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PRESIDENT'S FORWARD

Welcome to the 1996 edition of The ASPEP Journal. The Journal is an annual publication of The American Society of Professional Emergency Planners. Papers are accepted from all disciplines relating to the field of emergency management and are reviewed and selected by a standing committee of the Society. In line with the philosophy of ASPEP, emphasis is placed on providing a venue for viewpoints from the global emergency management community comprising both the public and private sectors and including both emergency management practitioners and the academic community.

The American Society of Professional Emergency Planners (ASPEP) was founded in 1972 and was incorporated under the laws of the State of Minnesota in 1979. Since its inception, ASPEP members have attained the highest competencies available in the emergency management community. Members must be nationally certified in emergency management to be eligible for ASPEP membership.

The purpose of the organization is to:

- Support and serve allied professional organizations
- Provide venues for professional development through publications, continuing education and professional exchange
- Provide sustainable emergency management skills to others.

We, as a society, endeavor to foster professional development among our membership and our field. Our thanks to the authors of this year's Journal for helping us achieve some part of that mission through this publication. We hope many more will join us in these pages next year. If you are interested in publishing in the Journal, please write ASPEP at the address listed on the front title page. We would be happy to put you on our mailing list for the annual Call for Papers.

Janet D. Dilling, CEM
President, ASPEP, 1996

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EFFICIENT USE OF WORKPLACE TELEPHONES AFTER DISASTER STRIKES

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You are at work, your children are in school, and your elderly mother is at home alone. The earth begins to shake. Quickly, you duck under your desk to protect yourself. The intensity increases, and the first thought that flashes into your mind is, "this is it, the BIG ONE is hitting!" The unthinkable has happened. It has struck during work hours, and you are frantic to find out about your loved ones. How will you reach them?

The situation doesn't have to be an earthquake. A plane crash, major hazardous materials spill, train derailment, bombing, or other unexpected event can suddenly create an overwhelming demand on the public telephone network. You can take steps now to build into your organization's recovery plan the proper ways to use your communications tools.

If you have taken public warnings seriously and have properly prepared your family, you will have already identified an out-of-area friend or relative who will act as your contact point. Each of your family members will be carrying the designated number with them, and the school will have it in your children's' records as well. Everyone will know in advance that they are to call the distant party to leave word about their condition.

If you are like most people, however, you will panic and immediately grab the telephone to dial. When you pick up the receiver, there will be no dial tone. You will immediately think your telephone is dead. Now what will you do?

For years, after each major disaster, the notion that telephones "go dead" has been perpetuated by reports heard on the radio and TV. In reality, that is far from the truth. Telephone systems are no different than the computer you use daily at work. They are built to process a certain number of calls at any one time. When the demand increases, it just takes longer before the telephone system can send you a dial tone. It does not mean that they are broken or won't work.

THE NORTHRIDGE EARTHQUAKE EXPERIENCE

When the Northridge earthquake struck, I was about 40 miles from the epicenter. My telephone number was in a different area code, served by a different local telephone company. Throughout the first day, I waited 60 to 90 seconds before I received a dial tone. I received it every time. The telephones were not broken. They were just overloaded with people attempting to place calls.

WHAT REALLY HAPPENS TO THE TELEPHONE NETWORK

The telephone network is designed based on the amount of traffic it expects to carry during the busiest hour of the day, which is equivalent to approximately 10% of everyone within that area making or receiving a call during that hour. When a regional disaster hits, what percent of people do you think pick up their telephones? I can assure you it's much more than 10%. And in the case of an earthquake, the earth movement may also knock the receiver off, which makes the telephone switching equipment react as if someone is asking for a dial tone.

In fact, during Northridge, the telephone switching systems within the disaster area completed almost three times as many calls as normal that day. Sure, there were some intermittent problems, but within a few hours, service had been restored everywhere. Only one community of 1500 people who were located in a rural town about 30 miles away were isolated. They could call anywhere within their community, but they couldn't make or receive calls outside their local community. The cause was a broken gas main that exploded, burning the telephone facilities to the community. Telephone companies located in earthquake areas take great precautions to minimize service interruption by building structures that far exceed local building codes, securing and bracing all equipment, providing back-up generators to replace local power if it is lost, and activating dynamic controls within the network to open up outgoing calling pathways within the affected geography.

WHAT TO DO IN ADVANCE TO MINIMIZE COMMUNICATIONS DAMAGE

Has your organization taken the same precautions with the communications equipment it has installed at your location? In the United States before 1984, few if

any organizations even thought about their telephone service because most leased it from their telephone providers. In today's environment, everyone has the ability to install their own equipment right at the worksite yet very few have taken any precautions to protect this extremely costly asset.

Daily we hear horror stories of communications equipment at business locations that fails due to inadequate back-up power (you should have both Uninterrupted Power Supply (UPS) and a generator if you plan to use your system for any length of time after a disaster), collapsed flooring under the switch (all raised flooring should be braced in earthquake areas), water damage (tarps should be stored near the equipment for quick containment of damage if sprinklers are activated), back panels damaged by someone inadvertently working around the area (equipment areas should be secured with limited access at all times), and lengthy switch outages (system tapes and databases should be backed-up regularly and stored off-site). I'm sure you get the picture. The list of stories goes on, and on, and on.

EDUCATING EMPLOYEES ON HOW TO USE THE TELEPHONE NETWORK WISELY

Provide instructions in advance to let your employees know how to best use the telephone system. The instructions below can be incorporated into your plans and emphasized when training employees.

Before the Disaster:

- Designate a contact point at work for messages so employees can let you know their status.
- Have each employee provide you and their family with an out-of-area contact name and number (that will remain confidential and will be used only during an actual emergency). This may be the only way to reunite employees with their families or let relatives know someone is injured.
- Have employees inform their relatives not to try to reach them at work. Relatives and employees can exchange information through their designated out-of-area contact.
- Pre-designate where employees are to report to work if normal communications are overloaded. This prevents having to use calling trees which add to the congestion on the telephone network.

Immediately After The Disaster:

- Check all telephones to verify the receivers are properly on their hooks.
- Use your telephone only for emergency calls.
- If you have to make an emergency call, pick up the receiver and listen for a dial tone. It may take a few minutes. Do not flash the switchhook as that just sends you to the back of the waiting line.
- Be ready to dial your number when you hear the dial tone. The telephone equipment will only wait half as long as usual before sending a tone back if it doesn't receive your digits.
- If you receive a call from someone out of the area, have them inform your out-of-area contact point that you are O.K. This will eliminate your need to make the call.

Until Full Communications Are Restored:

- Continue to limit your use of the telephone. It may take several days before the increased calling subsides.
- Following an earthquake, aftershocks will occur. Do not use the telephone unless you have an emergency. Every aftershock creates a resurgence of calls on the telephone network, causing additional congestion.
- Keep your out-of-area contact informed at reasonable intervals. Remember, the best time to place a call is between 10:00 p.m. and 6:00 a.m. when other calling has subsided.

The secret to using your telephone successfully is knowing what to expect, and making each call count. Be sure to include instructions on how to reunite employees with their families in your training program.

AFTER HOURS COMMUNICATIONS

If a disaster strikes after normal work hours, or if you send employees home initially, you will want to let them know later where and when to report for work. The telephone network may be used more effectively by setting up an 800 number with voicemail capability. Employees are given a wallet sized card to carry with them at all times. When an event occurs, they are instructed to call the 800 number between 10:00 p.m. and 6:00 a.m. and listen to the information. Individual departments that want to provide different instructions for their employees may change their group's voicemail message by 10:00 PM.

By having employees call during the night hours when traffic on the telephone network has significantly decreased, they should have no problem getting right through. In fact, the very first night after the Northridge earthquake, all controls were out of the telephone network between those hours. Of course, the next morn-

ing after everyone woke up, congestion began anew. For the first week, the telephone network continued to experience congestion during the day hours, causing telephone network dynamic controls to be activated. Each significant aftershock brought a new onslaught of calls as everyone rushed to check on loved ones and friends.

After-hours calling to a recorded message is an alternative to setting up calling trees that speeds up communications and keeps everyone informed of the current status. Instead of each leader making multiple attempts to reach everyone on their list, each person is responsible for calling in at their own convenience during the designated hours to obtain current reporting or other key information. This would result in fewer calls and spreads the workload.

CREATIVE COMMUNICATIONS SOLUTIONS

The latest disasters have provided opportunities for people to use new communications technologies uniquely. Immediately following Northridge, on-line services such as America On Line (AOL), CompuServe, and Prodigy were flooded with messages from families trying to reach loved ones. A typical message might read "My aunt lives at 2220 Califa Street, and I haven't been able to reach her." A couple of minutes later, another message would show up saying "We checked on her already, she's just fine." We saw these services provide a similar role that amateur radio has played in prior events. Of course, they're using the public network to call their service provider which adds to the congestion, so this alternative may not work well in the future now that on-line services have become a popular pastime.

You can apply this idea to your own organization. Do you have an e-mail system that is on your Local Area Networks (LAN)? Why not predesignate a specific e-mail address to receive injury and damage reports from outlying offices? You can even designate in advance what information you want to receive, such as the number of injuries, evacuation and utilities status, damaged equipment, or requests for additional on-site assistance. If you don't have e-mail, create a form that can be faxed between the hours of 10:00 p.m. and 6:00 a.m. to your EOC or wherever damages will be assessed? Print the fax numbers and instructions right at the top of the form, so that at the time of the disaster, everyone will know what to do and where to send the information.

Other solutions that can provide greater flexibility in your communication network include products such as Primary Rate Integrated Services Digital Network (PRI), Frame Relay Service, and Switched Multimegabit Data Service (SMDS) are just a few. As your organization moves forward in its strategic planning, use business opportunities to build more diversity into your own communications network. Use your communications equipment wisely to speed up recovery efforts instead of hindering them. Plan today...survive tomorrow!

A NOTE ON COMPUTER MEDIATED COMMUNICATION IN HAZARDS MANAGEMENT AND HAZARDS RESEARCH

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INTRODUCTION

The Natural Hazards Research and Applications Information Center at the University of Colorado grew out of a major research project conducted in the early 1970s to assess the state of natural hazards research in the United States. The project, conducted by a group of scholars at the University of Colorado, was initiated, in part, to determine why the measures underTaken in this country to cope with disasters were not yielding the desired returns. The two broad aims of the project were "to provide a more nearly balanced and comprehensive basis for judging the social utility of allocating funds and personnel for various types of research on geophysical hazards [and] to stimulate, in the process of that analysis, a more systematic appraisal of research needs by scientific investigators in cooperation with the users of their findings" (White and Haas, 1975, p. xvii). Among the many conclusions of this broad, ambitious project was the finding that information exchange among researchers in different hazard disciplines, as well as information exchange between researchers and frontline hazard managers and policy makers, was deficient and that there was a clear need to improve the exchange of findings, thought, and concerns among these groups.

On the 20 year anniversary of that first study, the Natural Hazards Center has undertaken a "Second Assessment of Research and Applications on Natural Hazards" a broader look at the entire hazards field. The project currently involves well over 100 scholars and practi–tioners from around the nation who have volunteered their time and knowledge in order to try to create a comprehensive picture of hazards research and practice in the U.S. It is reviewing the past, taking stock of and integrating the present, and attempting to delineate key steps that need to be taken to improve hazards management in the future.

This paper was prepared as part of the Second Assessment a subsection on "Electronic Communications" in a section on "New Technologies and Approaches" in a chapter entitled "Innovative Paths and New Directions."

THE INFORMATION REVOLUTION

Since the original Assessment of Research on Natural Hazards was undertaken in the early 1970s, the base of information on hazards and disasters in the U.S. has grown enormously. As one of the results of that first assess–ment, the Natural Hazards Center now maintains a large library of information on human adjustments to hazards. Other organizations which maintain major hazard/disaster libraries include the Earthquake Engineering Research Center's National Information Service for Earthquake Engineering (EERC/NISEE), the National Center for Earthquake Engineering Research (NCEER), the Disaster Research Center (DRC), the National Geophysical Data Center (NGDC), the Federal Emergency Management Agency (FEMA), and the Insurance Institute for Property Loss Reduction (IIPLR).

When the first assessment (White and Haas, 1975; Mileti, Drabek, and Haas, 1975; Cochrane, 1972) was undertaken, there were few, if any, periodicals or journals being published that were specifically devoted to hazard/disaster management or research. Today, there are dozens (see Appendix A).

At the time of the first assessment, the journals of major disciplines from sociology to geology would occasionally devote single issues to hazards or disasters, but it is an indication of the maturation of the field of hazards management that today there are periodicals devoted both to various hazards and to various aspects of their management. Indeed, it is not uncommon these days for a hazards journal, in a special issue, to focus on, say, the psychological impact of disaster or the role of the media. In addition, if the annual bibliographies published by the Natural Hazards Center and the reports of new publications included in the center's bimonthly newsletter, the Natural Hazards Observer, are any indication, the number of books published annually on hazard management has also increased significantly over the years.

There are many reasons for this increase in printed

publications regarding hazards and disasters. A colleague (1) has suggested several: increased funding for both research and publication from the National Science Foundation, federal agencies, and other groups through such programs as the National Earthquake Hazards Reduction Program (NEHRP); the apparent recent increase in severe disasters and disaster costs in the U.S.; and an increased awareness of the threat posed by disasters among other interested disciplines and players such as the insurance industry.

Beyond this major growth in printed material, another increase in hazard-related information has proceeded at something approaching a geometric rate in the last decade. Two technological innovations, one based upon the other, have brought about changes in communication and information sharing which are so great that they represent qualitative as well as quantitative differences. Those innovations are the advent of computer mediated communication, in particular communication via the Internet, and the introduction of the World Wide Web as a means for multimedia communication on the Internet.

The changes wrought in American life by the appearance of, first, the personal computer, and, second, computer communication via the Internet are well known, as is the explosion of information transfer brought about by the World Wide Web. As remarkable as the changes themselves have been, the rate at which these changes have occurred is even more astonishing. Four years ago, the Web did not exist except as a prototypical system. Today, the number of sites offering information via the World Wide Web is almost impossible to ascertain, but one source (WebCrawler, 1996) estimates that, by April 1996, there were at least 145,166 World Wide Web servers (i.e., machines that run Web software and provide Web access) on the Internet, and probably closer to 200,000. Moreover, this number represents only servers, not logically distinct Web sites operated on the same machine. That number is unknown, but it is probably several times larger than the 150,000 to 200,000 cited above. Indeed, WebCrawler notes that the number of servers increased six fold in 1995. Another source, (Gray, 1995) notes that from June 1993 to June 1995, the number of Web sites doubled every 3 months. Yet another source (Lottor, 1996, cited by Rutkowski, 1996) notes that the growth of Internet hosts (not just Web hosts) has grown linearly since 1989 (when there were 100,000 such machines) to approximately 10,000,000 in early 1996. At that rate, the projected number in the year 2,000 will be approximately 100,000,000.

All of these numbers simply document what casual observation shows: that a new and unique medium of communication is sweeping the globe.

THE NET AND HAZARD/DISASTER MANAGEMENT

The field of hazardsdisaster management has been affected by this change as much as any other field. For example, according to an April 1996 news release from the Federal Emergency Management Agency (FEMA), at that time the agency offered over 8,000 pages of informa–tion via the World Wide Web, and FEMA's, of course, is only one site (albeit one of the larger and better ones dealing with disasters) within the giant network of the World Wide Web. In another recent news release from the agency (June 5, 1996), FEMA Director James Lee Witt was quoted as saying that the FEMA Web site had been accessed over 5 million times in 1995, yet FEMA had only begun creating and maintaining their Web repository of information in late 1994. As another example of the growth of hazard/disaster information on the World Wide Web, the Natural Hazards Center maintains on its Web site a list of other useful sites that individuals might consult for hazard/disaster information. That list represents only those Web sites that the editors at the Hazards Center feel are particularly useful and well constructed; thus, they probably represent less than one-half (and probably a much smaller proportion) of all sites that have relevance to hazards/ disaster management. That list now includes about 80 separate Universal Resource Locators (URL), i.e., Web addresses) (see Appendix B) as well as dozens of other Internet resources. As one final example of the magnitude of this change, the Natural Hazards Center has, for the last six years published an "electronic" (i.e., e–mail) newsletter, Disaster Research, on the Internet. From an initial distribution of about 100, the subscription list has grown at the almost constant geometric rate of 60% per year. Disaster Research now goes out to about 1,500 recipients around the world and is recirculated through numerous subnet-works and computer bulletin board systems to thousands of others.

Because of the speed and pervasiveness of this media revolution, issues surrounding electronic communication and knowledge transfer crosscut all dimensions of hazards management. Everyone from local emergency managers, to academic researchers, to federal officials are wondering how these new technologies will affect hazards management, and, perhaps, more pragmatically, how agencies can adapt these media to support their organizational missions.

Before addressing these issues, let us first briefly ex-

amine the information process that these new technologies will (hopefully) enhance.

THE TRANSFER OF HAZARDS INFORMATION

In a preliminary second assessment paper that I prepared in 1992, I suggested that, for analytic and research purposes, the information dissemination process in hazard management could be conceptualized in six dimensions (Figure 1). Hypothetically, a complete study of this field would examine both specific elements of this matrix (for example, the effectiveness of an earthquake preparedness brochure published by FEMA for local govern–ment officials regarding government liability during earthquake recovery), as well as broader issues defined by entire dimensions (for example, the relative efficacy of various media consulted by homeowners when looking for information on flood-damage prevention).

Because this framework is all encompassing, a critical question is what research, within the framework, is most needed. In the broadest terms, some of the key questions (and areas for possible research) are:

- What are the critical hazard information needs in the U.S.? Who, specifically, needs the information? When do they need it?
- Who can/should provide the information?
- What are the best means of making various information available?

FIGURE 1: THE DIMENSIONS OF HAZARD COMMUNICATIONS

1) **Hazard** (flood, earthquake, etc.)
2) **Disaster Stage or Disaster Intervention** (preparedness, impact, response, etc. or alternatively education, land-use management, insurance, etc.)
3) **Source of Information** (scholar, practitioner, agency, data-base, etc.)
4) **Target of Information** (government officials, emergency reponders, familes, schoolchildren, etc.)
5) **Medium** (face-to-face conversation, television, fax, CB radio, book, computer network, etc.)
6) **Message** - form and content (warning, report, educational information, etc.)

In that preliminary paper, I identified some more specific, immediate needs (at least in the pre-disaster period):

1) Many of the libraries mentioned above have made their databases accessible directly via computer. Because such information is geographically (and logically) scattered, however, there is an obvious need to further integrate the information and to make it more consistent, collectively accessible, and useable.(2)

2) There has been a long-standing need to collect and maintain in a central repository basic data on disaster impacts. No consistent set of information on disaster costs, including injuries, deaths, damage, and other direct and indirect financial consequences, exists. A sound base of such information would provide a solid foundation for hazard research in the next several decades.(3)

3) Similarly, there is no central source of collective risk assessment data. Hazard managers and other interested persons typically have no single source (indeed, no definitive collection of sources) they can consult to determine the overall hazardousness of a given place.

4) Finally, the transfer of useful hazard mitigation information between the U.S. and developing nations has not happened consistently in any formal way. Given the United States' leadership in dealing with natural hazards, a means for transferring our knowledge and experience to other nations seems almost a moral imperative.

COMPUTER MEDIATED COMMUNICATION AS PART OF THE SOLUTION

One of the consequences of the information revolution described above is that old, slow, expensive forms of communication, such as letters, newsletters, journals, and conferences are being replaced with computer communication media.(4)

In a 1992 article in Earthquake Spectra, Sarah Michaels argues that it is a mistake to think of the transfer of hazards information as a linear process in which "information producers" inform "information users." She suggests that the two communities are not distinct and that persons directly involved in hazards management most often get their information through "information webs" linking colleagues and other members of loose and fluid "issue networks",not from centralized information structures. She concludes that, "It would be worth experimenting with strategically subsidizing particular issue networks [her emphasis] to determine if they are an efficient, cost effective means of promoting information dissemination. The challenge is for existing, formal institutions to promote and support the dissemination activities of informal structures."

Today, computer networks represent a very effective "informal structure" through which hazards researchers and hazard information centers can join one another

as well as other interested groups in the ongoing exchange of information and focused discussion regarding specific issues in hazards and disasters. The Internet has provided a means through which hazards managers and researchers can reinforce their position among other human networks, such as architects, community planners, and elected officials, and become participants in a national and world colloquy on hazards and disasters. Indeed, beyond simply providing a means of informal conversation among hazard practitioners, computers and computer networks have helped to resolve, or at least begun to resolve, each of the four issues cited above.

- They are helping to consolidate and make more readily available the information maintained by the various hazard/disaster centers in the U.S. Internet technology, particularly the World Wide Web, is creating "virtual" consolidated libraries or databases, even full-text databases, of hazards information that include the collective holdings of many institutions. (5 - see also, Note 2)
- Computers and computer networks are making it feasible to collect and consolidate disaster event data and vulnerability information and thus to develop a baseline of information on disaster impacts. (6)
- Networks, and particularly the Internet, are already proving invaluable in transmitting information to developing nations. (7)

While many of the prototypical activities are aimed at strengthening mitigation through pre-event planning and preparedness, some research and initial efforts have also been undertaken to determine how and to what extent the Internet can be used to facilitate actual disaster response and recovery. (8)

BEYOND THE MACHINE: UNDERSTANDING THE USERS

More research is needed regarding the technical/machine aspects of computer communication to aid hazard management, but such studies will inevitably happen. Entrepreneurial technological innovators will develop and market new, and better, computer-based tools. Everyone involved in emergency management from academic researchers to frontline local emergency response coordinators will struggle with the ever increasing rate of change in their field. At the same time that the technological marvels proliferate, additional research will be needed to help maximize the efficacy of these new technologies for disaster management i.e., research into the psychological, organizational, and social issues that accompany their use (see Drabek, 1991, for an example of early work in this area). Understanding these problems may be as essential as the technological innovations themselves to furthering the benefits of computer mediated communication in hazards/disaster management. Some of the difficult, but critical, questions that could be ad dressed include:

1) What are the optimum ways for making decisions in fluid environments where information accumulates and changes rapidly? Are there heuristics (machine-based or human-based) that can aid humans in decision making when they are using computers to acquire, organize, and interpret information? Are such aids different during times of crisis (disaster), when information flow is fast but the integrity of the information is questionable, than during times of calm (predisaster). We may simply need to have a better understanding of exactly how hazard/disaster management decisions are made at either time.

An implicit model of computer use in today's world of emergency management is that computers supply information which humans use to make major decisions and choices. Is this the best model? How can machine and human be better integrated to make operational decisions easier, faster, and more effective? What "decisions" can be made by the machine?

What are the optimal communication structures and protocols for conveying information in times of crisis or in times of peace?

2) Are there ways to aid humans in filtering information and in determining which information is most useful, accurate, and timely and which is not? In other words, how does one deal with the issues of too much information and too much poor information?

3) As Quarantelli has noted (Quarantelli, 1996) (via a conference held on the Internet!) the use of new technologies almost inevitably leads to new forms of disaster involving those technologies. For instance, the appearance of computer systems and networks heralds the advent of system crashes and network failures. More critical studies need to be undertaken (regarding backup and redundant systems, for example) to ensure that computer mediated communication is truly an asset in disaster management and not a burden, particularly if the system fails.

4) In a larger context, Quarantelli (1996) offers a question that subsumes the preceding questions regarding the use of computer communication in hazards management: "What kinds of general social infrastructures and cultures are necessary for the adequate function-

ing of the disaster relevant technology? ... We need research in particular to discover where there will be likely lags in the social/cultural dimensions that will create points of vulnerability." In other words, what parallel changes in culture and society (in training and education, for example) are needed to optimize the effective integration of computer communication technology into disaster management?

A FINAL NOTE ON RESEARCH DESIGN

Although it seems inevitable that computer communication resources will be used increasingly to transmit hazards information, the speed with which these technologies are adopted, as well as the form and content of their development, will be determined by the organizations and individuals who choose to further computer use to mitigate hazards. A significant challenge over the next decade, therefore, will be for hazard researchers to determine how computer networks and communication can be best used to integrate hazards research into the ongoing discourse among persons directly involved in hazards management and mitigation. Among the biggest challenges are the further integration of the multiple resources that already exist and the development of means to filter and navigate the surplus of information that exists so that Internet users can quickly and easily find the essential information that they need and make decisions based on that information. This information must be made accessible to those developing nations and communities most in need of vital hazard management and mitigation information.

All of these questions must take into account the dynamic setting in which they are posed.(9) Research specific to today's World Wide Web is unlikely to be helpful, since, by the time that research sees the light of day, the World Wide Web probably will have changed to something different from what it is now - or will have been supplanted by a new technology. Designing useful enquiry in such a rapidly changing world is a challenge in itself.

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Yin, Robert K., and Gwendolyn B. Moore

1985 The Utilization of Research: Lessons from the Natural Hazards Field. Washington, D.C.: The Cosmos Corporation.

Recommends problem-focused research and ongoing interaction between user groups and researchers before, during, and after research is conducted. Cites other ways in which researchers can improve research utilization (by joining professional organizations, etc.). The authors' support of a "social-interaction" theory of information utilization in which "research producers and users must belong to over-lapping networks and have ongoing communication in order for utilization to occur" again suggests the potential importance of computer mediated communication.

NOTES

1. Katie Frohmberg, former director of the National Information Service on Earthquake Engineering at the Earthquake Engineering Research Center, University of California Berkeley, in personal conversation.

2. I originally posed this issue four years ago. Frohmberg now suggests that the Internet has progressed to the point that we are now moving toward "digital libraries" – complete libraries online. This transition is beginning with the posting of more and more reference works on the Internet, but, Frohmberg suggests that, in the not-too-distant future, complete libraries - including full texts of all volumes - will become available. The digital library will thus ameliorate the logical and geographical scattering problem just cited.

3. In her review of this paper, Frohmberg emphasized the need for a cross-disciplinary approach to this problem, and the need to look at various interests to determine what information is needed and to insure that it is included in a systematic way. Some organizations are already addressing this issue. For example, a group of agencies in California is currently examining their process of conducting postearthquake reconnaissance in order to insure that information needs across agencies and disciplines are filled. (For information on this initiative, contact Jill Andrews, Southern California Earthquake Center, University of Southern California, University Park, Mail Code 0472; e–mail: jandrews@coda.usc.edu.)

4. Frohmberg notes, correctly, that computer mediated communication has had its strongest effect on informal (vs. formal) communication. E-mail, in particular, has greatly reinforced informal communication and collaboration among researchers. The impact in more formal realms - journals and conferences, for example - has not been as great. Journals and conferences are only just now being published and conducted in the electronic world; a popular, acceptable form of either one has not really been established; and the effect on such academic traditions as the peer review process is not yet clear.

5. Indeed, the World Wide Web by itself enables cross-referencing and indexing that promotes some integration of information.

Beyond this form of synthesis, however, members of some parts of the hazards/disaster community are addressing these problems directly. For example, in 1994 and 1995, the Federal Emergency Management Agency and National Emergency Management Association hosted "Emergency Management Information Systems Partnerships" conferences specifically to promote under–standing and integration of the many efforts currently underway among national, state, local, and nonprofit organizations to use various information systems to enhance disaster management. Additionally, in January 1996, the National Science Foundation funded a conference, hosted by the Earthquake Engineering Research Center at the University of California at Berkeley, specifically to examine ways in which the various

earthquake information providers in the U.S. could strengthen and integrate their efforts.

Even before that conference, the National Information Service for Earthquake Engineering (NISEE) and the National Center for Earthquake Engineering Research (NCEER) had made their catalogs of holdings available jointly on a computer-readable CD ROM disk, and, as of this writing, as a result of the January meeting, a consortium of earthquake information providers in the U.S. is working to develop a comprehensive World Wide Web page - called EQNet - that would provide an introduction to and an annotated database of all the various agencies and information sources dealing with earthquakes in the U.S. For more information on this effort, contact Pat Coty, National Center for Earthquake Engineering Research - Information Service, c/o Science and Engineering Library, 304 Capen Hall, State University of New York-Buffalo, Buffalo, NY 14260–2200; e-mail: nerncoty@ubvms.cc.buffalo.edu.

6. In fact, as one of its goals, the Second Assessment on Natural Hazards is addressing this question and attempting to compile a database of disaster information for the U.S. for the last 20 years.

7. For countries with the necessary technology, the World Wide Web is already, to some degree, solving this problem; however, actual programs focusing on developing countries are limited. One model program that has been undertaken, however, is a joint project of the Pan American Health Organization (PAHO) and the National Aeronautics and Space Administration (NASA) involving the introduction of Internet technology and culture to emergency management agencies, hospitals, and other health care facilities in Central America to increase communication and collaboration among those organizations regarding hazards/disaster management and to provide them access to Internet resources beyond the region. (For more information on this project, contact Patricia Bittner, Disaster Program, PAHO, 525 23rd Street, N.W., Washington, DC 20037; e-mail: disaster@paho.org.)

8. For example, the United Nations Department of Humanitarian Affairs has launched a major effort to construct ReliefWeb a Web-based information base for international agencies involved in response and relief following major disasters and complex emergencies. In addition, the Federal Emergency Management Agency is reportedly considering using on-site electronic "kiosks" to facilitate individual postdisaster relief applications.

9. In looking back at the paper I prepared in 1992 as a preliminary piece for the Second Assess ment on Natural Hazards, I was struck by how many of the problems and issues with Internet communication cited then had been addressed in the ensuing four years.

Appendix A

Periodicals Cited on the Natural Hazards Center's World Wide Web "Home Page" as Pertinent or Useful in the Study of Natural Hazards

INFORMATION SOURCES II

The following is a list of periodicals that the Hazards Center has found informative and useful. Included, whenever possible, are the address for placing subscriptions, frequency of publication, and cost.

Action: The Newsletter of the Canadian National Committee (CNC) for the International Decade for Natural Disaster Reduction (IDNDR)

CC-IDNDR/DIPCN, The Royal Society of Canada, 225 rue Metcalfe Street, Suite 308, Ottawa, Ontario K2P 1P9 Canada; fax: (613) 991-6996. Biannually -free.

AEDR Newsletter

Jim Cohen, American Engineers for Disaster Relief, P.O. Box 684, Princeton Junction, NJ 08550-0684; (201) 678-1960, ext. 706; fax: (609) 737-3714. Published irregularly - free.

Abstract Journal in Earthquake Engineering (AJEE)

National Information Service for Earthquake Engineering, Earthquake Engineering Research Center, University of California -Berkeley, 1301 South 46th Street, Richmond, CA 94804-4698; (510) 231-9468. Biannually - $80.00 for two issues, U.S., Canada, and Mexico; $100.00, outside North America.

American Weather Observer

401 Whitney Boulevard, Belvidere, IL 61008-3772; (815) 544-9811; fax: (815) 544-6334. Monthly - $16.95/year.

Animal Disaster Report, Quarterly Newsletter of the American Academy of Veterinary Disaster Medicine

Carolina Equine Services, 604 St. Vincent's Drive, Holly Springs, NC 27540; fax: (919) 557-3071. $25.00/year.

ASDSO Newsletter

Association of State Dam Safety Officials, Inc., 450 Old East Vine Street, Second Floor, Lexing-

ton, KY 40507; (606) 257-5140. Bimonthly - $15/year (Subscription is also included with various types of memberships. Call for membership information).

Asian Disaster Preparedness News

Asian Disaster Preparedness Center (ADPC), Asian Institute of Technology, P.O. Box 2754, Bangkok 1051, Thailand; tel: (66-2) 524-5378; fax: (66-2) 524-5360; e-mail: adpc@cs.ait.ac.th. Quarterly - contact the ADPC information officer at the above address for subscription information.

ASFPM News and Views

Association of State Floodplain Managers, 4233 West Beltline Highway, Madison, WI 53711; (608) 274-0123. Bimonthly - subscription included in membership fee ($50/year).

Avalanche Review

American Association of Avalanche Professionals, Executive Secretary, P.O. Box 34004, Truckee, CA 96160; phone and fax: (916) 587-3653; e-mail: 7141351@mcimail.com. Monthly between November and April - subscribing membership, $30.00/year.

Aware Report

National Weather Service, 1325 East-West Highway, Room 14360, Silver Spring, MD 20910, attn: Linda Kremkau; (301) 713-0090. Quarterly - free.

Bridges: Emergency Management Connections

National Coordinating Council on Emergency Management, 7297 Lee Highway, Suite N, Falls Church, VA 22042; (703) 533-7672; fax: (703) 241-5603 Anually - single copies are free; additional copies are $5.00 each..

Bulletin of the Global Volcanism Network

American Geophysical Union, 2000 Florida Avenue, N.W., Washington, DC 20009; (202) 462-6900. Monthly - $20/year, U.S.; $32, elsewhere.

