Natural Hazard Research

DISSEMINATING DISASTER-RELATED INFORMATION TO PUBLIC AND PRIVATE USERS

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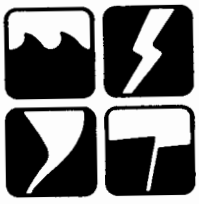

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SUMMARY

Research has shown that the effectiveness of the way chosen to transfer scientific and technical information is determined in large part by recognizing and responding to the real needs of the intended users of such information. An efficacious transfer mode will consider the user's pertinent characteristics, and design all communications with those characteristics in mind.

This paper presents possible approaches to providing scientific knowledge and technical assistance to public and private institutions. Advantages and disadvantages of each technique are also discussed. The approaches can be used by federal agencies, state and local governments, universities, and other organizations with education and training programs in emergency management.

The communication techniques are included in the following categories:

- User Needs Identification
- Approaches to Dissemination
  - Intermediaries
  - New, Permanent Organizations
  - Ad hoc Teams and Organizations
- Means of Dissemination
  - Publications
  - Public Information and Education
  - Training and Education
  - Meetings
  - Innovation Transfer
  - Technical Assistance

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PREFACE

This paper is one in a series on research in progress in the field of human adjustments to natural hazards. It is intended that these papers be used as working documents by those directly involved in hazard research, as well as inform a larger circle of interested persons. The series was started with funds from the National Science Foundation to the University of Colorado and Clark University, but it is now on a self-supporting basis. Authorship of the papers is not necessarily confined to those working at these institutions.

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INTRODUCTION

This paper presents possible approaches to providing needed scientific knowledge and technical assistance to a broad range of public and private institutions, and discusses advantages and disadvantages inherent in each of these approaches. The paper provides an overview of alternative ways to translate and disseminate scientific and technical information for public and private user groups. While this paper was originally prepared for use by the Federal Emergency Management Agency,* the approaches discussed could be used by states, local governments, universities and other organizations with educational and training missions in the field of emergency management.

The techniques to be evaluated are included under the following categories:

- User Needs Identification--an initial step rather than an approach
- Approaches to Dissemination

  A. Intermediaries
  B. New permanent organizations
  C. Ad hoc teams, organizations

- Means of Dissemination

  A. Publications
  B. Public information and education
  C. Training and education
  D. Meetings
  E. Innovation transfer
  F. Technical assistance

Some duplication occurs because there are several possible ways to group functions such as a clearinghouse, which is one means of disseminating information but not an end in itself. It should be emphasized that some

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*The original version of this paper was prepared for the National Academy of Sciences, Committee on Emergency Management; it was used as a supplement to its report on The Role of Science and Technology in Emergency Management, National Academy Press, 1982.

of these mechanisms may be combined or linked; for example, a workshop on flood hazard mitigation might combine both training and technical assistance elements. The preferable dissemination mechanism(s) will depend in large part on the needs and level of expertise of the participants.

Dimensions to Dissemination

Over the years, many researchers have pointed out that the effectiveness of the way chosen to disseminate scientific and technical information is determined by responding to the real (rather than perceived) user needs. An effective mechanism will recognize the user's characteristics, and design the access and the products with those characteristics in mind. By first seeking better definitions of state and local government needs, interests, problems, and priorities, one can "emphasize a demand-pull instead of a technology push approach to intergovernmental transfer of scientific and technical information" (Committee on Science and Technology, 1976, p. 15).

A related concern is the capacity of the information users to understand and apply the new information. In certain fields, it may be necessary to build or strengthen scientific and technical capabilities at the state and local level in order to mount an effective dissemination effort. User receptivity is another key determinant of whether research results get read and used. Technology transfer should be viewed as a continuous process, one requiring continuing interest, capability, and resources of both the user and producer (or promoter) of scientific and technical information. Funding (and hence commitment) to implement the technical utilization programs is critical to ensure success.

Assumptions and Limitations of This Paper

In discussing approaches and mechanisms for dissemination, it is assumed that the characteristics of the users or client groups designated as the recipients have been identified and that user needs and preferences are known. This presentation of the various options, with the pros and cons of each, is a brief one and, because of the limits of the paper, cannot go into the complex (multi-level and multi-faceted) reality that exists.

Similarly, the so-called users of research results are not all state and local officials with operational responsibilities. The client group served may also include researchers, private contractors, and others with less specific responsibilities.

