notifying all employees and elected officials of COOP activation. It assigns responsibility to specific officials for determining who is needed at the EOC. It also describes the communications systems (and backup) to be used and the role of the Public Information Officer.

A COOP may be activated either during or outside normal working hours. These two very different situations raise important issues. The first one is managing personnel with and without essential function duties. The second issue is family notification. Except absentees, all employees are present when a COOP is activated during work hours. This notification can be swift. Employees can hear the message directly from a supervisor. When the COOP is activated outside working hours, essential function employees should be given reporting instructions. Other employees should be given COOP instructions with guidance on how to monitor conditions at work. Monitoring might involve directions to use a special information "hot line" or to monitor specific mass media for further instructions.

If the COOP requires employees without an essential function role to be sent home when activated during work hours, those leaving will be able to report to their families about their welfare. They can implement their own household emergency plans. Employees who remain at work will also feel family responsibilities. To assuage concerns about family safety, fire departments for many years have had programs that report on employee status to designated family members. They also initiate checks on family and home conditions and report to employees. Depending on the nature of the disaster, employee family members may be assisted in evacuating. They may be provided with resources for protection in place if needed. They may be given help in controlling damage to property. Family reports and "welfare checks" are scheduled periodically as long as the employee is on duty. Such programs are critical for all departments under COO planning. The size of the program will vary with resources. The establishment of at least a minimal program significantly strengthens the motivation of employees. It also reduces the distractions of employees who must work during emergencies.

Plan Review, Training, and Exercises

To be effective, the process of COO planning must be ongoing. This is accomplished through its integration with the jurisdiction emergency-planning process. It is also accomplished through COOP reviews, training, and exercises. Each of

Table 8-5: COOP Notification and Callback Element

Notification and Callback
1. Elected Officials and Town Manager
When the Anytown EOC is activated, notification is immediately provided to the Mayor, Town Manager, Police Chief, Fire Chief, and Emergency Management Coordinator (Town EOP, Annex A, Appendix 1, Sections 1 and 2). If the COOP has been activated by an on-scene Incident Commander, each of the preceding officials will be so informed. If the COOP is to be activated from the EOC, the preceding officials will be informed by the EOC.
The Mayor determines which elected officials need to be notified COOP activation. The Mayor determines which elected officials are required at the EOC or other designated locations. The City Manager will determine which staff are notified of COOP activation and which are required at the EOC.
Notifications and callbacks are provided via telephone or cellular telephone. Paging systems may be used if deemed appropriate. Notifications and callbacks can be assigned to the Police Department Dispatch Center or the Fire Department Alarm Room. When other systems have failed, public safety personnel or Anytown staff may be dispatched to deliver notification and instructions face-to-face.
2. Departments
Activation of the COOP notifies the department head, who will notify the department COOP Coordinator. If the COOP Coordinator receives notification directly, then the COOP representative will notify the department head immediately.
If the COOP is activated during normal working hours, the department COOP Coordinator will notify the departmental COO-planning team and all other departmental employees. The COOP Coordinator will determine whether non-COO-planning team employees will remain at their posts, assist COO planning team members, assume other responsibilities, or return to their homes. If relocation to a designated alternate facility is required, the COOP Coordinator will determine whether non-COO-planning team members are required at the alternate facility.
If the COOP is activated outside normal working hours, the department COOP Coordinator will notify the COO-planning team and instruct members whether callback is to their normal work station, a designated alternative facility, or some other location.

(continued)

Table 8-5 ***(continued)***

The jurisdiction's Emergency Management Coordinator or COOP Coordinator, on activation outside normal working hours, will inform the PIO and request that announcements be released to local radio and television stations regarding "nonemergency employees". These announcements may instruct non-COO-planning team employees to (1) report to work stations as normal, (2) report to an alternate location, or (3) to not report to work until further contact has been initiated by the Anytown government. Employees who do not hear such announcements and report to their normal work station are met by Anytown staff and briefed.
When the Public Works Director is notified of COOP activation, the Public Works departmental EOC will be activated and the Water and Wastewater Systems Emergency Response Plan engaged. When the Technology Services Director is notified, the Technology Services Business Continuity Plan will be activated.

these elements is directly addressed in the plan. The jurisdictional COOP coordinator assumes responsibility for conducting plan reviews. These should take place at least annually. They should involve full representation from elected bodies, administrative leadership, emergency management, and all departments and essential functions supported by the COOP. The review should address the adequacy of the plan. The review should also address new conditions that might require incorporation of additional essential functions or fundamental changes in operational strategy or logistics. The use of personnel from nearby jurisdictions and subject matter experts enhances the effectiveness of these reviews. As part of the review process, you should establish procedures for incorporating changes in the plan. Training should reflect changes. Finally, plan review should be completed following each exercise or incident-initiated activation of the COOP. And you should redistribute the revised plan.

The COOP coordinator oversees training processes connected with the COOP. Training that is specific to essential function delivery is normally covered in departmental SOPs. It is scheduled by those authorities. This type of training prepares individuals and teams to accomplish particular tasks. They use selected equipment under defined conditions. Training that is overseen at the jurisdictional level includes:

- ▲ COOP awareness training, including family preparedness and jurisdictional programs for family support, for all employees.
- ▲ COOP activation, concept of operations, and communications training for incident commanders, senior elected and appointed officials, department heads, and EOC personnel.
- ▲ COOP processes and responsibilities for employees who do not execute essential functions.

- ▲ Training for jurisdictional relocation teams or training for jurisdictional personnel who will coordinate the activity of contracted or external relocation teams.

Targets for training should include personnel with primary responsibilities. Their backups should be trained. Those who may assume responsibility through authority delegations or succession orders need to be trained as well. Training should be offered at least once a year. The training plan should include provisions for immediate training of new or reassigned personnel.

Exercises are a way to checking the functionality of the jurisdictional COOP program. You will need to include the full range of exercise types. These include tabletop, functional, and full-scale. At least one full-scale exercise should be accomplished each year. As the program becomes more established, the exercise emphasis should move away from awareness-type tabletops to emphasize functional and full-scale activities. The exercise program should include scenarios that:

- ▲ Use a wide range of potential hazards.
- ▲ Address all phases of COOP implementation: activation, notification, relocation, communications, essential function delivery, resumption of normal operations, and plan deactivation.
- ▲ Address principal systems, particularly interoperable communications, internet dependence, and jurisdictional information and computer systems.
- ▲ Test alternate facility operational capabilities.
- ▲ Evaluate logistical support, services, and infrastructure systems.
- ▲ Test the ability of COOP personnel to work with emergency response system personnel.
- ▲ Test the intergovernmental and interagency relationships specified in the plan.

The Continuity of Operations Plan

There is a lot of information on COO-planning processes, plan organization, and plan writing. Much of this guidance is very elaborate. The COOP information from FEMA (2004a), the Maryland Emergency Management Agency (2004), and the Florida Division of Emergency Management (2005) approaches or exceeds 100 pages. These are useful documents. They provide much detail. However, you should not assume that the length of the COOP should match that of the guidance. Lengthy plans may become unusable during an emergency. You will need to embrace several principles:

- ▲ COOPs are part of the jurisdictional emergency-planning process. They rely on the same supporting analyses generated in that process.
- ▲ COOPs should be linked to the jurisdictional EOP. The COOP uses the same EOCs and IMS.

FOR EXAMPLE

North Dakota's Government Functions

North Dakota's COOP classifies functions according to four levels depending on loss of life, economic viability, and confidence in government. *Essential* functions produce negative consequences in one or more of these criteria if interrupted for 24 hours or less. *Vital* functions produce negative outcomes only after 72 hours. *Necessary* functions produce negative outcomes if not restored within 2 weeks. *Desired* functions are those that could be interrupted for more than 2 weeks. Only essential functions were addressed under the COOP.

- ▲ COOPs should cross-reference and integrate the business continuity planning done by jurisdiction departments.
- ▲ COOP implementation is the duty of each department with an essential function. Each department is responsible for organizing, equipping, training, and exercising to ensure success.
- ▲ COO planning should be linked to the jurisdictional mitigation plan. It should form a bridge to the recovery planning process.

These points emphasize that the COOP does not exist in isolation. The COOP should not duplicate existing analyses in other plans. The COOP should not duplicate teams that are in other plans. These practices ensure that the COOP is brief and functional for personnel who must use it. The guidance available from the North Dakota Emergency Management Agency (2003) and the Wisconsin County Government (2002) represent approaches that reflect these planning principles.

SELF-CHECK

- ▲ Why do you want to move decisions about the priority of restoring essential services from the emergency response period to the COO planning process?
- ▲ Relocating to alternate sites greatly increases the complexity of a COOP. What are some measures you can use to avoid it?
- ▲ Under a COOP, employees who are not "regular" emergency services people will be asked to continue to execute an essential function during a disaster. They will worry about their families. How can you address these worries in the planning process?
- ▲ Once it is designed and operating, how do you ensure the effectiveness of your COO plan?

8.3 Business Continuity Plans

Businesses are damaged by disasters too. A **business continuity plan** addresses the measures that will be used to preserve business operability and market share during and after a disaster. Cerullo and Cerullo (2004: 70) studied Hurricane Andrew's impact on Florida in 1992. Eighty percent of the businesses without a recovery plan failed within 2 years. In 1998, more than 75% of U.S. businesses lacked continuity plans (Hartford Loss Control Department, 1998). Following the 9/11 attacks, the number of businesses with plans increased to 30% (Hagg, 2002). The number grew to 50% 2 years later (Contingency Planning and Management, 2004). Other studies show low estimates as well. Drabek (1994) surveyed 185 tourist-oriented firms. He found only 31% of the businesses had adequate levels of evacuation preparedness. Fewer than half of the businesses interviewed in the earthquake-prone San Francisco Bay Area had emergency plans. They also had not trained employees. And they had not conducted drills (Mileti and Fitzpatrick 1993). This is despite this area's experience in the Loma Prieta earthquake only a few years earlier. A study of Memphis and Des Moines found low levels of preparedness. Businesses in Memphis had implemented an average of only 4 of 17 recommended preparedness activities. Those in Des Moines used an average of only 1.7 of 13 measures (Dahlhamer and D'Souza, 1997).

Plan effectiveness has not been addressed in studies. However, the results available show serious problems. A 2002 study reported that 40% of businesses that claimed to have a continuity plan had not conducted a vulnerability analysis. Nor had they conducted a business impact analysis (Ernst and Young, 2002). Ernest-Jones (2005) conducted a national survey of businesses. The survey revealed that, among those having a plan, 19% had never tested the plan or couldn't remember a test. Also, 59% had not tested the plan in the past year. In addition to incomplete plans, preparedness is often narrow. It is focused on computer systems (Wold, 1997). Kennedy, Perrottet, and Thomas (2003) emphasized the need for businesses to develop an ongoing planning process. This should mirror the processes used in governments. Herbane, Elliott, and Swartz (2004) have stressed that business continuity planning should be part of strategic management. It should also incorporate mitigation measures. It should address the full range of threats to external dependencies. For example, the dependencies would include supply and distribution chains.

Local government is an important stakeholder in business emergency planning. When businesses are damaged, both those businesses and the local economy suffer. This is true whether the businesses are temporarily or permanently damaged. Employees may lose their jobs. Residents may be forced to search elsewhere for goods and services that were readily available before the disaster. The problems are worse when entire business districts are damaged or destroyed. Households suffer because their shopping patterns are disrupted. Businesses suffer because they rely on business-to-business sales. They also suffer because they rely on other businesses to assist them in attracting customers. Finally, local government suffers a loss of sales and property tax revenues. Kayyem and Chang (2002) argue that LEMAs should consider outreach and planning support for local businesses. This will help the residents, businesses, and the government.

The benefits of COO planning for businesses are extensive. The ultimate risk for business is complete failure. This outcome exceeds the penalty to local governments, which can count on support from state and federal government. A comprehensive business disaster plan:

- Reduces health and safety risks to employees and customers.
- Minimizes production downtime.
- Reduces impact damage to facilities and nonstructural (equipment) components.
- Protects information systems (including software programs and data).
- Reduces damage to inventories of raw, intermediate, or finished products.
- Protects market share and defection of customers.
- Protects shareholder (stock) value.
- Minimizes brand deterioration.
- Reduces insurance costs.
- Facilitates compliance with government regulatory requirements.

There are two big barriers to business recovery planning. These are cost and time investment (Yoshida and Deyle, 2005). Both of these issues must be considered in perspective if they are to be overcome. The cost of developing a business ROP will be small compared with the costs of damage repair, lost revenue, and lost market share. These costs will be high even in a moderate sized disaster. The time investment is usually also measured in monetary terms. It can be expressed as initial investment versus ongoing investment. The initial investment to hire a consulting firm or assemble an internal planning team depends on the size of the firm. It can be partially recouped through immediate insurance savings and can be amortized over the projected life of the business. Training and exercise costs can be largely absorbed. This can be done by assigning responsibility for these functions to security, risk management, and loss control departments that normally protect business revenue. Frost (1994) argues that this planning offers a kind of “internal insurance” against many kinds of potential losses. This insurance prevents problems. It offers tax advantages. It offsets both operating costs and external insurance costs. Internal insurance is particularly desirable when you realize that SBA recovery loans are difficult to obtain and slow to arrive, especially when a disaster affects a wide area (Mowbray, 2005).

There is much guidance for the process of developing and maintaining business continuity plans. Cerullo and Cerullo (2004) found that a large consulting industry is available for business plan construction. There are 19 organizations, insurance companies, and associations that support no-cost or low-cost professional guidance for business continuity planning. FEMA (2003a) and other groups have developed an *Emergency Management Guide for Business & Industry.* This guide outlines a planning process. It identifies critical corporate emergency management functions. It provides information about a variety of hazards. It lists sources to contact for further information. The substantial volume of books and technical articles designed to support business recovery planning can facilitate any attempt to design a planning process.

Business recovery planning differs little from government COO planning (Fontana and Connor, 2001; Kayyem and Chang, 2002). The most important factor for success in both is getting the attention of the CEO to allocate the resources and influence that will support the planning process. The planning process encompasses the same milestones for businesses as for governments. The content of the plans are parallel. Definitions of essential functions are specific to the business. However, the process of identifying them and planning for their continued function is comparable with public sector efforts. In both sectors, the success of plans depends on an active training program, plan review process, and exercise program.

One significant issue for private sector disaster planning is that businesses are built around products and services. Planning for environmental extremes is not widely recognized as a concern. There are several issues that deserve special attention in business disaster planning.

- ▲ Kayyem and Chang (2002) urge businesses to form partnerships with local government when developing disaster plans. Mutual interest is the motivating factor. Local government emergency planners have experience in disaster planning. They have access to jurisdictional H/VAs and other supporting analyses. They have access to subject matter experts. They have knowledge of specialized guidance. They have experience in plan writing. They have knowledge of training and exercise programs.
- ▲ Gupta (2002) found that business ROPs must address a wide range of dependencies. They depend on their supplier. They depend on their customers. They depend on their employees. It is important that you identify all third-party dependencies or chain dependencies. An example of a chain dependency is a dependency on the production of the products that businesses need. Transportation services are a critical dependency. Internet service providers, vendors, distributors, and financial services are part of the critical dependencies that can be interrupted by disasters.
- ▲ Morwood (1998) advised that special attention be given to establishing on-site incident response teams and IMSs. Businesses have executive chains of command. Response teams must often cross normal authority lines. There is also a difference between executive decision makers and managers who command disaster responses. These differences are in skills, expertise, and goals. An internal incident management system clarifies responsibilities and authority during disaster operations.

FOR EXAMPLE

Broward County Business Disaster

In 2005, Hurricane Wilma made landfall in Broward County, Florida. One-half of all businesses experienced minor to moderate damage. Twenty percent saw serious damage. This includes roof collapse or complete inventory loss. Small and moderate sized businesses were the most seriously affected. The National Minority Chamber of Commerce reported that 90% of its 390 local members reported damage. This was both infrastructure damage and revenue loss. There were larger businesses that had engaged in predisaster protection. These experienced much lower levels of damage.

- ▲ Savage (2002) emphasized that special provisions should be made to establish a company EOC. Disaster operations can rarely be effectively run from a conference room or security center. Special communications equipment and other resources must be assembled. They must be assembled in an appropriate secure location free of distractions.
- ▲ Moore (1995) contended that business plans often ignored potential need for temporarily relocating operations. The plans also ignore the need to relocate management. Both these arrangements must be preplanned.
- ▲ Cerullo and Cerullo (2004) report special difficulties arise in sustaining training and exercise programs for business plans. The ability to mount effective emergency operations quickly decays in the absence of sustained training and exercises. These features need to be explicit in the plan. The plan manager should renew top management commitment to disaster preparations. This should be done at least once a year.

SELF-CHECK

- Why do we say that local governments have a high state in business recovery following disasters?
- Because business recovery planning has been talked about for so many years, businesses must be good at it. Right?
- What is the difference between executive decision makers and emergency decision makers? Can't we just use the CEO for disaster incident command?
- What are the main reasons that businesses fail to develop business recovery plans?

SUMMARY

One of your goals as an emergency planner is to keep the emergency response organization running even during a disaster. This may entail moving operations and relocating employees. You will need to be able to have an EOC and key personnel working and communicating during response and recovery. You also have to ensure that essential services are working. For example, there may be lack of clean water available after a hurricane. Then you would have a public health crisis on top of the damaged buildings and displaced residents that need support. In addition, businesses must have continuity operations plans. You can work with businesses to ensure that they have a solid plan that will allow them to survive a disaster. Businesses employ residents, provide goods and services, and contribute to the local tax bases. Businesses are an important sector of every community.

KEY TERMS

Alternate Facility	A structure that has been tested and can survive maximum likely disaster agent forces and provides all necessities for delivering an essential service.
Business Continuity Plan	A plan that addresses the measures that will be used to preserve business operability and market share during and after a disaster.
Cold Site	Site that stores disk-based restart information for computer systems.
Continuity of Government	Measures that ensure that representative government survives during and after a disaster.
Continuity of Operations	Measures that ensure that government departments can deliver essential services during and after a disaster.
Delegation of Authority	Process that sets rules for which lower officials assume the authority of higher officials temporarily unable to serve.
Essential Functions	The definition varies, but usually these functions are ones that create negative outcomes within 24 hours of curtailment.
Hot Site	A facility that runs local computer systems on daily updates at remote locations.
Necessary Functions	Functions that cause negative outcomes only if they are curtailed for 14 days or more.

Order of Succession	Defines the sequence of role incumbents who replace a higher-level position incumbent who permanently cannot serve.
Production Chain	The sequence of actions by individuals and organizations, with added resources, that ends with successful service delivery.
Vital Functions	Functions that create negative outcomes if curtailed for more than 72 hours.
Vital Records	Government documentation of significant events in the lives of citizens, including marriages, births, deaths, and divorces.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of the basics of the continuity of operations plans.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. Business disaster continuity plans protect businesses but have little impact on government. True or False?
2. To successfully build a COOP, you must have the vocal and visible support of elected officials and top administrators in a government. True or False?
3. Federal agencies are required by statute, Presidential Decision Directives, and Executive Orders to have continuity of operations and government plans. True or False?
4. The available research shows that most businesses do not have functional business continuity plans. True or False?
5. Functions that create negative outcomes if they are suspended for more than 72 hours are considered:
   (a) essential functions.
   (b) vital functions.
   (c) necessary functions.
   (d) preferred functions.
6. Having water available to the public is an:
   (a) essential functions.
   (b) vital functions.
   (c) necessary functions.
   (d) preferred functions.
7. One circumstance that usually requires COOP activation is a disaster that causes many deaths and injuries among people who execute necessary functions. True or False?
8. Order of succession and delegation of authority are the same. True or False?
9. A business recovery plan should include establishment of an on-site emergency operations center. True or False?

Review Questions

1. What are the primary goals of government COOPs?
2. What is the difference between COO and COG?
3. How is mitigation and recovery planning related to COOPs?

Applying This Chapter

1. You are a planner in Chandler, Arizona. This community has a strong tradition of emergency management but has always been very small and felt no COOP was needed. Explosive growth in the past 4 years has increased local government size and complexity. You are beginning to develop the plan. What is the purpose of developing a concept of operations statement?
2. Lodi, California, has a strong agricultural economy, an effective EOP, and a COOP. Concern has arisen about business preparedness and you think it would increase if the LEMA did outreach. How will you explain to the City Manager that local governments have a stake in promoting continuity planning by local businesses?
3. You are leading the relocation planning group under the Abilene, Texas COO planning team. You are reviewing the EOP and trying to figure out safe ways to reduce relocation and alternate site demands. What operational challenges impede relocation strategies? What measures are available to reduce dependence on alternate sites?

YOU TRY IT

Relocation Team Construction

Your jurisdictional COO planning team has determined that only one essential function, water service systems, is to be relocated to an alternate facility. A city facility has been identified that meets the requirements for housing this essential function. You have been selected to lead a work group of city personnel to handle relocation when the COOP is activated. What will the team you create look like organizationally? What equipment will you request? How will you handle notification and callback for these teams?

Cross-Sector Planning

Your city has a strong emergency management and planning program. The local economy is diverse but depends on a large number of locally owned small businesses with no single large employers. How will you convince the local city manager that your agency should develop an outreach program to promote local business disaster planning? What elements or services will you include in this program?

LEMA Business Outreach Program

As part of the COOP and city recovery operations plan reviews, you have become concerned that although the government sector is strong, the business sector is not. The COO process has alerted LEMA planners to the concern that supply chain interruptions and physical damages to businesses may cause a serious impact on the local economy. And this impact will inevitably hurt government. A quick phone survey reveals that only one business in your area has done a continuity plan. The LEMA has started outreach to increase planning. What arguments will you give business owners, managers, and operators that they should be doing continuity plans?

9

MILESTONES THAT STRUCTURE EMERGENCY PLANNING

Organizing Tasks for Emergency Planners

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of the milestones that structure emergency planning.
Determine where to concentrate your effort.

What You'll Learn in This Chapter

▲ The structure and execution of strategic analysis in the planning process
▲ The structure and execution of operational analysis in the planning process
▲ The complementary roles of operational analysis, strategic analysis, and resource mobilization
▲ The close relationship between mitigation planning and recovery planning
▲ Applications of communication to achieve planning objectives

After Studying This Chapter, You'll Be Able To

▲ Apply principles for communicating risk to the public
▲ Interrelate changes in vulnerability with changes in protective strategy
▲ Prepare assessments of an emergency agency and plan
▲ Prepare resources for mitigation projects and planning
▲ Examine issues the LEMA must address for recovery planning

Goals and Outcomes

▲ Assess specific tasks in strategic analysis
▲ Assemble a disaster recovery committee
▲ Create a Crisis Communication Team
▲ Assess federal mandates for local training and exercises
▲ Manage information dissemination in an escalating crisis

INTRODUCTION

Community hazard management is done by the local emergency management agency (LEMA) in a jurisdictional context. This context includes the emergency management system. Also included are the public policy and the intergovernmental systems. The technology for specific hazards places limits on how these systems create policies. The hazard management policy directs the ways that mitigation, preparedness, response, and recovery are accomplished. The goal of emergency planning is community preparedness. The scope of tasks for emergency preparedness is guided by response capabilities. These activities also overlap mitigation and recovery strategies. The ability to mitigate affects the way we respond to disasters; high levels of mitigation reduce the need for emergency response. High levels of community preparedness and response capabilities shape the needs for recovery planning. The connections between all emergency management tasks are reflected in the planning process and the emergency operations plan (EOP).

These connections demand that planning efforts be coordinated. The planning calendar must be year-round. Hazards have two time frames during which you play two different roles. First, there are times when the threat of a disaster impact is very low. This is when you conduct hazard/vulnerability analyses (H/VAs), plan, train, and exercise. Second, there are times when a disaster is imminent. When a crisis looms, you are actively engaged in plan implementation. You may even be working in an emergency operations center (EOC). You must perform tasks during each of these two periods, so it is important to know the tasks that define each time period.

The continuing hazard phase means it is *possible* that disasters could threaten public safety, property, and the environment, but no threat is imminent. This phase often involves hazard mitigation and emergency preparedness activities. Recovery preparations are also undertaken. You perform five functions during this phase: strategic analysis, operational analysis, resource mobilization, program development, and program implementation. These functions are not executed in sequence. They are performed all at once. Strategic analysis, operational analysis, and resource mobilization support the jurisdiction's emergency response. But hazard planning is broader than just the response of agencies. LEMAs develop strategies that are embodied in programs to communicate with citizens, public officials, nonprofit groups, and private organizations. These programs are targets for you during the continuing hazard phase.

The tasks associated with strategic analysis in the continuing hazard phase are discussed first. This review is followed by the other two tasks in the continuing hazard phase: operational analysis and resource analysis. The closing discussion reviews issues relevant to the crisis phase.

9.1 Strategic Analysis

Strategic analysis creates the information that keeps the planning process going. Strategic analysis tends to be highly complex. It provides the knowledge to make intelligent choices.

Step 1: Continue community hazard vulnerability analysis. Emergency planning must come from a careful hazard/vulnerability analysis (H/VA). H/VA is a continuing process. You revisit H/VAs annually to keep current with changes. Environmental scanning is a primary means of seeing new threats. You must look at the geographic areas of the community that are at greatest risk. And you must know who and what are the most vulnerable to disasters. This knowledge serves three purposes. First, it allows you to communicate vulnerability to community leaders. Second, it makes possible the renewal and review of plans for a response. Third, it supports the process of selecting protective action recommendations (PARs). By renewing hazard maps, you learn of changes in high risk areas. Thus, the EOP is realigned. And there is a focus on risk communications to the public. Renewed mapping of vulnerable areas, coupled with knowledge of their demographics, business composition, and economic dependencies, helps you to identify which combinations of incentives, sanctions, and new technology are best suited to increasing citizens' and businesses' hazard adjustment adoption.

Step 2: Continue to build understanding of the community context. Without people and their constructions, hazards rarely produce disasters. The mix of an event and the human element occupies the attention of planners. Knowing the changing community leads to good emergency management. The structure of the community affects the type of programs that are feasible. It affects the level of preparedness. It affects the way the response system works. And it affects the paths to recovery. Disasters are a local problem. Environmental hazard management is primarily a local activity. You must know the public policy system. You must also know about households, businesses, and organizations. Key points to be watched include ethnic groupings, communication channels, perceptions of authorities, and education and income distribution. On-line census data become dated quickly. Various local planning departments and associations maintain updated information.

Environmental hazards usually are not high priorities for officials, business leaders, and households. The planners must create hazard awareness and support for adopting hazard adjustments. A strategy includes specific programs that work. It also includes the creation of groups for hazard management. Knowledge of the community lets planners to send clear messages to these groups.

Step 3: Monitor community perceptions of hazards and hazard adjustments. The way hazards and protective actions are viewed by authorities, businesses, and households affect the way you design strategies and policies. These views reveal the necessary mix of program emphasis. You must attend to creating awareness and explaining vulnerability. At the same time, you explain what measures reduce vulnerability and how. Knowing how hazards and adjustments are viewed tells you about the need for and nature of risk communication programs.

Monitoring community perceptions can be done in various ways, depending on the LEMA's resources. Less resource-consuming approaches include monitoring local print and broadcast news, following local magazine stories reporting (or not reporting) on hazards, listening to radio talk shows, following issues raised in political campaigns, attending city or county council meetings, and being aware of local hazard activist group activities. You can also attend local emergency planning committee (LEPC) meetings. More resource-intensive approaches include commissioning public opinion surveys, conducting personal interviews with key business leaders and jurisdictional authorities. Organizing public meetings in the community also use more resources.

Information from monitoring perceptions is used to identify misunderstanding that may create barriers to effective strategy and policies. You use information from the monitoring process to identify perceptions likely to create barriers to emergency management. A belief in disaster myths is one kind of barrier. Another type of barrier arises from the difference between the public perception of danger and "expert assessments" of danger. Slovic (1987) reports that the public feels greater risks are linked with nuclear power plants and chemical facilities. The public often believes that technological hazards are more dangerous than experts say. They also feel natural hazards are less dangerous (Lindell and Perry, 2001). You can address misperceptions through risk communication programs.

Finally, emergency planners who know people's beliefs can assess the need for explaining risk reduction. Describing risks linked with hazards without information about protective responses simply creates fear. And while some might seek more information, many might not. Some might ignore information about protective actions. Often people have little awareness of appropriate hazard adjustments. There is wide variation in people's ratings of the efficacy and resource needs of adjustments. You need to clearly share information about specific household hazard adjustments and their effectiveness when communicating risks. See Figure 9-1 for an example of a hazard adjustment.

Step 4: Set goals for the risk communication program. The risk communication process is used to educate people about hazards and about reducing their vulnerability. Risk communications also target local officials and businesses. Risk communications tell everyone the LEMA is doing its job. Effective LEMAs have ongoing programs. Their goals include creating

Figure 9-1

Following Hurricane Floyd the house on the left was raised to mitigate flooding from storm suige. It sharply contrasts with the higher risk home on the right.

hazard awareness, sharing hazard adjustment information, and explaining people's personal responsibility for protection.

Hazard awareness is the first step in the process of hazard adjustment. To adopt hazard adjustments, people need to know about the hazards and the vulnerability they create. These needs require planners to share a range of information. Understanding vulnerability demands that people know if events of different magnitudes will occur in their location. For example, addressing hurricane threats requires you to discuss atmospheric processes and long-term threats posed by hurricanes. You must ensure that local residents personalize the risks to themselves and their families. They must appreciate the chance of damage to their property and disruption to their lives. You might share maps showing the dangers from wind and storm surge. You might describe the vulnerability of different types of structures. Hurricane-prone areas can be marked on large-scale maps showing local landmarks.

High levels of community disaster preparedness come when you foster people's sense of personal responsibility for self-protection. Risk communications explain the limits of what local government and industry can do. People can do much to prevent damage to their homes and avoid death or injury to themselves and their families. The communications should tell people about the different types of hazard adjustments. They should have accurate information about the efficacy and resource needs for these adjustments.

Risk communication about environmental hazards should be a long-term process. Whether targeting businesses or households, you should follow four guidelines in structuring risk communications:

- ▲ Repeat messages to reach newcomers and reinforce information.
- ▲ Send the same message at different times of the year.
- ▲ Send the same message from different sources using different communication channels.
- ▲ Send messages about protections that are grouped by hazard (hurricane protections) and by type of protection (evacuation for hurricanes, floods, chemical accidents, or volcanic eruptions).

Sustained risk communication programs create significant increases in preparedness. A long-term approach is not likely to have immediate results, but it can help put hazards on the political agenda. Attention in the policy arena reinforces that individual efforts are important. By taking an incremental approach over many years, you reinforce previous messages and build a cumulative impact. A phased approach reduces the need to cover all the issues in a single effort. This way you won't overload residents with information.

Step 5: Address issues in mitigation planning. Hazard mitigation tries to prevent disasters or reduce the likelihood of negative outcomes. Prevention avoids or reduces the need for emergency response. Mitigation is a critical part of the process of managing hazards. It is related to recovery. Mitigation is done by controlling the hazard agent or the human use system. Technology dictates whether measures can be undertaken to attack hazard agents. Hazards linked with processes that humans exert a degree of control over are more easily mitigated. Natural hazards are mitigated by changing the relationship of humans and the built environment to the hazard agent.

Both forms of mitigation involve high costs to a jurisdiction. They are often viewed with skepticism by officials. The costs may be a direct financial outlay (e.g., retrofitting buildings). Other costs are related to the political will and the policy process. Political will is often required to get households and businesses out of flood plains. The Disaster Mitigation Act of 2000 requires states, tribes, and local governments to develop hazard mitigation programs. There is a small monetary incentive for compliance through increased funding from federally sponsored mitigation grants.

The requirement that local governments make plans does not erase the skepticism of the authorities. LEMAs take the lead coordinated mitigation planning. The first challenge is to present arguments supporting the need for mitigation. Advantages to mitigation rest with its ability to:

- ▲ Prevent loss of life and injury.
- ▲ Reduce or eliminate property damage.
- ▲ Reduce economic losses and contribute to a resilient economy.
- ▲ Reduce social dislocation and victim stress.
- ▲ Minimize losses to agricultural and livestock sectors.
- ▲ Protect infrastructure from damage.
- ▲ Reduce legal liability for government and public officials under failure to plan complaints.
- ▲ Reduce interruptions of critical facility function (like utilities and telecommunications).

The second challenge is tracking local hazards for mitigation efforts. Plans should create specific measures that build high levels of mitigation over time. Local plans possess two important elements: identifying specific projects and locating resources.

Your role in mitigation strategy formation has two parts. The first part is to establish the value of mitigation (especially to local officials and businesses). Descriptions of hazard vulnerability can establish the need of mitigation activities. But you also need to explain the costs and benefits of these measures. Two important resources for planners were published by FEMA: *Report on Costs and Benefits of Natural Hazard Mitigation* (1998a) and *Protecting Business Operations* (1998b). Each of these reports documents case studies that produced favorable cost-benefit ratios. Development is an important revenue concern to local governments. Showing developers and businesses cost-effective ideas appeal to skeptical authorities. Such cost-effective mitigation measures for businesses include:

- ▲ Selecting other locations in a community that are less susceptible to natural hazards.
- ▲ Using design standards for new structures that reduce damage from hazards.
- ▲ Raising buildings or critical equipment above the likely level of floods.
- ▲ Reinforcing building components that might be damaged by ground shaking or wind.
- ▲ Hardening systems for water, natural gas, electricity, sewage, and other lifelines that might be compromised by natural hazards.

The second part of mitigation strategy involves monitoring the availability of external funding. In most cases, this means looking to the federal government.

Natural hazard-specific programs are a primary funding source. These programs include the National Flood Insurance Program, the National Hurricane Program, the National Earthquake Hazards Reduction Program, and the National Dam Safety Program. FEMA also operates four general programs:

- ▲ The Hazard Mitigation Grant Program funds long-term projects in connection with recovery from disasters declared under the provisions of the Stafford Act.
- ▲ The Flood Assistance Mitigation Program provides multiple services, and one component provides support for purchasing properties and structures located in flood plains.
- ▲ The Pre-Disaster Mitigation Program provides funding for projects outside the context of a Stafford Act disaster declaration.
- ▲ The Environmental, Historic Preservation, and Cultural Resources Program funds mitigation efforts related to structures that appear on Historic Registries.

FEMA's Mitigation Division also supports requests for technical services from local governments. These include map modernization, library access, education and training, and specialized consulting in mitigation assessments.

Step 6: Address issues in recovery planning. Disaster recovery restores the built environment. The community's social and economic vitality are also addressed. Recovery is closely related to mitigation. The level of preparedness and emergency response capabilities directly affect the disruption and physical damage caused by disasters. Developing preimpact plans for recovery ensures that hazard mitigation is part of the disaster recovery. Preimpact plans can help officials resist postimpact pressure to quickly restore the community while ignoring conditions that produced the vulnerability. By developing disaster resilience, communities can minimize disaster impacts. They can improve recovery, with minimal outside assistance. They can also enhance the recovery of all population segments and economic sectors. These are complex issues that require time and preparation. Preimpact recovery planning provides some preimpact thinking time. This reduces postimpact pressure. It also increases the chance to make sustainable development goals. The Natural Hazards Research and Applications Information Center (2001) has published a list of resources for emergency planners engaged in pre-impact recovery activities (www.colorado.edu/hazards).

Every recovery operations plan (ROP) is unique to the disaster incident and the community context. And every ROP has both short-term and long-term elements. There are, however, predictable tasks for every recovery effort. You can address these tasks before the need to do them arises. Two tasks that always arise are leadership and damage assessment.

Every disaster recovery poses huge leadership and organizational needs that increase as time passes. You can be ready for these needs by creating a recovery committee. A committee can be made up of lead agencies, usually the LEMA and the local planning department. Directors of the local planning, building, public works, engineering, parks and recreation, economic development, finance, housing, and social services departments, as well as a public information officer should participate. Members should also include local utility companies, business organizations, religious and charitable groups, and neighborhood groups. A committee serves as the face of local government in the recovery process and creates the ROP. It is the contact point for citizens, agencies from other governments, and businesses.

A recovery plan requires damage assessments. In the short run, damage assessments are for Stafford Act (Presidential) disaster declarations. States may also require damage data for a state declaration. Disaster assessment includes both physical and social impact assessment. Physical impact assessment is called **damage assessment.** It must be done for residential, commercial, and industrial buildings. Damage assessment also is conducted for infrastructure (e.g., water, sewer, electric power, and fuel). Finally, damage assessment includes evaluation of critical facilities. You can develop plans for assessment processes. Staff from local government departments can be trained and assigned to Damage Assessment Teams. To cover large scale assessments, these personnel can be augmented by staff from private organizations and other jurisdictions through contractual arrangements. The complexity varies depending on the purpose of the assessment. Early estimates can be made by minimally trained personnel. Final assessments for formal recovery plans may require highly trained specialists. Assessment of social impacts is called **victims' needs assessment.** The process begins with identifying the community's vulnerable segments. These may be defined as specific locations and neighborhoods or types of households and businesses. You can choose and train staff for Victims' Needs Assessment Teams. These can be supplemented with staff from other organizations, such as the Salvation Army and the Red Cross.

There are many other recovery functions that you can address in advance. Depending on the damage levels, these functions are used to different extents. They are primarily short-term recovery issues. Long-term recovery needs are more difficult to project. They always involve community dialogue that is difficult to anticipate. There are 12 functions that you can preplan to promote a better recovery:

1. **Impact area security and reentry.** You need to create systems for maintaining security in the impact area. This is especially true if it has been evacuated or the hazard agent has rendered the area uninhabitable. Security systems ensure that residents do not return before it is safe. They also protect property. You need ways for credentialing residents and others who should have access. Access restrictions are most defensible if the jurisdiction states habitability criteria, such as the restoration of transportation and sewer systems.

2. **Temporary population shelter/housing.** Shelter is considered short term. If people can't return to the impact area for a month or more, jurisdictions must be prepared to move to temporary housing. For Stafford Act declarations, FEMA funds temporary housing. But the program is conducted with the local jurisdiction. The existing housing market can usually absorb displaced households. If not, FEMA can bring in mobile homes. The need for temporary housing increases as the size of the socially vulnerable population increases. Following Hurricane Katrina, many cities on the Gulf coast had to use mobile homes. You need to develop strategies for location. Depending on damage levels, this could be on victims' lots or in hastily constructed mobile home parks. If parks are to be established, issues of location, construction, and lifelines should be preplanned to speed occupancy (Perry and Lindell, 1997c).
3. **Temporary business operation.** Damaged or destroyed businesses need temporary operating locations. In the short run, local authorities can use permit systems to enable temporary business operations. You should also develop criteria for selecting temporary business operations. This may be needed for as much as a year (and even longer in some cases). A temporary location often becomes a permanent location when business operations continue there for extended periods. Thus, local zoning plans, the local development plan, and closeness to other business areas should be taken into account.
4. **Infrastructure restoration.** Households and businesses may not resume normal functioning because of the lack of potable water, sewer, electric power, fuel, telecommunications, or transportation. Inspection and repair programs address lifelines and structures such as streets, bridges, street signs, and street lights. Such repairs help emergency workers and crews to operate while they rebuild damaged structures. Any conflicting priorities are best managed through preimpact decisions. Linking health and safety to the damage assessment procedures reduce postimpact negotiation regarding restoration.
5. **Critical facility operation.** Critical facilities must be quickly restored to operational status. This process demands careful prioritization. The facilities operating at a given time must handle existing demands, with potential to expand services over time. Priority is given to hospitals, police stations, and fire stations. Other critical facilities include water treatment plants, transit bus barns, public works equipment yards, and government offices. Privately operated infrastructure includes electric power stations, television and radio facilities (both stations and broadcast towers), and telephone switching facilities. You need to build preimpact strategies to restore critical facilities.

6. **Debris management.** Wind hazards, water hazards, and explosions create debris from vegetation, signage, and vehicles. Hazardous materials spills can contaminate soil and buildings. **Debris management** is the plan developed to remove and/or contain physical debris that hampers both extended emergency operations and recovery operations. Debris management is complicated if criminal evidence must be gathered. This is a common challenge in transportation accidents and in terrorist incidents. Local jurisdictions under the Stafford Act can get limited debris removal assistance from FEMA. Preimpact planning for debris removal requires a jurisdictional manager to coordinate with agencies and groups involved in making decisions about debris types, storage sites, and reduction sites. Keeping lists of debris removal firms speeds up the postimpact processes.
7. **Emergency demolition.** The process of detecting and demolishing structures so severely damaged that they pose an immediate threat to citizens and emergency responders. Degree of damage varies by hazard agent and building structural integrity. Some standing structures may require demolition for safety reasons. Preplanning should outline procedures to decide if demolition is required. You will need input from structural engineers. Preservationists should also be consulted. Historic sites can be surveyed and inventoried before disaster strikes.
8. **Repair permit process.** The preplanning process should create criteria for determining which damaged structures will be eligible for occupancy. This requires teams for inspecting all aspects of a building. Requests for building repair permits can overwhelm a local code enforcement department. Preplanning should address how the permit office staff can work with staff from other jurisdictions and the private sector. An emergency permit process may be implemented.
9. **Public health recovery.** Because the United States has few endemic diseases, natural disasters usually create minimal public health consequences. Morgan (2004) noted that dead bodies are a public health threat only if the body was diseased, contaminated a water supply, or served as haven for insects. Waterborne illnesses are a problem if survivors drink from, wash food in, or bathe in water sources that have been contaminated by raw sewage or chemical spills. Other disease vectors must also be controlled in areas where pests harbor diseases. Public health plans define preventive measures. These include limiting consumption of local food and water, quarantine, isolation, or evacuation.
10. **Mental health recovery.** Natural disasters produce few mental health consequences. Industrial disasters and terrorist attacks tend to produce more mental health consequences. In all types of disasters, victims face material resource loss and disruption of social networks. Resource loss is addressed by local programs. Mental health professionals help the recovery process by

acting as victim advocates, giving crisis therapy, and providing referrals for long-term care. Community systems to provide social support should be part of the preplanning process. For terrorist events, preplanning should include both counseling and referrals to long-term care.

11. **Donations management.** The process of receiving, organizing, and distributing (deploying) donations of funds, material, equipment, or time. Major disasters attract volunteers and diverse types of donations. Preplanning can address the management of volunteers after the event. Local Citizen Emergency Response Teams or Citizen Corps groups are often trained for these tasks. Financial donations are usually encouraged to go to the Red Cross or Salvation Army. When accounts are set up for control by government—such as those after the 9/11 attacks—a fund manager and auditing system are required.
12. **Disaster assistance.** In disasters with Stafford Act claims, FEMA provides for victim assistance. In addition to federal assistance, victims also need to contact local agencies (utilities, water departments, sewer departments, social service departments, and nongovernmental organizations) for support. Preplanning can ease the process of getting help by structuring a Disaster Assistance Center. This way, victims can resolve all of their needs at a single location. Assistance centers are often located near public transportation.

When a disaster is given a Stafford Act Presidential Disaster Declaration, many federal resources become available. The National Emergency Management Association reported in 1998 that only 1% of disasters receive such a declaration. And only about 20% get state declarations. Clearly, local jurisdictions must handle the recovery process with limited outside help.

FOR EXAMPLE

Allenville, Arizona, Flood Recovery Planning

Allenville was a small community founded in the 1940s by African American migratory farm-workers. Over time, the riverside community became racially mixed, but remained poor. By the late 1970s, upstream development and severe weather subjected Allenville to frequent, serious floods. Town leaders organized and petitioned the county, the state, and the Army Corps of Engineers to relocate the town. Residents endured more than 2 years of trailer life. Support groups and a newsletter were organized. Finally, state planners acquired a parcel of land through the Arizona floodplain land exchange statutes. Many Allenville residents continue to live in the new site, now named Hopeville.

SELF-CHECK

- **It doesn't seem practical that an H/VA would change much in a year—what do you do with the information you get from looking at it again?**
- **Why should LEMA risk communication programs be ongoing?**
- **Damage assessments are required for disaster declarations and planning for recovery. What can you do to preplan for damage assessment tasks?**
- **Why do you need rules and systems for citizens who want to return to their homes and neighborhoods after a disaster?**

9.2 Operational and Resource Analysis

Key activities for operational analysis focus on issues of management and communication with the public. These analyses form the basis for evaluating the LEMA. Effective emergency management can't be done without acknowledging the citizens who will benefit from it. Risk communication programs are the main link between you and the public.

Step 1: Facilitate evaluations of the LEMA. Evaluations are complex and not often done. Their value stems in part from their holistic nature. They study the full range of emergency management functions. And they consider the local capability to plan and execute these functions. Sometimes, higher levels of government order an external evaluation of a LEMA. The planning and operational failures during Hurricane Katrina led FEMA to announce formal evaluation of local jurisdiction natural disaster plans. More often, complete reviews are self-imposed by LEMAs seeking to improve their programs. The most desirable evaluations use external evaluators.

Materials and procedures for LEMAs to make self-assessments are available from several sources. If self-evaluations have been conducted in the past, you should always consider reusing at least some of the same criteria for future evaluations. In this way, you can make careful comparisons of how performance has changed on the same criteria over time. If you are beginning anew with evaluations or changing or adding to criteria used in the past, look at professionally supported criteria. A common source of criteria is the elements of National Fire Protection Association (NFPA) Standard 1600. NFPA 1600 defines 14 criteria for management programs:

- ▲ Laws and Authorities
- ▲ Resource Management

- Direction, Control, and Coordination
- Communications and Warning
- Operations and Procedures
- Finance and Administration
- Exercises, Evaluations, and Corrective Actions
- Crisis Communications and Public Information
- Hazard Identification, Risk Assessment, and Impact Analysis
- Hazard Mitigation
- Mutual Aid
- Planning
- Training
- Logistics and Facilities

The LEMA program must have an administrative structure, an identified coordinator, an advisory committee, and procedures for evaluation (see Figure 9-2). NFPA 1600 can be adapted to any level of government or private industry. The program elements assume that the goals of a program are to manage all hazards in a multiorganizational environment.

Figure 9-2

State emergency managers staff an incident command post in Shawnee, Oklahoma, during the 2006 wildfire season.

There are many private groups that will do evaluations for a fee. There are two government-related programs that can do the same for little cost. One is the Emergency Management Accreditation Program (EMAP), overseen by people appointed jointly by FEMA, the National Emergency Management Association, and the International Association of Emergency Managers. The criteria used for evaluation under EMAP are based on NFPA 1600. But the number of elements is larger (54 compared to NFPA's 14). The process for review gives 18 months to conduct a self-assessment of local agency compliance with EMAP standards. The self-assessment requires a proof of compliance record for each. The EMAP commission receives the results of the self-evaluation. Then, an on-site assessment is scheduled. During the on-site assessment, the assessor team finds additional compliance information. The team conducts inspections and an exit interview. On the basis of the site information, the commission recommends accreditation, conditional accreditation, or denies accreditation. Accreditation is valid for five years. Further information about EMAP can be found at www.emaponline.org/.

Another program related to EMAP and overseen by FEMA is the National Emergency Management Baseline Capability Assurance Program (BCAP). The goal of the BCAP is to make complete assessments of government's management capabilities. These serve as a baseline for federal assessment of overall levels of preparedness. The basic approach uses standards for evaluation. But they also gather lessons learned from effective jurisdictions. This creates a national standard for emergency management. For local governments, the program gives a baseline assessment of capability. Against this, future improvements can be measured. The standard used for assessment is based on the NFPA 1600 elements. But BCAP has 26 elements to evaluate. The assessment is primarily a self-assessment. It can be reported through the BCAP internet site. This assessment does not produce an accreditation. The information can be used as part of the EMAP accreditation process.

Step 2: Evaluate, review, and revise the jurisdictional EOP. Assessments of the LEMA also involve reviews of the emergency plan. Plan evaluations are more focused than full-agency assessments. As part of the emergency planning process, all elements of the EOP should be looked at annually. From your perspective, this is a consultative process. It includes talks with subject matter experts (SMEs) about changes in the hazard environment. It requires speaking with personnel regarding changes in their equipment needs and capability to respond. And it includes meeting with local officials to ensure that enough resources are available. Plan reviews are linked to evaluations of training and exercises. They also review lessons learned from past responses.

The LEMA conducts most of the reviews of jurisdiction emergency plans. There also are private sector companies that conduct plan evaluations for a fee. The Emergency Planning Society Web site (www.emergplansoc.org.uk) maintains a "supplier directory" for evaluations and other LEMA needs. The challenge of contracting out rests on three factors. First, there is a hefty fee for the service. Second, reviews by contractors are not necessarily customized to local needs. Finally, outside contractor evaluations can minimize the interaction between emergency planners, local officials, and operational personnel, removing the benefits of these contacts.

Step 3: Review training and exercise needs. Reviews of training and exercises are complex. LEMAs train staff on the jurisdictional EOP. They also provide specialized disaster training for public officials. You manage the schedules for such training and administer the training. Operational departments manage other training specific to their disaster functions. This training is part of SOP. Departments that deliver the training handle its scheduling, content, and updating. Your role is to confirm that the training goals have been met.

Some types of local training are required by federal mandates. Training may also be a condition of federal funding. The National Incident Management System (NIMS) is a planning and incident command system with requirements for local training. FEMA has mandated that all jurisdictions that accept federal money adopt NIMS. There is a NIMS compliance tool called "NIMCAST" (www.fema.gov/nimcast). Local jurisdictions can use it to determine their compliance status. There is also a support center that local agencies can to www.nimsonline.com/integration_center_directive.htm.

The LEMA should develop and oversee the jurisdictional exercise program. Because there are so many programs that require scheduled exercises, you should enumerate programs and list exercise requirements. Required exercises may take any of the three forms: tabletop, functional, or full-scale. The local EOP is exercised annually. Departments may elect to exercise individual plans and SOPs more often. Federally mandated exercises also abound. Annual exercises are required for participants in:

- ▲ The National Disaster Medical System
- ▲ The National Urban Search and Rescue Program
- ▲ The Urban Area Security Initiative
- ▲ The National Metropolitan Medical Response System Program

Accrediting agencies for hospitals, public health, police departments, and fire departments also require exercises. These accreditation requirements supplement state level requirements. Local jurisdictions often combine multiple-exercise requirements in a single exercise scenario to reduce exercise costs.

Satisfying requirements should not obscure the training value of exercises. By testing the emergency response organization, participants have chances to "learn by doing." This adds to their classroom learning. Exercises should be independently evaluated. The results should be formally written. The outcomes must be shared with participants. Exercise outcomes are also reviewed for changes in the EOP. Most jurisdictions have a library of exercise after-action reports to support the planning process.

Step 4: Identify and assess selection processes for protective measures. Protective measures are part of both the response phase and the preparedness phase. For the response phase, you examine the protocols used for selecting PARs. Protocols for PAR selection are hazard specific. They require assessments of agent aspects and environmental conditions. Reviews of PAR selection protocols need SMEs who know about agents and innovations that might influence the PAR selection process. The feasibility of implementing protective actions—especially protection in place and evacuation—should be examined on the basis of strategic analysis of the community. You should check these analyses for changes in housing stock, rights of way, street geometry, or development patterns that might affect the feasibility of implementing different PARs.

Protective action assessment also includes examining risk communication. It is critical that you inform people near hazardous facilities about the alert systems. They should know the procedures for protection in place or evacuation. This task includes more than just emergency procedures. It should also address hazard adjustments to reduce people's vulnerability. These adjustments include structural measures such as anchoring furniture against ground shaking or purchasing sandbags for flooding. You can urge people to make a family emergency plan and assemble an evacuation kit. You can describe adjustments in terms of efficacy and resource requirements. You refer citizens to resources like the American Red Cross (http://www.redcross.org/services/disaster/beprepared).

Step 5: Review hazard adjustment incentives, sanctions, and innovations. People must be convinced to make hazard adjustments. Some adjustments require a significant resource commitment. So the level of adoption could be increased by incentives, sanctions, and/or new technology. Local jurisdictions often find sanctions appealing. They avoid the costs linked with incentives. However, sanctions are difficult to enforce. They require constant monitoring. That is difficult to do, even in a workplace setting. Household hazard adjustments are done in the home. Thus, it is very hard for authorities to ensure compliance.

Special financing—grants, loans, or tax credits—can reduce costs to citizens. This strategy is very costly for jurisdictions. Sometimes adjustment can be promoted by drawing incentives from another source. Lindell (1995) noted that sealing homes for protection from toxic chemical releases also lowers their heating and air-conditioning needs. Thus, they promote two goals: increased toxic chemical safety and reduced power consumption.

You can also promote safety by reducing the resource requirements of hazard adjustment adoption. You might give homeowners outlines of steps in hazard adjustment. In earthquake-prone areas, you could provide plans for homeowners to bolt their houses to the foundations. This would make this adjustment easier for do-it-yourselfers. Publishing lists of qualified vendors for services, tools, and materials also helps people. You can also share information on new technology for hazard adjustments.

Step 6: Make operational assessments associated with risk communication. Hazard awareness programs notify people of the community's hazard exposure. They inform people about the best hazard adjustments. They also give warnings for prompt protective actions during the response period. There are operational issues linked with message delivery and receipt. You can address six such issues as part of operational analysis:

1. **Maintain a Crisis Communication Team.** The **crisis communication team** is a collection of LEMA technical specialists, trained in communicating, that link between the LEMA, operational responders, jurisdictional officials, technical experts, and the population at risk. You (and others) assigned to the team should have skills in speaking with citizens, officials, and experts. You maintain the protocol for activating a jurisdictional crisis communication team. The team must be ready for immediate activation. The team should document all response-related activities. These records are important for after-action reports. The team serves four functions during the response: they monitor media news about the disaster, support rumor control, supply special information to media, and interpret technical data for media.
2. **Monitor Risk Communication Channels.** The concern here is with communication channels used by the LEMA to reach citizens in the continuing hazard phase. The main risk communication channels are electronic media such as radio, television, Web sites, and print media. Other print media that have been used in hazard awareness programs include brochures, posters, telephone book inserts, comic/coloring books, reports, and scientific journal articles. Additional channels include informal discussions and formal meetings. For all broadcast systems, you need to confirm the procedures for activation and constraints on message length, duration, or repetition. Telephone ring-down systems require annual testing. Ways for activating, deploying, and creating message information for public delivery should be tested annually. Make sure that Web sites have current information and that previously distributed written material is still accurate.
3. **Identify Specific Audience Segments.** A strategic analysis supports your ability to get messages to vulnerable populations. By spreading messages via general public sources, you reach a homogeneous population. This

generic strategy is not expensive. Various groups of people are likely to have different interests and concerns, motives for doing hazard adjustments, and media choices. The task for you is to identify each audience segment in the community. Then find ways to target messages that will reach them. Audiences can be defined geographic and socioeconomic characteristics (age, sex, education, income, and ethnicity). Ensure that those at risk receive hazard-relevant information. Examine each audience's channel access and channel preferences. Message comprehension can be enhanced if you identify non-English- speaking audiences. Communities with large minority groups often contain mass media channels that are language specific.

4. **Maintain Effective Communication Flow in an Escalating Crisis.** You should preplan ways to coordinate the information from many responding agencies. During a crisis, the emergency response organization must provide a steady flow of information to the responders and to the public. For many natural hazards, federal agencies give local managers updates on the threat. You can require chemical and nuclear facility operators to establish procedures for giving frequent and complete updates for events involving their facilities. The types of information in an escalating crisis will depend on the specific situation. Content for incident alerts can be found on federal Web sites (FEMA and others). It is essential that you discuss with facility operators their information capabilities and needs. You should agree in advance about what information will be exchanged. Also discuss the channels through which it will be sent.
5. **Review Use of Informal Communication Networks.** Peer communication takes place during all hazard phases. These networks can help to alert people that hazards are present, emergency plans exist, and protections should be taken. Any information you give to a neighborhood group is likely to be passed on to other members, friends, relatives, neighbors, and co-workers. Information that is given in schools is also likely to be repeated at home. You must ensure that people receive accurate hazard adjustment information. Even the best intended friends, relatives, neighbors, and co-workers might misunderstand a message. One way to reduce distortion is to spread information through a range of official sources and channels. The idea is to provide many chances for people to hear official messages via several channels. People will retain the common elements of these messages.
6. **Build Source Credibility.** People consider credibility of hazard information sources. Sources include the news media, peers, and authorities. People tend to act on information from sources they consider credible. It is important that the LEMA be known as a credible source. Source credibility is an attribute that is defined in many ways and is subjective. You

can increase citizen views of your expertise and trustworthiness. Publicizing training, drills, and exercises alerts the public to LEMA capabilities and dedication. Seeing local responders supported by and acting with external expert responders reinforces your expertise. Credibility is strengthened when local authorities produce joint and consistent messages with experts. The perception of expertise is also reinforced with professional Web sites with local hazard information and links to outside sources. Credibility can also be enhanced by effective performance in public hearings or in meetings. Trust is an essential part of credibility. Renn and Levine (1991) show that trust develops when messages are perceived to be accurate, objective, and complete. You want to be seen as fair, unbiased, complete, and accurate. It also is important to involve the community in the continuing hazard phase, avoiding closed meetings, and explaining the agency's procedures.

Step 7: Make operational assessments of communications interoperability. Effective communication is the basis of effective disaster operations. Many small, local agencies have been cursed with poor internal radio communications for decades. Between-agency communications (police to fire) are often much more difficult to achieve. **Communications interoperability** (Public Safety Wireless Network Program, 2003:2) "refers to the ability of public safety personnel to communicate by radio with staff from other agencies, on demand and in real time." A 1998 study of 1045 fire and EMS agencies reported 30% of the participants agreed that lack of wireless communications interoperability has hampered their ability to perform response duties (Public Safety Wireless Network Program, 1998). Because the problem has persisted for so long, most agencies have devised means of "working around" difficulties. The National Task Force on Interoperability (2003:2) found that during the response to the 1995 Oklahoma City Bombing, "…first responders had to use runners to carry messages from one command center to another because the responding agencies used different emergency radio channels, different frequencies, and different radio systems."

Large emergencies, disasters, and terrorist incidents increase the number of interoperability issues. Although mutual aid systems have reduced interoperability problems, the issue persists. There are many problems that have slowed progress. The National Task Force on Interoperability (2003) identified these as outdated and incompatible communications equipment, limited and fragmented funding availability, poor planning coordination, and cooperation among agencies, and insufficient radio spectrum assigned to public safety. To remedy problems, the DHS issued interoperability standards for first responders. They created the SAFECOM program as a means to implement the requirements (U.S. Department of Homeland Security, 2004a). The SAFE-

COM program has devised a comprehensive plan for increasing awareness of the interoperability issue. The program enhances planning and partnerships at local, regional, and state levels and outlines funding strategies. The important task for you is to constantly assess interoperability challenges within your jurisdiction and regional mutual aid systems. These assessments can then be used as the basis for developing a regional interoperability plan and for getting external grant support.