California Geology

Division of Mines and Geology, P.O. Box 2980, Sacramento, CA 95812-2980; (916) 445-5716. Bimonthly - $10/year, $19/2 years, $28/3 years.

Contingency Planning and Management

Witter Publishing Corporation, 84 Park Avenue, Flemington, NJ 08822; (908) 788-0343; fax: (908) 788-3782; e-mail: WitterPub@aol.com. Monthly - free to qualified subscribers; otherwise, $99.00/year, U.S. and Canada; $150.00/year, elsewhere.

CUSEC Journal

Central United States Earthquake Consortium (CUSEC), 2630 East Holmes Road, Memphis, TN 38118-8001; (901) 345-0932; fax: (901) 345-0998. Three to four times per year - free.

Current Titles in Wildland Fire

International Association of Wildland Fire, P.O. Box 328, Fairfield, WA 99012; (509) 283-2397; fax: (509) 283-2264; e-mail: jgreenlee@igc.apc.org. Monthly - $45/year.

DHA News (formerly UNDRO News)

Department of Humanitarian Affairs (DHA), Palais des Nations, CH-1211, Geneva 10, Switzerland; tel: (41) 22 9171234; fax: (41) 22 9170023; e-mail: dhagva@cgnet.com; telex: 414242 dha ch. Bimonthly - free.

DisasterCom

Disaster Emergency Response Association, P.O. Box 37324, Milwaukee, WI 53237-0324. Quarterly - subscription part of membership fee ($15/year).

Disaster Management

UNISAF Publications, Division of FMJ International Publications, Ltd., Queensway House, 2 Queensway, Redhill, Surrey RH1 1QS, U.K.; tel: (0737) 768611; fax: (0737) 761685; telex: 948669 TOPJNL G. Quarterly - £213.10/year, U.K.; £256.15, overseas; $397, U.S.

Disaster Prevention and Management:
An International Journal

For subscriptions within the U.S., contact MCB University Press Limited, P.O. Box 10812, Birmingham, AL 35201-0812; (800) 633-4931; fax: (205) 995-1588. Outside the U.S., contact Customer Services, MCB University Press Limited, 62 Toller Lane, Bradford BD8 9BY, U.K.; fax: (0274) 547143. Quarterly - $299.95/year.

Disaster Recovery Journal

P.O. Box 510110, St. Louis, MO 63151; (314) 894-0276. Quarterly - free to all qualified personnel involved in managing, preparing, or supervising contingency planning; otherwise $10/year, U.S.; $24, Canada and Mexico; $47, elsewhere.

Disaster Response Network

Kelly Kennai, American Psychological Association, Practice Directorate, 750 First Street, N.E.,

Washington, DC 20002-4242; (202) 336-5898. Three times per year - free.

Disasters: Preparedness and Mitigation in the Americas

Pan American Health Organization, 525 23rd Street, N.W., Washington, DC 20037; (202) 861-6096; fax: (202) 775-4578; e-mail: disaster@paho.org. (Available in English and Spanish.) Quarterly - free.

Disasters: The Journal of Disaster Studies and Management

Journals Marketing Manager, Blackwell Publishers, 238 Main Street, Cambridge, MA 02142; or, 108 Cowley Road, Oxford OX4 1JF, U.K. Quarterly - Institutions: £97.50/year, Europe/ U.K.; $151/year, North America; £97.50/year, elsewhere. Individuals: £50/year, Europe/U.K.; $90/year, North America; £58/year, elsewhere.

Drought Network News

Mailing List Coordinator/DNN, Department of Agricultural Meteorology, 236 L.W. Chase Hall, University of Nebraska-Lincoln, P.O. Box 830728, Lincoln, NE 68583-0728; (402) 472-6707; fax: (402) 472-6614; e-mail: agme002@unlvm.unl.edu. Three times per year - free.

Earthquakes and Volcanoes

U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250; (202) 512-1800. Bimonthly - $11/year, U.S.; $13.75/year, elsewhere.

Earthquake Spectra

Earthquake Engineering Research Institute, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax: (510) 451-5411. Quarterly - $75/year, individuals; $120, institutions.

EERC News

Earthquake Engineering Research Center (EERC), University of California at Berkeley, 1301 South 46th Street, Richmond, CA 94804; (510) 231-9554; fax: (510) 231-9461. Quarterly - free.

EERI Newsletter

Earthquake Engineering Research Institute, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905; fax: (510) 451-5411. Monthly - subscription part of member ship fee ($115/year). Membership fee also includes Earthquake Spectra.

Emergency Preparedness Digest

Canada Communications Group-Publishing, Ottawa, Canada K1A 0S9; (819) 956-4802. Quarterly - $20 (Canadian)/year, Canada; $26 (U.S.)/year, U.S.

Emergency Preparedness News

BPI, 951 Pershing Drive, Silver Spring, MD 20910-4464; (301) 587-6300 or (800) 274-6737; fax (301) 587-1081. Biweekly - $299/year, add $13 for airmail postage outside the U.S.

Environment

Heldref Publications, 1319 Eighteenth Street, N.W., Washington, DC 20036-1802; (202) 296-6267, (800) 365-9753. Ten issues per year - $70/year, institutions; $35/year, individuals. $16 additional for subscriptions outside the U.S.

EOS: Transactions, American Geophysical Union

American Geophysical Union, 2000 Florida Avenue, N.W., Washington, DC 20009. Weekly - subscription part of membership fee ($20/year).

EPA Journal

Environmental Protection Agency (EPA), P.O. Box 371954, Pittsburgh, PA 15250-7954; (202) 512-2262. Bimonthly - $7.50/year, U.S.; $9.40, elsewhere.

epiCenter News

U.S. Army Corps of Engineers, Attn: CESPP-CO-Q (R. Cook), 211 Main Street, Room 302, San Francisco, CA 94105-1905; (415) 744-2807; fax: (415) 744-2774. Periodically - free.

Fault Line Forum

Utah Geological Survey, 2363 Foothill Drive, Salt Lake City, UT 84109- 1497; (801) 467-7970; fax: (801) 467-4070. Quarterly - free.

Hazard (formerly Hazard Monthly)

EIS International, 1401 Rockville Pike, Suite 500, Rockville, MD 20852; (800) 999-5009 or (301) 738-6900; fax: (301) 738-1026. Quarterly - free within the U.S.; call for pricing information outside U.S.

Hydata News and Views

American Water Resources Association, 950 Herndon Parkway, Suite 300, Herndon, VA 22070-5528; (703) 904-1225; fax: (703) 904-1228. Bimonthly - $23/year, U.S.; $29, elsewhere.

IAFC On Scene

International Association of Fire Chiefs (IAFC),

attn: Tim Elliott, 4025 Fair Ridge Drive, Fairfax, VA 22033-2868; (703) 273-0911, ext. 307. Twice monthly - part of IAFC member ship; $60/nonmembers within the U.S.; $70/nonmembers elsewhere.

IDNDR Informs - Latin America and the Caribbean (available in English and Spanish)

International Decade for Natural Disaster Reduction Regional Office, Apartado 3745-1000, San Joseé, Costa Rica; tel: (506) 257-2141; fax: (506) 257-2139; e-mail: cddcor@paho.org. Semiannually - free.

INCEDE Newsletter

International Center for Disaster-Mitigation Engineering (INCEDE), Institute of Industrial Science, University of Tokyo, 7-22-1 Roppongi, Minato-ku, Tokyo 106, Japan; tel: 813-3402-6231, ext. 2660-2663; fax: 81-3-3402-4165. Quarterly - free.

Industrial and Environmental Crisis Quarterly

Department of Management, Bucknell University, Lewisburg, PA 17837; (717) 524-1337; fax: (717) 524-1338. Quarterly - $195/year; additional $24/year, foreign postage and handling.

International Civil Defense Journal

International Civil Defense Organisation, 10-12 chemin de Surville, CH-1213 Petit-Lancy, Geneva, Switzerland; tel: (22) 793 44 33; fax: (22) 793 44 28. Quarterly - 25 Swiss francs/year, member countries; 50 Swiss francs/year, nonmember countries.

International Journal of Mass Emergencies and Disasters

David Neal, Institute of Emergency Administration and Planning, P.O. Box 13438, University of North Texas, Denton, TX 76203. Three times per year - $48, institutions; $20, individuals.

International Journal of Wildland Fire

International Association of Wildland Fire, P.O. Box 328, Fairfield, WA 99012; (509) 283-2397; fax: (509) 283-2264; e-mail: jgreenlee@igc.apc.org. Quarterly - $60/year, members; $95/year, nonmembers; $150/year, libraries and government offices.

International Landslide Research Group Newsletter

William Cotton & Associates (ILRG), 330 Village Lane, Los Gatos, CA 95030; (408) 354-5542; fax: (408) 354-1852. Published irregularly - $2/three issues, U.S., Canada, Mexico; $4, elsewhere.

Journal of Contingencies and Crisis Management.

Journals Marketing Manager, Blackwell Publishers, 108 Cowley Road, Oxford OX4 1JF, U.K.; or, Journals Marketing Manager, Blackwell Publishers, 238 Main Street, Suite 501, Cambridge, MA 02142. Quarterly - £95/year. Europe; $140, North America; £95, elsewhere.

Landslide News

Hiroshi Fukuoka/Kyoji Sassa, Secretariat of Landslide News, Disaster Prevention Research Institute, Kyoto University, Gokasho, Uji, Kyoto 611, Japan; tel: (81) 774-33-0021; fax: (81) 774-32-5597. Annually - free.

Macedon Digest

The Editor, Macedon Digest, Australian Emergency Management Institute, Main Road, Mt. Macedon, Victoria 3441, Australia; tel: 61-54-261 205; fax: 61-54-262 479. Quarterly - free.

Natural Disaster Loss Reduction Update

Insurance Institute for Property Loss Reduction, 73 Tremont Street, Suite 510, Boston, MA 02110-1273, attn: Karen Gahagan; (617) 722-0200; fax: (617) 722-0202. Quarterly - free.

Natural Disaster Reduction in China

Editorial Department for Natural Disaster Reduction in China, No. 147, Beiheyan Street, Beijing 100721, China; tel: 0086-1-5135544-1011; fax: 0086-1-5229170. Quarterly - $64.00/year (for airmail, add $6.00). Remittance should be sent to: Bank of China, Head Office Banking Department, 410 Fuchengmen Nei Dajei, Beijing 100818, China; Account: China Disaster Mitigation and Relief Association (Ministry of Civil Affairs, People's Republic of China); Foregin currency account number of the bank: 71412796.

Natural Hazards: Journal of the International Society for the Prevention and Mitigation of Natural Hazards.

Kluwer Academic Publishers, P.O. Box 322, 3300 AH Dordrecht, the Netherlands, or P.O. Box 358, Accord Station, Hingham, MA 02018-0358. Bimonthly - $289/year.

Natural Hazards Observer

Publications Clerk, Natural Hazards Research and Applications Information Center, IBS #6, Campus Box 482, University of Colorado, Boulder, CO 80309-0482; (303) 492-6819; fax: (303) 492-

2151; e-mail: jclark@colorado.edu. Bimonthly - free within the U.S.; $15/year, elsewhere.

NCCEM Bulletin

National Coordinating Council on Emergency Management (NCCEM), 7297 Lee Highway, Unit N, Falls Church, VA 22042; (703) 533-7672. Monthly - $75/year, nonmembers.

NCEER Bulletin

National Center for Earthquake Engineering Research (NCEER), State University of New York at Buffalo, Red Jacket Quadrangle, Buffalo, NY 14261; (716) 645-3391. Quarterly - free.

NCEER Information Service News

Information Service, National Center for Earthquake Engineering Research, 304 Capen Hall - SEL, State University of New York at Buffalo, Buffalo, NY 14260; (716) 645-3377; fax: (716) 645-3379; e-mail: nernceer@ubvms.cc.buffalo.edu. Monthly - free to nonprofit organizations and organizations with whom NCEER has a formal exchange; $45/year, North America; $75/year, international surface mail; $115/year, international air mail.

Red Cross, Red Crescent

International Federation of Red Cross and Red Crescent Societies; P.O. Box 372; CH-1211 Geneva 19; Switzerland; (41 22) 730 42 22; fax: (41 22) 733 03 95. Three issues per year.

Response

P.O. Box 3709, Fairfax, VA 22038; (703) 352-1349; fax: (703) 352-0309. Quarterly - $12.95/one year; $20.95/two years; $3 additional, Canada; $12 additional, foreign airmail.

Risk Abstracts

Cambridge Scientific Abstracts, 7200 Wisconsin Avenue, Suite 601, Bethesda, MD 20814; (800) 843-7751 or (301) 961-6700; fax: (301) 961-6720; e-mail: market@csa.com; world wide web: http://www.csa.com; gopher : gopher.csa.com. Quarterly - $225/year, U.S. institutions; $235, institutions elsewhere; individual subscribers receive a 50% discount; prices include availability in either print or electronic formats.

Risk Analysis

Plenum Publishing Corporation, 233 Spring Street, New York, NY 10013; (212) 620-8468; fax: (212) 807-1047. Bimonthly - $355/year, U.S.; $415, elsewhere.

SA-READ: Southern Africa Reducing Emergencies and Disasters

For information on availability, contact the Editor, SA READ, 11 Phillips Avenue, Belgravia, Harare, Zimbabwe.

SARScene: The Canadian Search and Rescue Newsletter

National Search and Rescue (SAR) Secretariat, Fourth Floor, 275 Slater Street, Ottawa, Ontario, Canada K1A 0K2; (613) 996-2642, or, within Canada, (800) 727-9414; fax: (613) 996-3746. Quarterly - free to members of the SAR community; free index available upon request.

Science of Tsunami Hazards

The Tsunami Society, Box 25218, Honolulu, HI 96825. Biannually - subscription part of membership fee ($25, individuals; $100, institutions; $5, students).

Southern California Earthquake Center Quarterly Newsletter

Southern California Earthquake Center, University of Southern California, University Park, Los Angeles, CA 90089-0740; (213) 740-5843; fax: (213) 740-0011; e-mail: jandrews@code.usc.edu. Quarterly - $25.00/year; checks should be payable to the University of Southern California/SCEC.

Storm Data

National Climatic Data Center, Federal Building, 151 Patton Avenue, Asheville, NC 28801-5001; (704) 271-4258; fax: (704) 271-4876. Monthly - $51/year, plus $5/order for postage and handling.

Stop Disasters

United Nations Secretariat for the International Decade for Natural Disaster Reduction, Palais des Nations, CH-1211, Geneva 10, Switzerland; tel: (41) 22 798 8400; fax: (41) 22 733 8695; or, Osservatorio Vesuviano, via A. Manzoni, 249 - 80123 Naples, Italy; tel: 39-81 575 5904; fax: 39-81 575 4239. Bimonthly - free.

Tephra - Journal of the New Zealand Ministry of Civil Defense

The Director, Ministry of Civil Defence, P.O. Box 5010, Wellington, New Zealand; tel: +64-4-473 7363; fax: +64-4-473 7369. Bimonthly - free.

Tsunami Newsletter

International Tsunami Information Center, Box 50027, Honolulu, HI 96850; fax: (808) 541-1678; e-mail: itic@ptwc.noaa.gov. Semi-annually - free

to scientists, engineers, educators, community protection agencies, and governments worldwide.

UCAR Quarterly

Millie Butterworth, University Corporation for Atmospheric Research, P.O. Box 3000, Boulder, CO 80307-3000; (303) 497-8601; e-mail: butterwo@ncar.ucar.edu. Quarterly - free.

U.S. Water News

Circulation Department, 230 Main Street, Halstead, KS 67056; (316) 835-2222; fax: (316) 835-2223. Monthly - $54/year, U.S.; $64/year, Canada; $99/year, elsewhere.

Watermark: The NFIP Newsletter

FEMA, National Flood Insurance Program, Public Affairs Office, 10115 Senate Drive, Lanham, MD 20706; (301) 731-5300. Biannually - free.

Weatherwise

Heldref Publications, 1319 18th Street, N.W., Washington, DC 20036-1802; (800) 365-9753. Bimonthly - $54/year, institutions; $32/year, individuals; add $12 for subscriptions outside the U.S.

Wildfire

International Association of Wildland Fire, P.O. Box 328, Fairfield, WA 99012; (509) 283-2397; fax: (509) 283-2264; e-mail: jgreenlee@igc.apc.org. Quarterly - $30/year.

Wildfire News and Notes

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101; (617) 770-3000. Published 4-6 times per year - free.

The Wind Engineer

Wind Engineering Research Council, Inc., P.O. Box 1159, Notre Dame, IN 46556-1159; (219) 631-6648; fax: (219) 631-9236; e-mail: kareem@navier.ce.nd.edu. Published periodi cally - cost included in membership fee ($25/year).

Appendix B

Additional Internet Resources Cited on the Natural Hazards Center's World Wide Web "Home Page" as Pertinent or Useful to Natural Hazards Managers, Policy Makers, or Researchers

Selected WWW and Gopher Sites

ALL HAZARDS

- FEMA - http://www.fema.gov/ - the Federal Emergency Management Agency's Web site now contains alsmost 4,000 pages of information - text, graphics, and photos about the agency itself; current disaster situations; and disaster preparedness, response, recovery, and mitigation generally. The site hosts a Tropical Storm Watch Page with archived information about recent storms, and, during the hurricane season, current weather photographs, forecasts, advisories, and situation reports. FEMA also offers an emergency news distribution service via the Net, and information about it is available from the FEMA Web site. The site also includes dozens of hypertext links to other Internet resources via its Global Emergency Management Service (GEMS) page. The agency is also now offering emergency management training materials and courses on-line.
- U.S. Geological Survey - http://www.usgs.gov the USGS maintains several Web sites with much useful information on hazards, including a hazards page with links to various USGS research and information centers, as well as an environmental hazards page with stuff on earthquakes, volcanoes, coastal erosion, hurricanes, floods, and radon hazards. Also take a look at the separate earthquake information page from the USGS Menlo Park office (just one of several earthquake pages available from the Survey).
- National Geophysical Data Center (NGDC) Natural Hazards Data - http://www.ngdc.noaa.gov/seg/hazard/hazards.html - this site contains databases, slide sets, and publications available from NGDC on geophysical hazards such as earthquakes, tsunamis, and volcanoes, and includes the Natural Hazards Data Resources Directory published jointly with the Natural Hazards Center.
- Emergency Preparedness Information Exchange (EPIX) http://hoshi.cic.sfu.ca/~anderson/ - one of the original Internet disaster sites, established by the Centre for Public Policy Research on Science and Technology, Simon Fraser University, British Columbia, Canada, EPIX contains information

about both current situations and disaster management generally.

- HazardNet - http://hoshi.cic.sfu.ca/hazard/- a demonstration project of the International Decade for Natural Disaster Reduction (IDNDR).
- Emergency Preparedness Canada (EPC) - http://hoshi.cic.sfu.ca/~epc/- emergency management and preparedness information in English or French.
- The Natural Disaster Reference Database Home Page http://ltpwww.gsfc.nasa.gov/ ndrd-cgi/ ndrd - assembled by the Earth Sciences Directorate of the NASA Goddard Space Flight Center in Greenbelt, Maryland, this site contains extensive bibliographic information on research results and programs related to the use of satellite remote sensing for disaster mitigation of all kinds.
- INCEDE-http://incede.iis.u-tokyo.ac.jp/ Incede.html - The International Center for Disaster-Mitigation Engineering - general information about INCEDE; abstracts of all INCEDE reports and back issues of INCEDE newsletters; summaries of recent research, including an extensive report on the Kobe earthquake; and other sections on recent disasters, hazard mitigation, severe weather, hydrology, remote sensing, etc.
- The United Nations Department of Humanitarian Affairs (UNDHA) Gopher gopher://gopher.unicc.org - among other useful information, the DHA gopher provides an extensive list of recent acquisitions by the DHA Documentation Center and the International Decade for Natural Disaster Reduction (IDNDR) Secretariat Library on all aspects of disaster management, aid, and humanitarian assistance. To browse this information, look under "DHA On-line," then under "DHA Information Sources," then under " DHA Documentation Center."

EARTHQUAKES AND TSUNAMIS

- Earthquake Hazards Information Home Page http://quake.wr.usgs.gov - The USGS Earthquake Hazards Information Home Page, mentioned above, is an excellent place to begin any search for seismic information. It includes information on the latest seismic events, earthquake hazard preparedness, and all other aspects of earthquakes. It also has an entire section devoted to the 1906 San Francisco earthquake, and an extensive, annotated list of other Web quake sites.
- Earthquake Information Gopher – gopher://nisee.ce.berkeley.edu/1 - This gopher, compiled by the National Information Service on Earthquake Engineering (NISEE), offers lots of earthquake engineering information and access to other interesting Net sites. NISEE is now also represented on the Earthquake Engineering Research Center (EERC) Web Site, where, among other things, the organization offers thousands of on-line earthquake photographs.]
- The National Center for Earthquake Engineering Research (NCEER) Home Page- http://nceer.eng.buffalo.edu - the NCEER Home Page offers a wide variety of resources, as well as links to other Internet information on earthquake engineering and natural hazards mitigation. The main menu features an interactive connection to NCEER's Quakeline database, background information on NCEER, a list of NCEER technical reports with ordering information, a comprehensive list of upcoming conferences, and access to many of the other information resources produced by the center.
- The Southern California Earthquake Center - http://www.usc.edu/dept/earth/quake/index.html - SCC is a Science and Technology Center of the National Science Foundation that brings scientists together for joint research to reduce vulnerability to earthquake hazards in Southern California. The formal mission of the center is to promote earthquake hazard reduction by estimating when and where future damaging earthquakes will occur, calculating the expected ground motion, and disseminating that information to the public. The Southern California Earthquake Center Home Page contains background information about SCEC and links to its many member academic institutions. Both the SCEC newsletter and SCEC publications list are available from this site, as well as a complete hypertext version of SCEC's guide to the earthquake hazard in Southern California, Putting Down Roots in Earthquake Country. Also, check out the Earthquake Hazard Analysis Map - a map of probable future Southern California earthquakes.
- Tsunami! - http://tsunami.ce.washington.edu/tsunami/counter.acgi?view - An On-Line Interactive Resource of Tsunami Information - this site contains information about the mechanisms of tsunami generation and propagation, great tsunamis in history, the impact of tsunamis on humankind, tsunami warning systems, and tsunami hazard mitigation. The site also includes more detailed mate-

rial about recent tsunami events and ongoing studies that will be of interest to tsunami and interdisciplinary researchers.

LANDSLIDES

- USGS Landslide Information Center - http://gldage.cr.usgs.gov/html_files/nlicsun.html - landslide information and indexes to landslide publications available both in hard copy and on-line.

VOLCANOES

- Cascade Volcanoes Observatory Page - http://vulcan.wr.usgs.gov/ - information not only on the Cascade volcanoes, but on volcano hazard mitigation generally. See especially the "Index of Volcanic Hazards" page.
- Michigan Tech's Volcanoes Page - http://www.geo.mtu.edu/volcanoes/ - a worldwide volcano reference map, and information on recent events, volcanic hazards mitigation, and remote sensing.

DROUGHT

- National Drought Mitigation Center - http://enso.unl.edu/ndmc - the National Drought Mitigation Center helps people and institutions develop and implement measures to reduce societal vulnerability to drought, focusing on prevention and risk management rather than crisis management. The NDMC site includes sections that describe the center; explain how and why to plan for drought; provide information about current forecasts, monitoring, and impacts - both for the U.S. and worldwide; present historic climate data; discuss the "Enigma of Drought" in depth and measures that have worked to alleviate drought impacts; offer directions for preparing a "Drought Planner's Handbook"; provide a directory of drought planners; and, of course, offer a list of other useful Internet sites.

HURRICANES AND OTHER SEVERE WEATHER

- National Hurricane Center - http://www.nhc.noaa.gov - Much information about hurricanes and tropical cyclones.
- The University of Michigan's Weathernet Tropical Weather Products Page - http://cirrus.sprl.umich.edu/wxnet/tropical.html - Weathernet touts this site as providing "the most comprehensive access to hurricane-related products on the Net - National Hurricane Center advisories, recon reports, local National Weather Service statements, tracking maps . . ." etc. Weathernet itself is a wonderful source of all kinds of weather information - much of it in images and other graphics - including information about all sorts of climatic hazards.
- The Federal Emergency Management Agency's Tropical Storm Watch Page – http://www.fema.gov/fema/trop.html - provides news and situation reports on current storms as well as archived information on past hurricanes monitored by FEMA.

FLOODS

- Dartmouth College Flood Remote Sensing Page – http://www.dartmouth.edu/artsci/ geog/floods/Index.html - the home page of the Global Flood Monitoring and Analysis Project - the work of a team of geographers at Darmouth who are using satellite technology and other means to develop up-to-the-minute flood maps to support flood management and relief efforts and to further flood prediction around the world. This site includes an evolving database of extreme floods and a collection of satellite images of several major events - in short, a wealth of data on recent major floods around the world for response agencies and researchers alike.

WILDFIRE

- FireNet – http://online.anu.edu.au/Forestry/fire/firenet.html - an international network for landscape fire information.

ADDITIONAL INTERNET RESOURCES ON HAZARDS AND DISASTERS

Below are additional sources of hazard/disaster information on the Internet. (There are many others. These represent some of the better ones we've found; they offer useful information and are good places to begin an Internet search). This list supplements the "hot list" of Web sites and gophers that appears above.

WORLD WIDE WEB

All Hazards

http://blume.stanford.edu:8080/

- The GLO-DISNET Server, currently under construction, is dedicated to providing information related to disaster and risk management for countries around the world. The site includes background information about the Global Network for Natural Disaster Risk Management (GLO-DISNET) and its participating organizations, along with the

on-line GLO-DISNET Global Information Database. The database presents information in two formats - by region and by subject - and includes a world map divided into regions. A person can click on any area to receive information about risk management for that part of the globe. GLO-DISNET anticipates adding more services; publishing reports, papers, proceedings and other information on-line; and establishing an electronic bulletin board.

http://niusr.org/~usar

- The National Institute for Urban Search and Rescue (NI/USR) Home Page includes, among other items, the latest issue of the NI/USR newsletter Press On!; a compendium of seismic information locations on the Net; earthquake preparedness information for child safety; as well as information about NI/USR itself.

gopher://vita.org/

- The Emergency Digital Information Service offers situation reports, other disaster information, and access to ftp holdings from the Volunteers in Technical Assistance (VITA) gopher.

http://www.ag.uiuc.edu/~disaster/disaster.html

- University of Illinois Cooperative Extension Service (CES) Disaster Services provides extensive information from the Illinois CES on current disasters; disaster preparedness and recovery; other agencies and networks dealing with disasters; and general information on disasters.

http://www.cla.sc.edu/geog/hrl/home.html

- The Hazards Research Lab (HRL) in the Department of Geography at the University of South Carolina was established in 1995 to conduct research and graduate training on the use of geographic information processing techniques in environmental hazards analysis and management. The HRL Home Page provides information on the laboratory mission, staff, current projects, and publications.

http://www.paho.org/english/whendisa.htm

- The PAHO (Pan American Health Organization) Disaster Section Home Page includes recent disaster situation reports, lists of disaster coordinators in Latin America and the Carribean, information about providing effective relief donations, and a guide to the World Health Organization Emergency Health Kit. It also provides back issues of the Disaster Section's excellent newsletter, Disasters: Preparedness and Mitigation in the Americas; other publications; access to PAHO's Regional Disaster Documentation Center in San Jose, Costa Rica; information about SUMA, PAHO's Relief Supply Management System; and guidance for those wishing to use the Internet to further disaster management in Latin America and the Carribean. All information is provided in English and Spanish.

http://www.reliefweb.int

- ReliefWeb is a Web site of the United Nations Department of Humanitarian Affairs (DHA), to become operational in June 1996, that offers information primarily for response and relief agencies. It includes country and emergency profiles, a bulletin section with daily updates, and a "What's New" feature that directs the reader to recently added information. The site also provides access the DHA-Online - information about resources, publications, and other services available from DHA.

http://rvik.ismennt.is/~gro/disaster/

- The Disaster Connection provides a disaster site database, hosts an on-line textbook project, and offers several full-text disaster-related documents as well as reviews of recent publications.

http://www.vifp.monash.edu.au/~davidt/admin.html

- The Australian Disaster Management Information Network (ADMIN), one of the original national disaster networks, is a collaborative effort maintained by Australia's many and varied emergency service organizations. It includes numerous on-line services, electronic documents and guides to both Australian and international services on the Internet.

http://www.vifp.monash.edu.au/~davidt/aemi.html

- The Australian Emergency Management Institute (AEMI) Web Site includes the AEMI handbook with a complete description of the services and training offered by the institute as well as recent issues of AEMI's INFOrecent Index of hazards/disaster literature.

http://www.catt.citri.edu.au/emergency/

- Guide to Emergency Services World Wide includes information about organizations around the world that provides assistance before, during, and after an emergency.

gopher://emailhost.ait.ac.th/11/ait/GenInfo/ADPC

- The ADPC gopher offers information from the Asian Disaster Preparedness Center, Asian Insti-

tute of Technology in Bangkok, Thailand. It includes not only information specific to the Asian region but also information useful throughout the world.

http://www.slip.net/~dfowler/1906/museum.html

- The City of San Francisco Museum Home Page is full of information, images, and other data concerning the Great 1906 Earthquake and fire, the 1989 Loma Prieta earthquake, and the 1991 Oakland Hills fires.

http://www.slip.net/~earthenv/

- The Earthweek Home Page offers a world map dotted with small icons that chronicle recent (within the last week) natural events - from earthquakes to forest fires to insect infestations. Click on an icon and find out the latest about the locust infestation in Iran . . . (Back issues are also available.)

http://www.yahoo.com

- Yahoo - this Internet Guide and search engine includes a section devoted to "Environment and Nature/Disasters" that interested persons can consult to determine the latest Net resources.

http://gcmd.gsfc.nasa.gov

- The Global Change Master Directory (GCMD) offers an on-line search and retrieval system for persons interested in identifying earth science data sets for educational and research needs. The heart of the directory is a data base of 3400 earth science entries. It includes references to data held at many federal agencies, universities, and foreign countries, and covers atmospheric, land, ocean, and solid earth science.

EARTHQUAKES AND TSUNAMIS

http://www.geophys.washington.edu/seismosurfing.html

- Seismosurfing is an index of known Internet connections where seismic data or seismic research information are available. It also offers instructions for obtaining seismic data for persons without access to the World Wide Web.

http://gldss7.cr.usgs.gov/

- The USGS: National Earthquake Information Center Web Site comprises pages and pages, maps and maps of seismicity information from around the world.

http://www.civeng.carleton.ca/cgi-bin/quakes

- The Earthquake Map Page - one of many earthquake locators on the Net - offers a world map with red Xs marking five recent major earthquakes. Clicking on an X zooms you in a little closer to that spot (repeatedly).

http://www.abag.ca.gov/bayarea/bayarea.html

- The Association of Bay Area Governments (ABAG) maintains a state-of-the-art Web site that includes a series of colorful maps depicting potential earthquake effects in the Bay area. A person can choose not only a specific locale in the Bay area, but also a specific earthquake source (i.e., a specific fault) and then view the consequences of the given scenario. The site includes additional information about the maps, about earthquake hazards in Northern California, and about seismic hazard mitigation generally.

http://blume.stanford.edu

- The John A. Blume Earthquake Engineering Center Home Page provides information about current research and publications available from the center, as well as the latest center newsletter.

http://vishnu.glg.nau.edu/wsspc.html

- The Western States Seismic Policy Council (WSSPC) Web Site describes the council, its mission, and its work, and includes a full-text draft monograph on seismic hazards to transportation in the western U.S., a catalog of member states' earthquake preparedness and mitigation products, a membership database, WSSPC annual meeting abstracts, information about the upcoming WSSPC annual conference, a calendar of related events, links to World Wide Web resources of the membership, and images of the 1994 Northridge earthquake.

http://www.eqe.com/

- The EQE International's Home Page contains EQE reports and publications, including an earthquake home preparedness guide; news regarding recent disaster events; numerous links to other Internet sources; and information about the risk assessment and design services available from this international engineering consulting firm.

http://www.ceri.memphis.edu

- The Center for Earthquake Research and Information (CERI), a research institute of the University of Memphis, provides accurate, immediate reports and information on the occurrence of regional and worldwide earthquakes; research related to the causes and effects of earthquakes originating in the New Madrid seismic zone and the Southern Ap-

palachian seismic zone; studies related to the need for earthquake resistant construction; and advice on the methods, means, and feasibility of reducing earthquake damage.

http://gandalf.ceri.memphis.edu/~cusec/index.html

- The Central United States Earthquake Consortium (CUSEC) Home Page provides a broad overview of the agency, a list of organizations with which CUSEC works, and information on the state agencies that make up the consortium.