This paper offers a synthesis of on-going efforts rather than a comprehensive research effort. The author's intent is to list dissemination mechanisms that have been (or are being) used in a variety of fields or professions, and to discuss the advantages and disadvantages of each in practical, operational, and experiential terms.

USER NEEDS IDENTIFICATION

The first step in determining which approach(es) to select for disseminating scientific and technical information is to identify the needs of users. Not just initially, but throughout the process of fostering dissemination, user needs should be ascertained and fed back into the process. Four means of determining the information and technical assistance needs of public and private sector user groups are listed below.

Surveys

Sponsor and conduct sample surveys among emergency managers and other decision makers to determine their needs for various types of scientific

and technical information. Many agencies are able to conduct (or contract for) a survey--by mail or by telephone--to determine the needs of public and/or private sector groups under existing legislation and regulations.

A conventional mail questionnaire is time-consuming to prepare, frequently requires two or three follow-ups to obtain a respectable number of responses, and is more burdensome to officials being queried. However, if the staff performs the survey, they reap first-hand knowledge of results and opportunity for direct dialog with users. Admittedly, the personnel, survey instrument production and application, as well as analysis capability and time must be available in order to do a satisfactory job in-house. Depending on the size of survey sample, duration and number of interviews planned, and other requirements (such as deadline for results), the staff may not have the block of uninterrupted time necessary to perform this work in-house.

Agency staff with appropriate knowledge could probe effectively for extent of use and impact of existing research reports and technical assistance provided, as well as determine current and future needs. Staff with programmatic or functional responsibility in areas in which user needs are being investigated, on the other hand, may not be totally objective (or may be perceived as not objective) by respondents. A serious credibility problem could jeopardize the usefulness of the survey.

Other Groups

Utilize existing professional, scientific, engineering, and public interest groups for assessing user needs and disseminating research information. As a variation on this approach, an existing advisory committee could be used for this purpose.

Professional societies and other special purpose organizations could organize and conduct user needs identification, although such groups usually relate most effectively to a single clientele group. (The role of such groups as information-givers to constituents is discussed later.) Such organizations are limited when it is necessary to do cross-discipline or multiple clientele contacts to determine user requirements. To compensate for a single or parochial view, an agency could ask several such groups to poll their members for a list of information and technical assistance needs; then, one of the contractors or agency staffers could pull all of the reports together into a cohesive whole report.

Professional groups usually have close and frequent contacts with their constituents and can readily organize a needs assessment exercise. The staff usually has good rapport with members; members, in turn, have confidence in the staffers' ability to report their needs accurately and effectively.

Such organizations probably would need full financial support to do a needs identification. If the survey effort were sizable, they may need to acquire additional personnel or work with a co- or subcontractor. Some professional organizations are loosely organized, with few paid, full-time staffers. Among the variables are staff capacity and experience, familiarity with applied research under contract, and competing demands for time. If staff persons have to learn on the job or be trained, the necessary time and costs of the project increase.

Single-Purpose Meetings

While meetings are most often used to foster discussion between researchers and research users regarding research results, a meeting could be convened to determine information and technical assistance needs. For

example, there could be a regional meeting on volcano-related problems for state and local officials, or a national conference on determining the effect of federal flood insurance on barrier island development.

Within its general authorities and responsibilities, an agency could organize and convene a single-purpose meeting to address a regional or national concern. Alternatively, the task could be delegated to a regional office, to a contractor, public interest group, or professional society. Depending on the complexity of the organizational arrangements, the amount of lead time available, and the nature of the topic around which the meeting is organized, the agency staff may or may not want to assume the responsibility themselves. The topic would probably be the key determinant of which outside organization would be most appropriately responsible for the meeting.

A meeting could be a useful way to deal with a new (perhaps unique) problem, one that needs immediate attention. If the problem or need is sufficiently localized, potentially "solvable," and would benefit from intergovernmental and/or interdisciplinary attention, then a meeting is a viable alternative. If, however, the problem or need is widespread, not particularly focused, of long-term onset, then a meeting would not appear to be an appropriate forum or offer hope of achieving consensus or closure regarding needs identification.