9.2.1 Resource Mobilization

Resource mobilization involves working with external agencies and groups. This ensures the jurisdiction's hazard management goals are met. There are three aspects to resource mobilization. One aspect is the federal mandates regarding resources. Another focuses on the activities that mobilize support. The third aspect centers on relationships with organizations.

Step 1: Address federal mandates regarding resources. Resources for emergency management and response need a wide range of equipment. Under the NIMS, FEMA requires that all equipment meet defined operational standards. It must be inter-operable with equipment used by other agencies. Many of these issues are routinely addressed locally. Fire departments often carry hose connector adaptors that match those used in all regional jurisdictions. The NIMS includes a plan to create national equipment standards, guidelines, and protocols. To support plan development, FEMA requires that lists of local emergency responder equipment be reviewed and approved through the NIMS Integration Center. You must be prepared to obtain copies of national equipment standards. This task will be challenging. Most local equipment purchases have not been federally funded. They are often tailored to local needs.

The NIMS also requires that local resources be classified by kind and type under federal definitions. This is intended to clarify the resource requests to the federal government under the *National Response Plan*. The directive applies to all resources used in emergency response in all incidents. You must ensure that local resource-naming systems are consistent with FEMA's. Personnel who manage resources for responses must undergo specialized training and receive certification from FEMA.

Step 2: Maintain the support of senior appointed and elected officials. Existing and new programs need the support of upper management. Participation of jurisdiction departments is enhanced if officials support emergency planning. Organizational support can be increased when middle managers "sell" the issues that they believe need a high priority to upper management. This means that you must facilitate the identification of hazard vulnerability as an important policy issue. Regularly meet with appointed and, if possible, elected officials. Offer briefing on LEMA planning, new or changing threats, regional emergency planning and response developments, and developments at the national level.

Step 3: Enlist the participation of other government agencies. No matter how much support local officials would like to provide, they likely have few additional resources for hazard management. So, you must embrace an interorganizational perspective. In this process, you ensure each agency is aware of all programs being planned by other agencies. This permits you to combine the programs into a broader context. In doing so, the resources of many agencies can focus on the same problems. Emergency planning goals are achieved by pooling the resources of multiple agencies. To obtain the active support of other agencies, you can identify ways in which collaboration can achieve everyone's goals. The difficulty of these efforts varies. Departments with long histories of interaction, such as police and fire, are likely to form successful collaborations. Working with land use planners, transportation planners, building inspectors, or public health officials might be more difficult because you work less frequently with these agencies. But working with land use planners ensures that zoning and subdivision regulations, capital development plans, and other activities minimize development in hazard-prone areas. Transportation planners ensure that timely evacuation from those areas is feasible. Building inspectors ensure that structures built in hazard-prone areas meet building codes. Public health officials ensure effective preparations for biohazards.

Step 4: Enlist the participation of nongovernmental and private organizations. The American Red Cross and the Salvation Army are active in response and disaster recovery. These and other nongovernmental organizations work with needy families. They can help you identify populations that are most likely to be vulnerable to disaster impact. These groups can also help households to prepare for emergencies.

Infrastructure organizations, such as water, wastewater, fuel, and electric power utilities, can play a major role in promoting the adoption of hazard adjustments. Most of these respond to routine emergencies (storms). They are aware of the demands that disasters can place on the community. In addition, these organizations bill all community residents for services. This situation forms a channel for you to send information about hazards and adjustments.

Step 5: Work with the mass media. Collectively, the mass media reach a large audience. It is a good idea to know about media goals and operations.

FOR EXAMPLE

Recovery in Stockton, Missouri

A major tornado struck Stockton in 2003, destroying nearly half of the towns businesses and damaging 500 homes. The town square was leveled, and even the cemetery lost many of its gravestones. Town emergency planners applied to the FEMA Sustainable Recovery Initiatives Program for support. A Recovery Committee was established and a plan was developed jointly with federal authorities. The recovery plan was completed within a year, with innovations including wider streets, new open green spaces, reconstruction of the town square as a business center, and new mitigation measures for the lake bordering town square.

Be familiar with people in the news media. You should build relationships that can help spread hazard adjustment information. Media contacts enhance the visibility and credibility of the LEMA. This is not to suggest that you attempt to manage the local media. This is likely to be both ineffective and counterproductive. The media serve functions in society that are distinctly different from those of emergency managers. A better approach is to have active contact with reporters and editors. This enhances your access to information channels.

Media access creates opportunities to spread information. If you are in a community subject to seasonal hazards, you can provide the media with press releases or PSAs. For other threats, such as earthquake hazards, reporters can be provided with information on long-term hazard adjustments and protective actions. Newspapers might include "hazard information inserts" that you prepare. And hazard managers can let the media know about performance of training, drills, and full-scale exercises.

Step 6: Work with neighborhood associations and civic organizations. There are many neighborhood associations and civic organizations. Some are hazard-relevant interest groups. Others are fraternal or service organizations. Members of these groups can be expected to be active if made aware of their community's social and environmental problems. You can engage these pools of active citizens. First, ask members to be an advocate of hazard safety. They can pass along official messages to friends and neighbors. Second, they form important voices in local government. They get hazards on the local policy agenda and provide a basis for policy formulation. Finally, they serve as a volunteer pool.

SELF-CHECK

- When conducting self-evaluations of your LEMA, what are the professional sources of evaluation criteria?
- There are lots of federal mandates that require LEMAs to conduct exercises. Outside of satisfying a requirement, what can exercises do for you?
- Why is it important to build planning and response coalitions from an interorganizational perspective?
- News media often publicize mistakes and make us look silly. What advantages are there to cultivating relationships with these folks?

9.3 Steps for Escalating Crisis or Emergency Response

There is a difference between a state of chronic hazard and an escalating crisis, but the time at which the transition takes place is rarely well defined. An **escalating crisis** is a situation in which there is a significantly increased likelihood of an incident occurring that will threaten the public's health, safety, and/or property. This probability is never completely objective. The determination of whether a crisis exists is also subjective. As a practical matter, a crisis exists if authorities *or* the media, *or* the community *believe* that there is an increased risk. If the media or residents believe that there is a crisis, then there is a crisis. Authorities must be prepared to specifically explain why a situation is or is not a crisis.

You can exert some control over the definition of the situation. You must lay out criteria that define elevated conditions of danger. For example, the National Weather Service has established an emergency classification system that consists of watches and warnings. The U.S. Nuclear Regulatory Commission classifies a reactor incident as an Unusual Event, an Alert, a Site Area Emergency, or a General Emergency. The number of categories in the system should reflect meaningful differences in the levels of response by local authorities. The number of categories is less important than the fact that the system is defined as objectively as possible and is agreed to by all responding organizations. Once authorities have determined that conditions have exceeded the criteria, they need to implement the predetermined response actions. Many of these actions are part of the emergency response. They include further emergency assessment, hazard source abatement, population protection, and incident management. But the period of escalation precedes the disaster impact and is governed only in part by plan provisions. At this point, risk communication is key. You must be prepared to execute five steps as a threat escalates into an emergency.

Step 1: Activate the crisis communication team promptly. When any of the criteria for a crisis in the emergency classification system have been exceeded, the crisis communication team should be activated promptly. This activation should initiate crisis-relevant information collection. It should open channels in preparation for sending out information. Team members contact SMEs. Federal or state oversight agencies are contacted too. The team should ensure that the public information officers of all crisis-relevant government agencies, nongovernmental organizations, and technological facilities coordinate their contacts with the media. This does not mean that all responding organizations must agree on all press releases. Everyone must be aware of the information sent by other organizations. That way, any disagreement may be clarified and explanations prepared for the media.

You should review press kits and any background materials for briefing the media or community groups. You should also be sure people who are connected to the crisis know about the situation. In a chemical plant crisis, for example, plant operators should be reminded to inform all employees about what is happening. Employees might be interviewed by reporters and talk to family, friends, and neighbors. It is important they have accurate information to share.

Early in a crisis, you should carefully review your communication goals. These goals become the criteria for evaluating press releases, press conferences, and public meetings. The main goal is to promote protective action by those in the greatest danger. Another goal is to actively monitor the situation of those who might later be at risk. An objective should not be to prevent “panic.” Disaster researchers have found this to be extremely rare. Nor should authorities ridicule what they consider to be unnecessary protective action by those who *think* they are at risk, as long as such actions do not impede the protection of those whom the authorities believe *are* at risk. It is very important for authorities to avoid promoting one protective action by criticizing another. For example, some say that people expose themselves to major traffic accident risks if they evacuate. Not only is this incorrect, but it leads those at risk to believe that there is nothing they can do to protect themselves.

Step 2: Determine the appropriate time to release sensitive information. When special technical monitoring allows the LEMA to cues of hazard onset, you must determine when to alert people of the danger. For example, harmonic tremors (earthquakes) may cue a volcanic event. The crisis communication team needs procedures that state when information is to be released. There are no universal rules for releasing information. Even experts disagree. Early releases of information often have a significant degree of uncertainty. There is a chance that crisis conditions might never happen. Or they will be less severe than expected.

Authorities often delay notification to avoid unnecessary disruption. However, delaying the release of information can be seen as a "cover-up." It is also important to respond to reporters' questions. "No comment" is a certain signal that information is being withheld.

An early release of information (if it's correct) can also enhance the credibility of the source. It can increase a source's control over the agenda. Being the first to break bad news allows the information to be placed within context. The timing of a press release can have a significant impact on the attention it receives. A press release on a slow news day might receive more notice. The advantages of early release also include an early response to the crisis. That way, people are prepared for action. If the crisis doesn't materialize, explanations can express concern for protecting citizens. Interviews with Houston, Texas, residents who were evacuated from areas not affected by the 2005 Hurricane Rita revealed that they were uncritical of authorities who ordered the evacuation. They would leave again under comparable circumstances.

Facing an escalating crisis, you should initiate communication with reporters through press releases and press conferences. Press releases give emergency officials the most control over the agenda. Interviews provide the least control. Despite the lack of control over the questions being asked, interviews are sometimes preferable to press conferences. Conferences can present a chaotic image. Thus, the organized setting of an interview can offset some loss of control over the agenda.

Step 3: Maintain source credibility with the news media and the public. It is critical that you obtain timely and accurate data from your own and other agencies. Incident strategy, tactics, and protective actions should be linked to these data. When you give information to the media and the public, the links between data and decisions should be made clear. When the available data are incomplete or based on estimates, you should admit it. This makes you honest about what is and is not known. A candid confession of ignorance might be uncomfortable, but it is less dangerous to your credibility than making up an answer or presenting incomplete data.

You should be aware that the media have many sources of information other than the LEMA. Thus, you should make an effort to respond to reporters when they need information. When official information is not available, reporters will get information from whatever sources are available to meet their deadlines. And it may or may not be accurate for the threat at hand. You also need to be aware of the competition among media organizations. It is important to avoid handicapping outlets that wait for official information. To reduce handicapping, you can send the available information to all media at the same time. This avoids the appearance of favoritism.

Step 4: Provide timely and accurate information. Providing timely and accurate information relates to the form in which information is presented and revelations about the process of creating information. Churchill (1997) recommends that effective news releases should be no longer than two pages. They should have short sentences in plain English. If these are for a non-English-speaking population, the LEMA can reduce distortion by self-translating the release. All news releases contain a dateline, the organizational source, a summary lead that provides a one-sentence abstract of the press release, the text of the press release, and a brief description of any attachments. You can add fact sheets to this information. For example, for increased volcanic activity that might result in an eruption, the news release would indicate the *who, what, when, where,* and *why* of that event. Attachments could include a mission description for the agency, photographs of the mountain, the detection equipment, or the EOC and fact sheets about volcanic processes, procedures for assessing eruption risks, and emergency response plans.

You should anticipate confrontational tactics of the media or members of the public. Hazards are often cloaked in conflict. If you are confronted with different opinions from other experts, give a calm reiteration of the scientific qualifications of your source. Overt attacks on other experts should be avoided. Your credibility is threatened by any departures from professionalism. Your role is to explain that the costs of not preparing for the risk are greater than those incurred in preparing.

You should be prepared to describe the process by which risks were assessed. You should specifically identify the dangers. Uncertainties are always present. You need to acknowledge this when you can't answer a question. Explain that data are being collected, describe how it is being analyzed, and indicate when the results will

FOR EXAMPLE

Crisis in New River, Arizona

In 2000, Governor Jane Hull declared an emergency for the central Arizona town of New River. During questioning by federal agents, a suspect revealed the existence of a large quantity of liquid and solid explosives and other corrosives in a building on his New River property. Entry by hazardous materials teams confirmed that materials were present and too volatile to move—they would have to be exploded in place. The Arizona Division of Emergency Management informed the townspeople of the threat and a weeklong period ensued during which a plan for making it safe was devised and implemented. A crisis team began meeting with townspeople. Dialogue among the team, subject experts, and townspeople formed a new solution based in recent technology. The area was evacuated, the building filled with foam, and the entire structure was transported to a waste dump. This removed citizen fears of exposure to burned toxins and still removed the threat.

be released. Hance and colleagues (1988) suggested that LEMAs should suggest some protective options when reporting that escalating threats have been detected. You need to balance the need for a thorough analysis with the need to have a starting point for a discussion with people at risk. The advantage of thorough analysis is that it can provide people with data about any residual risks. It can also give well-defined solutions. In contrast, the advantage of presenting tentative options is that the process remains open to input. Decisions about which course to pursue depend on the willingness and ability of everyone to accept ambiguity and to participate in a process to identify and select an appropriate management strategy.

Step 5: Evaluate performance through postincident critiques. Systematic evaluation is critical for performance improvement. Without documentation, evaluation becomes speculative. An important function of EOCs rests in documenting the incident. But an EOC might not be activated early in an escalating crisis. Under these conditions, you assume the responsibility for documentation. This covers not just outcomes but also the processes followed. This information helps postincident review and critique in a lessons learned format. All members of the team should review the goals of the risk communication program, the event logs kept during the incident, and other available documentation to find deficiencies in organizational performance. The focus of critique is the performance of the organization. It is a means of building a spirit of team cooperation.

SELF-CHECK

- What is an **escalating crisis** and how do you know when events constitute a crisis?
- When a crisis is declared, what should the crisis team do upon activation?
- What information should go into a press release?
- When reporting information to news media, what are your principal concerns?

SUMMARY

As an emergency planner, your goal is to ensure that your community is prepared for hazard incidents. Another goal is to plan ways that the damage of the hazard can be reduced. To achieve these two goals, you must take advantage of the time you have. When the threat of disaster impact is low, you must use this time to conduct H/VAs, plan, and complete training. When disaster looms, you must be implementing your plan. Each one of these phases has distinct steps that you need to take to ensure your plan is effective and losses are reduced.

KEY TERMS

Communications Interoperability	The ability to engage wireless communication with staff from other agencies, on demand and in real time.
Crisis Communication Team	A collection of LEMA technical specialists, trained in communicating, that link between the LEMA, operational responders, jurisdictional officials, technical experts, and the population at risk.
Damage Assessment	The measurement of physical damage caused by disaster impact, including secondary hazards.
Donations Management	The process of receiving, organizing, and distributing (deploying) donations of funds, material, equipment or time.
Emergency Demolition	The process of detecting and demolishing structures so severely damaged that they pose an immediate threat to citizens and emergency responders.
Victims' Needs Assessment	The measurement of the collective needs of disaster victims, also called social damage assessment.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of the milestones that structure emergency planning.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. The continuing hazard phase is a time when it is *possible* that disasters could threaten, but no threat is imminent. True or False?
2. Conducting a hazard/vulnerability analysis is an example of:
   - **(a)** Strategic analysis.
   - **(b)** Operational analysis.
   - **(c)** Threat analysis.
   - **(d)** Damage assessment.
3. By monitoring citizen beliefs you learn what information should be targeted for risk communication programs. True or False?
4. Building relationships with neighborhood associations has the dual advantage of allowing two-way communication and enhancing credibility. True or False?
5. You should delay sharing information about a crisis with citizens until you are absolutely certain that everything you say is accurate. True or False?
6. Press releases can be as long as you think necessary; this is your chance to give the media written detail. True or False?

Review Questions

1. What are the two time frames in which hazards are viewed by planners?
2. What is the role of strategic analysis in emergency planning?
3. How does operational analysis differ from strategic analysis?
4. What is the role of emergency planners in building the jurisdiction hazard mitigation strategy?

Applying This Chapter

1. After the Hurricane Katrina debacle of 2005, many LEMA reputations suffered. You are a planner with a municipal agency on the east Texas coast. How can publicizing your participation in exercises increase your LEMA credibility with the public?

2. You are participating in a comprehensive review of the Santa Clara, California, jurisdictional emergency operations plan. You are assigned to update the functional annex on communications. What is the function of a crisis communication team?
3. You are a planner with the Cavendish, Vermont, LEMA. The Director followed Hurricane Katrina news closely and was concerned that different LEMAs on the Gulf coast released such a wide range of information to the mass media. He felt that too much sensitive information was released. He also felt too much information that was later found inaccurate was released. What challenges should an emergency planner consider when making decisions about the release of sensitive information in a crisis?
4. You are the Senior Emergency Planner for Weed, California. The city has just hired a new PIO from the more intense community of Los Angeles. Your LEMA has been running two risk communication campaigns to enhance adjustment awareness for Mt. Shasta volcano and for local flooding. The PIO has scheduled a press conference to answer citizen and media questions. What will you tell the PIO about how to handle questions for which the answer may not be certain? What about his demeanor in general?

YOU TRY IT

Federal Mandates

Since the 9/11 attacks, the federal government has been very concerned with local hazard management. The massive response failures at all levels of government following Hurricane Katrina in 2005 intensified this concern. In establishing NIMS, FEMA created a program that requires much federal oversight of and intervention in local hazard management. In several instances, programs with local requirements have been presented by the oversight mechanisms that have not yet been established. As an emergency planner, how would you explain to a jurisdictional elected official that because of new equipment standards and the possibility of future federal oversight, your jurisdiction can't purchase the same equipment from the same vendors in the future?

Flood Crisis

Ice flows are slowly forming a temporary dam adjacent to the town where you are an emergency planner. Efforts to break up the flows have failed and estimates place town inundation in 4 days. The flood will be progressive, covering low lying areas first. You are assigned as the team leader for the crisis communications team. Your first task is a meeting with 200 residents to describe the threat and explain protective actions. How will you structure this first meeting? What topics will you address?

Media Relations

You are newly assigned to act as the public information officer for your LEMA. Specifically, you are trying to figure out how to better reach citizens with hazard adjustment information (not warnings). What will you do to introduce yourself to members of local news media? How will you determine which forms (channels) to approach first? What specific actions can you take that will get hazard awareness and adjustment information to citizens?

10

POPULATION WARNING

Behavioral Foundations and Practical Applications

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of population warning.
Determine where to concentrate your effort.

What You'll Learn in This Chapter

- ▲ The theory behind citizen decision making in emergencies
- ▲ The research results underlying warning systems design and response
- ▲ The behavioral research supporting spontaneous compliance
- ▲ The impact of environmental cues, credibility, social context, and personal characteristics on compliance

After Studying This Chapter, You'll Be Able To

- ▲ Examine the elements and operation of a community-warning system
- ▲ Examine conditions that cause spontaneous protective response
- ▲ Prepare warning message content for special populations
- ▲ Interpret for the effect of environmental cues on warnings
- ▲ Examine the role of research in effective warning plans

Goals and Outcomes

- ▲ Describe citizen emergency decision-making processes
- ▲ Enhance agency credibility in emergency warning settings
- ▲ Evaluate characteristics of warning channels
- ▲ Create incentives for citizens to comply with official warnings
- ▲ Create meaningful warning message content
- ▲ Create incentives for citizen use of public shelter

INTRODUCTION

Effective planning processes are based on four factors. These factors are accurate knowledge of the threat, local vulnerability, alternative protective actions, and human behavior. Knowledge of the first three is found in physical and natural science literature. And most planners are very comfortable in looking to science for guidance. They use this guidance in hazard vulnerability analysis or in technical aspects of protective action selection. Knowledge about human behavior is found in the social sciences. And yet, it is far less often accessed by emergency planners. However, this knowledge is critical to the success of emergency planning. The most carefully crafted evacuation plan will not work unless people decide to follow it. Warning messages must motivate people to comply with protective actions. Therefore, you must be familiar with the social and psychological factors that guide human response. Knowledge of these factors allows you to make plans that account for known behavior patterns. An example of a known pattern is the desire to account for family safety before evacuating. You must understand human behavior during the emergency period, when you have to take decisive action. It is during this period that you use predesigned warning systems to alert the public to the danger and what actions they should take.

Risk communication is the process of sharing information about hazards, vulnerabilities, and protective actions. Disaster warnings are one type of risk communication with two unique features. First, there is a sense of urgency. Disaster warnings are used when a threat is imminent. There are only minutes or possibly hours before the disaster occurs. The amount of time available is a function of the state of forecast technology. This varies from one hazard to another. For example, it is possible to detect and track hurricanes quite accurately. The amount of warning before impact can be measured in days. Conversely, the geophysical theory and monitoring technology to support seismic prediction is limited. Usually, there is no forewarning for earthquakes. The limited amount of warning time leads to the second feature of disaster warnings: protective action recommendations (PARs). These must focus on behaviors that can be quickly and easily implemented with whatever resources citizens have available. Often, the PAR is simply to evacuate or to shelter in place. The message content of PARs usually focuses on minimizing risks to personal safety rather than on reducing property damage.

To understand human behavior during the warning period you must understand how people make decisions about protective actions. This helps you to grasp the relationship between people's decisions to undertake protective action and situational influences. How people react to warnings is based on situational influences. These influences include environmental cues, social issues, warning types, and personal traits. It is important to understand the behavior of people who receive the warnings. Another part of the warning process is the response of people who are not in the risk area. Hurricane emergency operations plans (EOPs) often focus on identifying evacuation routes, evacuation estimates, and shelter capacities. However, these EOPs will be inadequate if they ignore spontaneous evacuation by people who are not in danger but also take protective action. Such issues are important factors in the construction and use of warning systems.

10.1 Protective Action Decisions

People's protective action decision-making processes are important. You must identify appropriate protective actions and present them to the public. People will consider acting on the recommendations based on their own judgment. Your goal is to present recommendations that people can review, agree with, and follow the proper response. This is best accomplished by understanding the way people make decisions and then tailoring messages to appeal to people's information needs.

10.1.1 The Protective Action Decision Model

Lindell and Perry (2004) developed the protective action decision model (PADM). This model identifies the factors people typically use to make protective actions decisions. The model applies to both decision making in crisis periods and during normal times. Our interest here is only in emergency decision making. This model uses stages to trace the logical questions people ask when making a decision to comply or not with a PAR. The process begins when they see and hear warnings from the environment. They can also observe people's behavior. They get information from peers, news media, or authorities. Once they have sensed these warnings, people must *comprehend* the available information (three predecisional processes). People begin either a protective action process or an information-seeking process. To move through the stages of either process, the individual must believe a danger exists, that some protective action is available, and that if implemented, the action really will protect. The eight stages of the decision process are shown in Table 10-1.

People enter the protective action process when they are secure about answers to critical questions. Conversely, people begin seeking information when there is uncertainty about the answers to critical questions. Once the uncertainty is resolved, people move to the next question or stage of the process. Depending on the decision maker's judgment of the danger and the possible protective actions, the outcome of the process will result in:

- ▲ Return to normal activities.
- ▲ Seeking more information.
- ▲ Adopting actions to protect persons and property.
- ▲ Engaging in actions to reduce psychological distress.

Table 10-1: PADM Warning Stages and Actions

Stage	*Activity*	*Question*	*Outcome*
1	Risk identification	Is there a real threat that I need to pay attention to?	Threat belief
2	Risk assessment	Do I need to take protective action?	Protection motivation
3	Protective action search	What can be done to achieve protection?	Decision set (alternative actions)
4	Protective action assessment and selection	What is the best method of protection?	Adaptive plan
5	Protective action implementation	Does protective action need to be taken now?	Threat response
6	Information needs assessment	What information do I need to answer my question?	Identified information need
7	Communication action assessment and selection	Where and how can I obtain this information?	Information search plan
8	Communication action implementation	Do I need the information now?	Decision information

Source: Adapted from Lindell and Perry (2004).

The model tries to show the way that people typically make decisions. These decisions are about adopting actions to protect against imminent environmental threats. In both the protective action decision-making process and the information-seeking process, the stages are sequential. However, not everyone always follows every step in exactly the same order. For example, recent work by Gladwin and colleagues (2002) suggests a highly credible source might obtain instant and unquestioning compliance. People might follow a directive to evacuate an area at risk—even if there were no explanation of what other protective actions were feasible. These findings are consistent with psychological theories. The PADM assumes that people vary greatly in the ways they process persuasive messages.

Both environmental cues and risk communication from other persons prompt three predecisional processes. **Predecisional processes** precede protective choices but focus the decision maker's attention on the possibility of an environmental danger. These processes bring information to people's conscious awareness. These are exposure to, attention to, and interpretation of cues in the physical or social environment. These relate to receiving a warning, attending to the warning, and comprehending the message. Whatever the source of the warnings, all three predecisional processes are necessary. A person cannot process information if they're not exposed to it, do not pay attention to it, or misinterprets it.

The **decision stages** refer to the issues a person addresses in making a choice to implement (or not) protective actions. The decision stages track people's acknowledgment of the hazard, their assessment of what should be done, what can be done, and ultimately what to do. The PADM follows protective action decision making through five decision stages:

1. **Risk identification:** The person's threat belief or decision that the information indicates an extreme event is *about* to occur that could threaten safety, health, property, or routine activities.
2. **Risk assessment:** Results in protection motivation if there is a high degree of certainty that a person will experience severe consequences.
3. **Protective action search.** A person's ability to recall from memory or obtain from another source actions that are effective in providing protection.
4. **Protective action assessment and selection:** Takes place as the decision maker evaluates available protective actions in terms of their cost, time and effort, knowledge and skill, tools and equipment, and social cooperation. The decision maker determines which protective actions meet these criteria and selects from among those the one believed to be most effective and feasible to implement.
5. **Protective action implementation:** Begins when the decision maker concludes it is time to begin to take the protective action.

Just as people differ in the amount of uncertainty that will trigger information seeking, so too will they differ in the amount of information that will return them to the protective action decision process. At any of these stages, the decision maker might determine that more information is needed. These information needs are captured in three additional activities:

- Information needs assessment results in an identified information need if the person at risk can articulate what information is needed to answer an unresolved question.
- Communication action assessment and selection produce an information search plan if the decision maker can determine where and how to obtain the needed information.
- Communication action implementation results in decision information if the person decides the identified information is needed immediately.

10.1.2 Factors Influencing Protective Action Decision Outcomes

To understand predictions made by the PADM requires knowledge of the factors that affect the predecision stages and the decision stages. These factors are situational variables. They guide individuals to particular decision outcomes. They are influences outside the protective action decision process that shape the decisions made at each stage. Researchers have found four categories of variables influence people's responses to disaster warnings. These are environmental cues, social context, warning components (source, channel, and message), and receiver characteristics.

Environmental Cues

Environmental cues are information from the five human senses that tell us danger is present. Physical cues, such as sights, sounds, and smells, give evidence that a real threat exists and that it should be assessed. If the technology regarding a hazard is not well developed or not available locally, hazard agent cues might be the only source of advance information about disaster impact. The sight of funnel clouds or the roaring of the wind has given many tornado victims evidence of danger. Train derailments that release hazardous materials are sometimes prefaced by noise, the sight of derailed cars, or the odor of a toxic cloud.

The apparent absence of physical cues that would be expected during hazard impact can hamper protective action decision making. Gruntfest, Downing, and White (1978) described a flood in Colorado's Big Thompson Canyon that was caused by heavy, but localized, nighttime downpour far up in the mountains. Shortly after daybreak, people in a restaurant at the mouth of the canyon were warned of imminent flooding. They refused to evacuate. They refused because the skies were clear and it had not rained where they were. Shortly afterward, they received an *erroneous* warning that an upstream dam had collapsed. They evacuated immediately. Warning recipients acted as they did because the accurate warning was in apparent conflict with the available environmental cues, but the incorrect warning was not.

The behavioral response of other people can also provide cues indicating danger. Like environmental cues, observations of the behavior of others sometimes promotes and sometimes retards progress through the protective action decision stages. Zeigler and Johnson (1984) confirm that witnessing people gathering belongings and packing their cars prompts consideration of evacuation. Sorenson (1991) and Tierney, Lindell, and Perry (2001) have reported that behavioral observations can:

- ▲ Reinforce the advisability of complying with recommended protective actions.
- ▲ Inform observers about protective actions previously unknown to them.
- ▲ Remind observers about relevant protective information previously communicated.

Observing the responses of others has a strong effect on people. Seeing how others react causes a stronger reaction in people than hazard agent cues (Tierney, 1988).

During widespread evacuations, observers clearly see others taking the threat seriously. They actively engage in protection. The behavioral cues facilitate protective action search, protective action assessment, and protective action implementation. When observers see that people are taking actions, but they do not know why, then they want more information.

Social Context

The social context of the warning includes people's integration into kinship networks, community involvement, and family obligations. The PADM suggests that kin and friendship networks have important effects on the protective action decision process. People's interaction and exchange patterns with their kin can play an important role in the warning dissemination process. Therefore, they play an important role in the successful adaptation to imminent threats. Similarly, the availability of many peers can also facilitate many aspects of people's disaster response. Drabek (1983) has shown that when officials deliver warning messages, social networks relay them. For example, people may hear from their friends that they need to evacuate. The number of sources for a warning message increases with the number of friends and peers that one has. This increases the number of warnings received. It increases the speed with which people receive those warnings.

The information-seeking processes often prompt warning recipients to contact others. Broader family and community networks increase the amount and detail of available information. It increases the number of sources for warning confirmation. Drabek and Stephenson (1971: 199) reported that extended family relationships were "crucial as warning message and confirmation sources... telephone conversations with relatives during the warning period were usually a key factor."

Mileti and Sorenson (1988) have documented situations in which having nearby family members can stop people from taking protective action. Sorenson (2000) confirmed that people refuse to evacuate unless they know their family is safe. A large family means there are more people to check on and deeper obligations. This increases the amount of time required for checking. Friendship networks function similar to kin networks.

Community involvement is people's interaction with groups and associations. Community participation operates much like kin and friendship networks. Members of groups talk to each other about the threat. They discuss what action to take. Membership in groups increases people's social contacts. This increases people's access to information. Community involvement increases the number of warning sources (Aguirre, 1991). It increases the detail of message content. It also increases the opportunities for warning confirmation. Drabek and Boggs (1968) established that community contacts are less important sources of information than family. However, community ties can substitute for weak or absent family relationships.

Families faced with disaster seek to protect members. They tend to perform as units when undertaking any protective action. Perry (1985) found this is important when the PAR is evacuation. Families tend to depart as units. They try to remain together throughout the journey. Evacuation compliance does sometimes occur when family members are separated, as long as people know separated family members are safe. The effect of family context on compliance with other types of PARs has not been studied. It is likely, however, that the conditions for compliance would be similar to those for evacuation. Sheltering in place involves remaining indoors. This minimizes the exchange of air to the outside. If family members are separated when a warning is received to shelter in place, we would expect a high level of compliance as long as they believe other family members are safe. In contrast, evacuation creates uncertainty about the location of those who have evacuated, so reunification of the family following evacuation is difficult if family members do not know how to find each other. This is not an issue for sheltering in place because there is no movement. An increasing number of households own multiple cell phones. This has made communication among separated family members less problematic. This line of communication is not fail-safe. Severe disaster impacts can destroy cell towers. High use loads can prevent access to the network. It is unclear how people will respond to PARs if they expect to be able to contact each other by cell phone but are prevented from doing so. The most cautious assumption is that lack of knowledge about the safety of family members will slow any decision to undertake protective action.

Warning Components

People's response to a warning message is directly affected by the source of the warning. It is affected by the channel through which it passes. It is affected by the content of the message. These factors are especially important in rapid-onset disasters that do not provide environmental cues to their onset. Sources that rapidly disseminate well-constructed messages through well-used communication channels motivate decision makers to attend to and comply with PARs. Effective message content promotes threat belief. It promotes protection motivation. It provides an adaptive plan. It also encourages timely response.

Warning sources vary by type. They include authorities, media, and peers. People judge each type in terms of its credibility. Credibility is composed of two main characteristics: expertise and trustworthiness. McGuire (1985) defines expertise as access to special skills and information. Trustworthiness is the willingness and ability to communicate information without bias. Whether or not a source is credible, its use of reward or coercive power can increase compliance with PARs. However, these bases of power are rarely used in American communities. Sources also differ in their accessibility to warning recipients. These can significantly influence the ease with which recipients receive any decision information they seek.

Perceptions of source credibility have an impact on many stages of the protective action decision process (see Figure 10-1). A warning from a credible source is more likely to attract attention. It will be accepted as accurate. This outcome affects risk identification and assessment. It increases the likelihood of citizen belief that danger is present. A PAR from a credible source also is likely to be seen as effective. Perry and Lindell (1990a) found that people assess expertise and trustworthiness in evaluating sources. They considered a source's past reliability. The credibility of different warning sources varies by hazard agent. Perry and Lindell (2003b) reported that people see friends and relatives as highly credible sources for familiar hazards. Governmental authorities tend to receive the higher ratings in radiological threats. They are also seen as more credible in unfamiliar hazards and terrorist threats.

Credible sources increase threat belief and protection motivation and decrease warning confirmation and other information-seeking activities. Drabek (1999) emphasized that the most common response to any disaster warning is disbelief. This reflects a **normalcy bias** that drives warning recipients to try to reinterpret cues of pending danger to mean that all is really normal. Particularly when warning sources have questionable credibility, people attempt to confirm the message by contacting a different source to verify the claim. Warning confirmation is a logical solution to the dilemma of minimizing disruption to normal activities and maximizing personal safety. Obtaining additional information about the threat can enable the warning recipient to:

- ▲ Disconfirm the warning.
- ▲ Find that an imminent personal threat exists (supporting protective action search, protective action assessment, and protective action implementation).
- ▲ Find that the threat to self and property is uncertain, remote, or modest in severity (supporting continued active information seeking or passive information monitoring).

Warning content captures the warning recipients' assessments of the existence of a threat, its seriousness, and what should be done in response to it. Lindell and Perry (1992) reported that the decision process yields the best outcomes when warnings convey specific information about the location, time, and magnitude of impact. When message content addresses these factors, people are more likely to believe that there is a real threat. They are more likely to personalize the risk. People will then be motivated to take protective actions. People are likely to respond inappropriately if they cannot accurately estimate their distance from the impact point. Specifically, people will underrespond if they overestimate their distance from the impact point. People will overrespond if they underestimate their distance from the impact point.

Fitzpatrick and Mileti (1991) and Lindell and Perry (2000) confirm that warnings with a specific PAR are more likely to generate an appropriate response

Figure 10-1

Research shows that uniformed authorities—like this police officer—usually have high credibility for quick-onset events.

than messages without guidance. There are at least two explanations for this effect. First, PARs contribute to the decision. People are given an alternative to continuing normal activities. Second, an official PAR implies that authorities consider the recommended action to be effective. This facilitates protective action assessment. In either case, you should ensure all messages contain PARs.

Repetition of a warning message increases threat belief. It enhances people's perceptions of risk. Lachman, Tatsuoka, and Bonk (1961) first called attention to this effect in their study of tsunami warnings in Hawaii. The study showed that, after a siren signal was sounded, further warnings via other channels increased evacuation compliance. Mileti and Beck (1975) replicated these findings for flood warnings in Rapid City, South Dakota. They found that the magnitude of the increases in response declined with each successive warning. Perry, Lindell, and Greene (1981) found further qualification in a study of flood evacuation, namely, that warning repetition was positively correlated with threat belief. The correlation with disaster response, however, was not statistically significant. This latter finding is consistent with the PADM. This is because threat belief is a single element. It takes place early in the protective action decision process. Later steps introduce additional (new) information. This determines whether the decision maker will comply with a PAR. Mileti and his colleagues (1992) emphasized that repeated transmission across a variety of channels is most likely to enhance warning penetration of normal activities. It ensures that each person in the risk area will receive at least one warning.

Mileti and O'Brien (1992) addressed message style issues. They wrote that warnings should be specific, consistent, clear, and accurate. Mileti and Sorenson (1987) found that people are affected by factors such as the use of figurative language. This is consistent with findings from research on social cognition that vivid images are more readily understood and remembered. Warning messages should include explicit conclusions about the threat. They should include what actions should be taken. Warnings should begin with a description of the threat. This should be the basis for the official PAR. Warnings should be delivered forcefully. Many planners have reported that emphasizing the high likelihood of death from remaining in a risk area substantially increases evacuation rates.

Even if you give a single warning message to the population at risk, people will receive many variants on this message from a wide range of sources. An official warning typically travels through the community as it is relayed by the media and people's friends and relatives. A greater number of sources will get involved when there are conflicting risk assessments. More sources will also become involved when there are differences in opinion about PARs. Even when warning sources agree, the message might conflict with environmental cues. Also, those who are told to evacuate might observe that others in the community are not making visible preparations to leave. In all of these cases, conflicts cause delays while the conflicts are resolved or while additional information is either actively sought or passively awaited.

Receiver Characteristics

The characteristics of people receiving the warning also influence the types of actions taken. Many recipient characteristics have been studied. Many studies have been contradictory or inconclusive. Nonetheless, four categories of traits do produce consistent findings about warning response. The categories are previous experience, preexisting beliefs, personality traits, and demographic traits.

Previous experience with disasters has been assumed to promote protective actions. However, studies have shown conflicting findings (Lindell and Perry, 2004). Anderson (1969) found that those who had recently experienced a natural disaster were more likely to believe warnings and accept a PAR. Nelson and colleagues (1989) studied 2820 residents of the Tampa Bay area following Hurricane Elena. The study found that people who had been area residents for many years were more likely to evacuate. However, some studies report that a large proportion of people who failed to evacuate during hurricanes were long-time residents of an area that had experienced hurricanes in the past (Windham et al., 1977). Baker (1993) reviewed many hurricane studies. He could find no evidence for a direct effect of experience on warning response.

The conflict among these results can be resolved. We can carefully reexamine some of the conclusions drawn by previous researchers. Fritz (1961: 659) concluded that levels of preparedness are highest in "*communities* that have *repeatedly* and *recently* experienced the *same* kind of disaster" (emphasis added). This experience can affect people in a number of ways. First, it can result in the creation of mechanisms such as an emergency management system that responds to disaster onset. Experience with a hazard might have little effect on people if disaster impacts are very infrequent. Also, there would be little effect if past incidents took place when many residents were not alive (or were living elsewhere). In such cases, people who had not personally seen disasters could only learn about them through others. Careful scrutiny of research suggests that past experience has no clearly definable impact on protective action decision making.

Prior beliefs or interpretations of disasters might explain why experience is not positively correlated with warning compliance. Burton, Kates, and White (1993) described people as "prisoners of their experience." People find it difficult to conceive of situations that are more extreme than their past experience. Mileti (1999) states that people often think the last disaster is the worst that can occur. People who have lived on the same river and experienced only small floods for many years cannot even conceive of a catastrophic flood. The effect of experience on protective behavior depends on *what is learned* from that experience.

What people have learned from their direct or vicarious experience can be called *salient beliefs* (Fishbein and Ajzen, 1975) or *schemas* (Fiske and Taylor, 1991). Much research on hazards has focused on what makes a risk unacceptable. These studies have found that risk perception can be defined by traits such as dread and whether the risks are understood. Flynn and colleagues (1998) state that nuclear facilities are viewed very negatively. This is because they are high in both categories. There has been little research on people's beliefs about protective actions themselves. Lindell and Perry (1992) described perceptions of three protective actions for a toxic chemical emergency. Evacuation was perceived to be better than sheltering in place or expedient respiratory protection. However, they also found that evacuation was also perceived as more demanding in time, effort, skill, and money. These are negative attributes. They offset evacuation's positive evaluation with respect to efficacy. Lindell and Prater (2002) compared the perceived characteristics of 12 different seismic hazard adjustments. They found that people choose actions based on their perceived efficacy in providing protection and their resource requirements. Lindell and Whitney (2000) found that efficacy attributes are the strongest factors in people's choice of seismic hazard protections to adopt.

Personality characteristics have long been speculated to cause disaster behaviors. However, Perry (1983) pointed out almost none have been tested in field research. Sims and Bauman (1972) reported that those who believe they control what happens to them (internal locus of control) are more likely to undertake protective actions in response to tornado warnings. Turner and colleagues (1986) suggest people who are fatalistic (external locus of control) are different. They believe that it is not possible to achieve protection. They believe that regardless of what protection they take, their fate is out of their hands. They are, therefore, less likely to act on a disaster warning.

To interpret these findings requires a distinction between fatalism and what Bandura (1977) calls low self-efficacy.

- ▲ **Fatalism** is a personality trait whereby people believe that external forces beyond their control determine what happens to them.
- ▲ **Self-efficacy** refers to the confidence that people have that they determine their personal outcomes, not some uncontrollable fate. Individuals might strongly believe they control their own outcomes. They might also have a low sense of self-efficacy in implementing an unfamiliar protective action. We must also separately consider the efficacy of that action in providing protection. Self-efficacy refers to people's expectations about whether they have the ability to perform a specific task.
- ▲ **Response efficacy** refers to an individual's belief that implementing a given PAR will actually give impact protection.

The PADM makes no prediction regarding the effects of personal control perceptions on predecisional processes. There is also no evidence to suggest that beliefs about personal control would affect the formation of a threat belief or protection motivation. The PADM does predict that self-efficacy affects protective action assessment. It also, to a lesser degree, affects information search. Fatalism is correlated with response. People who are high in fatalism would, by their very nature, be low in self-efficacy for *all* protective actions. In contrast, those who are low in fatalism might be high in self-efficacy for one protective action. However, they may be low in self-efficacy for another.

Demographic characteristics influence different aspects of response behavior. It has been argued that income, education, age, gender, and ethnicity directly affect the predecisional stages of disaster response. They also affect the five stages of the protective action decision process. These variables also appear to affect relationships to friends, family, and the community. These relationships themselves influence the decision process. They also influence information-seeking behaviors such as warning confirmation. Turner and colleagues (1981) found women more likely to believe warnings than men. Windham and colleagues (1977) found older people are less likely to believe warnings.

Drabek (1986) argued that demographic characteristics are not useful in predicting warning response. His concern is that a person's age, gender, and ethnicity are set at birth. This is long before they have an opportunity to respond to a warning. Events that cause warning response behavior happen long after birth. These events shape things such as risk perception and belief in the danger, which then affect decision making. Demographic variables may work in chains. Gender produces experiences that make women more risk averse when children are involved. Risk aversion causes people to more often adopt PARS. The important relationship is not gender with PAR adoption. It is the closer link between risk aversion and PAR adoption. Perry and Lindell (1991) used sophisticated statistical analysis to show that these closer-linked variables are more critical for accurate behavior prediction than the demographic characteristics that precede them. This was confirmed by Aguirre's (1991) analysis of hurricane evacuation compliance which found that socioeconomic status, gender, age, and marital status were not statistically significantly related to disaster response.

Two other problems arise in interpreting demographic variables. First, there is little meaningful data on these variables in warning settings. Studies indicating gender differences in the response are important. However, more needs to be learned about the relationship of gender to environmental cues, social context, warning components, and other receiver traits. More also needs to be learned about gender and its effects on predecisional processes and the stages of the protective action decision making. It is possible that family roles account for gender differences. The data on gender in disaster response use the individual, not the family, as the unit of analysis. Second, some variables are related to each other. Their effects are difficult to separate. It is difficult to determine which one (or combination) of these is responsible for a particular pattern of response. In light of these concerns, we will focus on three demographic variables. We will look at the effects of age, socioeconomic status, and ethnicity.

The elderly tend to experience more negative outcomes in disasters. They die during impact more often (Perry and Lindell, 1997b). They experience greater monetary losses (Bolin and Klenow, 1983). The elderly have more negative emotional and physical health consequences. One explanation for this is differences in disaster response. Sorenson and Richardson (1984) and Steele and colleagues (1979) have reported that the propensity to comply with an evacuation warning decreases as age increases. This leaves more elderly in vulnerable areas. Difficulties in interpretation arise, however. This is because these studies tended to confound factors such as physical health and social participation with age. Drabek (1983) argues that failure to include intervening variables probably accounts for conflicting reports that elderly are no less likely to engage in protective action than other age groups. Perry and Lindell (1997b) conducted a review of age and evacuation in nine disasters. They found no statistically significant relationship between age and evacuation compliance. Age is important in warning response. This is because it is related to other factors. This is the chain effect of demographic variables. As age increases, there are decreases in the levels of social activity. More social isolation produces fewer chances of receiving a warning.

We do not know if socioeconomic status has a direct influence on disaster response. Lachman and colleagues (1961) found education was unrelated to evacuation. However, Flynn and Chalmers (1980) reported a positive relationship between formal education and evacuation. Two points are important in interpreting these data. First, among studies showing relationships of income and education with any warning variable, the magnitude of the correlation was low. Second, we do not know why either education or income should be *directly* related to any of the stages of the decision process. One possible explanation for effects of income and education is that they decrease evacuation feasibility due to restricted material resources, knowledge, and skill. Low income could decrease the likelihood of having a personal vehicle. Both of these variables could be related to low geographic mobility.

Another possible role for socioeconomic status in disaster response might lie in its influence on social context variables. Alvirez and Bean (1976) and Tomeh (1978) reported that socioeconomic status is positively correlated with participation in voluntary associations and other community organizations. Cohen and Kapsis (1978) determined that lower socioeconomic status is associated with lower rates of participation even when ethnicity is controlled.

Age appears to have a significant effect on the predecisional process of warning receipt. Age does not, however, have an effect on exposure to environmental cues. Age also does not have an effect on attention to warnings or message comprehension. Socioeconomic status is not predicted to have effects on any of the predecisional processes. Neither age nor socioeconomic status has a direct effect on the formation of a threat belief, protection motivation, protective action search, or assessment. The research reviewed here suggests that there could be a modest effect of age on information search. This is only because age can produce social isolation.

Ethnicity has received little attention from disaster researchers. Researchers have measured ethnicity when they probably should have been asking people about how much they identify with an ethnic group. It is not possible to determine the extent to which ethnic identity measures adherence to ethnic subcultural activities. Ethnic minorities are sometimes more deeply immersed in kin and social networks. They are also more active in the community (Bianchi and Farley, 1979). This suggests ethnicity may influence disaster response through its effects on family context and social participation. This is supported by

Clifford (1958). His study of a Rio Grande flood found “people were oriented so strongly toward the extended family that they almost completely neglected neighbors and friends.” The African American kinship network is more extensive and cohesive than that of Whites (Staples, 1976). Staples wrote that “a larger proportion of Black families take relatives into their households.” Wilkson (1999) reported similar findings for Mexican and Asian Americans. Clearly, family structure and roles are different for minorities. Minority households are more likely to have extended families. They are more likely to house people from more than one generation. They often have more than one family in the same house. Therefore, there are more warning sources and confirmation sources. It also implies an increase in the number of people whose safety must be accounted for in minority families.

Perry and Lindell (1991) studied the warning responses of Whites, African Americans, and Mexican Americans. A key finding of this study was that evacuation warning compliance was a function of perceived risk, possession of an adaptive plan, and warning characteristics. These findings indicate that *without regard to ethnicity,* people are likely to comply with a PAR if they are convinced that the warning is accurate, risk is high, and they have an adaptive plan. This does not mean that ethnicity is not an issue for response. These data also show that ethnicity is strongly related to source credibility and warning confirmation behavior. However, there appears to be no simple relationship between ethnicity and source credibility. There are variations from one community to another. In Abilene, Texas—a community affected by a major flood—Mexican Americans cited social network contacts as the most credible sources (Perry and Lindell, 1991). This was followed by mass media. After the media, uniformed authorities were most credible. In contrast, Mexican Americans in Mt. Vernon, Washington, who were warned of a hazardous materials emergency, most often identified authorities as the most credible source. This was followed by mass media. This was then followed by social networks. African Americans in the Abilene flood had highest confidence in authorities. This was followed by social networks. Whites in that community had the most confidence in the mass media. This was followed by authorities. Attributions of source credibility differ between ethnic groups. For a particular ethnic group, credibility differs between communities.

The most common response to a disaster warning is disbelief and a search for further information. Perry and Lindell (1991) found that there are ethnic variations in the level of warning confirmation behavior. There are also variations in the types of sources contacted by warning recipients. Slightly smaller proportions of Whites attempted to confirm warning messages than either African Americans or Mexican Americans. In confirming messages, ethnic groups made different decisions about which source to contact first. In both the flood and hazardous materials emergencies, Whites were most likely to contact the mass media. They were also somewhat more likely to contact social networks.

Mexican Americans confronted with a flood threat followed the same pattern as Whites. However, when faced with a hazmat emergency, they were most likely to use a social network contact first. They then contacted the mass media. African Americans were most likely to use a social network contact. They then contacted an authority. The important conclusion is that, left to their own devices, members of different ethnic groups contact different categories of sources for warning confirmation. There is also variation within the same ethnic group and across types of disaster agent.

Ethnicity appears to influence the predecisional process of warning reception. However, it does not influence attention to warnings and environmental cues. Ethnicity also affects message comprehension (through language). Ethnicity affects environmental cue interpretation. The research record does not support that ethnicity affects the formation of a threat belief or protection motivation. It is possible that ethnicity affects protective action search and protective action assessment indirectly through perceptions of personal control. There are no consistent effects of ethnicity on information search.

10.1.3 Warning Compliance and Spontaneous Response

People receive a warning that contains a PAR. Then they can choose whether or not to comply. Failure to comply with the guidance can result from poor warning messages. Failure can also occur because the recipient obtains additional information. This information may be from environmental cues or other social sources. The level of noncompliance with PARs is quite high in many disasters. Dow and Cutter (2002) reported an evacuation rate of 65% during Hurricane Floyd in South Carolina. Riad, Norris, and Ruback (1999) found only a 42% evacuation rate in Hurricanes Hugo and Andrew. Prater, Wenger, and Grady (2000) found a 34% evacuation rate in the Texas counties most severely threatened by Hurricane Bret. Baker (1991) reported that evacuation rates have varied from one location to another in the same storm. They also vary from one storm to another at the same location. The variation in compliance rates is due to variation in the availability of environmental cues, situational variables, warning components, and receiver traits.

Noncompliance can take three forms. People might hear a warning message and elect to not heed the PAR. They may not alter their routine activities. A second form of noncompliance involves hearing the message, but adopting some protective measure other than the one recommended by authorities. The third form is called **spontaneous protective response.** This takes place when those who are not at risk hear a warning and adopt the official PAR. Spontaneous protective response can be problematic when the protection undertaken by people not at risk impedes the compliance of people who are at risk. Spontaneous response is a common problem in evacuation. When the hazard agent produces very high levels of fear in the warned population, there are likely to be many evacuees outside the risk area identified by authorities. The problem is exacerbated when **warning mechanisms** are not exclusively targeted to those at risk. However, even perfect targeting does not eliminate the problem. Zeigler and colleagues (1981) used **evacuation shadow** to refer to people in the "shadow" of a vulnerable area who comply with the PAR.

Lindell and Perry (1983) found specific reasons for spontaneous protective response. The basic cause is a lack of confidence in authorities. This can arise if people believe authorities are withholding information. They may believe that authorities do not have access to correct information. They may also believe that the authorities cannot predict what the hazard may do over time. These beliefs indicate that the local authorities have given insufficient resources to risk communication.

Even in communities where people think authorities are very credible, spontaneous protective response can arise when the threat generates very high levels of fear. Fear leads people to more careful scrutiny of warning messages. Attention to the recommendations of authorities coupled with high fear often encourages people outside designated vulnerable areas to adopt protections as a way of reducing fear. This happens frequently when the threat rests in technology such as nuclear power plants or chemical facilities or transportation. Burton and colleagues (1993) found spontaneous evacuations in connection with the Mississauga, Ontario, train derailment. This derailment involved chlorine. There were also spontaneous evacuations during the 1980 eruption of Mt. St. Helens volcano (Perry and Lindell, 1990a). Stein and Murray (2005) interviewed Houston citizens who lived outside the risk area for Hurricane Rita. Many left even though they were not in danger. Many of those citied fear of possible damage based on the recent highly destructive impact of Hurricane Katrina in New Orleans.

FOR EXAMPLE

Three Mile Island Evacuation Shadow

On March 28, 1979, there was a malfunction in Unit Two of the Three Mile Island Nuclear Generating Station. This combined with operators' misinterpretation of the plant's behavior, caused a partial meltdown of the radioactive fuel in the reactor core. The Pennsylvania governor was concerned about the potential for fallout. He advised that pregnant women and small children living within 5 miles of the plant evacuate. He also advised those within a 10-mile radius to shelter indoors. By the time the crisis subsided after 5 days, more than 144,000 people had evacuated. This was about 40% of the population living within a 15-mile radius. Many local businesses had to close because of employee absenteeism.

Girard and Peacock (1997) further confirmed the occurrence of spontaneous evacuation in hurricanes. Baker (1991) reported a range from 20% to 50% PAR compliance of residents in areas of low risk. Lindell and colleagues (2001) found that rates of expected spontaneous evacuation decayed exponentially as area elevation and distance from the coast increased. The expectation of spontaneous evacuation had a significant inverse relationship to respondents' confidence in the accuracy of evacuation warnings.

SELF-CHECK

- Define **fatalism** and explain how it relates to response efficacy.
- Warnings are one type of risk communication. What makes them different from other **risk communications?**
- Why don't people just do whatever they are told in a warning message?
- Why don't demographic variables—age, gender, and ethnicity—have important effects on people's compliance with the protections recommended in warnings?
- What causes **spontaneous protective response?**

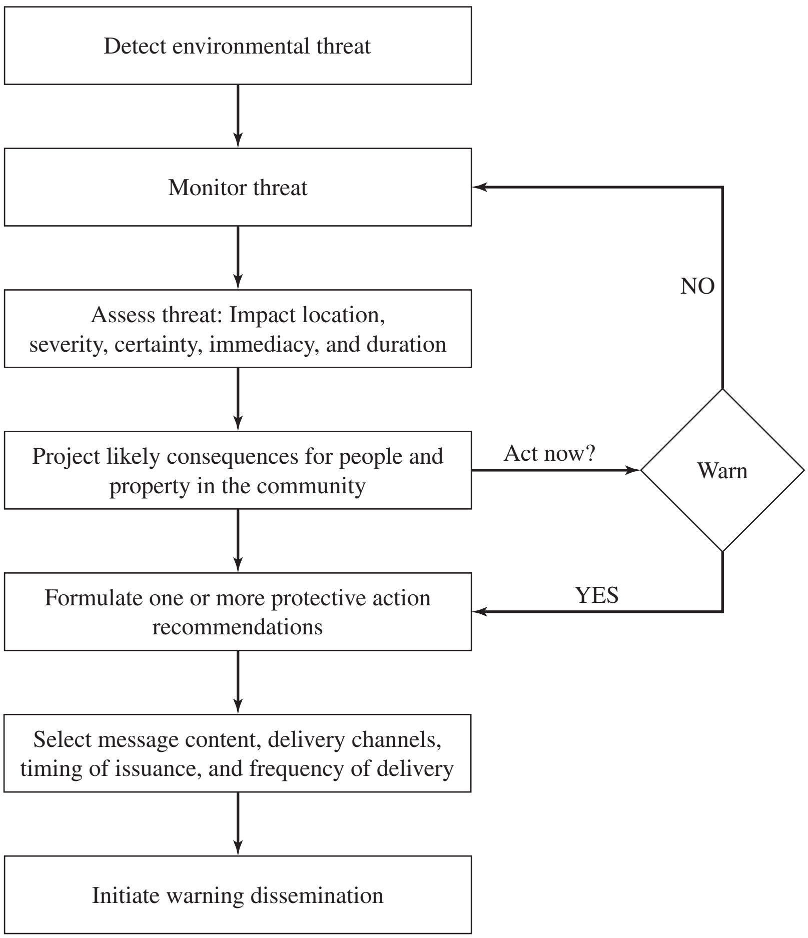
10.2 Planning Applications of Decision-Making Studies

Disaster researchers create theories to explain the behavior of households, organizations, and societies in response to environmental hazards. They study many variables that you can't control. However, these variables are important in understanding disaster response. Emergency planners and managers have a slightly different goal. They want to understand behavior, but they also want to influence behavior. They need to shape behavior into patterns that protect individuals from disaster impacts. Planners are interested in research because it provides the understanding that allows them to design successful programs for community protection. Emergency planners are particularly interested in attributes that they can change to influence human behavior. These attributes include people's knowledge of hazard agents, impact characteristics, perceptions of risk, and receipt of warning messages. Attributes that planners can't change become part of the strategic analysis. These include demographic traits, family context issues, and people's embeddedness within social networks. The research that we have organized in our discussion of the PADM offers many suggestions that can be used to build effective local warning systems.

10.2.1 Community Warning System Structure

Community-warning systems connect authorities' threat evaluations with citizens who might be vulnerable. Warnings are the product of social organization. They are also the product of the state of technology relative to the hazard. Social organization refers to the evaluations and interpretations of threat information made by authorities. It also refers to the process followed to reach a decision to warn citizens, and the mechanisms used to deliver the warnings. Figure 10-2 shows a flow diagram of the steps involved in issuing disaster warnings. This schematic presents the tasks of warning issuance in sequence. The operation of a warning system begins with detection of an environmental threat and a prediction of its location, time, and magnitude of impact. Threat detection and prediction might

Figure 10-2



Sequence for issuing community disaster warnings.

be managed by a variety of organizations. It is usually managed at higher levels of government.

The first critical capability of a warning system is to be able to receive information about environmental threats from many sources. Following threat detection, emergency personnel monitor the threat and project its potential impacts. You must identify the vulnerable geographic areas where protective action will be needed. You must then estimate the amount of time available for implementation. Monitoring and assessment are continuing activities because some threats change their estimated location, time, and magnitude of impact over time.

Projections of impact are the main data on which officials base their decision to warn those at risk. The level of projected negative consequences needed to justify a warning is specific to the affected areas. Local standards of acceptable risk are interpreted by working with elected officials. Until an action threshold is reached, you must continue to monitor the threat. Once the action threshold is reached, local officials must formulate one or more PARs. These are based on levels of preparedness. Officials must also consider the amount of forewarning and the likely severity of impact. When forewarning is short and severity is high, PARs are likely to focus on personal safety measures. With increased forewarning, lower estimated severity, or higher levels of community preparedness, PARs include suggestions about property protection.