VOLCANOES

http://www.avo.alaska.edu

- The Alaska Volcano Observatory World Wide Web Site offers information about aviation and volcanic ash hazards and other volcanic risks, with sections covering highlights of past eruptions, current events, videos available from the center, and lots of photos and hypertext links to other volcano Web sites.

http://www.dartmouth.edu/pages/rox/volcanoes/elecvolc.html

- The Electronic Volcano bills itself as "a window into the world of information on active volcanoes." The site is a source of many types of materials on active volcanoes worldwide - such as maps, photographs, and full texts of dissertations. It offers introductory material in Chinese, German, Spanish, Italian, French, and Russian, and then provides guides to catalogs of active volcanoes and volcano literature. The Electronic Volcano also includes lists of volcanic observatories and institutions, abstracts and excerpts from theses related to active volcanism, descriptions of volcanic hazards, a section on current events and research, and a volcano name and country index.

http://xrfmac.lanl.gov/heiken/IAVCEI_home_page

- The International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) Web Site includes information about the association's structure, purpose, and programs, and about many of association's members. It also offers a publication list, a list of safety recommendations for volcanologists and the general public, a list of upcoming conferences, and numerous links to other volcanology sites on the Web.

FLOODS

http://www.fema.gov/fema/flood.html

- FEMA' background page on floods and flood fact sheet provide basic, but essential, information about flood hazards and flood damage and injury prevention.

http://h2o.usgs.gov/

- The main water resources page of the U.S. Geological Survey directs readers to reports of current floods or other hydrologic events. Many of the local sites referred to post notes from field crews and provide special reports on emergency activities. The site includes a page offering current streamflow conditions for many states.

HURRICANES AND COASTAL HAZARDS

http://champ.eng.clemson.edu/

- The Coastal Hazards Assessment and Mitigation Project at Clemson University (CHAMP) primarily focuses on studies of storm damage to low rise buildings. Its Web site contains information about CHAMP projects, courses offered on wind damage engineering and hazard mitigation at Clemson, and various links to useful Web sites dealing with hurricanes, tropical storms, and high wind.

http://aspl.sbs.ohio-state.edu/tropicaltext.html

- Ohio State University's Atmospheric Sciences Program has put together a site that includes this page with a broad array of current weather information, tropical storm outlooks and advisories, satellite images - mostly compiled from National Hurricane Center data. The site also includes a "Severe Weather and Natural Disaster Bulletins" page http://aspl.sbs.ohio-state.edu/ severetext.html that provides information about all sorts of recent and current events. The subheadings include thunderstorms; tornadoes; floods; adverse marine weather and coastal flooding; tropical advisories; special weather and severe weather statements; adverse winter weather; fog/wind/fire/pollution; avalanche, earthquake, and tsunami reports; natural disaster bul letins; civil emergencies; and short term forecasts.

http://www.fema.gov/fema/hurricaf.html

- FEMA's "Fact Sheet" on Hurricanes, includes information about what to do before, during, and after a hurricane and steps to take to effect long-term mitigation.

ftp://downdry.atmos.colostate.edu/pub/TCfaqI ftp:/

//pub/TCfaqII

- Two lists of tropical cyclone FAQs (Frequently Asked Questions), prepared by Christopher W. Landsea, a NOAA postdoctoral researcher, covering virtually all aspects of hurricanes.

http://www.florida.net:80/storm/

- The Ft. Lauderdale Sun-Sentinel's Hurricane '95 Home Page is an excellent site for information on preparing for and recovering from hurricanes.

http://www.usatoday.com/weather/whur0.htm

- The USA Today Weather Guide to Hurricane Information includes the 1996 outlook, USA Today stories about current and recent tropical storms, an overview of the remarkable 1995 hurricane season, various other articles covering virtually all aspects of hurricanes - from meteorology to sociology. As you might expect from USA Today, the site offers lots of charts, graphs, pictures, and other gewgaws.

WILDFIRE

http://www.teleport.com/~wildfire

- The International Association of Wildland Fire Web Site offers articles and other information from the current issue of Wildfire, the association's quarterly bulletin.

TORNADOES

http://www.fema.gov/fema/tornadof.html

- FEMA's "Fact Sheet" on Tornadoes covers personal tornado preparedness, response, and recovery.

SEVERE WEATHER AND CLIMATE CHANGE

http://www.ncdc.noaa.gov

- The Web Site of the National Climate Data Center is the climate/weather researcher's Shangri-la. It includes data from thousands of weather stations around the world, as well as hundreds of images, numerous technical reports on extreme weather events, and lots of other climate/weather data.

LIGHTNING

http://www.lightningsafety.com

- The National Lightning Safety Insitute Web Page provides information about lightning losses in the United States and offers lightning safety tips for human beings and human structures.

MENTAL HEALTH AND EMERGENCY MEDICINE

http://hypnos.m.ehime-u.ac.jp/GHDNet/index.html

- The Global Health Disaster Network is a Net site created to make disaster health and medical information available globally. It includes an extensive bibliogaphy of journal articles on disaster medicine, copius links to other sites, and access to the World Association for Disaster and Emergency Medicine.

http://gladstone.uoregon.edu/~dvb/trauma.htm

- David Baldwin's Emotional Trauma Information Pages includes information about PTSD and emotional response to disasters.

GOPHERS

gopher://disaster.cprost.sfu.ca:5555

- EPIX (Emergency Preparedness Information Exchange) - gopher to disaster.cprost.sfu.ca:5555 or telnet disaster.cprost.sfu.ca (user id = epix, no password necessary)

gopher://vita.org

- VITA (Volunteers in Technical Assistance) Gopher - gopher vita.org (situation reports and information on international emergencies)

gopher://esusda.gov

- CSREES (Cooperative State Research, Education, and Extension Service) Gopher - gopher esusda.gov. Look under "Disaster Relief Information."

gopher://ecosys.drdr.virginia.edu/11/library/gen/toxics

- EPA Chemical Substance Fact Sheets from the University of Virginia - gopher ecosys.drdr.virginia.edu/11/library/gen/toxics.

gopher://nmnhgoph.si.edu

- The Bulletin of the Global Volcanism Network and other information about the Smithsonian Global Volcanism Program - gopher nmnhgoph.si.edu (select "Smithsonian Global Volcanism Program")

LISTS/NEWSLETTERS/DISCUSSION GROUPS/NEWSGROUPS

- Disaster Research (DR) (published by the Natural Hazard Center) - subscribe by sending an e-mail message to listproc@lists.colorado.edu with the single command in the body of the message: subscribe hazards [your name] (Where [your name] is replaced with your name)
- Networks in Emergency Management ("Nets") (focuses on computer networks and networking in emergency management) - subscribe by sending an e-mail message to listserv@hoshi.cic.sfu.ca with the single command in the body of the message: subscribe nets [your name]

- FEMA E-Mail News Service - subscribe by sending an e-mail message to majordomo@fema.gov with the single command in the body of the message: subscribe news
- RISKANAL (Society for Risk Analysis list) - subscribe by sending an e-mail message to listserv@listserv.pnl.gov with the single command in the body of the message: subscribe riskanal [your name]
- OFDA-L (U.S. AID's Office of Foreign Disaster Assistance - reports on disasters in which OFDA is involved) - subscribe by sending an e-mail message to listproc@info.usaid.gov with the single command in the body of the message: subscribe OFDA-L [your name]
- EMERG-L (emergency services) - subscribe by sending an e-mail message to listserv@bitnic.educom.edu with the single command in the body of the message: subscribe EMERG-L [your name]
- QUAKE-L - subscribe by sending an e-mail message to listserv@listserv.nodak.edu with the single command in the body of the message: sub QUAKE-L [firstname, lastname]
- GIS_GROUP (a list for hazards GIS researchers and users) - subscribe by sending an e-mail message to majordomo@violet.berkeley.edu with the single command in the body of the message: subscribe gis_group
- EMERCAN (a list for the Canadian emergency preparedness community) - subscribe by sending an e-mail message to listserv@hoshi.cic.sfu.ca with the single command in the body of the message: subscribe emercan [first name, last name]
- DESASTRES-CA (a list, primarily in Spanish, for disaster managers and others concerned about hazards in Central America) - subscribe by sending an e-mail message to majordomo@ops.org.ni with the single command in the body of the message: subscribe desastres-ca [your e-mail address]
- CSAR (computers in search and rescue) - subscribe by sending an e-mail message to csarreq@hpasdd.mayfield.hp.com with the command in the body of the message: subscribe CSAR [Your name] [Agency or SAR affiliation, if applicable]
- SITREPS.LIST (disaster situation reports from various agencies) - subscribe by sending an e-mail message to listserv@mediccom.norden1.com with the single command in the body of the message: subscribe sitreps.list [your e-mail address in full]
- SAR-L (a list for search and rescue personnel) - subscribe by sending an e-mail message to SAR-L-request@islandnet.com with the single command in the body of the message: subscribe SAR-L [your name]
- The following lists can be subscribed to by sending a message to [listserver name]@safnet.chigate.com with a subject of SUBSCRIBE. You may also subscribe by sending a message to listserv@safnet.chigate.com with a message of [subscribe] [listserv name] [user name@address] For further information, contact dan.guenthner@safnet.chigate.com.
  - SAFNET-L - SAF-Net Network discussions
  - SAFETY-L - occupational safety & health issues
  - HAZMAT-L - hazardous materials issues
  - FIREMEN-L - discussions re: fire fighters and equipment
  - SALEM-L - state & local emergency management personnel
  - MEDICAL-L - medical discussion, all are welcome
  - POLICE-L - law enforcement discussions

THERE ARE MANY OTHER LISTS AVAILABLE.

USENET NEWSGROUPS

- alt.disasters.misc • misc.emerg-services - plus many others

In addition, America Online has an emergency/disaster management forum, and we assume some other private vendors do as well.

BULLETIN BOARD SYSTEMS

- State and Local Emergency Management Data Users' Group (SALEMDUG) BBS - (708) 739-1312 (run by FEMA).
- VoadNet (sort of a BBS run by Voluntary Organizations Active in Disaster) - for info, e-mail: al_vanderpol@ecunet.org
- SAFNet BBS - (801) 831-4498

PLUS MANY, MANY OTHERS

OTHER SERVICES

http://epd_hp9k.caenn.wisc.edu/dmc/

- Disaster management courses are available via the Net from the Disaster Management Center at the University of Wisconsin - Extension. You can look at the DMC Web site or e-mail to

almanac@study.engr.wisc.edu (send message "send help" for help with the server; send message "send course aimscope catalog" to receive a catalog of courses and info about how to receive them by e-mail). Alternatively, you can also look at http://epdwww.engr.wisc.edu/istudy/ dmeng.html for a description of all the disaster management independent study courses available. For a human contact, try Judy Faber - faber@epd.engr.wisc.edu.

- PILOTS is an electronic index to Published International Literature on Traumatic Stress produced by the National Center for Post-Traumatic Stress Disorder. Telnet to lib.darmouth.edu; at the prompt type "select file pilots." E-mail enquiries to ptsd@dartmouth.edu.
- The U.S. Army Corps of Engineers' Earthquake Center of Expertise in its newsletter - "The epiCenter News" - suggests the following addresses as providing the latest information about quakes around the world. Use the "finger" command - for example, finger quake@fm.gi.alaska.edu - to receive an account of the most recent quakes recorded at these various seismic stations:
  - fm.gi.alaska.edu Alaska network
  - scec2.gps.caltech.edu Southern California network
  - gldfs.cr.usgs.gov NEIS bulletin of worlwide earthquakes
  - slueas.slu.edu St. Louis U. network
  - seismo.unr.edu Nevada network
  - eqinfo.seis.utah.edu U. of Utah network
  - geophys.washington.edu Washington-Oregon network
  - andreas.wr.usgs.gov Northern California net work
  - tako.wr.usgs.gov Hawaii Volcano Observatory network

DISASTER MANAGEMENT IN THE CARMEL RIVER FLOODS

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ABSTRACT

Carmel-by-the-Sea is a city in California, population about 5,000, which became internationally famous a few years ago when Clint Eastwood was elected mayor. Carmel had been founded in 1776 by Father Junipero Serra who built a mission near the Carmel River. Carmel is near Monterey, of Cannery Row fame, and Pebble Beach, a golfers' paradise.

The Carmel River overflowed its banks during the night of 9 January 1995. There were no deaths or injuries. Some upriver residents who lived near the river were evacuated by firefighters and Sheriff's deputies; however, several hundred residents who lived14 miles downriver were very angry that they received no alerting, no warning, and no evacuation by public safety agencies. Some were awakened by neighbors to find river water three feet deep in their living rooms. Firefighters and volunteers evacuated many of them by boat.

The Monterey County Board of Supervisors established a Carmel River Flood Task Force to investigate what had happened and determine what went wrong so that corrective actions could be taken. This paper discusses the work of the committees of the task force with particular attention to the Neighborhood Preparedness Committee. This was a small disaster, but from a research viewpoint it provided useful lessons-learned. This information was examined in order to determine if the disaster planning and the standard operating procedures for emergency operations centers of neighboring cities needed to be revised.

INTRODUCTION

After the January 1995 flood of the Carmel River, questions were asked by angry residents concerning lack of alerting and evacuation of downriver homes by Monterey County public safety agencies when the seriousness of the flooding upriver had been known for hours. The residents also questioned why no flood control projects had been undertaken after many years of study, and asked themselves why they were not better prepared for floods.

The Carmel River Flood Task Force had four committees.

Fact-finding Committee
Levees and Infrastructure Committee
Emergency Preparedness Committee
Neighborhood Preparedness Committee

The Task Force prepared its "Carmel River Flood Task Force Final Report" in May 1995. The County Administrative Office prepared its "Report on the Carmel River Flood of January 9th and 10th, 1995" for the Board of Supervisors meeting of February 28, 1995. The Task Force's information was based in part on the County's report but in the following discussions, some of the statements of the County seemed overly optimistic when compared to facts uncovered by the committees.

FACT-FINDING COMMITTEE

This committee examined the factors that contributed to the January 1995 flooding disaster since preliminary newspaper reports alleged that:

- Monterey County's emergency operations center (EOC) was not activated early enough
- the appropriate decision-making personnel did not come to the EOC when it was activated
- no one was in charge in the EOC
- information from hydrologists about river heights and stream flow rates was ignored
- no evacuation order was given until residents finally managed to get word to the EOC that the river was overflowing and running down their street.

Emergency Operations Center

"The emergency operations center was activated at a "cadre" (core members) level and functioned well during the flood." (county report)

Comment: The Monterey County Herald, January 29, had a front-page headline "Mission Fields residents grill public officials at flood hearing". "Angry Mission Fields

residents vented their frustrations on public officials yesterday during the first public forum since their homes were flooded 2 1/2 weeks ago". With hindsight, many people felt that the EOC should have been activated on January 9 at least four hours earlier than 2355, and responsible decision-making personnel should have reported in as soon as possible. The facts were that some of the senior officials did not come to the emergency operations center during the emergency and did not arrive in person until the next morning after the emergency was over. (Carmel Pine Cone, January 12, back page).

Chapter 2.68 of the Monterey County Code, "Emergency Procedures and Organization" states that the Director of Emergency Services is tasked with the overall management, coordination, and control of emergency preparedness and response functions. The Director of Emergency Services shall designate the order of succession to that office, to take effect in the event the Director is unavailable to attend meetings or otherwise perform the duties of that office during an emergency (2.68.060 B). The order of succession on January 9 is unknown since those in the order of succession did not come to the EOC.

Interagency Coordination And Communication

"Inter-agency coordination and communications functioned well during the emergency." (county report)

Comment: Many of the residents of Mission Fields who did not receive an evacuation warning do not agree with this conclusion of the report. In fact, the Carmel Pine Cone, January 12, had a front-page headline, "Flood victims blast county response; officials provide conflicting answers." "As a spokesman for the county Office of Emergency Services (OES) said that law enforcement was responsible for the evacuation call, Monterey County Sheriff Norm Hicks explained the evacuation order "was not my decision" but that of the OES."

The Monterey County Herald, January 15, had a front-page headline, "Flood warnings arrived too late." The (acting) emergency services coordinator, was quoted as saying he sent a fax at 10:30 p.m. Monday night to emergency agencies alerting them that the National Weather Service had issued a flood warning for the area, (EmerBull 5-4 in enclosure (2) county report). He then sent a second fax at 12:15 a.m. Tuesday saying that the Upper Carmel River has exceeded flood stage above Rosie's Bridge and flooding is expected, (EmerBull 5-3). This second fax was sent to the Sheriff, CHP, Carmel Valley Fire and Mid Carmel Valley Fire. However, because of confusion in the emergency operations center it was not sent to the dispatcher at the California Department of Forestry (CDF) Emergency Command Center in King City nor to the Cypress Fire District which serves Mission Fields. Consequently, the residents of the Mission Fields area received no official warning of the flood which then poured into many of their homes.

Lessons learned: "California Department of Forestry (CDF) ECC (King City)" was added to the addresses of Emergency Services Bulletins beginning with EmerBull 5-17 on January 23,1995. (Note: The improvement of communications and interagency coordination between the county and the CDF is vital to the protection of Monterey County cities from the danger of a fire similar to the Oakland/Berkeley East Bay Hills 1991 fire when 3000 houses were destroyed.)

The county's EOC needs to be physically manned by appropriate personnel. If the Director of the emergency operations center is out of town or actually unable to come to the EOC, the order of succession should produce someone. It would appear that no one was in charge and necessary decisions on such matters as alerting, warning, evacuation, manning, and requests for mutual aid were never made. (Note: Other cities have orders of succession with five alternates.)

The county EOC was not adequately manned. There were only two administrative staff present instead of the usual numerous helpers for updating situation status boards , documentation, updating resource status boards, messengers, answering the telephone, etc. The Public Information Officer was only there "part-time". Hydrologists were in and out and not present to provide technical advice when necessary. The Governor's Office of Emergency Services has an elaborate system for mutual aid for emergency managers to assist in the EOC. Additional emergency managers could have reported to the county EOC within a few hours since the OES Regional Office telephoned the EOC at 2300 and 0030 to request status reports. One of the requirements of cities and counties receiving FEMA grants is to participate in the State's mutual aid system. FEMA grants pay half of the salary of emergency managers.

Emergency Plans

"The emergency plans applicable to this emergency were limited to the Monterey County Multi-Hazard Emergency Plan. This Plan, distributed on a limited basis, was employed during the emergency." (county report)

Comment: The distribution was indeed on a limited basis. None of the twelve cities of Monterey County had

copies and none were available in county libraries for the public. (Actually, the Plan did not discuss the possibility of flooding in the areas which received the most damage.)

Evacuation

"Assessment of the county's overall evacuation plans, policies, and procedures requires an examination of which agency or agencies bear the responsibility for initiating an on-scene evacuation. In the event of an evacuation, the principal responsibility for initiating an evacuation lies with the Sheriff. However, the practical decision to evacuate lies with the agencies having expertise with the type of incident, and it should be a joint decision involving all concerned." (county report)

Comment: The basis of the Incident Command System is to have one person in charge in the emergency operations center. In an ideal world, the technical advisors (hydrologists) in the Planning Section would provide technical data on stream flow rates, river heights, and estimates of flooding to the Planning Section Chief. The planners would coordinate with Law Enforcement, Fire, and Public Works units in the Operations Section to prepare a plan for warning and evacuation of residents who might be flooded. The Director of the EOC would approve the plan and order the Operations Section Chief to implement the planned evacuation. This apparently was not done.

LEVEES AND INFRASTRUCTURE COMMITTEE

This committee's mission was to consider and recommend remedial solutions to prevent disastrous flooding in the future. After review of previous studies it recommended that a Flood Control Zone and Community Benefit Assessment Districts be established. The purpose would be to provide funding for flood control planning activities and implement flood control projects. Funding is necessary for maintenance and operation of an alert system for providing flood warnings along the Carmel River.

Some actions recommended in 1989 to remove south bank levees have now been implemented. Some agricultural fields have been converted to riparian and wetlands habitat and some levees have been removed to create floodways to protect residential areas. It was also recommended that Monterey County and Carmel-by-the-Sea support a coordinated effort to improve the storm drainage system in the Rio Park area to prevent the flooding of homes in the Mission Fields area. Other recommendations about assessment districts have not yet been approved.

EMERGENCY PREPAREDNESS COMMITTEE

The committee reviewed the operation of public and private agencies before, during, and after the flood. A number of recommendations were made. The committee recommended that the County Office of Emergency Services develop a uniform system of precautionary warning and alerting of residents and businesses to the possibility of flooding. Electronic monitoring equipment to determine river height and flow should be bought and installed. Visual depth markers should be installed at strategic locations to allow residents to recognize for themselves the potential for flooding.

Sandbags and other emergency supplies should be stockpiled. The present communications system should be redesigned and consolidated if feasible. A system needs to be developed for the Monterey County Sheriff's Department to coordinate traffic control for evacuations with the California Highway Patrol. The Sheriff should develop a system to protect flooded areas from looters. "Restricted" signage, citizen patrols and deputies might be appropriate.

NEIGHBORHOOD PREPAREDNESS COMMITTEE

This committee studied the problems of residents and neighborhoods along the Carmel River. The basic assumption was that the normal emergency response organizations may be overwhelmed in a severe flood. Each household and neighborhood should be prepared and organized to fend for themselves and assist one another. Each household should have emergency supplies, such as flashlights, a battery-operated radio, drinking water, food, first aid kit, candles, etc. Family members should be trained in first aid and know how to turn off their gas, electricity, and water utilities. Evacuation plans must be developed. Each family should prepare their home for floods, earthquakes, wildland fires and other disasters. Valuables and personal treasures should be safeguarded. Home flood walls or elevating the home may need to be considered.

Neighborhoods should consider forming homeowners associations and disaster teams. They should have block captains, a river watch coordinator and a neighborhood disaster coordinator. Each neighborhood should conduct a survey of residents to locate people who are old, frail, or disabled, and families with young children. The survey should also identify people with specials skills, such as nursing, and locate families with emergency equipment such as chain saws, cellular phones, and 4-wheel drive vehicles. The committee developed a "Flood and Disaster Guide", see Appen-

dix A. This Guide includes suggested lists of emergency supplies, emergency telephone numbers and evacuation information.

CARMEL RIVER FLOOD OF MARCH 1995

The Carmel River flood of January 9-10, 1995, was a disaster where the response had many problems some of which were caused by confusion in the emergency operations center and lack of training of key personnel. Although the Carmel River valley residents whose homes were flooded believed that another flood might not occur for another 20 years, an even more severe flood came within two months. The Route 1 highway bridge over the Carmel River was washed away and the Monterey Peninsula cities of Carmel-by-the-Sea, Pacific Grove, Monterey, Seaside, and Marina were isolated from the rest of the county for more than 24 hours. The county activated its emergency operations center and declared a local emergency at 0700 on March 11, 1995. The EOC remained in full continuous operation until 0200 on March 14, 1995. Residents of the Carmel River valley were evacuated and there were no injuries or deaths. Water depths inside homes were higher in the March flood than in the January flood. The overall response of the appropriate agencies, however, was much improved because of the beneficial training they had received as a result of the January flood.

CONCLUSION

This is a story with a happier ending than might have been expected. The disaster of the January flood had galvanized both governmental and non-governmental agencies into taking corrective action and training. The performance in the March flood demonstrated what might be accomplished by coordinated cooperative efforts.

The former members of the Neighborhood Preparedness Committee of the Carmel River Flood Task Force held a meeting on August 1, 1996, and organized a "Carmel River Residents Flood Preparedness Committee." The new committee intends to coordinate flood preparedness activities of the various homeowner associations along the river, to sponsor neighborhood emergency response team training, and to have an annual "Flood Disaster Awareness Week" in November before the rainy season begins.

REFERENCES

Monterey County Administrative Office, "Report on the Carmel River Flood of January 9th and 10th, 1995" prepared for the Board of Supervisors meeting February 28, 1995.

Carmel River Flood Task Force, "Final Report", prepared for the Monterey County Board of Supervisors and Residents of the Carmel River 100-Year Flood Plain, May 1995

Monterey County Administrative Office, "Report on the Monterey County Floods of March 9-15,1995" prepared for the Board of Supervisors meeting October 10, 1995.

APPENDIX A

Post This Prominently in Your Home

CARMEL RIVER NEIGHBORHOODS FLOOD AND DISASTER GUIDE

EMERGENCY TELEPHONE NUMBERS

911 - EMERGENCY (if life or property are threatened)

DISASTER INFORMATION

647-7911 - Sheriff's Non-Emergency Line

755-5010 - Disaster Situation Information (OES)

RECORDED MESSAGES

755-3991 - Disaster Conditions (OES)

649-1993 - Carmel River Conditions (Water Management)

EMERGENCY INFORMATION RADIO FREQUENCIES

primary:	KSCO - 1080 AM
secondary:	KBOQ - 95.5 FM
	KTOM - 1380 AM / 100.7 FM
	KOCN - 104.9 FM
also:	local TV News
	NOAA Weather Radio 162.55 MHz

IF YOU NEED TO EVACUATE, DO THESE THINGS

If an Evacuation order is given, leave home within 20 minutes and take these things:

prescriptions/medications/eyeglasses

money/checks/credit cards

insurance papers: home, flood, health, car

irreplaceable photographs & keepsakes

keys: home, car, safe deposit, business

personal address book

driver's license

pets, leash, pet food

clothing & toilet itemshome

inventory information

IF TOLD YOU HAVE MORE TIME TO EVACUATE, CONSIDER:

1. removing other items of value - collections, family heirlooms, computers
2. elevating items, in case of flood
3. turning off electricity, gas and water

If told you must evacuate, do so quickly. Any delay threatens the safety of your family and rescue workers. Assume once you leave you will not be allowed back.

EMERGENCY SUPPLIES
to keep stocked and handy

battery-operated flashlights and radios, with extra batteries, plus candles and matches
several fire extinguishers
drinking water and nutritious food that needs no cooking
medicines, first aid kit, and personal hygiene items
clothing for an evacuation, including warm jackets/raingear
basic tools (knife, screwdrivers, pliers, hammer, rope, etc.)
keep vehicle fueled
battery-operated weather radio, scanner, cellular telephone

MAKE A FAMILY EVACUATION PLAN

Plan escape routes from your house and designate where to meet outside
Determine where you could find each other if the family does not evacuate together such as at relatives, friends, or evacuation center
If you have children, know the school's evacuation plan
Register at the official evacuation center so others can locate you

PREPARE YOUR HOME AND YOURSELF

Organize your home with floods and other disasters in mind:
Keep valuable items up high, not down low
Identify your most important portable valuable items (pictures, documents, insurance papers, keys, etc.) and keep them accessible; where possible, keep copies of these items at a safe location away from your home
Prepare a home inventory, and store a copy in a safe place away from your home
For homes especially vulnerable to floods, seek professional guidance to prepare or modify your home

Review First Aid and Survival Guide, pages B1-B12, in your Telephone Book

Prepared by the Neighborhood Preparedness Committee of the Carmel River Flood Task Force - April 1995

DISASTER MANAGEMENT CONFERENCES ON THE INTERNET

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ABSTRACT

The Internet now offers a new approach for improving the sharing of information on disaster management concerns and research among emergency management practitioners. Three examples will be discussed in this paper.

The University of Bradford in England organized an international disaster management virtual conference on the Internet from June 1 through August 31, 1996, instead of hosting another traditional disaster conference at the University which it had done each year between 1989 and 1993.

The United Nations Secretariat for the International Decade for Natural Disaster Reduction (IDNDR) and the Regional IDNDR Office for Latin America and the Caribbean in San Jose, Costa Rica, organized an internet conference August 16 to October 16, 1996, as part of the IDNDR "Cities at Risk" public awareness campaign.

FEMA has a Preparedness, Training and Exercise Directorate. The Preparedness Branch of the Training Division has a Family Preparedness Program. This program's "Parnership in Action" project held a discussion conference on the Internet on June 20, 1996, and plans to have another Internet conference in November 1996.

UNIVERSITY OF BRADFORD, UK

The University of Bradford's Disaster Prevention and Limitation Unit held a traditional international conference on disasters every year between 1989 and 1993 in England. The costs of airplane travel, hotels, meals, and conference registration, however, were obstacles which made it difficult or impossible for many interested would-be participants to get travel funds or the allocation of time to actually go to England for the conference. Professor Alf Keller, Director of the Disaster Prevention and Limitation Unit, therefore, decided to organize a conference on the Internet. The Virtual Conference Center of MCB University Press conducted this First Internet Conference on Electronic Communication and Disaster Management from 1st June through August 1, 1996, at its WWW web site http://www.mcb.co.uk/confhome.htm

The Organising Committee for this virtual conference included:

Chairman: Dr. A.Z. Keller, University of Bradford

Mr. Eric Alley, OBE, President, Institute of Civil Defence and Disaster Studies

Dr. Eric Dykes, Civil Emergencies Centre, University of Hertfordshire

Professor Hayim Granot, Bar-I-Lan University, Israel

Professor E.L. Quarentelli, Disaster Research Centre, University of Delaware, USA

Dr. S.W.A.Gunn, President, World Association of Disaster and Emergency Medicine

Professor Denis Smith, Centre for Risk and Crisis Management, University of Durham

Mr. Keith Cassidy, Head, Major Hazards Assessment Unit, Health and Safety Executive, UK Secretary, Ms. E.L. Coles, Centre for Risk and Crisis Management, University of Durham.

It was intended that this conference would be the first in a series of annual conferences and would prove a natural evolution from the five traditional conferences (1989-1993) initiated by the Disaster Prevention and Limitation Unit at the University of Bradford, UK.

Papers presented during the conference included:

"Problematical Aspects of the Information/Communication Revolution for Disaster Planning and Disaster Research: Ten Non-Technical Issues and Questions." Professor E L Quarantelli, Disaster Research Centre, University of Delaware, USA

"Emergency Communications: A Step Toward Standardization." Ghislain Demers, University of British Columbia, Canada

"Using the WWW as a Medium to Teach Disaster Management: Notes on a Course in Progress." Dirk H R Spennemann, Charles Sturt University, New South

Wales, Australia

"The Role of Amateur Radio in Providing Emergency Electronic Communication for Disaster Management." Russell C Coile, Ph.D, FICD, Disaster Coordinator, Pacific Grove Fire Department, California, USA

"On a Wing and A prayer? Exploring the Human Components of Technical Failure." Professor Denis Smith, Durham University Business School, UK

"Tasmanian Lifelines Project." John Lunn, Tasmanian State Emergency Service, Australia

"Emergency Inter-Organisational Relationships." Professor Hayim Granot, Bar-Ilan University Israel

"No Introduction Necessary." Neil Hayes, Emergency Planning Unit, Manchester FCDA, UK

"A Global Emergency Management Information Network Initiative: GEMINI." Albert J Simard, Canadian Forest Service Forest Fire Coordinator

"The Canadian Wildfire Fire Information System." Albert J Simard, Canadian Forest Service Forest Fire Coordinator

"Disaster Schemata and the School Curriculum." Dr John Lidstone, Queensland University of Technology, Australia

The papers were posted on the Internet. All registered participates were invited to send in questions or comments on the papers. The authors then answered the questions and provided further discussion of the issues raised.

International Decade for Natural Disaster Reduction

The United Nations Secretariat for the International Decade for Natural Disaster Reduction (IDNDR) and the Regional IDNDR Office for Latin America and the Caribbean in San Jose, Costa Rica, organized an Internet conference August 26- October 16, 1996. The theme of the conference was "Cities at Risk." The call for participation said,

"Are the cities of today and tomorrow waiting for catastrophes to happen? Every day, there are news reports concerning cities stricken by disasters. These events are likely to continue, and become worse, unless we change our policies and actions regarding environment and development.

-What is the conference? The 1996 IDNDR Conference, "Solutions for Cities at Risk," is a forum to exchange ideas and practical solutions on how city authorities and concerned citizens can protect their cities from natural disasters.

-Who will be involved? City administrators, national government authorities, NGOs, UN agencies, universities, scientific organizations, businesses ...people from all world regions with an interest in issues related to the environment, development and disasters.

- Why participate? * Learn what communities around the world are doing to protect themselves from disasters. * Pose questions to those directly involved in city programs to see how their activities could be adapted to your own work.

* Present your urban disaster mitigation experiences for discussion and feedback.

* Consult experts in many different professions about disaster mitigation issues.

- Conference goals: The emphasis of this conference will be on the exchange of practical solutions that city authorities and concerned citizens can adapt to their own local needs. The conference aims to: * Encourage urban authorities and community leaders to protect cities from disasters. * Gather "success stories" of urban disaster mitigation that can be adapted in various cities around the world. * Identify policies and "lessons learned" that may be adapted to local circumstances. * Facilitate networking, partnerships, and exchanges between all organizations interested in making cities safer from disasters.