General Meetings

At an already scheduled general purpose meeting, include a session that polls those in attendance about their needs identification. Agency staff or a professional society staffer could "piggyback" a special session at an existing meeting to obtain the desired information from those present. Although one cannot be sure that the participants are typical of the

larger group with which one is concerned, if the area of need is not too complex and if the participants are familiar with it, this approach could be useful. It also entails relatively little cost or organizing. A structured approach--such as the use of Nominal Group Techniques--could yield good results in a short time. Examples of meetings that could be used are as follows:

(1) Summer meeting of University of Colorado's Natural Hazard Research and Applications Information Center.

(2) Annual meeting of city managers or county officials.

(3) Annual meeting of the Earthquake Engineering Research Institute (for certain subjects).

APPROACHES TO DISSEMINATION

Intermediary Organizations

Utilize national organizations that can serve as two-way communication links between key state and local officials and other federal agencies sponsoring or producing emergency-related research, e.g., Council of State Governments, National Governors' Association, National League of Cities, U.S. Conference of Mayors, International City Management Association, National Conference of State Legislatures, National Association of Counties, National Association of Emergency Management Agencies, and U.S. Civil Defense Council.

Numerous categories of potential intermediaries exist and the number of individual organizations is in the hundreds. For the sake of simplicity and brevity, the public interest groups, professional societies and professional associations are the types of groups deemed most useful and potentially effective in this context. With reference to the use of non-profit institutions (whether universities or public interest or professional associations) as technology transfer agents, it should be noted that, "the

most significant deterrent to their effectiveness is continuous stable support [by the federal government]" (Committee on Science and Technology, 1976, p. 7).

Given the thousands of units of local governments and the wide array of business interests in the United States, to name only two examples, it is imperative that the national associations that represent these organizations be the primary point of contact for an agency. Some types and examples of national organizations that could be useful intermediaries between federal and other public officials are listed below.

Under public organizations, the two federal organizations listed have a mandate to foster federal/state/local exchanges, but they do not have constituencies with whom they interact regularly. Similarly, the for-profit organizations also have an information dissemination capability, but it is mainly a one-way flow. In the academic sector, at least two universities--Ohio State and the University of Colorado--have a major disaster research center and sponsor meetings, but they too lack a direct constituent relationship with public or private practitioners concerned with emergency management.

Public

- Intergovernmental Science, Engineering, Technology Advisory Panel (ISETAP)
- Federal Laboratories Consortium

Private

(1) Not-for-Profit

(a) Public Interest Groups:

- National Governors' Association
- Council of State Governments

- International City Management Association
- National League of Cities
- National Association of Counties
- Conference of Mayors
- National Conference of State Legislatures
- Academy for State and Local Government

(b) Others:

- National Academy of Sciences

(2) For Profit (examples only)

- J. H. Wiggins Company
- Sheaffer and Roland
- John Blume and Associates
- Spangle and Associates
- Dames and Moore
- Woodward-Clyde Consultants

The public interest groups and professional associations are notably effective in their efforts to achieve application of research and to aid in making the research needs of their constituents known (Bingham and McNaught, 1975). The so-called "Big 7" public interest groups (named in 1,a) have been working with federal agencies for more than a decade on applied research projects, disseminating research results and new program information, and gathering data from members. Generally, the PIGs perform some functions quite well: (1) they disseminate information about new programs, innovations, accomplishments, and research results; (2) they gather data via surveys (mail and telephone) and on-site interviews, and gather information about a wide variety of experiences and perceptions (the groups can do this well because they have a special advantage in gaining access to

members, obtaining cooperation, and getting an unusually high rate of return for questionnaires); (3) they facilitate dialogue between federal officials and state or local officials (where problems have occurred, and tension is high between the federal, the state, or local officials, the PIGs can neutralize the environment); (4) they help build state and local understanding of and constituencies for federal programs and services, and can stimulate demand from their client groups for the programs and the scientific and technical information products of federal agencies; and (5) they serve in an advisory capacity. PIG staffers and/or their constituents can review federal laws, regulations, programs and serve on advisory committees.

Dealing with PIGs and professional associations does have its limitations, however, some of which are inherent and some of which are highly variable. While an organization with a single constituency or narrowly construed mission may be superb at reaching one group, the organizing may be limited to one group or its close relatives, so to speak. The association staffers may lack the contacts or breadth of capability to perform a broad survey or to interpret research findings.