Once protective actions have been selected, you can work focus on the warning message. The specific wording of the message must be crafted. Channels must be selected for dissemination. Decisions must be made about the rate and repetition of the warning message. Behavioral research provides a knowledge framework for making these decisions.

10.2.2 Elements of Issuing Population Warnings

You must execute the functions that support the warning system before a disaster threatens. Emergency personnel are responsible for knowing which hazards threaten their communities. They must establish arrangements for receiving and monitoring threat information. They must install computer software. They must install other decision support systems for threat assessment. Planners select warning mechanisms to allow authorities to send messages to people in risk areas. The planning process should enable you to control official message content and channels. You should be able to influence warning confirmation and information search. You should be able to anticipate the effects of critical contingencies such as environmental cues, social context, and receiver traits. Finally, *before* a crisis, you should disseminate information to the community about their plans and procedures for population warning. Hazard dissemination programs allow you to alert citizens in advance about what communication channels to monitor. You can inform people what PARs to expect. You can tell them what logistical preparations to make. You can also tell them how to confirm warnings. Effective communication of this information means the warning message will be less surprising. It will be more consistent with people's knowledge of the hazard agent. It will be easier to confirm. It will also be more strongly suggestive of protection actions that have been previously identified by authorities.

Research on people's response to warnings informs the way you accomplish five functions: managing source credibility, constructing warning messages, selecting warning channels, controlling citizen information seeking, and creating incentives for warning compliance.

Managing Source Credibility

Local authorities build warning source credibility through repeated contacts with citizens during normal conditions and in the early stages of an emergency. Hazard awareness programs form an important opportunity for local officials to enhance their credibility before they must issue warnings. Hazard awareness programs can engage local residents in a wide range of hazard-relevant issues, as well as explain disaster-warning processes. They demonstrate officials' expertise and access to specialized information and confirm their commitment to community safety. To the extent these objectives are achieved, authorities are likely to resolve any questions about their expertise and trustworthiness before disaster warnings must be delivered. Source credibility attributions can vary across communities and ethnic groups. The appropriate strategy for addressing such variation is not to attempt to determine which source is best for each group and match each group with a different source. Instead, community-wide credibility enhancement can be promoted if local officials observe four general principles:

1. Build credibility by working with local groups before crisis is imminent. A continuing outreach program builds confidence in local agencies' expertise and trustworthiness.
2. Use multiple sources and multiple channels to maximize the warning network's coverage. If multiple sources agree on the warning, citizens see the consensus.
3. Deliver messages in a way that emphasizes the need to take the threat seriously. How this is done varies by warning channel. Broadcasts via mass media or the Emergency Alert System can emphasize seriousness by comparing the present risk with past risks, mentioning jurisdiction vulnerability assessments or citing external hazard specialists. When using mobile public address systems or face-to-face, seriousness can be reinforced by having personnel drive emergency vehicles and wear uniforms and protective gear.
4. All warning messages should emphasize the use of official sources for threat assessment. This tells warning recipients that the message is backed by the credentials and authority of the source and its access to specialized knowledge, skills, and equipment. This is especially helpful in technological disasters or natural events with which citizens are unfamiliar.

Constructing Warning Messages

A warning message is a way of conveying the results of a risk assessment from one person to another. An official warning is based on scientific risk assessments. It is transmitted by authorities to those who are in danger. Disaster researchers have found that people rarely comply unquestioningly with the recommendations of authorities. This is especially true when these warnings conflict with environmental cues, information from the mass media, or the observed behavior of others. You should expect people to disbelieve messages at first. Warning recipients routinely distort messages. They may conclude that "things are really normal." They may believe that it's not necessary to depart from normal activities. Ambiguous or conflicting messages can delay adaptive response or prevent it altogether. Also, if there is sufficient time before impact, warning messages will be relayed by multiple intermediates in the mass media and among peers. This message relay increases the chance of content distortion.

You should construct clear, concise messages to avoid problems associated with distortion. Specifically, the warning message should contain information that addresses personal risk assessment. It should also address protective action selection. Drabek (1999) argues that warning content needs to allow people to answer eight questions:

1. *Who is issuing the warning?* Identify the governmental organization that collected and evaluated the risk information. This should be an agency that is recognized by warning recipients as one that has a legal responsibility and a special competence to protect the public.
2. *What type of event is threatening?* Identify the environmental event that poses a threat. If environmental cues might conflict with the message, this should be explained briefly.
3. *Who is being threatened?* Indicate which people and property are at risk. Usually, this is a particular geographic area defined by recognizable landmarks such as transportation routes, political boundaries, or geographical features. If specific demographic groups are at risk—pregnant women, children, or elderly—these should be specifically identified.
4. *When is the impact expected to occur at the warning recipient's location?* If time allows and the information is available, the warning message should project successive impact times over large impact areas.
5. *How intense is the event expected to be at the warning recipient's location?* Define the severity of the physical impact by geographic area. Messages should separate the physical magnitude of the event from the physical and social consequences for the warning recipient. Hurricanes are classified by Saffir-Simpson category. Tornadoes are categorized on the Fujita scale. These are likely to have little meaning for most people unless linked to the likelihood of death or injury, property destruction, and disruption of work and daily activities.

6. *How probable is it that the event will strike the warning recipient's location?* Explain the likelihood that the warning recipient will be affected. Even when impact is uncertain, authorities should make it clear that uncertainty is determined by the probabilistic nature of the event, not incompetence on the part of the warning source. False alarms do have some impact on people's later disaster responses. It is difficult to overemphasize the need for taking protective action even when there is uncertainty about the location, time, and magnitude of impact.
7. *What specific protective actions should be taken?* PARs should provide specific guidance about what to do, as well as when and how to do it. An evacuation recommendation should indicate when to leave, what to take, where to go, and how to get there. Those who need assistance should be told how to obtain help.
8. *Are there high-risk groups that require special actions?* Identify population segments and activities that are at especially high risk. For hurricanes or tornadoes, this would include those who live in mobile homes. In the case of floods, this would include people who might attempt to drive automobiles through moving water.

This might appear to be a large amount of information to transmit in a warning message. The basis for inclusion rests in decades of research about people's warning behavior. The National Science and Technology Council (2000) urges emergency planners to develop "fill in the blank" warning messages that contain open spaces where event-specific information can be inserted. Such message formats ensure that relevant information is included. They also help to eliminate extra information.

The need to include warning information that guides people's assessments of the situation can be seen by critiquing a simple short warning message. The message is "the river is flooding—residents of low-lying areas should evacuate." This is the type of message provided by broadcasters when you don't appropriately brief them. This general warning identifies the danger. It suggests what action to take. It is otherwise fundamentally uninformative.

- ▲ It fails to indicate the authority for issuing the warning, so listeners cannot tell if the warning has been issued by a competent source.
- ▲ The message does not specifically describe the impact area. *Low-lying area* is especially vague. Even telling listeners that the flood will crest 10 feet above flood stage fails to help them personalize the risk because many floodplain residents will not know the elevation of their homes. The definition of "low-lying" depends on what you compare your location with.
- ▲ The message indicates that flooding is in progress, so there is certainty about the event. However, warning recipients need to know if *their* locations will be flooded, not if *any* locations will be flooded.

- ▲ The message fails to indicate the estimated time of impact. This fails to instill a sense of urgency. Warning recipients will want to know when their location will flood.
- ▲ The guidance to evacuate fails to indicate a safe route of travel, a safe destination, or methods of obtaining assistance for those who lack transportation.

This type of brief and incomplete warning is likely to create very low compliance. It will spur the need for people to devote time to information seeking. It will also elicit a dangerous response if people evacuate to more vulnerable locations because of the vague information. The problems with general warnings rest in people's inability to personalize the risk. General warnings also create uncertainty about an appropriate protective action.

Warning Channel Selection

Warnings are effective only to the extent that those at risk actually receive the message. Coverage of the risk area varies with the channels through which warnings are disseminated. Warning channels are ways or processes through which messages are sent to populations. There are many warning channels. These include face-to-face contact, telephone, siren, mobile loudspeaker, radio, television, and newspaper. You match channel characteristics with communication needs. Six characteristics of warning channels have been identified that affect their effectiveness:

1. **Precision of dissemination** refers to a channel's ability to warn all of those at risk (sensitivity) and only those at risk (specificity). Face-to-face warnings can be precisely targeted. Those delivering the warning can be given very detailed instructions about who is at risk. The broadcast media (radio and television) are very imprecise. A warning message can be received by anyone in the reception area. This over warning problem can be reduced if broadcasters provide specific information about who is and is not at risk. However, people sometimes ignore this guidance. The over warning aspect of broadcast media arises in large scope threats such as hurricanes, volcanic eruptions, and tsunamis. The wide impact area often results in broadcast of messages to people for whom they are not intended. This produces response challenges. More people than necessary undertake protection.
2. **Penetration** of normal activities refers to the power of warning mechanisms to get the attention of those at risk. This is especially true for disaster agents that allow little forewarning. Rogers and Sorensen (1988) found warnings transmitted over the broadcast media are more likely to be received when the population at risk is watching the television or listening to the radio. Warnings transmitted over these same channels are

least likely to be effective when those in the impact area are asleep. Thus, telephone alerts or face-to-face warnings penetrate best during night dissemination. You must carefully select high penetration channels. You must send immediate action warnings. Penetration needs are usually related to timing of the message. For example, if a threat is detected in the middle of the night with a short time until impact, the channel selected must have the capacity to wake the majority of the population from their sleep. Tone alert radios, such as NOAA Weather Radio, can do this. Normal radio and television receivers cannot.

3. **Message specificity** is the level of detail about the threat, vulnerability, and PARs. Sirens can only provide an *alert*. This indicates only that there is an emergency but not what it is or what should be done. In contrast, radio or television can be used to disseminate very specific and detailed warnings. These document the onset of the threat and provide details about recommended protective actions. Face-to-face channels can also supply great specificity and, in addition, provide an opportunity for two-way communication.
4. Some channels are more susceptible to **message distortion:** failure to convey the original message in original form and content. Message distortion frequently arises when information is communicated through a chain. For example, telephone trees structure warnings so that after being warned, each person in the tree calls a designated list of people. This procedure is much faster than having a single individual make all calls, but distortion can creep in as the message passes between people. Distortion in telephone trees can be minimized if there is a standard warning message and people have been trained in its use. Distortion can arise with most channels. This is because even official warnings will be relayed among people. They may be changed in the process. These effects are usually handled by creation of warning information centers that people can contact directly.
5. **Rate of dissemination** over time is the speed of the mechanism; how many people can be warned in what time frame? Short forewarning usually demands reliance on channels that reach the largest number of people at risk in the shortest time possible. The electronic media are very high on this characteristic. Newspapers are low.
6. **Sender and receiver resource requirements** consist of the capital (equipment) and personnel-training resources. Telephones require no new equipment or personnel training. Others might require major investments in new communication technology. Sirens require major investments by the sender. Tone alert radios require investments by the receivers.

In choosing warning channels, you must pair channel characteristics with agent-generated demands and the warning context. Table 10-2 summarizes six

Table 10-2: Characteristics of Warning Channels

Channel	*Precision*	*Penetration*	*Specificity*	*Distortion*	*Rate*	*Resources*
Radio	Poor	Poor: tone alert higher	Moderate: no visual	Low with script	High	Low
Television	Poor	Poor	High	Low with script	High	Low
Route alarm	High	Moderate	Moderate: no visual	Low with script	Moderate	Low
Automated telephone	High	High	Moderate: no visual	Low with script	High	High to agency
Face-to-face	High	High	High	Low with script	Low	Low
Sirens	Low without training	High	Poor	High without training	High	Low
Newspapers	Moderate	Poor	High	Low with script	Low	Low

common warning mechanisms. Five of the warning mechanisms are self-explanatory: face-to-face warnings, sirens, television broadcast, newspapers, and radio. Route alarms involve having personnel drive specific routes repeating a standardized warning message specific to the geographic area. Automated or manual telephone systems place calls to vulnerable dwelling units and play recorded warnings when the phone is answered.

Warning coverage is increased when warning messages are sent over multiple channels. This is because the probability of receiving at least one warning increases with the number of warning channels. It also increases with the number of warnings disseminated over each channel. The reception of warnings via multiple channels increases the likelihood of warning compliance. Furthermore, the use of multiple official channels is likely to increase warning relay through unofficial sources. These sources include friends, relatives, neighbors, and co-workers. This provides additional reinforcement for threat belief and assessment of the risk as serious and imminent.

Warning channels also can vary in the degree to which they affect different decision stages. Mechanisms with high specificity, low distortion, and high feedback capability increase message comprehension. Warning channels that support high precision, high specificity, and high feedback capability support the information seeking stages. Face-to-face warnings and nonautomated telephone systems support information seeking. The other channels do not. The internet is a good information source. It can be used for incidents with ample forewarning. However, it suffers the same problems as radio and television as a warning channel. Moreover, the number of homes with internet access and the proportion of those on-line at warning dissemination is likely to be even lower than with more conventional electronic media.

Managing Information Seeking

The most common first reaction to a warning is disbelief. Different people give different information sources different levels of credibility. Lindell and Perry (1996) reported that people attempt to confirm warnings by consulting multiple sources. Confirmation by credible sources is important in determining whether to comply with official warnings. You can influence the extent and nature of information-seeking process by avoiding source deficiencies, content deficiencies, information conflicts, and channel deficiencies. These tactics can reduce the amount of information-seeking behavior. They will not eliminate it altogether. Effective warning system planning addresses the need for people's opportunities to get more information in emergencies.

You can establish information centers. Also, you can adapt local hotlines to provide timely and accurate threat information. These measures also allow you to detect rumors. You can identify the frequently asked questions whose answers would be appropriate to discuss in the news media. Both techniques involve people making phone calls. This tactic requires preimpact planning if it is to be effective. You may want to advise people to avoid using telephones during emergencies. Citizens never obey this advice. During the 1994 Northridge earthquake in the Los Angeles area, even cell phone traffic was overloaded (see Figure 10-3). This forced some emergency agencies to switch to satellite-based telephones. People in disaster impact areas *always* seek information about the event. People outside the impact area seek information about loved ones who might need assistance. The magnitude of telephone convergence increases with the disaster's speed of onset and scope and intensity of impact. Rather than asking people not to make calls, anticipate it and introduce technological fixes. Innovations in telecommunications have increased local jurisdictions' capacity for handling surges. Increasing telephone capacity costs money. However, the benefits in rumor control, information precision, and information detail appear to outweigh the costs.

Predisaster planning to design, equip, and staff information centers is an important step. The utility of these centers depends on your ability to assure people that their questions will be answered by calling the number. An official warning message provides one opportunity for publicizing the existence of such centers. However, these messages should only reinforce information disseminated as part of ongoing hazard awareness programs. The San Francisco Fire Department, as part of its earthquake preparedness Web site, reminds citizens to limit telephone use during earthquakes. It also includes information center telephone numbers to use when accurate information is needed. Many counties and large

Figure 10-3

Approximately 114,000 residential and commercial buildings were damaged and 72 people killed in the 1994 Northridge earthquake.

cities have established community hot lines for many purposes. Such systems can readily be converted to support disaster information seeking. This can be done by connecting incoming calls to prerecorded messages or human operators. Some smaller communities advertise the availability of several different numbers. This is done in an effort to spread calls across multiple exchanges. In either case, measures must be taken to ensure the system is responsive to the community. A system that overloads quickly will create frustration. The demands on a warning confirmation line can be minimized. If your warning messages address Drabek's eight questions, people will need to clarify fewer issues. The messages should be delivered across many channels.

Creating Specific Protective Action Incentives

Lindell and Perry (2004) have advocated creating PAR **compliance incentives.** An incentive is any measure that removes implementation barriers to PARs. Most incentives have been developed for evacuation plans. To facilitate evacuation compliance, many jurisdictions devise evacuation traffic management plans. This includes route information. It also includes the designation of safe destinations. It is often in the form of labeled maps. Another evacuation incentive is the provision of transportation out of endangered areas in high-occupancy vehicles for those without access to cars. Many of these households meet their routine needs for transportation to work, shopping, and other daily activities by receiving rides with peers. These same people are almost certain to offer transportation assistance in an emergency as well. The need for public evacuation transportation support will often be small. However, it cannot be assumed to be zero. Consequently, local authorities should describe the locations where buses will stop. They should also describe the routes they drive as well as when the bus pickups will be terminated. You can encourage nursing homes and other group facilities to comply with evacuations by making predisaster contacts. You should also provide technical guidance and support. Large businesses and other critical facilities can be approached in similar fashion. Disseminating plans to assist individuals with personal mobility limitations that do not live in group settings is also a compliance incentive.

Incentives are not limited to removing evacuation barriers. They are highly specific to each jurisdiction. The resources available for planning constrain the types and extensiveness of compliance incentives that can be implemented. Elaborate or costly measures may simply be impossible burdens in small jurisdictions. The use of incentives requires the creation of the incentive itself and the use of an ongoing dissemination program to inform the public of its availability. Without both components, there is a high probability that incentive programs will create more frustration than compliance. The least costly incentives are often the most inventive, such as using regular city complaint telephone lines for warning confirmations. Private sector partnerships can often be used to support incentives by arranging for large employers to provide mass transportation to employees in emergencies. They can also establish "company shelters" or safe havens. Although many incentives must be specific to hazard agent-generated demands, communications and sheltering are useful themes whether pursued by government alone or in partnership with private or nongovernmental organizations.

Facilitating communication among family members serves as a general incentive for compliance with a variety of protections, particularly evacuations. Families rarely evacuate if the welfare of any members is not accounted for and many families don't think about communication when devising a family emergency plan. Local authorities can systematize this function by establishing centralized family message centers and enhancing human accountability capabilities in congregate care centers. For decades, congregate care facilities operated by the American Red Cross and the Salvation Army have accounted for those who are staying in a given shelter and the status of their health. The widespread availability of personal computers after the 1980s greatly enhanced the speed of information retrieval. Both organizations typically aggregate their information for a given disaster, providing a relatively comprehensive accounting that can be accessed both by concerned citizens from outside the impact area and by evacuees seeking separated family members. The American Red Cross Web site also offers an innovative system for distant relatives to locate information on families. Some larger municipalities undertake the information aggregation themselves. By publicizing the existence of this capability either during an emergency or through a preimpact hazard awareness program, local officials can help people refine their family emergency plans or find family members whose whereabouts are unknown.

The establishment of congregate care facilities where evacuees can stay during a period of absence from homes raises a significant issue regarding their use. For years, disaster studies reported that evacuees prefer to stay with friends or relatives than in public shelters. Mileti and colleagues (1992) estimated that use of congregate care is likely to be in the range of 5% to 15% of evacuees. This depends on the characteristics of the evacuees, the situation, and the community. Evacuees are more likely to rely on public shelters if they are less integrated into the community, have lower incomes, or rely on public transit. Situational factors that increase use of public facilities include night evacuations, bad weather, evacuation of an entire community, and the anticipation of a brief evacuation. Finally, characteristics of the community that promote shelter use include isolation from other communities and high levels of community emergency preparedness—both of which are factors suggesting congregate care facilities will be better equipped and better known to evacuees. Even if public facilities are used only by a small proportion of evacuees, they are critical for those with no other place to go.

The availability of congregate care facilities should be included in the warning message. The extent people actually use them often depends on information disseminated as part of hazard awareness programs. It is possible to devise (and advertise) incentives to use public shelters by examining the fears and needs of evacuees. Local authorities can make shelters more attractive by partnering with local humane society chapters or veterinarian professional groups to accommodate pets. The elderly and children, in particular, integrate pets into their lives. They hesitate to undertake protection without them. Most Americans will long remember videotape of a toddler made physically ill when officials took away his dog as he boarded a bus to evacuate New Orleans following Hurricane Katrina. Other incentives for shelter use include:

- ▲ Ensure each shelter's organization is structured according to the incident management system.
- ▲ Provide activities for adults and children.
- ▲ Preplan shelter locations to ensure adequate sanitary facilities.
- ▲ Consider needs for electricity, air conditioning, and heating when selecting shelter locations.
- ▲ Plan for at least minimal privacy for individuals is important for successful longer-term sheltering.
- ▲ Stabilize shelter assignments; don't move evacuees between shelters.
- ▲ Establish caches of equipment and supplies to initiate sheltering.
- ▲ Preplan food service needs.
- ▲ Preplan evacuees' access to replacement pharmaceuticals.
- ▲ Bring disaster assistance personnel to shelters.

FOR EXAMPLE

Hazardous Materials Incident Warnings

The Phoenix Fire Department assumes and warns people to evacuate threatened areas when hazardous incident responses are underway. The channel they use to warn citizens is face-to-face warnings. Firefighters wear response garb. They have helmets on and breathing protection displayed. If a resident refuses to evacuate, the firefighter is instructed to ask for the name and address of next of kin. The firefighter tells the resident that this information is needed to facilitate identification after death. Citizen evacuation compliance levels for these incidents are extremely high.

- ▲ Provide current information about the hazard response and damages.
- ▲ Include emergency medical technicians and behavioral health specialists.
- ▲ Designate some shelter locations exclusively for elderly or special needs evacuees.
- ▲ Accommodate people who wish to check in and out of shelters.
- ▲ Build family tracking into shelters through networked computers.

These options for shelter incentives are derived from research on shelter experiences. Researchers have also examined the conditions considered supportive of life. These can be powerful incentives for compliance. Litman (2005:7) conducted an after-action analysis of evacuation and sheltering in Hurricane Katrina. He concluded, “had residents been offered free transport in and out of the city and assurance of a comfortable and safe refuge, half of those who stayed would have left.” Incentives are a means of enhancing compliance with PARs.

SELF-CHECK

- Why do we say that issuing a warning is a process?
- What is the major cause of **message distortion** and what can you do about it?
- What is a **compliance incentive** and how do they help you?
- Citizen information seeking slows down their adoption of PARs. How can you reduce this behavior?
- Under what conditions do citizens use shelters provided by authorities?
- What is an **evacuation shadow** and why should you care?

SUMMARY

As an emergency planner, you are expected to create warning systems to alert people in danger. To do this effectively, you need to know that warnings are the process of a system. The system is based on threat prediction or detection, and both depend on the state of technology relative to the specific threat. The system is also affected by the jurisdictional resources available to create and sustain it. Much of your role in the warning system is to interpret technical data about the presence and approach of threats. You will also be responsible for determining the most effective protective measures to use as PARs. The warning system uses specific warning mechanisms to distribute information. These mechanisms have different characteristics and you must match the characteristics of the hazard with the features of the warning delivery system. To enhance citizen timely PAR compliance, you need to understand what factors go into the protective action decision process. Your goal is to convince as many people as possible that they need to protect themselves from the disaster impact. To create the most persuasive message possible, you have to understand the traits of warning recipients and the traits of people in your community. For example, a message to a Hispanic neighborhood may be crafted differently and delivered in different ways and by different sources than it would be to an African American neighborhood. You need to plan to ensure that the emergency response system can deal with both undercompliance and overcompliance by citizens.

KEY TERMS

Compliance Incentive	Any measure taken by authorities that removes implementation barriers to PARs.
Decision Stages	The series of choices that reflect people's assessment of the need for protection, including risk identification, risk assessment, protective action search, protective action assessment and selection, and protective action implementation.
Environmental Cues	Signals in the environment, detectable by unaided human senses, that a threat is imminent.
Evacuation Shadow	An area not at risk but evacuated by residents.
Fatalism	A personality trait whereby people believe that external forces beyond their control determine what happens to them.
Message Distortion	Failure to a original message in original form and content.

Message Specificity	A message's level of detail about the threat, vulnerability, and PARs.
Normalcy Bias	The tendency to reinterpret danger cues (warnings, environmental signs, etc.) so they mean conditions are "normal" and don't reflect a pending crisis.
Penetration	Term that refers to the power of warning mechanisms to get the attention of those at risk.
Precision of Dissemination	Term that refers to a channel's ability to warn all of those at risk (sensitivity) and only those at risk (specificity).
Predecision Processes	Processes that bring information to people's conscious awareness. These are exposure to, attention to, and interpretation of cues in the physical or social environment. These relate to receiving a warning, attending to the warning, and comprehending the message.
Rate of Dissemination	The speed of the mechanism or the number of people that can be warned in a given time frame.
Response Efficacy	An individual's belief that execution of a protective measure will in fact achieve some degree of protection from a threat.
Risk Communication	The process of sharing information about environmental hazards with those at risk. Risk communication includes warnings about imminent threats and dissemination programs when threats are not imminent.
Sender and Receiver Resources	The capital (equipment) and personnel training resources demanded to keep a community-warning system functioning.
Spontaneous Protective Response	Term that refers to people who engage in an officially recommended protective action when they are not in the target risk area.
Warning Mechanisms	Different means of disseminating a warning to the population of a risk area, including face-to-face communication, mobile speakers, telephone systems, and the like. They are also called warning channels or warning modes.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of population warning.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. As a practical matter, citizens can be forced to comply with disaster warnings. True or False?
2. A person's prior experience with a hazard (e.g., hurricanes) has a big influence on how they respond to a PAR. True or False?
3. A warning message should always contain a protective action recommendation. True or False?
4. A well-constructed warning message and the use of "hot line" confirmation centers reduce citizen information seeking time. True or False?
5. If the majority of a population heed a warning message, that indicates that the warning had good:
   (a) precision.
   (b) penetration.
   (c) distortion.
   (d) normalcy bias.
6. The most common response of citizens to first hearing a disaster warning is disbelief. True or False?
7. Warning compliance incentives are very expensive, and only a few large jurisdictions can use them. True or False?
8. Providing transportation out of areas at risk for those who do not have their own transportation is an example of:
   (a) response efficacy.
   (b) response efficiency.
   (c) a compliance incentive.
   (d) evacuation shadow.

Review Questions

1. What features of warnings set them apart from other risk communications?
2. What is the role of peer contacts—friends, neighbors, and relatives—in warning processes?
3. What conditions tend to produce spontaneous protective actions on the part of citizens?

Applying This Chapter

1. You are an emergency planner for a small coastal town in Florida. You know that a hurricane might affect your community and you must prepare a warning message. What questions should the message content address?
2. Castle Rock, Washington, faces seasonal river flooding, a volcano threat, and is near a nuclear plant. Each threat has different demands for a warning channel. Floods are familiar and slow onset. Volcanic eruptions are worst near the cone and happen fast. Nuclear power plants are localized, unfamiliar, and happen fast. When deciding which channel to use, what features of channels will you examine?
3. In Orange County, California, wildfires threaten every year. The PAR differs from year to year, but the threat is familiar and people are slow to respond to warnings. What are protective action compliance incentives and how do you go about creating them?

YOU TRY IT

Promoting Risk Identification

The PADM emphasizes that warning messages need to convince citizens that the risk identified is real and pertains to them. If you were preparing a warning communication to people living below coastal cliffs about mudslide danger from heavy rain, what points would you make to convince people of the validity of the danger?

Selecting a Warning Channel

You are part of the warning team in your local emergency management agency addressing the derailment of 11 tank cars carrying sulfuric acid. The time is 5:00 am and the rush hour begins at 7:00 am in your town. Three of the tank cars are ruptured with slow leaks. What bases will you use to decide which warning channel is appropriate? Which one will you choose?

Minimizing Evacuation Shadow

Your community is facing a dangerous hurricane that is estimated to make landfall only of the far south part of town. Three weeks ago, a larger community 150 miles away was completely devastated by a hurricane. You anticipate fear reactions may cause overresponse. What measures will you take to reduce the evacuation shadow?

11

PLANNING FOR HAZARD ADJUSTMENT

Protection Adoption, Hazard Awareness, and Risk Communication

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of planning for hazard adjustment.
Determine where to concentrate your effort.

What You'll Learn in This Chapter

- ▲ Understand the role of hazard awareness in the adjustment adoption process
- ▲ Learn the elements of hazard adjustment processes
- ▲ Understand how risk communication fits into the constellation of tools to create hazard adjustment
- ▲ Appreciate the research bases of awareness campaigns and adjustment behavior

After Studying This Chapter, You'll Be Able To

- ▲ Distinguish hazard awareness from hazard adjustment
- ▲ Use channel accessibility and source credibility to target audience segments
- ▲ Examine ways to break down people's barriers to hazard adjustment
- ▲ Examine the steps required in a hazard adjustment process
- ▲ Change message content in hazard awareness to achieve multiple objectives

Goals and Outcomes

- ▲ Design an effective hazard awareness program
- ▲ Create ways to reduce message distortion
- ▲ Leverage adjustments using risk communication, sanctions, and technological innovations
- ▲ Assess steps in the classical communication model that affect awareness campaigns
- ▲ Assess strengths and weaknesses of communication sources
- ▲ Target audience segments using communication channels

INTRODUCTION

Disaster warnings are a specific type of risk communication. They are designed to achieve quick protection in the face of an imminent threat. Planners also must communicate with citizens when threats are not imminent. During these times, planners share information about what to do during disasters. Even more important, the contacts allow discussing the reduction of hazard vulnerability. These types of preimpact measures to reduce vulnerability are called **hazard mitigation measures.** The adoption of mitigation and preparedness measures is part of a broader process called hazard adjustment. Hazard adjustment assumes that humans live with some threats that can be prevented and some that cannot. Disasters represent the periodic impacts caused by hazards when human use systems overlap hazard processes. The emphasis of hazard adjustment is the longer time frame in which hazards operate. When you can promote high levels of hazard adjustment in a community, they achieve higher levels of hazard resilience.

The forces that influence the adoption of hazard adjustments are similar to those that influence the adoption of protective action recommendations (PARs) described in warnings. The environments for the two types of risk communication are very different. So different that the effects of some factors must be reinterpreted and new factors added to understand hazard adjustments. The protective action decision model (PADM) is a theoretical framework that fits both environments. It is used to help you understand the concept of hazard adjustment and the research on hazard awareness programs. You can translate this information into effective practices for encouraging hazard adjustment.

11.1 The Concept of Hazard Adjustment

Understanding hazard adjustment requires a shift in thinking. Often, planning attention focuses on the bad outcomes of a single hazard agent (disasters). For adjustment, we need to think about the hazard as a cyclic process. There are many hazards that pose a variety of risks to humans. These risks include health and safety dangers. There are also dangers to the material culture. The risks are greater because the human use system intrudes on natural and man-made processes. To achieve long-term survival, humans must adjust to both natural and man-made processes. Burton, Kates, and White (1993) emphasize that hazard adjustment requires changing human behavior or our relationship to the environmental features or our technology. Using these approaches, you can begin to promote hazard adjustment in your community. Risk communication is a critical tool for hazard adjustment.

11.1.1 The Dimensions of Hazard Adjustment

Lindell and Perry (2000) and others state that hazard adjustments are done in stages. This is similar to the PAR adoption that citizens do after hearing warnings. The stages for adjustment are reflected in the PADM and represent five activities:

1. Becoming aware of the hazard.
2. Gaining knowledge of alternative adjustments.
3. Selecting one or more adjustments.
4. Implementing those selected adjustments.
5. Evaluating those adjustments.

A critical point for emergency planners is that there is a distinction between *adopting* and *implementing* hazard adjustments.

- **Hazard Adjustment Adoption** refers to an initial commitment of resources to a particular adjustment. This follows the development of awareness. It also includes an assessment of the need to undertake risk reduction and of the suitability of a particular adjustment.
- **Hazard Adjustment Implementation** refers to a *continuing* allocation of resources following the initial commitment. This is a means of sustaining the achieved level of risk reduction.

The principal concern among researchers has been with adoption. But you must address both issues. People's *evaluation* of the efficacy of adjustments has two contexts. First, they are done to determine usefulness of a measure being adopted. Then they examine implemented adjustments to decide if they should be changed or discontinued.

The adoption of hazard adjustments may be conscious or unconscious. It depends on the specific hazard. It also depends on the level of human control over the natural or manmade processes and the cultural definition of the hazard. Hazard adjustments can focus on directly manipulating the source of the hazard. Or it can focus on manipulating human behavior relative to the hazard. The methods of hazard source control are very important. Stringent containment rules for moving hazardous materials mitigate the possibility of a release that may threaten humans. Flood mitigation measures might include dredging river channels or build systems of dams. To successfully adjust to a hazard by manipulating natural processes requires a significant degree of human control. Control over the natural environment is higher for some hazards (floods) than for others (tornadoes or earthquakes).

Emergency planners have also achieved variable success in changing human behavior as an adjustment strategy. In adjusting to hazards, humans face the choices of doing nothing and bearing any losses. They may also share losses through disaster relief or hazard insurance programs. And they may reduce losses through the adoption of hazard mitigation measures. Hazard mitigation passively protects people and property during a disaster. Seismic hazards are reduced when people anchor building walls to foundations. Zoning regulations can keep new buildings in areas outside a flood-plain.

Perry and Lindell (1997a) found that hazard adjustments may be done by households, organizations, and communities. Governments usually undertake the large-scale, resource-intensive hazard adjustments. In the United States, the federal government provides insurance against floods and earthquakes. Government also undertakes earthquake mitigation measures for roads, bridges, and public buildings. Some governments are responsible for informing people of hazards and protective measures. They also ensure compliance with established guidelines (building codes).

Household adjustments focus mostly on the personal safety and property of families. Households may adopt adjustments for many reasons. Doing so may be a family tradition or a subcultural identity (Mormons are urged to keep a year's supply of food). The range of household adjustments is great. They can differ widely by cost, resource needs, and individual effort. In California's earthquake-prone regions, household seismic adjustment may include structural modification of houses. It may also include securing a room's contents and installing quick shutoff valves on natural gas lines. Household adjustments for the Gulf coast include structural strengthening and sometimes elevating homes above likely water levels. It also includes learning evacuation warning signals and routes to safety. Adjustments for chemical or radiation threats include storing breathing masks and knowing warning and evacuation systems.

You should know that adjustments differ across hazards. However, some adjustments are effective for all or many hazards. These are called **generic functions.** For example, evacuation gives protection from many events. Structural reinforcement of buildings mitigates dangers from earthquakes, hurricanes, and tornadoes. Other household adjustments are hazard-specific. For example, retreat to a basement is protective for tornadoes but increases danger in floods. Protection in place (staying indoors with breathing protection) is useful for hazardous materials or radiation threats. But staying in place can be only partially protective—if at all—for volcanic eruptions. Each event has a specific character. This must be taken into account when considering preparedness measures. Thus, sometimes vulnerability can be reduced only by responding to specific threat characteristics.

Different hazards have different causal mechanisms. They may require different hazard adjustments. This has spawned an unfortunate tendency by scientists and government agencies to make risk communication programs specific to each hazard. This multiplies the number of programs to match the number of hazards addressed. Content is important. Sometimes content must be matched to hazard. However, risk communication is more efficient if you address the commonalities among hazards. That is, you can look at generic functions as adjustment targets for multiple hazards at the same time. You can use this multiple protection achievement as part of a reasoning process to influence people to adopt an

Figure 11-1

Ft. Lauderdale Florida property owners implemented hasty window protection against Hurricane Frances.

adjustment. In keeping with the PADM, risk communications share reasoning processes with people at risk regarding their protective options. See Figure 11-1 for an example of a protective action.

11.1.2 Risk Communication and Hazard Adjustment

We are concerned with the relationship between risk communication from authorities and people's adoption of hazard adjustments. There are critical differences between delivering disaster warnings and managing risk communications. One distinction is the time frame for risk communications. Warnings ask people to immediately adopt one adjustment. Doing so results in short-term protection of personal safety. The impact of a disaster is imminent. There is little time to reflect on the danger and consult with others. Social interaction processes do operate. But they are bound by the amount of time between message receipt and impact.

Risk communications promoting hazard adjustment are usually scheduled before a disaster threat. This makes time constraints *per se* less important. This definitely does *not* mean that adjustments will always be adopted. In fact, the relationship between time and adoption behavior is more complex. Tierney, Lindell, and Perry (2001) reported that it is quite difficult to convince households to undertake any type of hazard adjustment. The less imminent the impact, the more concerned people are with other life issues and priorities. However, the time available during times of low hazard threat provides authorities greater flexibility in choosing message channels and content. It also gives them the chance to issue many communications that discuss different hazard adjustments.

11.1.3 The Local Context for Risk Communication

Risk communication exists within the context of hazard management. Both of these are *local* endeavors. Local Emergency Management Agencies (LEMAs) play a prominent role in risk communication. Their efforts are supported by county, state, and federal agencies, businesses, and organizations such as the Red Cross and the Salvation Army (see Figure 11-2). Risk communication is part of the cycle of the emergency-planning process. It is used to promote both mitigation and preparedness. Risk communications educate and persuade. Their location in local government means that, in designing risk communication programs, you must take into account the local policy and emergency management environment.

Figure 11-2

The Salvation Army is well-known for providing shelter following disasters and for operating mass feeding operations.

The process of hazard management begins with strategic analysis. The analysis finds exposures and rates the level of risk for the jurisdiction. You should delineate people (the geographic and demographic segments of the population). You must also look at property (building types and economic sectors) and infrastructure (electric power, fuel, water and wastewater, telecommunications, and transportation). You should project the consequences of a disaster impact. This information forms the foundation for a jurisdiction's management strategy. The strategy identifies which hazards require active management. It also selects the best mix of mitigation, preparedness, emergency response, and disaster recovery. Strategies must identify barriers and constraints. They also select specific tools that can achieve strategic hazard goals within prevailing constraints (Birkland, 1997).

Hazard management strategy depends on legal mandates and local resources. It also depends on local priorities and state and federal resources. You can use legal mandates requiring jurisdictions to protect public health and safety. This provides a legitimate basis for demanding that specific elements be part of a community hazard management strategy. You can use even limited staff time and budget to advise public and private organizations about their vulnerabilities. And you can invite them to help create hazard management strategies. You can add to these lateral communications with upward communication to senior officials. You can also use downward communication to citizens.

The hazard management strategy balances jurisdictional reliance on mitigation, preparedness, emergency response, and recovery. If there is a reliance on preparedness and response, the LEMA will need to monitor the community and environment. Continual monitoring supports protective actions such as evacuation and sheltering in place. These actions require rapid detection and spread of warnings to those at greatest risk. An emphasis on mitigation also requires environmental monitoring. But it also demands active risk communication. You can divide mitigation measures into segments according to who undertakes them. There are measures that depend on household hazard adjustments, business adjustments, and government adjustments (e.g., zoning, building codes, or structural strengthening). All sectors must adopt and implement all adjustments for successful hazard mitigation.

You should use risk communication programs as a tool for buttressing mitigation efforts. Risk communication leads to the adoption of adjustments when people know the *consequences* of failing to make adjustments. That is, risk communication tries to change people's beliefs. It also is used to change people's beliefs about the consequences of alternative hazard adjustments. Historically, most programs assumed that people make bad protective decisions because they are uninformed. Programs also assumed that sharing scientific information about hazards would change people's beliefs. In turn, it was assumed that more scientific information would get them to adopt hazard adjustments.

11.1.4 Leveraging Hazard Adjustment

Mileti (1999) argued that most disasters exist largely *by design*. People and buildings are vulnerable when they encroach on hazardous areas. This happens when we live in floodplains or near ground faults, volcanoes, or hazardous facilities. It also happens when we fail to take mitigation measures (structural strengthening or elevation) that do reduce vulnerability of the dangerously situated. Vulnerability accumulates in communities as we encroach and fail to protect over time. Planners often lead the effort to reduce vulnerability. This includes historically accumulated vulnerabilities and the drive to stop new vulnerability creation. You must often try to resolve the conflict between long-term and short-term economic goals. There are three strategies used to minimize the conflict: innovations, sanctions, and risk communication.

Technological innovations can achieve risk reduction. They avoid the trade-off between efficacy and cost. Innovations provide protection at the same cost as existing methods. Or they provide the same level of efficacy at lower cost. At times, there are improvements in both cost and performance. However, local government has little control over their availability. Emergency planners in areas prone to wildfires might be interested in inexpensive roof shingles with greater fire resistance, but local government can't produce the product. The role of government in these cases is to find new products and pass that information to the community.

Sanctions are incentives or punishments. Incentives provide *extrinsic rewards*. The most common incentives are financial rewards. These encourage people to adopt adjustments because they reduce costs. However, people may object to subsidies for people knowingly living in risk areas who should be providing for their own protection. This is especially true when the exposed group is rich. A direct benefit of a good incentive program is reduced personal vulnerability. In addition, however, the local economy is also protected. Thus, society as a whole benefits because less tax revenue is spent on disaster assistance.

Officials may find it difficult to justify the cash outlays for certain groups or for benefits that come in the future. There may be other reasons that financial incentives might not have the impact policy makers want. Households must have a positive cash flow if incentives are to help. Those who lack sufficient surplus funds may not use the incentive. Or they may not be able to wait until an initial investment is recovered over a long waiting period. Also, these incentives assume that the cost of the adjustment is the *only* block to adoption. Financial incentives can work if those people base their economic decisions on perfect information, perfect foresight, and utility maximization. Research support for these assumptions is limited. And it has shown people consider many factors in addition to cost (Lindell and Perry, 2004). These other factors include commitments of personal time and effort, knowledge and skill, tools and equipment, and social cooperation.

A financial incentive fills the gap between the cost of an adjustment and what the household can afford. Technological incentives fill the gap between the time, effort, knowledge, and skill requirements of an adjustment and the amount of the corresponding resource that the household can expend. You can create these technological incentives by making lists of qualified contractors or products. Tool banks also form a technological incentive. They loan specialized equipment to homeowners who need to retrofit their homes. In all cases, you either defray the household information-seeking load or you are providing an equipment loan service.

There are also other incentives, such as social recognition, that provide rewards for adopting adjustments. LEMAs can develop programs to provide recognition for the groups with the most adjustment adoptions in a year. Recognition can be a powerful incentive for some people. Community groups might be rewarded with local improvements (e.g., parks). Perceived fairness is an important concern when implementing this type of incentive.

Another class of sanctions—an alternative to incentives—provides *extrinsic punishments* for not implementing a specific hazard adjustment. These operate similar to local ordinances. Establishing any program of punishments requires that the public affected be informed of the requirements and sanctions. They must be given a time frame to respond. And they must be informed when enforcement begins. Regulations are a simple and inexpensive method of ensuring the adoption of adjustments. You may find the challenge of this type of program both political and operational. Ordinances are part of the public policy process, and not all those subject to rules will obey them.

Emergency planners often avoid strategies that involve punishment because of the high costs imposed on the jurisdiction. Horwich (1993) finds three disadvantages to sanctions:

1. People and businesses subject to a new mandate must be informed of its requirements and timing. This requires hearings and mailings to the public. This process places a strain on agencies and increases costs.
2. Simplistic mandates force some into excessive levels of protection, whereas others don't have enough protection. Complex mandates are often too complicated for people to understand or to undertake.
3. Sanctions require monitoring to ensure compliance. Structural mandates for buildings must be enforced with plan reviews. There must be inspections during the construction process. An inspection program demands personnel (inspectors), management, and implementation costs (vehicles and instruments). These do not benefit from economies of scale or history of inspections.

When implemented individually, all of these actions have limited effectiveness in reducing losses from hazards. To have a measurable impact, programs must integrate all of these mechanisms. You must identify the existing mix of adjustments in their communities. You must assess the social forces maintaining that mix of adjustments. You should identify the most effective mix of hazard adjustments. The goal is to increase their community's capacity and commitment to adopt and implement this new mix of adjustments.

Table 11-1 shows the four mechanisms to promote adoption and three categories of hazard adjustments. Risk communication in this schema addresses information about the hazard regardless of the type of hazard adjustment advocated. Each cell contains information about a specific adjustment. The incentives for hazard mitigation and preparedness for emergency response are identical. But they differ from the incentives for recovery preparedness. Local jurisdictions have limited control over incentives for recovery preparedness. Only the federal government seems to have enough money to subsidize hazard insurance.

The regulation of land use and building codes are usually handled by the local government. This produces many chances for sanctions promoting adjustment adoption. Jurisdictions can also establish preparedness requirements for hazard planning, staffing, and training. Federal and state governments tend to rely on these mechanisms. Rules for recovery are not often developed by local governments. Insurance regulations are handled at the state level more than at the federal level. Finally, technological innovations center on new products and services. New mitigation measures are principally for property protection.

Table 11-1: Methods of Promoting Hazard Adjustments by Households and Businesses

	Hazard Mitigation	*Response Preparedness*	*Recovery Preparedness*
Risk communication	Information on hazard vulnerability and property protection methods	Information on hazard vulnerability and population protection methods	Information on hazard vulnerability and financial asset protection methods
Incentives	Grants, loans, tax credits, rebates	Grants, loans, tax credits, rebates	Subsidized insurance*
Sanctions	Land use regulations, building codes	Required plans, staffing, and training	Required insurance*
Technological advances	New products and services for property protection	New products and services for communication, population protection, and property protection	

*Federal or state responsibility.

FOR EXAMPLE

Oregon Earthquake Adjustment

In 1989, the Oregon legislature enacted a series of laws governing mitigation and preparedness for “infrequent but devastating earthquakes.” Since then, the Oregon Department of Geology and Mineral Industries partnered with the FEMA and statewide school districts to increase awareness of and encourage adjustments for earthquake damage in school buildings. The program includes engineering assessments of school buildings, coupled with detailed information on structural earthquake protection measures and potential sources for funding.

Technological innovations for response preparedness are based in risk communication, population protection, and property protection.

All of these mechanisms should not replace risk communication. Incentives and sanctions transfer costs from risk area residents to the taxpayers who live outside the risk area. That is, incentives and sanctions frequently subsidize risk area occupancy. Incentives and technological innovations involve voluntary compliance. Thus, risk communication is used to ensure that people adopt hazard adjustments. An effective risk communication program is critical to a community’s efforts to reduce hazard vulnerability.

SELF-CHECK

- What are the three types of measures that can be used to promote hazard adjustment?
- Why do researchers say that people create disasters by design?
- Why do jurisdictions avoid sanction strategies that rely on punishments for those who don’t adopt and implement protective measures?
- In addition to cost, what are some of the factors citizens consider when they select a particular hazard adjustment?

11.2 Hazard Awareness Programs

People often make the wrong protective decisions because they are uninformed. Hazard awareness programs give scientific information. The hope is to change people’s beliefs about the hazard. These new beliefs might lead to the adoption of adjustments. However, the exclusive focus on the message ignores the roles of source, channel, and receivers. This naive approach also ignores blocks to information processing, such as personal priorities and conflicts with existing beliefs. The hazard adjustment model tries to adequately picture the issues involved.

Hazard awareness programs and external sanctions are key features of plans to enhance adoption of adjustments. Effective management balances both strategies. Our concern is with the use of risk communication by government to promote the adoption of hazard adjustments. We will describe a science-based model and review outcomes of past hazard awareness programs.

11.2.1 Communication Model and Evaluation Issues

The classic persuasion approach (Source-Message-Channel-Receiver-Effect) can be used to evaluate hazard awareness programs. These programs make the public aware of hazards and educate them about actions that reduce vulnerability. There are many programs supported by federal and state funds. The efficacy of these programs often is simply assumed. Few evaluations have been conducted to show whether these programs follow the principles of effective communication and are successful. Lindell and Perry (2004) identify many obstacles to drawing lessons from existing programs:

- Very few of the programs have been externally evaluated, so few data or lessons-learned discussions exist.
- Reviews are based on only a very small, and thus possibly biased, sample of programs. There is no mechanism for determining what part of all programs is represented by the evaluated programs.
- When programs have been evaluated, the outcomes report inconsistent results. Some variations can be attributed to information sources, media channels, and content. Or others may be audience aspects such as education, ethnicity, and hazard experience. Some may be due to the research designs of the evaluations.
- Evaluations have used various criteria to define success. Simple criteria include number of people exposed and audience reactions. Complex criteria include knowledge or beliefs about the hazard and adjustment adoption.

It is possible to draw some useful conclusions from program evaluations. The conclusions can be supplemented with information from studies of adjustments. The available data are presented in categories: information source, channel, message, receiver, and effect. These represent the stages of communication process.

11.2.2 Information Sources and Their Characteristics

Information sources usually represent one or more categories of sender. These include authorities, news media and peers. These sources differ in their ability to influence people's attention to and acceptance of information. Perry and Lindell (1990) found that official sources tend to be perceived as the most credible. Credibility was inferred from credentials (job title and education) or association with known experts or past successful performance. Lindell and Perry (1992) also documented that citizens believe that hazard knowledge varies for the same source when different hazards are involved. Residents near Mt. St. Helens felt they knew almost as much as officials about the volcano (a familiar hazard). The residents felt they knew much less than officials about (unfamiliar) nuclear power plants or chemical hazards. Views of sources may vary by gender, ethnicity, and other demographic characteristics. The research on source perceptions and demographic variables has been inconclusive.

Credibility has different components that may vary independently. Components are traits such as expertise, trustworthiness, likeability, or attractiveness. A source could be perceived to be high in expertise but low in trustworthiness, or vice versa. O'Keefe (1990) found that credibility is one of the most important aspects of an information source. Likeability also is important. Other factors (similarity and physical attractiveness) exert their effects through their impact on credibility and likeability. Little research is available about the ways that source characteristics affect awareness programs. Perry and Nigg (1985) found that awareness programs are more effective when they rely on multiple sources and transmit over many channels. Such a strategy not only finds the target population but also sets the topic on the "public agenda." It increases the chance information will pass through informal social networks. Often multimedia campaigns exceed the resources of emergency planners. This raises the question of what cost-effective mix of source, message, and channel is most likely to get a specified effect in one segment of the population. Carefully designed campaigns have become the hallmark of current direct-mail advertising. They are likely to provide one cost-effective method for increasing hazard awareness and adjustment.

The issue of perceived source characteristics is indirectly related to the emphasis on peer influence in some hazard awareness programs. Michaels (1990) found that people helped by peers are more likely to change their behavior (adopt adjustments). They are more likely to question the practices of the organizations where they work. And they bring pressure to bear on policy makers. A bank president whose basic operations were damaged by an earthquake can carry a message to other presidents. These are peers—not strangers—talking about what they stand to lose. They can also point out what mitigates the hazard. We don't know why peer communication works. Experienced officials might have an impact simply because of their access to officers at similar institutions. And their definition of the threat may be accepted because of personal experience. And peers are more likely to share mutually understandable descriptions of events. Or they are more likely to convey a sense of the value of some actions by describing successful implementation.

11.2.3 Information Channels and Their Characteristics

Mileti and Darlington (1997) studied many information channels used in hazard awareness programs. This included the mass media, brochures, posters, magazines, phone book inserts, books, scientific journals, and informal and formal meetings. Because these channels differ, messages are often channel-bound. Radio, face-to-face chats, and lectures are limited to verbal information. Television, print media, and computer programs can give numeric and graphic information. This means that different channels likely contribute to different stages of information processing. "Public service announcements" help initiate hazard awareness and keep issues salient. Printed materials provide details to identify a threat and its hazard adjustments. In contrast, public meetings and call-in programs provide two-way communication to identify and answer questions.

11.2.4 Message Construction

Communication programs can be analyzed as an individual message or as a whole program. Individual messages are defined by the amount of material, speed of presentation, number of arguments, repetition, style, clarity, ordering, forcefulness, and extremity of the position advocated. Some aspects can be assessed objectively. The number of words, the speed of a presentation, and the number of arguments can be counted. Repetition can be also measured. Finally, the clarity and extremity of the arguments must be measured subjectively.

Sorensen and Mileti (1987) outlined broad themes for whole program evaluation. Lindell and Perry (1992) found that some programs emphasize attracting attention. They also make message content less complex to promote understanding and retention. These tactics can be seen in educational model programs. Some rely on a well-known person (prestige) to endorse hazard-relevant activities. Sometimes a mascot is used (likeability); Smokey the Bear successfully promoted Forest Service programs.

Other programs focus on message content. Hazard awareness campaigns focus on six kinds of content:

1. Scientific information programs give technical data about the hazard agent. Although the information is correct, it is often complex. Thus, scientific information is processed and retained by few.
2. Practical instructions focus on the protective response. The simplest form is the *prompt*. This is a sign that defines a single contingency (climb canyon wall in case of flash flood). Prompts are shorter than brochures. They are more likely to be read and retained.

3. Attribute portrayal strategies emphasize the advantages of hazard adjustments.
4. Fear appeals describe the potential negative consequences of disaster impact. These messages list the disadvantages of failing to take action.
5. Norm-oriented communications emphasize the social consequences of adopting the recommended actions. These show the recommended actions as socially acceptable and expected.
6. Learning through participation has cognitive benefits and social rewards. The cognitive aspect allows for the step-by-step guidance for complex actions, such as the development of a family emergency plan. The social rewards recognize people's efforts to complete the task.

You would want to use some or all of these content themes to reinforce a message. More effective programs present different themes in successive messages (campaigns). Petty and Cacioppo (1986) found that the more superficial themes, social modeling and education, rely on the peripheral route to persuasion and involve heuristic processing. Chaiken (1987) argued that such themes might be targeted to specific audiences. Or they may be used in the initial stages of a campaign. These stages will be followed by messages that involve themes relying on the central route to persuasion and involve systematic processing.

11.2.5 Characteristics of Information Receivers

You will face a dilemma when designing hazard awareness programs. Most programs assume the audience is homogeneous. Information materials are often not tailored to each population subgroup. One reason for this is the low cost of a generic program. However, communities are diverse. Thus, there will be different demographic groups and interest groups with corresponding different media preferences. Different approaches must be used to reach the entire community.

Tailoring information to the characteristics of the audience is known as **audience segmentation.** Over the past decade, it has become common for hazard awareness programs to target their information to particular audiences, but there is a conspicuous lack of specific research on receiver characteristics to provide definitive guidance on this topic. The Bay Area Regional Earthquake Preparedness Project (BAREPP) and Southern California Earthquake Preparedness Project (SCEPP) operated by the California Office of Emergency Services (OES) have published guides and manuals for special groups including schools, hospitals, corporations, city managers, emergency managers, and media (Eisner, 1990; Schulz, 1993). Unfortunately, the success of these targeted approaches has not been studied, so their effectiveness remains a matter of conjecture and anecdote. The basis for audience segmentation strategies should be found in research on receiver characteristics. This can be broadly defined in terms of socioeconomic, geographic, and psychological aspects. A number of socioeconomic characteristics are correlated with adjustment adoption. Studies have documented that hazard adjustment and hazard awareness are higher for:

- ▲ People with higher educational attainment and higher household income (Farley et al., 1993).
- ▲ Those of female gender (Mileti and O'Brien, 1992; Zhang, 1994).
- ▲ Those of White ethnicity (Edwards, 1993).
- ▲ Elderly in flood situations (Phifer, Kaniasty, and Norris, 1988; Kaniasty and Norris, 1993).
- ▲ Those with high levels of social network contact (Turner, Nigg, and Heller-Paz, 1986).
- ▲ Those highly integrated into the community (Russell, Goltz, and Bourque, 1995).
- ▲ Those in close proximity to hazard zones (Farley, 1998).

These findings suggest attentive audience segments. They also point to the kinds of audience segments that are more difficult to reach. The design of hazard awareness programs depends in part on the way these variables affect the adoption of adjustments. Fishbein and Ajzen (1981) showed that differences among groups facing the same hazard could be explained by differences in attitudes, norms, and perception of hazard controllability. This leads to the conclusion that socioeconomic characteristics have low correlations with hazard adjustment. They are distal (indirect) rather than proximal (direct) causes of hazard adjustment. Demographics are useful in understanding hazard response. They are proxies for more directly relevant variables or they only affect variables early in the causal chain. They are likely to be related to the receivers' personal resources and social support (especially financial resources) for implementing recommended adjustments.

The position taken by Fishbein and Ajzen (1981) identified two important issues for hazard adjustment and awareness campaigns. The first issue concerns the accuracy of the groups' beliefs. A person of a particular gender, class, or ethnic group may do fewer adjustments. These people may inaccurately believe they are less vulnerable. Other groups may not adopt adjustments because they have too few resources (Lindell and Barnes, 1986). A second issue concerns the origins of these beliefs. A gender, class, or ethnic group may be less integrated into the community. They may have or choose less exposure to hazard communications. Such groups may also have less motivation or ability to heed, interpret, accept, or take action on those hazard communications. Neither belief accuracy nor belief origins has been addressed in research on hazards.

Hazard proximity does not usually have strong correlation with hazard adjustment. Hazard proximity affects hazard adjustment through its effects on the recency, frequency, and magnitude of personal exposure to events. These three features affect people's views of the hazard agent and appropriate adjustments. However, proximity to hazards may cause people to seek out information.

The importance of personality traits in hazard adjustment adoption is unclear. Sims and Baumann (1972) reported that tornado-coping styles in the North and the South were related to locus of control. Bauman and Sims (1974) later failed to find any correlation between locus of control and adjustment to hurricanes. Schiff (1977) failed to find a correlation between locus of control and adjustment and also found no correlation between any personality variables and adjustment. Farley and colleagues (1993) found support for fatalism as a predictor of adjustment. These contradictory results may be due to variations in the measurement and the samples. But it also may be due to the limited power of personality variables for explaining hazard adjustment. Specifically, there may be a connection between feeling powerless and believing available protections are ineffective. It may not be a sense of personal powerlessness against hazards. It may be the possibly accurate knowledge that the available actions to protect will not work. This would not necessarily apply to situations in general and would not reflect an external locus of control. This line of argument is supported by Mulilis and Lippa's (1990) finding that adjustment adoption was predicted by self-efficacy. This is a construct that Wood and Bandura (1989) contend is task specific. And it probably should not be considered a personality trait. It may be that a person's perceived lack of self-efficacy is equivalent to a perceived presence of implementation barriers, such as lack of required knowledge, skill, or other resources. The latter perspective directs attention toward identifying and removing the barriers (a feasible task) rather than attempting to change someone's personality (not a task for emergency planners).

Personality traits are unlikely to have any direct practical value for you. First, traits are, by their very definition, *enduring* attributes that are unlikely to change in response to a campaign. Second, even if a specific trait would be responsive to a specific message, it would be difficult to identify those people with that trait. Thus, there is little practical reason to place much emphasis on personality variables in emergency management.