The Internet conference is taking place August 26, 1996, to October 25, 1996. The World Wide Web Home Page is: http://www.quipu.net/risk/

The organizers used electronic mail to send the papers and to receive questions and comments. Messages were sent to: risk@thecity.sfsu.edu.

English was the working language, but guidelines were available in French and Spanish. Participants registered by sending an e-mail message to: listserv@thecity.sfsu.edu with the message: subscribe risk [your-first-name your-last-name] (Example: subscribe risk James Witt) (substituting your own first and last name for "James Witt")

This initiative, organized by the United Nations Secretariat for the International Decade for Natural Disaster Reduction (IDNDR), is part of the 1996 IDNDR "Cities at Risk" public awareness campaign. Anyone wishing to receive campaign materials to help carry out local activities or receive additional information about the Internet conference ahould contact:

Natalie Domeisen

IDNDR Secretariat

UN Department of Humanitarian Affairs
Palais des Nations
CH-1211 Geneva 10
Switzerland
Tel: ++41-22 / 7986894
Fax: ++41-22 / 7338695
E-mail: idndr@dha.unicc.org

The IDNDR WWW Home Page is:
http://hoshi.cic.sfu.ca/hazard/idndr.html

FEMA'S FAMILY PREPAREDNESS PROGRAM

The third example of Internet conferences is a FEMA project organized by FEMA Preparedness, Training and Exercise Directorate. The Training Division's Preparedness Branch has a Family Preparedness Program. The goal of this program is to have the American public better prepared about what to do before, during and after a disaster. The Family Preparedness program intends to help emergency managers develop partnerships with businesses, schools, industry and community organization, and to disseminate disaster preparedness information, including using the Internet.

FEMA has begun to develop its own national partners. This initial group includes the American Red Cross, National Weather Service, Boy Scouts of America, Girl Scouts of the U.S.A., AFL-CIO Community Services, National Sheriffs' Association, Camp Fire Boys and Girls, and the National Association for Search and Rescue.

The Family Preparedness program's "Parnership in Action" project held its first conference on the Internet on June 20, 1996. The World Wide Web Home Page was: http://www.partner.org/actnow

The conference was opened by Kay Goss, FEMA Associate Director for Preparedness, Training and Exercises with greetings from President Clinton and Director James Lee Witt. The facilitator was Ralph Swisher, Family Preparedness program manager. FEMA had gathered a panel of experts to answer questions submitted over the Internet. The experts were: Rocky Lopes of the American Red Cross Community Education Department; Bob Johnson, Chairman of the National Coordinating Council on Emergency Management Family Preparedness Task Force; Janet Clements of the Virginia Department of Emergency Management; Barbara Patasce, Public Fire Education Specialist for the United States Fire Administration; and Pat Moore, a Cerfified Disaster Recovery Professional, Fellow of the Business Continuity Institute. FEMA invited anyone interested to register for the conference and submit questions for the experts during the initial two hour period.

The registration process is intended to build up a national resource bank of people interested in emergency management. The information inserted by the participants indicates their individual skills, acomplishments and interests. The resource bank makes it possible for individuals to contact others of like interests.

FEMA plans to have its second Family Preparedness Internet conference in November 1996.

CONCLUSION

These examples illustrate only some of the types of use of the Internet for emergency management. It is to be hoped that technological advances will continue to evolve to help us with the dissemination of disaster preparedness information.

Information on disaster research and these Internet applications is available from the Natural Hazards Research and Applications Information Center of the University of Colorado, Boulder. The Center publishes an electronic newsletter DISASTER RESEARCH. To subscribe or unsubscribe send a message to: listproc@lists.colorado.edu To subscribe, send this one-line command in the body of your message: SUBSCRIBE HAZARDS Your Name

A printed bimonthly newsletter, the "Natural Hazards Observer" is also available and is free. Subscription requests for the Observer should be sent to:

Natural Hazards Research and Applications
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Attn: Janet Clark, Publications Clerk
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CALIFORNIA'S STANDARDIZED EMERGENCY MANAGEMENT SYSTEM

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ABSTRACT

The State of California is in the process of changing to a new statewide "Standardized Emergency Management System." The new system will become effective on December 1, 1996, and will be mandatory for all state agencies. All 58 counties, 467 cities, and thousands of special districts have been invited to participate. To encourage all organizations to agree to participate, the law provides that if any decide not to participate, they will not be eligible for any post-disaster funding of emergency-related personnel costs.

The new system builds on the twenty-year-old Incident Command System. It provides procedures for five levels of activity: field level, local jurisdiction, county, State region, and Governor's Office of Emergency Services. Mutual aid and multi-agency / inter-agency coordination issues are addressed. Counties will become Operational Areas responsible for coordination of all local jurisdictions and special districts within their area. A new Operational Area Satellite Information System will provide communications among the counties and with the State's regions and the Governor's office.

INTRODUCTION

Southern California had a number of big fires about twenty-five years ago. A method of coordinating the response of the various fire departments which provided mutual aid was later developed by a group called "Fire Fighting Resources of California Organized for Potential Emergencies" (FIRESCOPE). The method was called the "Incident Command System" (ICS). In this system, each incident had an "incident commander" who had an organization of four sections: operations, planning, logistics, and finance. Procedures were specified so that assisting units would report to a staging area, receive assignments, use a common communications plan, keep records in a uniform manner, etc.

This system spread throughout California and was widely adopted by many fire departments. It was not adopted by all fire departments, however. More importantly, it was perceived to be a "Fire Department" system and, therefore, was not adopted by law enforcement agencies, public works departments, and school districts.

In October 1991, there was a disastrous fire in Oakland and Berkeley. This "East Bay Hills" fire caused 25 deaths and 150 injuries. There were 3,354 houses and 456 apartments destroyed. It was the worst urban fire in the history of the United States. The estimated cost of the fire was $1.5 billion. There were a number of contributing factors to the poor performance of the Oakland and Berkeley fire departments according to the official "lessons-learned" report prepared by the East Bay Hills Fire Operations Review Group (1992). The weather made firefighting almost impossible with temperature of 92 degrees Fahrenheit, relative humidity of 16 percent, and winds of 30 knots gusting to 50 knots. The streets were narrow and clogged with burned-out hulks of a thousand automobiles. The water supply for firefighting came from hilltop reservoirs which were soon emptied. The wood poles carrying electrical wires up the hills to the pumps burned so that there was no electricity to pump more water into the reservoirs. The fire ignited 790 houses in the first hour.

There were other factors, however. The Oakland Fire Department did not use the Incident Command System and had no formal mutual aid agreements. The Fire Department moved its command post to three different locations during the fire, while the Police Department established two different command posts. It was difficult for the Governor to find out who was in charge and what was going on.

Furthermore, the Oakland Fire Department had a different size hydrant from all other California cities so that mutual aid engines from other cities needed to use an adapter which was in short supply. The Oakland Fire Department's budget had been cut so much in the preceding ten years that about 40% of the personnel had retired without replacement, and there had not been money for wildland fire training. With little money available for modernization, the fire engines had to rely on antiquated four-channel radios for communication

instead of modern sixteen-channel radios. This made it difficult to communicate with the 300 mutual aid fire engines which had arrived.

As a result of the fires, new laws were passed to improve the coordination of state and local emergency response in California. State Senator Petris, whose home in Oakland had been burned, prepared the draft of Senate Bill 1841 which was subsequently approved by the state legislature and signed by the Governor. This law is found in Section 8607 of the Government Code (1993). The new "Standardized Emergency Management System" (SEMS) is scheduled to go into effect on December 1, 1996.

SEMS TRAINING

A comprehensive training program was developed for all emergency personnel because this is a new system. Four courses were developed by the Governor's Office of Emergency Services:

- Introductory Course - Four modules
- Field Level - Nineteen modules covering ICS orientation, basic, intermediate, and advanced SEMS instruction.
- Emergency Operations Center Level - Nine modules covering EOCs at local government, operational area, region and state.
- Executive Level - One module

BASIC COMPONENTS OF SEMS

The new Standardized Emergency Management System was based on improvements to existing systems and some new concepts. These components are:

- Incident Command System (ICS) - The ICS, as developed by FIRESCOPE, will be used at the field level by all responders.
- Multi-Agency Coordination - Multi-agency coordination is the coordination among different agencies within a jurisdiction, such as Fire and Police. Inter-agency coordination takes place between different levels, such as city police, county deputy sheriffs, state police and California Highway Patrol officers.
- Master Mutual Aid Agreement - State, counties and cities originally signed a master agreement in 1950. This has been further developed to cover fire, law enforcement, coroner, emergency medical, and search and rescue systems.
- Operational Area - An operational area consists of a county and all political subdivisions within that county's area.
- Operational Area Satellite Information System (OASIS) - A satellite communications system with a high frequency radio backup installed in each of the 58 counties, the regions and the State.

RESPONSE LEVELS

There are five organizational response levels described by the SEMS regulations. These levels are:

1. Field Response - The field response level is at the scene of an incident where the emergency responders are actively carrying out their missions of search and rescue, putting out fires, stopping the spread of hazardous chemicals, etc. An Incident Commander is in command of all response actions.
2. Local Government - Cities coordinate the overall emergency response and recovery activities within their jurisdictions by activating an emergency operations center.
3. Operational Area - Each county and all political subdivisions of cities and special districts within the county's area constitute an "Operational Area." The operational area coordinates information, resources, and priorities among local governments within the area. Also, it provides a communications link between the local government level and the regional level.
4. Regions - The State of California has three administrative regions to provide coordination of mutual aid, information and other emergency-related activities among the six mutual aid regions of the State.
5. State - The Governor's Office of Emergency Services manages state resources, coordinates mutual aid among the three regions, and is the initial coordination and communications link with the federal disaster response system.

BASIC FEATURES OF SEMS

Essential Functions - Each of the five response levels of SEMS has five primary functions: management, operations, planning/intelligence, logistics, and finance/administration. At the field level, the ICS term "command" is used for the management function. The other four levels have emergency operations centers where the term "management" is more appropriate for the coordination of resources and information than the term "command".

Management by Objectives - Each level of SEMS should identify measurable objectives and plan the op-

erational time period necessary to accomplish them.

Action Planning - Action planning is used at each level to provide participants with objectives and steps required for accomplishment. The plans contain assignments and allocation of resources to accomplish the objectives.

Modular Organization - Only those parts of an organization that are necessary are activated.

Hierarchy of Management - Everyone in the organization has designated supervision. SEMS is organized to provide a single overall organization with appropriate span of control.

Span of Control - SEMS considers that one supervisor should have direct supervision of no more than seven positions.

Common Terminology - Standardized terminology is used for position titles, organizational elements, facility designations and resources to enable multi-agency, multi-jurisdiction organizations to work together without confusion.

Resource Management - All levels are involved in coordinating, inventorying, and managing resources.

Communications - SEMS emphasizes good information flows and adequate communications for all agencies.

SEMS ACTIVITIES

The primary functions of SEMS in emergency operations centers and the associated activities are:

FUNCTIONS	ACTIVITIES
Management	Responsible for over all emergency policy and coordination.
Operations	Responsible for coordination of all jurisdictional operations in support of the response to the emergency.
Planning/Intelligence	Responsible for collecting, evaluating, and disseminating information and maintaining documentation.
Logistics	Responsible for providing facilities, services, personnel, equipment, and materials.
Finance/Administration	Responsible for financial activities and other administrative matters.

EMERGENCY OPERATIONS CENTERS

Although the field responders at an incident work together using the basic Incident Command System, the four higher organizational levels (local jurisdictions, operational areas, regions and the State) will activate SEMS emergency operations centers. Here in California we seem to have a wide variety of disasters including earthquakes, tsunamis, wildland/urban fires, hazardous chemical spills, ocean oil spills, transportation accidents involving aircraft and railroads, floods, and major rain, wind and snow storms. Unless the local Emergency Manager has already done so, the emergency operations center is usually activated when a local disaster is declared or proclaimed.

SUMMARY

The Standardized Emergency Management System was developed as a management system to cope with both large and small disasters. It will coordinate the response from various jurisdictions and agencies and uses new technologies, such as satellites, to improve the reliability of communications. SEMS makes the resources of all state agencies available to support counties and local jurisdictions. All emergency response personnel are being given training appropriate for their level of responsibilities and multi-hazard emergency plans are being rewritten to incorporate the principles of the new Standardized Emergency Management System.

REFERENCES

East Bay Hills Fire Operations Review Group. The East Bay Hills Fire: A Multi-Agency Review of the October 1991 Fire in the Oakland/Berkeley Hills. Report by the Governor's Office of Emergency Services, State of California, Sacramento, CA, February 27, 1992

SEMS Statute, California Government Code, Section 8607, Chapter 7, Division 1, Part 2, January 1, 1993.

INFORMATION TECHNOLOGY AND THE REDUCTION OF GLOBAL RISK

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ABSTRACT

This paper explores the role of information technology in facilitating collective behavior under conditions of shared risk. Specifically, it addresses the question: In what ways do information technology affect a community's capacity to acknowledge a threat, to accept responsibility for reducing perceived risk, and to engage in constructive action to protect its own welfare?

Using advanced information technology, problems of shared risk can be reconsidered at both local and global levels of management. The technical capacity to order, store, retrieve, analyze, and disseminate information simultaneously to multiple users at distant locations creates the potential for innovative approaches to collective learning and self organization in response to global threats, such as seismic risk. Linking organizational capacity for mobilizing the resources of a community to appropriate uses of information technology creates a "sociotechnical system" in which the technical capacity to exchange timely, accurate information among multiple participants increases the organizational capacity to solve shared problems that require action at both local and global levels.

1. INTRODUCTION

The problem of shared risk requires a transition to a new level of interdependent action that incorporates risk reduction into daily operations at the local level as well as facilitates response capacity across multiple organizations at the global level, in event of adverse conditions that affect a whole community. Such transition occurs at several levels of perception and action within a community, and at multiple levels within a global society. This multilevel requirement for knowledge and action generates a complex, adaptive system of continuing anticipation and response to a known problem, such as seismic risk. Information technology now creates the potential for addressing recurring problems such as earthquakes, which often prove catastrophic locally, on a global scale.

In this paper, I propose that disaster serves as a mechanism of transition in complex, social systems that can be used constructively to redesign the system's structure and performance to fit more appropriately the vulnerabilities of its environment. Unattended, disaster creates the conditions for more serious or costly disruption at a later time. This study focuses on the emergence of rapidly evolving response systems in disaster environments which are critical in defining the direction of development for the community's next phase of performance. Specifically, I examine the process of self organization in a comparative study of two interorganizational response systems that evolved following earthquake disasters: the Marathwada, India, earthquake on September 30, 1993, and the HanshinAwaji, Japan, earthquake on January 17, 1995. In societies vulnerable to seismic risk, severe earthquakes represent the civilian equivalent of war, a massive shock to the entire technical, organizational, economic, political, and social system. How a complex, sociotechnical system responds to this shock provides valuable insight into its likely evolution to the next phase in its performance and its likely actions to prevent recurrence.

Self organization represents a spontaneous reallocation of energy and action in response to changes in the operating environment (Galbraith, 1977; Bougon, Weick, and Dinhorst, 1977; Rochlin et. al., 1987, Comfort, 1994), and occurs within the larger context of complex, adaptive systems (CAS). Although not fully defined, the characteristics of CAS are increasingly recognized by contemporary theorists. I draw upon four theoretical perspectives crossing several disciplines to synthesize a preliminary model of self organization as a process of transition that functions within complex, adaptive systems. These perspectives are: 1) systems behavior; 2) selective evolution; 3) emergent order; and 4) multidimensional measurement.

Self organization occurs in an information-rich environment in which a cumulative shift in energy, action, and understanding of the larger goal generates a refo-

cusing of attention among the set of sub–groups, shifting their separate cycles of feedback on performance toward the larger problem and reformulating a common goal for the entire system. Integrating the sub–systems' performance with the wider system's goal creates a single point of intersection among the several dimensions involved in the evolution of the whole system. These intersection points can be represented graphically in "state space" (Ditto and Pecora, 1993), the abstract representation of the multidimensional environment through which the CAS is moving. Plotting these single points of multidimensional intersection in performance over time provides a measure of change for the larger system. Mapping the shifts among sub–groups within the system over time indicates the point at which substantive transformation of the system is likely to occur, and offers an opportunity to consider constructive interventions in the information process that will drive the integration of action within the system. This concept allows us to visualize a series of single points, each representing the state of interaction among several dimensions of the CAS, and, therefore, permits the graphic representation and measurement of dynamic change in a complex, adaptive system. Such measurement requires the sophisticated use of computer modeling, but current technology enables its implementation (Chang, 1995; Chang and Hsu, 1992).

In summary, the conditions of self organization require a socio–technical system that combines sufficient structure to exchange information among its multiple components with sufficient flexibility to adapt action to the demands of a dynamic environment. Self organization depends upon ready access to timely, accurate information through an infrastructure that supports systematic monitoring of critical conditions, feedback to responsible participants, and revision of actions taken in the light of new information.

Inquiry into actual processes of self organization in disaster environments requires appropriate measurement. While we can devise theoretic measures of assessment, most require sophisticated computer technology that has not yet been incorporated into practicing disaster operations centers. Building upon the concepts outlined by Stuart Kauffman (1993) in his discussion of the interaction among actors in a complex, dynamic system, I outline a preliminary methodology that reveals the major characteristics of rapidly evolving disaster response systems and their inherent processes of self organization.

2. METHODS AND MEASUREMENT IN NONLINEAR SYSTEMS

Methods needed to assess self organizing processes in disaster environments differ from those used in assessing linear systems. Disaster environments are fundamentally nonlinear, and require a mode of measurement and modeling that can capture the continuously evolving relationships among the interdependent components of the system. Linear models are singularly inappropriate for these nonlinear, dynamic conditions.1 In disaster environments, there are too many agents involved in performing too many different functions simultaneously under radically altered conditions to attribute direct, linear causality to any one agent or condition.

The capacity to make "transitions" between different states, an essential feature of complex behavior (Nicolis and Prigogine, 1987:36), distinguishes nonlinear from linear social systems. With linear models of policy analysis, econometrics, or trend analysis, we are able to chart the performance of established systems within prescribed parameters over time (McKibbin and Sachs, 1991). However, these models do not allow us to anticipate future states in dynamic systems or to predict with any degree of certainty what outcomes would follow from which alternative courses of action. Linear models assume that existing conditions are likely to remain stable over time, and that conditions operating in the future will function very much as they did in the past. In the rapidly changing, complex environments of disaster, such models are often invalid or misleading.

In nonlinear systems, differences in initial conditions precipitate variations in performance that increase markedly– in processes iterated over time (Prigogine and Stengers, 1984; Ruelle, 1991; Nicolis and Prigogine, 1987). Nonlinear systems also exhibit primary characteristics of stochasticity and irreversibility in time (Prigogine, 1987; Gell-Mann, 1994). That is, random events set in motion sequences of reasoning and action that differ from previous behavior in the system, generate different dynamics of selection and evolution in performance (Kauffman, 1993), and create different memories and interpretations of that experience. Disaster events, therefore, produce unique combinations of choices, actions, and reasoning that could not be predicted. Once generated and instantiated in experience and practice, however, these reasoning and action processes cannot be reversed. We need a set of nonlinear measures and supporting concepts to capture this dynamic exchange of information, attention, and action both within the system and between the evolving system and its environment.

Borrowing from biology, the concept of an N–K system (Kauffman, 1993:175–209) permits identification of basic characteristics of self organizing systems that reallocate their energy and action to serve changing system needs. In Kauffman's original model, N equals the number of actors in the system, K equals the number of interactions among these actors, and P equals the "bias for choice" among the actors, or the goal of the system that drives action. These three measures allow the identification of a fourth measure — the boundaries of the system — operating in response to specific events, times, conditions, and locations in the wider environment. Defining the boundaries helps to identify the relationships between types of complex systems and especially to distinguish sub–systems within larger systems.

The measure, D, represents the duration of the interactions among actors in the system, acknowledging that some interactions may be intense but brief, while others may continue at lower levels of effort over longer periods of time. A final measure, T, denotes the types of transactions that are carried out by organizations operating as participants in the system. Other characteristics regarding the sources of support and conditions of the environment may be identified and mapped, but this set of measures provides an initial assessment of the operating characteristics of a complex, adaptive system.

This set of characteristics may be summarized as follows (Comfort, 1994:306–307):

1) N = number of organizations participating in disaster response
2) K = estimated number of interactions among participating organizations
3) P = shared goal of organizations, or 'bias for choice' in actions
4) B = boundaries of the system
5) D = duration of interactions among organizations
6) T = types of transactions performed by organizations

These six measures allow us to track the dynamic characteristics of system performance, but they also exceed the capacity of individual managers to monitor their operating systems, using ordinary methods of data collection, analysis, and static representation. Advanced information technology permits the design of monitoring and mapping techniques that allow managers to track characteristics of dynamic system performance over time and to incorporate this information into their management processes. These methods can be very effective in providing decision support in rapidly changing environments (Comfort and Chang, 1995).

Until such technology is fully incorporated into disaster management operations, cruder measures may be used to distinguish evolving systems in a complex society. We can identify sets of interacting organizations which, in turn, contain subsystems that perform separate functions in related contexts. Such measures document patterns of interaction within and between interdependent organizational systems in a first step toward charting the dynamics of transition in disaster response. They also identify gaps in the exchange of information among these interdependent systems that inhibit acceptance of alternative strategies, reinforcing static behavior and resistance to change. These methods use standard data collection methods as interim procedures, but follow the logic of nonlinear reasoning.

I have used the N–K model to guide data collection and analysis in field studies of the disaster response systems that evolved following the 1993 Marathwada, India, and 1995 Hanshin, Japan, earthquakes. Computerized information systems were not fully in place to provide measures of exchange of information among participating organizations in either case of disaster operations, although partial records of some activity were available in both India and Japan. I present data from the field research, following the logic of the N–K model and noting gaps and inadequacies in this preliminary application.

Three types of data were used in the conduct of each field study: 1) semistructured interviews with responsible management personnel at the local, district, state/prefectural, and in Japan, national levels; 2) operations records and reports prepared by the participating agencies as well as professional reports prepared by external organizations; and 3) content analyses of newspaper reports of disaster response operations in local and national newspapers following the earthquake. In each case, interviews were conducted in the field with assistance from local translators. A detailed description of sample designs and questionnaires used for the surveys of practicing managers and procedures for conducting the organizational analyses is available elsewhere (Comfort, 1995a; 1995b).

3. A COMPARISON OF TWO DISASTER RESPONSE SYSTEMS FOLLOWING EARTHQUAKES: MAHARASHTRA, INDIA, SEPTEMBER 30, 1993, AND HANSHIN, JAPAN, JANUARY 17, 1995.2

3.1 Maharashtra, India: An N–K System of Disaster Response

A magnitude 6.43 earthquake struck the Marathwada region of Maharashtra State in Central India at 3:56 a.m. on September 30, 1993. The epicenter of the earthquake was near the village of Killari in Latur District, with extensive damage reported throughout the District as well as in the adjoining District, Osmanabad. The event illustrates the rapid evolution of a disaster response system and offers insight into processes of self organization.

Three initial conditions — technical, organizational, and social — significantly affected the rapid evolution of a disaster response system following the Marathwada earthquake. First, the Government of India had invested in a national satellite communications system in 1988, and had located downlinks in the offices of the State Ministers and District Collectors. Latur District, for example, maintains a branch of the National Informatics Centre (NIC) which provides basic information to support the district's administration. Two fulltime Indian Administrative Service (IAS) officers and one trained person from each district department operate its NIC communications and information services. The satellite communications system allows multiway communications between Maharashtra State offices in Bombay and other district and subdistrict offices within the state, as well as among the 25 states in the nation and between state and national offices in New Delhi.4 The satellite system serves as the base communications network, and computer links operate between the cities of the region: Solapur, Omerga, Latur, and Osmanabad. Within the cities, microwave links permit two-way communication among city offices. This technical capacity provides the mechanism for rapid, multi-way communications among all agents responsible for conducting operations that require multiagency coordination.

Second, the IAS has established a professional corps of educated public administrators who share a common background of professional training, accept a common set of responsibilities towards developing the capacities of the citizenry in their jurisdictions, and represent a strong presence of national government in state and local jurisdictions. Most officers have also had some experience with disaster response as part of their IAS training.5 The IAS provides a national pool of trained professional administrators from which emergency assistance may be drawn during disaster operations. This national system provides an organizational structure which allows the rapid expansion of administrative capacity to meet urgent needs by integrating trained officers easily into an evolving response system, and reassigning them again after the needs have been met.

Finally, Indian society has a strong tradition of voluntary associations - religious, humanitarian, community, political, and professional - that are oriented to community activities and supported by strong humanitarian values. The long-standing Hindu tradition provides a core set of widely shared beliefs that reinforces actions taken to help others. This societal norm of assisting those in need is powerfully activated by a sudden, destructive event such as an earthquake, and is reinforced by the working institutions of the nation.

This set of initial conditions — a strong technical capacity for communications, a strong organizational capacity for public organizations that allows flexible use of available resources, and a strong tradition of voluntary, humanitarian action — created a socio-technical infrastructure that enabled a rapid transition from routine daily operations to dynamic disaster response.

In Marathwada's context of rural poverty and underdevelopment, a remarkably effective disaster response system evolved to meet the needs of the affected population following the earthquake. While the operations logs were not available from local disaster managers, it was possible to reconstruct an approximate record of response from interviews with the District Collectors, members of the local Gram Panchayats or village councils, and other participants in the system who assumed emergency responsibilities. This record showed interactive response initiated within minutes of the earthquake among village, district, regional, and state administrators. During the first critical hours and days following the disaster, public response was greatly supplemented by voluntary action.

Disaster operations continued at an intense rate with a rapidly expanding number of participants joining the interjurisdictional response system. For example, Medecins sans Frontiers, Netherlands, arrived the second morning, bringing a mobile dispensary for medicines and medical supplies. Engineers from the State Ministry of Public Works restored water by the second day in some villages and by the fourth day in most others. Arrangements were made to truck in water via tank-

ers for the remaining villages that suffered disruption in water distribution systems. Electricity was restored by the second day in most villages. Army detachments arrived on the morning of October 2, 1993, the third day following the disaster, to assume direction of the search and rescue operations and to assist in the cremation of the dead. The Army detachments succeeded in rescuing over 6,000 injured in Latur and over 3,000 injured in Osmanabad. In addition, over 6,000 dead were removed and cremated. Search and rescue operations were substantially completed by October 5, 1993, an extraordinary feat given the number of villages (67 villages severely affected; 1191 villages damaged) and breadth of the Marathwada region. Voluntary organizations contributed food, clothing, and assistance to search and rescue operations.6 A distinct system of public, nonprofit, and private organizations engaged in response operations for the Marathwada disaster evolved at a remarkably rapid rate. Nearly 12,000 non military personnel were engaged in rescue and relief operations. The system crossed jurisdictional boundaries from village to district to region to state to national to international levels.

The Regional Disaster Coordinator attributed the rapid evolution of the disaster response system to their use of an extensive network of communications to coordinate disaster operations,[7]although some microwave radio towers were dislocated and telephone lines were down. This technical capacity for multiway communications supported the organizational capacity to mobilize resources and personnel quickly to respond to urgent needs.

Using the methodology of the N–K system, we sought to define the major characteristics of this dynamic system. The data for this system are reported elsewhere (Comfort, 1995a), but may be briefly summarized. The disaster response system identified as derived from the media analysis included 119 organizations. In this total response system, the critical role of nonprofit organizations is shown, representing 81, or 68.1% of all organizations identified in news reports as participants in the disaster response system. Public organizations represented 32, or 26.9% of the organizations identified in the comprehensive disaster response system, and private organizations represented the smallest group, 6, or 5% of the participants in the disaster response system. International organizations (23), both public and nonprofit, make up 19.3% of the total response system, showing links between India and wider sources of funding and support.

The data reported for the Marathwada earthquake document the rapid evolution of a system of organizations engaged in interdependent response operations directed toward the goal of protecting life and property in the damaged communities. The system crossed jurisdictional lines as participants searched for the most appropriate and efficient means to meet urgent community needs. Significantly, the system integrated public, private, and nonprofit organizations in shared response to the critical needs of the disaster-affected population. The high degree of involvement by nonprofit organizations greatly supported the humanitarian needs of the victims, which could not be met by public organizations alone. This shared responsibility resulted in a high degree of cooperation among public and nonprofit organizations. Private organizations were also involved in disaster response, but to a lesser extent. Private companies frequently supported the voluntary contributions of time and wages by employees to the disaster response effort.

The rapid evolution of the disaster response system had marked consequences for the recovery of the damaged communities. First, since basic services were restored quickly and local administrators and village councils were directly involved in response operations, the affected communities moved relatively easily to reengagement in reconstruction efforts. Second, other groups saw the reconstruction of housing and lifeline services as opportunities for employment training for young people, and allied these tasks with local technical colleges to provide supervised apprenticeships to local personnel. Third, the spontaneous response of voluntary and nongovernmental organizations to the humanitarian needs of the disaster-affected villages created a vital bridge of support and hope to earthquake victims that enabled them to find new sources of encouragement and strength from the wider national community. Finally, both participants in, and beneficiaries of, the response system had a largely favorable perception of the interjurisdictional effort. Of the 48 respondents included in the set of interviews for the field study, 27, or 56.3%, volunteered positive comments regarding the response system. Only 3 respondents made negative observations; the remaining 18 respondents offered no comment. A retired lawyer who had volunteered his services observed that the government had "acted with rare promptness" to generate a framework for action that others could follow.

3.2 Hanshin, Japan: An N–K System of Disaster Response

A severe earthquake struck the Hanshin region of Japan at 5:46 a.m. on January 17, 1995, registering 7.2 on the Richter scale of magnitude. The epicenter was located on northern Awaji Island, just off shore from Kobe, a city of 1.5 million population, and the rupture registered strong ground motion directly through downtown Kobe and northward to the neighboring cities of Nishinomiya, Ashiya, Itami City, Amagasaki, Takarazuka, and other towns in Southern Hyogo Prefecture. A disaster response system evolved following this event, revealing evidence of self organization in this dynamic, uncertain environment.

As in the 1993 Marathwada, India, earthquake, the initial conditions prevailing in the Southern Hyogo Prefecture of Japan in January, 1995, shaped in significant ways the response system that evolved following this disaster. Unlike the Marathwada earthquake, the technical, organizational, and social conditions of this metropolitan region were those of an advanced industrial society. Kobe, the principal city in the Hanshin region, is located in the south central section of Honshu, the main island of Japan. Geographically, the city stretches 30 kilometers east to west along Osaka Bay, with the Rokko Mountains rising steeply to the north. Kobe is a modern city, with interdependent systems of transportation, industry, trade, banking, education, and medical care linking the city to others in the region. Extensive networks of railways, bus lines, airports, telecommunications, electrical, gas, and sewer lines provide efficient, modern service to this metropolitan region of over 10 million people. Building structures represent a mix of types, with sophisticated seismic engineering in highrise buildings interspersed with old style wooden houses with heavy tile roofs. The technical profile of the region is generally strong and, prior to the earthquake, was a matter of pride for residents of the region.

Organizationally, however, the area was not well prepared for seismic risk. Although the islands of Japan are located at the juncture of three tectonic plates and seismic risk is well known in the nation, residents generally believed the Hanshin region, which had last experienced a moderate earthquake (6.1 Richter scale) in 1916, was relatively stable in contrast to the Tokyo region, which had suffered a major earthquake with heavy losses in 1923. Consequently, relatively little investment had been made in earthquake preparedness, either by public organizations or residents. While cities in the region had emergency plans, their preparation had been oriented toward small, local disasters of fires and floods. Private utility companies, such as Kansai Electric Co. and Osaka Gas Co., demonstrated substantial investment in seismic mitigation efforts to protect their interests but were not directly linked to the public agencies. Socially, there existed little tradition of voluntary organizations or community self help associations. Most people focused their lives on their work associations and their families.

Although the initial technical systems were strong, there was little interorganizational capacity to reallocate resources and action in timely response when these interdependent systems failed under the severe shock of the unanticipated earthquake. In the densely populated, complex urban environment of the Hanshin region, the Magnitude 7.2 earthquake at 5:46 a.m. on January 17, 1995, set off a cascading effect in the area's network of interdependent systems. Failure in one system triggered failure in another which triggered further failure in a third, each failure compounding the damage and leading to full–scale disaster, affecting approximately 4 million people in the metropolitan region.

The damage was extensive. The death toll has climbed past 6,300 in recent reports (National Land Agency, 1995)8 and the number of wounded totaled 41,648 in the April 25, 1995, report. The total losses in housing were 101,233 homes totally destroyed, 107,269 homes half destroyed, and 182,190 homes partially destroyed, for a total of 390,692 damaged homes. A total of 3,669 public buildings were damaged or destroyed, and 294 fires were ignited by the earthquake in the Hanshin region.