Associations that are heavily dependent on external sources of funding (i.e., grants and contracts rather than dues) have variable staffing levels and staff capability at any given time. If an organization had funding support for a research applications project one year previous, it would have built up the staff to perform the work for the duration of the funding period. As would be true of a for-profit organization, the staff level would be adjusted as quickly as possible to cut costs. It is important to assess the appropriateness of these organizations based on current capability, since that quality deteriorates quickly. The inherently limited

range of products from specialized organizations could be broadened by imaginative planning and packaging by the funding source.

As is true of any contractor, the PIGs and the professional associations may drift toward a secondary objective (or a self-serving one) if the work effort is not properly set forth initially and then supervised closely.

There are three functions PIGs excel at:

(1) Reaching their constituencies quickly and effectively. For example, if you want to know what governors think, the National Governors' Association staff can find out readily.

(2) Achieving utilization of information disseminated. The PIG staffers share information via inhouse publications and via meetings and conferences; they often give technical assistance; and they use peer exchange, which is a highly effective transfer technique.

(3) Aiding in the adoption of innovations and sharing information about them.

Additional private and semi-private intermediary organizations are as follows:

(3) Academic

- University of Colorado (NHRAIC)
- The Ohio State University (DRC)

(4) Associations (not-for-profit groups of professional, business, industry, public officials)

- National Association of Home Builders
- National Floodplain Managers Association

(5) Professional Societies

- Earthquake Engineering Research Institute
- American Academy for Advancement of Science
- American Society of Consulting Engineers
- Research Committee on Disasters

(6) Voluntary Agencies

- Red Cross
- National Voluntary Organizations Active in Disasters

Another way to use intermediary organizations (particularly specialized trade or professional associations) is as a third party, i.e., for advice or for monitoring a manufacturing or other operation. An example of each follows: (1) the National Academy of Sciences has served in an advisory role regarding candidates for the head of the U.S. Geological Survey; and (2) the National Conference of States on Building and Code and Standards has served as a third-party monitor of the manufacturing of mobile homes for the Department of Housing and Urban Development.

A knowledgeable, independent third party can provide advice or serve a review (or quality control) function on behalf of a governmental organization. This allows the governmental unit to engage in fewer monitoring and regulatory activities. However, not all services and/or processes can be done appropriately or well by a third party.

New, Permanent Organizations

It may be possible to create a professional society in emergency management, including the publication of a journal covering the interests in the field. One of the notable characteristics of the emergency management field is the sizable number of disciplines, interests, and responsibilities of the "members" of the community. There are several relatively small core groups, but a large number of satellite interests and institutions. For example, a small, but growing number of mental health professionals are interested in disaster-related research insofar as it affects their profession.

In a great variety of other professions, a professional society serves a useful role. Such societies usually provide a central organizational presence, a periodical, and an annual conference for their members. Many provide much more, such as education and training programs, professional certification, and representation or even advocacy at the national and international levels. In more specific terms, a professional emergency management society could provide the following functions and service on behalf of its membership:

(1) A national presence as well as an organization with full-time staffers;

(2) Membership services--information and educational materials, meetings and conferences, information or referral services, and perhaps job placement services;

(3) Publications--newsletter, professional journal or magazine; and

(4) Research and training capability--usually started with dues money and then expanded on self-sustaining or grant/contract-sustaining basis.

On the other hand, the emergency management "community" consists of a large number of disparate interests, professions, and disciplines. The question exists as to whether enough groups share the interests and needs that would motivate their coalescing into a national organization. Further, could one professional society and one journal meet the needs of the community and, if so, what form would each take?

Another key question is who should support the establishment of a society, for how long, and in what way. Establishing a new professional society would be a time-consuming effort. Financial support for the initial organizing activities and for the beginning of the operational phase would be essential. Either foundation or federal support probably would be needed, at least initially. The appropriateness and legality of the use of

federal money to establish a not-for-profit professional society needs to be determined.

If a professional society were started, some of the functions it would be expected to perform (annual conference, professional journal) would be at least partially duplicative of the ongoing activities of some existing organizations. Several organizations now exist that perform some of the functions and services that a professional society would provide. Following is a list of the two main existing organizations (multi-purpose) and a brief account of their relevant services.

(1) University of Colorado, Natural Hazards Research and Applications Information Center, Boulder, CO--a seven-year-old research center that a) publishes a free bimonthly newsletter, b) provides informational and inquiry services, c) sponsors a major annual conference of research producers and users, d) has a library which interested persons can arrange to use, and e) publishes monographs, working papers, and special publications. NHRAIC is limited to natural disasters.