11.2.6 Social Psychology of Messages

Message effects can be defined relative to information-processing stages. During exposure to an event, attention is paid to interpret information. Interpretation of an event happens whether the information is clear or not. The receiver's comprehension of the sender's meaning depends on how well the message matches the receiver's existing beliefs about the hazard. Comprehension will suffer if the message contains many unfamiliar terms and describes too many unfamiliar variables. A misunderstood message does not always produce confusion. Instead, the receiver may act on the misinterpretation. Finally, acceptance of the sender's message depends on how well the message matches the receiver's existing beliefs. A message is likely to be rejected if it conflicts with existing beliefs. But it will be accepted if the information is new (thus posing no conflict) or poses little conflict with existing beliefs. The information is likely to be retained if it's compatible with a person's other beliefs. Thus, the impact of the message would depend on whether the information source is viewed as legitimate, positive referents, and trustworthy. Official sources are legitimate authorities. Informal sources, such as friends, are positive referents. The media cite expert sources. The most persuasive sources will have multiple bases of influence (legitimacy, expertise, trustworthiness, and likeability).

The key effects of a message are the impacts on beliefs about the hazard and adjustments. The most basic natural hazard belief is awareness. Drabek (1986) found that across many hazards, people often reported that they didn't know of their vulnerability. People also need to understand how the hazard produces vulnerability. Lindell and Barnes (1986) found a variety of hazard traits were linked to hazard adjustments. These traits included the likelihood of a major event, prevention potential, speed of onset, presence of environmental cues, scope of impact, and duration of impact. Lindell and Perry (2000) reported that hazard adjustment is correlated with event probability and several classes of personal consequences.

Another important cause of adjustment adoption is found in people's perceptions of alternative hazard adjustments. People don't seem to be able to think of many different ways of protection. There is little research to guide you in this area. Most studies asked people to identify rather than evaluate adjustment alternatives. The available research reveals that people can name few or no protective actions. This underscores the importance of LEMA educational efforts. When people do learn multiple protections, planners will have to know how they conceptualize them. Lindell and Perry (1992) argued that people think of protective responses in four ways: efficacy, cost, time requirements, and implementation barriers. Efficacy compares the safety from protective actions to the severity of the hazard impacts. Cost compares the money and effort for response to people's resources. Time requirements are defined by the time needed to take action in relation to the time of hazard impact. And implementation barriers include external obstacles and the skills and knowledge required to take protective action. When you recommend mitigation and preparedness measures, choose those with high efficacy, low cost, low time requirements and few implementation barriers.

Mulilis and Duval (1996) found that levels of hazard awareness and commitment to adjustments decay (decline) as time passes. There are two reasons why decay is a problem. First, Fazio (1985) shows that attitudes based on personal experience are more powerful predictors of behavior. Views based on persuasion are less so. As we move farther from an impact, there are fewer people around with direct experience. Second, the psychological impact of disaster events declines with time. The Earthquake Engineering Research Institute (1996) found that government at all levels, as well as groups of all types and size, are more likely to undertake hazard adjustments immediately after a disaster. The window of opportunity closes quickly. A **window of opportunity** is a time during which public attention and that of elected officials and others is focused on a given hazard.

Keeping the public interested in hazards when associated disasters don't often happen is a challenging problem. Yin and Andranovich (1987) argue that professional associations can play a critical role in keeping hazard issues salient. Tobin (1994: 23) has pointed out that it is far more important to build a sustained advocacy program than to "wait for the window to open." Alesch and Petak (1986) believe that natural hazards policy advocates should make sure that the problem is recognized. They must have a known solution. And they must ensure the actors are in place when interest is high on the policy makers' agendas.

The stability of people's beliefs about hazards and adjustments should be addressed in awareness programs. Midden and Verplanken (1990) found that although a group may accept the same set of risk dimensions in a population doesn't mean that all the people evaluate risk from each dimension in the same way. Nor does it mean that people's views of risk are consistent over time. Lindell and Perry (1990) found that some people's ideas of volcano risks were reliable over time, whereas others were not. Reliably perceived risk characteristics were found in each of four categories—traits of the hazard agent, types of the hazard impact, perceived personal consequences, and affective reactions to the hazard. Lindell and Perry (1992) later found that people's ideas of alternative protective actions and perceptions of the stability of the hazard were related to the adoption of a hazard adjustment.

Additional perspective on the stability of hazard perceptions is found in longitudinal changes in hazard-relevant beliefs and behavior. The data on households show an increase in the adoption of pre-impact earthquake hazard adjustments over the past 20 years. Kunreuther (1993) reported that the percentage of earthquake-insured homeowners in California had risen in that time from 5% to 30%. This increase was due to media coverage of the 1989 Loma Prieta earthquake, predictions, and California state mandates. Kunreuther also found an increase in insurance coverage in the New Madrid Seismic Zone from 12% in 1989 to 37% in 1990. This was a response to the subsequently discredited Iben Browning earthquake prediction. Palm and her colleagues (1990) estimated—despite trends—that only 5% to 12% of the earthquake-exposed households had adopted any hazard mitigation measures. These findings were later confirmed in a study conducted by Palm and Hodson (1992) after the Loma Prieta earthquake. Kunreuther attributed the inadequate levels of household earthquake hazard adjustments to individuals' tendency to ignore very low probabilities. Thus, they took no personal action, especially because they did not experience an event.

FOR EXAMPLE

Severe Weather Awareness in Ohio

The Ohio Emergency Management Agency conducts an annual Severe Weather Awareness Week involving multiple events and information dissemination about mitigation and preparedness for households. The program is overseen by the Ohio Committee for Severe Weather Awareness, a government—nonprofit partnership. Activities include Gubernatorial Resolutions, poster contests, and presentations on state and federal emergency plans, health concerns, and specific protective measures for tornadoes, floods, thunderstorms, and lightening. A mitigation and preparedness guide is distributed, and Web sites with extended information are advertised.

SELF-CHECK

- On what bases do people attribute credibility?
- What is the window of opportunity?
- What is the advantage of print media for campaigns promoting hazard adjustment?
- Are personality traits important targets for emergency planners who want to increase hazard adjustment?

11.3 Practical Implications for Risk Communication

The theory and research on hazard awareness and adjustment are sparse. The few studies do provide practical information about disseminating hazard information. We must focus not on every variable but only on those subject to our control. Sources, channels, and message construction are all subject to control. These include data about sources, channels, and messages. From these studies we can create strategic and structural guidelines for directing hazard awareness campaigns. We mentioned these issues in talking about warning systems. The difference in the discussion here is that we are talking about communications that adjust to the hazard (in normal times) and not an immediately pending disaster. The two situations are very different and demand different strategies.

11.3.1 Strategy for Risk Communication

By strategy, we are referring to the approach adopted for conceptualizing and organizing the use of risk communication as a tool in emergency planning.

Devising a strategy means that you collect and scrutinize the assumptions about the tool. And you look at the context in which it is to be used. We will discuss our assumptions in the form of guidelines for conducting risk communication. These are drawn from the logic of the PADM. These guidelines are supported by research on decision making and studies of communication programs:

- *Knowledge of the community is the critical basis for choosing a successful risk communication approach.* Drabek (1987, 1990) found that emergency managers felt that successful initiatives take into account specific community traits and citizen preferences. Success requires you to know the capabilities of the local system and the characteristics of the population.
- *Use the vulnerability assessment to find protective measures useful across several local hazards.* Risk communication aims to send specific messages to reduce or eliminate negative consequences for households. Your jurisdiction will face several hazards. When you communicate protective measures with multiple hazard efficacy, you reduce the total demand for community education. Evidence shows that people are more likely to adopt measures that may counter many threats.
- *Adopt a long-term perspective on conducting risk communications.* Risk knowledge can accumulate over time. Think of the constellation of local threats and likely protections. The goal is to share information on all the threats and protections. You can send information by priority: how likely is a particular risk? Your task can be spread over many years and "campaigns." The messages in one campaign can reinforce previous messages. This approach frees the emergency manager from covering all the issues in a single effort.
- *You must foster an interagency and interorganizational view.* You need to know what kinds of information are shared in your area by other local, county, state, and federal agencies. Knowing the plans of other agencies allows you to keep your messages consistent and complementary in content. It also prevents giving people competing or conflicting messages.
- *Credibility building is part of risk communication.* Joint planning and communication with credible agencies produce a halo effect for local agencies. By building contacts, producing consistent messages, and being seen with experts, local emergency managers reinforce citizen beliefs that they have access to knowledge about hazards. Local goals can be achieved at lower cost through coalitions with other organizations.
- *Risk communication should specifically emphasize hazard adjustments.* Creating awareness is important but without knowledge of protections, it is not useful. The likelihood of adjustment adoption is higher if messages address attitudes toward the adjustments. People need to know that there are protections and that they can make those adjustments. They also must know specifics of the adjustment itself.

- *There is a long-term role for the local media.* Ongoing risk communication processes depend on many messages passed through many channels over a sustained period of time. The media provide channels that reach large numbers of people. Mass media can send targeted messages to community groups. The media have two functions key to risk communication: public service education and news. You can inform these functions by volunteering information. Active contact with media can allow planner's access to channels familiar to people. Having a positive relationship with the media also increases the visibility of the emergency management function.
- *Risk communication is a single tool. There are limits to its effectiveness.* A combination of tools best achieves specific management goals. Communication is an important path, but not the only path. Even risk communication itself needs to be conceived in terms of larger and long-term information dissemination and hazard adjustment objectives. The expectations for a single dissemination effort should be moderate at best.

What research tells us about household adjustment adoption and the nature of those adjustments themselves can guide our risk communication tactics. We know that messages require reinforcement in subsequent messages, a feature that demands multiple dissemination efforts over time. Households adopt adjustments at different rates as well, further emphasizing the importance of multiple messages over time. Hearing the same message via multiple channels enhances citizen belief in the accuracy of the message. We also know that there are multiple types of specific adjustments that may be undertaken for any single hazard. These different adjustments afford different types of protection (health and safety versus structure protection) at differing levels of effectiveness (different earthquake structural reinforcements perform differently at various shaking intensities). Disseminating information on the hazard itself, accompanied by an elaboration of all possible appropriate protections is consequently a daunting endeavor. You risk producing information overload, which reduces citizens' capability to understand and act. Even if an emergency planner successfully presented a large number of adjustments in a single campaign, the adoption of all of them would be unlikely. Worse, the mix of adoptions people choose might favor more easily implemented, inexpensive measures to the exclusion of others. Risk communication involves multiple, *coordinated* disseminations over time. Send messages for the most probable hazards first, and keep repeating those messages periodically. Make sure the risk communication efforts over a five-year time frame are connected to achieve specific goals for sharing hazard adjustment information.

You also must accept that even the best single campaign will not produce high levels of household adoptions of protective measures. Many variables influence the adoption process. Studies of household preparedness have indicated that few people take protective measures as a function of risk communications.

Thus, you should never assume that your community has a high level of preparedness just because you conduct information campaigns. You want to use all the tools—risk communication, sanctions, incentives, and innovations—to shape preparedness in your community.

11.3.2 Structuring Risk Communication

The structure of risk communications refers to the overlap of the communication process with patterns of human behavior. We hope to identify key features of risk communications that can increase protective measure adoptions. We will report ideas derived from the PADM and supported by field research.

Decision Dimensions

Risk communication should attend to human protective action *decision dimensions*. The PADM shows that adjustment intentions are affected by five key factors: perception of risk, knowledge of the hazard and adjustment, views on personal responsibility, protective efficacy, and convenience issues. These variables should be addressed in the message design. Risk statements are sometimes hard for people to understand. People often fail to correctly interpret claims such as "there is a 50% probability of a damaging earthquake over the next decade." Even less often can people figure out how that should affect their current behavior. People may not connect the abstract concepts with the need for protective measures. We also know that personal hazard knowledge is sometimes fleeting. There is a rapidly decaying memory curve. And other life issues compete for attention and recall. You should focus on creating personal hazard knowledge about adjustments, rather than the more general conception of the hazard. This knowledge gives you three insights on creating messages for risk communication:

1. To enhance retention, adjustment information must be clearly presented and interpreted: What does a 50% chance of earthquake mean? All information must be reinforced over time. The mix of channels is helpful here. Broadcast media give verbal reinforcement. Newspapers and brochures can show much detail and be kept for future reference.
2. Explanation of risks need not be extensive. Say it simply and concisely. Mileti and Fitzpatrick (1993) remind planners to assume that citizens will seek further information. Provide easy to follow up sources: magazines, books, and Web sites. Interested people will search out details.
3. Messages should address people's personal responsibility for self-protection. They should also address adjustment efficacy and convenience issues. People tend not to adopt adjustments when they believe that the responsibility for protection rests with the government or someone else. Citizens also want to know if protections really work and how difficult it is to implement them.

Sources and Credibility

Avoid oversimplified notions of information sources and their influence power. Problems are compounded when planners believe that they are the people's "official" sources. People receive many messages via many channels, from many sources. Sources can vary widely in levels of expertise. Common sources of hazard information include media, friends, and relatives. Thus, officials represent only one source of many. People evaluate both sources and information before acting (or not acting) on it. In this multifaceted environment, you are challenged to keep your efforts consistent. Official messages are distinguished by explicit attention to known decision dimensions, issues of credibility, and channel accessibility. They also give attention to providing correct information. And they are concerned with communication across the demographic barriers.

Source credibility is established over time. Research indicates that credibility includes a history of accuracy, trustworthiness, and expertise. A single contact can't establish a credible reputation with the public. But each contact is a chance to add to credibility. You should stress the issue of expertise. You can note the expertise of the LEMA and its access to other experts (federal or others). Managers can reference a history of accurate predictions.

Credibility has special implications among ethnic minorities and the poor. Little research addresses credibility issues for the poor. But limited research is available to describe credibility issues for ethnic groups. Most data deal with Mexican Americans, African Americans, and Whites (Lindell and Perry, 2004). Firefighters and police (officials) tend to be regarded as credible by all three groups. Generally, African Americans and Whites tend to be more skeptical of the media. Mexican Americans usually see peers as more credible. The results, however, vary by location and threat familiarity. Thus, the more familiar people are with a threat (floods), the more likely they consider peers as credible, without regard to ethnicity. In the case of less familiar threats (anthrax, bird flu, or radiation), each group tends to find authorities more credible than other sources. Location seems to affect the relationships between ethnic groups and specific authorities, usually police. Thus, in one community, an ethnic group may rate police as not very credible. However, the same ethnic group in another community may rate police as credible.

What can you do with such findings? Results are limited in that they deal with only three ethnic groups. And there is no completely consistent pattern even with only those three groups. Another limitation is that credibility attributions differ between communities. Different ethnic groups make different credibility attributions at different times. It is probably not possible to devise a single statement that would apply nationwide. This shows that there is no substitute for knowing your community. You should know which minority groups are present and where they reside in the community and how they view local authorities. Such information can be gained by observation and through informants.

The best information about the community comes from an active LEMA outreach program. There are outreach methods for every budget and agency size. You can send speakers to community organizations, church groups, or professional associations. You can invite citizens to serve on task forces. You can conduct neighborhood meetings or even picnics. In these ways, you get to know many ethnic groups. You also enhance the visibility of authorities. This fosters dialogue. And you facilitate citizens' access to accurate information. Credible community leaders can be recruited to endorse hazard adjustment information.

Channel Accessibility

Channel accessibility is unevenly spread in communities. Citizen access to different information channels can vary because of individual preferences. Or there may be limits imposed by the absence of resources or personal skills. Studies show that lack of resources and personal skills do not prevent channel access. Instead, they limit the number of available channels. If you live in Los Angeles and can't understand English, the channels that reach you are far fewer than reach an English speaker. Individual channel preferences also focus channel access. For risk communication, you can use a variety of channels that might meet many individual preferences and direct interested parties to another channel. You might run a public service announcement on many radio stations that mentions hurricane risks and refers interested parties to a LEMA Web site or information telephone number.

Research shows that there are different patterns of channel preference among ethnic groups (Nelson and Perry, 1991; Perry and Nelson, 1991). Whites tend to prefer information from brochures and articles. Mexican Americans prefer radio, television, and neighborhood meetings. African Americans tend to prefer radio, newspapers, and brochures. Channel preferences also differed by location. These conclusions have the same limitations as data on source credibility. A small number of ethnic groups are involved. There are differences within ethnic groups. Channel preference changes over time. It is also affected by situational factors. Thus, you should adopt a conservative strategy. You should use the widest possible range of channels. Don't rely exclusively on targeting specific groups. If you use enough channels, you are likely to reach those with even the most varied pattern of channel preferences. Of course, there may be limits on resources and that limits the number of channels. Brief messages via radio and television serve as "public service spots." These outlets involve a range of costs from minimum to moderate (there is cost in producing a custom videotape presentation for television or printing an elaborate insert for a newspaper). Providing speakers depends on LEMA staffing limits. Likewise, brochures involve printing and sometimes language translation costs. To cast a broad but realistic net, remember these important pieces of guidance:

- ▲ Radio broadcasts, newspapers, and direct mail brochures reach across the channel preferences of most ethnic groups. Newspapers and brochures are very useful. They provide a "written record" that can be retained and referred to in the future.
- ▲ Officials need not be bound to direct mail and mass media. If you operate any level of citizen outreach program, it is only a minor challenge to incorporate hazard awareness and adjustment information. Speakers represent not only channels to citizens but also chances for a dialogue between citizens and managers.

Message Structure

The structure of messages in risk communications about adopting hazard adjustments need not follow exactly the same rules as warning messages. We inform citizens that a hazard is present and important protections when the threat is not imminent and time is available for citizen interpretation and action. Of course, because there is no immediate pressure for action does not mean that we can demand citizen time and attention with lengthy, undisciplined communications. Risk communications must still be professional and concise. Mileti (1993) argues that messages need to capture six pieces of information:

1. What is the threat?
2. What areas of the community are affected?
3. When will it affect citizens in the risk areas?
4. What are the effects likely to be?
5. What should people in danger do?
6. Where is more information available?

We always include in risk messages a statement of our identity and authority to speak of the issue. Beyond that, risk communications usually succinctly cover the threat, where and when it will materialize, and what damages can be expected. The emphasis in these messages is on what should be done (protective action) and where more information is available. The first four questions are answered to get the person's attention and establish salience. Then we devote necessary detail to exactly what the protections are, how the individual achieves them, and how much protection they afford. In almost every case, your risk communication should specify both passive sources of more information (books, Web sites, or manuals) and two-way communication (hot lines, office phones, and LEMA presentation schedules).

Effective messages are not too long or mired in details. You may be tempted to elaborate because there is less pressure for a quick response. Long, detailed messages can potentially create information overload. The receiver may confuse important information with the incidental. Too much information is as bad as incomplete information. Consequently, the reference to "more information" is critical. The referenced information can indeed provide more exhaustive detail. But it also turns control of information consumption back to the individual to access at a comfortable rate. Citizens form our audience; they are not our prisoners.

Language Barriers

Language is a critical issue when communicating with recent immigrants and the very poor. Older, acculturated groups generally function in English. Language barriers also arise for minority groups who have resisted acculturation. Language differences constitute an obvious limitation to understanding hazard information. A language barrier presents serious problems for disaster warnings. Any difficulty in understanding instructions can result in slower compliance with emergency directives. Most communications to enhance preparedness are more lengthy and complex than warnings. The protective actions recommended may require help for implementation. Thus, hazard adjustment information should be presented in multilingual format across multiple channels.

In large cities, you can locate mass media that are language specific. In Los Angeles, San Francisco, and Seattle, for example, there are cable television channels, radio stations, newspapers, and magazines that use Mandarin, Cantonese, Japanese, Vietnamese, Farsi, and Spanish languages. In jurisdictions with smaller concentrations of minority citizens, the number of channels will be far more restricted, perhaps none at all. If you know your community, you will be able to find some (even informal) ways to communicate. All written information disseminated should be multilingual. The translations need to be professionally done. Don't give an English language hazard workshop announcement to a Spanish language radio station. You risk staff members doing a "freelance" translation that may be partly adequate. It is also appropriate to include English with every translation. You must ensure that all language versions of the message are consistent and contain the same information.

Message Distortion and Confirmation

A key concern for planners is that accurate information is given to and retained by the public. Messages transmitted by emergency authorities have high accuracy. But officials are not the only sources of information. People get messages from many sources. Even the best intended friends and relatives may get the information wrong. The message may be distorted by selective recall and interpretation. Mass media sometimes give an official message verbatim. However, through editorializing or commenting, they might distort the message. The potential for misunderstandings are great because there is often no pressure for people to act quickly in adopting protections. So there is a lag between learning and implementing. This means people can forget details before they try to take action and when questions do finally arise in implementing, people may not remember whom to ask.

It is very difficult to prevent or correct message distortions. In some cases, the distortion may never come to the attention of authorities. One strategy for reducing the potential for distortion is to use a range of official sources and channels. This creates a blanket of supplemental hazard information. The idea is to provide many ways for citizens to hear a consistent official message. Another effective strategy for reducing message distortion can be built on known patterns confirmation behavior. Drabek (1986) showed that after receiving hazard information from any source, people attempt to confirm that information. Research confirms that this behavior takes place in most cases among different ethnic groups.

Lindell and Perry (1992) suggest that confirmation behavior is a chance for emergency managers to insert accurate information into citizen interactions. The mechanism is similar in aim to "rumor control centers." As a part of all official hazard messages, managers can include reference to other official sources. Then people can directly contact those sources for more information. Because the managers can influence the messages in the "other official sources," it is possible to ensure that both accurate and consistent messages are given. An advantage of this strategy is that people can be referred to sources that involve both one-way and two-way communication. Examples of one-way communication can be the use of internet Web sites (Hwang, Sanderson, and Lindell, 2001) and telephone book insertions (Perry, Lindell, and Greene, 1982). Two-way communications can be achieved by referring citizens to walk-in advisement centers and information telephone call-in centers.

FOR EXAMPLE

Mt. Shasta Volcanic Hazard Awareness

The U.S. Geological Survey produced a pamphlet describing volcanic threats posed to the local area by Mt. Shasta. Shasta County authorities collaborated with California Office of Emergency Services and local municipal officials to distribute the threat information to citizens in four vulnerable communities. The pamphlets were directly mailed to all residents, press releases appeared in local and regional newspapers and were read on local radio, and pamphlets were made available at public gathering places (post offices, city halls, and supermarkets). A probability sample of residents questioned one year following the initial dissemination efforts revealed that only 37.1% of the residents possessed or could remember seeing a copy of the pamphlet.

SELF-CHECK

- How do you reduce problems associated with language barriers when disseminating information on hazard adjustments?
- What are the five factors on which households make decisions about whether to adopt a hazard adjustment?
- Why do mass media have such an important role in risk communication about adjustments?
- Why should planners consult the local vulnerability assessment when designing plans for hazard adjustment communications?

SUMMARY

People must first be aware of and understand the scope of the hazards they face before they change their behavior and lifestyle to reduce potential losses. In this lesson, you have identified methods of effective risk communication. You have defined how different people will react to different messages. You have also identified the best methods and channels for disseminating your message. You have examined ways to design and create a hazard adjustment program.

KEY TERMS

Audience Segmentation Identifying the audience for communications in terms of defined characteristics—age, gender, and others—with the intent to tailor messages.

Generic Functions Actions that afford effective protection for multiple hazards.

Hazard Adjustment Adoption The initial commitment of resources needed for a particular adjustment following individual awareness and choice of an acceptable adjustment.

Hazard Adjustment Implementation The continuing allocation of personal resources needed to sustain the protection achieved by an adjustment adoption.

Hazard Mitigation Measures Any measure taken before disaster impact that reduces the vulnerability of individuals, organizations, or structures.

Window of Opportunity A time during which public attention and that of elected officials and others is focused on a given hazard.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of planning for hazard adjustment.

Measure your learning by comparing the pre-test and post-test results.

Summary Questions

1. Hazard adjustment assumes that almost all natural and technological threats can be prevented. True or False?
2. Emergency planners have experienced great success in getting citizens to change their behavior to reduce hazard vulnerability. True or False?
3. Research indicates that the proportion of people living in earthquake-prone areas that adopt adjustments is increasing over the past decade. True or False?
4. People are more likely to adopt a protective adjustment if the probability that the hazard will produce a disaster is high, as in seasonal flooding. True or False?
5. What group among all ethnic groups has the most source credibility
   (a) Neighbors
   (b) Media
   (c) Officials
   (d) Coworkers
6. Decay in hazard awareness can be countered by using multiple communication channels. True or False?
7. Hazard communications should try to convince people that they have a personal responsibility to protect themselves and their families. True or False?
8. Who is the most likely to have hazard awareness?
   (a) Female resident with a high income.
   (b) Male resident with a low income.
   (c) Elderly man who lives by himself.
   (d) Female resident with a low income who lives by herself.

Review Questions

1. What is hazard adjustment?
2. What is risk communication and how is it used in promoting hazard adjustment?

3. What are the five decision dimensions on which households decide to undertake hazard adjustments?

Applying This Chapter

1. You have been assigned to support the LEMA risk communication program for wildfires in Showlow, Arizona. Wildfires are an every season event in your area. Last year, the LEMA used local TV and radio as a communication channel. When a survey of residents was conducted, many of them had tried to implement technically ineffective measures. Please discuss at least one mechanism available to you that reduces distortion of official messages.
2. As a planner in Olympia Washington, you know that you have large numbers of people in your area that speak and read only Vietnamese and Chinese. You are setting up the plan for an annual awareness and adjustment campaign for local flooding. What can you do to overcome language barriers?
3. You have just come from the Yavapai County Arizona LEMA Director's office. He has just come from a budget meeting in the County Manager's Office. The Manager is hesitant, in a lean budget year, to fund the LEMA request for a five-year, multihazard citizen information campaign. You have been asked to draft a memo explaining why it is important to adopt a long-term perspective for hazard awareness campaigns. What will you write?

YOU TRY IT

Enhancing Flood Hazard Adjustments

Your community business district is old and elected officials believe downtown business could be revitalized if the district were developed along a “river walk” theme. This can be accomplished by building pedestrian accommodations along the river and encouraging about 20 businesses to relocate from the old business district. As an emergency planner, how would you use risk communication and incentives to ensure that relocating businesses engage sound flood hazard adjustments?

Wildfire Hazard Awareness

You are an emergency manager for a rural southwest county. Much of your county is within a short drive of a major city. The County Supervisors, in a revenue enhancement plan, allowed developers to create “wooded communities” in forest areas nearest the city. These communities are now being populated with former city dwellers unfamiliar with basic wildfire threats. What components will you include in a hazard awareness campaign to reach these new residents? How will you convince people to establish the traditional vegetation clear areas in the urban-wildland interface?

Message Distortion Control

You work in a close-knit community of 10,000 where social involvement in government and voluntary associations is high. Large parts of the community are in a floodplain, but there have been few damaging floods in the past 25 years. A new development project 50 miles upstream has modified runoff areas and will produce an elevated local flood risk. Everyone in the community seems to have conventional wisdom and “experience” with floods that contradict the message of enhanced vulnerability you need to share. What measures will you take in structuring your awareness campaign to reduce message distortion?

12

STRUCTURES FOR MANAGING EMERGENCY RESPONSE

Executing Emergency Plan Provisions

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of structures for managing emergency response.
Determine where to concentrate your effort.

What You'll Learn in This Chapter

▲ The way that the jurisdictional emergency operations center (EOC) connects to emergency operations
▲ The way that EOCs are structured and the functions they serve
▲ The way that incident management systems (IMS) guide scene operations
▲ The principles of area command and unified command
▲ The complementary nature of the IMS with the EOC

After Studying This Chapter, You'll Be Able To

▲ Evaluate the functioning of any EOC
▲ Use sound principles to design an EOC
▲ Define components of the EOC organization and their roles
▲ Differentiate traditional IMS from NIMS ICS
▲ Define components of an IMS and their functions

Goals and Outcomes

▲ Evaluate conditions when the IMS best operates without the EOC
▲ Assess conditions where command must be vested in the EOC
▲ Define EOC support for integrating public information functions
▲ Execute the policy functions of the EOC
▲ Manage the EOC interface with elected officials and jurisdiction administrators

INTRODUCTION

Preparedness is achieved through planning, equipping, training, and exercising. The planning process is based on the hazard/vulnerability analysis. The process brings together planners and responders who define agent- and response-generated demands and how they will be met. Responsibility for tactics and task execution is assigned. Equipment needs are defined and acquired. The training process ensures that personnel know their jobs and equipment. Exercises test and improve the system. The management of operations, sometimes called command and control, is inherent in this vision of preparedness. Response functions such as assessment, population protection, hazard operations, and incident management, are executed within an organizing structure. This structure is called the incident management system (IMS). The goal of the IMS is to organize functions and coordinate agencies that carry out the response functions at one or more operational scenes. The IMS is overseen by a single Incident Commander (IC).

The IMS is supported by the jurisdictional emergency operations center (EOC). The EOC is the focal point for acquiring resources. The EOC directs these resources to ICs at scenes (see Figure 12-1). The EOC is the center for

Figure 12-1

The Lake Charles, Louisiana EOC opened early in anticipation of Hurricane Rita in 2005.

policy and information about the disaster response. It brings together elected and appointed policy makers, specialists in different aspects of agent- and response-generated demands, and representatives of nonprofit and government agencies. A jurisdictional EOC differs from a departmental EOC or an incident command post. The jurisdictional EOC is concerned with the entire community. It is responsive to other local governments, state government, and federal assets. The jurisdictional EOC issues directives for response policy and operational assignments. A departmental EOC is located in the department's normal operations area to support its personnel. For example, it is common for public works and transportation departments to maintain departmental EOCs. They call on their own standard operating procedures (or devise "on-the-spot" procedures). They dispatch only their own personnel and resources. Such departmental EOCs also supply representatives to the jurisdictional EOC. Finally, incident command posts are established by police, fire departments, or other agencies with personnel on the scene. The purpose of a command post is to coordinate the units at an incident scene.

There is a critical link between the IMS and the EOC. The sections of the traditional IMS are:

- Administration
- Planning
- Safety
- Operations
- Logistics

They serve the support functions for the IC in everyday emergencies. In a large-scale disaster, the IMS performs these functions for a particular scene, but the EOC handles communitywide functions. Although the IMS is separated from the EOC in this discussion, it is important to emphasize their inseparability in significant field operations. The IMS can be used without the activation of an EOC in minor emergencies. In large incidents, the EOC organizes complex, specialized, or large-scale support that may be needed at the scene. The EOC is a critical management structure when there are multiple disaster scenes involving many different organizations. In such cases, the IMS is used at each scene, and there is one IC for each scene. Overall responsibility for managing the problem rests in the jurisdiction EOC. In slow developing events—such as the secret release of a biological agent—there might be no single scene. In this case, the jurisdictional EOC would be the focus for managing emergency response. These situations emphasize the interjurisdictional function of EOCs. County and state EOCs link to the jurisdiction EOC. They may all be linked to a Joint Field Office—as a link to federal resources—under the National Response Plan (FEMA: 2004b). In these illustrations and in practice, the IMS and the EOC complement one another.

12.1 Emergency Operations Centers

The EOC is the center of coordination. It is also the center of resource assembly and deployment and management strategy in large-scale disasters. Perry (1995) pointed out that the EOC is the place where technical emergency management directly interfaces with senior policy makers. The EOC coordinates the multiagency, intergovernmental incident response to ensure it forms an effective and efficient effort. The EOC is also the central node of the incident information network. It is the point through which information is released to the mass media and the public.

Wenger and colleagues (1989) found that, despite its critical role, many EOCs are not activated during disasters. This is most common in smaller communities where EOC use is often sporadic and poorly understood. The New York EOC was crushed under rubble on 9/11. This caused serious challenges in coordinating resources. Homeland Security Presidential Directive Number 5 (HSPD 5), a direct response to the New York experience, established a national protocol for incident management. Although HSPD #5 is new, McHugh (1995) documented that problems with EOC establishment and use are not new. A variety of command and control difficulties persist following HSPD #5 with EOC implementation in both states and small communities (USGAO, 2003a). The problem is by no means unique to the United States. There are problems in establishing standards for EOC structure and use in the United Kingdom (Alexander, 2003), Europe (Triglia, 1996), and Australia (Emergency Management Australia, 1996).

The sporadic and improvised use of EOCs may be traced to three factors:

1. Large incidents that absolutely require an EOC are infrequent. Small incidents can be managed with minimal EOC activation or with the EOC functions assumed by other organizations.
2. Local planners sometimes narrowly define the jurisdictional emergency management system as a purely technical system, thus failing to address the social, economic, and political implications of the incident.
3. Many planners do not fully understand the functions and structure of the EOC and its relationship to the IMS. By focusing on operations at an incident scene, the command post inappropriately becomes the center of support activities—sometimes impeding operations at the scene.

The EOC is a crucial management structure. This is especially true when large-scale disaster demands require the resources of many internal and outside agencies (FEMA, 1993b). Historically, such large-scale incidents have low-impact probabilities. However, they have high-negative consequences. More predictable hazards that generate significant damages also pose needs for EOC functions.

Perry and Lindell (2003b) advised that EOCs are critical to meet incident demands in all terrorist attacks. Alexander (2002) underscored the need for

EOCs to manage the special planning and resources required in terrorist incidents. Fischer (1999) contended that terrorist incidents increase the need to communicate with the public and politicians, and this capability is centered in the EOC. Rudman (2003) argued that the EOC is the most effective base for addressing the range of complex demands of terrorist attacks. Perry (2003b) concluded EOCs were able to deal with the many variations of attacks in terms of agent use, facility, population targets, and attack timing.

To be an effective emergency planner, you must:

- ▲ Understand the jurisdictional policy context of the EOC.
- ▲ Grasp the functions performed by the EOC.
- ▲ Know the basic structure and operation of an EOC.
- ▲ Understand how to plan and establish an EOC.

12.1.1 Jurisdictional Setting of the EOC

At the EOC, emergency managers have access to elected officials and leaders for counsel regarding the policy implications of the response (Perry, 1991). This political connection is important in very large-scale natural and technical disasters, but critical in terrorist incidents, which raise unique policy questions. Fischer (2000) found that a biological attack may require public health and emergency authorities to implement widespread quarantine, forced evacuation, or enforced drug interventions to stem exposures and reduce disease spread. Political and legal authority is required to implement such measures. Issues such as mandatory inoculation raise civil rights concerns. Thus, there is an intersection of disaster management with law and public policy that requires rapid, close, and constructive involvement of authorities. This is best achieved in the EOC.

Perry (2003a) showed that the EOC is related to the responder personnel's IMS. The IMS is the organization used by field responders. They handle the agent- and response-generated demands at the incident scene. In major incidents, the EOC receives the threat information generated by the IMS. The EOC uses that information to identify, acquire, and dispatch appropriate resources to the incident scene. Terrorist threats involving chemical, biological, radiological, nuclear, or explosive (CBRNE) agents may present no response scene and have to be managed from the EOC. EOC command would formulate strategy and tactics. The EOC would assume the command responsibilities for decisions about direct threat abatement and deploying agencies and personnel.

When disasters have a regional scope of impact, many EOCs work together. The different EOCs coordinate communication and action. Each EOC assembles, deploys, and controls the resources within its jurisdiction. The coordination is across municipalities and also with county and state EOCs. You may also need to work with special field offices, information centers, and the EOCs of federal agencies. As the size of an impact area increases, it is necessary for multiple jurisdictional personnel and resources to operate at the same time. This multi-jurisdictional command and control issue will almost always be present in terrorist incidents. Links among EOCs avoid many command and control problems and can effectively address those that do materialize.

The EOC is the principal structure for receiving and redeploying resources from outside the jurisdiction. Even though some extra resources can be directly absorbed by the local IMS, many others cannot. Local tradition, mutual aid agreements, and the *National Response Plan* strive to preserve local control of the response. This means that local authorities direct and deploy the outside resources and teams. For example, hazardous materials teams and special rescue teams come with their own equipment and command structure. They are deployed through the local EOC and IMS. Similarly, public heath personnel come with both legal authority and special technical skills. National authorities also retain control over their own teams. You can view incident command and control as a network of linked EOCs. This preserves the principle of elected official control. For state and local governments, the EOC decision makers are either the elected leaders or are directly responsible to them.

12.1.2 Functions of the EOC

The demands on an EOC vary. They depend on the community's level of preparedness and the types of agent- and response-generated demands. Some demands can be met by generic functions. Jurisdiction elected and appointed leaders, higher governments, and citizens also make demands on EOCs. Quarantelli (1979) elaborated six functions that any EOC should be able to accomplish. These functions are relevant whether the command function is located at an incident site or the EOC itself.

EOC Coordination Responsibilities

EOC coordination is the series of actions that assesses agent- and response-generated demands, gathers demand-relevant resources, and deploys those resources efficiently and effectively. Sorenson, Mileti, and Copenhaver (1985) described EOC commander and staff responsibilities for ensuring responder organizations are aware of one another's missions and duties. The EOC commander uses the EOP as a framework for this coordination. The EOP contains the mutual aid agreements, task designations for responding organizations, chains of command, and resource directories. The part of EOC coordination in the EOP is preplanned. Within this planning, the EOC commander can creatively improvise during an incident. Ford and Schmidt (2000) established that flexibility for command should be built into all plans and EOC designs. However, the bases of flexibility rest in the planning process, not improvisation borne of unpreparedness.

Policy Making Functions

The EOC must address policy at multiple levels. The EOC connects emergency operations with the capabilities of the community and the public interest. The technical issues in disaster operations are preaddressed in the EOP. However, the execution of both planned and improvised actions often requires the involvement of local political and legal authorities. These authorities must make decisions about balancing public safety needs with personal freedom and private property. When disaster demands can only be met by varying from normative rules or legal prescriptions, their role is critical.

Together, elected officials, managers, and emergency authorities define the strategies used in the emergency response. The policies made reflect broad principles. EOC policy guides strategy and tactics, not tasks in the field. However, many policies arise from situational demands not covered in an EOP. These can be difficult decisions to make. A raised railroad track may act as a dam for flood waters, threatening to submerge homes in an artificial lake. Do you simply bulldoze the tracks to breech the dam? Such cases require emergency authorities to closely consult with elected and senior officials who will be held responsible as the legitimate authority.

Public health crises require complex EOC policy making. Authorities must identify the threat, assess medical options, and choose the appropriate strategy and tactics. These medical decisions must be made with the concurrence of political authorities and involvement of field agencies. Because most public health departments lack personnel for enforcement, emergency managers, police, firefighters, and others will implement a chosen response. A terrorist-released contagious agent, for example, might require isolation of symptomatic patients and inoculation of others. Citizens usually view such actions as very personally invasive. Successful implementation of such programs requires giving the public a lot of information and the visible approval of elected authorities.

EOC Support of Emergency Operations and Population Protection

Every EOC supports disaster operations. Typically, disaster demands change as time passes. Continuing emergency assessment is required to monitor the demands produced by the initial impact. New demands from secondary threats must be identified. For example, in large floods, the initial concern with rescue gives way to concerns about public health associated with potential overflow of sewer systems. Response operations must adapt. The EOC stores information on the situation, interprets it, and uses it to project consequences for operations. The EOC disseminates these analyses to ICs. The EOC ensures the prompt delivery of needed resources to incident scenes. Resources and personnel obtained from other jurisdictions and external agencies require EOC staff to coordinate with the local IMS to define deployment protocols.

Another dimension of the relationship between the EOC and the field (through IMS) is related to general population protection. The IMS is primarily focused on operations at the incident scene. ICs are concerned with technical assessment and correction of hazard agent related conditions. IMS is also concerned with conditions that threaten assessment and preventive and corrective actions. It is the EOC that assumes responsibility for maintaining a community view rather than just an incident scene view. The EOC collects data from the scene *and* from other sources. The EOC then determines the types of population protection that are appropriate for those citizens located beyond the incident scene. For example, on-scene technicians may use software to project the direction of a chemical plume. They then report this to the EOC with a recommendation to evacuate. The EOC Operations Section will reassess the data. The EOC then confirms recommendations about the areas to be evacuated, the routes of egress, and the designated safe areas for evacuee mass care. This information then can be relayed through the EOC Police Liaison to a police command post for execution. At the same time, EOC personnel will examine the needs of evacuees in mass care and the time they will spend there. In addition, they will assess whether other areas of the community are vulnerable and determine appropriate protective action recommendations for those areas as well. The population protection function of the EOC extends beyond specific hazards at a scene. It includes secondary threats throughout the community.

The EOC as Information and Analysis Center

EOCs take the lead in gathering, interpreting, disseminating, and storing information about an incident. The focal information pertains to the agent- and response-generated demands, deployment, and use of resources. The scope of information gathering by the EOC is broad. Emergency assessment information is particularly critical. It is gathered throughout the incident. The EOC also gathers information on the success of the overall disaster response. This includes information on the timing and effectiveness of operational decisions and deployments. Such data are useful in the short run to adapt managerial strategy to event demands. These data also constitute long- run feedback to improve subsequent performance. The EOC also is a clearinghouse for information. It collects information on the activity and success of different response agencies. It relays the information to other response agencies with related tasks. This provides all response organizations with a database on which to make specific strategy decisions. Finally, the EOC tracks the nature and progress of disaster response. The jurisdictional EOC must collect and disseminate a variety of types of information as well as preserve it for future use. This does not mean that the EOC should become a library. It simply emphasizes that some form of record keeping should be devised and used during EOC activation.

The Public Information Function

The EOC also informs the public directly and through mass media. The EOC is the most effective structure for public information dissemination. The EOC is "closest" to accurate incident information. Heightened information access at the EOC mitigates against sharing incorrect, incomplete, or ambiguous information. Public information functions placed at field locations are problematic because of the "local" perspective and their potential interference with operations. Incident commander is on the response. This environment is not well suited to information dissemination or to manage those who seek information. In contrast, the EOC has a response-wide view (including intergovernmental issues) and can be organized accommodate both the media and citizens who want information.

This does not mean that the media or public information officers should set up in the same room with the EOC commander and staff. Instead, the public information system is placed near (not inside) the EOC. Two audiences are of principal concern: the general public and those at risk. The general public is usually addressed with press releases. The public at risk is addressed both via press releases and dedicated information contacts such as hot lines. The mass media are another important audience. The media can serve as a buffer between the EOC and the public. Indeed, the media provides critical channels through which managers can disseminate information. The mass media will disseminate information on its own if emergency managers do not provide it (Lindell and Perry, 1992). This underscores EOC importance as provider of accurate information to media representatives and of appropriate facilities for media operations.

Dynes (1994) argued that connecting the EOC with the public information function solves many common problems. When the EOC is the main point of contact with all media, the chance of disseminating inconsistent or conflicting public information is reduced. The EOC is a single, convenient place for mass media to obtain correct information. Giving accurate information to the public can also reduce demands on the response system. Wenger and James (1994) found that accurate and timely information ensures outsiders to know where the impact area is located and how to avoid it. This reduces problems associated with convergence. Complete information also ensures that outsiders know if friends and relatives are in the impact area. This reduces the felt need to telephone, visit, or "rescue" such people.

The EOC Public Information Officer (PIO) routinely shares information with managers of organizations charged with activities such as warning, evacuation, and mass care. This enhances the quality of information shared with people in vulnerable areas. One key feature of such communication is that authorities can provide information that allows people to determine if they are really in danger. Perry (1985) pointed out that this procedure was not well handled during the l979 reactor accident at Three Mile Island (Pennsylvania). Many people thought they were in danger when they were not. The problem is that people who take protective action when they are not at risk might impede the protection of those who really are in danger.

EOC Visitor Management Functions

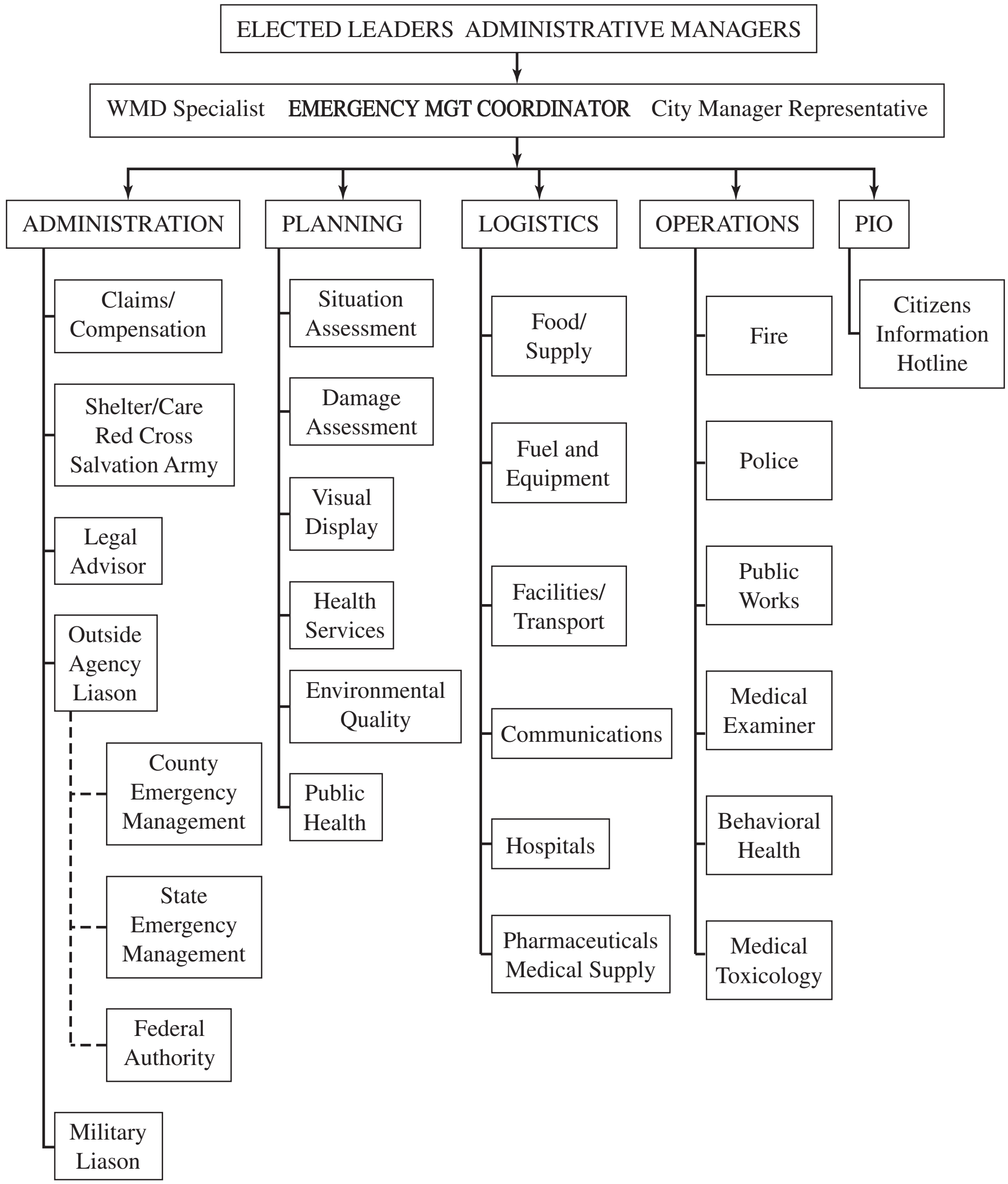
The EOC is the only response facility capable of effectively hosting visitors to the disaster site. EOC managers sometimes underestimate the number of visitors (usually government VIPs) who wish to observe disaster operations. Sometimes these visitors have legitimate disaster-related duties. However, sometimes they only want to show concern. Particularly in terrorist incidents, the number of intergovernmental visitors and press representatives is likely to be overwhelming. EOCs usually have limited space. They cannot easily accommodate visitors who lack specific response-related functions. VIPs are difficult to turn away, so you need to develop a plan to manage such visitors. This is usually not very demanding, but it requires Public Information Officer PIO personnel who can distribute easily understood, prewritten information. A PIO representative can usually be assigned to escort groups of visitors. A PIO can explain operational procedures. Also, a PIO can answer questions. It is also important to have designated space for visitors near the EOC that allows them to feel supportive and obtain information, but at the same time remain a minimum obstacle to emergency response activities.

12.1.3 Staffing and Operating the EOC

There are multiple models for staffing and operating EOCs. Most of them are based on specific agency representation. EOC staffing usually involves identifying groups that should be involved in a given type of incident and including representatives from those agencies as members of the EOC staff. According to Brunacini (2002), most modern EOCs have adapted a functional form of organization that complements and supports the IMS. This approach envisions the EOC as a place that brings together communication capabilities, as well as logistical and personnel support from all the resources inside and outside the jurisdiction. It is best if the EOC is a permanent structure. However, some smaller jurisdictions assemble the EOC components when they are needed. Figure 12-2 shows the structure of a local government EOC. It is directly linked to the City or County Manager and elected officials who provide policy and advisory leadership. The EOC is the assembly point for representatives from many departments, agencies, and private organizations. The emphasis is on the role they play in the emergency response. Incident demands define which personnel occupy the EOC. If the functionality rule is followed, the structure of the EOC will resemble the structure of the IMS. It will have the same capability for being tailored to incident demands.

Michaels (1996) identifies two common patterns for command of a jurisdictional EOC. In one pattern, the EOC commander is the jurisdiction emergency services coordinator. This person is technically trained in emergency management,

Figure 12-2



Filled-out EOC structure for a WMD/CBRNE terrorist incident.

consults with EOC staff, devises a disaster response strategy, consults with municipal authorities for policy approval when appropriate, and implements the strategy. This approach involves direct contact between EOC commander and municipal authorities. A second pattern of EOC management involves the use of a disaster management committee, or advisory body in addition to the EOC commander. See Figure 12-2 for a diagram of the EOC structure.

Often the advisory group is headed by a chief elected official or chief administrative officer. It may include the directors of the jurisdiction's disaster-relevant departments. For example, police, fire, public health, and public works. Disaster response policy may be devised by the EOC commander and reviewed by this group. Or it may be created jointly by the EOC commander in consultation with this group.

The EOC structure is tailored to fit the nature and magnitude of the event being managed. The EOC is activated under a variety of special conditions. These include those in which the impact area involves a significant portion of the jurisdiction or when many specialized resources will be needed in incident management. Hoetmer (2003) noted that the EOC may be activated by any of several individuals or their authorized representatives: the City or County Manager, Fire Chief, Police Chief, or Emergency Management Coordinator. Activation may be full or partial. In most jurisdictions, a fire or police department Incident Commander can initiate activation through the department chief or by acting as the chief's authorized representative. When the EOC is activated, the emergency management coordinator is the first to be notified. The coordinator then decides what services and functions are needed. This tailors the EOC to the event. In most jurisdictions, notifications are made by a dispatch center using digital paging systems or voice communications.

The level below EOC Command in Figure 12-2 shows the four standard sections that are also common to IMSs:

1. Administration
2. Planning
3. Logistics
4. Operations

It also includes a Public Information Section. The latter is administered by the jurisdictional PIO. This PIO coordinates with agency PIOs to ensure consistent, accurate, and timely public information. The placement of the EOC PIO section varies by jurisdiction. Usually it is close to the center of operations to allow easy access by officials and staff. However, it is not so close that media representatives can directly observe EOC activities. The PIO normally establishes a location near the EOC for media representatives. The PIO holds regular press briefings. Most jurisdictional EOCs include a citizen information hot line or communications center. These are designed to receive citizen calls. The placement of this function depends on the availability of space and equipment.

Each EOC section executes a group of functions, plus additional assignments as needed. The **EOC Administration Section** addresses legal issues, mass care for victims, and liaison with agencies outside the immediate jurisdiction. Most jurisdictions maintain formal agreements with the Red Cross or Salvation Army to staff and operate mass care facilities. These house and feed victims and people who were displaced from their homes because of their proximity to the scene of operations. Under extremely unusual circumstances, such as an exceptionally large number of casualties, victim medical treatment and other functions may be located at mass care facilities. In most cases, behavioral health personnel from a private organization or the jurisdiction (fire department specialists) are present at these facilities. Administration also deals with the National Guard, National Disaster Medical System, and any other needed military contacts. If representatives from other governments are needed, they are assigned to administration section.

The **EOC Planning Section** executes the planning function for the incident, manages risk assessment data, forecasts likely agent and response demands, and manages the display of data and consequence analyses. The Planning Section assembles the information that is used by jurisdictional authorities to request local, state, and Stafford Act emergency declarations. Carter (1991) points out that most large EOCs use some form of incident management software, including GIS capabilities. The Planning Section normally manages this system, although it serves all EOC sections (Frosdick, 1997).

Depending on the hazard agent, the Planning Section may incorporate public health resources and environmental surety (postimpact cleanup and restoration) resources. State health departments usually have capabilities for laboratory analysis, epidemiological investigation, vector tracking, and medical treatment guidance. State health departments also serve as the direct contact with the U.S. Centers for Disease Control and Prevention. In WMD or disease epidemic incidents, it is important for local emergency authorities to understand the legal powers of health departments, which vary among jurisdictions. Health departments usually possess the legal authority to order mass prophylaxis or other treatment for the public. The Planning Section maintains a branch for environmental protection if it is expected that the disaster agent may affect and linger in the air, soil, or water. This branch provides decision guidance regarding hazmat issues, agent identification, environmental consequences, and cleanup.

The **EOC Operations Section** is the principal liaison with incident scenes and controls operations from the EOC in disasters without a scene. Disaster abatement may require many disparate operations simultaneously. These can include fire suppression, hazardous materials response, technical rescue, emergency medical services, decontamination, ambulance services, and law enforcement functions (Kramer and Bahme, 1992). Internal and external agencies that provide operational functions have EOC representatives that are directly connected to the scene IMS. The public works representative arranges for barricading, special hazards, and other related functions. For incidents with many scenes or none identifiable, Coleman and Granito (1988) stress the importance of an EOC capacity to directly dispatch agencies and personnel or to have special links to a dispatch center.

There are three reasons why the Operations Section adds branches. One reason is for disasters that produce high death rates. A second reason is toxicological threats. The third reason is for disasters with a high probability of psychological consequences. The Medical Examiner's Office coordinates the handling of deceased victims. The behavioral health representative in the EOC coordinates with appropriate on-scene officers. This person ensures that the necessary resources are at the scene or mass care facilities. The behavioral health representative in the EOC activates mutual aid or other agreements to expand available mental health resources. This person also coordinates with Poison/Toxicology Branch to ensure that information regarding behavioral health symptoms from an agent are known to other responders. Behavioral health needs at hospitals and mass care facilities are coordinated through this branch. Finally, the Poison/Toxicology Branch provides research to support agent identification. This branch provides advice about decontamination. It guides on-scene antidote administration and treatment.

The **EOC Logistics Section** is dedicated to supporting scene operations with: food and supplies; fuel and equipment; facilities and transport; and communications. In incidents that involve large numbers of injuries or illness victims, this includes hospital coordination. The hospital representative serves as a point of contact and information exchange with regional hospitals regarding threat (chemical or biological agent) and treatment information available from the scene, hospital bed availability and capacity, and hospital needs for supplies and pharmaceuticals. In a WMD incident, Logistics address requests for and deployment of pharmaceuticals and medical supplies. This includes movement of pharmaceuticals and supplies within the local emergency medical system and receipt from the National Pharmaceutical Stockpile and CHEMPACK caches.

12.1.4 Designing EOCs

EOC design skills are important because jurisdictions add and upgrade EOCs. The first requirement for an EOC is that it will be safe from hazard exposures. Second, it should be able to obtain and process timely information about the incident. This capability is established by having telecommunications and information-processing equipment that will provide an effective division of labor while maintaining coordination of action. An EOC should provide ready access to those who are needed for a timely and effective response. This includes both those who have technical knowledge as well as those with policy-making responsibilities. Finally, the EOC must be designed with enough space to perform the response functions that take place within it. The EOC layout must provide a layout that places its staff in close proximity to the equipment, information, and materials they need.

An accepted process for creating an EOC encompasses eight steps:

Step 1: Establish an EOC design team. The design team should possess expertise in preparedness, information technology, ergonomics, and architecture. The design team should interview representatives of all functional teams that will work in the EOC to define specific design features.

Step 2: Analyze the EOC organization. The design team should examine the jurisdictional EOP and its accompanying procedures to identify the functional teams into which the EOC is organized, the positions to be staffed within each team, and how the positions are related to one another. The design team also should assess the flows of resources associated with each position. They consider the flow of information. Static information, such as written EOPs, plant layouts, evacuation route locations, and dose reduction factors for local residential structures, should be stored for easy retrieval. Consideration should be given to acquiring and managing dynamic information about the status of hazard conditions, especially how the information is routed to those who need it. Both static and dynamic information can be conveyed in three different formats. These formats are verbal, numeric, or graphic. The inherent difficulty in transmitting some types of information can combine with the volume of information transmitted to severely strain the capacity of EOC staff without advanced telecommunication technologies.

Step 3: Evaluate resource flow for each EOC position. The flow of materials generally is not problematic unless paper is used. Equipment flows are minimal in dedicated EOCs although they can be significant if the EOC is located in a space that normally is used for another purpose. However, flows of personnel are very intense during an EOC's initial activation and shift changes. Some positions require a considerable amount of movement. The use of analysis teams demands that team leaders frequently interact with the EOC command staff. All movement must be designed to minimize the disruption to other EOC staff.

Step 4: Identify position workstation requirements. The design team should determine the workstation requirements for each position. They assess vertical and horizontal storage space. They should know the number of personnel using space concurrently. It is advisable to provide seating and, in some cases, work surfaces, whose height can be adjusted readily to accommodate differences in workers' body dimensions. Similarly, keyboard heights and computer viewing angles also should be adjustable.

Step 5: Assess environmental conditions. All positions within the EOC are likely to have similar needs for heating, ventilation, and air conditioning. However, there can be big differences in the need for lighting and noise suppression. Variation in lighting needs can be accommodated by providing locally controllable task lighting. Noise suppression can be achieved with acoustically absorbent material.

Step 6: Identify space needs. The amount of space needed for each position is determined by the horizontal workspace and needed circulation space. Variation in the staffing needs for different types of incidents requires a design that provides flexibility in space allocation between EOC activations. This flexibility can be provided by open space designs with moveable partitions between team areas.

Step 7: Develop a Facility Conceptual Design. The design team's architect can use information flow demands to construct an **adjacency matrix.** The adjacency matrix describes the need for physical proximity of EOC sections and teams. The adjacency matrix, together with the information from the space analysis, can be used to develop an idealized layout. This idealized layout must be adapted to the physical constraints of an existing building where the EOC will be constructed.

Step 8: Document the EOC design basis. The design team should prepare a design basis document. This should summarize the results of their analyses and the resulting design. This document should be reviewed by those responsible for the EOC's operations. It should also be reviewed by a committee with representatives from each team that will staff the EOC. This review will provide an opportunity for users to verify the accuracy of the design basis. It also provides a benchmark against which subsequent proposals for EOC renovations can be assessed.