4. DISCUSSION

What have we learned from this comparative study of disaster response systems in two very different economic, social, and legal settings? Differences and similarities can be identified between the Indian and Japanese disaster response systems on four critical issues that are instructive as we consider means of reducing risk to natural disaster on a global scale. These differences and similarities are summarized briefly by country on the issues of timing, balance between structure and flexibility, self organization, and sustainability.

1. Timing in the evolution of the response system

India: Response system evolved rapidly; five factors were important to this process:

a. Relevant policy makers had access to technical means for exchange of information through satellite system and related radio and cell phone networks

b. Indian Administrative Service provided a flexible organizational structure and trained personnel
c. Humanitarian values of the Hindu religion provided an "internal model" or schema for voluntary action to assist those in need
d. No previously established laws governed or restricted emergency response, allowing managers flexibility to adapt action to urgent needs based upon informed judgment and prompt feedback
e. Interaction among these technical, organizational, cognitive, and legal characteristics created a basic information infrastructure place to support rapid response

Japan: Interdependent emergency response organizations were unable to make rapid transition to an emergency response system vital to saving lives in the first hours following the earthquake. Critical factors inhibited this transition:

a. Basic information infrastructure needed to support the search for, and exchange of, information in the dynamic disaster environment was either not available or not functioning
b. Japan had adopted a technical strategy for seismic mitigation and had assumed that high investment in engineered buildings and transportation facilities would prevent collapse
c. Misjudgment in this technical strategy was compounded by underinvestment in public sector capacity at the local level, given level of exposure to seismic risk
d. Existing organizational structure for emergency response was inadequate for a major metropolitan disaster with regional impact
e. Citizenry had relatively little experience with voluntary organizations prior to the disaster; a strong contingent of volunteers did emerge to assist in disaster response, many of whom were students or young people who were volunteering for community service for the first time
f. Interaction among the above factors resulted in a high number of people who experienced intense trauma over a longer period, resulting in a relatively high incidence of reported traumatic stress

2. Balance between structure and flexibility in disaster environment

India: The Indian Satellite System served as the primary vehicle for communication between the district collectors and the state ministries. IAS officials in turn established a network of microwave communications among villages within the districts and cellular phone communications within the villages. This extensive and effective network of communications facilitated rapid decision-making among the participant actors and supported the rapid evolution of the response system.

Japan: The business sector had invested in information technology, and performed well within its limited range, but it did not have clear, effective communication linkages with public sector agencies responsible for life and property. Public sector investments in information technology either were not fully operational, e.g. Kobe Fire Department's GIS and computerized dispatch system, or failed, e.g. Hyogo Prefecture's satellite communication system, to support decision making in disaster operations

3. Self Organization in Disaster Response

India: Self organization was evident in the response of personnel in the first minutes of the disaster, as well as in the massive response of ordinary citizens who volunteered assistance to the victims of disaster. The challenge is sustaining the new forms of interaction and engagement among the participating actors through continued communication, substantive exchange of goods as well as knowledge, and prompt, candid feedback among the participants into the recovery and reconstruction period.

Japan: Self organization did occur, but later and more sporadically in the response period. Volunteer groups were organized, many for the first time, to function in this disaster and entered the response period only on the fourth day. The challenge is to build upon this spontaneous base of interest and experience to foster a continuing exchange of information, knowledge, and skills in the mitigation of seismic risk in Japan and other nations.

4. Sustainability of the response system into recovery

India: India started from initial conditions of extreme poverty in the villages struck by the earthquake. Consequently, the "building blocks" with which managers could construct an interdependent response and recovery system were much more primitive and fragile than in a more developed country. These elements were often improvisational and rudimentary. They could be greatly strengthened through systematic development, training, information exchange, and systematic monitoring or feedback among participating organizations.

Japan:Initial conditions of a strong economy and good organizational skills became evident as the system turned from response to recovery. For example, the recovery system mobilized resources from all prefectures in the nation to provide water to the areas in which the distribution system had been damaged. This system operated efficiently for about 2.5 months.

Noting the differences and similarities between the Indian and Japanese disaster response systems, this analysis confirms important characteristics of a nonlinear model of disaster response. First, disaster creates a "symmetry-shattering event" (Kiel, 1994) that both disrupts established patterns of thought and action and creates the opportunity to redesign an emergency response system that "fits" the environment more effectively. Second, the critical function of aggregating units from different levels of an intergovernmental disaster response system easily into a wider system of response underscores both the difficulty of this task under linear models of organization and the interdependence of these units in a massive, large-scale disaster. This function and its capacity to mobilize resources — personnel, equipment, supplies, skills, and knowledge — requires a mechanism of information exchange to achieve a shared system-wide goal: protection of life and property. This function appears to be performed more effectively in rapidly changing disaster environments by a nonlinear, dynamic system that is able to coordinate diverse resources, materials, and personnel across previously established organizational and jurisdictional boundaries. It is essentially an organizational system operating in parallel, supported by a strong, distributed information system. Third, the goal of the disaster response system serves as an "internal model" for self organizing processes. This goal allows participants from diverse perspectives, experience, and resources to adjust their actions and contributions to that of other participants in the system. Finally, an "epistemic community" (Haas, 1990) of knowledgeable people from diverse backgrounds, experience, and organizations that focuses on the shared problem and articulates a common goal is vital to formulating strategies of risk reduction and collective response which can be communicated to a wider set of responsible actors. This step is essential to the development of "resonance" or willingness to support shared action when necessary to sustain the goal of a responsible, civil society. There are some indications that the formation of such a self-organizing community of knowledgeable people is already taking place in Japan, for example, through the Pan Pacific Forum in Kobe that is meeting regularly to form policy recommendations for the reconstruction process. The group includes about 40 responsible community leaders from education, business, medical care, publishing, and voluntary organizations.[9]

5. CONCLUSIONS

In conclusion, the cases of the Maharashtra and Hanshin disaster response systems indicate that processes of self organization in disaster response are dependent upon a sociotechnical infrastructure that supports the timely, accurate exchange of information in a rapidly changing environment. The N-K model offers a means of assessing disaster response systems in different contexts in the effort to gain insight into the dynamics of the rapidly evolving process of disaster response and recovery. This approach offers a significant opportunity to design information strategies for disaster environments that would facilitate the constructive emergence of self organizing systems guided by the system-wide goal of protection of life and property. Toward this objective, I offer the following recommendations:

1. The model of a rapidly evolving disaster response system and the methodology for assessing such systems in practice need more rigorous evaluation in the context of actual organizations. This could be done through a simulated operations exercise using a computerized information system that would allow the monitoring of messages sent and received, actions taken based upon this information exchange, and feedback among organizations and jurisdictions participating in the exercise.
2. Such an exercise could be initiated as a collaborative project among a set of key actors and designed as a vehicle for research, education, and training of professional personnel in the study of rapidly-evolving disaster response systems.
3. Such activities for global problems such as seismic risk are most effectively carried out under the auspices of international organizations such as the UN; for example, there is a current UN initiative under way to establish an interregional network for seismic policy involving Mexico, Ecuador, Indonesia, Turkey, and China (United Nations, 1995).
4. Such studies, further, contribute to our broader theoretical understanding of complex, adaptive, systems and how they facilitate or fail to support proposed actions in the international arena.

NOTES

1. For example, Peter May (1993:651–652) uses a standard linear regression analysis to explain the effects of state agency regulatory style upon implementation efforts in his analysis of legal mandates as an instrument of policy change in communities vulnerable to seismic risk. May's analysis assumes that the legal mandates and their designed styles of regulation are the principal factors causing change in agency behavior, and employs a linear model to assess the strength of this influence. In contrast, the dynamics of rapidly evolving disaster response systems would not permit the application of such a model.
2. I acknowledge, with thanks and appreciation, the assistance of Dr. Sharayu Ananataram, Department of Sociology, SNDT University, Bombay, for her careful assistance in research, translation, and planning for the conduct of field research in India.
3. The magnitude of the earthquake was estimated at Mb = 6.3 and Ms = 6.4 Richter scale by the US Geological Survey. The earthquake was reported as M6.5 in the press. India Today, October 11, 1993:54.
4. Praveen Pardeshi, District Collector, Latur. Interview, December 22, 1993.
5. Dineshkumar Jain, District Collector, Solapur. Interview, December 22, 1993.
6. Interview, Regional Coordinating Officer, Marathwada Disaster Operations, Solapur, December 22, 1993.
7. Interview, Regional Disaster Coordinator and District Collector, IAS, Solapur, December 22, 1993.
8. Summary of Reports from Ministries regarding Status of Hanshin–Awaji Disaster Operations, National Land Agency, Tokyo, Japan, April 23, 1995.
9. Interview, Dean, Graduate School of International Cooperation Studies, Kobe University, Kobe, Japan, May 14, 1995. Other fora also serve this capacity, such as the Pan Pacific Conference being planned by a Canadian Disaster Management group as its contribution to the United Nations International Decade for Natural Hazard Reduction in Vancouver, Canada, in July 1996.

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THINK THE UNTHINKABLE

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As this paper was being finished, a large truck bomb was detonated outside a U.S. Air Force housing unit at an air base in Saudi Arabia. Television news reports compared the similarities to the bombing of the Oklahoma City Federal Building. In Arizona, authorities arrested a group suspected of preparing to bomb government buildings. These incidents are the most recent impetus for action to prepare for an ever widening scope of emergencies.

The plague of terrorism is not in remission. To borrow from a Biblical legend, emergency managers must be prepared for the Rider on a Pale Horse, the maker of calamity (Revelation 6:8).

In recent years, the United States has experienced the symptoms of a plague once thought to be contained beyond foreign shores. This plague is terrorism, and the United States is obviously not immune. Recent examples of the work of terrorists, saboteurs, and vandals within our borders are the bombing of the World Trade Center and of the Oklahoma City Federal Building, and the derailment of Amtrack's *Sunset Limited.*

No doubt, the combination of integrated emergency management training, an adaptable incident command system, and aggressive interactive networking by emergency management professionals fostered dissemination of the lessons learned at the World Trade Center and, thereby, enhanced the response in Oklahoma City. The subsequent snowballing effect of such networking and the additional lessons learned in Oklahoma City surely played a large part in the smooth and mutually supportive efforts of federal, state, and local response organizations, in the middle of the night, at the Amtrak wreck in the Arizona desert.

These highly publicized incidents are not the only incidents of terrorism, sabotage, and vandalism being experienced, however. Other small scale incidents that did not result in a loss of life include the damage by an explosive device to a remote weather station near a New York City airport and successive unexplained outages experienced by an electric power company in a rural area of New Mexico.

If an evaluation of terrorist and sabotage incidents fails to include these less dramatic incidents of vandalism, an understanding of the full nature of the problem will fail to crystalize and will become lost in the rush to try to satisfy the immediate public outcry with well intentioned, but superficial, fixes associated with the more spectacular incidents.

Many current emergency plans are too narrow and protracted in scope. These plans have not been kept current to provide for rapidly evolving local circumstances, for political conditions, or for increasingly vulnerable exposures. Consequently, there appears to be a very real need for a systematic review of the emergency management plan development and maintenance process. The development and implementation of a systematic review process will not be a simple task but is absolutely necessary. The existing array of emergency plans and procedures is awesome, and the material worth of these documents no doubt spans the full spectrum from a valuable asset to a tremendous, and likely unrecognized, liability.

A graphic depiction of the basic emergency plan hierarchy to the state level is essentially a pyramid. The base of this pyramid is a set of discrete emergency management hazard assessments and contingency plans prepared by each entity in the public and private sector. In this context, public sector plans are those plans which protect employees and visitors to public facilities, i.e., a city office complex or a maintenance yard, as opposed to plans which are prepared by a government entity for protection of the public at large. The next higher level is the city emergency plan that consolidates the individual plans prepared within the community. Above this level is the plan prepared by the Local Emergency Planning Committee (LEPC) which is a consolidation of all community plans within a geographic area. At the top of the pyramid is the state plan which is a compilation of the efforts of the individual LEPCs.

Although this hierarchical structure has greatly improved the effectiveness of emergency response at all levels, there is an inherent weakness. This weakness is

with the regulatory drivers which include the Occupational Safety and Health Administration standards (OSHA), the Resource Conservation and Recovery Act of 1976 (RCRA), Title III of the Superfund Amendment and Reauthorization Act of 1986 (SARA), etc. These drivers set only minimum requirements, largely with respect to hazardous materials, and do not require provisions in contingency and emergency preparedness plans to provide for overt acts.

Planning is an ongoing process and plans should be continually improved and updated. Routine and regular reviews of all planning documents are absolutely necessary. All plans must be based on the hazards present and in the realistic capabilities of responders. It must be remembered that plans which are based on unrealistic assumptions or which list non-existent resources can also be serious legal liabilities. Emergency managers must realize that the breadth and depth of emergency planning should be greatly expanded. The reality of the world today is clear. Emergency managers must shift to a proactive approach on preparing for emergencies by including threat analysis in any emergency management hazard assessment.

The concept of a "Standard of Care" has never been more difficult to pin down. Such a standard is ever changing and varies from jurisdiction to jurisdiction. A standard of care is a powerful driver in the plan preparation and maintenance process. Care must be taken by planners to avoid the belief that work is finished when the local emergency response system equals that of the neighboring communities. The yardstick against which a plan is assessed should be continually challenged.

The naivety of emergency plans and procedures developed solely to handle design-basis accidents, fires, floods, etc., must be recognized. Procedures that are limited to these incidents are inadequate and no longer acceptable. They are the product of an approach which focuses on natural events and on accidentally initiated incidents which result from the acts of reasonable individuals. They do not fully consider the destructive potential of malevolent acts. Criteria for the development of emergency response procedures must not only recognize and provide for the obvious threats, but should also work the "what if" game to include the broadest scope of malevolent acts. The increased scope of the preplanning routine should be extended beyond the traditional assessments of design–basis hazards associated with a particular facility or exposure. This new scope must include an evaluation of facilities, systems, and other exposures as a potential target of a terrorist, saboteur, or vandal. To protect adequately against these new threats, we, as emergency planners, must learn to think objectively about the unthinkable and to expand the lexicon of emergency management to include the term "target" as used in the security system. It is difficult to consider exposures in one's own community a potential target. The very act of planning protective and/or response actions for such considerations seems to increase the distasteful feeling of vulnerability. The general terrorist, however, whether a leader of many or a loner, will be cold, calculating, and ruthless in his planning and execution. We cannot provide for every contingency; but if we think "what if," we will recognize a direct violation of the laws of coincidence during an emergency.

One way to increase the depth and breadth of emergency plans is for emergency managers to look at the components of their jurisdiction and how they interlock. Another way is to dig out the books on barrier analysis and add the twist of a threat to barriers from both sides. It will be a tough and never ending task. Because of economic considerations and a natural desire for convenience, the most comprehensive and effective plans will be out-of-date before the last custody receipt is complete. If the authority having jurisdiction is constantly walking his or her spaces, however, great improvements in readiness can be realized.

Awareness of the possible damage from an incident is the key element in proactive emergency response preparation. Understanding the effect of intentional damage to a pipeline attached to an overpass of a below–grade roadway will enable the preplanning of storm drain protection and the rerouting of traffic. Consideration of the results of breaching the multiple barriers protecting a hazardous materials handling facility will surely force a revisit to response and evacuation plans and may also extend to zoning considerations.

The present world situation requires that emergency managers think the unthinkable when developing emergency response plans and consider a full range of deliberate acts and secondary effects. To borrow from the Biblical legend, we must be prepared for the Rider on a Pale Horse, the maker of calamity.

AFTER ALBERTO: DEVELOPING AN EMERGENCY RESPONSE SYSTEM FOR THE GEORGIA DIVISION OF PUBLIC HEALTH

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PREFACE

This paper walks through the process of how a state public health agency recognized its need for a structured emergency response system and how it built such a system. Specifically, this paper describes the impetus for Georgia's Division of Public Health development of an emergency response system, how the Division built a committee to articulate its needs in an Invitation to Bid, how the solicitation was managed, how DPH chose a contractor, and how ICF Kaiser has assisted DPH in moving toward its goal of developing a state-of-the-art public health emergency response network based on the Incident Command System.

INTRODUCTION

In early July 1994, the Georgia Department of Human Resources (DHR), Division of Public Health (DPH) found itself in the throes of an emergency response as a result of Tropical Storm Alberto, which stalled over southwest Georgia for several days. Rivers rose 44 feet above flood stage, inundating 55 counties, and thirty-one people were killed. Approximately one-third of the state was severely impacted by direct damage from the flood waters. Interstate 75, the main north-south route between Georgia and Florida, was under water and rendered unusable for several days. Albany, the major population center in southwest Georgia, was cut in half when the Flint River, which runs through the center of town, went well above flood stage and made the bridges unusable. The Courthouse in the town of Newton (a small town in Baker County) was under water up to the second story, and all roads to the town were also under water.

The daily lives and health of tens of thousands of Georgians were affected as a result of the storm's devastation. More than 14,000 displaced residents needed shelter. Thousands of private wells were contaminated from overflow from a major sewage treatment plant. Hundreds of caskets floated to the surface from two flooded cemeteries. In addition, health care providers were limited in their ability to provide services due to power outages, lack of potable water, and flooded-out roads, buildings, and bridges (Clinton, et al., 1995, pp. 684-688).

To address the immediate crisis of flood-related health problems and disruptions in health services, state, district, and county public health units responded with emergency medical services, assessments of potable water and sanitary systems, surveillance for potential disaster-related epidemic outbreaks, and care for people affected by the flood. In the months that followed the cresting of the rivers, however, secondary public health problems (such as environmental health hazards and service needs of affected residents) remained as the flood waters and immediate crises receded. Eventually, 68 counties became involved in flood recovery activities (Georgia Department of Human Resources, Division of Public Health, 1995, p.3).

Georgia public health professionals found themselves overwhelmed and underprepared to deal with a disaster of the scale of the 1994 floods. Professionals were unprepared to provide the types and depth of public health services expected by the affected citizens and the Georgia Emergency Management Agency (GEMA). For example, the following range of functions are included in Annex 10 and Annex 11 of GEMA's Emergency Operations Plan (Georgia Emergency Management Agency, 1995):

- **Annex 10, Health and Medical Services.** Annex 10 assigns DPH with responsibility for: medical care (including emergency and resident medical and dental care, doctors, technicians, sup-

plies, equipment, ambulance service, hospitals, clinics, and first aid units, and planning and operation of facilities and services); public health and sanitation (referring to services, equipment, and staffing essential to protect the public from communicable diseases and contamination of food and water supplies; development and monitoring of health information; inspection and control of sanitation measures; inspection of individual water supplies; disease vector and epidemic control; immunization; and laboratory testing); and crisis counseling (referring to the professional personnel, services, and facilities to relieve mental health problems caused or aggravated by a disaster or its aftermath).

- **Annex 11, Mass Care and Shelter.** Annex 11 assigns DHR/DPH with responsibilities for mass care and sheltering (including assisting the Georgia Division of Family and Children Services and the American Red Cross in evaluating/approving suitable shelter locations, feeding, and emergency first aid operations).

While the requirements for DPH were documented in GEMA's Emergency Operations Plan, the development of these requirements had taken place outside of DPH and without DPH's involvement. In essence, there had been insufficient coordination among DPH, DHR, and GEMA during the planning process and no training at the operational level at the state, or in the 19 regional public health district offices, or in the 159 county public health departments.

As a result, the efforts of state, district, and local public health officials were improvised "as-needed" during the 1994 floods. Public health response and recovery efforts were hampered by non-uniform data collection across the different affected counties, the absence of a command structure and communication system, and a lack of training for DPH staff and public health district directors and accompanying public health agency staff (Georgia Department of Human Resources, 1994).

After the floods, public health staff felt that, although their improvisational responses were adequate in many cases, there existed a need to delineate the scope of public health responsibilities during disasters, and to establish a formal structure for public health disaster response. DPH's flood response and recovery activities revealed that DPH needed to set forth a command structure and clear communication lines for public health professionals to use to reduce the confusion about who should report what to whom during a disaster.

ADDRESSING THE NEED FOR OPERATING PROCEDURES AND TRAINING

As a result of Tropical Storm Alberto, federal grant assistance was made available to affected southeastern states. DPH made an early decision to apply for funds to develop an improved infrastructure to deal with the spectrum of emergency response issues related to public health. Two primary factors contributed to DPH's interest in pursuing the development of public health emergency response operating procedures: (1) DPH's experiences from Tropical Storm Alberto, which highlighted a number of areas in which improvements could be made; and (2) the availability of federal funds. With the specter of the massive preparations necessary to protect public health during the 1996 Summer Olympics in Atlanta, the need for emergency management planning became even more evident. Specifically, DPH became convinced of the need for in-depth, operation-focused emergency response Internal Operating Procedures. Furthermore, DPH realized that emergency response training and capacity-building at all levels of public health in Georgia — state, district, and county, with the coordination the of county emergency managers — was vital to prepare for future disasters (Georgia Department of Human Resources, 1995).

The federal funds came from a Congressional appropriation that allowed the Center for Disease Control and Prevention (CDC) (U.S. Department of Health and Human Services, Public Health Unit), to make money available to the 1994 flood affected states (i.e., Georgia, Florida, and Alabama). These funds were to be used to assess the health threats and address the public health issues associated with Tropical Storm Alberto and subsequent flooding and to restore public health programs that were impacted by the floods. Specifically, recipient activities were to include identifying and addressing public health impacts of the floods (including assessing contamination of private water wells and vector borne disease risk); restoring public health programs and activities that were adversely impacted by the floods; and developing capability to prevent public health consequences of future disasters. DPH received a grant from the CDC to pursue a variety of disaster recovery and preparedness activities, including the development of a framework for state and local level comprehensive disaster planning . For the development of its comprehensive emergency management framework, DPH decided to obtain contractor assistance.

DPH staff understood that it was crucial to articulate

the Division's public health disaster planning priorities and needs clearly prior to soliciting help from a consultant. To achieve this goal, DPH established a committee that included key DPH staff, the DHR Emergency Coordinator, CDC and Public Health Service representatives, and district Health Directors. An important element contributing to the success of the work of this committee was the composition of the committee; emergency management experts from DHR and CDC were included, as well as stakeholders from DPH who would ultimately be affected by the actual plan. This committee obtained and examined existing public health disaster plans from other states, and after much discussion and revision, drafted a detailed Invitation to Bid (ITB).

DPH wanted an improved system that would be responsive to a wide variety of disaster situations. DPH also wanted to incorporate the responsibilities outlined in the plan into DPH's current operations, so that when operations changed over time, so would the plan. Ideally, at the end of the grant period, DPH envisioned that there would be in Georgia a cadre of trained emergency response staff who would conduct a continuing program of in-service education for public health professionals in emergency response. DPH put a high priority on building public health emergency response capacity, evolution, and perpetuation in the state of Georgia. Overall, DPH emphasized that the new framework should be appropriately suited to the unique characteristics of Georgia's public health system, such as its 159 autonomous county Boards of Health.

DPH staff did not have previous experience in contracting for this type of service. To review the bids that it received, DPH established its own internal review process. The Division first reviewed written submissions, and narrowed the field of possible candidates to three firms. DPH then requested oral presentations from each of the three firms. Finally, DPH staff, in cooperation with the ITB committee, made the final selection. One lesson that DPH carried away from this experience was that oral question and answer periods were a necessary component of the selection process. It enabled DPH to make fine distinctions between available services and compatibility of staff. DPH emphasizes that, if possible, states should leave room in their selection processes for oral interviews and qualitative judgments, because it is important to establish a close and compatible working relationship with the contractor. DPH has used this selection process again in subsequent procurement efforts.

DEVELOPMENT OF DPH'S EMERGENCY OPERATING PROCEDURES

ICF Kaiser, with extensive emergency management qualifications and experience advising clients such as the U.S. Environmental Protection Agency, U.S. Department of Energy, and U.S. Department of Defense and the states of Florida, Illinois, and California, was the successful bidder. ICF Kaiser augmented these qualifications with other team members: (1) six doctors from Emory University's Disaster Medicine Section, Division of Emergency Medicine, and the School of Public Health's Center for Injury Control were added to the Team for their experience in medical emergency operations; (2) Jane Kushma (University of North Texas) brought close to 15 years experience with the American Red Cross, serving as lead planner for mass care issues and had expertise in addressing the issues of persons with special needs; and (3) Mathtech, Inc., a small business specializing in technical research and consulting, was added to the team for its staff's expertise in emergency management, operations research, and emergency communications.

ICF Kaiser proposed a process that efficiently collected information, raised emergency management awareness within the Division, and managed team members in Texas, Virginia, Michigan, and Georgia. ICF Kaiser's and DPH's strategy involved the following steps: researching and reporting existing conditions, revising the project approach, drafting the Division-level operating procedures, drafting the district and county-level procedures, and implementation/training.

Researching and Reporting Existing Conditions.

It was important to DPH that a system be built that highlights and enhances existing public health practices. To learn as much as possible about how Georgia's public health professionals work with their partners in the state during routine and emergency situations, a directed research approach was devised to obtain relevant information and guidance from key stakeholders and to obtain an in-depth understanding of the current public health preparedness, emergency response, recovery, and mitigation infrastructure in Georgia. ICF Kaiser gathered as much information as possible to help devise a plan that was based on how Georgians operate. This would limit the creation of new functions and positions. To accomplish this, an extensive series of stakeholder meetings was held, first at the division/state level, and then at the district/county level. Numerous telephone interviews were also conducted with both individuals who participated in the meetings and with

new contacts. The purpose of these meetings and interviews was to gain the best first-hand information from individuals and organizations most likely to add to, and benefit from, the project. An important consideration was to leverage the existing resources in the state through MOUs and other partnerships. In all, discussions were held with over 200 stakeholders.

Other activities conducted during this research phase were the identification of successful public health-related emergency response models within the state and identification of other useful city, county, and state models. Agreements, guidelines, SOPs, and plans already developed or implemented were also identified and analyzed. Information on federal, state, and local resources available for medical supplies and equipment, environmental health supplies, and laboratory support was also gathered. One important goal of the information collection effort was to create an electronic data entry form that would facilitate uniformity and sharing of data throughout Georgia's public health system.

One notable example of an "existing condition" highlighted during the research phase was that, until the 1994 floods, public health staff — from the state division level to the county level — were rarely asked to participate in Georgian emergency response planning, preparedness, and response efforts. For the most part, the emergency response community (and DPH itself) did not consider DPH a bona fide player in the state's emergency response system. Exceptions to this were the Emergency Medical Services (EMS) community and the public health professionals in the hurricane-prone coastal areas. As a result, Georgia's public health system lacked a comprehensive emergency plan, and staff were not involved in any emergency response-related training or exercises.

The end product of this research step was an "Existing Conditions" report that reviewed and summarized the existing conditions, concerns, strengths, and weaknesses of the Georgia public health system's preparedness, response, mitigation and recovery capabilities.

Revising the Project Approach and Drafting the Division-Level Operating Procedures.

ICF Kaiser and DPH used the results outlined in the "Existing Conditions" report to refine the overall project approach plan, and to ensure that the plan was a "good match" for the unique needs of Georgia's public health system.

ICF Kaiser considered several management options to structure a public health response system for the state of Georgia, including the Incident Command System (ICS). The ICS was originally developed by the fire services to provide a standard system for managing emergencies. In general, ICS provides a common organizational framework within which agencies can work across levels of government and across jurisdictions to collectively manage an incident. The specific ICS model that ICF Kaiser adapted for application to DPH is the California Standardized Emergency Management System (SEMS). (See California's Standardized Emergency Management System by R. C. Coile.)

DPH decided to use the ICS as the system to manage operations during a response for the following reasons:

- The organizational structure of ICS adapts to any emergency or incident to which emergency response agencies would be expected to respond.
- The system expands in a rapid and logical manner from an initial response (single level of government, single jurisdiction) into a major incident (multiple levels of government, multi-jurisdiction) and contracts as the organizational needs of the situation decrease.
- The system has basic common elements in organization, terminology and procedures.
- The system is readily adaptable to new technology.

DPH concluded that employing the ICS-SEMS model as the management structure for public health emergency response in Georgia is beneficial because: (1) the model satisfies DPH's need to establish a public health infrastructure that relies on consistent functional positions that are easily transferable and understood across jurisdictions and up-and-down the levels of government; and (2) the model will create for DPH a state-of-the-art system. While the ICS structure is tried-and-true for emergency management in a variety of situations, it has rarely been applied to a public health network of agencies and organizations. An organizational chart displaying how the ICS was applied to DPH is included as Exhibit 1, shown on page 53.

ICF Kaiser and DPH defined and translated program standards and objectives into a set of draft operating procedures for DPH responsibilities. These operating procedures summarized divisional responsibilities as outlined in GEMA's Operations Plan and other plans, and in input from responsible division organizations. "Position descriptions" have also been drafted for each functional position described in a complete and compartmentalized document called the Internal Operating Procedures. Consequently, individuals interested in

one of the procedures may review that section only, making the document user-friendly and efficient to use. ICF Kaiser and DPH plan to develop a "pocket guide" that summarizes key information for response, recovery, and mitigation using text, checklists, and matrices. This pocket guide will be easy to distribute and use in the field, and will serve as a refresher for those already trained on the procedures.

Drafting District and County-Level Operating Procedures.

This part of the project is still in progress. ICF Kaiser and DPH plan to create generic models for district and county Internal Operating Procedures documents that flow directly from the division Internal Operating Procedures documents. These models will also use the Incident Command System framework. ICF Kaiser and DPH anticipate that each district or county can use these generic models easily to tailor procedures and lists that meet their own needs. The generic procedures models will contain the information common to each district or county, as well as annotated sections that describe the type and level of detail suggested for each district or county to add. ICF Kaiser and DPH plan to include sufficient examples in the models to reflect the variety of information that might be added.

Implementation/Training.

The implementation phase of this project will be the final test of the division Internal Operating Procedures document and the district- and county-level models.

ICF Kaiser and DPH plan to conduct 20 training sessions — one in each of the 19 Georgia health districts and one at the state level. Each training session will consist of eight hours of training on the internal operating procedures with mini, decision-based exercises and quizzes to create an interactive training experience. Training on the FEMA reimbursement process will also be included. ICF Kaiser and DPH also plan to conduct two table-top exercises. One exercise, designed for the county and district personnel, will require mutual aid and will involve several agencies. The second exercise will test the internal operating procedures at the state-level.

During the implementation/training phase, DPH staff will be trained and the overall level of public health preparedness across the state will be raised. The success of this training will be measured by a test administered by ICF Kaiser to all attendees of the training courses. The training will involve approximately 500 Georgian public health professionals.

CONCLUSION

Prior to July 1994, the Georgia Division of Public Health was not considered, and generally did not consider itself, a player on the field of emergency management. The devastating floods of 1994, however, and the upcoming Summer Olympics of 1996 were driving forces to improve their emergency preparedness capabilities. With available federal funding, DPH staff took the opportunity to improve their state of readiness. They have worked side-by-side with ICF Kaiser in analyzing the existing relationships between Georgia public health officials and the more traditional players in emergency response, in reviewing their own strengths and weaknesses, and in considering how to incorporate emergency management in the responsibilities of state, district, and county public health professionals.

The process this far (seven months into the project) has created an awareness of emergency preparedness issues that heretofore was not a part of DPH's frame of reference. While not specifically initiated because of the Olympics, the process of creating the draft internal operating procedures advanced DPH's readiness to respond to the challenge of the 1996 Summer Olympics.