(2) The Ohio State University, Disaster Research Center, Columbus, OH--also a well-established research center which a) has published a free newsletter (until recently), b) provided, on limited and informal basis, some information and inquiry services, c) sponsored periodic national and international conferences, and d) has a library which interested persons can arrange to use. DRC deals with both natural and human-caused disasters.

The above organizations have been receiving federal support for their activities and, on occasion, the existence of each center has been precarious. Should federal funding dry up for one or all of these organizations, the need for a professional society probably would intensify. Should there be only one location in the nation for library services, researchers across the country will be inconvenienced.

Another possibility may be the establishment of a federal clearinghouse for emergency-related research.* The most probable agency in this is

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*This has been a topic of discussion and analysis for at least ten years, going back to several agencies that were predecessors of FEMA. For example, see Charles E. Fritz, 1971.

FEMA. A clearinghouse usually is one function of an organization and not an end in itself.* Thus, this item is connected with the earlier discussion of the creation of a professional society. The clearinghouse functions must be discussed in terms of whether the function is housed inside or outside of, for instance, FEMA.

The prerequisites for a clearinghouse are as follows:

(1) A complete, working library containing (or having access to) the relevant documents and data sources, plus interlibrary loan capability.

(2) Staff to maintain library.

(3) Staff to respond to inquiries capably and quickly.

(4) Knowledge of persons to contact for specialized information.

(5) Ability to provide quick, accurate information.

(6) Contacts with user groups, both to obtain documents and information and to foster use of the service.

(7) Reputation for objectivity, capability, speed, and accuracy, to engender trust of and proven utility to users.

If an agency could quickly build the library and assign appropriate staff to a clearinghouse, the agency conceivably could have the most comprehensive emergency management capability in the country under one roof. That same feature, comprehensiveness, also means a heavy burden of responsibility for building and maintaining a complete collection of documents, data sources, and contacts for all aspects of natural, technological, and nuclear emergencies.

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*One example of a scientific and technical information clearinghouse is the Model Interstate Scientific and Technical Information Clearinghouse (MISTIC), which has been operated for more than five years by the National Conference of State Legislatures. It was designed to establish and strengthen communication links between legislatures, and between state legislatures and federal agencies. In the near future, disaster-related information and contacts will be incorporated into MISTIC.

Currently, however, FEMA lacks the basic library and staff to build ddd and maintain a clearinghouse; consequently, it does not meet the prerequisites at this time. A federal agency that operates a clearinghouse faces several constraints: (1) ability to respond quickly to urgent inquiries, since questions of judgment and policy frequently come up in the course of preparing replies; (2) ability to maintain rapport with user groups, since this is usually done by program staff and not by library staff; and (3) ability to ensure objectivity and degree of responsiveness to state and local users to gain their full trust.

Building the requisite library and clearinghouse capability would be a relatively long-term undertaking. It would take one year at a minimum. In the meantime, alternatives should be considered to continue to provide at least the present level of assistance to state and local officials, as well as to researchers and contractors.

Ad Hoc Teams, Organizations

The formation of special teams of scientific and technical experts to advise state and local officials on emergency management problems is a possibility. For many years, a number of disaster researchers have recommended that such teams serve as information providers during the disaster response phase and/or afterwards for mitigation and recovery activities. Recently, the concept has become a reality in the form of the Hazard Mitigation Teams that FEMA has been using soon after major flood disasters. Similar teams have been suggested for use in the wake of such incidents as Three Mile Island, to assist the generalists (such as a governor) who have to make crucial decisions regarding evacuation and relocation of endangered citizens.

Potentially, such teams can offer valuable assistance from specialized, highly technical--perhaps interdisciplinary--cadres of experts available on short notice in various parts of the United States. Ad hoc, expert teams could be helpful for a broad array of natural, technological, and nuclear accidents or incidents. Determining which specialties (or mix of specialties will be needed), where, and when are complex decisions, however; making arrangements for the interaction of the experts with the federal, state, and local public decision-makers also is an involved task. Careful and constant planning will be required to achieve the desired effect. Among other questions are the role of a central office vis-a-vis regional offices in making and maintaining the arrangements with the expert team members, and the role of experts in regard to federal coordinating offices.