12.1.5 Special Features for EOCs

EOCs are structures that house complex functions. They are part of the jurisdictional emergency response capability. The EOC should be examined for integrity. This is because it is a critical part of effective response. Erickson (1999) developed a listing of seven features of EOC planning and construction. This serves as a checklist for evaluating special features of these facilities:

- ▲ *Is there an alternate location or EOC in the event the primary EOC is rendered inoperable?* The attack on the World Trade Towers on 9/11 rendered New York's primary and secondary EOCs inoperable. An alternate location is important not just because spectacular events can be destructive. Plumbing failures, fires, electrical problems, and similar difficulties can render a primary EOC unusable. The alternate EOC need not be permanent. Plans for a location and hasty implementation can be maintained. However, it should be accessible from the main facility.

- *Is the EOC resistant to high-priority hazards in the vulnerability assessment?* Structural soundness to wind, water, and shaking threats is important. The EOC should be outside flood plains. The EOC should be outside other hazard vulnerable zones. The EOC should be away from hazardous materials threats.
- *Is the EOC configured with space to accommodate sleeping, rest, and food for staff?* All EOC staff, especially command staff, should be assigned shifts to avoid exhaustion. When hazard conditions require long staffing periods, it is important to arrange space for sleeping, sanitary facilities, and food service.
- *Is the EOC secure?* Security requires access controls, staff identification systems, barriers, surveillance devices, and police protection.
- *Does the EOC accommodate terrorism incident security and law enforcement needs?* If the FBI is to operate on-site, some EOC personnel will need federal security clearances. There may be needs for classified materials control and protection. There may be a need for secure communications equipment. Most jurisdictional EOCs plan to send cleared personnel as representatives to local FBI or other centers that normally possess operating capabilities when classified information is addressed.
- *Do the Primary and Alternate EOCs have backup power sources?* In most cases, power sources are mobile gasoline generators.
- *Does the local emergency management agency operate an active training and exercise program for EOC staff?* Like all features of emergency response, a

FOR EXAMPLE

Oklahoma City Bombing Identity Demands

On April 19, 1995, the Alfred P. Murrah Federal Building partially collapsed after 4800 pounds of explosives were detonated in a parked van (see Figure 12-3). The emergency period extended for weeks. Many outside first responders and official visitors arrived at the scene. The EOC had to issue more than 28,000 identity badges. The "lessons-learned" report advised EOCs to develop protocols for credentialing visitors. It also advised them to adopt a system that can make the physical cards.

Figure 12-3

A large convergence of visitors and external emergency personnel following the 1995 bombing of the Murrah Federal Building caused the EOC to develop streamlined identification processes.

jurisdiction training and exercise system is necessary to ensure the EOC can operate successfully.

In an era of terrorism, the EOC is critically important. The demands posed by a terrorist attack would require many specialized resources and personnel for effective response. The EOC ensures such diverse resources will be assembled and deployed effectively. The EOC model described here can serve emergency managers in at least three important ways. First, it provides a basis of comparison by offering a standard of both structure and function. You can compare this against existing community EOCs. Such comparisons are useful in that they encourage scrutiny of the community response system and its needs. Second, the model can serve as a guide for a community constructing a new EOC. It suggests a structure and functions that are possible and might be desirable to include in the new EOC. Finally, the model serves as the basis for how an EOC fits into the community's larger disaster- planning and response system. By addressing this issue, you can become more aware of the interdependence of planning and response. You can also become more sensitive to needs that routinely arise during and after disaster events.

SELF-CHECK

- Why do jurisdictions fail to use their EOCs regularly?
- Why should elected and appointed policy makers clutter up the EOC?
- What is the **EOC Planning Section** and what does it do?
- When you design or redesign a permanent EOC or create a temporary one, what are the most important selection criteria?

12.2 Incident Management Systems

Incident management systems (IMSs) are neither new nor confined to traditional emergency management. Incident management has military origins. Law enforcement agencies have long used the incident command system (ICS) for large-scale incident response. Both IMS and ICS encompass the notion of a preplanned, organized structure for response operations. They are treated here as interchangeable. An important cause of the confusion regarding IMS/ICS is that different professions and professionals have used different meanings. Different terms have been used at different times. Large municipal fire departments use the Incident Management System (Brunacini, 1985) and the National Fire Protection Association adopted a standard (NFPA 1561) on emergency services IMS in 2000. Similarly, the Law Enforcement Incident Command System (LEICS) was systematized and endorsed by the Police Officers Standards and Testing (POST) organization (Bartosh, 2003). The Hospital Emergency ICS (HEICS), used in public health organizations, originated with the Orange County California Emergency Medical Services Agency and has diffused widely through the medical community. The Department of Homeland Security now requires that local and state jurisdictions adopt the Incident Command System component of the National Incident Management System (NIMS) as a condition for homeland security funding.

The NIMS ICS component is similar to traditional IMS used in fire and police agencies. This means that NIMS ICS is at least familiar. It is used by most large fire services agencies in the United States. You need to know both traditional IMS and the NIMS form of ICS. They are likely to coexist in the emergency services community for some time. NIMS ICS is likely to be quickly adopted in large agencies that use extensive federal funding. It will be adopted more slowly in agencies less dependent on federal support. It may never be adopted in some small jurisdictions. The description of the IMS presented here will follow the system commonly in use by the fire services. The objective is to describe the actual operational management side of events. The focus will be on the IMS or NIMS ICS. There are a few areas where NIMS ICS differs from traditional IMS, but these are largely differences of terminology and will be identified.

The critical issue with IMS is not so much one of having some particular type of incident management system but of actually understanding and using it routinely. Wenger and his colleagues (1989) found disaster response organizations often spoke of IMS. However, they rarely actually used it. A Task Force of the Council on Foreign Relations (Rudman, 2003) studied first-responder capabilities. They found, although use of an IMS would promote successful outcomes and save responder lives, few municipal fire and police departments use the systems except on very large incidents. Brunacini (2002) argues that an IMS not used in routine incidents is useless. It is rarely rehearsed. It will be difficult to implement in stressful major incidents. Some of the lack of use stems from misunderstanding of the principles of IMS and how it fits into a jurisdictional disaster and emergency management system.

IMSs of all types are used to ensure effective execution of EOPs. They are designed to accommodate response flexibility. Flexibility is needed to address challenges posed by the changing environment. Few planners are first responders (direct IMS *users*). They may be less clear about the structure and use of IMS. There are two fundamental principles for IMS. First, the local response structure must be flexible enough to readily expand as additional resources are added to meet the demands of an escalating event. Second, the IMS used to respond to everyday emergencies is likely to form the basis of an expanded structure to deal with disasters. The aim of all IMS is to rationalize and organize responders while integrating preplanned resources into the response.

12.2.1 Evolution of the IMS

Historically, incident command procedures have been both region-specific and sometimes unique to specific agencies or disciplines. The fire services have adopted the principle that fire departments need a common IMS to increase the effectiveness of response. This problem was strongly felt during the early 1980s in southern California, where large wildfires routinely required coordinated response by many agencies from many jurisdictions. With funding from FEMA, the FIRESCOPE (Firefighting Resources of Southern California Organized for Potential Emergencies) was formalized. **FIRESCOPE** was an emergency response system that incorporates both planning functions and the functions of an EOC for wildfires.

FIRESCOPE was tailored specifically to large-scale incidents. It was also tailored to the structure of southern California fire services. The basic system was very popular and promising. However, it was only used on large, multijurisdictional incidents. With support from the National Fire Protection Association (NFPA), Phoenix (Arizona) Fire Chief Alan Brunacini (1985) adapted and enhanced the FIRESCOPE system so that it could be used as easily in small events as in large ones. Brunacini changed the command function to include specialized advisors. He expanded the operations function to include routine departmental response demands. He also included connections to a municipal EOC and to police incident commanders. This revised structure was called IMS. A major advantage of Brunacini's work is that IMS can be used on all incidents. This is done so daily use will enhance the effectiveness of the system when it is used during infrequent large-scale incidents. In 2000, the IMS was recognized and recommended by the NFPA through its standard setting process. IMS is now widely used in the American, Canadian, British, and Australian fire services (Buckle et al., 2000). For more than a decade, the Oklahoma State University Fire Services Program and the National Fire Protection Association have provided IMS instruction in the United States and internationally.

A principal aim of IMS is to make all resources of the jurisdiction potentially available for every incident. This is true whether it is a routine emergency or a major disaster. The IMS is the basic structure into which outside resources are integrated when disaster demands outstrip a jurisdiction's resources. Effective preplanning permits all resources to be provided automatically from a central dispatch. This is done as the response escalates to meet the Incident Commander's assessment of demands. The IMS itself is a field structure designed to marshal resources at one or more impact scenes. It may or may not be supported by activation of a jurisdictional EOC. This depends on the size and complexity of the event. The advantage of using the local IMS as the basis for response lies in its ability to quickly initiate and effectively expand emergency operations.

12.2.2 IMS in Jurisdictional Perspective

IMS is typically used with a single event, in an identifiable geographical area. This is consistent with the evolution of the IMS as a means of organizing resources for the use of an IC. This is why it appealed to fire, police, and emergency medical personnel. Most of the work of emergency planners is more global. It focuses on hazard vulnerability, planning, facility/equipment acquisition, training, and exercising. These activities are part of the broader preparedness program that identifies the demands the IMS must address and the resources available to it.

Wide-scope disasters involve extensive impacts that cause the focus on response to shift from a geographic scene to the jurisdictional EOC. Disasters can involve multiple-impact locations, progressive onset, or the use of many response agencies across a wide impact area.

- ▲ **Unified command** is a NIMS term to capture the involvement of many agencies in an EOC at an incident with a single scene.

- **Area command** is the NIMS term to describe the situation where an EOC collects multiple agency (function) representatives when coordinating operations at multiple scenes or when no single scene exists.

Emergency managers and planners typically reside in the EOC during disasters. Because the EOC can be organized along the same functional lines as the IMS, it is in this setting that the emergency managers use the IMS. The goal remains the same as the IMS in the field. The goal is to deploy the resources and personnel needed to abate the hazard and manage the impact.

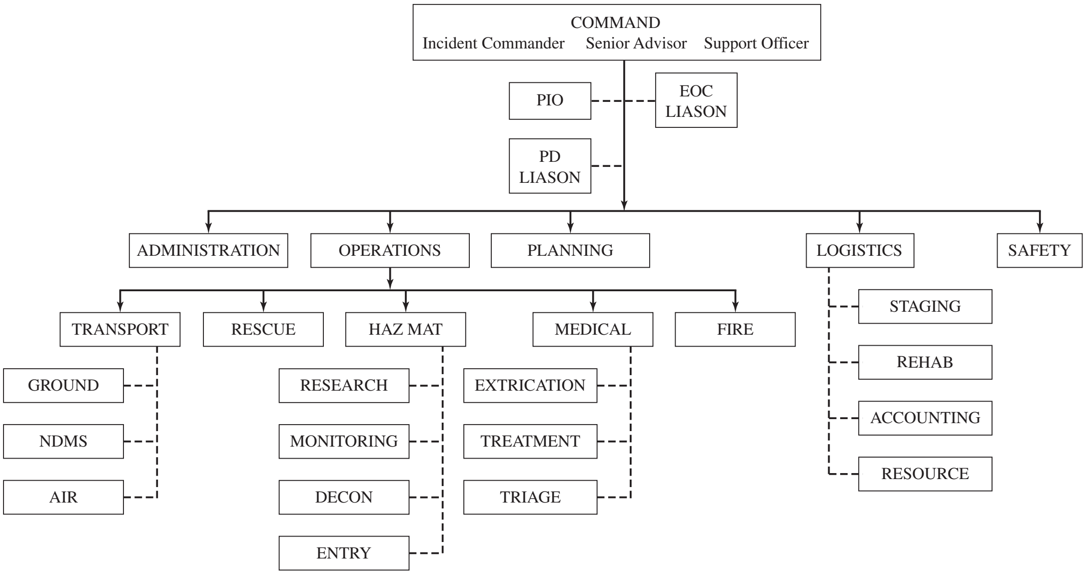
12.2.3 Elements of the IMS

The IMS is function based. It is not agency or responder-identity based. Concern is with activities such as search and rescue, evacuation, hazardous materials identification, shelter provision, fuel supply, and similar *functions* needed in a variety of disaster settings. The unity of command under an overall IC makes the question of which agencies or personnel perform functions less important than the accomplishment of the task itself. Another advantage of the IMS lies in its adaptability to incidents of any size, scope, and nature. It functions equally well for events precipitated by fire, medical emergencies, weather, hazardous materials, or other demands. It applies to small, routine incidents as effectively as large, complex, multi-jurisdictional incidents. The effectiveness and efficiency of IMS depends on four factors:

1. There must be accurate assessment of agent- and response-generated demands for the range of threats likely to be faced. Some assessment comes from preplanning. An Incident Commander is responsible for continuous identification of threats and reassessment during the course of the incident.
2. The IMS assumes the presence of a cadre of technically trained and adequately equipped response personnel. These personnel might be present at an incident scene, available on call, or located in an EOC.
3. Emergency response resources appropriate to the threat must be identified and located. They are usually assembled in centralized locations.
4. The jurisdiction must have a centralized location for deploying resources to one or more scenes. In emergencies, this is usually achieved by a dispatch center, whereas in disasters, this function is overseen by the EOC.

Within these assumptions, the IMS is built around responsibilities of the IC. Any qualified responder may assume the IC role. In practice, the IC is usually the first arriving fire department company officer or a first arriving police supervisor. The philosophy is that there must always be one (and only one) IC at every

Figure 12-4



A filled-out Incident Management System (IMS).

incident scene. It is the duty of arriving command officers to assume command. Figure 12-4 shows a filled-out IMS structure. This might be used in disasters, large fires, or terrorist incidents.

The IMS structure begins with the assumption of command by an officer. It grows as the IC addresses the incident demands. The organizational structure of the IMS derives from two types of demands. First, there are demands of the hazard agent. Second, demands are created by the emergency response organization. For example, the commitment of firefighters to fire suppression requires equipment and supplies or the rescue for endangered responders.

The structure of the IMS uses the terms sections, branches, and sectors to describe different sized functional groupings of personnel, equipment, and apparatus/vehicles. NIMS ICS uses the terms division and group as a replacement for what is called a sector. NIMS ICS specifically limits the number of branches under a section to a maximum of five. It limits the number of divisions or groups under a branch to not more than 25. Although these limits don't explicitly exist in fire services IMS, there are rules to remind an IC of the concept of adequate span of control. In IMS, it is difficult to imagine the circumstances where an incident commander would allow a branch chief to attempt to command more than five sectors.

Command is shown in Figure 12-4 with five sections directly attached to it. A section is the largest functional grouping, located nearest the incident command officers. These five sections operate as appropriate to the incident size and conditions and include Administration, Operations, Logistics, Planning, and

Safety. NIMS ICS does not explicitly identify a Safety Section, although safety is addressed in discussion, and on NIMS organizational charts safety is shown as a function appended under Command. Branches are established under sections and represent functional tactical areas relevant to each section. Figure 12-4 shows five branches under operations: Fire, Rescue, Hazardous materials, Medical, and Transportation.

Branches are named according to their functions, and the number of branches depends on the functions required in the incident. The IMS for an urban earthquake would include a Heavy Rescue Branch, whereas the IMS for a hazardous chemical leak would include an Evacuation Branch. Sectors are defined beneath branches and execute very specific tasks. Typically, sectors contain units such as fire companies, public works barricade teams, bomb squads, or other special teams. The choice of defining a function as a branch or sector depends on the size, geographic scope, and number of distinct incident demands. In small hazardous materials incidents with few victims, the Medical Branch might involve a single unit and be called a Medical Sector. In events where there is no fire, Fire Branch would not exist. This flexibility in the IMS allows it to accommodate complex situations. It allocates responsibility for response strategy, tactics, and tasks based both on preplanning and real-time incident assessment.

Each of the units or groupings defined the IMS has its own internal structure. Command is vested in the IC who, under traditional IMS, may be assisted by a Support Officer and Senior Advisor. The Incident Commander first assumes command and establishes a Command Post. Following this, and throughout the incident, the IC performs the following functions:

- ▲ Conducts initial situation evaluation and continual reassessments.
- ▲ Initiates, maintains, and controls communications.
- ▲ Identifies incident management strategy, develops an action plan, and assigns resources.
- ▲ Calls for supplemental resources, including EOC activation.
- ▲ Develops an organizational command structure.
- ▲ Continually reviews, evaluates, and revises the incident action plan.
- ▲ Provides for continuing, transferring, and terminating command.

Through these duties, the IC builds and maintains the strategy and resources required to manage the scene.

The Support Officer and Senior Advisor each review, evaluate, and recommend changes to the incident action plan. NIMS ICS does not appear to explicitly include these two roles by these names. However, discussions of Unified Command available from the NIMS Integration Center do describe these functions. The IMS Support Officer addresses tactical priorities, critical factors, and safety. This person creates tactical plans for control and accountability, evaluating the viability of the response organization, and ensuring a manageable span of control. The IMS Support Officer also evaluates the need for additional resources at the scene. The Senior Advisor is concerned with overall incident management. This person evaluates the need to adapt the incident organization through changes in branches or sectors. The Senior Advisor also evaluates the need for liaison functions with other departments, outside agencies, public officials, property owners, tenants, and other parties affected by the incident. In most jurisdictions, Command is supported by an on-scene Public Information Officer (PIO), a liaison to law enforcement or public works command posts and a liaison to the EOC. The goal of an articulated Command is to spread the functions to specialists where possible, promote effective communication with responders on-scene and emergency management authorities off-scene. This permits the Incident Commander to concentrate on the incident itself.

The Public Information Sector deals with mass media and provides standardized information reports needed to accurately describe the situation. The PIO directs the sector. The PIO establishes a media area that does not impede operations. The PIO gathers information about the incident. NIMS ICS establishes a Joint Information Center (JIC). The JIC establishes policies, procedures, and protocols for gathering and disseminating information. It appears that the NIMS JIC is equivalent to the public information function at an EOC. A formal JIC at an incident scene would be difficult to manage without interference to incident command and operations. Thus, traditional IMS requires the on-scene PIO to coordinate with the EOC PIO (and PIOs for other responding agencies) to ensure consistent, accurate information dissemination and to avoid release of potentially sensitive information. In complex incidents, especially WMD terrorism incidents, Command assigns a Police Liaison as a formal link with the Police Command Post to ensure the quality of joint or unified command at the scene. The Police Liaison deals with all activities requiring police-fire coordination including, but not limited to, traffic control, crowd control, scene security, and evacuations. The PIO also deals with crime scene management in terrorist incidents.

The remainder of the IMS chart is composed of sections, branches, sectors, and task units. In both IMS and NIMS ICS, sections operate in the on-scene command post at the strategy level. In NIMS lexicon, only those in command of a section are called “chief.” NIMS ICS (DHS, 2004b) appears to explicitly assign a particular and fixed number of *units* below each section. For example, in the Planning Section, NIMS ICS demands units for resources, situation, demobilization, documentation, and technical specialists. There are at least two possible interpretations of these NIMS ICS requirements. First, these might simply be the functions that the section is responsible to oversee. Moreover, it is implicit that there may be other functions. These functions will be carried out in branches or sectors by individual teams. This interpretation is consistent with fire services IMS. Another interpretation is that DHS intends these units to be fixed functions for every incident and that they will be organized as NIMS ICS branches or groups or divisions by the Incident Commander. This interpretation is quite constraining and not particularly realistic in terms of disaster operations. It is not possible to unequivocally distinguish on the basis of the written documentation which interpretation was intended by DHS. The present discussion of IMS will use the first interpretation. The NIMS *units* will be treated as functions for personnel at the section (strategy level) and if appropriate can be assigned to branch or sector personnel (tactical and task levels).

The Administration Section (called Finance/Administration in NIMS ICS) focuses on procurement, cost recovery, liability, and risk management. The Planning Section is charged primarily with technical liaison, forecasting incident demands, and serves as the "clearinghouse" for information. In a major hazardous materials incident, this function is particularly critical. Specialized information from a variety of specialists (toxicologists, physicians, chemists, etc.) flows to the scene. The Planning Section becomes the voice of these numerous sources to Incident Command.

The Logistics Section is the support mechanism for the incident response organization. This section oversees four critical functions: staging, accountability, rehabilitation, and resources. It is important to remember that the IMS provides flexibility in response by activating and staffing sectors based on incident demands, not preset criteria. Staging oversees the initial arrival and deployment of resources at the scene. Accountability refers to tracking the units and individual crews participating in an incident to ensure their safety. Rehabilitation is responsible for monitoring and care of deployed personnel, including physical and psychological condition. This sector uses specialized equipment and also provides food, fluids, and debriefing for personnel. Finally, the resource sector oversees all equipment and apparatus, provides communications equipment, and handles repairs and resupply. Resource would be responsible in terrorist incidents for supervising the movement of antidotes, other pharmaceuticals and medical supplies, and equipment to the scene.

The Operations section deals directly with all operational activities at the incident site. A critical duty of the Operations Section is to establish branches that accomplish specific tasks to meet incident demands. As many branches as needed are created under IMS. NIMS ICS specifies a maximum of five branches (without explanation). Branches typically include primary operational functions: fire, rescue, hazardous materials, medical, transportation, and evacuation. Fire Branch is charged with the management and suppression of fires and, as appropriate, operates sectors. Rescue branch is charged with search and rescue and extrication of responders who become lost, trapped, or endangered in the incident. Evacuation branch coordinates the movement of citizens from vulnerable areas adjacent to the scene. Hazardous materials branch typically houses four sectors representing principal functions of research, monitoring, decontamination, and entry. In a terrorist incident, this branch would address critical response priorities and performs agent identification, designation of hot, warm, and cold zones, and also coordinates with law enforcement resources for site access control and special services. The entry sector is responsible for hot zone entry. Although emergency decontamination of victims may begin with the first units on scene, the hazardous materials branch establishes specialized decontamination lines and equipment and performs technical decontamination.

The medical branch coordinates the activity of sectors and/or units to address extrication, triage, and treatment of patients. The extrication sector is responsible for locating and removing trapped or nonambulatory patients to treatment areas. Triage refers to making the initial assessment of patient conditions and treatment needs. This function may be performed before, simultaneously with, or after decontamination in hazmat incidents, depending on the nature of the hazard agent. The toxicity of the agent determines victim assessment and in the case of nerve agents, the timing of the administration of antidotes. Similarly, contingent on the agent, antidote administration may be appropriate at the earliest moment. In such cases, treatment and extrication personnel with appropriate PPE would begin administration prior to or during mass decontamination.

The behavioral/mental health function usually operates as a sector under the medical branch. The on-scene behavioral health coordinator works through the branch officer while maintaining liaison with the planning section and the EOC, if the latter has been activated. Behavioral health units, with appropriate PPE, may oversee and assist patients awaiting decontamination, during the decontamination process, in treatment and transportation, and possibly in mass care facilities or hospitals.

The transportation branch can expand to multiple sectors, depending on incident demands. Two sectors are usually established in different directional movement points for ground transportation to local hospitals or mass care facilities. This movement may involve different vehicles as appropriate to patient needs, including buses for uncontaminated or decontaminated "walking wounded," as well as ambulances or other emergency vehicles. The Air Sector moves patients by rotary wing craft if needed by the patients and safe, given the hazard agent involved.

Safety is the fifth section in the standard IMS and an assigned responsibility under the incident commander in NIMS ICS. The safety officer is responsible for managing safety at the incident. A large part of this work is creating and implementing plans for rescue, scene safety practice, and environmental mitigation following operations. Safety section monitors reports from safety officers in different scene locations and reports progress to command. If safety observers uncover a pattern of unsafe practices, the Safety Officer is usually vested with the authority to stop operations at a scene.

12.2.4 Revisiting the IMS

The IMS and NIMS ICS form flexible structures for organizing emergency response. The value of understanding the IMS lies in the relationship between EOPs and emergency operations. To adequately plan for a threat, the structure used to address threats at the scene must be taken into account. The IMS and NIMS ICS reflect and direct the capabilities of the organizations responding to the emergency. Because of this, emergency planning that accounts for the local IMS have a greater likelihood of being successfully implemented in the field. The system of IMS functions is largely compatible with NIMS ICS. A grasp of one ensures a grasp of the other. NIMS ICS, however, is used by an unknown number of professional groups, organizations, and agencies. Some time will pass before NIMS ICS is uniformly implemented throughout the country.

It is critical for you to understand that the community's IMS and its EOC must be designed to work together. In small-scale emergencies, the IMS gathers and controls needed resources at a scene. As the incident demands escalate, response-generated demands increase substantially. The EOC must be activated to support operations at the incident scene. Whether one or more incident scenes exist, on-scene operations are best commanded there, not from the EOC. The EOC performs a more direct command role in slow developing or diffuse scope of impact events. This is especially in incidents with no identifiable scene or those requiring operations at many scenes simultaneously. Even in these cases, however, EOC Command does not run scene operations. Instead, it assumes responsibility for overall incident strategy and tactics.

FOR EXAMPLE

Hurricane Katrina in New Orleans

On August 29, 2005, Hurricane Katrina struck New Orleans. The city's protective levee system failed, causing flooding in 80% of the city. The city's evacuation plan failed to provide for the transit-dependent population. Many people were left in the city. In the immediate aftermath, the city's ICS failed in part because first responders were not available and because those that remained had severely impaired communications. Local emergency assessments, emergency response, and care for citizens virtually ground to a halt.

SELF-CHECK

- Why is it likely that many forms of IMS/ICS will coexist with NIMS ICS for years to come?
- If IMS is to be successfully used in your jurisdiction, what four primary conditions must pre-exist?
- What does the IMS Logistics Section accomplish during incident operations?
- Because emergency planners rarely use the IMS themselves, why should they have to understand it?

SUMMARY

As an emergency planner, you must use two structures to manage emergencies on the ground: the emergency operations center and the incident management system. Generically, the goal of both EOC and IMS is the same: to ensure that all the talent, equipment, and resources that can be marshaled by the jurisdiction are optimally used against the disaster agent. The EOC uses a jurisdiction wide view of the incident needs. It takes into account whether there are many operational scenes or none. You must evaluate how the EOC works. You must design an EOC by using sound principles. The EOC is also the node that connects disaster operations in the jurisdiction with government, private sector, and nonprofit resources inside and outside the jurisdiction. Many EOCs may simultaneously operate during very large-scale disasters and catastrophes. The IMS focuses on disaster operations at a single scene. IMS command—the IC, Senior Advisor, and Support Officer—formulate, direct, and adapt the incident action plan. To allow IMS command to focus on the agent-generated needs, sections operate for Planning, Administration, Logistics, Safety, and Operations. You must evaluate conditions when the IMS operates with and without the EOC. Knowing how to best use the EOC and IMS together will enhance your plans and ensure that emergency response will be effective.

KEY TERMS

Adjacency Matrix Matrix that describes the physical proximity needs that stem from access team needs among EOC sections.

Area Command The NIMS ICS term to describe the situation in which jurisdictional EOC coordinates operations at multiple scenes or when no single scene exists.

EOC Administration Section	EOC section that addresses legal issues, mass care for victims, and liaison with agencies outside the immediate jurisdiction.
EOC Coordination	The series of actions that assesses agent- and response-generated demands, gathers demand-relevant resources and deploys those resources efficiently and effectively.
EOC Logistics Section	EOC section dedicated to supporting scene operations with food and supplies, fuel and equipment, facilities and transport, and communications.
EOC Operations Section	EOC section that serves as the principal liaison with incident scenes and controls operations from the EOC in disasters without a scene.
EOC Planning Section	EOC section that executes the planning function for the incident, manages risk assessment data, forecasts likely agent and response demands, and manages the display of data and consequence analyses.
FIRESCOPE	An emergency response system that incorporates both planning functions and the functions of an EOC for managing wildfires.
Unified Command	NIMS term for the collection of representatives from many agencies in an EOC where there is a single scene.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of the basics of the structures for managing emergency response.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. The jurisdictional EOC and a Command Post are the same structure. True or False?
2. Safety is a section in traditional IMS but not in NIMS ICS. True or False?
3. The EOC Section responsible for assembling, interpreting, and alerting the IC of issues derived from incident assessment data is:
   (a) Administration
   (b) Logistics
   (c) Planning
   (d) Operations
4. Unified command refers to the situation where many representatives of response organizations are assembled in an EOC managing multiple scenes over a given geographic area. True or False?
5. The most serious problem facing emergency managers is not the availability of incident management systems but getting jurisdictions to regularly use the systems. True or False?
6. Three roles make up command in traditional IMS: the IC, Senior Advisor, and Support Officer. True or False?
7. The first step in creating an EOC is:
   (a) analyze the EOC organization.
   (b) eocument the EOC design basis.
   (c) establish an EOC team.
   (d) assess environmental conditions.

Review Questions

1. What is an EOC and how is it different from a command post?
2. What are the six principal functions of an EOC?
3. What is the incident management system and what functions does it serve?

Applying This Chapter

1. As a LEMA planner in Daylight, Tennessee, you have to take on multiple responsibilities. One of those is handling training for fire department volunteers in incident management systems. All the textbooks and U.S. Fire Administration Manuals teach traditional IMS. But the LEMA Director worries that NIMS ICS should also be covered. How are the traditional IMS and NIMS ICS related? Are there good reasons for an emergency planner to know both systems?
2. The Los Angeles City Manager's office has designated a Deputy City Manager to serve as the office representative to the EOC during disasters. You have been briefing the Deputy—who has never been exposed to emergency operations anywhere—on different roles in the emergency response organization. How will you explain the role of Incident Command under both IMS and NIMS ICS?
3. The Tempe, Arizona, EOC is state-of-the-art. The alternate EOC has been in the same building for several years, however, and needs updating with some enhancements. In your budget request to the City Manager for an improvement budget, why will you say it is important to maintain an alternate or backup EOC?

YOU TRY IT

Selecting an Alternate EOC

You have been assigned to lead a team that will select a new secondary EOC for your jurisdiction. The LEMA director has given you a list of 11 buildings owned by the city where space can be made available for a backup EOC. No decision has been made on whether the EOC facility will be fully equipped or designed for hasty implementation. What issues will you consider in choosing a site from among the 11 alternatives?

Supporting Private Emergency Plans

You have been assigned to review the on-site emergency response plan for a large chemical firm in your community. The plan creates decontamination teams, medical teams, pipe and container repair teams, and extrication teams. There appears to be no specific command structure for operations. How would you help the company planner adapt a basic IMS structure to organize the company response?

Public Information Challenges

You are advising a small jurisdiction located about 5 miles from your large jurisdiction. The planner in the small town has gotten the fire and police departments to adopt IMS for every call that cannot be handled by a single unit. But they can't afford to place a dedicated public information officer at every scene where IMS is used. They do have a good EOC. What suggestions can you give your colleague about how the EOC might be used to disseminate public information? Does the EOC have to be fully activated to fulfill this function?

13

SELECTED FEDERAL EMERGENCY PLANNING MANDATES

Balancing Local Needs with Federal Requirements

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of federal emergency planning mandates.
Determine where to concentrate your efforts.

What You'll Learn in This Chapter

- ▲ The nature and enforcement mechanisms for federal emergency planning mandates
- ▲ The importance of disaster impacts as focusing events in the genesis of policy initiatives
- ▲ The importance of inter-governmental relations for large-scale emergency management policy success
- ▲ The history and success of hazardous chemical policy in the United States
- ▲ The origins and success of national policy initiatives to combat terrorist threats
- ▲ The emergence and goals of the National Incident Management System (NIMS)

After Studying This Chapter, You'll Be Able To

- ▲ Define the aims and components of the National Response Plan (NRP)
- ▲ Specify the requirements for Local Emergency Planning Agency (LEMA) compliance with NIMS
- ▲ Ensure the local incident management system (IMS) is capable of interface with NRP resources
- ▲ Describe goals and concept of operations for Metropolitan Medical Response System (MMRS)
- ▲ Delineate the policy objectives and organization of the Urban Areas Security Initiative (UASI)

Goals and Outcomes

- ▲ Evaluate the structure and function of Local Emergency Planning Committees (LEPCs)
- ▲ Implement planning requirements under SARA Title III legislation
- ▲ Detail the components of NIMS and evaluate their likely impacts on LEMA operations
- ▲ Evaluate local training and certification needs under NIMS
- ▲ Assess local support needs for NRP emergency services functions
- ▲ Evaluate the avenues available to LEMAs for contacting the NRP Joint Field Office
- ▲ Assess and enhance local and state intergovernmental ties for enhanced response capability

INTRODUCTION

Through legislation, Executive Orders, Presidential Decision Directives, and administrative rule making, the federal government has the power to direct state and local governments to initiate emergency planning processes and generate emergency plans. Prior to 9/11, there were only a few such mandates. These were principally linked with civil defense planning, nuclear power plants, the Clean Air Act, Metropolitan Medical Response Systems (MMRS), and the Emergency Planning and Community Right to Know Act. Since 9/11, the federal government has been developing frameworks that bridge all governments. Emergency management professionals have long expressed concern that local agencies should develop plans, use incident management systems (IMSs), and create emergency operations centers (EOCs). The 9/11 attacks brought tremendous visibility to these needs. The Federal Emergency Management Agency (FEMA) and later the Department of Homeland Security (DHS) have responded to these needs by creating a centralized system to control response processes.

There has been little research, but much argument, about models for emergency management and planning. Arguments stem from the general nature of many approaches to policy for management. There are also difficulties in systems using these approaches. Dynes (1994) looked at methods that preserve higher levels of flexibility. Many researchers have noted specific policies and progress in emergency management. Sylves (1991) argues that many policy problems arise from institutional challenges created by intergovernmental relations. He concludes that uneven implementation of response frameworks stems from:

- ▲ Difficulty in obtaining a professional consensus regarding appropriate or effective planning and response models
- ▲ The weak institutional status of emergency management agencies (especially at the national level)
- ▲ The fragmentation of disaster responsibilities across many agencies and programs at each level of government
- ▲ The weakness of political constituencies that advocate improved emergency management
- ▲ Severely constrained national, state, and local budgets for emergency planning and response

Sylves points out the lack of direction and funding. These are the bases for lack of action and stagnant policy. Yet the turbulent emergency management environment since 9/11 arose from this uncertain policy direction and from an increase in funding for emergency management (Task Force on State and Local Homeland Security Funding, 2004). Federal attempts to have consistent planning and response models have created an environment with a “top-down” flow of communications and requirements (Tierney, 2005).

The 9/11 attacks provided a **focusing event,** an incident that brought into the public and government spotlight certain aspects of emergency management policy (Birkland, 1997). The system was reviewed at a policy level. Many pre-existing weaknesses and the response challenges linked with 9/11 became salient to policy makers (Smithson and Levy, 2000). This event marked a **window of opportunity;** a period of time where political will to change, the funding for change, and a continuing threat all coincided (FEMA, 2002). The 9/11 attacks created the window of opportunity in which the DHS was created in 2003. The DHS absorbed FEMA and other agencies. It also oversees a variety of programs from other executive departments, including Health and Human Services, Energy, Commerce, Defense, Agriculture, Interior, Treasury, and Justice. The DHS provides a central structure for defining federal rules and plans. Its budget gives the agency clout to impose those rules. Its mission has three goals: prevent terrorist attacks, reduce exposure to terrorism, and minimize the damage and recover from terrorist attacks (Bush, 2002). The DHS also retains the "all hazards" duties carried by FEMA. However, many have expressed doubt about the DHS giving resources to non-terrorism issues. The U.S. General Accounting Office (USGAO, 2005a:1) found that the DHS has directed that the "majority of first responder grant funding be used to enhance capabilities [related to] terrorist attacks."

The DHS faces challenges to its ability to fulfill all of its duties (USGAO, 2003b). Much of the concern is linked to the DHS's ability to implement policies (Office of the Inspector General, 2004). There is also policy uncertainty about how to involve law enforcement in the response to terrorist incidents (Waugh, 2004). Perhaps the most important point regarding federal efforts at terrorism and emergency management is that they do not take full advantage of existing emergency management knowledge and structures (Tierney, 2005). This includes structures developed and funded by federal agencies before 2001. Similarly, terrorism has been researched for decades (Jenkins, 2001). Various terrorist threats to nuclear facilities, as well as the terrorist use of radiological devices, biological agents and chemical agents, have likewise received serious government attention in the past (Tierney, Lindell and Perry, 2001). The GAO (2005a) notes that the DHS must focus on management efforts. The DHS must also connect current policy with past knowledge and existing programs.

The DHS and FEMA's poor showings during Hurricane Katrina reveal that the federal environment for emergency management remains turbulent. This increases the likelihood of strategic uncertainty. However, there is a trend toward more federal influence in local emergency management. The DHS has guidelines for local agencies that define appropriate capabilities (DHS, 2005b). It also outlines a "universal" list of tasks that local agencies should be able to execute (DHS, 2005a). The National Response Plan (NRP) addresses state and local access to federal resources. The National Incident Management System (NIMS) specifies local planning, incident management, and resource practices. In 2003, the Urban Area Security Initiative (UASI) was added to the 1997 Metropolitan Medical

Response System (MMRS). Such federal mandates are being enforced through legislative and administrative rule-making, incentives, and financial support arrangements. There is no research that measures the success of these attempts to influence local planning and response practices (USGAO, 2004c).

Federal interventions present real—and largely enforceable—demands upon local jurisdictions. These programs represent only a fraction of federal programs funding local emergency management. There are both pre- and post-9/11 programs. These support a wide range of purposes (National League of Cities, 2002). Programs also exist outside DHS. For example, there are the biological threat plans supported by the Centers for Disease Control and Prevention, the Environmental Protection Agency and the Nuclear Regulatory Commission. Since 2003, the U.S. Conference of Mayors (2004b) has been closely tracking 10 preparedness programs. Two classes of programs have been selected for presentation here: Centralized planning/response initiatives and terrorism response systems. It is not possible to catalog all programs that fall into these two categories. The federal program environment changes often. Many programs are not clearly linked to state and local actions (Tierney, 2005). Five programs are discussed here because of their large size and scope, their direct impact on local disaster planning and operations, and their potential budget impacts on local governments. Although the programs are at significantly different stages of implementation, our discussion will examine the intent, background, and function of each.

13.1 Centralized Planning and Response Initiatives

Centralized planning and response plans seek to structure local government planning practices. One of the oldest programs is the plan required under the 1986 Emergency Planning and Community Right to Know Act (EPCRA, also known as SARA Title III). SARA Title III requires the creation of State Emergency Response Commissions (SERCs) and Local Emergency Planning Committees (LEPCs). These groups oversee planning efforts for toxic chemicals. The NIMS is also a centralized program that requires state, local, and tribal governments to adopt specific response planning practices. The NRP centrally defines resources available to state, local, and tribal governments.

13.1.1 SARA Title III

SARA Title III (STIII) directs the management of hazardous materials. STIII has two main tactics for reducing chemical accidents. First, it mandates that industry share data on the extremely hazardous substances (EHSs) produced or in storage. Second, it requires each state to create a SERC and LEPCs to receive, evaluate, and act upon that data. This data is available for community vulnerability assessments. These show the potential health and safety impacts of chemical releases. The data can be used to select hazard mitigation measures and to identify emergency response needs. Under STIII, LEPCs serve as the focus of local government's efforts to prepare response plans. LEPCS submit plans to the SERCs. These plans are annually updated. LEPCs inform citizens about these plans and the hazards.

Policy Context

STIII was intended to enhance community management of chemical accidents (Fire, Grant, and Hoover, 1990). This included assessment, threat monitoring, mitigation, and preparedness. Few of STIII's provisions were new. Bierlein (1987) reported that compliance needs arising from five major pieces of legislation—the Hazardous Materials Transportation Act, Clean Water Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, and Occupational Safety and Health Act—collectively addressed the same issues. And some states already required disclosure of hazardous materials (Sherry and Purin, 1987). Planning councils and fire departments were required to have contact with local industry to support response planning (Leesak, 1999). At the time STIII was passed in 1986, however, these activities were not widely adopted across the country.

STIII represented a departure from the norm. Most funded programs in the mid-1980s were those for nuclear risks. STIII differed from these efforts in its *degree of regulatory decentralization*. STIII leaves the hazard assessment process to local agencies. Under other programs, assessment was mostly done by federal agencies.

STIII encouraged locals to engage risk reduction. Under the nuclear attack program, community-level planning was very centralized. Federal planners chose communities to be evacuated, communities to host evacuees, and the tactics of the movement (Lindell, 1994). Local efforts also tended to be centralized and isolated within a Civil Defense Director's office (Perry, 1982). However limited the program was in terms of its planning process, it did provide federal funding for local planning activities. Nuclear power plant emergency response plans also were funded by sources external to the community. The push for such funding lay with the federal licensing requirements.

STIII did not create a means for federal control of vulnerability analyses. It did not allow for federal evaluation of local preparedness. And it provided no explicit funding incentives for LEPCs. For some, minimizing federal control was the only feasible path. EHSs are found at thousands of facilities. These facilities are spread within communities. They are technologically diverse in terms of process and sophistication. Many have very limited financial resources. Also, local governments differ in terms of population, resources, and administrative structures. Under these conditions, a federally centralized plan for toxic chemical hazards was logistically infeasible.

The approach under STIII involved federal agencies in vulnerability assessments. Federal authorities provided guidance for finding the vulnerable zone for each toxic chemical plant (USEPA, 1987). This contrasts with the federal rule assignment for a 10-mile zone at all nuclear power plants (USNRC, 1978). STIII allowed local governments to create response plans as long as federal planning targets were observed (National Response Team, 1987). Local authorities set the level of spending based on their risks and resources. The law only provides sanctions for plants failing to disclose EHSs onsite or failing to notify authorities of a release (USEPA, 1993).

Program Demands

STIII asks that local authorities use industry's data in an assessment of risk. It also requires that they use this data to select hazard management strategies. In 1986, local governments lacked the skills and resources to meet either demand (May and Williams, 1987). STIII required investments of time and effort, specialized knowledge, and resources (Mickunas, Kansal, and Turpin, 1995). Practical hazard assessment is feasible only if specialized knowledge can be transferred from industry to local authorities.

STIII challenges local governments. Research shows that disaster planning is a low priority for local government (Schneider, 1992). Local government must have a broader strategic choice than the development of plans required by STIII. In effect, four choices were available to authorities: (1) pressure local industry to invest in safer processes, (2) spend local funds on getting response resources, (3) bear the short-term economic loss of driving away an industry that produced jobs and added to the tax base, or (4) simply accept the long-term risk of an accident.

STIII also had standards for LEPCs. Diversity within LEPCs influences whether management choices reflect community values. Diversity in LEPC activities offers a continuing forum for addressing community conflicts over management. By making latent conflicts manifest, the LEPC can generate superior solutions to conflicting needs. Diverse representation on an LEPC enhances public perceptions of legitimacy. And it gets attention to LEPC activities from the community at large. These features, in turn, can enhance community support. This can overcome the lack of priority given to disaster planning by elected and appointed officials.

STIII Outcomes

There are no comprehensive studies of STIII outcomes. Thus, one must define expectations and locate relevant research to assess success. STIII mandates that industry disclose presence of EHSs. It demands that SERCs and LEPCs be created. LEPCs should prepare and submit emergency response plans. LEPCs must also achieve diverse representation and engage the public.

▲ The goal of industry disclosure has not been completely achieved. Malich et al. (1998) reported high levels of industry compliance in America. Baram, Dillon, and Ruffle (1992) reported complete voluntary compliance in a case study of eight large U.S. chemical companies. Lindell and Perry (2001)

found that actual counts of industry compliance with LEPC reporting demands were very high in Illinois, Indiana, and Michigan.
The national sample analyzed by Adams et al. (1994) indicated that identifying non-reporting firms is a high priority for LEPCs. However, 29% of all LEPC chairs felt reporting should be improved.

- ▲ The requirement to create SERCs and LEPCs has been successful. All states have formed SERCs and LEPCs (Finegold and Solyst, 1994). Thirty-one states have established counties as the focal home for LEPCs. But other geographic definitions of scope have also been adopted. One state has a single statewide LEPC. Four states have regional LEPCs. Four states in New England have implemented LEPCs at the township level. No data were available on the remaining states.
- ▲ LEPC compliance with the requirement to prepare and submit response plans to the SERC varies widely. The statistics from the National Governors' Association show that LEPCs in more than half of the states have submitted plans. Finegold and Solyst (1994) found that 22 states reported that all LEPCs had submitted plans to their SERC. And 16 states reported that some LEPCs had submitted the required plans. Adams et al. (1994) found that 35% of all LEPCs could be classified as mostly compliant. Another 44% were fully compliant. Many LEPCs have *exceeded* the STIII minimum requirements. Kartez (1992) reported that nearly half of the LEPCs studied had updated their plans. They had also calculated vulnerable zones more frequently than required. Adams et al. (1994) found that almost two-thirds of the LEPCs had taken many proactive steps not explicitly required by the law.
- ▲ STIII explicitly requires that LEPC membership represent 13 different groups. It should include citizens' groups, health and social service organizations, and public safety agencies, among others. Data on LEPCs show that diverse representation has been achieved. Adams et al. (1994) stated that 12 of 13 types of organizations were represented on more than 50% of the LEPCs. Rich, Conn, and Owens (1993) used a national sample to confirm that LEPCs have diverse memberships. Lindell and Meier (1994) documented that more than two-thirds of LEPCs in Michigan, Illinois, and Indiana had diverse memberships.
- ▲ STIII's goals for promoting public dialogue appear slimly met, if at all. Kartez (1992) showed that less than half of the LEPCs had input from *any* community group. Baram, Dillon, and Ruffle (1992) reported that the LEPC was an effective bridge for dialogue between industry and officials. However, citizens were absent from the LEPC. Citizens also expressed disinterest. Lindell and Perry (2001) found that LEPC members view public information and outreach to be important. However, outreach activities appear to be very low. These activities are also met with indifference by the public.

Lessons for Emergency Planning

The research on LEPCs has implications for several persistent issues that confront emergency planners. There are at least four myths that arise in the policy arena. These serve as barriers to emergency planning. These apply mostly to planning for technological hazards. But they also bear upon natural hazards. These myths are related to claims about the impact of disclosing dangers to citizens, the behavior of industry, and the lack of federal funding.

- It is commonly argued that if citizens know the risks of a hazard, they react with anger. This anger is directed at the industry and the local government. The LEPC studies do not confirm this. Adams et al. (1994) found that nearly half of LEPCs had received no public inquiries. Only one-fourth had received more than six inquires in the past 12 months. Lindell and Meier (1994) reported that Michigan LEPCs had received limited news media coverage (typically one to two times per year). Similarly, Rich et al. (1992), Rest (1990), and Sutton (1990) reported the LEPCs experienced both low levels of media coverage and very low levels of inquiries from citizens. However, public inquires do appear to vary widely among LEPCs. Inquiry levels are caused by factors other than LEPC dissemination efforts.
- It is argued that serious conflicts about emergency planning arise between local governments and industries. Yet this expectation was not present between chemical handlers and the local communities. Kartez (1992) found industry has provided substantial assistance to LEPCs. This includes help with technical hazard analysis and mutual aid for emergency response. Industry also supports hazard data interpretation and management. They assist with public outreach. And they fund hazardous materials training and operations (Lindell et al.,1995). Baram, Dillon, and Ruffle (1992) detailed both national efforts by industrial groups and individual efforts by eight private firms to provide information, funding, and other forms of support. The Chemical Manufacturers Association (1990) maintained an active support program. Smith (1993) reported that hazardous chemical handlers in the paper industry approached STIII as a chance to build trust with and invest in local communities.
- Local governments express concern that the economic power of private firms will subvert plans. The LEPC studies show local governments are not forced to bow to the chemical industry's power. If anything, the data support the opposite conclusion. Even in the absence of community pressure, plants have implemented a variety of mitigation measures (Keyworth and Smith, 1992). Adams et al. (1994) found 41% of all LEPCs had made hazard reduction or prevention proposals that were accepted. Kartez (1992) found 10% of EHS handlers engaged in chemical source reduction or substitution actions.

- ▲ Policy makers often argue that without federal funding, local emergency planning, and management initiatives will not be effective. The lack of funding for LEPCs has not enhanced their formation or effectiveness. But it does not seem to have universally inhibited effectiveness. Studies do indicate that LEPC members *believe* that they could be more effective with more funding (Lindell and Perry, 2001). However, many LEPCs function beyond minimal STIII requirements at current levels of funding. Most jurisdictions have developed sources of financial support. Fourteen states provide allocations from state funds (Finegold and Solyst, 1993). Adams et al. (1994) reported that 34% of all LEPCs had an operating budget. And 28% received funds from local government. Twelve percent received funds from local industry.

STIII in Perspective with Local Impacts

STIII shows that a minimally intrusive federal hazard regulation with little funding can yield positive impacts on local hazard management. The hazard data disclosure requirements of STIII have led to positive actions for hazard assessment and emergency preparedness. All of this was achieved in the absence of pressures from community interest groups. This suggests that the more exacting requirements of the Clean Air Act Amendments Section 112(r) are likely to yield even greater risk reduction, albeit at greater cost to industry (Chinander, Kleindorfer, and Kunreuther, 1998). Research on California's Risk Management and Prevention Plans (RMPPs) has produced similar conclusions (Lindell and Perry, 1998). The expense of the RMPP process has induced about half of the firms affected to change processes or chemicals. **Hazard source substitution** is the replacement of one high-threat chemical in a process with another lower threat or no threat chemical. If these results reflect the experience in the country as a whole, toxic chemical regulation will be successful in reducing risks to communities.

STIII produced increased contact among all types of public and private organizations. STIII has clearly promoted dialogue. Therefore it has advanced local disaster management. The creation of LEPCs produced a management structure that can be used as a model for a range of hazards. LEPCs represent a type of strategic planning process for environmental hazards that must always address complex long-range issues. And these are often a low priority for elected officials. LEPCs offer a concept and structure for hazard management that allows for meaningful work to be accomplished. This is done in spite of the low priority assigned such planning activities by both political officials and citizens.

For you, the LEPCs are an important resource. The emergency planning products of an LEPC should be accounted for in local jurisdictional EOPs. Since most LEPCs are organized on a county or other regional basis, they also provide points of contact to regionalize local plans. LEPCs locate private sector partners and resources. And they get support in the policy arena.

13.1.2 The National Incident Management System

Homeland Security Presidential Directive Number 5 (HSPD-5) is a direct response to federally defined multi-jurisdictional, multi-organizational problems arising in response to the 9/11 attacks. It established a National Incident Management System (NIMS). HSPD-5 directed that the DHS develop a *National Response Plan* (a newer version of the existing *Federal Response Plan*). It assigned the DHS to oversee the NIMS. HSPD-5 requires all federal agencies to adopt NIMS immediately. All state and local organizations (including Indian nations) must have adopted NIMS as a condition for federal funding beginning in fiscal year 2005. The DHS (2004b) issued partial documentation for NIMS on March 1, 2004. The NIMS organization is similar to the California Standardized Emergency Management System (SEMS). NIMS centrally prescribes a planning process. It defines preparedness practices, resource management, communications, technology use, and plan maintenance features.

NIMS Elements

The intent of NIMS was to create a nationwide framework for all-hazard response by all disciplines (emergency management, fire services, law enforcement, emergency medical services, etc.). Most of the existing NIMS documentation addresses the incident command system (ICS component). "[O]ther aspects…will require additional development and refinement to enable compliance at a future date" (USDHS, 2004b: viii). There are six parts to NIMS. Each has a series of processes and tasks to be engaged. Much guidance was created for incident command. But, at mid-2006, the guidance for the other five parts remained forthcoming.

Command and management is the first component of NIMS. It focuses upon the nature of incident response organization and public information. The main issues are defined as the ICS, "multi-agency coordination systems," and "public information systems." Federal planners have changed commonly used names for some IMS components (IMS "sectors" are NIMS "divisions or groups"). They changed standard protocols for naming IMS assignments (IMS "branch chief" is NIMS "director"). They relegated other IMS functions to different organizational levels (IMS "safety section" is a sub-function under "command" in NIMS). NIMS ICS otherwise generally copies IMS ideas of organization, accountability, and command (using both unified command and area command).

DHS has established centralized training and certification requirements in NIMS ICS.

NIMS defines multi-agency coordination systems as "a combination of facilities, equipment, personnel, procedures and communications integrated into a common system with responsibility for coordinating and supporting domestic incident management activities" (USDHS, 2004b:26). NIMS has two elements in multi-agency coordination systems—EOCs and "multiagency coordination entities." The functions given to each are served by EOCs. NIMS defines EOCs as a location as well as a group of functions. The DHS guidance points to the need for jurisdictional EOCs. But it vaguely separates other government and private EOCs. NIMS guidance uses the term "multiagency coordination entity" for centers of command and resources for events that cross jurisdictional lines. In practice and statute, each jurisdiction affected by a disaster has an EOC. And a coordination of response is achieved by linking local EOCs with county and state EOCs. It is not clear that the NIMS either supports or negates these EOC links. It is also not clear what status is right for a "multiagency coordination entity." It appears that these entities represent "naming alternatives" for established emergency response and management structures. Traditional IMS provides a link with systems operated by different classes of agencies and governments (public works, EMS, law enforcement, hospitals, etc.). And it includes joint systems for responders within and across jurisdictional boundaries (Brunacini, 2002).

Public information functions under NIMS are those normally assigned to EOCs (Perry, 2003a). NIMS ICS requires that a public information officer be attached to Command. Public information should be coordinated across agencies. These goals are achieved by a "joint information system" and a "joint information center" (JIC). The system involves sharing information with the public. It also involves ways to share information across agencies. This ensures the consistency of released information. The JIC is simply a location where "public affairs professionals" can meet.

NIMS *preparedness* "involves an integrated combination of planning, training, exercises, personnel qualification and certification standards, equipment acquisition and certification standards, and publication management processes and activities" (USDHS, 2004b:33). It describes the planning process and structures for emergency response. Locals are alerted to address mitigation in the planning process. Recovery planning is mentioned but not described. Preparedness is acknowledged as a function of the state and local jurisdictions, not the federal government. Much of the guidance is normal procedures. NIMS preparedness includes the constraining notion that DHS will issue standards and certifications for "NIMS-related functions." Equipment must be centrally "certified." There is brief discussion in the NIMS guidance that DHS equipment certification will meet other requirements (OSHA). There is no mention of the National Fire Protection Association guidelines or the Interagency Board for Equipment Standardization and Interoperability requirements. Finally, this part notes that forms used in ICS must be standardized to federal guidelines.

The resource management of NIMS is complex. Three of the tasks are routine for any system. These are the ability to activate, dispatch, and deactivate resources. The fourth task is resource inventory, also pre-existing in most jurisdictions. But NIMS imposes centralized rules. This is in addition to the DHS's "resource typing system." Resource inventory specifies how resources are to be categorized, acquired, and tracked. DHS also certifies personnel who handle resources. There are also rules for determining what resources are needed for different incidents. Partial resource definitions have been developed for 120 resources by FEMA (2004c). DHS has not extended and finalized the system. And the guidance on a certification process is not currently available.

NIMS *communications and information management* develops standards for communications at an incident. It specifies processes for managing incident information. It appears to overlap some of the command and management guidance on public information systems. These guidelines require that local jurisdictions "formulate and disseminate indications and warnings" (USDHS, 2004b: 49). These are aimed at public warning functions. NIMS directs that "effective communications processes and systems exist." These must follow unnamed standards "designated by the NIMS Integration Center in partnership with recognized standards development organizations" (USDHS, 2004b: 50). NIMS also requires interoperable communications. But it fails to indicate the path to this goal. It does not mention any existing federal programs on interoperability (Public Safety Wireless Network Program, 1998, 2003; National Task Force on Interoperability, 2003), including those established by the Department of Homeland Security (2004b).

The *supporting technologies* requirement appears to charge DHS to monitor technology developments useful in emergency management. The goal is to enable the addition of scientific advances into the preparedness process. The guidance commits DHS to a research program. The results will be shared with everyone. The NIMS Integration Center will consult with technical specialists. They will develop standards for equipment performance. The Integration Center will "issue appropriate guidelines as part of its standards-development and facilitation responsibilities" (USDHS, 2004b: 57). It is not explained how these standards will relate to the testing and certification of equipment.

NIMS *ongoing management and maintenance* "establishes an activity to provide strategic direction for and oversight of the NIMS, supporting both routine review and the continuous refinement of the system and its components over the long term" (USDHS, 2004b: 59). This duty is mostly that of DHS, delegated to the NIMS Integration Center. Processes should exist for groups to offer feedback and suggestions regarding NIMS. This component requires the development of a system to change NIMS based upon lessons learned from events, tests, and exercises and suggestions from other jurisdictions.

NIMS as a Program

The status of NIMS as a federal policy and program is very difficult to assess. With regard to the origins of NIMS, "Both NRP [the National Response Plan] and NIMS have been developed in a top down manner, centrally coordinated by DHS…[and] views differ on the scope and intent of stakeholder involvement in developing NRP and NIMS (Hess and Harald, 2004:2). It appears that the academic disaster research community was minimally—if at all—involved in the process of generating NIMS. The record is not clear about how other guidance was solicited by DHS, from whom, or how it was incorporated.

A great concern to municipal agencies is the detail in which processes and protocols are specified within NIMS. Christen (2004: 103) pointed out that in the fire service "not everyone is happy with national standards and protocols that supersede local preferences." Many wonder if these details promote or retard the management of disasters.

There are also demands imposed on DHS, FEMA, and the NIMS Integration Center to generate standards, conduct testing, and provide certifications. The clearest certification standards to date require all personnel to be trained and tested in NIMS and NIMS ICS. Initially this meant people would take a course (IS700) on NIMS through the FEMA Emergency Management Institute. Students would take a graded test. If they passed, they would get a certificate. The online course had very long waits. After much frustration, DHS (2005d) announced a new program for 2006. This program would partner with local entities to simplify the process. The basic premise is that DHS will provide states with training toolkits. States will deliver the training. The partnership program is quite involved. The new program certainly increases demands on state and local governments and possibly on DHS itself.

Many NIMS programs are titled "interim." Much is not addressed in detail (five of the six components of NIMS). Many demands are made without specifying a process. The demands have proved difficult to oversee and implement by DHS. The certification processes "implemented" have proved difficult to operate using the DHS systems. Proposed changes and future protocols appear to be as bureaucratically susceptible to quagmire as the original processes. Facing programs that don't operate, DHS has devised unworkable solutions and continued to issue demands for compliance. NIMS is not well integrated with other federal programs. NIMS also uses "micro-management" tactics that attempt to specify both process and procedure at local levels. The administrative demands on local jurisdictions are immense. Federal programs either forbid hiring new personnel or minimally fund administrative support. Only the largest jurisdictions can fully staff LEMAs. This leaves many of the NIMS requirements to be done by small committees, fire departments, or police departments. And their primary functions are public safety not responding to a federal bureaucracy. Under these conditions, it is difficult for many local governments to comply with NIMS (O'Connor, 2005).