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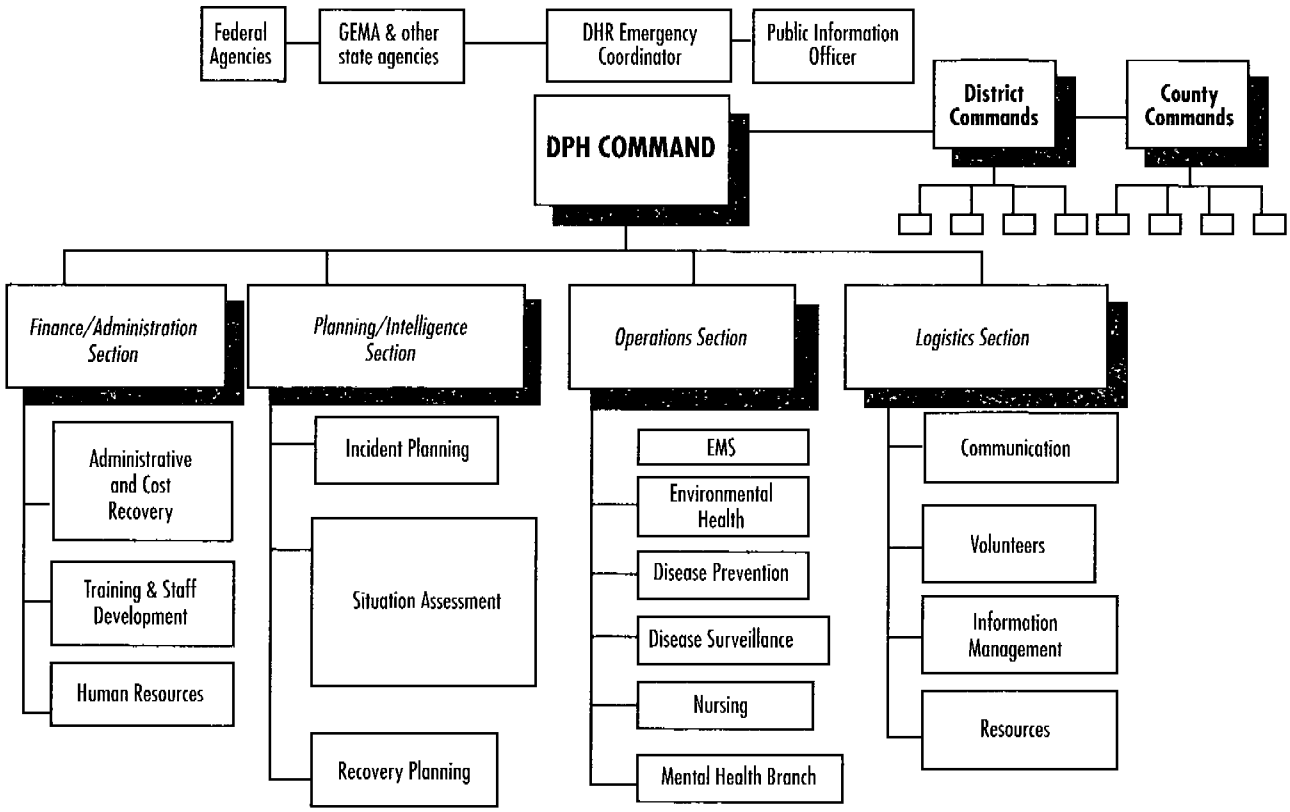
EXHIBIT 1
DPH INCIDENT COMMAND SYSTEM



CHANGING ENVIRONMENTS: TECHNOLOGY DRIVEN EXERCISES

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Preparing for the worse case scenario is an emergency management standard. Over the past several years, there has been increased recognition of the important role that exercises play in our emergency preparedness. The exercise held before the United Airlines' Sioux City crash and more recently the Florida statewide hurricane exercise that preceded Hurricane Erin contributed immeasurably to a successful response. Exercises will continue to be an important component of a well rounded Emergency Management program.

With the increased focus on exercises comes new innovations and techniques in the production, execution and evaluation of exercises. One of the newest and sometimes most controversial ideas is the concept of "freeplay." Freeplay exercises depend on changing the participants' environment to stimulate action rather than on pre-scripted and rehearsed messages.

MSEL

The most common exercise framework is based on the Master Sequence of Events List (MSEL). This is the basis for the hazards or problems in the exercise. This is followed by the cascading or minor events that are a consequence of the major events. Individual messages and the actions anticipated are developed from these events. These messages are then the "drivers" of exercise play.

The biggest advantage of the MSEL concept is that it works. It is time proven and everyone is familiar with it. There are sequential steps in the production of a MSEL exercise and the exercise inputs are directly tied to an expected outcome.

Unfortunately, there are some major drawbacks to MSEL driven exercises. First, there is an inflexibility to acceptance of innovative or unexpected solutions to the problems presented. Second, a critical step in a response process may be forgotten and can be unintentionally prompted by a message that dictates that particular action. Third, realism suffers under artificial time constraints and under follow–up message traffic that is inconsistent with player actions. Fourth, the complexity of keeping up with the actions the players are taking and whether they coincide with the exercise design can challenge the best Controller, Simulator or Evaluator.

FREEPLAY

In the last several years, freeplay exercises having been gaining more acceptance. Freeplay exercises are less structured than MSEL driven exercises and they are still carefully planned and designed. A major events list and timeline is still developed around exercise objectives. Although minor events lists, expected actions, and messages may still play a part in the exercise development, the emphasis is placed on changing the players environment to force them to respond. If the exercise design staff is successful in effecting this change of environment by making the event seem "real" to the players, very few "prompting" messages are required to drive the exercise. There is generally a response simulation cell or smaller jurisdiction to give the "big picture" to give the status of ongoing actions, and to communicate with regarding requests for assistance. The players themselves, through their self–generated traffic and through their actions based on established policies, procedures and planning, drive additional play for themselves and other participants.

The most noteworthy advantage to freeplay exercises is the inherent realism. During an actual emergency, structured messages do not come into the Emergency Operations Center telling the staff everything that is happening and prompting them to respond. Often, there is a lack of hard information, and staff must think ahead of the incident to anticipate needs and resources. Much of the time is spent in coordinating with other agencies, vendors, etc. to prevent further damage or to recover from an incident that has already occurred. Besides this information coming from responders at the incident, there is a heavy reliance on media information, weather information, and modeling, which are easily and realistically simulated during a freeplay exercise. As a result of the realism, player actions are more consistent with what they would be in an actual event. Problems

arising from a lack of established procedures are also easily identified. If the necessary procedures are not in place, players will be sitting around wondering what to do next. Problems are not covered up with an artificial blitz of message traffic that in effect may become "busy work." Freeplay exercises also require less manpower to administer, and fewer controllers and simulators are necessary to keep the exercise on track.

There are, however, disadvantages to freeplay exercises. In the absence of a partially trained staff and established procedures, freeplay exercises will not work. If you have a new staff or are evaluating new procedures, it is better to rely on the structured, if somewhat stiff, MSEL and message driven exercise. You can then gradually introduce freeplay periods into the exercise to stimulate player problem solving and to identify training needs. Another disadvantage to freeplay exercises is evaluating player actions through an evaluation plan and good evaluator training. One of the biggest factors in deciding whether or not to conduct a freeplay exercise, however, is player enthusiasm and motivation. Where the staff is motivated and excited about the exercise, success is almost guaranteed. If that motivation is not present, the chances for success are greatly reduced.

ENVIRONMENT EQUALS REALISM

The degree to which we are successful in achieving a realistic environment in emergency management exercises influences the way we perceive the situation and consequently influence our actions. The antithesis of realism is assumption and inferred information. A lack of realism in an exercise will always produce certain assumptions that distort any realistic solutions applied to a problem. These solutions must always be suspect because assumptions, usually one dimensional, represent only one way in which a situation or information can be perceived. Inferred information or unspoken information goes to the heart of situation assessment. The less inferential information used to determine the emergency situation, the more accurate and realistic situation assessment and corresponding actions are.

In an Emergency Operations Center (EOC), removed from the site of an emergency, our normal senses are deprived of direct observations. Our ability to understand a situation at another site is dependent on information entering the EOC. Situational awareness by EOC members is fostored by artificial means such as video, audio and computer graphics. To the minds of EOC personnel, this artificial environment is conveying real information about real places with real problems.

The EOC environment is artificially produced electronically, whether in a real emergency or an exercise. Situational awareness, assessment and the actions they demand are dependent on what this artificial environment tells us. In emergency management exercises, the more that realism can be produced the more it leads to accurate and realistic solutions to problems. In essence, the degree of realism we feel parallels what the EOC's artificial environment communicates to us.

FULLY INVOLVED SENSES

The way in which we perceive our environment is through our senses. Through the use of such artificial means as radio or phone contact with the incident site, television or commercial radio reports and computer displays and models, EOC personnel use their senses of vision, hearing and touch to assess the emergency situation.

The artificial environment in the EOC has become primarily visual since as much as 70% of our interpretation of the environment is from sight. The visual EOC environment includes cable television, graphic computer displays or hazard models, and the printed word.

Another important sense, especially to emergency responder, is touch. These emergency personnel use a "hands on" approach in every aspect of their professions, influencing the way they perceive their environment and the corresponding actions they take..

If it is true that the EOC environment is both artificial and electronically produced. If what this environment tells us dictates the actions we take, then simulating these inputs should lead to increased realism during emergency management exercises. The more senses we involve in the simulation, the more realistic the environment, and thus the more accurate the situation assessment and the response actions will be.

The challenge, then, is to fully involve participants' senses. Video is a major focus in most emergency operations centers. Whether it shows computer graphics, informational displays, and hazard models or television broadcasts, live interviews, and "special bulletins", video is an essential tool. These inputs into the EOC environment can be very accurately simulated to produce realism in exercises. Audio inputs are another major contributor to the overall picture in the EOC. Through commercial radio broadcasts, amateur radio, and the "Emergency Alerting System (EAS), audio can be simulated to produce a realistic environment. Physical movement during an exercise has the obvious benefit of providing realistic response times and capabili-

ties from emergency responders. Most importantly, a realistic disaster site drill which is part of the exercise and which provides visual and audio cues to the EOC can add a measure of realism unapproachable through other methods.

COMPUTER TECHNOLOGY IN THE CONDUCT, DEVELOPMENT AND EVALUATION OF REALISTIC EXERCISES

Computer technology is invaluable in realistically portraying some of the visual and audio cues that make up the EOC's environment. Many presentation type programs (i.e., Powerpoint, Harvard Graphics, Astound, etc.) are capable of imitating the display of a moving color weather radar display. The issuance of a severe weather statement accompanied by a corresponding radar display is much more realistic than either alone. A notification call from the National Weather Service and a simulated television broadcast reporting unconfirmed damage from the path of the storm further adds to the realism.

One of the more interesting facets of computer aided exercises is in the potential of "virtual reality." Tabletop exercises are becoming more popular as a training and coordination tool in emergency management, but because the environment is relaxed and non-stressed, realism and detail suffer. Some tabletop participants have trouble imagining or visualizing the incident scene. Computer programs exist that easily build virtual reality or 3D worlds to depict the imagined scene. Exercise participants may then concentrate on coordination and action, not trying to picture and agree on the location and incident.

There are promising computer driven exercise enhancements on the horizon. One recent project of the U.S. Army's Simulation, Training, and Instrumentation Command (STRICOM) involved the conversion of the military's use of training simulators for the battlefield into a computer generated simulation of natural or man made disasters applicable to the field of emergency management. Using STRICOM's hardware and software, first responders can respond realistically to events "on the ground" as they are occurring and communicate problems and obstacles to the Emergency Operations Center for realistic problem solving and coordination.

Computer programs will assist in the exercise design process have existed for years. Many emergency managers still use the dated "Computer Generated Exercise Package" (CGEP) and venerable CADET software to great effect in the development of exercises. These programs, once thought to be complex, can be adequately imitated by simple computer databases today. With a minimum of training in programming current database software, a novice could reproduce and improve on these systems. Current word processing software makes it easy to "fill in the blanks" to produce accurate and realistic severe weather statements or exercise messages. Such work is currently being pursued by many. The true excitement in exercise development is centered around computer generated maps, hazard models, and reliable documentation of past emergencies.

Geographic Information Systems (GIS) have opened a new level of realism in emergency management exercises. The ability to display on a very precise map the location of critical facilities, road junctures, flood or storm surge zones, and evacuation routes is a boon to the exercise designer. With GIS, the ability to accurately describe an incident location and what surrounds it is possible. Exercise simulators unfamiliar with a jurisdiction can now, with a glance at a map, tell the EOC not only the location of an emergency, but list the surrounding facilities, residential areas, evacuation routes, and resource staging areas . The ability to model various hazards with computer software also enhances the exercise design process. Many hazards are now being modeled, from flood inundation to damage estimates from earthquakes. Hurricane tracking software is in abundance and can be a valuable tool in creating very realistic tropical storm or hurricane data including graphic displays to use in supporting an exercise. The tried and true "CAMEO" and "ALOHA" software has provided emergency managers the ability to accurately display map and chemical plume information. Using "CAMEO" (Computer Aided Management of Emergency Operations) to develop exercise scenarios or to determine which chemical hazard to use in an exercise is an excellent way not only to add realism, but also to provide supporting documentation for the conduct of an exercise. Some emergency operations centers use databases to store messages during an actual emergency. These databases are a valuable reference guide on exactly what has been reported or requested in different emergencies and to accurately portray in your exercise the information and taskings that occurred during an actual event.

Evaluating how personnel use policies and procedures to respond to an incident is the goal of exercising. Unfortunately, this is the most neglected part of the exercise process. For many years, computer programs have existed to collect and collate exercise data so that some conclusions about performance can be made. The cur-

rent standard is the "Emergency Management Exercise Reporting System" (EMERS) which is a good system to use for general data collection and performance evaluation. Other more specific evaluation tools exist or can be developed to produce an exercise after–action report.

Many emergency operations centers use computer databases on Local Area Networks (LAN) to store messages during disasters. The database may also be set up to allow exercise participants in the EOC to record their observations on the exercise and suggest possible solutions to the problems they encounter. By having these in a database format, problems may be categorized and sorted as needed by the exercise evaluators. The database format also allows easy adaptation of statistical data into computer generated graphs or charts which can then be incorporated into a more comprehensive and understandable after action report. Once the problems or deficiencies have been identified in the after action report, the corrective actions may begin. Computer software has been developed that will guide emergency management officials in identifying which corrective actions are needed and the tasks that must be performed to attain each correction. A timeline for accomplishing the tasks and, finally, the individuals or groups responsible for ensuring that the corrections take place are also identified. The software will produce a "Corrective Actions Report" (CAR) that can be used to reevaluate the emergency management system during the next exercise.

Technology will continue to shape the way we design, conduct, and evaluate exercises. Regardless of the type of exercise you conduct, and whether it is a MSEL driven exercise or is designed as a freeplay exercise, realism created by technological means will provide an enhanced exercise experience for your staff. That enhanced experience will provide you with one of the most crucial elements for a successful exercise – motivated and enthusiastic participants. That enthusiasm, together with a good plan and a solid training and exercising program, will ensure your company or community is ready for "the big one".

PROFESSIONAL EXCHANGE: A TOOL FOR PROFESSIONAL DEVELOPMENT

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ABSTRACT

The subject of professional exchange means different things to everyone. A formal student exchange program or, on a personal level, the contacts and one-on-one exchange derived from a conference or a training session may come to mind. Whatever the image, professional exchange is a viable tool for professional development. This paper explores professional exchange in the context of a committee established by the American Society of Professional Emergency Planners for that purpose. The viewpoints are based upon the personal experience of chairing the group. The committee investigated and provided their findings and suggestions on various ways that professional exchange can contribute to professional growth of the individual and the emergency management profession.

INTRODUCTION

The American Society of Professional Emergency Planners (ASPEP) created a new committee this past year to explore and expand the concept of professional exchange. The primary goal of the committee arose from the ASPEP Mission—Professional development through service—and one of the organization's purposes—provide venues for professional development through publications, continuing education, and professional exchange. The President of ASPEP gave the formal charge below to the ASPEP Professional Exchange Committee.

PROFESSIONAL EXCHANGE COMMITTEE MISSION:

To explore professional exchange opportunities within the global emergency management community.

After considering its mission, the Professional Exchange Committee adopted a scope of work and established four Work Groups with milestones and deliverables designed to accomplish the committee's goals. The committee members communicated through telephone calls, faxes, e-mail, and the U.S. postal. Interest and the committee grew as ASPEP members learned about the ad hoc committee through the ASPEP Journal and the initial activities of individual Professional Exchange Committee. Work Groups addressed specific goals with the guidance of an assigned Work Group Chair.

Professional Exchange Committee Work Group 1

One of the most logical moves for the Professional Exchange Committee was to examine the potential for establishing professional exchange vehicles with other organizations, groups, and agencies. Work Group 1 suggested and implemented formal professional exchange agreements with several organizations that were announced at the ASPEP Annual Meeting and in the ASPEP Newsletter. In the initial stages of this first year, the conventional agreements were opportunities to explore future means of expanding the relationships and to ensure that the arrangements are beneficial to the exchange organizations and ASPEP. The following list suggests some of the ways that formal agreements may be advantageous to all involved:

- Networking enhances each organization's efforts by supporting and publicizing respective activities, projects, conferences, and other programs of interest.
- Involvement in signed agreements encourages professional exchange between all levels, regions, or chapters of participating organizations.
- Sharing membership lists, workshop opportunities, and project involvement expands and enhances human and educational resources.
- Better understanding, cooperation, and communication with professional exchange partners benefit all levels of organizational representation.

Professional Exchange Committee Work Group 2

Locating exchange opportunities and compiling information related to standing exchange programs were prime considerations for the Professional Exchange Committee. Professional exchange programs exist as a means of giving participants first-hand experience and knowledge of what it is like to work and live in environments and areas of the world that would otherwise be impossible. One of the Professional Exchange

Committee's Work Groups investigated existing professional emergency management or related exchange programs around the world in government, industry, business, the military, and academia. Work Group 2 identified several programs with information on how to apply for programs to teach, assist, observe, and contribute or share information. The Work Group reported its findings during ASPEP's annual meeting in October with information on the programs identified this year. Future efforts by this Work Group will encourage, track, and report actual exchanges to stimulate interest and participation. Further recommendations may involve ASPEP as an exchange vehicle while seeking other exchange programs of interest to professional emergency managers.

The following exchange programs are among those identified within the first year of the Professional Exchange Committee:

- Florida Association of Voluntary Agencies for Caribbean Action (FAVA/CA) agreed to use ASPEP members for the International Volunteer Corps
- CMA Peer Exchange Programs with Local Emergency Planning Committees (LEPCs)
- Association for International Practical Training (AIPT)
- Point Beach Nuclear Plant hosted a professional exchange group from Russia
- Louisville, Kentucky has a sister city arrangement with Quito, Ecuador for exchanges with their national civil defense organization
- The Organization of American States (OAS) uses trainers in emergency management and related subjects, language skills (Spanish) preferred

Professional Exchange Committee Work Group 3

The third Professional Exchange Committee Work Group explored requests for formal written demonstrations of professional exchanges. Sharing experiences with details of strategy, creative approaches, and beneficial outcome is an excellent way to promote and encourage professional exchanges within the community and surrounding area. The Work Group looked at an incentive program to further this aspect of skilled interchange as a tool to stimulate and encourage utilization of similar ideas and techniques for professional growth. Work Group 3 envisions the expansion of this effort in the coming year and hopes to interest several emergency managers in sharing personal accounts with their peers. Written demonstrations may be disseminated in print, possibly in the ASPEP Journal, or shared as part of the program of the NCCEM Annual Conference.

Professional Exchange Committee Work Group 4

Everyone cannot participate in a structured exchange program that requires a lengthy leave of absence from home and workplace. The fourth Work Group agreed to investigate the possibility of compiling and publishing workable ideas and examples to enhance emergency management through less exotic means of professional exchange. This Work Group sought examples of innovative ideas, both simple and complex, to share with emergency management professionals. Suggestions based on real life examples may spark professional exchange activities that benefit the emergency manager, the emergency preparedness program, emergency services personnel, and the community as well. The rationale for this was more than the lack of opportunity for many people to participate in a formal program. It took into consideration our tendency as human beings to feel secure in what we know and unwilling to open our minds to new ideas. Our nature can hinder the objective consideration of trying new methods and new technology such as the Internet and e-mail. By sharing even the simplest ideas, emergency management practitioners may be encouraged to:

- Form new liaisons with other disciplines,
- Take advantage of hometown opportunities, and
- Be the catalyst to make things happen to better our communities.

RESULTS AND RECOMMENDATIONS

The results of the ASPEP Professional Exchange Committee thus far are exciting and full of potential. The members of the Professional Exchange Committee identified many suggestions and ideas as they accomplished their tasks. The work of the committee is clearly incomplete; the concept is much too large and new to address in one year. Some of the ideas that evolved from this effort exceed the scope and intent of the committee as well as ASPEP's administrative and financial capabilities. However, the need for and benefits of professional exchange are obvious whether in a formal program or through global access to the Internet. The numbers of personnel involved in emergency management and related disciplines support the concept, practicality, and wisdom of using professional exchange in its many forms as a means of professional development. The first year findings of the Professional Exchange Committee reinforce ASPEP's vision of professional exchange as a positive and aggressive approach to enhance the global emergency management profession. The committee

members recommend the continuation of the Professional Exchange Committee and other appropriate means to pursue professional exchange as a means of networking and developing skills, knowledge, and abilities in the global emergency management community.

CONCLUSION: COMMITTEE OBSERVATIONS

A discussion of the ASPEP Professional Exchange Committee would be incomplete without expanding on what may be the most viable tool for professional exchange and development. Results from a year of committee work and ASPEP membership input indicate the most logical and practicable way for the majority of our profession to participate in a professional exchange is through the Internet. The Internet offers lessons learned, case studies, distance learning, calls for papers, online conferences, and job listings plus the advantages of networking with people who share common interests around the world. It is an exciting approach to professional exchange and is desirable because it allows participation from one's home base. Online technology can lead to exciting opportunities for professional development, participation in formal exchange programs, new friends and peers, and global name and program recognition. Most significantly, these opportunities are not futuristic; they are available today on the Net. Three examples follow that demonstrate the types of interaction and networking possible.

The Virtual Conference Centre, MCB University Press, hosted the Disaster '96 Internet Conference this summer. A wide variety of papers were available for discussion and participation was free to everyone. Participants downloaded or printed the papers they wished to read and examined them at leisure. Participants could go back to the web site and join the conference by commenting and asking questions. The authors and online conference participants were able to read all feedback and the dialogue was then open to all. From this forum, emergency management practitioners and advocates from around the world shared their experiences, accomplishments, and viewpoints with anyone who accessed the site. Papers from Australia on distance learning and competency based courses in emergency management were especially interesting as professional development tools. A dialogue began with our Australian peers with hopes of fostering networking, sharing of ideas and materials, and professional exchange opportunities. Along this same line, comments from South Africa reiterated the importance of distance learning as a vital tool to train emergency services personnel in remote areas.

Another exciting online conference also occurred this summer via efforts of the Federal Emergency Management Agency (FEMA). FEMA's Family Preparedness Program sponsored an ACT NOW video conference and online conference with an emphasis on partnering. Both events were very successful and participation was excellent. The online conference, of course, was a first for many participants and proved to be an invaluable learning experience.

The Emergency Information Infrastructure Partnership (EIIP) was also revitalized this year through a plan of action that reconvened its Work Groups to carry out the tasks involved with the effort. The National Coordinating Council on Emergency Management (NCCEM), National Emergency Management Association (NEMA), the National Volunteer Fire Council (NVFC), State and Local Emergency Management Data Users Group (SALEMDUG), and FEMA are working closely with other partner organizations and agencies to improve emergency management and response services through the improved use of information technology. FEMA has established an EIIP Web Site (http://www.partner.org) that will be used along with other means to conduct EIIP Work Group business and accomplish overall EIIP goals. This effort is important to everyone interested or involved in emergency management. Everyone is encouraged to take special note of the EIIP Web Site because it provides an emergency management forum and great potential for professional exchange and growth.

The use of online technology to promote professional exchange and development is a viable tool. Access is available to more people every day. Moving into cyberspace may still be a foreign prospect for many people. With the appropriate hardware, software, and a phone line, it takes a little time and hands-on experience to develop the confidence to surf the Net with the best of them. Now is the time to use Internet, e-mail, and other technologies. A wealth of information and opportunities for professional interaction is there for the taking. The ASPEP Professional Exchange Committee urges everyone to give the Internet and related technologies a try. Committee members echo the sentiments of Alan W. Watts who said, *"The only way to make sense out of change is to plunge into it, move with it, and join the dance."*

BUILDING AN INTEGRATED EMERGENCY TRAINING SYSTEM

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Emergency managers have a daunting task in managing the training requirements for the many workers who plan for and respond to an emergency. Not only do emergency workers come from different technical disciplines, but their education and experience varies widely. In addition, the cadres of workers who plan for and respond to emergencies typically come from many different organizations, making comprehensive training time-consuming and expensive to coordinate.

A systems approach may be taken in designing an integrated emergency training system. The purpose of this approach is to provide a coordinated, comprehensive system for a documented training program that ensures each worker receives what is needed in order to perform the job when the time comes.

An integrated emergency training system requires three components. The first is identifying all required emergency training as well as those training needs that are not required but are desirable for worker performance. Next, an integrated system identifies who will provide the training. Finally, the system includes a training record keeping system.

The systems approach to integrated emergency training was developed within the US Department of Energy (DOE) first for the emergency managers of the many DOE operational facilities across the country1. There were several drivers for the system's development, many of which exist in state and local emergency planning as well. To assist in deciding whether an integrated training system will benefit you, answer the following questions:

- Are there increasing federal, state, and local training requirements for emergency workers?
- Do you have an increase in the numbers and types of workers who play a role in planning and responding to emergencies?
- Are there workers who are new to the agency or the area you serve?
- Do the emergency planning and response agencies lack written, comprehensive training plans?
- Is there more than one central agency or person who serves as the coordinator for all emergency training?
- Is there a lack of proper training record keeping?

If you answer yes to some of these questions, adopting an integrated training system will assist you. Working through the system with all the agencies and workers you must coordinate with will enhance decision making and clarify roles and responsibilities for training. This in turn serves as documentation and justification for applying needed resources to meet your training needs.

IDENTIFYING TRAINING NEEDS AND REQUIREMENTS

The first component of an integrated emergency training system is to gather in one document all the training needs for all emergency planners and responders. This includes an individual training needs assessment for each category of worker and identification of training requirements. Training requirements that affect your emergency organization may come from federal law or regulation, state law or regulation, local law or regulation, industry standards, professional certification requirements, or corporate policy. It is necessary to find all training requirements for each category of worker. Once you have completed a comprehensive listing of these requirements, you will add to them to what the workers themselves say they need in order to do their job. The benefits in gathering these training requirements in one place are several. Collaborating agencies will understand the breadth of training required. Similar training requirements can be grouped together to save training time and expense, and a comprehensive list is useful in prioritizing training needs and applying resources to meet those needs.

IDENTIFYING SPECIFIC TRAINING TOPICS

From the comprehensive listing of emergency training needs and requirements it is possible to identify specific training topics to be included in the training plan. Going through the results of individual training needs assessments allows you to extract specific topics

and to question training needs that are unclear to you. From the regulatory requirements that have been identified you will also extract specific training topics. Regulatory requirements need careful and thoughtful reading, for few training requirements will be specifically stated. Regulations usually call for the ability to perform a certain task, which in turn implies that training will be required in order to carry out the task. As regulatory requirements are reviewed, it is also necessary to extract administrative requirements - for instance, if training is required annually, be sure to note this in your list. If training records must be kept in a certain way note this as well. At the end of this process, you will have a thorough list of specific training tropics that are either identified as needed by workers or are required or implied by regulation.

STRUCTURING WORKER CATEGORIES FOR TRAINING

The next task is to identify all the workers who should be included in your integrated emergency training system. Workers carry different job titles across agencies but often perform similar functions. As you gather the names and job descriptions of the workers you wish to include, it is possible to separate them into functional position descriptions. Group all workers into one or more of the functional position descriptions and list these descriptions from top to bottom. Include the top executives in an emergency response and work the list until you have included all workers. If it is your responsibility to provide information to ancillary people, such as providing emergency information to tourists in your area, list these as well. What you want to end up with is a comprehensive list of everyone who must be trained for an emergency situation.

You may find that functionally, the job descriptions break into main categories with subcategories. For example, your main categories may include Emergency Operations Center (EOC) crisis managers, EOC technical support staff, field response teams, field monitoring teams, and the general public. Field response teams may further break out into health, physics, security, fire, emergency medical service, and environmental protection.

DEVELOPING A TRAINING RESPONSIBILITY MATRIX

At this point in the development of your integrated emergency training system you have identified all possible training topics as well as all possible workers and others who require some type of training. The next step is to develop a matrix that identifies who is responsible to provide each piece of required training. One of the benefits of such a matrix is that you will normally find more than one organization providing the same training topic, often not in a consistent, coordinated manner. This is poor training technique and results in personnel working at cross purposes during an emergency response. In addition, when you assign a responsible party for a particular training topic, it may be possible to eliminate duplicate training efforts. This saves training expense and frees up resources for training that is needed but not being provided. Answer two questions as you work through the training responsibility matrix. The first question is "who has the primary responsibility for carrying out training on this specific topic?" The other question is "who has oversight to assure this training is being carried out?" The final result is a matrix listing on one axis all specific training topics and on the other axis the responsible agency to carry out the training as well as the party responsible for oversight.

Developing a target audience to topic matrix

The second matrix that is key to your integrated training system identifies who receives what training and the level of training required. One axis is again the specific training topics, just as in the first matrix you developed. The second axis is the listing of functional job categories (and subcategories if you have them). Within each square of the matrix you may simply indicate a "yes" or "no" as to whether that functional job category requires that specific training topic. You may also elect to indicate the level of training required. For instance, some workers need full, comprehensive, certifiable training in a topic such as use of personal protective equipment (PPE). Others need an overview to understand what PPE is even though they may not use it. If you find this is the case in your agency simply designate a code for full training (F), overview training (O), and so forth. You can create as many categories for levels of training as you wish, but you must clearly define in writing what each level means.

ESTABLISH TRAINING RECORD KEEPING

An integrated training system must include a written record keeping policy and procedure for creating and maintaining training records. Some of the regulations that drive your training requirements may include a specific way of record keeping, or detail a certain length of time that records must be kept. These are requirements identified in the "identifying training needs and requirements" component discussed above. Be sure to review any specific training record keeping requirements and include them in your written policy. You may also have human resource department requirements for

employee training records that must be met in your written policy. It is wise to develop a written policy and procedure that is designed to meet any audit or inspections you undergo, that complies with personnel record requirements, and that integrates or coordinates with any central training record keeping function within your agency.

COMPLETE A WRITTEN TRAINING PLAN

Each of the components you have completed has provided supporting documentation and information for the written training plan. A good training plan is succinct, detailed, and useable. Because you coordinated all aspects of the integrated training system with all participants as each component was completed, your training plan will be understandable and frequently used. The listing of requirements, specific training topics, functional job categories, responsible training parties, and level of training required are all a part of your comprehensive plan. In addition, the plan should document how training is to be implemented; what resources to meet the training plan are required; how training is designed, tested, and updated; and what instructor qualifications or certification is required. When the plan is complete, the responsible senior manager should sign it and provide a copy to all agencies whose workers are covered by the plan.

Taking a systems approach to emergency training is a way to collaborate effectively with all participants and use training resources efficiently. More importantly, an integrated emergency training plan ensures that emergency workers have the training needed to carry out their jobs correctly and safely. When these objectives are met emergency planning and response is at its best.

1 Guidelines Toward an Integrated Emergency Training System, Second Edition. TRADE Emergency Management Issues Special Interest Group. Oak Ridge Institute for Science and Education: 1993.

JUST AS A DISASTER IS NOT SIMPLY A BIG ACCIDENT, SO A CATASTROPHE IS NOT JUST A BIGGER DISASTER

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In this article we stress that emergency managers should differentiate between "disasters" and "catastrophes" because they are somewhat different for planning and managing purposes. This conclusion is derived from findings not only from the Disaster Research Center (DRC) studies conducted now over a 33 year period, but also from the observations of other researchers, both domestic and foreign. As illustrated in the examples below, there are differences that should make a difference in the preparedness and response activities of any crisis relevant groups.

DISASTERS AND EVERYDAY ACCIDENTS

For some time, there has been widespread acceptance of a rough distinction between the terms "everyday emergencies" and "disasters." Most disaster researchers and many policy and operational personnel in emergency management agencies now recognize and make that distinction, seeing a quantitative and qualitative difference between routine accidents and "disasters." It is granted that a disaster is not simply a "bigger accident."

For instance, the research shows that in terms of organizational behavior there are the following differences. In disasters, in contrast to everyday emergencies, organizations have to:

(1) Quickly relate to more and unfamiliar groups.

One DRC study of an airline crash found that more than 68 different fire departments alone were on the scene. A Canadian study done by Scanlon in 1991 on a major fire found 346 organizations appeared including seven departments of local government, 10 regional government agencies, 25 entities from the provincial government and 27 organizations from the federal level, as well as 31 fire departments, 41 churches, hospitals, and schools, four utilities, eight voluntary agencies, four new emergent groups, and also at least 42 different players from the private sector;

(2) Adjust to losing part of their autonomy and freedom of action.

Since the time needs and values of the community and the crisis take precedence over everyday ones, all individuals and organizations may be monitored and ordered about by social entities that may not even exist in routine times. The destruction of property is accepted to save lives in search and rescue efforts, and in the building of levees or firebreaks);

(3) Apply different performance standards.

New social norms emerge at the height of the crisis regarding what is acceptable and nonacceptable. Thus, performance standards for organizations such as hospitals and the emergency medical services often change where the normal priority, speed of response in handling casualties, is superseded by a need to more equitably distribute many victims to the available medical facilities); and

(4) Operate within a closer than usual public and private sector interface.