Additionally, such teams could have both operational and informational responsibilities. For example, in 1980, after Mount St. Helens erupted, a Technical Information Network was created; it had both advisory (to the federal coordinating officer) and informational (to the general public and special interest audiences) responsibilities.

For some purposes, it may be necessary to go beyond an ad hoc response and use an expert team for a longer period. Arguing for a more systematic program to examine what happens when a major disaster occurs, White and Haas stated, "The present emergency, catch-as-catch-can appraisals by hurriedly assembled groups, often unsuited to the tasks, should be replaced by predesignated interdisciplinary teams prepared to make intensive studies of common factors in a number of disaster situations, covering perhaps ten each year" (1975, p. 10).

MEANS OF DISSEMINATION

Publications

Technical assistance bulletins (TABs) can be tailored to a special event and to different audiences. The Mount St. Helens Network, which was a multi-agency, multi-disciplinary group that functioned for a three-month period, May 1980-July 1980, produced an assistance bulletin. The network included scientific and technical personnel from a variety of federal and state agencies as well as the academic community. A series of 33 bulletins were prepared by FEMA and sent to 13,000 addresses.

According to the first bulletin, "the Mount St. Helens Technical Information Network was organized to stimulate and expedite the flow of technical information about the eruption of Mount St. Helens and its effects on man and his environment. The Network grew from the concerns expressed by President Carter and Governor Ray of Washington that there be a mechanism for exchanging technical information among experts and disseminating this information to the public" (Initial bulletin, unnumbered, 6/1/1980). The intent was "to serve the reader by supplying the most credible data available in a form that can be readily applied" (Bulletin #33--"Network Closeout," 7/1/1980).

As was true with Mount St. Helens, a special response is needed when it is recognized that the scientific and technological aspects of the disaster will dominate the management of the emergency and the lives of the people affected.

Bulletins can be prepared to distribute scientific findings and recommendations and also to respond to questions raised by those affected. The Mount St. Helens TABs addressed health, mechanical, and agricultural concerns as well as public works, insurance, and wildlife (see National

Science Foundation, 1981). However, technical assistance bulletins would have little or no effect if they were technically inaccurate, issued too often or too late, or distributed to the wrong audience.

The Mount St. Helens Network was headed by a FEMA staffer who served as a Science and Technical Advisor to the Federal Coordinating Officer. That person had three major functions: (1) advising the FCO, (2) preparing bulletins (for the general public and for certain business interests), and (3) serving as "den mother" for researchers studying scientific or technical aspects of the disaster. It appears that the technical assistance bulletins benefited from being prepared by a staffer who had the "clout" of being associated with the FCO, the credibility of being the federally designated Science and Technical Advisor, and special expertise that went beyond that of the FCO and Public Information Officer (PIO) usually assigned to the disaster.

The use of technical assistance bulletins should be limited to high technology incidents and, perhaps, to a large earthquake. Judging from the one experience to date (Mount St. Helens), the TABs are most useful when there is need for a central credible source, the disaster is acute rather than chronic, and special scientific and technical expertise is needed than exceeds that of the FCO and PIO.

Another type of newsletter is one aimed at bridging the gap between the emergency management communities and the relevant research-oriented communities. The publication of a newsletter, like the operation of a clearinghouse, is usually one function of an organization and not an end in itself. The topic of a newsletter came up earlier, in the discussion of the functions of a professional society, because it is a likely adjunct to operating a clearinghouse.

Features of a newsletter that would serve emergency management practitioners and research producers include:

(1) natural, technological, nuclear incident coverage;
(2) legislative, administrative, regulatory developments, up-dates;
(3) programmatic descriptions, innovations;
(4) research results, research in progress;
(5) new grant awards for research projects;
(6) book reviews;
(7) state and local news notes; and
(8) letters to editor.

Presently, there are three newsletters that try not only to provide news, but also to bridge the gap between the emergency management operational personnel and the researcher. Since three now exist, one of which is free, it's essential to identify the needs not yet met and the audience not yet satisfied before considering starting another one. Based on a quick analysis of the three newsletters now in print, it would appear that each one has only about half of the desirable features listed, and each has a relatively small circulation. A summary of the three follows:

(1) Natural Hazards Observer (University of Colorado)--a free, bi-monthly newsletter; limited to natural disasters. It focuses on features (3), (4), (5), and (6). Circulation is about 8,000.