On a practical level, the likelihood that NIMS can work is difficult to know. Some parts of NIMS could be called policy. But much of the program is undefined. Much of it has no clear path to do generally stated goals. There is no doubt DHS can make agencies accepting federal funding adopt NIMS. However, effective implementation is quite a different matter. Compared to SARA Title III, NIMS lays out a centrally well funded, but inflexible program. It seeks to specify many details of local management and planning practice. Unfortunately, the approach of NIMS resembles the federal Crisis Relocation Program (for nuclear attacks). And that program quietly failed when local governments refused to support it (May and Williams, 1986: 122-124).

Local jurisdictions accepting federal Homeland Security Grant Program funding must accept NIMS. The NIMS Integration Center identified six NIMS activities for states and territories to comply:

- ▲ Existing training programs and exercise plans must reflect NIMS
- ▲ Establish that federal preparedness funding is available for state, local, and tribal NIMS implementation
- ▲ Revise EOPs to reflect NIMS
- ▲ Engage in intrastate mutual aid agreements
- ▲ Offer NIMS technical assistance to local governments and tribes
- ▲ Ensure that NIMS ICS is institutionalized

The NIMS Integration also enumerates five requirements that also include local and tribal governments:

- ▲ Complete the FEMA Emergency Management Institute NIMS awareness course (IS700)
- ▲ The local jurisdiction must officially adopt NIMS through legislation, executive orders, resolutions, or ordinances.
- ▲ Review NIMS literature to determine what features are not met in the local jurisdiction and devise a plan to meet them
- ▲ Create a plan and timeframe for fully implementing NIMS
- ▲ Ensure that NIMS ICS is institutionalized

NIMS compliance requires that executive personnel (not just first responders) take training. Local emergency managers must complete training in the National Response Plan (IS-800). A range of incident command classes must be completed by selected response personnel. There are obvious difficulties with these requirements for local jurisdictions in particular. The practical side of DHS training delivery remains a problem. FEMA has now developed a local trainer certification plan and identified equivalent courses offered by the U.S. Fire Administration that can replace some web-based courses. It appears, however, that the numbers of new personnel required for training will outweigh any flexibility gained by introducing local training and equivalent courses. It is ultimately very difficult for local agencies to specify what parts of an *unfinished* program are not met, devise a plan and timeframe for meeting them, and determine what constitutes ICS institutionalization.

13.1.3 National Response Plan

The National Response Plan (USDHS, 2004c) is less a mandate for local planning than a description of federal disaster resources. It states how the federal government will interface with state, local, and tribal governments. The NRP affects local planning. It specifies the way federal officials and agencies deploy in an emergency. It defines the support functions from the federal government. The NRP is designed to apply to all hazards. The NRP is similar to the old Federal Response Plan. But it lays out different organizing points for local support. The NRP is a federal document that:

- ▲ Specifies the federal concept of operations
- ▲ Describes federal coordinating structures
- ▲ Sets expectations for state and local government elected officials (chief executives)
- ▲ Defines parameters of available federal support
- ▲ Is implemented, overseen, and maintained by the DHS

The organization of the NRP is based on the assumption that NIMS will be *successfully* used by all federal, state, local, and tribal government agencies. The NRP also applies to certain private groups. Under HSPD-5 private operators of regulated facilities or hazardous operations (nuclear power plants, chemical facilities) are responsible for engaging in mitigation and preparedness measures. They must also support incident response. In general, private groups can be subject to NRP rules when:

- ▲ They are victims in an incident
- ▲ They are a response resource
- ▲ They have partnered with a public sector response organization
- ▲ They are required to participate under law or by administrative regulation

The NRP is intended for national-level policy and coordination of activities. It should not interfere with the lawful efforts of sub-national jurisdictions to manage disasters. That is, it is assumed that all incidents should be addressed at the lowest possible jurisdictional level. The Robert T. Stafford Disaster Relief and Emergency Assistance Act is the source of federal determinations of Presidential Disaster Declarations (PDDs). Thus, it guides the level of support and funding allowed from the federal government. The NRP also allows the DHS Secretary to declare "Incidents of National Significance (INS)." Whether a disaster is a PDD and/or an INS affects the level of federal resources available. It also determines if federal rules can be expedited or suspended to enhance effective response.

The resources available under the NRP are defined in 15 categories called Emergency Support Functions (ESFs). The ESFs are groupings of resources under defined coordinating mechanisms (organizational units). These interface with affected jurisdictions. They provide staffing for emergency response organizations. ESFs may be activated for either Stafford Act disasters or non–Stafford Act disasters. They may be activated as a complete group or in terms of those selectively needed for incident response. The 15 ESFs obligate federal help for as follows:

- **ESF #1:** Transportation. Provide federal and civil transportation support. Conduct damage and impact assessment. Ensure transportation safety. Manage movement restrictions. Address restoration and recovery of transportation infrastructure.
- **ESF #2:** Communications. Provide assistance with repair and restoration of telecommunications infrastructure. Protect and repair of national cyber and information technology and coordinate with the telecommunications industry.
- **ESF #3:** Public Works and Engineering. Engage in critical infrastructure liaison. Provide engineering services and construction management. Protect, repair and restore infrastructure.
- **ESF #4:** Firefighting. Assist with firefighting on federal lands. Support urban and rural area fire suppression activities.
- **ESF #5:** Emergency Management. Support and coordinate incident management efforts, including resources and human capital, financial management, and incident action plans.
- **ESF #6:** Mass Care, Housing and Human Services. Support establishment of mass care and feeding strategies. Provide interim housing and ensure the delivery of human services.
- **ESF #7:** Resource Support. Assist with space needs for response and recovery. Contract services and incidental office support needs.
- **ESF #8:** Public Health and Medical Services. Provide support for public health needs, medical care support, mental health services, and care and disposition of the dead.
- **ESF #9:** Urban Search and Rescue. Assist with immediate life-saving and urban search and rescue.
- **ESF #10:** Oil and Hazardous Materials Response. Assist with environmental safety (sampling, monitoring). Support short- and long-term cleanup.
- **ESF #11:** Agriculture and Natural Resources. Provide human nutrition assistance (bulk food distribution). Support food safety and security needs. Address animal and plant disease or pest management. Support protection and restoration of natural and cultural resources.
- **ESF #12:** Energy. Assess, repair and restore energy infrastructure. Forecast consequences of incidents for energy needs and availability. Coordinate with energy industry organizations and facilities.
- **ESF #13:** Public Safety and Security. Support public safety agencies in planning for security for incidents and managing incidents.
- **ESF #14:** Long-Term Community Recovery and Mitigation. Conduct social and economic community impact analyses, mitigation assessments. Provide long-term recovery assistance.

▲ **ESF #15:** External Affairs. Assist with media and community relations, emergency public information and protective action guidance, and congressional, tribal, or international affairs.

The NRP also names 17 specialized federal teams. They are deployed through the ESFs. Although federal officers can explain the extent and nature of ESFs, you should be familiar with ESF teams' capabilities and limitations so they can be explained to local leadership. Ultimately, the ESFs form a menu of supportive services, equipment, and teams for incident assistance.

The NRP creates operational structures for managing INSs. Four of these are not specific to federal operations: state and local EOCs, area commands, and incident command posts. There are seven structures that are only federal and have specific functions under the NRP:

▲ **National Operations Center (NOC).** The NOC is a permanent federal structure that continuously operates under interagency governance. It includes law enforcement, emergency management, national intelligence, and private sector coordination. The HNOC coordinates information sharing among federal, state, local, and tribal organizations. It notifies those organizations when an INS is declared.

▲ **Interagency Incident Management Group (IIMG).** The DHS Secretary activates the IIMG as a senior advisory council. The membership of the IIMG is tailored to the specific nature of the incident. It includes executive level officers from federal agencies.

▲ **National Response Coordination Center (NRCC).** FEMA operates the NRCC as a multi-agency center (under the HSOC) to provide overall coordination of federal agencies responding to INSs. The NRCC operates both pre-impact to monitor potential and developing threats and post-impact for coordinating federal agencies.

▲ **Regional Response Coordination Center (RRCC).** The RRCC is activated by FEMA early in an incident to coordinate regional response operations, set federal priorities and implement federal support of local operations. The RRCC operates only until a Joint Field Office (JFO) is established. Its principal functions are to establish communications with affected state emergency management organizations and the NRCC and to coordinate the deployment of federal advance teams.

▲ **Strategic Information and Operations Center (SIOC).** The FBI operates the SIOC as the hub and operational control center for federal intelligence and law enforcement activities related to credible terrorist threats and incidents. Located at FBI Headquarters, the SIOC is directly linked to the HSOC and IIMG. It houses the National Joint Terrorism Task Force.

▲ **Joint Field Office (JFO).** The JFO is established locally to serve affected jurisdictions requiring federal help. It is a multi-agency office that serves as the focal point for requests for and receipt of federal support. It exists only as long as needed and houses key federal officers. But it does not manage on-scene operations. Incidents may have one or more JFOs.

- **Joint Operations Center (JOC).** The JOC is a NIMS branch under the JFO. It is established by a senior law enforcement officer. It has stand-alone responsibilities for collection, interpretation, and investigation of intelligence and the prosecution of criminal acts. As part of the JFO, it is responsible for the intelligence and information function in terrorist threats and incidents.

The most central structure to local emergency managers and planners during a disaster is the JFO. It is structured with sections addressing operations, planning, logistics, and finance and administration. The JFO Coordination Staff includes the key federal officers. State and local officers direct the deployment of resources. They resolve communications and other issues that arise between incident needs and resource availability. Two critical state officials are located here: the State Coordinating Officer that manages state resources for the incident and the Governor's Authorized Representative. The JFO may also include people from heavily impacted local jurisdictions. There are four critical federal managerial officers:

- **Principal Federal Official (PFO).** This officer is assigned by the DHS Secretary to ease all aspects of federal incident support. In complex or geographically dispersed incidents the DHS Secretary may appoint the same individual as PFO and FCO, using deputies to support the functions.
- **Federal Coordinating Officer (FCO).** The FCO works directly with the Unified or Area Incident Command in managing federal resource activities. The FCO is the federal counterpart to the State Coordinating Officer. The FCO works with the PFO. In Stafford Act declarations with no assigned PFO, the FCO assumes that role.
- **Senior Federal Law Enforcement Official (SFLEO).** This officer is the principal director and coordinator for investigative and other law enforcement functions. In terrorist incidents, this role is filled by the FBI Senior Agent in Charge.
- **Federal Resource Coordinator (FRC).** The FRC manages resource support from federal agencies to other federal agencies in incidents that do not qualify for a declaration under the Stafford Act.

The JFO Coordination Group is charged with managing federal-to-federal and federal-to-local resource exchanges. It also serves a potential appeal function for local jurisdictions. The PFO has direct contact with the DHS Secretary. Both the

FOR EXAMPLE

First Opportunity for the 2005 National Response Plan

When Hurricane Katrina struck the Gulf Coast in 2005, it was the first major disaster to follow the issuance of the NRP devised by DHS and implemented by FEMA. The President declared an emergency before the hurricane made landfall and FEMA officials established contact with state and local governments. DHS Secretary Michael Chertoff acknowledged that FEMA was overwhelmed by disaster demands, and systems that were part of the NRP did not function as planned. Problematic decisions were made regarding pre-positioning of resources, deployment of pre-positioned resources, mobilizing federal assets (notably Urban Search and Rescue Teams) and implementing NRP organizing structures.

governor's authorized representative and the State Coordinating Officer (usually the director of the state homeland security agency) have direct access to the PFO. Under normal chain of command, a local official or Incident Commander has access to the JFO. If conflicts arise that cannot be quickly resolved, officials can gain direct access through the Governor's Office to the PFO.

The NRP links the complex network of federal agencies and resources to the local needs. These guidelines create the elements of a response system. The aim of the response system is to meaningfully join federal means to the "top" of a local IMS. The links begin with the JFO. They trace downward through a series of EOCs (area and joint commands) and field command posts. Then they connect with an Incident Commander at a scene. The NRP attempts to join bureaucratic and centralized federal organizations and decision structures with local emergency response systems. These local systems tend not to be bureaucratic or centralized. At the level of local incident command, response and responder flexibility and decentralized decision-making are often keys to successful operations (Brunacini, 2002). There is conflict inherent in the NRP arrangements. Successful work under the NRP requires that local emergency managers and planners:

- ▲ Are familiar with federal capabilities that apply to probable impacts under the jurisdictional hazard vulnerability assessment.
- ▲ Include discussion of federal capabilities in the emergency planning process.
- ▲ Incorporate federal capability assessments in training programs for field command officers, EOC commanders, and appropriate jurisdictional officials.

▲ Understand the organizational principles (particularly chain of command) for the NRP.

▲ Include NRP relevant scenarios in comprehensive exercise planning.

SELF-CHECK

- What is a **focusing event** and a **window of opportunity?**
- We often hear that conflicts arise when local governments try to enforce emergency planning for technological hazards. That businesses actively resist planning efforts and don't support local governments. Is this true?
- Why should a local government adopt NIMS?
- Does the NRP remove local control of disasters and substitute federal control by determining what resources are available?

13.2 Terrorism-Related Initiatives

Since 9/11, there have been many attempts to enhance terrorism preparedness. Some professionals worried that the terrorism emphasis would reduce an all-hazards approach. Thus, federal programs began to emphasize spending that supported natural, technological, and terrorist threats (Grannis, 2003: 213). However, terrorist threats can't be addressed in exactly the same ways as other hazards. This stems from unique demands of chemical, biological, radiological, nuclear, and explosive (CBRNE) agents. Measures for CBRNE agents demand special equipment and considerations. However, CBRNE agents can arise from technological accidents too. So the response-generated demands are less unique than they might otherwise seem. DHS tried to balance the differences. They emphasize special equipment purchases for response and law enforcement roles for terrorism prevention. At the same time they demand that response systems be adaptable to an all-hazards approach.

The first nationwide program to address Weapons of Mass Destruction (WMD)CBRNE threats was the Metropolitan Medical Response System (MMRS) Program. It was established under the Nunn-Lugar-Domenici Amendment to the National Defense Authorization Act for fiscal year 1997. This program was established under the Department of Health and Human Services (DHHS). It created coalitions of public, private, and nonprofit organizations to address mass casualties. The MMRS program has been modestly funded over the years. But it has produced high levels of response activity. Also, it has been exercised for years and has independent positive evaluations (USGAO, 1998). A second program was the 2003 Urban Areas Security Initiative. The premise was that urban areas were likely terrorist targets. The annual UASI fiscal support has been many multiples of MMRS funding. UASI support sharply declined in 2006 and MMRS may end by 2008.

Each program was voluntary in that it required local government applications. In both cases, federal pre-screening led to target areas being invited to apply. The MMRS approach assigned the same level of resources to entering municipalities each year e.g. ($350,000 in 1997). The level of funding varied between years. The UASI approach has used a more complex way to determine resource assignments to urban area. Each UASI area is assigned a different budget in each year.

Before 9/11, most disaster plans were public. As a critical part of hazard awareness campaigns, it was routine to advertise planning activities. This was a means of enhancing citizen compliance. Because terrorists are capable premeditation, EOP plan details have been more closely guarded since 9/11. This will be a significant issue for you. You must determine what can involve the public and what must be withheld. The following descriptions of the MMRS and UASI programs respect concerns with plan confidentiality.

13.2.1 The Metropolitan Medical Response System

The MMRS places emergency response in the EOC and IMS and seeks to involve multiple external organizations. The MMRS programs tend to be in high population density areas and other terrorist targets. There are 124 city and regional MMRSs spread over 43 states.

MMRS Aims

The initial purpose of the MMRS program was to enhance local efforts to manage mass casualty incidents from terrorist use of CBRNE agents (Perry, 2003c). This mission was driven by the fact that specialized federal assets for attacks are 48 to 72 hours away. The MMRS goal is to ensure cities can operate independently until support arrives. It develops a strong local IMS that can integrate specialized resources. Local response agencies must have specialized equipment and training to meet CBRNE agent demands. Unlike many federal programs, the MMRS mission has evolved over time. The focus has expanded to include incendiary explosive threats. It is well established as an *all-hazards* program.

An MMRS links multiple response systems. Horizontal linkages involve first responders (firefighters, hazmat technicians, and emergency medical personnel), public health, emergency management, law enforcement, mass fatality, and medical and behavioral health services. There also are vertical linkages—public health participation involves city, county, and state agencies—as well as links with private and nonprofit organizations such as hospitals, environmental cleanup companies, and ambulance systems. There are also requirements that MMRS cities plan for receipt and integration of important federal assets. This includes building a relationship with the National Disaster Medical System (NDMS). This also includes having a capacity to receive drugs from the strategic national stockpile and other assets from federal programs such as CHEMPAK and BIOWATCH.

The MMRS program has imposed a management process on recipient cities. Cities must operate an IMS and link it to a jurisdictional EOC. They have to enhance mutual aid agreements with surrounding communities. They need to integrate county and state agencies. And they must conduct joint planning, training, and exercises on a continuing basis. The exact nature of the IMS, EOC, mutual aid and other arrangements are left to the cities. MMRS programs address some mitigation and recovery issues. But they emphasize preparedness and response. As a condition of declaring an MMRS "fully operational," each city conducted a full-scale exercise with independent federal evaluation. Achievement of operational status is treated at the federal level as only one milestone in the continuing development of an MMRS.

Concept of Operations

There are two models for MMRS operations. The **strike force model** uses specially trained and equipped mobile personnel deployed after a CBRNE incident is verified. Most cities use the MMRS **IMS model;** all personnel are trained and equipped for CBRNE incidents at different specialization levels. This requires all first responders to be alert to potential CBRNE events. Embedding MMRS into the IMS produces two outcomes: (l) no untrained, unprotected personnel will be exposed to a CBRNE agent and (2) first responders are prepared to make an assessment and immediately address the threat.

The MMRS IMS model assumes that if a geographically defined incident scene exists, threat management should be directed from that location. If there is no scene, the MMRS focuses event management in the jurisdictional EOC. The individuals commanding the response operations are always those closest to the event. For scene-based threats, the MMRS flows from the IMS used by response agencies. A result of the IMS is to make all resources of the city (including mutual aid) available for every incident. The resources are provided step by step, as the Incident Commander builds a response organization to meet the incident demands. To date, most terrorist attacks have been scene-based. All of the events involving incendiary explosives are in this category.

The anthrax threats following 9/11 did not have a single scene where responders could collect. In a city, secret release of a biological agent could kill or injure many. We may not know anything has happened until hospitals are already clogged. We may never know where it started. Events that have many scenes or no definable scene are managed from the jurisdictional EOC.

There are two parts to response under the MMRS IMS model. The first is inherent in the IMS. It is represented by trained and equipped first responders guided by an Incident Commander (IC). All first responder agencies must actually use the IMS on every call. The IMS has a joint command in which fire and police (and other agencies, as needed) are involved. These first responders are always on duty. They respond to both routine calls and suspected terrorist incident calls. Thereby they provide wide coverage of all potential events. The second part of the MMRS IMS model is the EOC. The MMRS adds special administrative staff for terrorist incidents. This augmentation includes technical experts from private, nonprofit, and public organizations. They have special skills related to CBRNE agents. This expertise is normally housed in the EOC. But it can be dispatched to an incident scene if needed. The EOC itself is structured in IMS terms.

System Activation

The system for activating an MMRS is extensive. There are three generic levels of surveillance that activate the MMRS. The first level consists of police and fire dispatchers. By routine incident report questioning, they may believe the 9-1-1 call is about a CBRNE agent. A second route for alert is initiated by incident first responders. During a call, first-on-scene personnel may notice *signs and symptoms* indicating a CBRNE incident. The third route to MMRS activation arises from public health screening. These screenings include:

- ▲ State and county health department screening and disease reporting programs
- ▲ State overseen federal programs like BIOWATCH surveillance
- ▲ Monitoring of patterns in EMS responses over a defined period to identify patient complaint and hospital transport needs
- ▲ Monitoring of patients by hospital emergency department physicians and infection control personnel
- ▲ Patterns and levels of employee sick days in public and private organizations that have agreed to participate in monitoring

For terrorist events (and other disasters), the focal points for activating an MMRS are fire and police dispatch centers. Many potential terrorist events use chemical and radiological agents and are likely to be reported as hazardous materials or medical calls. Biological events have a wider spectrum of possible detection. There is redundancy in MMRS activation systems. For example, it is probable that evidence of the *same biological event* would be detected at the same time by various medical personnel. Thus, a pattern of hospital emergency department closures detected by a dispatch center may coincide with a report by hospitals that there is a high volume of patients presenting similar symptoms. These reports may be later followed by epidemiological evidence of infectious agent patterns.

System Responsibilities

Most mass casualty terrorist incidents have involved simple explosives or chemical agents. Terrorist CBRNE incidents require special knowledge and equipment for detection, monitoring, and abatement. Different agents or system activation paths may result in different configurations for both IMS and the EOC. The MMRS model is an all-hazards approach. The organizations involved in MMRS response vary by agent- and response-generated demands. But the model was specifically created to deal with the special demands of terrorist events. Thus, the discussion of system elements and roles will focus on terrorist incidents that generate an incident scene.

Within the MMRS model, all first responders have received some level of CBRNE agent training. And they carry specialized equipment. An important goal at the scene is to proceed with operations safely and quickly. Care for victims is a high priority. First on the scene are **awareness level responders**: first responders with specialized personal protective equipment (PPE) and CBRNE training capable of recognizing a likely WMD threat, initiating response, and calling more specialized assets. The specialists are **technician level responders** who have extended PPE, agent-specific training and extensive specialized equipment. Following these, other response obligations are enumerated. Many activities proceed at the same time. And while pre-planning is emphasized, some actions are improvised. Many response disciplines are represented at the scene in the MMRS model.

- *First-on-scene awareness level responders*. Five duties face these responders at the scene. The first is impact area isolation and perimeter control. Equipment positioning is the second task. The third task is to assess downwind hazards and initiate protective actions. The fourth task is to initiate the collection of casualties and begin victim management. The last task is **emergency gross decontamination—**quick use of water to clean victims of traces of the CBRNE agent.
- *Technician level operations at the scene*. These personnel do five activities: scene layout adjustment, impact area inspection, agent identification, victim extrication, and technical decontamination. Hazardous materials (hazmat) units bring pharmaceuticals and special equipment from the MMRS cache to the scene. These personnel make initial entry into the hot zone. But they maintain awareness of safety issues and the presence of potential evidence. They also locate victims who require rescue and note locations of the dead. Toxicology specialists can support agent identification. **Technical decontamination** at a scene is the use of special solutions, specific to the agent, and scrubbing to remove the agent from the skin. If timing is critical, antidotes may be given to victims.
- *Scene medical management*. The IMS medical branch conducts initial medical intervention. This chain of care continues to emergency rooms to

definitive care. Medical management at the scene serves four functions: triage, medical treatment, mental health support, and patient transportation. Treatment areas are established in the cold zone. Treatment administered is consistent with agent identification. Areas near treatment serve as collection points for patients to be transported to hospitals. It is critical in terrorist incidents to attend to the mental health needs of victims and their surviving kin. Behavioral Health Sector may be assigned to decontamination lines, treatment areas, and the transportation branch. Behavioral health units and personnel may be deployed to receiving hospitals and mass shelters. If a patient's injuries are serious and the hospital overloaded, patients can be moved to the NDMS for military medical transport to extended care.

- ▲ *Law enforcement*. Law enforcement operates at scene-based incidents and when there is no scene. The intelligence function is stressed more when no scene is present. Law enforcement manages intelligence, police logistics, and FBI coordination. They also manage evidence control and scene security. Specialized police units are trained and outfitted with PPE to operate in both warm and hot zones. The law enforcement branch makes a secure perimeter at all response-related facilities. These include EOCs, mass care facilities, treatment areas, media centers, jurisdiction critical facilities, and other agency offices that deliver services (e.g. hospitals, morgues, and others).
- ▲ *Hospital mass patient care*. Each hospital response is guided by its own disaster plan. MMRS-related hospital plans address six issues: internal and external hospital security, lock-down processes, establishment and conduct of decontamination, tracking for walk-in patients (not from a scene), decisions to treat patients inside the facility and/or in treatment areas outside the hospital, and triage for walk-in patients. Hospital disaster plans specify the process to supplement hospital bed capacity. The medical staff selects patient treatments. They assign patients to definitive care.
- ▲ *Mass fatality management.* The medical examiner's task has seven general functions: receive human remains; safeguard personal property; identify the deceased; prepare and complete case file records on each decedent; photograph, fingerprint, and collect DNA specimens; provide death certificates; and coordinate and release remains for final disposition. The medical examiner occupies an important place in the chain of evidence for law enforcement proceedings.
- ▲ *Public health departments.* Local and state agencies conduct epidemiologic surveillance and investigation. They conduct scientific investigations aimed at identification and control of the agent. They determine preventive measures for populations. And to the extent possible, they implement

those measures. In the MMRS model, public health is represented in the EOC during all types of CBRNE events to provide medical guidance. The role of public health is central in biological incidents. Two special powers vested with public health departments and used in biological incident management are administration of mass prophylaxis and requirement of quarantine. Drugs and/or vaccines are obtained through multiple sources. These include the MMRS pharmaceuticals cache, the CHEMPACK caches, and the Strategic National Stockpile.

MMRS Policy and Funding

For most of the MMRS program history, funding for program work has not fit the model currently favored by DHS. The funding came directly to the cities from Department of Health and Human Services (DHHS). MMRS cities needed a program that included broad participation by a range of agencies. Funding patterns were erratic. They often failed to cover the costs to cities of sustaining MMRS programs. The funding history between 1997 and 2002 shows the levels of variability:

- ▲ 1997: 25 MMRS cities were given $350,000 and equipment loans from the DOD to establish programs.
- ▲ 1998: no MMRS cities established and no continuation funding for existing programs.
- ▲ 1999: 20 new MMRS cities were selected and given $600,000 with the 25 existing programs given $200,000 to enhance biological preparedness.
- ▲ 2000: 25 new programs established with $600,000 each and no continuation funding for existing program.
- ▲ 2001: 25 new cities at $600,000 with no continuation funding for existing programs.
- ▲ 2002: 25 new cities at $600,000 with $50,000 continuation funding for existing programs.
- ▲ 2003: 4 new regional MMRS programs at $600,000; Existing programs were assigned $280,000 in FY2003 and $400,000 in FY2004.

MMRS has been successful. None of the cities dropped out of the program when funding was lean. The MMRS program stands in stark contrast to other federal programs.

In March 2003, the MMRS program passed from DHHS to the DHS (FEMA). Except for the National Urban Search and Rescue Program, the MMRS program represents the only tested federally devised model for disaster operations. The challenge for the MMRS program is sustainability (Grannis, 2003: 108). A very important challenge is to maintain emphasis on MMRS while integrating it with the much larger UASI of 2003. In the past, funds to sustain established MMRS cities were made available. Under DHS, funds to sustain the established MMRS programs have continued. However, future federal support is no more certain than for any other program. No new MMRS systems have been established since 2003. Interestingly, the FY2005 allocation for the National MMRS Program decreased to $29 million. The MMRS program was assigned no funding in the White House proposed budget for 2006. But efforts are under way to establish some funding. The 2005 allocation (and 2006 if any) is also subject to retention of 20% at the state level. This makes the federal commitment to the successful MMRS cities even more tenuous.

13.2.2 The Urban Areas Security Initiative

In July of 2002, President George W. Bush approved the *National Strategy for Homeland Security* as a framework for national efforts to prevent and respond to terrorist actions. Beginning in 2003, the DHS Office for Domestic Preparedness (ODP, formerly part of the DOJ) inaugurated UASI as part of the *National Strategy for Homeland Security*. In late 2003, President Bush approved the Homeland Security Appropriations Act. This act continues and expands UASI at a funding level exceeding $4 billion. Seven urban areas were approved for funding in 2003. That number grew to 50 in 2004. For 2005, DHS added seven new UASI jurisdictions. The awards range from $207 million to New York City, to $5 million for Louisville, Kentucky. In addition to these grants, 25 mass transit systems were identified for funding in 2004. The 2006 UASI guidance reduced the number of continuing cities to 35 with the highest calculated risk levels and reduced future program funding.

UASI Aims and Funding

The purpose of UASI is “to create a sustainable national model program to enhance security and overall preparedness to prevent, respond to, and recover from acts of terrorism” (USDHS, 2004d: vii). The level of funding for urban areas has been based in part on risk assessments. UASI does not impose a particular response model. It requires local governments to cooperate in making a strategic plan that either creates a new or supplements existing disaster plans for terrorist attacks in the urban area. The program has also been directed to develop an all-hazards emphasis. In these positive features it is similar to *Project Impact*. This was an under-funded FEMA effort to establish disaster resistant communities (Witt, 1999). UASI allows spending across five areas: planning, equipment acquisition, training, exercises, and management and administration. The funding is intergovernmental. Federal money is given to states which, in turn, pass funds to local governments, who distribute it among themselves. Money allocated based on strategic plans and mutual agreements among the core city’s urban area administrator, the participating municipal governments, and the county and state emergency authorities. All expenditures are subject to federal review.

Recently, the DHS has changed its approach to funding local programs. The DHS Office of State and Local Government Coordination and Preparedness (SLGCP) has created a program that combines the application process for six major federal programs and centers that process with state governments. The programs affected are the State Homeland Security Grant Program, UASI, the Law Enforcement Terrorism Prevention Program, the Citizen Corps Program, Emergency Management Performance Grants, and the MMRS Program. Some of the budget allocations appear to have increased. Others decreased over previous years. Cities will primarily receive less. States get more resources and a greater administrative role and burden.

UASI Concept of Operations

Plans developed by urban areas are not subject to public scrutiny. Much of the public UASI material focuses on milestones in prevention, planning, response and recovery that have terrorism-related goals. Many of the UASI urban areas have adopted response plans that follow the model used by the National Urban Search and Rescue (USAR) program (FEMA, 2003b). The basic premises of this approach rely on specialized equipment and specially trained mobile response teams. The federal requirements define the response area as the urban area. But many states require UASI operations to extend statewide. UASI urban areas that contain MMRS cities usually adapt MMRS capabilities under a UASI operational plan. This tactic incorporates into UASI the MMRS's mobile capability.

The basic concept of operations adapted from USAR creates rapid response teams. The teams are spread through the urban area reducing travel time, and achieving dispersal of equipment, personnel, and response vehicles. The teams are organized into a task force concept. Teams can be activated (requested) by any jurisdiction faced with an overwhelming event. The teams can quickly deliver expertise and equipment to any jurisdiction. Most urban area teams bring law enforcement resources. The teams are designed to enhance of local resources. This concept of operations combines the strengths of the IMS for managing on scene response and EOCs as strategic and resource centers.

Common UASI Operational Elements

The goal of a UASI Task Force is to deliver a timely response anytime disaster demands overwhelm local capability. This approach addresses a big problem faced by small jurisdictions. Events may quickly outstrip the ability of the jurisdiction and its local mutual aid to respond effectively. A UASI task force supplements and reinforces the local jurisdiction response. UASI resources can arrive much more quickly than federal resources under the NRP.

The first step in UASI operations is the rapid deployment of an Incident Support Team (IST) for situation assessment. The IST then operates within the IMS to mobilize other resources. The IST supports the decisions of the local Incident

Commander. The UASI operational component is captured in rapid response teams (RRT) trained and equipped to operate in CBRNE environments. These are also capable of mounting operations for structural collapse, technical rescue, fire suppression, pre- and post-blast explosive operations, SWAT, mass medical casualties, and mass evacuation.

The activation of the IST and RRTs requires an inter-jurisdictional command and control system. In a large incident, every jurisdiction centers its command strategy in a local EOC. All federal CBRNE resources are available through the FBI Joint Operations Center, a NRP Joint Field Office, and/or the state EOC. In each case, local EOC decision-makers report to officials of their jurisdiction. A network of EOCs may be activated that represents city, county, and state jurisdictions. The IST represents the UASI Task Force command and control on scene. The IST supports the local IMS and Incident Commander and the local EOC. The local IC controls incident response. The IST supports the local command structure. The IST is the interface between the local jurisdiction, UASI resources, state resources, and federal resources.

UASI Policy and Prospect

Local emergency managers view UASI cautiously. It brings substantial funding to local needs. It allows a degree of local choice in planning, administration, and funding. Complaints include concern that the federal level defines the funding for each budget category. Local governments bear much of the accounting load.

FOR EXAMPLE

Phoenix, Arizona MMRS Anthrax Responses

Prior to September 2001, the Phoenix MMRS had responded to three emergency calls of “suspected anthrax” or “unidentified white powder.” Each of these incidents was positively identified as a hoax (the substance was a food product and not harmful). Like most other major cities, Phoenix experienced a high volume of anthrax calls following the detections of anthrax in Florida, New York, and Washington, D.C., after the 9/11 attacks. The high frequency of anthrax calls continued for more than three months; between October 10 and November 12, 2001, 243 anthrax/unidentified substance calls were dispatched. All of these incidents were hoaxes (the suspected anthrax or unknown substances, when tested, were food products: flour, dry coffee creamer, powdered sugar, granular sugar, or corn starch). The high budget consequences of sending full MMRS teams to these calls required that the city develop smaller, streamlined teams with specialists and testing equipment to such calls.

There is also concern that the pass-through mechanism from federal to local agencies diverts funds from urban area preparedness. Finally, if UASI is to succeed in sustaining a local response capability, there must be high levels of continuing cooperation among federal, state, county, and city government.

At the present time, there is little basis for judging the success of the UASI program. The program is new. But plans must be kept secure. When combined with the usual hurdles to data collection, these obstacles inhibit the amount of information in the open literature for evaluating the program. Most urban areas funded in the FY03 cycle have obtained federal approval of their strategic plans. But implementation is slow. There has simply not been time to establish a capability that could be evaluated in full-scale exercises. The most pressing problem is the overall decline in funding. In 2006, DHS cut back the number of cities funded to 35, notifying those that remain of termination. Most of the original UASI goals are unachieved and selected assets have been acquired by selected urban areas. It is doubtful that urban areas can continue the preparedness and other measures achieved under UASI without further DHS support. There is at least the strong possibility that UASI cutbacks will represent a loss of previous investments and a decrease in local preparedness.

SELF-CHECK

- Why can't we just deal with terrorist threats in the same mitigation, preparedness, response, and recovery format for natural and technological hazards?
- What are some of the vertical and horizontal linkages created by MMRS programs
- What is the difference between **emergency gross decontamination** and **technical decontamination?**
- UASI may lose federal support, with severe consequences for local jurisdictions. Can you think of ways locals can protect their capabilities when complying with federal programs?

SUMMARY

As an emergency planner, it is in your best interest, and your community's best interest, to understand what programs the federal government offers and the requirements of each. In this lesson, you examined the history of federal emergency planning mandates and how they are developed. You evaluated the importance of inter-governmental relations in plan and response success. You defined the structure and function of LEPCs. You also described the National Incident Management System and the National Response Plan.

KEY TERMS

Awareness Level Responders	First responders with specialized personal protective gear and CBRNE training capable of recognizing a likely WMD threat, initiating response and calling more specialized assets.
Emergency Gross Decontamination	Quick use of water to clean victims of traces of a CBRNE agent.
Focusing Event	An incident that brings into the public and government spotlight certain aspects of emergency management policy.
Hazard Source Substitution	The replacement of one high threat chemical in a process with another lower threat or no threat chemical.
MMRS IMS Model	Model in which all personnel are trained and equipped to detect and address CBRNE incidents at differing levels of specialization.
MMRS Strike Force Model	Model in which specially trained and equipped mobile personnel are deployed after a CBRNE incident is verified.
Technical Decontamination	Use of special solutions, specific to the agent, and scrubbing to remove an agent from the skin.
Technician-Level Responders	Personnel who have extended PPE, agent-specific training, and extensive specialized equipment.
Window of Opportunity	A period of time where political will to change, the funding for change, and a continuing threat all coincide.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of federal emergency planning mandates.
Measure your learning by comparing the pre-test and post-test results.

Summary Questions

1. All local governments and Indian nations must adopt NIMS. True or False?
2. NIMS is:
   (a) an incident command system.
   (b) a training system.
   (c) an equipment and personnel certification system.
   (d) All of the above.
3. It is a myth that citizens become angry when they are informed of the scientifically determined risks of a specific hazard. True or False?
4. The NRP is a catalog of national government capabilities related to terrorist incidents and other disasters. True or False?
5. The unique organizational feature of MMRS programs is that:
   (a) they bring together government, nonprofit, and private organization disaster expertise.
   (b) they have been inexpensive to operate.
   (c) they combine terrorist response with other hazards.
   (d) they utilize a strike force concept of operations.
6. Terrorist-related restrictions on public disclosures of emergency plans restrict:
   (a) LEMA capabilities to effectively self-evaluate plans.
   (b) LEMA risk communication programs with the public.
   (c) LEMA ability to obtain external expert evaluations.
   (d) All of the above.

Review Questions

1. What are the primary reasons that national attempts to establish disaster response models or frameworks have failed?
2. What is the ultimate goal of the National Response Plan relative to the management of disasters in local communities?

3. Why is it difficult to develop all-hazard emergency management programs that effectively consider both natural and technological disasters and terrorism?

Applying This Chapter

1. You are the LEMA Director in Morenci Arizona. You have moderate resources and only small federal emergency funding. What problems do you face in trying to implement NIMS? What are the principal challenges DHS faces in overseeing NIMS?
2. Phoenix, Arizona was one of the first MMRS cities. As a Phoenix emergency planner, you have been asked to make a presentation to the 10 most recent MMRS cities. How will you explain that an MMRS is more likely to succeed if you practice comprehensive emergency management?
3. Although the UASI program funding waxes and wanes, your small city LEMA Director wants to know if any program components might improve your response strategy. You have been assigned to research the program and find out what can be used. The equipment and training support seem too costly but you focus on response strategy. What is the basic operational response strategy or concept of operations used under the Urban Areas Security Initiative?

YOU TRY IT

Selecting an Alternate EOC

You have been assigned to lead a team that will select a new secondary EOC for your jurisdiction. The LEMA director has given you a list of 11 buildings owned by the city where space can be made available for a backup EOC. No decision has been made on whether the EOC facility will be fully equipped or designed for hasty implementation. What issues will you consider in choosing a site from among the 11 alternatives?

Message Distortion Control

You have been assigned to review the on-site emergency response plan for a large chemical firm in your community. The plan creates decontamination teams, medical teams, pipe and container repair teams, and extrication teams. There appears to be no specific command structure for operations. How would you help the company planner adapt a basic IMS structure to organize the company response?

MMRS and UASI Combinations

Your jurisdiction was one of the first MMRS cities and has now been chosen as the core city in a UASI urban area. You have been assigned to develop a single concept of operations statement that combines the MMRS with the UASI response plan. What agency representatives will you consult for this task? What will your outline of the combined concept of operations look like?

14

EMERGENCY PLANNING PROFESSIONALISM AND THE FUTURE

Professional Identity, Credentials, and Prospects

Starting Point

Go to www.wiley.com/college/Perry to assess your knowledge of emergency planning professionalism and the future.
Determine where you need to concentrate your effort.

What You'll Learn in This Chapter

▲ The evolution of emergency planning into emergency management
▲ The criteria used to measure emergency management as a profession
▲ The avenues available to practitioners for professional growth
▲ The legal liabilities of and protections for emergency managers
▲ Trends in emergency planning and management

After Studying This Chapter, You'll Be Able To

▲ Examine sources for practitioner certification and education
▲ Distinguish emergency managers from first responders
▲ Place the emergency planning function in the profession of emergency management
▲ Examine the importance of continued professional development in emergency management
▲ Analyze the role of technology in the 21st century practice of emergency management

Goals and Outcomes

▲ Create a personal professional development plan
▲ Evaluate the credibility of certificate programs
▲ Assess conditions and statutes establishing immunity for emergency managers
▲ Evaluate the impact of 21st century challenges for emergency management
▲ Assess barriers for LEMA adoption of emergency management technology

INTRODUCTION

Emergency planning drives preparedness, defines processes, and creates plans. Planning achieves jurisdictional goals related to mitigation, response, and recovery. It is an activity that creates disaster resilient communities. The many facets of emergency planning can be understood in relationship to emergency management. Planning can be pictured by the education and credentials needed to do the job. It can also been understood relative to the changing demands on emergency planners.

14.1 Picturing Emergency Planning and Management

Emergency planning is done by people working in public or private organizations. But who are emergency planners? How do they relate to the context in which they work? Part of this issue concerns job titles and jurisdictions. Through the 1950s, civil defense authorities did some of the functions now done by local emergency management agencies (LEMAs). Many cities placed emergency functions in fire or police departments. Some used a committee under a Civil Defense Director. By the early 1970s, there was a clear need for skills exceeding civil defense requirements. Particularly, the rise of technological threats required more knowledge and training. Thus, emergency-planning agencies were created or renamed and the employees titled emergency planners.

As planners' skills continued to grow, the term emergency management was used to capture the wide scope of planning activities. The title "planner" persisted for many years in the civil service systems. "Emergency manager" conflicted with job classification systems that kept the term "manager" for specific job duties. Then the International City Manager's Association adopted the term emergency management and civil service systems began to change (Whittaker, 1979). Emergency-planning departments became emergency management agencies. And the planning function came to be done by emergency managers. Planner persists as a title, but it is more often a function.

In time, emergency planners have become indistinguishable from emergency managers. We will use the two terms—like others in the profession—interchangeably. However, we will distinguish the function of emergency planning. The changes in terminology reflect the growth of emergency planning and management as a profession. To understand the profession, we need to discuss who the practitioners are, what a profession looks like, and where emergency management stands.

14.1.1 Emergency Planners and Managers

Emergency management usually includes a diverse range of participants. Some of these are defined by function; some, by area of scientific specialization.

Because the task of managing has grown more complex, the number of actors who support emergency functions has also increased.

With so many people involved, it became important to define the role and create a professional identity.

- An **emergency manager** is "one who possesses the knowledge, skills and abilities to effectively manage a comprehensive [emergency] management program" (Ditch, 2003: 12). The International Association of Emergency Managers (IAEM) definition specifies that a program includes the tasks of mitigation, preparedness, response, and recovery.
- An **emergency planner** is an emergency manager performing or leading the technical planning process to achieve defined mitigation, preparedness, response, or recovery goals.

To be a profession, people must agree about the main features of the field and its practitioners' skills. Emergency management is an applied practice. It is a public policy pursuit. It is also an academic research and teaching area. Certainly, one person may work in more than one area. When we speak of training and education for emergency managers, however, the distinctions among the roles should be respected. Each role reflects a different perspective and scope of responsibility.

There are distinctions among practitioners of emergency management. There is an important difference between first responders and emergency managers. The first responder directly addresses the consequences of a disaster, often at a task level. Brunacini (2002) tells firefighters their job is to put their bodies between citizens and a threat. They perform the tasks for which they are trained while the broader response is coordinated centrally by "emergency managers." An important difference is the orientation (and training) of the first responder to act in the preparedness and response phases to execute very specific duties relative to the threat at an incident scene.

Terrorism threats sometimes make physicians, nurses, and medical personnel fit the traditional definition of first responders. The point here is not to exclude but to distinguish first responders from emergency managers. Managers handle strategy and tactics for a wide range of threats. They address the full range of mitigation, preparedness, response, and recovery. They rarely appear at a scene to deliver services. But they coordinate the efforts of first responders during the response phase. They also emphasize the planning and coordination that characterizes Integrated Emergency Management Systems (IEMS). The link between emergency managers and first responders is emphasized in practice. At a city level, management duties are often performed by people trained as first responders within fire or police departments (Drabek, 1987). Emergency management duties—especially their planning duties—expand the scope of their jobs far beyond their first-responder duties.

Different settings affect the nature of a manager's duties. A main distinction is between government and private sector emergency managers. Although they do many things the same way, there are important differences as well. Private sector managers have a more narrow scope, usually focusing on a single business, site, or industry (Elliott et al., 1999). Except when mandated by law, private sector managers look out for their employees, not the public. The reason for engaging in emergency management in the private sector is tied to corporate life and viability (Lindell and Perry, 1998). By contrast, government managers address the needs of citizens, government employees, governments as organizations, and sometimes private sector organizations (Perry and Lindell, 2003b). Governments also engage in emergency management as a public duty. They may also be held legally liable for failures to recognize and plan for threats. Of course, private groups can also be held liable in courts. But they are not usually expected to engage in community emergency management. One setting is not better than the other. Private and public managers operate with differing scope, resources, obligations, and public accountability.

Managers at different levels of government have different issues of scope and context. The way emergency management is constituted and resources allocated varies among jurisdictions. It also varies among governmental levels. At the city level, it rarely exists as a separate department except in large cities. It is often embodied in an emergency manager's or a city manager's office. Or it is placed within a fire or police department. Sometimes much, if not all, of the management function is given to a county organization (Emergency Management or Sheriff's Office). Local management functions are highly variable in their presence as well as in their degree of success [(USGAO), 2003a]. The city level is closest to the people and the threat. This reflects the idea that all disasters are local. At the same time, local emergency managers inherit federal and state mandates. And they often have the fewest resources. They must rely on outside help, the media, and even private groups to achieve their goals.

State and federal emergency managers occupy positions very different from local managers. Each state has an emergency management department. At the federal level, the Federal Emergency Management Agency (FEMA) is now part of the Department of Homeland Security (DHS). The DHS works with federal agencies under the National Response Plan. Federal and state management operate at a policy and program level. Only a few programs involve direct response operations during events. The NIMS has resources "flow downward" to local managers. At federal and state levels, the job emphasizes "management" of programs. The ability to find experts and technology and link them with programs and policies remains important. But as Drabek (1990) notes, key skills also include agenda control, building support, and budget and financial analysis. Also, tenure terms may lead federal officials to adopt narrow planning horizons (Moore, 1995).

Emergency managers cannot be trained and educated to do everything. Often, the list of desirable knowledge discourages people ("here's what you don't know"). This isn't to say that creating a job description for emergency managers is without value. But it is important to not overwhelm people. Instead, communicate priorities. These vary by role: public versus private, governmental level, specific technical focus, etc. The professional challenge for training and education is to create effective managers who can master the knowledge and be a team player. To survive into the future, the *emergency manager* must give way to the *emergency management team.*

14.1.2 Emergency Management as a Profession

The concept of profession serves as a road map for what to expect. It also serves as a source of benchmarks for progress. A **profession** is a collection of practitioners identified by expertise who control and apply a given body of knowledge. And they operate with an element of professional accountability (Friedson, 2001). This approach implies a degree of homogeneity. However, Trank and Rynes (2003) note that a given profession may be composed of a variety of occupations. Each is distinct to some degree. Nonetheless, they can be grouped together in terms of shared knowledge and shared goals. Evetts (2003: 397) also sees "professions as the structural, occupational and institutional arrangements for dealing with work." In both of these views, a profession is a category of activity, within which one finds a variety of occupations.

There is agreement on the key features of professions. The first of these is that *professions have explicit membership rules that exclude the unqualified*. Usually, this means education and training are required for legitimate claim to membership in a profession. Mature professions rely on academic degrees from accredited programs. Sometimes there is a national certifying test. The content of degree programs is guided by an external professional accrediting agency. The agency reviews the content of the degree program and offers an official and public approval. This interaction ensures the education provided reflects the standards of the profession.

Training is narrower than education. It is aimed at explaining the use of tools or understanding appropriate responses to particular situations. Less mature professions—lacking degree programs and accrediting bodies—use training as the "marker" to identify practitioners. In this context, training is multidimensional. Practitioners may require specific training in a variety of skills to adequately claim professional status. Also, training is bounded in time: specific problems may change and specific solutions to deal with problems may change.

Certifications ensure that a person has mastered either subject matter content or operational expertise (or both). This may involve classroom-based training or other forms of showing knowledge. All require that those certified demonstrate their knowledge in some structured format (e.g. test). Certifications can represent either very specific or broad knowledge, skills, and abilities. The professional legitimacy of any certification depends on the authority of the organization that offers it.

A second defining feature of professions rests in *the creation and control of knowledge systems that are used to define a field of endeavor*. Mosher (1968: 122) pointed out that "the perspective and motivation of each professional are shaped by the lens provided…by professional education, professional experience, and by professional colleagues." Hays and Reeves (1984: 137) emphasize that professions have an "evolving and agreed-upon body of knowledge" and worldview. The body of knowledge may be science based. However, other knowledge can also be used, depending on the focus of the profession. The important point is that the knowledge is systematic. There must be agreed upon rules for generating, evaluating, and using the knowledge. The body of knowledge is the "foundation from which professionals innovate and extend the knowledge base" (Trank and Rynes, 2000: 191).

The third defining feature of professions is *the ideological and ethical component*. A profession socializes members to view the world from a particular perspective. They follow professional norms that may differ from those of the public. Friedson (2001: 122) stated that the ideology of a profession gives members a "higher goal that may reach beyond that of those they are supposed to serve." This attitude defines the professional identity. It supports the use of caution in finding problems and solutions. Professional ideals are usually embodied in ethical codes. These codes reflect the values of the members of the profession. Ethical codes encourage compliance as proof of professionalism. There may be sanctions for those who fail to comply.

These three features of professions provide a platform for understanding emergency management as a profession. The control of membership, the control of a body of knowledge, and an ideological (ethical) component together offer a picture of what professions must accomplish. They also define accountability.

The Evolution of an Emergency Management Profession

Most practitioners would agree that emergency management is a profession. But they would disagree about its maturity. We view it as a developing profession. After all, the concept itself has been undergoing very rapid change. As recently as the 1950s, emergency management largely meant wartime attack preparations. Since then, the vision of the field has added natural and technological hazards and, most recently, terrorist threats. Over the same period, the profession has changed from reactive to proactive. Former FEMA Director James Lee Witt (1999) led the field to make mitigation as important as preparedness, response, and recovery. The threat environment has radically changed. The tools for coping with these threats have also changed.

In the 1950s, the job title was often Civil Defense Director. These people rarely had training beyond some history in the military. They often were not college educated and were usually not high up in the jurisdiction administration. The emergency manager was a largely "invisible person, presumably attached in some way to defense authorities (whoever they were), charged for the most part with civil defense duties (whatever they were) (Perry, 1985: 135). Blanchard (2005) pointed out that this vision has given way to a career-oriented, college-educated professional. This is a person who uses scientific knowledge to oversee complex systems. The manager is seen as one who must have communication and organizational skills of a professional. And they must also grasp the particulars of a range of environmental threats (Drabek, 2003).

The picture of the profession offered here is multifaceted. Managers must assess the full range of hazards and set goals. This point separates emergency managers from first responders. Emergency management also involves using the skills from many disciplines. Thus, the manager understands each skill fits into the picture. Like any other profession, it requires strategic planning, political management, and human resources management (Blanchard, 2003).

Avenues to Developing the Profession

The three aspects of professions help define the professional status of emergency management. The first point helps define *emergency management as a profession and a professional identity*. Paths to this outcome include enhancing our professional ideology and ethics. Emergency management is interdisciplinary. It also serves as an umbrella for many technical fields (an inclusive approach). We also need to establish boundaries. These identify unique features of being a manager. This process need not be combative. It should produce a reasonable vision of what emergency management is and is not. Much of this is done by using comprehensive emergency management and integrated emergency management systems. It is productive to distinguish emergency managers from first responders. It can be done without asserting that any field is more important than another.

A professional association is one mark of a maturing field. There are many associations for management professionals. These range in emphasis from narrow subject matter (the Association of Contingency Planners) to broad subject matter (National Association of Environmental Professionals). There are at least three key groups. The IAEM has a long history. It began as the Civil Defense Council and then became the National Coordinating Committee on Emergency Management. The IAEM sponsors meetings, continuing education, and a professional certification program. The National Emergency Management Association is open to state management directors. The Disaster Preparedness and Emergency Response Association is international in scope. It embraces both public and private sectors. Participation in these groups provides a chance for learning, for networking, and for gaining a "sense of self" as a manager.

Creating an identity for managers is also done through continuing education and professional development programs. Continuing education is available through universities, corporations, and government sponsorship. For example, the most extensive professional development opportunities can be found in the programs operated by FEMA's Emergency Management Institute. There is a "Professional Development Series" and an "Advanced Professional Series." Each of these offers specialized training and certificates for completing a course of study.

Professional ethics is also important to professional growth. The IAEM emphasizes ethics among its members. It has adopted a formal ethical code. The IAEM code has three parts. The first focuses on the need to respect people, law, and fiscal resources. The second focuses on creating trust, acting fairly, and using resources wisely. Finally, the code asserts that members should embrace professionalism founded on education, safety, and protection of life and property. This code also notes concern for respecting the regulations and resources of the organizations served. Moore (1995) argues that such rules place the emergency manager in the role of "faithful servant." As they become "experts," some professional groups move away from this position. They focus on ethical aspects of service reflecting discipline-specific principles and evaluative rules.

Emergency managers are likely to be subject to a variety of ethical codes. For example, those who are Certified Environmental Professionals are subject to the Academy of Board Certified Environmental Professionals Code of Ethics and Standards of Practice for Environmental Professionals. The Business Continuity Institute also has a code of ethics for members. Many emergency managers are members of the American Society for Public Administration. Finally, managers are subject to the codes of their jurisdictions. This "nesting" of ethical guidelines is rarely a problem. It is common for professionals. Ethical codes inform the public and the organizations where professionals work that managers are prepared to act in keeping with their professional identity and standards.

A second professional measure is an *identifiable body of knowledge for managers*. Emergency management will always use knowledge from other fields. Scientific knowledge has a significant role in the conduct of emergency management. And there is a growing body of knowledge specific to the field. We need to increase the body of knowledge of strategies and tools. Such growth supports better management. It also supports the review of the many tools managers use. Currently, this body of knowledge is very sparse (Lindell and Perry, 2001). Drabek (1987, 1990, 2003) is one of the few researchers who has studied the organizational strategies of emergency managers. Managers benefit from research. Managers should support meaningful research. They should offer ideas for topics or note areas for research attention. They should also critique the results of research, using the knowledge in their work (Mileti, 1999: 257).

There has been new growth in the emergency management body of knowledge. Contacts between professional associations facilitate communications about research priorities and research results. An organized body of tested knowledge is a critical support for claims. This body of knowledge forms a defensible basis for practice. When new methods are needed, it is the platform from which one innovates. The extent to which managers know this body of knowledge provides a standard for evaluating their performance. It also forms the basis for their education and training. It also helps assert credibility to the public and other decision makers.

The third measure of this profession assesses efforts to *assert control over the body of knowledge and its dissemination*. This goal is achieved by training, certifications, and academic degrees. The IAEM and the FEMA Higher Education Project are two sources for the education and training. The process of training is a public indicator that sets emergency management apart as a profession. To gain control of a body of knowledge, however, managers must define the limits of what information lies within it. Thus, they define the goals for training and education (Walker, 1998).

Institutional Influences on Emergency Management

FEMA and the DHS represent the national government authority on emergency management. FEMA does not have control over the broader profession. It has both an obligation to lead and define government emergency management. FEMA speaks for the government, but not for professional associations, researchers, or the private sector. Through its Higher Education Project, established in 1996, FEMA has undertaken three paths to define and influence the use of the emergency management body of knowledge. This first path is through practitioner direct study (Blanchard, 2003). The second tactic has been to create specific courses with emergency management content. These are available online. Third, FEMA has compiled and circulated a list of college level programs.

The National Fire Administration has long been a part of FEMA. But there is a close relationship between the fire service and emergency management that predates FEMA. The fire service has been influential in the growth of emergency planning and management. Fire departments have always played an important role in disaster planning as well as response. For many years these departments were the main home for city emergency management functions. The National Fire Prevention Association (NFPA) was the first to recognize emergency management as a critical function. They set standards for its execution. The NFPA

FOR EXAMPLE

Defining Emergency Management Responsibility

The Society of Human Resource Management (SHRM) is an association of private and public sector personnel and human resource managers. In 2002, they began urging their members to broaden the definition of their duties to develop plans for protecting human resources in disasters and terrorist incidents. The SHRM sees a wide role in the planning process for their professionals to support emergency managers in creating personnel protection mechanisms, urging employees to have personal disaster plans, and preparing to address the work-related disaster needs of employees and their families.

standards defined clear boundaries for the field of emergency management. It also set both a task list and skill set for managers.

SELF-CHECK

- Define **emergency manager** and **emergency planner.**
- What is the difference between an **emergency planner** and an **emergency manager?**
- How can emergency management as a field ensure that only qualified people do the job?
- Why should emergency management have an ethical code?

14.2 Opportunities for Education and Training

Education and training in emergency management have expanded. In the 1980s, training focused mostly on sub-areas such as medical services, hazardous materials management, and firefighting. Some college courses were available. But almost no college offered degrees until the 1990s. As the profession grew, the need for emergency managers has been more widely recognized. There are now many more programs that offer basic education and training. These are based in universities, professional associations, and private organizations.

14.2.1 Certification Programs in Emergency Management

Training programs and classes are an important step in ensuring that management knowledge gets to practitioners. There are programs that also offer a certificate. Certifications are a means of ensuring that managers get technical training and can document their expertise. There are certifications available in many areas. Each of these programs has its own audience. Each has its own level of credibility and visibility. In some form, **certification programs** test the knowledge and experience of emergency professionals and provide documentation of performance.

There are many specific certifications of interest to emergency professionals. Some test broader skills. Some test narrower skills. Since 1979, the National Association of Environmental Professionals, now through the Academy of Board Certified Environmental Professionals (established in 1993), has offered the Certified Environmental Professional (CEP) program. This is a very broad certification. It offers five functional areas in which one may test for certification—environmental assessments, documentation, operations, planning, and research and education. The CEP is a challenging certification. The minimum requirements include a bachelor's degree and 9 years of experience.

Business continuity planning offers a range of certificates. According to Mallet (2002), the two principal sponsors are the Business Continuity Institute (BCI) and the Disaster Recovery Institute International (DRII). BCI offers a series of progressive certifications that are keyed to levels of institute membership. DRII offers three graded certifications—Associate Business Continuity Planner, Certified Business Continuity Professional, and Master Business Continuity Professional. A number of universities and colleges also offer certifications in contingency planning and recovery planning. The University of Richmond (Virginia) offers four levels of certification for a Recovery Planner—Associate, Certified, Senior, and Master.