The need for the quick mobilization of resources for overall community crisis purposes often preempts everyday rights and domains. Goods, equipment, personnel, and facilities are often requisitioned or volunteered for the common good from individuals or organizations without due process or normal private organizational procedures.

Though not all planning and operational agencies in the emergency management area see and accept such differences between everyday accidents and disasters, in the majority of local American communities, such factors are seen as relevant to crisis planning and managing (Wenger, Quarantelli and Dynes, 1986).

DISASTERS AND CATASTROPHES

Increasingly, researchers are also suggesting that it is necessary for planning and managing purposes to also make a distinction between occasions that might be called "disasters" and those that might be designated "catastrophes." For American researchers in particular,

this has become more and more evident as they have studied crises in other societies, especially in developing societies. Certain of the social behaviors in some of those occasions have a different quality to them than those in the more typical happenings. These qualitatively different occasions might be usefully called "catastrophes."

The differences can be seen at the organizational, community and societal levels in particular. For our purposes, however, let us state and illustrate at least four general ways in which disasters and catastrophes differ.

Up to now America, compared with many other societies, has had relatively few catastrophes. The examples we give from outside the United States are to illustrate what this society could be faced with in the future. Although this is a topic for another paper, we are all but certain to be faced with more and worse disasters and catastrophes as we move into the 21st Century, (see Quarantelli, 1996).

A catastrophe can be compared to a disaster in four ways:

(1) Most or all of the community is heavily impacted.

For example, Hurricane Hugo destroyed or heavily damaged over 90% of all homes in St. Croix in the U.S. Virgin Islands. This made it impossible for displaced victims to seek shelter with nearby relatives and friends, as they typically do in disaster situations. Typically, in contrast, only some parts of a community are impacted even in major disasters. In the Mexico City earthquake of 1985, less than two percent of the residential housing stock was lost. In a survey conducted by the Disaster Research Center, only 4.9% of the population reported that there was great damage to the building in which they lived. This example also implies that it is not total loss but loss relative to the total base that is crucial. A sudden loss of 50 homes in a metropolitan area may not even be a disaster, but could be catastrophic in nature for a small village.

In addition, in catastrophes, the facilities and operational bases of almost all emergency organizations are themselves usually directly hit. After Hurricane Andrew struck southern Florida, for instance, many buildings that housed police, fire, welfare, and local medical centers were seriously damaged or destroyed, making working in them all but impossible. While some such facilities may be directly impacted in a major disaster, the great majority typically survive with little or no damage. Thus, the first organizations that mobilize in major disasters, generally, cannot do so in catastrophes because they often have no place from which to operate. This happened in devastated Darwin, Australia, after Cyclone Tracy, in the massive flooding in Bangladesh a few years ago, as well as the Tangshan earthquake in China in 1976. Few organizational/community plans in American communities address well the problem of how to operate when everyday organizational facilities cannot be used in a disaster.

(2) Local officials are unable to undertake their usual work roles, and this extends into the recovery period.

In catastrophic situations, local personnel are often unable to carry out their formal and organizational work roles for some time both right after impact and into the recovery period. This is because some local workers are dead or injured; are unable to communicate with or be contacted by their usual clients or customers; or are unable to provide information, knowledge, and skills that they usually provide. In some recent catastrophes in developing countries, practically all the medical or police personnel in some towns were fatalities. In Florida communities affected by Hurricane Andrew, many social workers had no way of communicating with or being reached by users of their services. This general inability to provide usual services happens, if at all, only on a very small scale in major disasters, and if it does, endures for relatively short periods of time.

Because local personnel are casualties or because usual community resources are not available, many leadership roles may have to be taken by people from outside the community. Planning which assumes that local community officials will take an active role in the immediate post-impact period of a major disaster is very realistic. Contrary to the arguments sometimes made regarding evacuation planning around nuclear plants, almost no relevant officials will fail to carry out their formal roles in an actual disaster. In catastrophes where there is no place to work or where activities cannot be carried out, the motivation to do one's job may exist, but cannot be implemented. Another consequence is that the local-outside organizational frictions that occasionally arise in disasters can become a major problem in a catastrophe.

(3) Most, if not all, of the normal, everyday community functions are sharply and simultaneously interrupted.

In a catastrophe, most if not all, places of work, recreation, worship, and education totally shut down and the lifeline infrastructure is so badly disrupted that there will be stoppages or extensive shortages of electricity,

water, mail, or telephone services as well as other means of communication and transportation. This could be seen in many communities after Hurricane Andrew where more than half of the homes in southern Dade County were destroyed or suffered major damage. Similarly, for days after the tornado that devastated the town of Xenia and surrounding areas, regular community life was mostly nonexistent. According to a DRC study, 39.1% of homes in Xenia were destroyed and 19.1% were severely damaged. This also occurred in the very widespread Armenian earthquake. In such situations, the damage to residential areas tends to be correlated with destruction to nonresidential areas. This means that there are far more social elements that need to be restored to "normal" functioning after a catastrophe than after a disaster.

In major disasters, there is no massive across-the-board disruption of community life, although particular neighborhoods may be devastated as happened in the Mexico City earthquake of 1985. Life in many contiguous areas go on almost normally. This was also true of the Northridge, Los Angeles, earthquake of January, 1994; 12,000 people went to the horse racing track in the area the afternoon of the quake as usual.

(4) Finally, help from nearby communities cannot be provided

In many catastrophes, not only are all or most of the residents in a community directly affected, but also affected are those in nearby localities. This can be seen in the typhoons that hit southwestern Asia such, as in the Philippines, and in the accident to the nuclear plant at Chernobyl. In short, catastrophes tend to affect multiple communities, and often have a regional character. This can and does affect the typical massive convergence on a stricken community. In a disaster, there is usually only one target for the convergence, whereas in a catastrophe not only can nearby communities not contribute to the inflow, they themselves often become competing sources for an eventual unequal inflow of goods, personnel, supplies, and communication.

Whatever differences there may be at the organizational level and whatever the damage to community areas, research suggests that insofar as individual, household and small group level behavioral responses are concerned, there may not be many behavioral distinctions between catastrophes and major disasters. For instance, it is typically true in disasters that the great bulk of the search and rescue is done by the immediate survivors. This was also true even in the catastrophic earthquake in Armenia a few years ago, and more recently in the one in Kobe, Japan. Similarly pro–social behavior will be predominant, with antisocial behavior, such as looting, being as rare in catastrophes as it is in disasters.

IMPLICATIONS

The distinction we have just drawn between catastrophes and disasters is not important in itself. The difference goes far beyond terminological distinctions. What is clear is that catastrophes require some different kinds of planning and managing than do even major disasters. This is true whether the focus is on the planning for mitigation, preparedness, response, or recovery. As noted, possible problems may be in sheltering victims or mobilizing local organizations. Many more differences can be found by looking at the local community plan and asking what it assumes as being in place after impact (Dynes, 1994).

This does not mean that everything is different. Although research has not yet fully clarified what the most significant differences are, it appears that the differences are more likely to increase going up the social scale from the individual to the nation. Around the impact time, at the individual human level, the reaction is remarkably similar and generally good. Citizens very seldom panic, evacuation is undertaken mostly by family or household units, and casualties will be taken to nearby medical facilities. At the organizational and community level, however, there are more differences between a catastrophe and a disasters, and generally they will lead to a poorer response in the former compared to the latter. There will be even slower organizational assessments of the problems in the situation, poorer and more inaccurate information flow between agencies, and substantially greater difficulty in coordinating the organized response. This will make an Incident Command System (ICS), which is a dubious arrangement even for disasters (see Wenger, Quarantelli and Dynes, 1989), even less appropriate.

The planning and managing principles that hold for major disasters are not necessarily totally invalid for catastrophes. It is probably still true that the functional planning for a catastrophe should be as close as possible to every day, traditional ways of doing things. Everything else being equal, the less citizens and groups are asked to act in unfamiliar or non everyday ways, the better the response will be.

On the other hand, the qualitatively different demands and needs that surface in catastrophes compared to disasters, mean that more innovative and creative actions and measures will be required in a catastrophe

than in a major disaster (Quarantelli, 1995).

What does one do with a large number of victims who cannot go to nearby friends and relatives because they have also been displaced? Given American values and norms, they will still object to being placed in mass public shelters for other than an overnight stay. In a catastrophe, the usual balance between many traditional and new ways that work well in a disaster requires a greater shift to nonroutine or innovative measures such as preplanning to facilitate victims living in or around their wrecked homes where they will at least have the social support of their equally victimized neighbors. English and German studies of air raid victims in World War II consistently found that they much preferred to continue to live in and around damaged and destroyed but familiar buildings, blocks and neighborhoods instead of being placed with strangers in unfamiliar settings elsewhere especially if their known neighbors were also around.

We did not get very far when we tried to deal with disasters as if they were simply larger everyday emergencies. We will similarly not do the best that can be done if we try to deal with a catastrophe as we do a major disaster. As some research has shown, we should learn from those occasions elsewhere so that we can take into account the important differences between the planning and managing of catastrophes and the planning and managing of disasters. As for emergency mangers, if we have called their attention to these differences and they start thinking about what these differences might mean with respect to their local planning and managing, our major purpose in writing this note has been accomplished.

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TERRORISM: A NEW CHALLENGE FOR EMERGENCY MANAGEMENT

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Terrorism is a worldwide concern, a threat that will remain with us for the foreseeable future and which must be addressed like other long–term hazards, such as earthquakes and hurricanes. It is not a new phenomenon; indeed, it has been a common occurrence throughout history. Since World War II, however, the tactic has assumed more importance, primarily because of the amplified effect provided by media and the tremendous increases in the destructive capabilities of even very small weapons. We have seen recently, here in the United States the potential for terrorist violence, mass casualty and mass destructive events, presents a significant risk for virtually everyone in the world. his paper suggests that terrorism is only a new disaster that must be incorporated into our local plans as we prepare our hazard analysis. It further suggests that, as the Federal government is changing its emphasis and addressing consequence management from an emergency management model, we must do the same and encourage our local officials that the integrated emergency management model is the best approach.

Emergency management functions and anti-terrorism policy interventions are not that different. Preparedness continues to deal with preparation of response units, planning, development of communication networks, designation of lead agencies, and physical security. Mitigation and response are approached somewhat differently. Mitigation of terrorist activity can be affected through several avenues:[1]

- Reduction of the terrorists' freedom of movement,
- Obstruction or denial of opportunity to attack most vulnerable targets,
- Alteration of terrorists' operational environment so that it is less supportive of violent activities, e.g., reduce opportunities to launch large scale attacks,
- Containment of the threat implicit in the violent acts,
- Containment of the physical destruction resulting from terrorist attacks,
- Isolation of terrorists from supporters,
- Alleviation of conditions that may increase the frustration of opposition political groups or significant segments of the population and thus precipitate violence,
- Counteraction of the political message communicated by the terrorist, and
- Response to specific demands.

Mitigation programs can also focus on the cultivation of a climate that is hostile to terrorists, thus reducing their opportunity to use violence and increasing the likelihood that they will be identified and captured. The terrorist's operational environment can be made less hospitable simply by doing what Rodney King once suggested, "Can't we all just get along?" Recovery activities are those which are familiar to us: containment of terrorist threat, restoration of services, counseling of victims and responders, and aid to families of victims.

Dr. William L. Waugh, Jr. suggests in his book *Terrorism and Emergency Management* that an emergency management approach to the problem of terrorism may provide a framework for a more comprehensive and effective policy than now exists. He further suggests that problem definition and the organization of programs to address the problem of terrorism will have significant impacts on the effectiveness of this policy. Certainly, framing the problem of terrorism in terms of its broader impact, rather than simply in terms of resolving separate acts or campaigns of violence, does suggest that the design of policy and the structures of response should be significantly different than those common in most nations today.

Given the destructive capacities of modern weapons, the nihilistic motivations of some terrorist groups, and the fragility of modern society, policy makers should be preparing for catastrophic terrorist violence. Since the results of terrorism may take the form of biological threat, nuclear accident, or major structural failure, the management of terrorist events should be very similar to the management of those events we handle today, such as hazardous materials. The proper equipment

must be identified and provided to those who have been trained to use it. Plans must continue to be developed, exercised and incorporated into the community disaster plan. Public education and awareness training continues to be important if we are to maintain a comprehensive emergency management program.

One limiting factor in designing and gaining support for emergency management programs has been that policy makers and the public at large tend to think of emergency or crisis management solely in terms of response. There is some vague understanding that disaster planning is necessary, but the extent of preparation for potential disasters, the need to mitigate the effects of such catastrophes, and the real problems of recovery are seldom considered. The emergency management framework is being proposed as a vehicle for redefining the policy problem raised by terrorist violence and broadening the focus of policies and programs intended to address it. If catastrophic, mass casualty, and mass destruction terrorism presents essentially the same kinds of challenges to responding agencies as other types of disasters, then the same kinds of disaster programs may be appropriate.

The emergency management framework that has been suggested is that anti-terrorism programs be comprehensive and include programs to prepare for, mitigate the effects of, and recover from the destruction that might occur as well as respond directly to the more immediate crises caused by the violence.

Mitigation programs are likely to be of low salience in communities that do not perceive they have a significant risk of being involved directly or indirectly in a terrorist event.[2] Terrorists may choose targets simply because local authorities are not prepared to respond to such violence, so low issue salience may be particularly debilitating for anti-terrorism programs. I believe this offers a great opportunity to look beyond the "typical response" community, an opportunities to bring the regional fire, EMS, medical, and public health communities as well as the law enforcement communities together to develop strike teams which will be better prepared for terrorist attack and for the consequences associated with it.

As terrorist groups decentralize, detection becomes tougher representing a new threat. President Clinton's vow of swift justice for the June truck bombing in Saudi Arabia is hitting all the right notes with an American public concerned about terrorism.[3] Keeping that vow, and preventing such acts from occurring abroad or, even worse, in the United States, is not likely to be either swift or easy, because of significant changes in recent years in how terrorists conduct their business. No longer are terrorist groups rigidly hierarchical, nor are many of the perpetrators of terrorism tied to a particular group or dogma. Today, the organization of terrorism, particularly that emanating from the Middle East, is a lot more fluid. In the 1980s - when terrorists attacked a U.S. Embassy, a Marine barracks in Beirut, Lebanon, and bombed a Pan Am Jetliner over Lockerbie, Scotland - terrorist groups were more clearly defined. Intelligence analysts usually knew their leaders, the number of followers, their capabilities and how they operated. This is no longer the case. Today we are dealing with something that is not a centrally coordinated conspiracy, but a type of global network. "Think of it as a terrorist Internet," says Brian Jenkins of with Kroll Associates, an international investigative and consulting firm.[4] Cases in point are the two bombings in Saudi Arabia in June 1996 in which Americans were targeted. The latest killed 19 American servicemen and wounded hundreds when a tanker truck exploded outside a U.S. Air Force compound in Dhahran.

An interesting case study in the implications of terroristic acts and the consequences associated with them is the nerve gas terror that occurred in Tokyo during morning rush hour on March 20, 1995.[5] Diffusion of nerve gas had been staged at 15 stations and one depot on three subway lines in Tokyo. The Tokyo Fire Department (TFD) took immediate action and conducted rescue work, first–aid treatment, the analysis of the gas, the cleanup of the disaster scenes, etc., with 340 emergency units and 1364 personnel responding. In total, 692 victims were handled by the TFD; 135 of the 1364 TFD responders were also sickened and injured after exposure to the nerve gas; 688 people were transported by fire department vehicles, while the rest of the victims were transported by police vehicles and taxis, or were able to visit hospitals by themselves. Citizens transporting themselves to health facilities any way they could has also happened in Oklahoma City and many other disaster. Total casualties eventually reached 5510, only a portion of them handled by the responding rescue organizations. This points out the necessity for having the hospitals firmly plugged into the planning process, as well as the need for them to have internal plans developed and exercised.

This disaster was so unusual because it took a great deal of time to identify the exact hazard. The nerve gas was actually colorless and odorless, leaving no trace anywhere. The toxic substance worsened victims' con-

ditions suddenly, and indirect contamination presented additional problems. The responders were not prepared for what faced them. The tragedy happened during morning rush hour. "We've had a patient here... The passenger's got convulsions... This is Kayabacho Station." This was the first request for an ambulance; it was made at 8:09 a.m. "Ambulance, please... Hachobori Station... We've got a fainted passenger... We want an ambulance at Exit 9, please." This was a report from Hachobori Station, which was then followed by another call, the third one, from Tsukiji Station with a station worker yelling into the phone, "We've got a person passing out here at Tsukiji Station... We're waiting for your help in front of the Honganji Temple." The report from Hachobori Station came in at 8:10 a.m., and the one from Tsukiji Station at 8:13 a.m. Another call was made by a Kamijacho Station employee at 8:15, and an additional one from Ningyocho Station at 8:17 a.m. Thus, emergency calls flooded in one after another. After the 8:13 a.m. report, there was another call from Tsukiji Station that a train had been blown up. The Tokyo Fire Department took immediate action against these incidents with the Fire Suppression Division Chief leading the operation.

Events made it clear that the diffusion of nerve gas had been staged at 15 stations on three subway lines.

Many commuting passengers and station workers fainted, felt nauseous, or complained of eye irritation on the incident day. It turned out that several devices capable of releasing nerve gas had been initiated simultaneously, both on trains and at stations in the subway system.

Shortly after the deliberate release of the chemical warfare agent sarin (nerve gas) in the Tokyo subway, the Metropolitan Washington Council of Governments (COG) became concerned about the possibility of a similar attack in the Washington, DC, area. Jack Evans, Chairman, Board of Directors for COG wrote to President Clinton[6] "...We understand the position of the Federal government is that risk of such an attack is 'slight' and that ... the United States government has structures and mechanisms in place to address these situations... Nevertheless, the recent bombing of the Federal building in Oklahoma City indicated that, if such an incident were to occur in the metropolitan Washington area, local police, fire and Emergency Medical Services (EMS) personnel will be the first responders. Thus, we believe that immediate action must be taken to prepare for a scenario similar to the Tokyo attack."

Mr. Evans went on to point out to the President that our detection and monitoring capability is limited and exists only within special hazardous materials units, not on first response apparatus. He further stated, "Our hazardous materials teams can immediately respond with only about 55 members for the entire metropolitan area, and thus must rely on firefighters for assistance in dealing with large numbers of casualties. Neither the hazardous materials staff, nor these firefighters, are trained to deal with chemical warfare agents, and neither are equipped with the appropriate amount of protective clothing. Our EMS and hospital personnel are not trained in how to decontaminate patients exposed to chemical warfare agents, are not equipped to protect themselves, and are unable to treat large numbers of chemical casualties." Mr. Evans continued "... our police departments are not trained, nor equipped with appropriate protective clothing or respirators, to respond to any personnel in the immediate vicinity of a chemical attack. Thus, they would be unable to intervene in any meaningful way in a hostage or other critical incident."

As the City of Atlanta has been planning and training over the last five years for the Centennial Olympic Games we realized some of the same things Mr. Evans pointed out to the President. Consequently, we broadened our response capability and integrated our approach. We've been successful in making more groups aware of the hazards of chemical and biological weapons and taken steps to equip well-trained teams and incorporate neighboring response resources into a metropolitan response capability.

The President of the United States responded by assigning this mission to the Department of Health and Human Services. The Public Health Service (PHS) Office of Emergency Preparedness (OEP) developed a framework for a Chemical and Biological (C/B) Rapid Deployment Team. This team is envisioned as a rapid response technical assistance team that can provide timely technical assistance to local and State responders.

The forming of Metro Strike Teams (MSTs) at major metropolitan areas to assist in the immediate response to a C/B terrorist act is a great answer. It is consistent with the need to ensure effective and appropriate management for chemical and biological release events. Such events are overwhelmingly medical in nature, and present civilian pre-hospital EMS and in-hospital capabilities lack the proper resources and training to confront what was previously viewed as a military problem. It is proposed that a strategy for resolving the po-

tential public health emergency while ensuring the highest level of patient care consistent with existing professional standards of operations be adopted.

The purpose and mission of the MST is to, at the request of local and/or regional jurisdictions, respond to and assist with the medical management and public health consequences of chemical, biological and radiological incidents which result from accidental or deliberate acts. The scope of operations is identified and presented in four broad areas to include:[7]

- Medical management of chemical, biological, or radiological incidents arising from the consequences of technological accidents and/or terrorism
- Technical consultation on Chemical, Biological and Radiological (CBR) incidents
- Medical intelligence about the CBR incident
- Interaction with applicable law enforcement, and other responding anti-terrorism agencies

Local jurisdictions can also activate a local MST team, however, activation will be immediately confirmed by notification to the Health and Human Services Office of Emergency Preparedness (HHS OEP). Following this activation, applicable state emergency management and EMS agencies will receive notification. A MST can also be activated at the direction of the HHS Office of Emergency Preparedness.

Finally, due the complex and unique demands presented by chemical, biological and radiological threats and the consequent responses, local and regional medical jurisdictions must have immediate access to rapid, technologically-advanced medical interventions. Establishment of Metropolitan Strike Teams will assist in mitigating the medical consequences of these horrifying events by providing a highly trained, readily deployable, fully equipped team of medical professionals to support local resources.

In a greater context, anti-terrorism policies should be built around the emergency management framework with the law enforcement and national security authorities as only one component in that larger organization. To the extent that we are dealing with catastrophic disasters, there will certainly be national security implications. But the need is to balance them with other national interests. The principal task may be in designing a system that clearly delineates agency responsibilities with one lead agency responsible for coordinating, but not necessarily controlling, the anti-terrorism program. The emphasis should be on consensus building rather than on hierarchical control. Decentralized decision making is to be expected, and agreement on goals and objectives will assure greater consistency in the decisions made.[8] Moreover, it is unlikely that one level of government or one agency will have clear jurisdiction over a major terrorist-spawned disaster. It is unlikely given the fragmented nature of government in most large, developed nations that one agency could adequately design, implement, operate and maintain programs to prepare for, mitigate the effects of, respond to, and recover from disasters without involving other agencies. Coordination of efforts, therefore, is a fundamental concern and professional networks are essential.

Terrorism is expected to remain with us for the foreseeable future. One course of action is to develop a narrowly focused set of anti-terrorism and counter-terrorism programs as many nations are already doing. A second course of action is to make the best use of current emergency management resources to develop a broader, focused network of policies and programs that will address the range of problems that terrorist violence might engender. The emergency management framework provides just such a focus.

FOOTNOTES

[1]Dr. William L. Waugh, Jr., Terrorism and Emergency Management (pg. 73–74).

[2]William L. Waugh, Jr., Terrorism and Emergency Management (p. 18).

[3]Ron Martz, Staff Writer, Atlanta Journal Constitution, Sunday, June 30, 1996.

[4]Ron Martz, Staff Writer, Atlanta Journal Constitution, Sunday, June 30, 1996.

[5]Tokyo Fire Department after action report.

[6]Excerpts from letter to President Clinton from Council of Governments' Chairman of the Board.

[7]Health and Human Services Office of Emergency Preparedness recommendations.

[8]William L. Waugh, Jr., Terrorism and Emergency Management (p. 153).

SAVING YOURSELF FROM DISASTER

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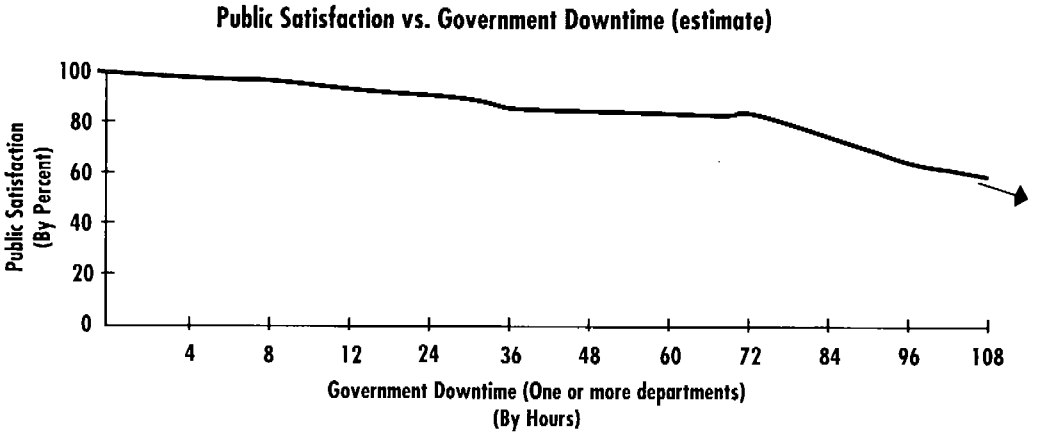
Emergency management offices in the public sector focus primarily on how to mitigate, prepare for, respond to, and recover from disasters that occur in their jurisdictions. Little attention is given to the disasters that can occur within the emergency management office or in the governmental departments that support the peacetime and emergency functions of their jurisdiction. Most Emergency Operations Plans operate under the assumption that all critical emergency functions of the government are not susceptible to the emergencies and disasters that occur outside of government office buildings. Most Emergency Operations Plans also operate under the assumption that there are no internal hazards that can affect governmental peacetime and emergency operations. Each of these assumptions is false, and can prove to be very costly if they are adhered to. Emergency managers must first realize that their operations, as well as their government's operations, are vulnerable not only to external hazards, but to internal hazards as well. This document will take a look at the different hazards that can affect the integrity of governmental operations. This document will also discuss the different measures that emergency managers can implement to ensure governmental continuity during peacetime and disaster operations.

Emergency Planners must ask themselves, "What would happen if any particular agency in our jurisdiction was suddenly made inoperable by a disaster?" "What would happen if our Emergency Operations Center was made inoperable by a disaster?" "Do we have provisions for the continuity of governmental operations in our Emergency Operations Plan?" Imagine the ill feelings of employees if they could not get their paychecks because the Payroll Department was made inoperable by a disaster. How about the loss of income if the courthouse records, which contained outstanding traffic tickets to be paid, were destroyed? Imagine the increasing distrust that citizens may have if particular government services, such as food stamps or public health, were halted due to a disaster. Lack of preparation on the part of jurisdictions to ensure the continuity of government under any circumstances can be both financially costly and politically costly. Citizens will not support governments, or individuals involved with governments, who cannot provide the services they require on a consistent basis. (See Figure 1)



The most obvious hazards to which governmental operations are vulnerable are external hazards, such as: fire, flood and flash flood, tornado, hurricane, winter storm, earthquake, hazardous material incident from a fixed facility or a transportation accident, structural failure, aircraft accident, severe thunderstorm (lightning), landslide and mudflow, drought, tsunami, volcanic eruption, and dam failures. Emergency managers may deal with these hazards on a regular basis in planning for their communities; however, very few emergency managers ever plan for what they would do if their Emergency Operations Center or other government facility was affected by any of these disasters. This must

be planned for.

With the rise of technology and the increase in the use of computers to run daily operations, we must look at the hazards that might interrupt or disable computer systems and bring governmental operations to a standstill. These hazards create "internal disasters" and include: water leakage or flood, fire, power failure, mechanical breakdown, software failure, accidental destruction of software or hardware through contamination (viruses), and intentional destruction of software or hardware by disgruntled employees, hackers, terrorists, or vandals. These are "hidden evils" to which all governments and their departments are susceptible. Steps need to be taken to mitigate and prevent, as well as to respond and recover, from these internal disasters.

The remainder of this document will discuss how emergency managers can address this issue and cover the steps that can be taken to implement a Governmental Continuity and Contingency Plan.

Many obstacles lie before an emergency manager when presenting this issue to administrators of their jurisdiction. Cost justification, passivity in developing the Governmental Continuity and Contingency Plan, an attitude that insurance may pay for the damages to the computer system, and the "It will never happen to us, so we do not need a plan" syndrome are obstacles which may be experienced. Fortunately, there are ways to address each of these issues.

Let's begin by looking at cost justification. A good administrator, mayor, or city manager likes to know how cost effective any project will be, particularly if operating under a limited budget. In developing a Governmental Continuity and Contingency Plan, one must look at the costs versus the potential returns from developing this plan. One strategy is to look at the dollar value of one hour of downtime.

Calculate the average hourly wage of a person who uses the system for which the Governmental Continuity and Contingency Plan is being developed. Multiply this by the number of people using the system who would not be working due to the computer system failure. Assuming that all of the data in the system could be re-entered at a later time, use the same calculation as above to figure one hour of overtime pay for each user of the system. Add these two dollar figures together and you will have the monetary labor cost for one hour of downtime (Toigo, 13).

To show what extended downtime labor costs can be, multiply this number by 12 hours, 24 hours, 48 hours, and so on (See Figure 2). Further costs can be determined by factoring in missed deadlines, citizen or customer dissatisfaction (especially costly to those elected officials) where these can be quantified, and missed revenues. All of these costs can be significantly reduced by developing and implementing a Governmental Continuity and Contingency Plan.

Figure 2 Formula for Determining Monetary Cost of System Downtime

HOURLY WAGE OF SOMEONE ON SYSTEM		DOWNTIME (HOURS)		PEOPLE USING SYSTEM		COST
	X		X		=	
$10.00		24		20		$4800.00
HOURLY OVERTIME WAGE OF SOMEONE ON SYSTEM		**DOWNTIME (HOURS)**		**PEOPLE USING SYSTEM**		
	X		X		=	
$15.00		24		20		$7200.00
					+	
					TOTAL COST	= $12000.00

*** This does not include the cost of missed deadlines, citizen or customer dissatisfaction, and missed revenues.

Next is the obstacle of personnel taking passive roles in the development of the Governmental Continuity and Contingency Plan. From time to time, emergency managers may have to deal with people who feel that they just have to go through the motions to get by. This may include people who work within the government. Some of these people will do the minimum required to complete what is asked of them. To combat apathy, people must be shown that if they are a user of a computer, computer system, or network, they have a responsibil-

ity to ensure the integrity and the safety of those systems. If a computer fails and someone is not able to complete their work or misses a deadline, sympathy will be limited. For some people, missing a deadline could mean missing a promotion, losing their credibility, and even losing their job. Is that worth being passive over?

Another obstacle is that many people believe insurance will pay for all damages, so there is no need to worry about it. This is not completely true. Insurance may be able to pay for the replacement of hardware and software, but will rarely pay for intangible costs such as information loss, customer dissatisfaction, lost worker time, and missed deadlines.

A fourth obstacle is the reasoning that, since a disaster has never affected the operations, one will never affect them. The answer to this problem is simple. In April of 1994, a tornado ripped through the town of Desoto, Texas. The newly built City Hall was destroyed. "Records and computer systems were destroyed and governmental services that were based out of that building were slowed and, in some cases, halted for several days" (Stovall, "Lancaster and Desoto, Texas," 1-18). Desoto, Texas had never been hit by a tornado before April 1994. Another example is the bombing of the Alfred Murrah Federal Building on April 19, 1995. "Literally thousands, and probably millions, of pieces of forms and documents from the building could be seen on the ground" (Stovall, "Oklahoma City," 1-13). Since this building housed such offices as the United States Department of Housing and Urban Development and a Social Security Office, one can imagine all of the documents and computerized information that was lost in the blast. A bombing had never occurred at this building before. Why couldn't situations such as these occur at other governmental buildings? The answer is that they can. Is not having a Governmental Continuity and Contingency Plan a risk that we are willing to take? With a little research, one can find many articles on businesses that have lost millions of dollars, or have even gone bankrupt, because they did not have a Business Continuity/Disaster Recovery Plan. These business people did not think it could happen to them either.

These are some of the obstacles that an emergency manager may encounter when trying to gain administrative support for the development of a Governmental Continuity and Contingency Plan. Some of the ideas that have been presented will help "sell" the idea of a Plan to the jurisdiction's administrators.

Once the administrators of a jurisdiction agree that there is a need for a Governmental Continuity and Contingency Plan, an effort should be made to have the administration approve internal government policies that require all departments to work toward the protection of their personnel, property, and assets. The policies should require each department within the jurisdiction to participate in developing the Governmental Continuity and Contingency Plan and should allow the development of a planning team which will be instrumental in developing the overall Plan.

Once the policies are in place, all planning team members should be brought together to learn about the concepts behind the Governmental Continuity and Contingency Plan. An effective way to gain support is by explaining the cost effectiveness of the Plan and by discounting other arguments against the Plan by using the same concepts that were used with the administration. The effort must focus on the team concept. Everyone must work together to come up with solutions that will make the overall jurisdiction better as well as safer. While the team concept is essential to developing the Governmental Continuity and Contingency Plan, team members must be sure to respect one another's "territories" while focusing on the mission of the team. This is key to developing a strong planning team.