(2) Hazards Monthly (private)--a monthly subscription newsletter ($36 per year). It tends to emphasize features (1), (2), and (3). Circulation is not known.

(3) Emergency Preparedness News (private)--a bi-weekly, subscription newsletter ($127 per year). It features (1), (2), and (3). Circulation is not known.

Public Information and Education

The preparation of a public information and education program aimed at the needs of many different audiences (mass media personnel, public officials, disaster relief specialists, school teachers, the aged, foreign

language groups) is a broad mission, one which will take substantial time to develop. Not only is it necessary to plan a campaign to educate and inform the population about all types of hazards and emergencies, but it is necessary to educate and inform people throughout their lifetimes. New hazards crop up almost daily, and the hazards a person faces may vary as he/she moves around the country.

A better informed citizenry--together with better informed and better prepared city, county, and state officials--should have a variety of benefits: (1) improved response to emergency warnings, (2) better state preparedness, (3) greater willingness to mitigate recognized hazards, and (4) reduced loss of life and damage to property from advance knowledge of precautions to take.

Among the basic requirements for an agency carrying out such a program are:

(1) A central, comprehensive library is a fundamental need. This would provide a foundation of information for mounting public information and educational efforts as well as be a repository for such efforts across the country.

(2) One or more periodicals should be available to emergency managers and to the public.

(3) A public information campaign will provide comprehensive coverage of topics to many audiences. Informational efforts are needed for salient emergency management problems and issues that are on-going, as well as for seasonal, topical problems and issues. Further, many sub-groups of the public (the elderly, the non-English speaking) have special informational requirements. This is a costly activity to be continued over a long period of time.

The development of school and college curricula aimed at educating the public about various hazards and the countermeasures is another large mission. Efforts to add information about hazards to the formal educational process are essential. In college and post-graduate programs, the

introduction of hazards and emergency management topics to formal curricula could be very useful. A wide variety of professionals would benefit from such information, for instance, geologists, public administrators, and doctors. Such an on-going effort would reach persons in their formative years, but the payoff would be many years coming.

Education and Training

Related to the public information and education efforts for the general public is the need for education and training of the many types of emergency management specialists. An education program for emergency management professionals would have to be integrated into many levels of the higher education process (e.g., degree programs, certification programs), and into the special courses and continuing education of many in-service professionals. Emergency management professionals include not only those in public service, but also those in private employ. Consequently, educational programs need to include key professional organizations that are most directly involved in emergency management.

This would help to develop a cadre of professional emergency managers who ultimately would obtain positions in public, private, and academic employment (e.g., a Masters in Public Administration, with specialization in Emergency Management). However, such a major program would be very time-consuming and expensive to establish. It would also be difficult to measure the extent of application of scientific and technical knowledge.

A training approach (rather than a broad, relatively long-term educational effort) would be appropriate to address changes in policy, scientific knowledge or technology, physical standards, or newly emergent problems. This approach has been favored by many agencies to date.

For instance, the Training and Education Office of FEMA, with its training facility (the National Emergency Management Institute in Emmitsburg, Maryland), formulates and delivers special science and technology applications and correspondence courses in emergency management (see National Emergency Management Institute, 1982). In the course of providing training programs with scientific and technical content, practical applications should be sought, with skill-building emphasis for the public practitioners who have operational responsibility before, during, and after an emergency or disaster.

Many public officials, and some private organizations or contractors, are not part of operational aspects of emergency management, but they should be considered potential participants in training activities because they provide support and assistance to the operational personnel.

As scientific or technical topics are identified that require a training and education component, that information should be shared with FEMA's Training and Education staff. Closer and quicker linkages between research results and development of training and education programs would be desirable. For highly technical subjects, a broader educational training may have to be provided. Not all meetings should be at the Emergency Management Institute, however, because of the limitations of using one location for students from across the United States.

Meetings

National and regional meetings on particular scientific and technical subjects of widespread interest to emergency managers can be effective.*

*Two examples of meetings held in recent years that provided information on a specific topic and fostered an exchange among participants are the National Conference on Earthquakes and Related Hazards, 1977 (organized by the Council of State Governments with support from the National Science Foundation), and the Natural Hazards Data Resources Workshop, organized by the University of Colorado in 1978.