The largest number of certificates is offered in homeland security specialties. The ASIS International Foundation has offered the Certified Protection Professional program since 1977. In 2002, it began programs for Professional Certified Investigator and Physical Security Professional. Other established certifications in this area include the Certified Information Systems Security Professional, the Systems Security Certified Practitioner, the Certified Information Systems Auditor, the Security Certified Network Professional, the Security Certified Network Architect, and the Global Information Assurance Certification. The Association of Certified Fraud Examiners offers the Certified Fraud Examiner program. Blanchard (2005) located 42 programs in emergency management. And there are 53 certificate programs in Homeland Security, Homeland Defense, Terrorism, and Critical Infrastructure Protection Programs.

One must exercise caution in the pursuit of certification programs. Kaplan (2004: 1) points out that with the "pent-up demand for trained staff, the certification industry—those companies that administer or provide training for exams—has created a bevy of new certifications." Kaplan found several certification programs that provide instant accrediting based on experience for a fee. People should be warned to select programs that have been in existence for a long time. They should have independent boards of examiners. They should have established training and education programs. And they should be supported by relevant associations. One can also look to the National Fire Protection Association Standard 1000 *Fire Service Professional Qualifications, Accreditation and Certification Systems*. This standard identifies features to look for when choosing a credential.

The key credential for practicing managers and planners is IAEM's Certified Emergency Manager (CEM). The CEM program increases and maintains standards for managers' knowledge, skills, and abilities. In 2002, 560 individuals had received the CEM. It is renewed on a five-year cycle based on continuing education and service (Ditch, 2003). More than 60% of CEMs in 2006 have held certification more than 5 years. The CEM program is overseen by a Certification Commission. It is composed of various managers, FEMA, and associations.

The process for becoming a CEM involves four phases. You must complete an application, fulfill credential requirements, pass the test, and recertify after five years (Ditch, 2003). The requirements address education, training, and experience. You must have a bachelor's degree. Applicants must have at least three years of experience. But it is possible to use college degrees as experience. The rate is two years of experience for one year of education. Applicants must have practical experience in managing a disaster incident. Or they have had a major role in managing a full-scale disaster exercise. The CEM requires 100 hours of emergency management training and 100 hours of general management training. There is a 25-hour limit placed on training in any single area. The training should cover mitigation, preparedness, response, and recovery. You must also demonstrate "contributions to the profession" in at least six specific areas of activity. These include teaching, publishing, and serving on boards. Finally, everyone must complete a technical essay. The next step is to pass a test. Following the test, CEMs must recertify every five years. The CEM program is the only one that looks at the full range of knowledge, skills, and abilities of emergency management. Only the CEM ensures skills in management and management systems. The CEM has come to be accepted by those outside the profession as a sign of expertise. Thus, it is common that job applicants are required to have the CEM or to acquire it.

14.2.2 College and University Academic Programs

In almost all cases, certifications are related to academic experience. And they are not intended to take the place of degrees. The process of certification ties education and training with professional experience.

The growth of academic programs that support the profession shows that emergency management has matured as a field. Degree programs at the bachelor's level include other related fields the manager should know. Thus, there is a depth and breadth to a college education. And there is an emphasis on principles, models, and theories, not only problems and solutions. This gives students a broad range of problem-solving skills. It is this knowledge that reinforces the important ability to improvise (Drabek, 2003). Degree programs are a link between people in the field and researchers. Managers often use the body of knowledge. But they have little time to conduct the research to refine and extend it. Thus, the academic community assumes the role of conducting research. Centers that focus on management and disasters include the Disaster Research Center at the University of Delaware, the Natural Hazard Research and Applications Information Center at the University of Colorado (Boulder), and the Hazard Reduction and Recovery Center at Texas A&M University. Tierney, Lindell, and Perry (2001) found 28 such university-based centers. However, to support an entire profession, the academic connection needs to be both broad and deep.

The path to academic support for a profession is long and multifaceted. There must first be a demand for education and training. For managers, this means that the job market must need people. Small labor markets rely on training and certifications. These types of programs can be sustained at a small volume.

In the past decade, the number of jobs for managers has increased. The levels are high enough to provide a market for academic programs. Market recognition of emergency management has grown. Market needs will increase the need for degree programs. Darlington (2000) studied a sample of 1,886 schools. He found that 11.6% offered at least one course with emergency management content. However, less than 1% of colleges offered a bachelor's degree. And 1.5% had a postgraduate program. These numbers seem small, but there were no degree programs in the United States prior to 1983.

Content standardization across degree programs is the next professional challenge. There must be some assurance that graduates have a defined body of knowledge and skill consistent across programs. This body of knowledge and skills is defined by research and experiences. This information is given to faculty through publications, personal experience, or contacts with emergency managers. Both the FEMA Higher Education Project and the IEMA have taken active roles in shaping the vision of emergency management knowledge, skills, and abilities. FEMA has partnered with government agencies, professional associations, and private groups.

At some point, these efforts will mature into an accreditation system for degree programs in emergency management. This development is analogous to the development of certification for individual emergency managers. An **accrediting body** is an independent authority established to devise standards and create a review process for academic programs. Typically, such bodies or commissions are national or international in scope and, in addition to evaluating compliance with curriculum standards, foster communication within a profession. Walker (1998) has provided an extensive history and discussion of accreditation, including comments on the creation of an accreditation body for emergency management—similar to the International Fire Service Accreditation Congress. This type of accreditation focuses on academic program content and performance. It is distinct from institutional accreditation given to universities. Program accreditation ensures institutions provide the body of knowledge for professional practice.

14.2.3 Professionalism and Legal Liability

Certification and formal education provide evidence of achievement. This sets expectations for competent performance. Legal liability in the practice of emergency management applies as much to organizations and governments as to individuals. An employer may hold an individual emergency manager responsible for professional knowledge and behavior. But these obligations ultimately rest with the employing organization. A professional association might hold its members responsible for ethical practices. But sanctions are the level of control of the association. Associations do not impose technical competence obligations directly on their members. Certainly, accrediting bodies can withdraw accreditation of those who fail to meet standards. But this takes place in the testing context, not the context of practicing the profession. As yet, the legal system has not seen in emergency management anything like "medical malpractice" for doctors.

Statutes vary among the states. Government emergency powers to address disasters vary too. To understand state laws and practices, one must consult the relevant statutes. At the federal level, there are laws that define aspects of liability. The main ones are the Stafford Act (providing assistance to states and under which the President declares an Emergency or Major Disaster), the Defense Against Weapons of Mass Destruction Act (assigning rights, obligations, and resources relative to WMD according to Title 50, Chapter 40, U.S. Code), the Comprehensive Environmental Response, Compensation and Liability Act (section 105), the Clean Water Act (section 311), and the Homeland Security Act of 2002. A technical discussion of federal law and legal liability is the Defense Threat Reduction Agency (2004) book: *Domestic WMD Incident Management Legal Deskbook*. However, the best advice for a manager who has questions about legal liability is to ask jurisdictional legal authorities.

Emergency managers are usually concerned about two legal liability areas. The first arises when officials, *in responding to an emergency,* cause damage to persons or property. The second is that failure to *plan for or respond to* an event resulted in damage to persons or property. Federal liability under the first concern is addressed in three statutes—the Federal Tort Claims Act, the Stafford Act, and the Homeland Security Act of 2002. The Federal Tort Claims Act waives the federal government's sovereign immunity when employees are negligent in their duties (28 U.S. Code, section 2671). However, the government retains immunity for governmental functions, but it permits civil suits in the case of a negligent action of an employee. Three situations involving immunity are important to emergency managers. First, one may not bring a claim for damages in connection with quarantine. Second, one may not bring a claim if federal agencies or employees can show that they exercised *due care* in carrying out a statute. Third, the *discretionary function exception* provides immunity for federal agencies and employees when the claim is based in the "exercise or performance or failure to exercise or perform" a *discretionary* function (28 U.S. Code, section 2860, subsection a). The Stafford Act, similar to the discretionary function provision of the Federal Tort Claims Act, states:

> *"The Federal Government shall not be liable for any claim based upon the exercise or performance of or the failure to perform a discretionary function or duty on the part of a Federal agency or an employee of the Federal Government in carrying out the provisions of this Act" (42 U.S. Code, section 5148).*

The Stafford Act offers broad immunity for agencies and employees who are forced to improvise in response and recovery actions. There is some liability protection under the Homeland Security Act of 2002. But it has been less well tested in the courts. The Act (Public Law 107-296, section 302, subsection c) addresses the power of the Secretary of DHHS to declare a public health emergency and require medical antidotes for citizens and employees. There are limited remedies offered to those who experience death or injury from such actions. But most of the provision offers immunity to those who manufacture, distribute, or administer countermeasures under an official emergency declaration.

Each state's laws recognize the rights of individuals and businesses protected by tort law. Like the federal government, all states have some form of statutory immunity for emergency management activities. Clearly, there are times when elected officials and employees are not liable for injury or property damage. These protections stem from specific emergency management statutes.

The main issue in court claims has been to define the conditions in which government should be legally accountable and those in which sovereign immunity prevails. Statutory immunity has guaranteed that damages from specific response actions cannot be addressed in court. Immunity is recognized *unless* it can be shown that serious negligence exists. Here negligence means failing to take "reasonable and prudent" actions or when an intentional action harms persons or property.

Actions brought against individual responders usually have been decided in favor of the defendants. When a jurisdiction can show that it has a sound EOP and that managers are following that plan, there is relatively low risk of successful lawsuits. In most states, discretionary or statutory immunity is almost always extended during an actual disaster impact. Four states—Alaska, Kansas, South Carolina, and Utah—extend discretionary immunity when a plan exists and emergency responders are operating within the plan. This also includes drills and exercises. Failure to plan for or respond to an event is also addressed under tort law. Hence, many of the same statutes apply to this situation as well. The conditions demonstrating liability are complex. However, two plaintiff strategies have met with some success in court. The first strategy is to show that an entity failed to plan for an event whose impact produced death, injury, or property damage. The second strategy is to show that there was a failure to perform an effective vulnerability analysis.

Cases tend to be successful when there is a mandate that a plan be implemented. Such mandates may come from any level of government. Federal mandates are binding on all levels of government. The absence of a mandated plan places governments and managers at a serious disadvantage in court. The presence of a mandate is subject to interpretation by the courts. For example, it is clear that "floodplain management" is required by the National Flood Insurance Program. But this guidance may also be interpreted to indicate that flood plans are mandated. Even when a mandate does not appear to exist, you are not immune from litigation. If a plaintiff can argue that a mandate *should* have existed and hence a plan *should* have been in force, jurisdictions and public officials *may* be held accountable. These arguments are made on the grounds that a *specialized or local threat* existed that local officials should have planned for.

The second area of legal liability concerning emergency managers is failure to plan. This issue is also addressed under tort law. It arises whether plans officially were mandated or not. The question is competence or effectiveness. Thus, just

FOR EXAMPLE

International Association of Emergency Managers Survey

In 2005, the IAEM completed a study of its 2375 members that revealed 75% held bachelor's or graduate degrees and 22% were Certified Emergency Managers. More than 75% were males and 70% were 41 years or older. Less than half were members of stand-alone emergency management agencies. There were 12% who worked for the federal government, 9% were in state government, 44% were in local government, and 28% worked for a private or nonprofit organization.

having a plan is not a basis for arguing that a jurisdiction has acted responsibly and is immune from claims. A plan is judged to be effective and competent if it is consistent with guidelines and standards. The notion of compliance with "generally accepted standards" is difficult to define. FEMA has tried to define planning standards with respect to a wide range of threats. Managers who develop EOPs are well advised to follow federal guidance. They should document the rationale used to develop a plan as well.

SELF-CHECK

- Define **certification program** and **accrediting body.**
- Why be cautious in choosing a certificate program? How can you tell good from bad?
- Why is a college or university degree important for emergency managers?
- Under what conditions are practicing government emergency managers immune from prosecution under federal law?
- What are the main issues involved when people bring legal cases against emergency managers whom they believe are liable for disaster outcomes?

14.3 Exploring the Future

It is hard to forecast the future for any profession. Forecasts use recent trends to look into the future. But this can be problematic. The future might be influenced by entirely new events. A critique of disaster planning is that planners spend their time preparing for the most recent disaster. They do not anticipate new events. To make accurate projections, you must have knowledge of trends and project the trend in terms of known vulnerabilities. This approach relies on science. It makes claims not about specific outcomes but classes of vulnerabilities.

14.3.1 Challenges Facing Emergency Planners and Managers

Managers will face a broad range of challenges. These challenges are based in features such as economic issues, changing populations, and the growth of terrorist threats.

Increasing Urbanization and Hazard Exposure

The United States will have population growth and property development in hazard-prone areas (FEMA, 1997; Mileti, 1999; Schwab, Topping, Eadie, Deyle, and Smith, 1998). Despite this exposure to hazards, there has been no increase in deaths from these events. In fact; deaths have declined for many hazards (Sorensen, 2000). However, property losses have increased (Mileti, 1999). Deaths will decline because of improved emergency preparedness and response. But property losses will continue to increase. However, spikes in deaths could result from specific disasters in unprepared areas or those caused by new or unanticipated hazards. Emergency management must respond to these trends by increasing the emphasis on hazard mitigation. Recovery planning will need to focus on preventing the re-creation of high-risk areas. At the same time, preparedness and response measures will need to adapt protective strategies to cover high population densities.

Interdependencies in Infrastructure

Efficiency has produced changes in the economy. This will have an impact on vulnerability levels. **Just-in-time manufacturing,** the delivery of production material only at the time needed in the process, has reduced inventories. Thus, profits are increased for investors. And there are lower prices for consumers. This is a good development. Reduced inventories mean reduced losses when a disaster strikes. However, low inventories make companies more susceptible to supply chain interruptions. Reliance on electronic commerce—and especially banking—enhances the risk that deliberate attacks could negatively affect large regions. Economic impacts are difficult to address except at state and federal levels. The DHS is assigned to address cyber and economic disasters.

Increasing economic concentration in products (larger airplane size), organizations (larger corporation size), and geographic location (industrial clustering) increases short-term efficiency by reducing the amount of resources needed to produce each additional unit of goods and services. This economic concentration often is stimulated by competition that benefits consumers when reduced costs are passed on as reduced prices. This short-term efficiency necessarily eliminates the reserve resources needed to avoid production and distribution disruptions that stop customers from obtaining needed products and services. From the perspective of emergency management, these developments dictate a growing concern with private sector preparedness. Industrial clustering of businesses that deal with hazardous materials is a risk not only to business interruptions but increases community vulnerability.

Continued Emphasis on Growth

Public policy is often affected by "growth coalitions." These comprise real estate, construction, and other commercial interest groups. These coalitions benefit from growth. These benefits create communities where "public subsidies to and private investments in infrastructure, civic capital, construction, and related activities help to attract people, employers and jobs" (Buttel, 1997: 47). Such interests have often developed in hazard-prone land. But attempts to oppose all growth are neither feasible nor necessary. What is needed is *smart growth*. Emergency managers should link with other local agencies, businesses, and community groups to enhance the emphasis on mitigation and preparedness.

Rising Costs of Disaster Recovery

Part of the cost of disaster-related property loss is reimbursed by federal relief programs. The problem with this is that property in the most disaster-prone areas receive the most funding. But the tab is paid by all taxpayers. Thus, property owners in disaster-prone areas are being subsidized. A better system would expand the logic behind federal flood insurance to cover all hazards. Premiums would be in proportion to policyholders' loss potential (Kunreuther and Roth, 1998). This solution was proposed years ago (White and Haas, 1975; Drabek, 1991a). But limited progress has been achieved. Most recently, the dialogue has been renewed by congressional concerns about how much federal funding should be devoted to rebuilding severely damaged areas of New Orleans following Hurricane Katrina in 2005. During the 1990s, federal flood insurance improved with a risk-rating system to reduce repetitive losses. Nonetheless, insurance for earthquakes and hurricanes has become more problematic. Thus, the cost of disaster recovery will continue to be affected by an increasingly politicized process.

Increasing Population Diversity

Diversity of the population also poses challenges to emergency management. The growing number of Hispanic immigrants is well known. But there are many other groups that have also come to this country in recent years. In Los Angeles County, more than 100 languages are spoken. In addition, the average age of the American population is increasing. Thus, many more risk area residents will have physical or mental limitations. Some of these will be in nursing homes.

But others who live at home will require more help when disasters strike (Tierney, Lindell, and Perry, 2001). All of these challenges arose in the response to Hurricanes Katrina and Rita in 2005. These events showed that more planning is needed for warning, evacuation, and sheltering.

There is increasing inequality in American household incomes. Since the middle of the 1990s, the incomes of the top 20% of households have increased, whereas income at the bottom 20% decreased. The median income varies across jurisdictions, with some rural counties having income levels substantially below their urban and suburban counterparts. This has negative implications for jurisdictions whose households have incomes below the national average because of the continually eroding tax base. Reduced revenues mean fewer resources. This disparity between the richest and poorest jurisdictions will continue to fuel the "digital divide" between those who do and those who do not have enough money and training to adopt emerging electronic technologies. At the household level, income inequality is an important component of social vulnerability. It reduces households' ability to respond and to take protective measures.

Terrorist Threats

The methods of assessment for terrorist attacks will differ from those of other hazards. Threat detection, hazard monitoring, and damage assessment differ by hazard agent. However, the types of hazard agents used by terrorists do not differ from those that can be released accidentally from fixed-site facilities. In fact, the Oklahoma City and 9/11 attacks show that terrorists are likely to repeat the use of available destructive agents. That is, future attacks might involve hazardous materials facilities or transportation routes. But the difficulty in obtaining, handling, and dispersing biological and radiological agents reduces the likelihood of their use. We face much more danger from disease. Because a threat probability is low, however, does not mean that it can be ignored.

Terrorist threats pose new challenges. Chemicals such as sarin gas, "dirty bombs," and biohazards may be unfamiliar to local responders. These will require new response procedures and protective equipment. There will be a greater emphasis on effective improvisation. However, the general processes of assessment, hazard operations, and population protection will remain the same. Preparedness for terrorist threats will continue to show substantial variation, depending on the quality of local preparedness networks.

Community preparedness for terrorist threats will continue to have the same goals as preparedness for other hazards. Managers must add this into existing emergency response networks. They must anticipate impacts on risk area populations. They must assess their means for self-protection. There must be clear lines of authority. And managers must allocate resources and identify sources of extra-community assistance. They must find ways to coordinate with them too. Finally, managers must promote resource acquisition at all levels.

Household preparedness for terrorist threats will depend on awareness and adjustment adoption. These threats continue to have a low priority in small, local, private groups without prior disaster experience. Preparedness for terrorist threats will reflect the quality of local preparedness networks. Despite all efforts, response to these threats will depend on improvisation. We must take the lessons learned into planning, training, and exercises.

Preparedness for terrorist threats raises new issues. The presence of an intelligent adversary escalates information security problems that have not emerged during response to industrial accidents and environmental extremes. An intelligent adversary can take advantage of predictable population protective responses to inflict even greater casualties in secondary attacks during emergency operations and mass evacuations. Agencies at local, state, and federal levels must coordinate. Local organizations need to be given training, drills, and exercises on biohazards. Extensive drills and exercises are needed to determine if biohazard contagion could create emergency response challenges even more complex than those of hazardous materials contamination.

Low Priority of Emergency Management

Emergency management used to have a low priority on government agendas. This changed after 9/11. Interest in any hazard is highest when it conveys what Slovic (1987) calls signal value. **Signal value** is the determination that a threat of previously low salience should receive urgent attention. Despite the recent attention to terrorism, it is certainly not new. For example, the Irish Republican Army has used terrorism for decades in Ireland and Great Britain. And it has been an aspect of the relationship between the Israeli state and the Palestinians. Terrorism is not new in the United States. Ramzi Yousef bombed the World Trade Center Tower One in 1993. In 1995, the Murrah Federal Building was destroyed in Oklahoma City. The 9/11 attack was the largest and most successful strike on U.S. soil. The attack was very dramatic and telegenic, as well as very deadly. The challenge for us is to retain the knowledge we have and adapt this knowledge to threats projected in the future.

History shows us that as time passes without disaster recurrence, the salience of the event decreases. Thus, it is likely that recent attention to terrorist threats will slightly wane as time passes without new attacks on American soil. The 1979 nuclear power plant accident at Three Mile Island, the 1985 chemical release in Bhopal India, and other events have attracted media attention and government action in their immediate aftermath. In the long run, however, the media, the public, and government have reverted to an indifferent attitude toward these hazards. Thus, a major question concerns the length of time terrorism will dominate the news and the spending priorities of government. The generally low priority of emergency management could drop even lower in the coming years because of the substantial increase in the national debt and budget restrictions at state and local levels.

Intergovernmental Tensions

Tensions were felt among federal, state, and local governments during the late 1980s over preparedness for nuclear attack (Anderson and Mattingly, 1991; Drabek, 1991a). That issue disappeared with the collapse of the Soviet Union. Nonetheless, the fact that tensions have continued is testimony to their institutional nature. There are basic conflicts among levels of government that are inherent in the powers of each level, as well as in the differences in:

- ▲ Technical expertise (usually greater at higher levels of government)
- ▲ Site-specific data (usually greater at lower levels of government)
- ▲ Financial resources (usually greater at higher levels of government)
- ▲ Direct responsibility (usually greater at lower levels of government)

May and Deyle (1998) have pointed to a conflict between the goals of economic development and private property rights versus public safety and welfare. The balance between these two sets of goals is managed by a system of case law, legislation, and executive orders. Flood hazards are managed by 12 federal agencies, all 50 states, 3000 conservation districts, and 20,000 local governments in flood-prone areas (Federal Interagency Floodplain Management Task Force, 1992). The federal government alone has more than 50 hazard management laws and executive orders enacted at different times. This produces confusing and conflicting requirements.

There is limited control over land use at the federal level. The federal land use laws that do exist are weakly enforced. And federal programs indirectly encourage development of hazardous areas. This development results in more people and property at risk. Also, communities compete to attract economic development by offering more favorable terms to developers. Thus, there is a need for a common set of development regulations. Such an approach can avoid minimal compliance with standardized “cookie cutter” programs.

14.3.2 Opportunities for Emergency Planners and Managers

During the 1990s, there was a shift in federal emphasis from response and recovery to preimpact mitigation and preparedness. Project Impact played a major role (see Figure 14-1). It fostered public-private partnerships to look for hazard-prone areas. It promoted mitigation actions by government, businesses, and households. But federal funding for this project has been nearly eliminated. Nonetheless, many of the local programs continue to exist. Some are funded at the local level (Prater, 2001). Mitigation will remain both a challenge and an opportunity. And the growth of technology produces new ways to mitigate (see Figure 14-1).

The “intelligent city of the 21st century” has the promise of wireless links among its households, businesses, and government agencies (Ellis and Waugh, 2001). People have more opportunities to interact electronically (Organization

Figure 14-1

Project Impact, implemented by former FEMA director James Lee Witt, encouraged mitigation projects like placing homes on stilts to avoid damage from flooding.

for Economic Cooperation and Development, 2003). Communities are adopting systems in which all data are electronically stored, manipulated, and retrieved within a single software system. Such seamless integration promises increased effectiveness and efficiency. However, these systems are also vulnerable to attacks.

In the 20th century, *emergency management information technology* was used for decision support systems in the response phase of disasters (Marston, 1986). Another growing application is the use of computers for conducting hazard analyses. Researchers have described how computers can be used to identify areas at risk (Berke, Larsen, and Ruch, 1984; Dash, 1997; Griffith, 1986). They can project the damages resulting from a major event (French, 1986; Haney, 1986; Scawthorne, 1986). There are other information technologies with the potential for positive effects on emergency management. These include remote sensing, global positioning, and cellular communication.

14.3.3 Hazard Vulnerability Analysis

The need for systematic data on disaster losses has long been known. This need continues to limit the sophistication and precision of vulnerability determination (Mileti, 1999). There are limited data on the frequency and cost of different types of disasters. Such data are vital in an era of tight budgets. Major disasters have to compete for attention with less dramatic, but more certain, demands. Managers can become more effective in supporting their programs if they can use the available data.

Fischer (1998) and Mileti (1999) show that more data are coming available through federal Web sites. Hwang, Sanderson, and Lindell (2001) found that state agencies also have hazard analysis information on their Web sites. However, Lindell, Sanderson, and Hwang (2002) noted that few LEMAs use these sources. Nearly one-third use no hazard analysis information at all. Geographical Information Systems (GISs) have expanded to enhance database management, mapping, and spatial analysis. This technology has many applications in emergency management. But there are no data on the extent to which GIS is being used by local managers. For those who do access this information, the government sites account for much of their hazard information. However, constraints still exist. Site managers need to more frequently update information and maps. Some materials are hard to download. There are concerns that hazard data might allow terrorists to find high-value targets. Much information has now been placed on secure Web sites.

14.3.4 Hazard Mitigation

The use of GIS is one of the most important advances in hazard mitigation. It provides a better way to store and retrieve data about property parcels and infrastructure. GIS helps create alternative versions of land use plans. These can be compared to determine which best satisfies goals for economic development, social justice, and environmental sustainability. In addition, its information allows managers to work with land use planners to identify the appropriate use for each land parcel. The maps on Web sites also provide more information for citizens.

Assessment of structural resistance to hazard impacts remains a problem. These are best conducted by trained building inspectors. Postconstruction assessments of wind and seismic resistance are difficult. Thus, managers must continue to rely on the age of structures (and, thus, the version of the building code under which they were built) in making judgments about hazard resistance.

14.3.5 Emergency Preparedness

The main advances in preparedness are related to computing and the internet. Plans and procedures have long been stored and updated on computers. In recent years, there has been more use of graphics (e.g., PowerPoint) in training. Similarly, digital photography and video help to get out training materials at a low cost. GIS and CAMEO/ALOHA provide databases that can be used to store information other than noting risk zones. For example, these databases can be used during training, drills, and exercises to retrieve data about resources.

There have been many developments in evacuation modeling, such as CLEAR (Moeller, Urbanik, and Desrosiers, 1981) and EMDSS (Lindell, Prater, Perry, and Wu, 2002). To date, these models are not commercially available to you. Modeling programs have been used to find the evacuation time estimates (ETEs) for specific jurisdictions (Lindell, Prater, and Wu, 2002). However, the ETEs may not be accurate if the conditions of a real event differ. In many cases, managers do not know about the model's assumptions. So they cannot make adjustments when the need arises (Lindell and Prater, 2005). OREMS, a model developed at the Oak Ridge National Laboratory (2003), is being revised to provide an easier interface for managers.

14.3.6 Emergency Response

There have been major advances in integrated detection, forecast, and warning systems. The future seems bright for more advances. Anderson and Mattingly (1991) noted improved means for predicting weather and water hazards. Also there are improved ways to predict volcanic eruptions but not earthquakes (Sorensen, 2000). Other devices include hazardous materials detection systems, GPS systems, and digital cameras. Communications devices are connected through satellite dishes. And radio continues to be important. At the time of Drabek's (1991a) study, only sirens provided warnings for large areas. Since then, telephone-based alerting systems are more common. The NOAA *Weather Radio* system has long provided notification of emergencies (Travis and Riebsame, 1979). Its coverage has been extended over the years. In addition, the old *Emergency Broadcast System* has been replaced by the new *Emergency Alert System*. The *Partnership for Public Warning* promotes the use of cell phones for notifying people. Managers are also using teleconferencing and satellite communications (Tierney, 1995).

Many of the same technologies also support disaster recovery. Cell phones, GPS devices, and powerful computers help make rapid disaster assessments. In addition, damage assessors bypass paper forms.

14.3.7 The Impact of Technology

A relevant assessment of emergency management information technology adoption was conducted by Drabek (1991b). His research dealt with four topics:

- ▲ Factors affecting the adoption and implementation of personal computers
- ▲ Actual use of personal computers in emergency response
- ▲ Computer impacts on the emergency management agencies
- ▲ Policy issues regarding computer usage

Drabek found that computers "increased office efficiency (word processing capability); networking potential; budget management; resource management; public

FOR EXAMPLE

Data Bases in Anderson County, Tennessee

Anderson County, Tennessee, conducted an audit of its emergency preparedness in October 2005. A principal issue raised was the low availability and use of computer-based data systems for preparedness and response. County Emergency Management Director Steve Payne pointed out that GIS and GPS should be used for locating emergency response resources—even items as elementary as fire hydrants. Another issue was communication with businesses, where Payne rhetorically asked "Do we have Wal-Mart managers' names if we have to go in there?"

warning/evacuation applications (flash flood warnings); automated emergency notification for staff; and decision support systems such as hurricane tracking" (1991b:58). He determined that barriers to installing computers included lack of trained staff, machine incompatibility, and lack of information. Emergency managers also faced lack of software, staff shortages, and database problems. Finally, Drabek (1991b) reported that all agreed with three policy proposals. These were to create a national information clearinghouse, publish a newsletter on the use of personal computers in emergency management, and augment federal funding for implementing computer use in emergency management. These issues will remain on the emergency management agenda well into the 21st century.

SELF-CHECK

- Define **signal value.**
- As a best guess, what is likely to be the effect on emergency planning of increasing urbanization of our population?
- Will the high priority given emergency management since 9/11 continue?
- Where is emergency management technology headed in the next two decades?
- How can geographic information system software enhance mitigation planning?

SUMMARY

In this chapter, you have learned to distinguish the *function* of emergency planning from the *profession* of emergency management. An emergency manager is a person who possesses the knowledge, skills, and abilities to effectively manage a comprehensive emergency management program. An emergency planner is an emergency manager performing or leading the technical planning process to achieve defined mitigation, preparedness, response, or recovery goals. You also learned that a profession is marked by three features. There are rules for inclusion; for determining who is credentialed to do the job. The members of the profession control the application of a body of knowledge. And the members have a distinct ethical code that is tied to the performance of their function and not their employment by an organization. You learned that emergency management is making progress on each of these aspects of professionalism and that most people now consider it a profession. You learned that future changes in technology, hazards, and our society will affect the practice of emergency management and planning. In particular, we will become much more computer and software enhanced as a way of dealing with societal changes and new threat environments.

KEY TERMS

Accrediting Body An independent authority established to devise standards and create a review process for academic programs.

Certification Programs Programs that test (in some form) the knowledge and experience of emergency professionals and provide documentation of performance.

Emergency Manager A person who possesses the knowledge, skills, and abilities to effectively manage a comprehensive emergency management program.

Emergency Planner An emergency manager performing or leading the technical planning process to achieve defined mitigation, preparedness, response, and recovery goals.

Just-in-Time Manufacturing The delivery of production material only at the time it is needed in the process.

Profession A collection of practitioners identified by expertise who control and apply a given body of knowledge.

Signal Value The determination that a threat of previously low salience should receive urgent attention.

ASSESS YOUR UNDERSTANDING

Go to www.wiley.com/college/Perry to evaluate your knowledge of emergency planning professionalism and the future.
Measure your learning by comparing pre-test and post-test results.

Summary Questions

1. Government emergency managers are likely to be subject to multiple ethical codes. True or False?
2. Prior to 1983, it was impossible to get a college or university degree in emergency management. True or False?
3. Government emergency managers are given immunity from prosecution in connection with disaster planning and response. True or False?
4. While much of the future of emergency management will be computer based, few LEMAs have integrated computers into their operations. True or False?
5. To cement the status of emergency management as a profession, it is important that:
   (a) Certification programs be developed for practitioners.
   (b) College and university degrees be developed for practitioners.
   (c) An accrediting agency be established for LEMA program certification.
   (d) All of the above.
6. FEMA and DHS are the official voice of the profession of emergency management. True or False?
7. Just-in-Time manufacturing means:
   (a) only one unit of something is produced at a time.
   (b) product is produced in bulk and small quantities are shipped out.
   (c) the delivery of production material occurs only at the time needed in the process.
   (d) product is not manufactured until several orders are collected.

Review Questions

1. What is the difference between an emergency manager and a first responder?
2. How are government emergency managers and planners distinct from those in the private sector?
3. What three features that define professions must be addressed if emergency management is to continue to grow and be recognized?

Applying This Chapter

1. You are a new planner in the Portland, Oregon, LEMA. You haven't yet finished a college degree but you still want to show that you are advancing in the profession. What can the Comprehensive Emergency Manager certification do for you and why is it important for the profession?
2. You have just taken a new emergency-planning job in a different city. Your new LEMA seems not to sufficiently emphasize planning. You want to use limits on immunity statutes as an argument for increasing planning activity. What are the primary ways statutory immunity protects state and local government emergency managers?
3. Your LEMA region is the site of increased private sector development of coal reserves. This has brought in much local revenue. You want to use some of it to enhance your LEMAs use of emergency management information technology. How will you describe the barriers and incentives for using information technology to your LEMA Director?

YOU TRY IT

Professional Networking

In your own job as an emergency planner or manager, you will work in a private sector organization or a government emergency management agency. Your workplace contacts—other professionals and supervisors—will play an important role in determining what your emergency management job is and setting limits on the field. What other sources of understanding emergency management as a profession can you name?

First Responder Liability

Your community experienced local flooding because the river was overtopping its levees. Fire department responders were attempting to sandbag the levee to fill a breach and divert water flow during the late night hours. It became clear to the incident commander that the river was cresting faster than the sandbag operation could intervene. The responders cut the locks off the gate to a local construction company and used a large earth moving apparatus to quickly reinforce the levee. Unfortunately, later in operations the apparatus was severely damaged. The company has complained and threatened to sue the jurisdiction. What points will you include in a memo to the City Manager to explain and justify the first responder actions?

Professional Development Plans

What is your professional development plan? Where do you want to be five years from now? What training and education will you need to make that move and where can you obtain it? Is there a certificate program in your future?

BIBLIOGRAPHY

Abramowitz, J. N. 2001. Averting disaster. In *State of the world 2001,* ed. Worldwatch Institute, 123–142. New York: W. W. Norton.

Adams, W. C., S. D. Burns, and P. G. Handwerk. 1994. *Nationwide LEPC survey.* Washington, DC: George Washington University Department of Public Administration.

Aguirre, B. 1991. Evacuation in Cancun during Hurricane Gilbert. *International Journal of Mass Emergencies and Disasters* 9:31–45.

Aguirre, B., D. Wenger, and G. Vigo. 1998. A test of the emergent norm theory of collective behavior. *Sociological Forum* 13:301–320.

Aldrich, D., D. Ericson, and J. Johnson. 1982. *Public protection strategies for potential nuclear reactor accidents.* Albuquerque, NM: Sandia National Laboratories.

Alesch, D., and W. Petak. 1986. *The politics and economics of earthquake hazard mitigation.* Boulder: University of Colorado Institute of Behavioral Science.

Alexander, D. A. 2002. From civil defense to civil protection and back again. *Disaster Prevention and Management* 11:209–213.

Alexander, D. A. 2003. Towards the development of standards in emergency management training and education. *Disaster Prevention and Management* 12:113–123.

Alvirez, S., and T. Bean. 1976. Participation of blacks, Puerto Ricans and whites in voluntary associations. *Social Forces* 556:1053–1071.

Anderson, W. A. 1969. *Local civil defense in natural disaster: From office to organization.* Columbus, OH: Ohio State University Disaster Research Center.

Anderson, W. A., and S. Mattingly. 1991. Future directions. In *Emergency management: Principles and practice for local government,* eds. T. Drabek and G. Hoetmer, 311–335. Washington, DC: International City/County Management Association.

Anno, G., and M. Dore. 1978. *Protective action evaluation: The effectiveness of sheltering as a protective action against nuclear accidents.* Washington, DC: U.S. Environmental Protection Agency.

Anthony, D. l994. Managing the disaster. *Fire Engineering* 147(8): 22–40.

Babcock, W., and D. Rose. 2005. U.S. government initiatives reduce terrorist threat to personnel and structures. *AMPTIAC Quarterly* 6(4):5–10.

Baker, E. J. 1991. Hurricane evacuation behavior. *International Journal of Mass Emergencies and Disasters* 9:287–310.

Baker, E. J. 1993. Empirical studies of public response to tornado and hurricane warnings in the United States. In *Prediction and perception of natural hazards,* ed. J. Nemec, J. Nigg, and F. Siccardi, 65–74. London: Kluwer.

Bandura, A. 1977. *Social learning theory.* Englewood Cliffs, NJ: Prentice Hall.

Baram, M., P. Dillon, and B. Ruffle. 1992. *Managing chemical risks.* Boca Raton, FL: Lewis.

Barton, A. 1969. *Communities in disaster.* New York: Doubleday.

Bartosh, D. 2003. *Incident command in the era of terrorism.* Washington, DC: Police Executive Research Forum.

Bastein, M., M. Dumas., J. Laporte, and N. Parmentier. 1983. *Evacuation risks.* Paris: Commissariat a L'Energie Atomique.

Bauman, D., and J. Sims. 1974. Human response to the hurricane. In *Natural hazards,* ed. G. White, 25–39. New York: Oxford University Press.

Berke, P., L. Larsen, and C. Ruch. 1984. Risk, politics, and verticle shelter policy. In *The feasibility of vertical evacuation,* ed. C. Ruch, 127–167. Boulder: University of Colorado Institute of Behavioral Science.

Bianchi, S., and R. Farley. 1979. Racial differences in family living arrangements and economic well-being. *Journal of Marriage and the Family* 41: 537–551.

Bierlein, L. W. 1987. The problem of complexity. In *Hazardous materials, hazardous wastes,* ed. R. Scanlon, 12–23. Washington, DC: International City Management Association.

Birkland, T. A. 1997. *After disaster: Agenda setting, public policy and focusing events.* Washington, DC: Georgetown University Press.

Blanchard, B. W. 2003. *Outlines of competencies to develop successful 21st century hazard or disaster or emergency or risk managers.* Emmitsburg, MD: Emergency Management Institute.

Blanchard, B. W. 2004. *FEMA higher education project.* Emmitsburg, MD: Emergency Management Institute.

Blanchard, B. W. 2005. *FEMA: higher education project.* Emmitsburg, MD: Emergency Management Institute.

Blanchard-Boehm, R. D. 1998. Understanding public response to increased risk from natural hazards. *International Journal of Mass Emergencies and Disasters* 16:247–278.

Blewett, W., D. Reves, V. Area, D. Fatkin, and B. Cannon. 1996. *Expedient sheltering in place.* Aberdeen Proving Ground, MD: Englewood Research, Development, and Engineering Center.

Bolin, R., and D. Klenow. 1983. Older people in disaster. *Journal of Aging* 26:29–45.

Bolt, B. A. 1999. *Earthquakes: Science and society.* Upper Saddle River, NJ: Prentice-Hall.

Bourque, L., L. Russell, and J. Goltz. 1993. Human behavior during and immediately after the earthquake. *In The Loma Prieta California earthquake of October 17, 1989,* ed. P. Botton, 3–22. Reston, VA: U.S. Geological Survey.

Brown, L. R., G. Gardner, and B. Halweil. 1998. *Beyond Malthus: Sixteen dimensions of the population problem*. Washington, DC: Worldwatch Institute.

Brunacini, A. 1985. *Fire command.* Quincy, MA: National Fire Protection Association.

Brunacini, A. 2002. *Fire command.* 2d ed. Quincy, MA: National Fire Protection Association.

Bruno, G. 2005. Local disaster plans lacking: Guides are short on details. *Times Herald-Record* (Orange County, Pennsylvania), 25 September, A-1.

Buckle, P., G. Mars, and S. Smale, 2000. New approaches to assessing vulnerability and resilience, *Australian Journal of Emergency Management* 15 (winter): 8–14.

Burson, Z., and A. Profio. 1977. Structure shielding in reactor accidents. *Health Physics Journal* 33:287–299.

Burton, I., R., Kates, and G. White. 1993. *The environment as hazard.* 2d ed. New York: Guilford.

Bush, G. W. 2002. *The Department of Homeland Security.* Washington, DC: The White House.

Buttel, F. 1997. Social institutions and environmental change. In *The international handbook of environmental sociology,* ed. M. Redcliff and G. Woodgate, 40–5 Cheltenham, UK: Edward Elgar.

California Governor's Office of Emergency Services. l994. *Northridge earthquake January l7, l994, interim report*. Sacramento: Governor's Office of Emergency Services.

California Governor's Office of Emergency Services. 2003. *Continuity of government and continuity of operations: Emergency planning* *guidance for a consolidated approach*. Sacramento: Governor's Office of Emergency Services.

Caplow, T., H. Bahr, and B. Chadwick. 1981. *Analysis of the readiness of local communities for integrated emergency management planning*. Washington, DC: Federal Emergency Management Agency.

Carter, N. 1991. *Disaster management: A disaster manager's handbook.* Manila: Asian Development Bank.

Cascio, W. F. 1998. *Applied psychology in human resource management*. Upper Saddle River, NJ: Prentice Hall.

Centers for Disease Control and Prevention. 2004. *Chemical and radiological agents: Facts about sheltering in place*. Atlanta, GA: Centers for Disease Control and Prevention.

Cerullo, V, and M. Cerullo. 2004. Business continuity planning: A comprehensive approach. *ISM Journal* 19 (Summer): 70–78.

Chaiken, S. 1987. The heuristic model of persuasion. In *The Ontario symposium*, ed. M. Zanna, J. Olson, and C. Herman, 3–39. Hillsdale, NJ: Lawrence Erlbaum.

Charveriat, C. 2000. *Natural disasters in Latin American and the Caribbean: An overview of risk.* Washington, DC: Inter-American Development Bank.

Chavis, D. M., and A. Wandersman. 1990. Sense of community in the urban environment: A catalyst for participation and community development. *American Journal of Community Psychology* 18:55–82.

Chemical Manufacturers Association. 1990. *Communicating Title III.* Washington, DC: Chemical Manufacturers Association.

Chester, D. 1993. *Volcanoes and society.* London: Edward Arnold.

Chinander, K., P. Kleindorfer, and H. Kunreuther. 1998. Compliance strategies and regulatory effectiveness of performance-based regulation of chemical accident risks. *Risk Analysis* 18:135–144.

Christen, H. 2004. NIMS: The National Incident Management System. *Firehouse* (July): 96–104.

Churchill, E. R. 1997. Effective media relations. In *The public health consequences of disasters,* ed. E. Noji, 122–132. London: Kluwer.

Clifford, R. 1958. *The Rio Grande flood.* Washington, DC: National Academy of Sciences—National Research Council.

Cohen, S., and R. Kapsis. 1978. Participation of blacks, Puerto Ricans, and whites in voluntary associations. *Social Forces* 56:1053–1071.

Coleman, R., and J. Granito. 1988. *Managing fire services.* 2d ed. Washington, DC: International City Management Association.

Contingency Planning and Management. 2004. 2004 benchmark survey of business continuity, *Contingency Planning and Management* 11 (July): 12–18.

Cooke, D. 1995. L.A. earthquake puts city disaster planning to the test. *Disaster Recovery Journal* 7:10–14.

Cooper, D., W. Hinds, and J. Price. 1981. *Expedient methods of respiratory protection*. Boston: Massachusetts Department of Environmental Health Science.

Cooper, D., W. Hinds, J. Price,. R. Weker, and H. Yee. 1983. Common materials for emergency respiratory protection. *American Industrial Hygiene Association Journal* 44(10):1–6.

Covello, V. 1991. Risk comparisons and risk communication. In *Communicating risks to the public,* ed. R. Kasperson and P. Stallen, 79–124. London: Kluwer.

Crew, R. 1992. *Politics and public management.* St. Paul, MN: West.

Dahlhamer, J. M. and M. J. D'Souza. 1997. Determinants of business-disaster preparedness in two U.S. metropolitan areas. *International Journal of Mass Emergencies and Disasters* 15:265–281.

Darlington, J. 2000. *The profession of emergency management: Educational opportunities and gaps.* Macomb, IL: Western Illinois University.

Dash, N. 1997. The use of geographic information systems in disaster research. *International Journal of Mass Emergencies and Disasters* 15:135–146.

Davidson, E. A. 2001. *You can't eat GNP: Economics as if the ecology mattered*. Cambridge, MA: Perseus.

Defense Threat Reduction Agency. 2004. *Domestic WMD incident management legal deskbook.* Washington, DC: Defense Threat Reduction Agency.

Ditch, R. 2003. *Professionalism in emergency management*. Falls Church, VA: International Association of Emergency Managers.

Dow, K., and S. Cutter. 2002. Emerging hurricane issues. *Natural Hazards Review* 3:12–18.

Drabek, T. E. 1983. Shall we leave? *Emergency Management Review* 1:25–29.

Drabek, T. E. 1986. *Human system responses to disaster.* New York: Springer-Verlag.

Drabek, T. E. 1987. *The professional emergency manager.* Boulder: University of Colorado Institute of Behavioral Science.

Drabek, T. E. 1990. *Emergency management: Strategies for maintaining organizational integrity.* New York: Springer-Verlag.

Drabek, T. E. 1991a. The evolution of emergency management. In *Emergency management: Principles and practice for local government,* Ed. T. E. Drabek, and G. Hoetmer, 3–29. Washington, DC: International City/County Management Association.

Drabek, T. E. 1991b. *Microcomputers in emergency management: Implementation of computer technology*. Boulder: University of Colorado Institute of Behavioral Science.

Drabek, T. E. 1993. Major themes in disaster preparedness and response research. Paper presented at the Research Seminar on Socio-Economic Aspects of Disasters in Central America, at San Jose, Costa Rica.

Drabek, T. E. 1994. *Disaster evacuation and the tourist industry.* Boulder: University of Colorado Institute of Behavioral Science.

Drabek, T. E. 1999. Understanding disaster warning responses. *Social Science Journal* 36:515–523.

Drabek, T. E. 2003. *Strategies for coordinating disaster responses.* Boulder: University of Colorado Program on Environment and Behavior.

Drabek, T. E., and K. Boggs. 1968. Families in disaster: Reactions and relatives. *Journal of Marriage and the Family* 30:443–451.

Drabek, T. E., and J. Stephenson. 1971. When disaster strikes. *Journal of Applied Social Psychology* 1:187–203.

Dwyer, J., and C. Drew. 2005. Fear exceeded crime's reality in New Orleans. *New York Times,* September 29.

Dye, T. 1995. *Understanding public policy*. Englewood Cliffs, NJ: Prentice-Hall.

Dynes, R. 1994. Community emergency planning. *International Journal of Mass Emergencies and Disasters* 12:141–158.

Dynes, R. R., and E. L. Quarantelli. 1975. *The role of civil defense in disaster planning*. Columbus, OH: Ohio State University Disaster Research Center.

Dynes, R. R., and E. L. Quarantelli. 1976. Family and community context of individual reactions to disaster. In *Emergency and disaster management*, ed. H. Pared, H. Resnik, and L. Parad, 231–244. Bowie, MD: Charles Press.

Dynes, R. R., E. L. Quarantelli, and G. A. Kreps. 1972. *A perspective on disaster planning*. Columbus, OH: Ohio State University Disaster Research Center.

Earthquake Engineering Research Institute. 1996. *Public policy and building safety.* Oakland, CA: Earthquake Engineering Research Institute.

Edwards, M. L. 1993. Social location and self-protective behavior. *International Journal of Mass Emergencies and Disasters* 11: 293–304.

Eisner, R. K. 1990. Beyond planning: Learning from the Loma Prieta earthquake. *U.C. Berkeley College of Environmental Design News* 8: 6–9.

Elliott, D., E. Swartz, and B. Herbane. 1999. *Business continuity management*. London: Routledge.

Ellis, S. M., and W. L. Waugh. 2001. Emergency managers for the new millennium. In *Handbook of crisis and emergency management,* ed. A. Farazmand, 693–702. New York: Marcel Dekker.

Emergency Management Australia. 1996. *Australian emergency manual.* Canberra: Emergency Management Australia.

Emergency Management Institute. 2003. *Radiological emergency management.* Washington, DC: Federal Emergency Management Agency.

Engelman, R. J. 1992. Sheltering effectiveness against plutonium by buildings. *Atmospheric Environment* 26(17):3119–3125.

Erickson, P. A. 1999. *Emergency response planning.* New York: Academic Press.

Ernest-Jones, T. 2005. Business continuity strategy: The life line. *Network Security* 22 (August): 5–9.

Ernst and Young. 2002. *Business disaster plans in the United States.* New York: Ernst and Young.

Evetts, J. 2003. The sociological analysis of professionalism. *International Sociology* 18 (June): 395–415.

Farley, J. E. 1998. *Earthquake fears, predictions and preparations in mid-America.* Carbondale: Southern Illinois University Press.

Farley, J. E., H. D. Barlow, M. Finkelstein, and L. Riley, 1993. Earthquake hysteria before and after: A survey and follow-up on public response to the Browning forecast. *International Journal of Mass Emergencies and Disasters* 11:305–322.

Fazio, R. 1985. How do attitudes guide behavior? In *The handbook of motivation and cognition*, ed. R. Sorrentino, and E. Higgins, 204–243. New York: Guilford.

Federal Emergency Management Agency. 1990. *Guide for the development of state and local emergency operations plans* (CPG 1–8). Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 1993a. *Improving earthquake mitigation.* Washington, DC: Federal Emergency Management Agency Office of Earthquakes and Natural Hazards.

Federal Emergency Management Agency. 1993b. *Principal threats facing communities and local emergency management coordinators.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 1996. *Guide for all-hazard emergency operations planning* (SLG-101). Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 1997. *Multi-hazard identification and risk assessment*. Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 1998a. *Report on costs and benefits of natural hazard mitigation.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 1998b. *Protecting business operations.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 2002. *Summary of post-9/11 report: Lessons learned.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 2003a. *Emergency management guide for business and industry.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 2003b. *National urban search and rescue response system: Operations manual.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 2004a. *Interim guidance on continuity of operations planning for state and local governments.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 2004b. *National response plan.* Washington, DC: Federal Emergency Management Agency.

Federal Emergency Management Agency. 2004c. *Resource definitions: 120 resources.* Washington, DC: Federal Emergency Management Agency.

Federal Interagency Floodplain Management Task Force. 1992. *Floodplain management in the United States: An assessment report*. Vol.1. Washington, DC: Federal Emergency Management Agency.

Finegold, A. F., and J. Solyst. 1994. *Emergency Planning and Community Right to Know Act: A status of state actions*. Washington, DC: National Governors' Association.

Fire, F., N. Grant, and D. Hoover. 1990. *SARA Title III*. New York: Van Nostrand Reinhold.

Fischer, H. 1998. *Response to disaster.* Lanham, MD: University Press of America.

Fischer, H. 1999. Dimensions of biological terrorism. *Disaster Prevention and Management* 8:27–32.

Fischer, H. 2000. Mitigation and response planning in a bio-terrorist attack. *Disaster Prevention and Management* 9:360–67.

Fishbein, M., and I. Ajzen. 1975. *Belief, attitude, intention, and behavior.* Reading, MA: Addison-Wesley.

Fishbein, M., and I. Ajzen. 1981. Acceptance, yielding and impact. In *Cognitive responses in persuasion*, ed. R. Petty, T. Ostrom, and T. Brock, 339–359. Hillsdale, NJ: Lawrence Erlbaum.

Fiske, S. T., and S. E. Taylor. 1991. *Social cognition*. New York: McGraw-Hill.

Fitzpatrick, C., and D. Mileti, 1991. Motivating public evacuation, *International Journal of Mass Emergencies and Disasters* 9:137–152.

Florida Division of Emergency Management. 2005. *Continuity of operations: Elements of viability.* Tallahassee: Florida Department of Community Affairs.

Florin, P., and A. Wandersman. 1990. An introduction to citizen participation, voluntary organizations, and community development, *American Journal of Community Psychology* 18:41–54.

Flynn, C. B., and J. Chalmers. 1980. *The social and economic effects of the accident at Three Mile Island.* Tempe, AZ: Mountain West Research Corporation.

Flynn, J., E. Peters, C. K Mertz, and P. Slovic. 1998. Risk, media, and stigma at Rocky Flats. *Risk Analysis* 18:715–727.

Fontana, J., and D. Connor. 2001. Disaster recovery then and now. *Network World* 21:31–38.

Ford, J., and A. Schmidt. 2000. Emergency preparedness training: Strategies for enhancing real-world performance. *Journal of Hazardous Materials* 75:195–215.

Freidson, E. 2001. *Professionalism.* Chicago: University of Chicago Press.

French, S. P. 1986. The evolution of decision support systems for earthquake hazard mitigation. In *Terminal disasters: Computer applications in emergency management,* ed. S. Marston, 57–68. Boulder: University of Colorado Institute of Behavioral Science.

Fritz, C. 1961. Disasters. In *Contemporary social problems*, ed. R. Merton, and R. Nisbet, 651–694. New York: Harcourt, Brace and World.

Fritz, C. 1968. Disasters. In *International encyclopedia of the social sciences,* 451–455. New York: MacMillan and The Free Press.

Fritz, C., and E. Marks, 1954. The NORC studies of human behavior in disaster. *Journal of Social Issues* 10:26–41.

Fritz, C. and J. Mathewson. 1957. *Convergence behavior in disasters: A problem in social control*. Washington, DC: National Academy of Sciences—National Research Council.

Frosdick, S. 1997. The techniques of risk analysis are insufficient in themselves. *Disaster Prevention and Management* 6:165–77.

Frost, C. 1994. Effective responses for proactive enterprises: Business continuity planning. *Disaster Prevention and Management* 3(1):7–15.

Geophysics Study Committee. 1984. *Explosive volcanism.* Washington, DC: National Academy of Sciences Press.

Gillespie, D. F., and R. A. Colignon. 1993. Structural change in disaster preparedness networks. *International Journal of Mass Emergencies and Disasters* 11:143–162.

Gillespie, D. F., and C. L. Streeter. 1987. Conceptualizing and measuring disaster preparedness. *International Journal of Mass Emergencies and Disasters* 5:155–176.

Gillespie, D. F., R. A. Colignon, M. M. Banerjee, S. A. Murty, and M. Rogge. 1993. *Partnerships for community preparedness.* Boulder: University of Colorado Natural Hazards Research and Applications Information Center.

Girard, C., and W. Peacock. 1997. Ethnicity and segregation. In *Hurricane Andrew,* ed. W. Peacock, B. Morrow, and H. Gladwin, 191–205. New York: Routledge.

Gladwin, C., H. Gladwin, and W. Peacock. 2002. Modeling hurricane decisions with ethnographic methods. *International Journal of Mass Emergencies and Disasters* 19:117–43.

Gleser, G., B. Green, and C. Winget. 1981. *Prolonged psychosocial effects of disaster*. New York: Academic Press.

Goltz, J., L. Russell, and L. Bourque. 1992. Initial behavioral response to a rapid onset disaster. *International Journal of Mass Emergencies and Disasters* 10:43–69.

Grannis, D. 2003. Sustaining domestic preparedness: Changes in a post-9/11 world. In *First to arrive: State and local responses to terrorism,* ed. J. N. Kayyem, and R.L. Pangi, 207–220. Cambridge, MA: MIT Press.

Greenway, A. R. 1998. *Risk management planning handbook.* Rockville, MD: Government Institutes Press.

Griffith, D. A. 1986. Hurricane emergency management applications of the SLOSH numerical storm surge prediction model. In *Terminal disasters: Computer applications in emergency management,* ed. S. Marston, 83–94. Boulder: University of Colorado Institute of Behavioral Science.

Gruntfest, E., T. Downing, and G. White. 1978. Big Thompson flood exposes need for better flood reaction system. *Civil Engineering* 78:72–73.

Gupta, A. 2002. *Developing a continuity-of-operations plan.* Indianapolis, IN: Addison-Wesley.

Guyton, H.,H. Decker, and G. Anton. 1959. Emergency respiratory protection against radiological and biological aerosols. *AMA Archives of Industrial Health* 20:91-95.

Hage, A. 2002. Benchmark report: BCP in 2002. *Contingency Planning and Management* 9 (July): 21–32.

Hagg, R. 2002. *Business continuity plans : Really?* Tuscon: University of Arizona.

Hance, B., C. Chess, and P. Sandman. 1988. *Improving dialogue with communities.* New Brunswick, NJ: New Jersey Department of Environmental Protection.

Haney, T. 1986. Application of computer technology for damage/risk projections. In *Terminal disasters: Computer applications in emergency management,* ed. S. Marston 95–108. Boulder: University of Colorado Institute of Behavioral Science.

Hans, J., and T. Sell. 1974. *Evacuation risks: An evaluation.* Washington, DC: U.S. Environmental Protection Agency.

Hartford Loss Control Department. 1998. *Continuity planning for business operations.* Hartford, CT: The Hartford Insurance Company.

Hays, S., and T. Reeves. 1984. *Personnel management in the public sector*. Boston: Allyn and Bacon.

Herbane, B., D. Elliott, and E. Swartz. 1994. Business continuity management: Time for a strategic role. *Long-Range Planning* 37:435–457.

Hess, C., and J. Harrald. 2004. The national response plan: Process, prospects and participation. *Natural Hazards Observer* 28 (July): 1–3.

Hoene, C., M. Baldassare, and C. Brennan. 2002. *Homeland security and America's cities.* Washington, DC: National League of Cities.

Hoetmer, G. J. 2003. *Characteristics of effective emergency management organizational structures.* Fairfax, VA: Public Entity Risk Institute.

Horwich, G. 1993. The role of the for-profit private sector in disaster mitigation and response. *International Journal of Mass Emergencies and Disasters* 11:189–205.

Houts, P. S., M. K. Lindell, T. Hu, P. Cleary, G. Tokuhata, and C. Flynn. 1984. The protective action decision model applied to evacuation during the Three Mile Island crisis. *International Journal of Mass Emergencies and Disasters* 14:27–39.

Hwang, S. N., W. Sanderson, and M. K. Lindell. 2001. State emergency management agencies' hazard analysis information on the Internet. *International Journal of Mass Emergencies and Disasters* 19:85–108.

Instituut voor Sociaal Onderzoek Nederlandse Volk. 1955. *Studies in the Holland Flood Disaster.* Washington, DC: National Academy of Sciences.

Intergovernmental Panel on Climate Change. 2001. *Climate change 2001: The scientific basis*. New York: Cambridge University Press.

James, L., and S. Sells. 1981. Psychological climate: Theoretical perspectives and empirical research. In *Toward a psychology of situations: An interactional perspective*, ed. D. Magnusson, 275–295. Hillsdale, NJ: Erlbaum.

Jenkins, B. 2001. 30 years and counting. *Rand Review 16.* (Fall) 1-3.

Johnson, N. R. 1988. Fire in a crowded theatre. *International Journal of Mass Emergencies and Disasters* 6:7–26.

Jonkman, S. N., and I. Kelman. 2005. An analysis of the causes and circumstances of disaster deaths. *Disasters* 29(1):75–97.

Kaniasty, K., and F. Norris. 1993. A test of the social support deterioration model in the context of natural disaster. *Journal of Personality and Social Psychology* 64:395–408.