Another determination that needs to be made is who is to be the disaster recovery coordinator. A strong and knowledgeable disaster planning coordinator is very important to the success of the planning team. This person will lead the team and act as a "coach" as well as an enforcer, or one who makes sure that everyone completes tasks on time. This is important because the team can only be as strong as its weakest member. Some ideal people for this position may be those members in Management Information Systems (MIS) or Data Processing who have the expertise in computers and other technical devices. Anyone on the team may be chosen. This person is to work with departmental managers to develop educational programs for employees regarding what they are expected to protect and what measures they can take to do so. This includes implementing security measures and ensuring the continuous functioning of the computers. The disaster recovery coordinator may also help to identify ways to mitigate loss by retrofitting or replacing existing equipment.

The next step is to prepare a plan development schedule. Deadlines must be set for departments or team members to submit their assigned parts of the plan for review by the planning team. There needs to be a schedule for testing the plan after these deadlines have been established. The plan, in whole or in part, should be

tested and reviewed at least quarterly after it is finalized. This may seem like a lot of testing, but considering that a disaster affecting the operations of government can occur at any time, and that departmental personnel may occasionally change, it is needed. A program should also be developed. Personnel should be sent through a "refresher" course at least annually to keep awareness levels up. The plan and its implications should also be discussed with new employees during their orientation.

Next, the planning team should conduct a risk analysis of governmental facilities. Each member of the team can survey his or her department and bring their findings to the team. They should look at every facility or department, determining its susceptibility to water, fire, criminal intrusion, and other hazards. Once reviewed by the team, these findings should be sent to the governmental administrators and to the jurisdiction's MIS and departmental managers. This will give everyone within the jurisdiction a chance to see which areas need to be given the most priority during development of the plan.

When the risks have been identified and analyzed, the Governmental Continuity and Contingency Plan is ready to be developed.

The planning team will want to bring in the Human Resources Department. The Human Resources Department will be able to help with many aspects of the plan. First, the Human Resources Department can implement an educational program for employees on the Governmental Continuity and Contingency Plan. This should be aimed towards new and old employees. Refresher courses should also be scheduled to keep employees up-to-date on the current Plan. The Human Resources Department can also help the planning team develop a contact list for those persons involved in the mitigation, preparedness, response, and recovery sections of the Plan. This list should include contact names and their work, home, cellular, pager, and fax numbers. This list should remain confidential — only to be seen on a need-to-know basis. The Human Resources Department will also be able to help maintain this list by adding and deleting names and numbers. The Human Resources Department will also be able to notify the team of pending terminations or separations within the user community so that security measures can be taken.

The planning team will also develop a backup schedule for computer systems and programs within the jurisdiction. All backups of computers and computer systems must be documented. Backup procedures should be done daily in order to maintain the ability to recover lost data. If backup procedures are performed daily, the maximum loss should be only one day's data. The backup of computers can be done by copying data from computer hard drives to floppy disks, data tapes, or portable hard drives. Having backup copies of the data is crucial to the recovery process of any government.

The disaster planning team will need to develop any forms or other documents that may be needed during the governmental recovery process. This may include agreements with private vendors for products or services. Documents must include an inventory of the computer systems and their hardware and software which will be used to replace destroyed or damaged systems.

A master list of all passwords and encryption procedures must be recorded and stored in one central location. For security reasons, the disaster team coordinator should be the "keeper" of the passwords and procedures. These passwords and procedures should be kept in a secure location so that they cannot be used by anyone except for the MIS manager, the disaster planning coordinator, and his designees

Another task of the emergency planning team is to determine which computers, computer systems, and networks are most vital to the organization's operations. These computers and computer systems are those which, if inoperable, would bring critical service and functions to a standstill. Another strategy is to determine how much loss of income, loss of citizen satisfaction, or loss of service would occur if any particular computer, computer system, or network was inoperable. Once these determinations are made, a prioritized list needs to be made of computers, computer systems, and networks. This list should categorize the computer, computer systems, and networks from the most important ones, according to cost, service, and function, to the least important ones. This list indicates which systems to repair or replace first during the recovery effort.

In addition to making a prioritized list of computers, computer systems, and network within the jurisdiction, a list of all private vendors and suppliers who can help to rebuild the systems needs to made. It should include a telephone list of computer software and hardware technical support departments should. This list should include individual names and work numbers, home numbers; and fax, pager, and cellular numbers. It should contain at least two suppliers or vendors for each piece of equipment in case the primary contact is unavailable. This list can end up being a lifeline for those persons participating in the recovery process.

Other tasks that the planning team needs to accomplish are finding an off-site location to store data and finding an alternate location for daily operations should normal facilities be damaged or destroyed. When trying to find an off-site data storage location, several criteria need to be kept in mind. One is the location itself. If a facility is in a flood zone or a high hazard zone for tornadoes, storing data somewhere else within the facility or in a facility next door would not be practical. A data storage facility should be out of high hazard zones. Having a data storage facility a couple of hours away is not unheard of. The next question that the planning team should ask is, "How secure is the off-site data facility?" It would not be sensible to put data, especially confidential data, into a facility that anyone can get into. The structural integrity of the building must also be taken into consideration. It must be free of leaks in the roof, pest infestation, and fire hazards. The availability of the facility is also important. Is someone at the facility 24 hours a day or can you access the facility 24 hours a day? How fast can you retrieve your data should the need arise? Once a site has been found that suits the needs of the jurisdiction and a cost has been negotiated, a contract should be drawn up, approved by administration, and signed by administration and the data storage site representative. If the site is not safe, secure, and accessible, it defeats the purpose of putting data at that location.

The planning team must also locate a site to which a department or a jurisdiction can move should their facility become inoperable. There are two types of sites which can serve this purpose. The first is a "cold site" that is essentially empty. There are no computers, telephones, or appliances in place. If the equipment that is needed cannot be either duplicated or moved to this location, a "hot site" should be located. A hot site is one that is equipped with computers, telephones, appliances, and other equipment that may be necessary to resume operations. When deciding whether to use a particular cold or hot site, the same criteria as that for determining the suitability of a data storage site could be used. One suggestion may be to make a mutual aid agreement with another jurisdiction. Usually, the equipment is similar and it can be cheaper and more dependable. Once again, after a site is chosen and a cost negotiated, a contract needs to be drawn up and approved by the administration. The contract then needs to be signed by the jurisdiction's administration and the cold site or hot site lead representative. Ideally, the hot site or cold site would be co-located with the data storage facility. This would make resumption of operations much faster and smoother.

Other tasks that the planning team will need to complete are those such as the development a chain of command. People within the jurisdiction, including those members on the team, need to know who to report to or receive tasks from in an emergency where the Governmental Continuity and Contingency Plan has to be put into action. In addition, emergency actions such as monitoring alarms, alert and warning must be agreed on. Finally, the planning team needs to develop evacuation procedures. This will include telling each individual within the organization what to do and what to bring with them should they have to evacuate. Developing emergency action procedures will give employees in the jurisdiction "peace of mind" by giving them guidelines on what to do in an emergency. Development of the Plan will also help the planning team handle emergencies before they become disasters.

Developing a Governmental Continuity and Contingency Plan is beneficial to governments on the city, county, state, and federal levels. It allows a jurisdiction to analyze its assets and make them safer from the hazards created of nature and man. Carrying out a Plan will allow organizations to operate should one of these situations arise. It only takes one disaster, whether internal or external, to make or break someone's job. An effort must be made to develop and implement a Governmental Continuity and Contingency Plan in every jurisdiction. After all, if a jurisdiction cannot help itself, who can it help?

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IF YOU KNEW...YOU WERE THE LAST OF YOUR RACE, WOULD YOU BE ASKING THE SAME QUESTIONS YOU ARE ASKING NOW?

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Emergency planning professionals are by nature practical and humble people; practical due to the needs for planning, response, recovery and mitigation which will always exceed even the most robust budgets and staffing; humble from experiencing mother nature's impacts and from the outrages of manmade disasters that overcome the best plans and preparation. Planners shy away from the visionary and more toward the engineering of day-to-day survival operations—just getting past the next emergency challenge. That is the planning community's greatest strength, and perhaps its fatal flaw. Unfortunately, some little things, with big teeth, are just waiting to bite the U.S. emergency planning community in its flaw.

Failure to prepare for the unexpected has been a human flaw throughout history. The English protected themselves from a Spanish invasion in 1588, having built one of the greatest fleets in the Western World. They had not prepared London, however, for the tiny fleas brought into the docks by rats in 1665, from ships similar to those that protected London from the Spanish. Just a *small thing* lead to the Great Plague that caused over 75,000 fatalities among London residents. They were also not ready for the single spark of flame that burned London to the ground in 1666. Just ignorance or oversight? Whether considering the Inca and Aztec underestimation of a few conquistadors, or Napoleon and Hitler's underestimation of Russian winters, there are many historical examples of the overlooked: potentials that were ignored or viewed with the eye of practical assumptions. If only the planners of those times could have heard the lyrics from the 1940's tune by Phil Harris, "Someday some little bug is gonna get you!"

In the last ten years, planners have experienced a number of near misses from cataclysmic "gotchas" that did not happen, either by supreme intervention, luck, or preventive response. What if the Loma Prieta earthquake had struck two hours earlier? What if the Northridge earthquake had been at mid-day, during a busy school day? What if Hurricane Andrew had moved 1 degree of latitude north; what would have happened to Miami? What if a large tsunami had been generated by earthquakes in the Aleutians? These were all plausible scenarios that did not occur, leaving many U.S. planners relieved, and perhaps a little too confident. But there are other scenarios resulting in more devastation than mighty quakes, storms, and floods. What if the Ebola outbreak in Africa had spread, entered Florida via a tourist, and later migrated inland? What if the meteor the size of a house had struck the earth two years ago instead of passing between the earth and the moon? What if a terrorist from a middle-eastern group had entered a U.S. city with a viable nuclear weapon purchased from a diminished former Soviet state? And, what if global warming and climactic change had become more abrupt?

There are those who profess a chaos theory of emergency planning—that planners cannot truly prepare for adequate response and recovery before, during, or after large events because there are so many variables. There is some truth to this. A colleague once told me, "You prepare for emergencies and disasters. You respond to catastrophes." The scenarios proposed in a climactic change, meteor fall, and viral epidemic may be catastrophic; however, the emergency planning community can prepare a framework that can expand to deal with such possibilities.

Professional planners, having read this far, may be thinking, " Oh please! Another planner with an end of the world scenario!" That is what I would have thought five years ago. But there is too much new research, in fields far flung from emergency planning, that provide a wake up call. Some of the most daunting revelations are those of the Japanese climatologists who have developed forecast world drought. If these maps are correct, all planners will have to respond to massive changes in the current geopolitical structures, caused by huge losses in agricultural production, in a very short time. Additional research into the effect of climatic change on cultures is being completed by the Ukrai-

nian Academy of Sciences, along with the Russian Academy of Sciences. Their research focuses on migration and invasion in the Black Sea basin due to climatic changes, e.g., the Hittite invasion of Anatolia in third millennium BC after extended droughts. There is evidence that droughts led to mass migrations and radical changes in cultures over a 5,000 year period of weather instability. Similar changes are taking place now, as indicated by the increasing periods of extensive drought, severity of storms and rise in ocean temperatures. The emergency planning community must take a longer view in order to continue the commitment to the protection of life, property and the environment. Global warming and climatic changes are just two of the scenarios which were ignored in the past but which are now attracting more interest at the international level. The fact that these and other less familiar scenarios have been ignored in the past shows the inherent flaw in general disaster planning in the United States.

There are three unfortunate facts about the current approach to emergency preparedness in the U.S. which leave us vulnerable to ignored cataclysmic scenarios. First is the concept that a community which plans for the most "plausible" disaster and effectively handles day-to-day generic emergencies will provide reasonable response during more serious events. This premise is founded on mutual aid capabilities and on state and federal assistance. But what if an event were so widespread that mutual aid were limited or not available? What if there were a series of events (political, financial, or international) that reduced the availability of the federal? No one community can face every disaster impact with the latest technological resources. It is just too expensive for most communities. That is why mutual aid exists. That is why emergency planners perform community hazard and risk assessments. Resources have always been focused on the most likely threats and planning is based on the "plausible" event, and often ignores those events outside the bell curve of the more usual operations.

The second fact which increases our vulnerability to cataclysmic events is the emergency planners' lack of political power in fostering mitigation prior disasters. This is especially painful since such considerations would go far in reducing losses from larger events. For example, a county board of supervisors in California recently approved continued building in a metropolitan area flood plain that most emergency planners considered highly vulnerable to catastrophic losses. Local emergency planners raged against this without affect. Thousands of lives could now be placed needlessly at risk, as developers and politicians reap gain. As a profession, emergency planners remain a small voice in the wilderness when facing planning commissions and elected officials.

The third, and least recognized fact is the lack of understanding about what is happening to world cultures outside of the United States. The United Nations declared the 1990's as the International Decade for Natural Disaster Reduction (IDNDR). What could have shown more foresight? The typical U.S. emergency planner does not focus on IDNDR, however. Few understand its importance or value. The impacts of small events worldwide now have vast potential consequences to the economic stability of the United States due to the increased number of people now vulnerable to the effects of natural disasters. By the year 2000, half the world's population will lie in urban areas, crowded into 3% of the earth's land.1 Perhaps as much as 80% of the population growth in the 90's will occur in urban areas. By the year 2000, 17 of the 20 largest cities in the world will be in developing (it was 7 of 20 in 1950). Most of these cities are in areas where earthquakes, floods, landslides and other disasters pose the greatest risks. This issue is so serious that this year the UN is focusing on the sustainability of cities worldwide.

Many U.S. planners consider this a foreign or "world view" issue. But it is an issue posing an incredible risk to the continuity of U.S. culture in the next ten years. By the year 2003, 80% of the U.S. population will live within 10 miles of the coastlines. If present changes in patterns of hurricanes, earthquake, and global warming continue, there will have to be huge adjustments in where people live and how they are governed. Sustainability of the culture is part of an emergency planner's responsibility. It was not just natural disasters, war, and disease that destroyed the Maya culture, but most devastatingly its inability to sustain its government and culture in the face of the combined effects of various disasters. U.S. emergency planners must learn from the world community of planners throughout history and become less insular in their approaches.

These are hidden disaster risks that are not being addressed, due to the vulnerabilities in the U.S. planning systems. What practical steps can be taken to address these issues? There are many possible answers, including increasing the political awareness and influence of emergency planning professionals. For our cities, perhaps the most critical consideration is the mass relocation of citizens before, during, or after cataclysmic

events. Even though parts of San Francisco were lost in 1906, and much of Chicago in 1871, there has not been a true, total devastation of a major U.S. city since Atlanta was burned in the Civil War. The 1995 Kobe, Japan, earthquake cost $100 billion in losses. Since 1987, there have been at least 15 disasters that created losses of over $1 billion each, mainly because of urban impacts. Before 1987, there was only one that cost insurance companies over $1 billion. Cities can be lost!

Most U.S. planners turn a deaf ear to any discussions about the complete and permanent loss of a metropolitan area; however, a powerful shock wave roared through the California planning community after the Oakland Hills Fire, the LA Riots, and the Loma Prieta and Northridge earthquakes. Kobe was a warning. U.S. cities are at risk, and, if catastrophic losses overcome and bankrupt insurance firms, the process of rebuilding a livable urban infrastructure may be lost. It is the author's premise that in the next ten years, it is likely that the U.S. will experience the permanent loss of a major metropolitan center due to catastrophe.

The U.S. Federal emergency planning base considers mass repatriation and mass immigration at FEMA's level, but not the possibility of mass relocation of large segments of a U.S. city after a catastrophic loss. There is also no plan to deal with the impacts this might have in surrounding communities through which the evacuating hordes wander, nor how they might be absorbed into rural community life.

What would planning for urban mass relocation involve? Planners caught in the rancorous debate over mass relocation for nuclear defense planning know. Such plans can pose a logistics nightmare, and this planning was never completed in any effective manner at the local government level.

Some of the logistical issues include continuity of government (COG), transportation, water, food, shelter, and medical provisions. Maintaining law and order is a major concern. The U.S. may experience disaster refugee camps filled with its own people, on its own soil, for the first time since the Civil War. If the planning community does not prepare for these implications, the camps will be run as poorly as those used for the Japanese internment during WWII, or for those set up for the 1994-95 mass relocation of Cuban boat-people refugees to Guantanamo Bay. The Guantanamo Bay site processed less than 20,000 Cubans and Haitians for entry into the U.S. in those twelve months, at the cost to tax payers of over *$500 million.*[4] Meanwhile, facilities and planning for mass relocation for U.S. citizens relocated during cataclysmic events has gone begging. Without this planning, Americans may once again experience the migration drama and nightmares of the U.S. farmers and ranchers in the "Dirty '30's" who left their homes in Oklahoma, Texas, and the rest of the Midwest.

All disasters are local disasters. Local jurisdictions always carry the brunt of response and recovery, however, for the mass relocation of millions, the state authorities and Federal Government must become major players. The resources and strategic planning involved are vast as is the process of developing consensus and consent. State and Federal oversight and assistance is crucial, but must be measured in order not to overcome the legal authorities of local government to protect the health and welfare of its own constituency. Such planning takes years to establish real programs, not just paper programs. ***The time to start is now!***

There is a window of opportunity opening, with FEMA Director James Lee Witt leading the way by emphasizing pre-disaster mitigation. The author's premise is that the first issue for pre-disaster mitigation must be to save urbanites impacted by catastrophic losses. The first priority in this population must be children. Most importantly, special considerations must be taken for those children orphaned and dislocated prior to, during, and after the loss of a major U.S. city.

The UN focused on the needs of children in disaster with great concern in 1995. A special day of acknowledgment was observed during their Day for IDNDR—*Women and Children: Key to Prevention.* The lack of any large scale observance in the U.S. is telling. Little was done in this country to support that international day of activities and concern. The protection of American children is certainly one of the "what ifs" all U.S. professional emergency planners should be considering, *if they knew* that without such planning, the culture might perish.

> "Mitigation must go from a little used word after a disaster strikes—to a household word 365 days a year. But to do that, I need your continued suport, and your commitment to work in partnership with the Federal Government.
>
> And we'll all need to form partnerships, with the states, with businesses, bankers, and the developers, the insurance industry, with voluntary agencies, and with civic organizations, all of who play a role when disaster strikes."[5]
>
> James Lee Witt, Director, FEMA, 1995

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THE COMPREHENSIVE APPROACH TO EMERGENCY MANAGEMENT TO BE OR NOT TO BE: IT IS A MATTER OF INVOLVEMENT

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In a comprehensive emergency management system, one must incorporate the concerns and resources of all relevant segments of the population. In Broward County, we accomplished this through the identification, involvement, and cooperation of all the communities involved. In general terms, we must be sensitive to the governmental, residential, and business participants in the development and completion of an effective emergency operations plan.

The governmental operational structure should be based on a functional approach. The current Emergency Support Function concept employed by the Federal Emergency Management Agency and many state and local governments may be the most effective. It groups like agencies and assigns these agencies the responsibilities of not only resolving missions during emergencies, but assigning them the role of identifying and addressing potential problems that will arise during times of emergency. We can accomplish this task by establishing a teamwork environment using the TEAM (Together Everyone Accomplishes the Mission) philosophy which stresses the interdependence of one Emergency Support Function to another. The philosophy of Broward County groups agencies, many of whom work together routinely, and assigns lead responsibilities to one governmental agency, usually a department.

Broward County recognizes that citizens are a critical resource and problem solver in the overall emergency operation. We have categorized this as the Aresidential@ segment of our community. The county has begun actively seeking the involvement of municipal governments and residents in what we call the Community Emergency Response Team (CERT). To date, Broward County is possibly the only county that has established a county-wide CERT program. The CERT program is important because it is community based; the residents provide direction and ownership of the program. It is comprehensive because the program is part of an overall inclusive approach to emergency preparedness. It is honest because through the CERT program, residents will gain an understanding of the government's capabilities and shortcomings. This will create the necessary environment for the CERT program to flourish. We developed the program execution to illustrate government's ability to meet all needs simultaneously. Our residents must take action to satisfy some of the less critical needs traditionally addressed by the local government. The CERT program is also proactive. Based on lessons learned in the Whittier Earthquake, the Loma Prieta Earthquake, the Northridge Earthquake, and Hurricane Andrew, two concepts become evident. First, people will not be sufficiently prepared and second, many people will come to the assistance of their neighbors. We duplicate the functional approach proven effective at the government level, as embodied in the Emergency Support Functions, and implement it at the community level. This allows the community to mimic, at their level of expertise and responsibility, the same support functions government traditionally would provide for them under normal circumstances.

The mission of CERT is to identify the potential resources that exist within any given residential base, then help the residents identify and resolve common problems through effective training. The philosophical basis for the program is that, in an actual emergency, we will quickly exhaust traditional government resources. Thus a void will exist between the need of the citizen and the ability of the government to respond to the need. Broward County has recognized the potential void and has enlisted the help of fifteen of the twenty-eight municipalities in developing and sustaining Community Emergency Response Teams. Local officials train teams, emergency managers and emergency services personnel in a variety of important areas to ensure self-sufficiency for periods of several days to several weeks following a major disaster. The increased self-sufficiency

of community members will allow government agencies to focus their efforts and resources on addressing infrastructure concerns which have a broader impact on the community and which affect more of the population. CERT training includes first aid, basic damage assessment, municipal and county emergency operations, security, psychological impacts of disasters, and communications.

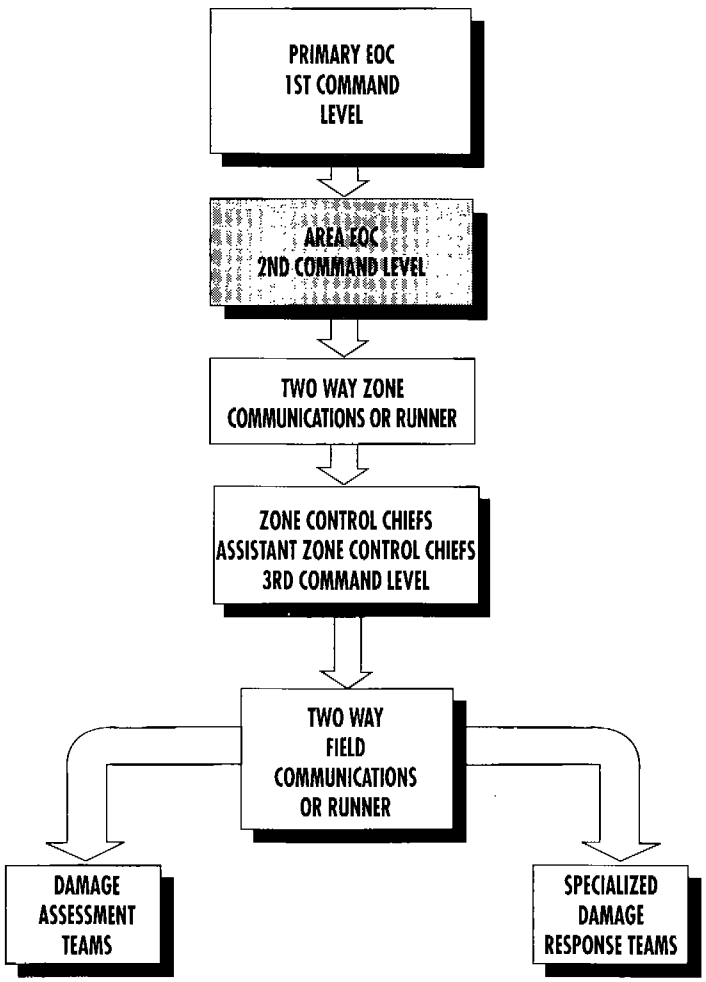
The last segment of our comprehensive plan concerns the business community. This segment shares common characteristics with the governmental and residential sectors of this plan: they are all part of the same community. Any issue which affects the community at large will affect the business community. This has serious implications. Every business owner and manager must face a basic issue after a major disaster: depending on the nature of the business, they must be ready for a substantial increase or a significant decrease in demand for products or services. No one can accurately predict how long the result of this change will be in effect.

We now apply to the business sector the same process of identification of resources, coordination, and plan execution as used for the government and the community sectors. This approach results in the Business Emergency Management Plan. This comprehensive plan is specifically based on the a fundamental concept that, while insurance policies protect against defined and measurable losses, an effective disaster recovery plan is required to protect against not-so-well defined and sometimes unmeasurable losses. These two approaches must compliment each other. The components of this plan are the same ones found in the other two: an Operations Center, local coordinators, effective means of communication, sector coordinators, and specified damage response teams.

This approach is simple. Three levels of command and control are ideal. This provides a built-in system that eliminates potential bottle-necks in the process. As in government and business, the top command level would be involved in activating the system, and ensuring that appropriate actions take place for the system to begin functioning. These would include addressing areas such as equipment, equipment issue, administration, and command and control concerns at the lower levels of the organization.

The second and third levels of command and control are based on geographical location or operational function. The third or field level would be primarily responsible for gathering, reporting, and providing first hand information and assistance by the specialized, predesignated teams which are responsible for very specific areas. The plan has to identify these areas ahead of time and reflect the special needs the plan is trying to satisfy. The flowchart shows this process. The team can never compromise on the effectiveness or the reliability of the communications process. Despite the complexity or the simplicity of your communications network, it must be an effective one at all levels.

The comprehensive emergency management philosophy goes beyond the four phases of emergency management. It specifically addresses the three communities essential to effective emergency management. These communities are governmental, residential, and business. Other disciplines, such as law enforcement, already employ this idea. As emergency management grows as a profession and as a function of government, this philosophy will enhance society's ability to respond to and recover from disaster.



EVACUATION - WHAT DOES THIS MEAN FOR THE PETS IN YOUR COMMUNITY?

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It is 4:15 a.m. and you and your loved ones are sound asleep. You hear a knock at the door and sleepily stumble through the house to respond. You wonder who in the world could be knocking at such an hour. As you open the door, you see a friend in his uniform. It is the local Sheriffs Deputy who informs you there has been a train accident just outside of town, and due to the threat of toxic fumes and fire, you must evacuate - just to be safe.

You rush around waking up the family and inform them that they must get dressed and out of the house immediately. Within 15 minutes you have everyone in the car, and as you drive away, you remember Brandy, the familys Irish Setter, is still outside in the back yard. You think to yourself that the evacuation is only precautionary; you and the family will probably be gone for only a few hours - right? You decide to leave Brandy behind. This decision is one you will regret.

On March 4, 1996, many of the pet-owners in Weyauwega, Wisconsin experienced a similar scenario. Both officials and residents thought the evacuation would only last a few hours. No one realized that the toppling of 14 tanker cars filled with a million pounds of propane fuel would result in an evacuation that would keep residents from their homes for three weeks.

When pet owners realized that they would not be returning home in a day or two, they began to worry. It was winter in Wisconsin and many animals had been left outside. How long could they survive the freezing temperatures being forecasted? Those left inside had provisions for only a day or two at the most. Pet owners pressed emergency officials for permission to return for their pets, but they were denied. The officials were concerned about the extreme hazards and continued to restrict access to the town. The Executive Director of the local humane society charged that the emergency operation managers in charge of the disaster never understood or cared about peoples pets. Reports like this added to the misunderstanding and distrusting of local emergency officials. It was only after the residents staged a clandestine, commando type pet-rescue mission that endangered both humans and animals that the emergency and state officials finally agreed to an official rescue mission.

Why are animals left behind? Sometimes, people just do not consider the seriousness of the situation. Some people are at work or away from home when the evacuation order is issued and cannot return home to retrieve their pets. In other situations, people may be physically handicapped and unable to take their pets without help. Because Red Cross shelters do not accept pets, those assisting the handicapped during an evacuation inform residents that pets cannot be taken. In these cases, as in others, the burden of rescuing pets falls on the shoulders of emergency officials. Emergency officials must keep in mind that there is a powerful bond between people and their animals, and great suffering for both humans and animals will occur when disaster creates a separation. This separation may lead to desperate, dangerous, and sometimes illegal acts to save animals. The majority of Weyauwega pet owners who left their animals behind regretted the decision, but do not regret risking their own lives to save them.

The Humane Society of the United States (HSUS) has created a Disaster Services Program to help prevent animals from becoming needless victims of disaster. One facet of the program is providing assistance for the inclusion of an animal component in the disaster planning effort. When emergency management officials recognize the importance of addressing the needs of animals in a disaster and have a community disaster plan that includes an animal component, it is more likely that pet owners will not be ordered to leave their animals behind. When planned for, local animal care professionals can accompany emergency personnel going door to door to give the evacuation order. These professionals can provide information and assistance to help evacuate animals to safety.

When developing an animal component for a community disaster plan, it is important for emergency plan-

ners to work with local humane agencies and animal care professionals to identify special needs required for the animals in your community. Animal care may include veterinarians and staff; kennel operators; animal trainers and groomers; animal clubs such as dog, cat, bird, and horse clubs; and local chapters of the HSUS and American Society for the Prevention of Cruelty to Animals (ASPCA). For example, many residents affected by the Southern California canyon fires owned horses. Horse trailers were necessary for the rescue operations staged during the advancement of the fire. Officials worked with local humane agencies and horse clubs throughout the state to acquire the necessary trailers. During the Oakland, California hills fire, local animal care professionals set up temporary shelters for the hundreds of pets dislocated by the fire. Volunteers worked night and day to reunite pets and their owners as quickly as possible. The task was not easy because many pet owners were scattered throughout the San Francisco Bay Area in Red Cross shelters, motels, and hotels. Emergency hotlines were set up so that pet owners could call to find out if their pets had been found and where they were sheltered.

The HSUS Disaster Services Program emphasizes the training of animal care professionals, emergency management personnel, and the public. Courses and workshops are available on setting up animal rescue staging areas and short-term shelters, and on animal behavior during disasters. Additionally, the HSUS has just released a video entitled, The Forgotten Victim, that deals with animals in disaster. The video is available through the American Red Cross.

Once a disaster hits, agencies like the local and national chapters of HSUS are available to help alleviate animal suffering. In Weyauwega, the HSUS provided guidance and assistance to local humane agencies who worked with the National Guard to stage an approved rescue of pets. Pet owners dressed in flack jackets rode to the rescue in armored vehicles chauffeured by the National Guard. The pet owners were allowed five minutes in their homes to rescue their animals or leave food and water behind for animals that could not be found or removed within the time limit. Cats, dogs, birds, and other miscellaneous pets numbering in the hundreds were reunited with their owners during the rescue. Unfortunately, many birds and some cats did not survive the ordeal. In Navarre Beach, Florida, the HSUS aided in humanly trapping and reuniting hundreds of cats displaced by hurricane Opal. In California, local and national chapters of the HSUS have assisted numerous local, state, and federal organizations in rescuing animal victims of fires and earthquakes.

Working jointly, the HSUS and the American Red Cross have produced a brochure containing tips for pet owners on how to plan ahead for a disaster, how to assemble a disaster supplies kit, and how to evacuate pets safely. Some of the key points that emergency officials should consider communicating to the pet-owning public in their community include:

- If evacuation is necessary, urge pet owners to take pets.
- Except for human-service animals (i.e., hearing or blind-assistance animals), Red Cross shelters cannot accept pets because of public health concerns. Instruct pet owners to prepare a list of hotels, motels, friends, or relatives that could take care of pets during an emergency evacuation. As an alternative, suggest preparing a list of boarding kennels or veterinarians in near-by cities or towns where pets could be boarded.
- Urge pet owners to keep collars and ID tags on pets at all times.
- Inform pet owners that pets should be brought inside when they hear about a potential disaster so that pets can be found quickly if evacuation becomes necessary.
- Stress that supplies and equipment needed to transport and care for pets should be assembled and accessible at all times.

It is critical for emergency management officials to recognize and address the needs of animals in a disaster by planning and preparing for them. Such planning in the Weyauwega disaster, as in any disaster, would have mitigated the pressure on emergency management and state officials. The tragic result could have been avoided and hundreds of animals and their owners could have been spared their suffering if the pet owners had been informed to take their pets. When a disaster strikes, whether it is a hazardous materials spill or an act of nature, it is difficult to predict how long the evacuation may last. Do not take a chance. Urge pet owners to take their pets with them. The safest place for pets is with their owners.

To help emergency management planners incorporate a section into their community disaster plan that specifically addresses domestic animals, the following topics are offered:

- Provide names and phone numbers of local animal care professionals or humane agency members

to accompany emergency personnel going door to door

- Maintain lists of local or nearby motels or hotels that will accept evacuees with pets
- Maintain names and phone numbers of local animal care professionals and law enforcement officers trained in pet-rescue operations
- Establish agreements with local humane agencies, veterinarians, and kennels for pet emergency care and sheltering
- Develop a notification/communication system for reuniting pets with their owners
- Conduct public instruction and educational programs on disaster planning for pets

Only with proper preplanning and training can emergency officials hope to provide for both human and animal concerns during an emergency evacuation.

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