The research producer (or sponsor) may decide to convene a meeting to share scientific or technical findings or gain information on appropriate applications. A meeting can serve as a communications and/or transfer mechanism--depending on its structure, number in attendance and format.

As was noted earlier, a workshop can be a useful opportunity to elicit ideas that contribute to a needs identification. More often, a workshop is an opportunity to discuss and disseminate new research findings. Further, it can facilitate an exchange of views among not only researchers, but also researchers, producers, and research users. Well-organized and timely meetings and symposia can be highly effective means for dissemination.

Many federal agencies use contractors to organize these meetings. Among the advantages, contractors have more flexibility in making arrangements; they can usually do the job more quickly, and can handle meetings in regional locations (other than federal regional office cities).

The four most widely used types of meetings have very different features and uses; these characteristics should be considered in determining which form or combination to use:

(1) conference--a large gathering that provides a marketplace for ideas;

(2) seminar--a research-driven gathering that usually allows a moderate amount of sharing of information;

(3) workshop--an application-oriented gathering that features skill development and application (it assumes a knowledge base is there); and

(4) colloquium--an informal gathering, which allows for extensive sharing of information and ideas among a small number of attendees.

A meeting will not be productive if called:

(1) for a vague purpose;

(2) when no new information is available (e.g., hurricane prediction techniques);

(3) when the interest in the topic is unilateral (e.g., agency or researchers touting something that users do not see as a priority (or a need at all);

(4) when participation and exchange is not really wanted by the sponsoring group;

(5) when too many other related and competing meetings are scheduled during the same fiscal year; and

(6) when travel funds are severely curtailed for important attendees.

Innovation Transfer

A related yet different approach to sharing scientific and technical information, particularly for programmatic and management applications, is publicizing the innovative process or experience. The process of identifying the innovative program and/or community, monitoring the innovation, then evaluating and documenting the experience for purposes of replication has been done successfully and effectively in other fields. Many federal agencies, sometimes using contractors, have used this technique in the past (it is frequently done by contractors because their evaluation is usually viewed as more objective).

This process has many forms and many names, some of which are (1) "Validation Cities" used by the U.S. Fire Administration in testing out fire master planning; (2) "Exemplary Programs" used by the Law Enforcement Assistance Administration; (3) "Innovations Transfer" used by the International City Management Association; and (4) "Lead City" concept used by Public Technology Incorporated.

One or more case studies, described in detail and depth, are the basis for understanding what a similar place or peer experienced, and give the reader the benefit of that experience without having to repeat it.

Attention is focused on a program or project that has proven to be successful and innovative.

A variation on this technique is to design a case study that is not an actual situation, but is a composite of actual cases or a realistic simulation to be used as a training mechanism. Not all subjects, however, can be reduced to case examples or transferred by this means. Such cases are very time-consuming to prepare, and many require highly specialized trainers.

Technical Assistance

An effective, and frequently used method of achieving technology and/or management transfer is by means of technical assistance. Such assistance usually is problem-focused and often is provided on-site. The receiver of technical assistance indicates willingness to adopt a technological change or innovation.

Technical assistance is provided in two forms, direct and indirect. Indirect technical assistance can be viewed as extending the services, innovations, and training experiences of a small, core group to a larger audience. Many forms of indirect technical assistance have already been discussed, i.e., publications, meetings, training and education.

Many federal agencies with operational responsibilities provide some direct technical assistance to state and local government. Often, they provide such assistance via contractors, professional associations, and other intermediary organizations. Direct technical assistance may be a brief, one-time effort, or it may entail a team of specialists on-site for many weeks. (In recent years, the National Science Foundation has supported the assignment of a scientist to a local government as a full-time, on-site technology transfer agent.)

Direct technical assistance is characterized by a one-to-one relationship (person-to-person or one organization to another). The ad hoc teams mentioned previously are a form of direct technical assistance. Direct technical assistance is an effective way to achieve utilization of research results because the specialist most familiar with the new knowledge helps the potential user adapt it to the new setting--in effect, assists with its transportation.

Technical assistance may be far more effective than several books or manuals for persons who learn best by doing and receiving personalized instruction. For certain needs--specific, discrete problems--it may often be a quick, relatively inexpensive aid. The time and expense entailed in personalized, on-site technical assistance do, however, prohibit that technique being used widely or often as a means of bringing new information to a locality or state.

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