Kaplan, L. G. 1996. *Emergency and disaster planning manual.* New York: McGraw-Hill.

Kaplan, S. 2004. You're certifiable! *CSO: The Resource for Security Executives*. http://www.csoonline.com/read/images/100702 certificate head.gif.

Kartez, J. 1992. *LEPC roles in toxic hazards reduction: Implementing Title III's unwritten goals.* College Station, TX: Texas A&M Hazard Reduction and Recovery Center.

Kartez, J. D., and M. K. Lindell. 1987. Planning for uncertainty: The case of local disaster planning. *Journal of the American Planning Association* 53:487–498.

Kartez, J. D., and M. K. Lindell. 1989. Adaptive planning for community disaster response. In *Cities and disaster,* ed. R. Sylves, and W. Waugh, 5–31. Springfield, Il: Charles C. Thomas.

Kayyem, J. N., and P .E. Chang. 2002. *Beyond business continuity: The role of the private sector in preparedness planning.* Cambridge, MA: John F. Kennedy School of Government, Harvard University.

Kennedy, P., C. Perrottet, and C. Thomas. 2003. Scenario planning after 9/11: Managing the impact of catastrophic events. *Strategy and Leadership* 31(1):4–13.

Keyworth, C., and D. Smith. 1992. Emergency notification under SARA Title III: Impacts on facility emergency planning. *Journal of Hazardous Materials* 31:241–253.

Killian, L. 1952. The significance of multiple group membership in disaster. *American Journal of Sociology* 57 (January): 309–14.

Korosec, T. 2005. Fatal fire: Fault found in bus brakes and bearings. *Houston Chronicle*, October 5, A-1.

Kramer, W. M., and C. W. Bahme. 1992. *The fire officer's guide to disaster control.* Saddlebrook, NJ: Fire Engineering Books.

Kunreuther, H. 1993. Earthquake insurance as a hazard reduction strategy. In *1993 National earthquake conference: Socio-economic effects*, ed. Committee on Socio-Economic Impacts, 191–210. Memphis, TN: Central United States Earthquake Consortium.

Kunreuther, H., and R.J. Roth, Sr. 1998. *Paying the price: The status and role of insurance against natural disasters in the United States.* Washington, DC: Joseph Henry Press.

Lachman, R., Tatsuoka, M. and Bonk, W. 1961. Human behavior during the tsunami of May 1960, *Science* 133:1405–1409.

Leesak, D. 1999. *Hazardous materials: Strategies and tactics*. Upper Saddle River, NJ: Prentice-Hall.

Lindell, M. K. 1994. Are local emergency preparedness committees effective in developing community disaster preparedness? *International Journal of Mass Emergencies and Disasters* 12:159–182.

Lindell, M. K. 1995. Assessing emergency preparedness in support of hazardous facility risk analyses. *Journal of Hazardous Materials* 40:297–303.

Lindell, M. K., and V. E. Barnes, 1986. Protective response to technological emergency: Risk perception and behavioral intention. *Nuclear Safety* 27:457–467.

Lindell, M. K., and C. J. Brandt. 2000. Climate quality and climate consensus as mediators of the relationship between organizational antecedents and outcomes, *Journal of Applied Psychology* 85:331–348.

Lindell, M. K. and T. Earle. 1983. How close is close enough? *Risk Analysis* 3:245–254.

Lindell, M. K., and M. J. Meier. 1994. Effectiveness of community planning for toxic chemical emergencies. *Journal of the American Planning Association* 60:222–234.

Lindell, M. K., and R. W. Perry. 1980. Evaluation criteria for emergency response plans in radiological transportation. *Journal of Hazardous Materials* 3:335–348.

Lindell, M. K., and R. W. Perry. 1983. Nuclear power plant emergency warning: How would the public respond? *Nuclear News* 26:49–53.

Lindell, M. K. and R. W. Perry. 1990. Effects of the Chernobyl accident on public perceptions of nuclear plant accident risks. *Risk Analysis* 10:393–399.

Lindell, M. K., and R. W. Perry. 1992. *Behavioral foundations of community emergency planning*. Washington, DC: Hemisphere Press.

Lindell, M. K., and R. W. Perry. 1996. Addressing gaps in environmental emergency planning. *Journal of Environmental Planning and Management*, 39(4):531–545.

Lindell, M. K., and R. W. Perry. 1997. Hazardous materials releases in the Northridge earthquake: Implications for seismic risk assessment. *Risk Analysis* 17 (April): 147–156.

Lindell, M. K., and R. W. Perry. 1998. Earthquake impacts and hazard adjustment by acutely hazardous materials facilities following the Northridge earthquake. *Earthquake Spectra* 14:285–299.

Lindell, M. K., and R. W. Perry. 2000. Household adjustment to earthquake hazard. *Environment and Behavior* 32 (July): 590–630.

Lindell, M. K., and R. W. Perry. 2001. Community innovation in hazardous materials management: Progress in implementing SARA Title III in the United States. *Journal of Hazardous Materials* 88 (December):169–194.

Lindell, M. K., and R. W. Perry. 2004. *Communicating environmental risk in multiethnic communities.* Thousand Oaks, CA: Sage Publications.

Lindell, M. K., and C. S. Prater. 2002. Risk area residents' perceptions and adoption of seismic hazard adjustments. *Journal of Applied Social Psychology* 32:2377–2392.

Lindell, M. K., C. S. Prater, and J. Y. Wu. 2002. *Hurricane evacuation time estimates for the Texas Gulf coast.* College Station, TX: Texas A&M University Hazard Reduction and Recovery Center.

Lindell, M. K., C. S. Prater, R. W. Perry, and J. Y. Wu. 2002. *EMBLEM: An empirically-based large scale evacuation time estimate model.*

College Station, TX: Texas A&M University Hazard Reduction and Recovery Center.

Lindell, M. K., C. W. Prater, W. Sanderson, H. Lee, Y. Zhang, A. Mohite, and S. Hwang. 2001. *Texas Gulf residents' expectations and intentions regarding hurricane evacuation.* College Station, TX: Texas A&M University Hazard Reduction and Recovery Center.

Lindell, M. K., W. G. Sanderson, and S. N. Hwang. 2002. Local government agencies' use of hazard analysis information. *International Journal of Mass Emergencies and Disasters* 20:29–39.

Lindell, M. K., and D. J. Whitney. 1995. Effects of organizational environment, internal structure and team climate on the effectiveness of local emergency planning committees. *Risk Analysis* 15: 439–447.

Lindell, M. K., and D. J. Whitney. 2000. Correlates of household seismic hazard adjustment adoption. *Risk Analysis* 20:13–25.

Lindell, M. K., D. J. Whitney, C. J. Futch, and C. S. Clause. 1996. The local emergency planning committee: A better way to coordinate disaster planning. In *Disaster management in the U.S. and Canada,* ed. R. Silves, and W. Waugh, 21–43. Springfield, IL: Charles C. Thomas.

Litman, T. 2005. *Lessons from Katrina*. Victoria, Canada: Victoria Transport Policy Institute.

Logue, J., M. Melick, and E. Struening. 1981. A study of health and mental status following a major natural disaster. In *Research in community and mental health*, ed. Simmons, R. 217–274. Greenwich, CT: JAI Press.

Malich, G., Braun, P. Loullis, and C. Winder. 1998. Comparisons of regulations concerning hazardous substances from an international perspective. *Journal of Hazardous Materials* 62:143–159.

Mallet, L. 2002. Should you be certified? *Contingency Planning and Management* 7 (March): 38–40.

Mankin, L., and R. W. Perry. 2004. Terrorism challenges for human resource management. *Review of Public Personnel Administration* 24 (March): 3–17.

Mannan, M. S., and D. L. Kirkpatrick. 2000. The pros and cons of shelter-in-place. *Process Safety Progress* 19(4): 210–218.

Marston, S. A. 1986. *Terminal disasters: Computer applications in emergency management*. Boulder: University of Colorado Institute of Behavioral Science.

Maryland Emergency Management Agency. 2004. *Preparing for an emergency: Continuity of operations planning for state agencies.* Baltimore: Maryland Emergency Management Agency.

Maslansky, C. J., and S. P. Maslansky. 1993. *Air monitoring instrumentation*. New York: Van Nostrand Reinhold.

May, P. J., and R. E. Deyle. 1998. Governing land use in hazardous areas with a patchwork system. In *Cooperating with nature: Confronting natural hazards with land-use planning for sustainable communities*, ed. R. Burby, 57–82. Washington, DC: Joseph Henry Press.

May, P. J., and W. Williams. 1986. *Disaster policy implementation*. New York: Plenum Press.

McEntire, D. 2003. *Disaster preparedness: ICMA IQ reports.* Washington, DC: International City/County Management Association.

McEntire, D., and A. Myers. 2004. Preparing communities for disaster. *Disaster Prevention and Management,* 13(2):140–152.

McGuire, W. J. 1985. The nature of attitudes and attitude change. In *Handbook of social psychology*, ed. G. Lindzey and E. Aronson, 233–256. New York: Random House.

McHugh, C. 1995. Preparing public safety organizations for a disaster response. *Disaster Prevention and Management* 4:25–36.

McQuiad, J., and M. Schleifstein. 2005. Left behind. *Times-Picayune*, October 5, Special Report Part 2, 3–5.

Melick, M. 1985. The Health of postdisaster populations. *In Perspectives on disaster recovery,* ed. J. Laube and S. Murphy, 179–209. New York: Appleton-Century-Crofts.

Menninger, W. 1952. Psychological reactions in an emergency. *American Journal of Psychiatry* 109:128–130.

Meyer, J., S. Paunonen, I. Gellatly, R. Goffin, and D. Jackson. 1989. Organizational commitment and job performance: It's the nature of the commitment that counts. *Journal of Applied Psychology* 74:152–156.

Michaels, J. V. 1996. *Technical risk management.* Upper Saddle River, NJ: Prentice Hall.

Michaels, S. 1990. *BAREPP survey of information users.* Oakland, CA: Bay Area Regional Earthquake Preparedness Project.

Mickunas, D., J. Kansal, and R. Turpin. 1995. Ambient monitoring of a SARA Title III facility using the TAGA 6000E MS/MS. *Journal of Hazardous Materials,* 43:45–54.

Midden, C. J., and B. Verplanken, 1990. The stability of nuclear attitudes after Chernobyl, *Journal of Environmental Psychology* 10: 111–119.

Mileti, D. S. 1974. *A normative causal model analysis of disaster warning response*. Boulder: University of Colorado Department of Sociology.

Mileti, D. S. 1993. Communicating public risk information. In *Prediction and perception of natural hazards,* ed. J. Nemec, J. Nigg, and F. Siccardi, 143–152. London: Kluwer Academic.

Mileti, D. S. 1999. *Disasters by design.* Washington, DC.: Joseph Henry Press.

Mileti, D. S., and E. Beck. 1975. Communication in crisis. *Communication Research* 2:24–49.

Mileti, D. S., and J. Darlington. 1997. The role of searching in shaping reactions to earthquake risk information. *Social Problems* 44:89–103.

Mileti, D. S., J. Darlington, C. Fitzpatrick, and P. O'Brien. 1993. *Communicating earthquake risk.* Fort Collins: Colorado State University Hazards Assessment Laboratory.

Mileti, D.S., and C. Fitzpatrick. 1993. *The great earthquake experiment.* Boulder, CO: Westview Press.

Mileti, D. S., C. Fitzpatrick, and B. C. Farhar. 1992. Fostering public preparations for natural hazards. *Environment* 34:16–39.

Mileti, D., D. Hartsough, and P Madsen. 1982. *The Three Mile Island incident.* Washington, DC: Shaw, Pittman, Potts, and Trowbridge.

Mileti, D. S., and P. O'Brien. 1992. Warnings during disasters. *Social Problems* 39:40–57.

Mileti, D. S., and J. Sorensen. 1987. Why people take precautions against natural disasters. In *Taking care: Why people take precautions,* ed. N. Weinstein, 296–320. New York: Cambridge University Press.

Mileti, D. S., and J. Sorenson. 1988. Planning and implementing warning systems. In *Mental Health Response to Mass Emergencies,* ed. M. Lystad, 321–345, New York: Brunner/Mazel.

Moeller, M., T. Urbanik, and A. Desrosiers. 1981. *CLEAR (calculates logical evacuation and response): A generic transportation network evacuation model for the calculation of evacuation time estimates, NUREG-CR-2504.* Washington, DC: U.S. Nuclear Regulatory Commission.

Moore, H. E. 1958. *Tornadoes over Texas*. Austin: University of Texas Press.

Moore, M. 1995. *Creating public value: Strategic management in government.* Cambridge, MA: Harvard University Press.

Moore, P. 1995. Critical elements of a disaster recovery and continuity plan. *Facilities* 13 (August): 22–27.

Morgan, O. 2004. Infectious disease risks from dead bodies following natural disasters. *Pan American Journal of Public Health* 15:307–312.

Morwood, G. 1998. Business continuity: Awareness and training programs. *Information Management and Computer Security* 6(1):28–32.

Mosher, F. 1968. *Democracy and the public service.* Englewood Cliffs, NJ: Prentice-Hall.

Mowbray, R. 2005. Delayed insurance pushes hurricane-damaged firms toward failure. *Times-Picayune*, November 13, A2.

Mulford, C. L., G. E. Klonglan, and J. P. Kopachevsky. 1973. *Securing community resources for social action.* Ames: Iowa State University Department of Sociology and Anthropology.

Mulilis, J. P., and T. S. Duval. 1996. Individual preparedness for disasters. In *International business trends*, ed. S. Amin, and S. Fullerton, 34–78. New York: John Wiley.

Mulilis, J. P., and R. A. Lippa. 1990. Behavioral change in earthquake preparedness due to negative threat appeals. *Journal of Applied Social Psychology* 20:619–638.

Murphy, S. 1984. Advanced practice implications of disaster stress research. *Journal of Psychosocial Nursing and Mental Health Services* 22:135–139.

National Fire Protection Association. 2004. *NFPA 1600: Standard on disaster/emergency management and business continuity programs.* Quincy, MA: National Fire Protection Association.

National Institute of Building Sciences. 1998. *HAZUS*. Washington, DC: National Institute of Building Sciences.

National League of Cities. 2002. *Homeland security: Federal resources for local governments.* Washington, DC: National League of Cities.

National Research Council. 2003. *The emergency manager of the future.* Washington, DC: National Academies Press.

National Response Team. 1987. *Hazardous materials emergency planning guide NRT-1*. Washington, DC: National Response Team.

National Safety Council. 1995. *User's manual for CAMEO: Computer-aided management of emergency operations.* Chicago: National Safety Council.

National Science and Technology Council. 2000. *Effective disaster warnings.* Washington, DC: Executive Office of the President of the United States.

National Task Force on Interoperability. 2003. *Why can't we talk?* Washington, DC: National Task Force on Interoperability.

Natural Hazards Research and Applications Information Center. 2001. *Resources for sustainable development.* Boulder: University of Colorado Natural Hazards Research and Applications Information Center.

Nelson, C., M. Covert, A. Kurtz, B. Fritzsche, C. Crumley, and A. Powell. 1989. *Models of hurricane evacuation behavior*. Tampa: University of South Florida Department of Psychology.

Nelson, L. S., and R. W. Perry. 1991. Organizing public education for technological emergencies. *Disaster Management* 4:21–26.

Nisbett, R. E. and L. Ross. 1980. *Human inference: Strategies and shortcomings of social judgment.* Englewood Cliffs, NJ: Prentice-Hall.

Noji, E. K. 1997. *The public health consequences of disasters.* New York: Oxford University Press.

North Dakota Emergency Management Agency. 2003. *Process to assist North Dakota state entities in developing a continuum of government plan.* Bismark: North Dakota Emergency Management Agency.

North, C., L. Tivis, J. McMillen, B. Pfefferbaum, E. Spitznagel, J. Cox, and E. Smith. 2002. Psychiatric disorders in rescue workers after the Oklahoma City bombing. *American Journal of Psychiatry* 159 (May): 857–859.

O'Connor, K. B. 2005. *Statement before the House Committee on Homeland Security on the Faster and Smarter Funding for First Responders Act*. Washington, DC: Office of the General President, International Association of Fire Fighters.

O'Keefe, D. 1990. *Persuasion*. Thousand Oaks, CA: Sage.

Oak Ridge National Laboratory. 1998. *OREMS: Oak Ridge evacuation management system*. Oak Ridge, TN: Oak Ridge National Laboratory.

Office of the Inspector General. 2004. *Review of the status of Department of Homeland Security efforts to address its major management challenges*. Washington, DC: U.S. Department of Homeland Security.

Ollendick, G., and M. Hoffman. 1982. Assessment of psychological reaction in disaster victims. *Journal of Community Psychology* 10: 157–167.

Organization for Economic Cooperation and Development. 2003. *Emerging risks in the 21st century: An agenda for action*. Paris: Organization for Economic Cooperation and Development.

Pal, T., G. Griffin, A. Miller, M. Doherty, and T. Vo-Dinh. 1993. Permeation measurements of chemical agent stimulants through protective clothing materials. *Journal of Hazardous Materials* 33:123–141.

Palm, R., and M. Hodgson. 1992. *After a California earthquake: Attitude and behavior change*. Chicago: University of Chicago Press.

Palm, R., M. Hodgson, R. Blanchard, and D. Lyons. 1990. *Earthquake insurance in California*. Boulder, CO: Westview.

Perry, R. W. 1982. *The social psychology of civil defense*. Lexington, MA: Health-Lexington Books.

Perry, R. W. 1983. Environmental hazards and psychopathology: Linking natural disasters with mental health. *Environmental Management* 7:543–552.

Perry, R. W. 1985. *Comprehensive emergency management*. Greenwich, CT: JAI Press.

Perry, R. W. 1987. Racial and ethnic minority citizens in disasters. In *The sociology of disasters*, ed. R. Dynes and C. Pelanda, 87–99. Gorizia, Italy: Franco Angelli.

Perry, R. W. 1991. Managing disaster response operations. In *Emergency management*. ed. T. Drabek, and G. Hoetmer, 201–223. Washington, DC: International City Management Association.

Perry, R. W. 1995. The structure and function of community emergency operations centers. *Disaster Prevention and Management* 4:37–42.

Perry, R.W. 2003a. Emergency operations centers in an era of terrorism. *Journal of Contingencies and Crisis Management* 11 (December): 151–159.

Perry, R. W. 2003b. Incident management systems in disaster management, *Disaster Prevention and Management.* 12(5):405–412.

Perry, R.W. 2003c. Municipal terrorism management in the United States. *Disaster Prevention and Management* 12(3):190–202.

Perry, R. W. 2004. The relationship of affective organizational commitment with supervisory trust. *Review of Public Personnel Administration* 24 (June):133–149.

Perry, R. W. and J.D. Godchaux. 2005. Volcano hazard management strategies: Fitting policy to patterned human responses. *Disaster Prevention and Management*, 14(2):183–195.

Perry, R. W. and M. K. Lindell. 1987. Source credibility in volcano hazard information. *Volcano News* 25:8–10.

Perry, R. W. and M.K. Lindell. 1990. *Living with Mt. St. Helens: Human adjustment to volcano hazard.* Pullman: Washington State University Press.

Perry, R. W. and M.K. Lindell. 1991. The effects of ethnicity on evacuation decision-making. *International Journal of Mass Emergencies and Disasters* 9:47–68.

Perry, R. W. and M.K. Lindell. 1997a. Earthquake planning for government continuity. *Environmental Management* 21 (January): 89–96.

Perry, R. W. and M. K. Lindell. 1997b. Aged citizens in the warning phase of disasters. *International Journal of Aging and Human Development* 44:257–267.

Perry, R. W. and M.K. Lindell. 1997c. Principles for managing community relocation as a hazard mitigation measure. *Journal of Contingencies and Crisis Management* 5 (March): 49–60.

Perry, R. W. and M. K. Lindell. 2003a. Preparedness for emergency response: Guidelines for the planning process. *Disasters* 27 (December): 336–350.

Perry, R. W. and M.K. Lindell. 2003b. Understanding human behavior in disasters with implications for terrorism. *Journal of Contingencies and Crisis Management* 11 (June): 49–61.

Perry, R.W., M.K. Lindell, and M.R. Greene, 1981. *Evacuation planning in emergency management.* Lexington, MA: Heath-Lexington Books.

Perry, R. W., M. K. Lindell, and M. Greene. 1982. Threat perception and public response to volcano hazard. *Journal of Social Psychology* 116:199–204.

Perry, R. W. and L. Nelson. 1991. Ethnicity and hazard information dissemination. *Environmental Management* 15:581–587.

Perry, R. W., and J. Nigg. 1985. Emergency management strategies for communicating hazard information. *Public Administration Review* 45: 72–77.

Petty, R., and J. Cacioppo. 1986. *Communication and persuasion.* New York: Springer-Verlag.

Phifer, J., K. Kaniasty, and F. Norris. 1988. The impact of natural disaster on the health of older adults. *Journal of Health and Social Behavior* 29:65–78.

Pine, J. 1991. Liability issues. In *Emergency management: Principles and practice for local government,* ed. T Drabex and G. Moetmer, 289–307. Washington, DC: International City/County Management Association.

Porter, L., R. Steers, R. Mowday, and P. Boulian. 1974. Organizational commitment, job satisfaction, and turnover among psychiatric technicians. *Journal of Applied Psychology* 59:603–609.

Prater, C. S., 2001. *Project impact: An evaluation.* College Station, TX: Texas A&M University Hazard Reduction and Recovery Center.

Prater, C. S., and M.K. Lindell. 2000. Politics of hazard mitigation. *Natural Hazards Review* 1:73–82.

Prater, C. W., D. Wenger, and K. Grady. 2000. *Hurricane Bret post-storm assessment.* College Station, TX: Texas A&M University Hazard Reduction and Recovery Center.

Price, J., D. Cooper, and H. Yee. 1985. *Expedient methods of respiratory protection III: Submicron particle tests and summary of quality factors.* Albuquerque, NM: Sandia National Laboratory.

Prince, S. 1920 *Catastrophe and social change.* New York: Columbia University Press.

Public Safety Wireless Network Program. 1998. *Fire and EMS communications interoperability.* Washington, DC: Public Safety Wireless Network Program.

Public Safety Wireless Network Program. 2003. *Critical issues facing public safety communications.* Washington, DC: Public Safety Wireless Network Program.

Quarantelli, E. L. 1954. The nature and conditions of panic. *American Journal of Sociology* 60:267–275.

Quarantelli, E. L. 1979. *Studies in disaster response and planning.* Newark, DE: University of Delaware Disaster Research Center.

Quarantelli, E. L. 1982. Ten research-derived principles of disaster planning. *Disaster Managemen,* 2:23–25.

Quarantelli, E. L. 1988. Disaster crisis management: A summary of research findings. *Journal of Management Studies* 25:373–389.

Quarantelli, E. L. 2000. Disaster research. In *Encyclopedia of Sociology,* ed. E. Borgatta and R. Montgomery, 682–688. New York: Macmillan

Quarantelli, E. L. 2005. *Catastrophes are different from disasters.* Newark, DE: University of Delaware, Disaster Research Center.

Quarantelli, E. L. and R. Dynes. 1977. Response to social crisis and disaster. *Annual Review of Sociology* 2:23–49.

Reader, I. 2000. *Religious violence in Japan: The case of Am Shinrikoyo.* London: Curzon Press.

Renn, O., and D. Levine. 1991. Credibility and trust in risk communication. In *Communicating risks to the public, ed. R. Kasperson and P. Stallen, 175–218.* London: Kluwer Academic.

Rest, K. M. 1990. *Implementing public policy at the local level*. Boston: Boston University Department of Political Science.

Riad, J. K., F. H. Norris, and R. B. Ruback. 1999. Predicting evacuation in two major disasters: Risk perception, social influence, and access to resources. *Journal of Applied Social Psychology* 29:918–934.

Rich, R., W. Conn, and W. Owens. 1993. Indirect regulation of environmental hazards through the provision of information to the public. *Policy Studies Journal* 21: 16–34.

Ridge, T. 2004. *Memorandum: National incident management system, March 1*. Washington, DC: U.S. Department of Homeland Security.

Rockett, J. D. 1994. A constructive critique of United Kingdom emergency planning. *Disaster Prevention and Management* 3:47–60.

Rogers, Gr., and J. Sorenson. 1988. Diffusion of emergency warnings. *The Environmental Professional* 10:185–198.

Rogers, G., A. Watson, J. Sorenson, R Sharp, and S. Carnes. 1990. *Evaluating protective actions for chemical agent emergencies.* Oak Ridge, TN: Oak Ridge National Laboratory.

Rogoff, M. J., V. Harrell, J. Dilling, L. Gispert, H. Wade, S. Khator, S. Lange, and R. Bitterli. 2003. Continuity of government operations: Developing an alternate relocations plan. *Public Works* 134 (January): 40–44.

Rossi, P., J. Wright, and E. Weber-Burdin. 1982. *Natural hazards and public choice.* New York: Academic Press.

Ruch, C., C. Miller, N. Haflich, P. Farber, P. Berke, and N. Stubbs. 1991. *The feasibility of vertical evacuation.* Boulder: University of Colorado, Institute of Behavioral Science.

Rudman, W. 2003. *Emergency responders: Drastically underfunded, dangerously unprepared.* Washington, DC: Council on Foreign Relations.

Russell, L. A., J. D. Goltz, and L. Bourque. 1995. Preparedness and mitigation activities before and after two earthquakes. *Environment and Behavior* 27:744–770.

Savage, M. 2002. Business continuity planning. *Work Study* 51(5): 254–261.

Scawthorn, C. 1986. Use of damage simulation in earthquake planning and emergency response management. In *Terminal disasters: Computer applications in emergency management,* ed. S. Marston, 109–120. Boulder: University of Colorado Institute of Behavioral Science.

Schiff, M. 1977. Hazard adjustment, locus of control and sensation seeking. *Environment and Behavior* 9:233–254.

Schneider, S.K. 1992. Governmental response to disasters: The conflict between bureaucratic procedures and emergent norms. *Public Administration Review* 52:135–145.

Schulz, P. 1993. Education, awareness and information transfer issues. In *Improving earthquake mitigation*, 159–175. Washington, DC: Federal Emergency Management Agency.

Schwab, J., K.C. Topping, C.C Eadie, R.E. Deyle, and R.A Smith. 1998. *Planning for post-disaster recovery and reconstruction*. Chicago: American Planning Association.

Shariat, S., S. Mallonee, E. Kruger, K. Farmer, and C. North. 1999. A prospective study of long-term health outcomes among Oklahoma City bombing survivors. *Journal of the Oklahoma State Medical Society* 92 (April): 178–186.

Sherry, S., and R. Purin. 1987. Disclosure information systems. In *Hazardous materials, hazardous wastes*, ed. R. Scanlon, 51–57. Washington, DC: International City Management association.

Silverstein, M. 1985. The impact of traumatic injuries on disaster recovery. In *Perspectives on Disaster Recovery,* ed. J. Laube and S. Murphy, 101–109. Norwalk, CT: Appleton-Century-Crofts.

Sims, J. and D. Bauman. 1972. The tornado threat: Coping styles of the North and the South. *Science* 176:1386–1392.

Singer, T. 1982. An introduction to disaster. *Aviation, Space, and Environmental Medicine* 53:245–250.

Slovic, P. 1987. Perception of risk. *Science* 236: 280–285.

Smith, E., L. Robins, T. Przybeck, E. Goldring, and S. Solomon. 1986. Psycho-social consequences of disaster. In *Disaster stress studies,* ed. J. Share, 49–76. Washington, DC: American Psychiatric Press.

Smith, K. 1993. Building trust in your community. *Tappi Journal* 76: 266–267.

Smithson, A. E. and L. Levy. 2000. *Ataxia: The chemical and biological terrorism threat and the U.S. response.* Washington, DC: Henry L. Stimson Center.

Sorenson, J. H. 1988. *Evaluation of warning and protective action implementation for chemical weapons accidents.* Oak Ridge: TN: Oak Ridge National Laboratory.

Sorenson, J. H. 1991. When shall we leave? Factors affecting the timing of evacuation departures. *International Journal of Mass Emergencies and Disasters* 9:153–164.

Sorenson, J. H. 2000. Hazard warning systems: Review of 20 years of progress. *Natural Hazards Review* 1:119–125.

Sorensen, J. H., and D. S. Mileti. 1987. Programs that encourage the adoption of precautions against natural hazards: Review and evaluation. In *Taking care: Why people take precautions*, ed. N. Weinstein, 321–339. New York: Cambridge University Press.

Sorenson, J. D. Mileti, and E. Copenhaver. 1985. Inter- and intra-organizational cohesion in emergencies. *International Journal of Mass Emergencies and Disasters* 3 (March): 27–52.

Sorenson, J. H., and B. Richardson. 1984. Risk and uncertainty as determinants of human response in emergencies. In *Proceedings of the annual meetings of the Society for Risk Analysis*, 23–34. Knoxville, TN: Society for Risk Analysis.

Sorenson, J., B. Shumpert, and B. Vogt. 2002. *Planning protective actions decision-making: Evacuation or shelter-in-place?* Oak Ridge, TN: Oak Ridge National Laboratory Environmental Services Division.

Sorenson, J., and B. Vogt. 2001. *Expedient respiratory and physical protection*. Oak Rdige, TN: Oak Ridge National Laboratory.

Staples, R. 1976. *Introduction to Black sociology*. New York: McGraw-Hill.

Staples, R., and A. Mirande. 1980. Racial and cultural variations among American families: A decennial review of the literature on minority families. *Journal of Marriage and the Family* 42:887–903.

Steele, G. A., M. Lyons, and D. Smith. 1979. *Area agency on aging: Disaster contingency planning*. Tallahassee: Florida Research Center.

Stein, R. and R. Murray. 2005. *Frequencies for the Houston Chronicle Hurricane Rita survey*. Houston: University of Houston Center for Public Policy.

Sutphen, S., and V. Bott. 1990. Issue salience and preparedness as perceived by city managers. In *Cities and disaster: North American studies in emergency management*, ed. R. Silves and W. Waugh, 29–38. Springfield, IL: Charles C. Thomas.

Sutton, V. 1990. *Perceptions of local emergency planning committee members' responsibility for risk communication and a proposed model risk communication program for local emergency planning committees under SARA Title III*. Austin: University of Texas, Department of Political Science.

Sylves, R. T. 1991. Adopting integrated emergency management in the United States. *International Journal of Mass Emergencies and Disasters* 9(4): 423–438.

Task Force on State and Local Homeland Security Funding. 2004. *A report from the task force on state and local homeland security funding.* Washington, DC: U.S. Department of Homeland Security.

Taylor, V. 1977. Good news about disaster. *Psychology Today* 93 (October): 94–96.

9/11 Commission. 2004. *The 9/11 commission report*. New York: W.W. Norton and Company.

Thomas, D. and Mileti, D.S. 2004. *Designing educational opportunities for the hazards manager of the 21st century*. Emmitsburg, MD: Federal Emergency Management Agency Emergency Management Institute.

Thompson, A. A., and A. J. Strickland. 1996. *Strategic management: Concepts and cases*. 9th ed. Chicago: Irwin.

Tierney, K. J. 1988. Social aspects of the Whittier Narrows earthquake, *Earthquake. Spectra* 4:11–23.

Tierney, K. J. 1995. Social aspects of the Northridge earthquake. In *The Northridge, California, earthquake of 17 January 1994,* ed. M. Woods and R. Seiple, 255–262. Sacramento: California Department of Conservation, Division of Mines and Geology.

Tierney, K. J. 2005. *The truth about homeland security.* Boulder: University of Colorado Natural Hazards Center.

Tierney, K., M.K. Lindell, and R. W. Perry. 2001. *Facing the unexpected: Disaster preparedness and response in the United States*. Washington, DC: Joseph Henry Press.

Tobin, T. 1994. Legacy of the Loma Prieta earthquake. In *Practical lessons from the Loma Prieta earthquake,* 21–34. Washington, DC: National Academies Press.

Tomeh, A. 1973. Formal voluntary organizations: Participation correlates and interrelationships. *Sociological Inquiry* 43:80–122.

Trank, C., and S. Rynes. 2003. Who moved our cheese? *Academy of Management Learning and Education* 2(2): 189–205.

Travis, R., and W. Riebsame. 1979. Communicating uncertainty: The nature of weather forecasts. *Journal of Geography* 78:168–172.

Trilgia, A. 1996. Training policies and civil protection in Italy. *Stop Disasters* 20:20–31.

Turner, R., J. Nigg, and D. Heller-Paz. 1986. *Waiting for disaster.* Los Angeles: University of California Press.

Turner, R., J. Nigg, D. Paz, and B. Young. 1981. *Community response to earthquake threat in Southern California: Part 10 summary and recommendations.* Los Angeles: University of California at Los Angeles. Institute for Social Science Research.

U.S. Conference of Mayors. 2004a. *Interoperability survey: A 192-city study.* Washington, DC: U. S. Conference of Mayors.

U.S. Conference of Mayors. 2004b. *Tracking federal homeland security funds sent to the 50 state governments*. Washington, DC: U.S. Conference of Mayors.

U.S. Department of Homeland Security. 2004a. *Statement of requirements for public safety wireless communications and interoperability: The SAFECOM program*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2004b. *National incident management system*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2004c. *National response plan*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2004d. *Urban areas security initiative grant program*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2005a. *Universal task list: Version 2.1*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2005b. *Target capabilities list: Version 1.1*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2005c. *Interim national infrastructure protection plan*. Washington, DC: U.S. Department of Homeland Security.

U.S. Department of Homeland Security. 2005d. *ODP information bulletin no. 193, October 20, 2005: Cooperative training and outreach program*. Washington, DC: U.S. Department of Homeland Security.

U.S. Environmental Protection Agency. 1987. *Technical guidance for hazards analysis: Emergency planning for extremely hazardous substances*. Washington, DC: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency 1993. *SARA Title III fact sheet*. Washington, DC: U.S. Environmental Protection Agency.

U.S. General Accounting Office. 1998. *Observations on the Nunn-Lugar-Domenici domestic preparedness program*. Washington, DC: U.S. Government Printing Office.

U.S. General Accounting Office. 2003a. *Bioterrorism: Preparedness varied across state and local jurisdictions*. Washington, DC: U.S. Government Printing Office.

U.S. General Accounting Office. 2003b. *Major management challenges and program risks: Department of Homeland Security*. Washington, DC: U.S. Government Printing Office.

U.S. General Accounting Office. 2004a. *Continuity of operations: Improved planning needed to ensure delivery of essential government services*. Washington, DC: U.S. General Accounting Office.

U.S. General Accounting Office. 2004b. *Opportunities to improve federal continuity planning guidance.* Washington, DC: U.S. General Accounting Office.

U.S. General Accounting Office. 2004c. *Combating terrorism: Evaluation of selected characteristics in national strategies related to terrorism.* Washington, DC: U.S. General Accounting Office.

U.S. General Accounting Office. 2005a. *DHS's efforts to enhance first responders' all-hazards capabilities continue to evolve.* Washington, DC: U.S. General Accounting Office.

U.S. General Accounting Office. 2005b. *Overview of Department of Homeland Security management challenges.* Washington, DC: U.S. General Accounting Office.

U.S. General Services Administration. 2002. *Template for developing a continuity plan.* Washington, DC: U.S. General Services Administration.

U.S. Nuclear Regulatory Commission. 1978. *Planning basis for the development of state and local government radiological response plans in support of light water nuclear power plants.* Washington, DC: U.S. Nuclear Regulatory Commission.

U.S. Nuclear Regulatory Commission. 1992. *Regulatory guide 3.67: Standard format and content for emergency plans for fuel cycle and materials facilities.* Washington, DC: U.S. Nuclear Regulatory Commission.

Urbanik, T. 2000. Evacuation time estimates for nuclear power plants. *Journal of Hazardous Materials* 75:165–180.

Urbanik, T., A. Desrosiers, M.K. Lindell, and C. Schuller. 1980. *Analysis of techniques for estimating evacuation times for emergency planning zones.* Washington, DC: U.S. Nuclear Regulatory Commission.

Walker, A. G. 1998. *Development of specialized accreditation for emergency management degree programs.* Emmitsburg, MD: Emergency Management Institute.

Walker, D. M. 2006. *Statement by Comptroller General David M. Walker on GAO's preliminary observations regarding preparedness and response to Hurricanes Katrina and Rita.* Washington, DC: U.S. General accounting office.

Wallace, A. F. C. 1957. Mazeway disintegration. *Human Organization* 16: 23–27.

Ward, J. 2003. Government as usual. *Homeland Protection Professional* 2 (May/June): 42–48.

Waugh, W. 2004. Terrorism, homeland security and the national emergency management network. *Public Organization Review* 3 (4): 373–385.

Webb, G. R., K. J Tierney, and J.M. Dahlhamer. 2001. Business and disasters: Empirical patterns and unanswered questions. *Natural Hazards Review* 1:83–90.

Wenger, D., and T. James. 1994. The convergence of volunteers in a consensus crisis. In *Disasters, collective behavior and social organization,* ed. R. Dynes and K. Tierney, 229–243. Newark, DE: University of Delaware Press.

Wenger, D. E., C. Faupel, and T. James. 1980. *Disaster beliefs and emergency planning*. Newark, DE: University of Delaware Disaster Research Center.

Wenger, D., E.L. Quarantelli, and R. Dynes. 1989. *Disaster analysis.* Newark, DE: University of Delaware Disaster Research Center.

Wenger, D. S. 1978. Community response to disaster: Functional and structural alterations. In *Disasters: Theory and research*, ed. E.L. Quarantelli, 17–47. Beverly Hills, CA: Sage.

Wert, B. J. 1979. Stress due to nuclear accident. *Occupational Health Nursing* 27:16–24.

White, G. F. and J. E. Haas. 1975. *An assessment of research on natural hazards*. Cambridge MA: MIT Press.

Whitney, D. J. and M.K. Lindell. 2000. Member commitment and participation in local emergency planning committees. *Policy Studies Journal* 28: 467–484.

Whittaker, H. 1979. *Comprehensive emergency management: A governor's guide.* Washington, DC: National Governors' Association.

Whyte, A. V. 1980. *Final report to Emergency Planning Canada on the survey of households evacuated during the Mississauga chlorine gas emergency.* Ottawa: Canadian Emergency Measures Organization.

Wilkson, D. 1999. Reframing family ethnicity in America. In *Family ethnicity*, ed. H. McAdoo, 16–42. Thousand Oaks, CA: Sage.

Wilson, D. J. 1987. Stay indoors or evacuate to avoid exposure to toxic gas. *Emergency Preparedness Digest (Canada)* 14:19–24.

Wilson, D. J. 1989. Variation of indoor shelter effectiveness caused by air leakage variability of houses in Canada and the USA, In *Proceedings of the conference on in-place protection during chemical emergencies,* ed. T. Glickman and A. Ujihara, 41–73. Washington, DC: Resources for the Future.

Windham, G., E. Posey, P. Ross, and B. Spencer. 1977. *Reactions to storm threat during Hurricane Eloise.* State College, MS: Mississippi State University.

Wisconsin County Government. 2002. *Operations plan guidance: COOP/COG.* Madison: Wisconsin County Government.

Witt, J. L. 1999. Project impact: Building a disaster resistant community, *Disaster Recovery Journal* 11(1):3–7.

Wold, G.H. 1997. Disaster recovery planning process. *Disaster Recovery Journal* 5(1):21–29.

Wood, R. and Bandura. A. 1989. Social cognitive theory of organizational management. *Academy of Management Review* 14:361–383.

Wu, J. Y. and M.K. Lindell. 2004. Housing reconstruction after two major earthquakes: The 1994 Northridge earthquake in the United States and the 1999 Chi-Chi earthquake in Taiwan. *Disasters* 28: 63–81.

Yin, R. and G. Andranovich. 1987. *Getting research used in the natural hazards field.* Washington, DC: Cosmos Corporation.

Yoshida, K., and R.E. Deyle. 2005. Determinants of small business hazard mitigation. *Natural Hazards Review* 6(1): 1–12.

Zeigler, D., and J. Johnson. 1984. *Evacuation behavior* in response to nuclear power plant accident. *Professional Geography* 36:207–215.

Zeigler, D., S. Brunn, and J Johnson. 1981. Evacuation from a nuclear technological disaster. *Geographical Review* 71: 1–16.

Zhang, J. 1994. Environmental hazards in the Chinese public eye. *Risk Analysis* 14:163–167.

GLOSSARY

Acceptable Risk The amount of risk exposure that individuals, organizations, or jurisdictions deem appropriate to tolerate.

Accrediting Body An independent authority established to devise standards and create a review process for academic programs.

Accumulated Exposure The total amount of toxic or radiological dose an individual receives over a defined period of time.

Adjacency Matrix Matrix that describes the physical proximity needs that stem from access team needs among EOC sections.

Agent-Generated Demands Those demands imposed by the hazard agent itself that might come from wind, water, ground shaking, heat, sulfuric acid, or influenza. They threaten human health and safety, property, and the environment.

Agricultural Vulnerability The consequences of disaster impact for any agricultural product, including crops or animals, or for the production and distribution chains associated with that product.

Air Exchange The rate at which air exchanges between a contaminated space and one that is not contaminated.

Alternate Facility A structure that has been tested and can survive maximum likely disaster agent forces and provides all necessities for delivering an essential service.

Anxiety Feelings of unease, uncertainty, fear, and apprehension that are considered normal a reaction to disasters.

Area Command The NIMS ICS term to describe the situation in which jurisdictional EOC coordinates operations at multiple scenes or when no single scene exists.

Audience Segmentation Identifying the audience for communications in terms of defined characteristics—age, gender, and others—with the intent to tailor messages.

Awareness-Level Responder First responders with specialized personal protective gear and CBRNE training capable of recognizing a likely WMD threat, initiating response, and calling more specialized assets.

Basic Plan Plan that captures the authority for planning, the goal of planning, and the concept of operations for response, as well as describes the emergency response organization.

Business Continuity Plan A plan that addresses the measures that will be used to preserve business operability and market share during and after a disaster.

Capability Shortfall The difference between the capabilities (personnel, equipment, and apparatus) needed to perform functions under a plan and those currently available to an organization.

Catastrophe Large scope of impact event that crosses multiple communities, produces very high levels of damage and social disruption, and sharply and concurrently interrupts community and lifeline services.

Certification Programs Programs that test (in some form) the knowledge and experience of emergency professionals and provide documentation of performance.

Citizen Emergency Response Team Sponsored volunteers who have been given professional training in disaster response and management.

Cold Site Site that stores disk-based restart information for computer systems.

Communications Interoperability The ability to engage wireless communication with staff from other agencies, on demand and in real time.

Community Vulnerability Assessment Tool (CVAT) A series of seven modules that a planner completes to produce his or her own local vulnerability assessment.

Compliance Incentive Any measure taken by authorities that removes implementation barriers to PARs.

Comprehensive Emergency Planning The process of simultaneously planning for all phases of all hazards that impinge on an individual, government, or organization.

Concept of Operations The strategic rules under which emergency response operations are to proceed.

Container Stabilization Process that restores an unstable container to a stable physical location or orientation.

Continuity of Government Measures that ensure that representative government survives during and after a disaster.

Continuity of Operations Measures that ensure that government departments can deliver essential services during and after a disaster.

Convergence The spontaneous flow of people, material, and resources to a disaster impact area.

Crisis Communication Team A collection of LEMA technical specialists, trained in communicating, that link between the LEMA, operational responders, jurisdictional officials, technical experts, and the population at risk.

Damage Assessment The measurement of physical damage caused by disaster impact, including secondary hazards.

Decision Stages The series of choices that reflect people's assessment of the need for protection, including risk identification, risk assessment, protective action search, protective action assessment and selection, and protective action implementation.

Delegation of Authority Process that sets rules for which lower officials assume the authority of higher officials who are temporarily unable to serve.

Disaster Myths Incorrect beliefs about the way citizens behave under disaster conditions.

Disaster Subculture A collection of coping patterns or protective behaviors that people have successfully used in the past to deal with a recurrent disaster.

Disaster Syndrome Term that refers to people who respond to disaster impact with apathy, confusion, and insensitivity to cues in the environment.

Disaster Sudden-onset occasions that seriously disrupt social routines, cause adoption of unplanned actions to adjust to the disruption, are designated in social space and time, and that endanger valued social objects.

Donations Management The process of receiving, organizing, and distributing (deploying) donations of funds, material, equipment, or time.

Emergency Damage Assessment Assessment that measures the immediate consequences of impact, projects the prospect for short-term further damage, estimates the chance of further primary impacts, and identifies likely secondary threat consequences.

Emergency Demolition The process of detecting and demolishing structures so severely damaged that they pose an immediate threat to citizens and emergency responders.

Emergency Gross Decontamination Quick use of water to clean victims of traces of a CBRNE agent.

Emergency Manager A person who possesses the knowledge, skills, and abilities to effectively manage a comprehensive emergency management program.

Emergency Planner An emergency manager performing or leading the technical planning process to achieve defined mitigation, preparedness, response, and recovery goals.

Emergency Shelters Unplanned and spontaneously sought locations that provide protection from the elements.

Emergencies Unforeseen but predictable narrow-scope incidents that regularly occur.

Environmental Cues Signals in the environment, detectable by unaided human senses, that a threat is imminent.

EOC Administration Section EOC section that addresses legal issues, mass care for victims, and liaison with agencies outside the immediate jurisdiction.

EOC Coordination The series of actions that assesses agent- and response-generated demands, gathers demand-relevant resources, and deploys those resources efficiently and effectively.

EOC Logistics Section EOC section dedicated to supporting scene operations with food and supplies; fuel and equipment; facilities and transport; and communications.

EOC Operations Section EOC section that serves as the principal liaison with incident scenes and controls operations from the EOC in disasters without a scene.

EOC Planning Section EOC section that executes the planning function for the incident, manages risk assessment data, forecasts likely agent and response demands, and manages the display of data and consequence analyses.

Essential Functions The definition varies, but usually these functions are ones that create negative outcomes within 24 hours of curtailment.

Evacuation Completeness Term that refers to the proportion of the risk-area residents that can be evacuated prior to impact.

Evacuation Shadow An area not at risk but evacuated by residents.

Evacuation The relocation of threatened populations to places outside the hazard impact area.

Expedient Respiratory Protection Breathing through an improvised filter to reduce exposure to dangerous particles and toxic chemicals.

Fatalism A personality trait whereby people believe that external forces beyond their control determine what happens to them.

Fire Control Process that organizes extinguishment, exposure (adjacent structures) protection, and controlled burn.

FIRESCOPE An emergency response system that incorporates both planning functions and the functions of an EOC for managing wildfires.

Focusing Event An incident that brings into the public and government spotlight certain aspects of emergency management policy.

Full-Scale Exercise Exercizes that tests all aspects and all organizational participants in an EOP in a realistic field setting.

Functional Annexe Annex that lists generic functions or tasks that must be accomplished across many types of disasters.

Functional Exercise Exercise that tests one or more functions in an emergency plan in a field setting designed to realistically approximate disaster conditions.

Generic Functions Actions that afford effective protection for multiple hazards.

Hazard Adjustment Adoption The initial commitment of resources needed for a particular adjustment following individual awareness and choice of an acceptable adjustment.

Hazard Adjustment Implementation The continuing allocation of personal resources needed to sustain the protection achieved by an adjustment adoption.

Hazard Exposure Exposure that arises when people live or work in areas that place them in the path of threats.

Hazard Mitigation Measures Any measure taken before disaster impact that reduces the vulnerability of individuals, organizations, or structures.

Hazard Source Substitution The replacement of one high-threat chemical in a process with another lower-threat or no-threat chemical.

Hazard/Vulnerability Assessment Assessment that identifies the hazards to which the jurisdiction is exposed, derives probabilities for impacts, and forecasts consequences.

Hazards US-Multi Hazard (HAZUS-MH) A software program that models potential losses from earthquakes, floods, and hurricane winds.

Hazard-Specific Annexes Annexes that describe procedures, protocols, and special demands associated with a specific type of disaster agent.

Homeland Security Advisory System Color-coded system created by the Department of Homeland Security to reflect the DHS's determination of the level of terrorist threat to the United States.

Hot Site A facility that runs local computer systems on daily updates at remote locations.

Human Vulnerability The extent to which exposure to a given hazard agent is likely to produce short- or long-term injury or death.

In Place Protection Protection in which peoples seek refuge within structures inside the impact area.

Jurisdictional Capacity Assessment Assessment that measures the functions that are required in the EOP for threat mitigation, preparedness, emergency response, and recovery and determines whether the system of departments, agencies, and mutual aid agreements can execute these functions.

Jurisdictional Emergency Operations Plan (EOP) A response blueprint with details on vulnerability, resources, and appropriate actions.

Just-in-Time Manufacturing The delivery of production material only at the time it is needed in the process.

Leadership Climate The atmosphere in which work is overseen by organizational or team leaders.

Leak Control Process that limits the rate at which chemical products escape from containment to the environment.

Local Emergency Management Agency An organization of municipal or county government assigned to engage in emergency management for the jurisdiction.

Mapping Process of tracing hazard exposures and likely impacts onto community maps.

Meeting Strategy A means of scheduling, conducting, and following up after planning meetings that promotes further participation and positive outcomes.

Message Distortion Failure to convey a message in original form and content.

Message Specificity A message's level of detail about the threat, vulnerability, and PARs.

Mitigation Activity Attempt to eliminate the causes of a disaster by modifying the agent, introducing technological innovation, or modifying the human use system.

MMRS IMS Model Model in which all personnel are trained and equipped to detect and address CBRNE incidents at differing levels of specialization.

MMRS Strike Force Model Model in which specially trained and equipped mobile personnel are deployed after a CBRNE incident is verified.

National Incident Management System (NIMS) A government-issued guideline for emergency planning and incident management.

Necessary Functions The definition varies, but usually these functions cause negative outcomes only if they are curtailed for 14 days or more.

NFPA 1600 Professional association standard that sets criteria for creating and operating successful emergency management programs.

NIMS Integration Center Organization that oversees the implementation of NIMS, issues NIMS standards, tests and certifies NIMS skills, and monitors system development.

Normalcy Bias The tendency to reinterpret danger cues (warnings, environmental signs, etc.) so they mean conditions are "normal" and don't reflect a pending crisis.

Order of Succession Defines the sequence of role incumbents who replace a higher-level position incumbent who permanently cannot serve.

Organizational Capability Analysis A systematic review of any organization's, personnel, training, equipment, and vehicles in terms of their ability to perform plan-specified response functions.

Organizational Climate Distinctive patterns of shared beliefs to which group members are socialized and that are reinforced by group interactions.

Organizational Commitment The strength of an individual's identification with and involvement in a particular organization.

Panic Flight High anxiety accompanied by rushing or running to avoid a threat when escape routes are perceived to be closing.

Peak Concentration Term that refers to the highest level of impurities present in air.

Penetration Term that refers to the power of warning mechanisms to get the attention of those at risk.

Permanent Housing Reestablishment of disaster victim household routines in preferred locations and structures.

Personal Protective Equipment (PPE) A range of protective gear from simple particulate masks and gloves, through self-contained breathing apparatus to fully encapsulated, positive air pressure suits.

Planning Horizon A defined time period over which one spreads defined tasks, culminating with goal accomplishment.

Plume A "cloud" or airborne mixture of particles or vapors.

Policy Adoption The approval of one or more policy options by an authority.

Policy Evaluation Process that determines the effectiveness of a policy.

Policy Formulation Planning and information gathering that identifies different options and forecasts likely outcomes.

Policy Implementation The actual execution of a policy.

Population Protection Analysis The process of defining the available warning mechanisms, defining threat circumstances to maximize the effectiveness of different mechanisms, and making appropriate protective recommendations.

Precision of Dissemination Term that refers to a channel's ability to warn all of those at risk (sensitivity) and only those at risk (specificity).

Predecision Processes Processes that bring information to people's conscious awareness. These are exposure to, attention to, and interpretation of cues in the physical or social environment. These relate to receiving a warning, attending to the warning, and comprehending the message.

Preparedness Activities Measures to protect lives and property when threats can't be controlled or when only partial protection can be achieved.

Production Chain The sequence of actions by individuals and organizations, with added resources, that ends with successful service delivery.

Profession A collection of practitioners identified by expertise who control and apply a given body of knowledge.

Rate of Dissemination The speed of the mechanism or the number of people that can be warned in a given time frame.

Recovery Period beginning after disaster impact is stabilized that focuses on restoring functions lost.

Resource Analysis The pairing of resources with estimated emergency response needs and planning for the acquisition and use of those resources.

Response Efficacy An individual's belief that execution of a protective measure will in fact achieve some degree of protection from a threat.

Response Generated Demand Demand on authorities that arises from plans associated with responding to agent-generated demands. This includes training, planning, public education, equipment, and others.

Risk Communication The process of sharing information about environmental hazards with those at risk. Risk communication includes warnings about imminent threats and dissemination programs when threats are not imminent.

Risk Reduction Analysis The analysis of the actions necessary to decrease known or projected levels of danger associated with a threat.

Role Abandonment The persistent myth that instead of doing their disaster-related jobs, emergency responders will leave to attend to other responsibilities.

Secondary Device Any agent (usually explosives) that is designed and deployed with the intent of injuring and disrupting emergency responders.

Secondary Hazards Risks that are caused by or associated with a primary hazard.

Sender and Receiver Resources The capital (equipment) and personnel-training resources demanded to keep a community-warning system functioning.

Signal Value The determination that a threat of previously low salience should receive urgent attention.

Situational Analysis A managerial assessment of organizational strengths, weaknesses, and opportunities both internally and with respect to the organizational environment.

Social Vulnerability A person's or group's ability to anticipate, prepare for, cope with, resist, and recover from disasters.

Spill Control Process that limits the rate at which a chemical disperses through the environment.

Spontaneous Protective Response Term that refers to people who engage in an officially recommended protective action when they are not in the target risk area.

Standard Operating Procedures Very detailed guides for specific tasks operational personnel perform in the field.

Strategic Choice The selection of goals, means of organizing, and measures to ensure success that an emergency manager believes are particularly suited to the community contexts.

Structural Vulnerability Vulnerability that arises when buildings are constructed by using designs and materials that are incapable of resisting stresses imposed by disaster agents.

Subject Matter Experts (SMEs) People who cultivate special knowledge of hazard agents, hazard processes, human behavior relative to hazards, or any of the processes or analyses that support any phase of emergency management.

Substance Inventory A listing of hazardous substances (usually defined in terms of federal or state statute), their quantities, and their location.

Supporting Analyses A variety of formal analyses conducted as part of the planning process that inform plan writing, including information about the community's hazards, vulnerable populations, and response capabilities.

Survivor Syndrome The presence of guilt and anxiety among people who survive a disaster exposure when others (potentially friends and relatives) did not survive.

Tabletop Exercise Plan test conducted in the classroom or conference room, based on a limited scenario, which allows participants to verbally describe their response to contingencies.

Technical Decontamination Use of special solutions, specific to the agent, and scrubbing to remove an agent an from the skin.

Technician-Level Responders Personnel who have extended PPE, agent-specific training, and extensive specialized equipment.

Temporary Housing Housing that achieves food and sleeping provisions and allows victims to reestablish household routines in nonpreferred locations or structures.

Temporary Shelter Shelter that provides protection from the elements and that includes food and sleeping facilities.

Therapeutic Community The altruistic and supportive behaviors extended by victims and nonvictims toward people affected by a disaster.

Turnover Time The mathematical reciprocal of the air exchange rate and the time required for an enclosed space to either become contaminated or to clear.

Unified Command NIMS term for the collection of representatives from many agencies in an EOC where there is a single scene.

Vertical Evacuation The movement of hurricane evacuees to resistant high-rise structures inside the impact area.

Vertical Load The weight or force resulting from the weight of the occupants, furniture, upper stories, and roof of a structure.

Victims' Needs Assessment The measurement of the collective needs of disaster victims. Also called social damage assessment.

Vital Functions The definition varies, but usually these are functions that create negative outcomes if curtailed for more than 72 hours.

Vital Records Government documentation of significant events in the lives of citizens, including marriages, births, deaths, and divorces.

Vulnerable Zone A geographic area within which people, structures, and environment (agriculture, husbandry, soil, water, etc.) are subject to harm.

Warning Mechanisms Different means of disseminating a warning to the population of a risk area, including face-to-face communication, mobile speakers, telephone systems, and the like. Also called warning channels or warning modes.

Weapons of Mass Destruction (WMD) Instruments adapted to produce mass casualties. These include chemical, biological, radiological, nuclear, and explosive (CBRNE) agents.

Window of Opportunity A period of time where political will to change, the funding for change, and a continuing threat all coincide.

PHOTO CREDITS

Figure 1-1: Ronald, L. Jameson, Division Chief, Phoenix Fire Department

Figure 2-1: Photo by Leif Skoogfors/FEMA; FEMA Web site, Image Number 21841; www.fema.gov

Figure 2-3: Ronald, L. Jameson, Division Chief, Phoenix Fire Department

Figure 3-1: Photo by Robert Kaufman/FEMA; FEMA Web site, Image Number 20511; www.fema.gov

Figure 4-2: Photo by Ronald Perry, Arizona State University

Figure 5-1: Photo by Ed Edahl/FEMA; FEMA Web site, Image Number 15803; www.fema.gov

Figure 6-1: Photo by Dave Gatley/FEMA; FEMA Web site, Image Number 385; www.fema.gov

Figure 7-1: Photo by Ronald L. Jameson, Division Chief, Phoenix Fire Department

Figure 8-1: Photo by Danny Peterson/Arizona State University Polytechnic

Figure 9-1: Photo by Dennis Wheeler/FEMA; FEMA Web site, Image Number 8500; www.fema.gov

Figure 9-2: Photo by Bob McMillan/FEMA; FEMA Web site Image Number 21940; www.fema.gov

Figure 10-1: Credit: Corbis Digital Stock; Image ID: GOV0041D

Figure 10-3: Photo by D. Perkins/NOAA; NOAA; Image ID IMG0095; www.noaa.gov

Figure 11-1: Photo by Mark Wolfe/FEMA; FEMA, Image Number 10411; www.fema.gov

Figure 11-2: Photo by Win Henderson/FEMA; FEMA, Image Number 15102; www.fema.gov

Figure 12-1: Photo by Greg Henshall/FEMA; FEMA: Image Number 16447; www.fema.gov

Figure 12-3: ©AP/Wide World Photos.

Figure 13-3: Photo by Jocelyn Augustino/FEMA; FEMA: Image Number 17716; www.fema.gov

INDEX

C

D

F

G

H

U

V

W