

Converting Disaster Scholarship into Effective Disaster Planning and Managing: Possibilities and Limitations

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I have spent most of my professional life since the 1950s doing research on the social aspects of disasters. This social science research in which I have participated, is of course part of a much larger body of studies undertaken in the last 40 years, could be characterized in a whole variety of ways as to findings, motifs, implications, uses, etc. But there is one theme that runs through the bulk of the work that has been done up to now: according to research findings much of what is generally believed about disaster related individual and group behavior is not true or correct. As I and others have phrased it, we are embedded in a great number of misconceptions or myths about behavior in disasters. This disaster mythology clearly does not make for effective planning for or managing of such crisis occasions.

Introduction

In recent years I have turned more and more to the matter of the *application* of research findings, or the uses of disaster research. Increasingly, I have become convinced that also in this area, if we are not in the middle of mythologies, too many of us have certain misconceptions or incorrect views about the connection between research and research use, and researchers and research users. These inaccurate or erroneous conceptions also neither facilitate the practical application of research findings nor make for good disaster planning and managing.

Thus, in my remarks, I am going to address the possibilities and limitations involved, as stated in the title of my talk, in "converting disaster scholarship into effective disaster planning and managing." It will be particularly emphasized that research can be used in a variety of ways, some going considerably beyond the obvious—these are the possibilities. We will however also note that there are certain things research cannot be expected to do—these are the limitations. If we understand the complexities of these

possibilities and limitations it will be easier to better plan for and manage disasters.

An Introductory Example

Let me lead into my general remarks in what may seem a somewhat unusual way. I want to go back to the time of the American revolution and present an anecdote or story about Benjamin Franklin. Now among his many activities Franklin used to fly kites during lightning storms. This dealt with his interest in electricity and studies concerning it. At any rate, the story goes that one day someone challenged him and said: what conceivable use could come from flying kites during thunder storms; of what practical value is it? Franklin did not answer directly. But he posed a question of his own on return: who has saved more lives in the long run, the carpenters who had built better lifeboats or the astronomers who had plotted the stars, whose knowledge contributed in time to better ship navigation? This is a very interesting statement. Franklin's position is clear: the more theoretical studies which were certainly not safety-directed and which did not seem very practical, had in the long run saved far more lives than the best practical skills of the carpenters. Among other things it certainly illustrates the point that there can be different kinds of research activities.

With the Franklin anecdote as background, I want to organize the rest of my remarks around five general points or themes. Let me first mention or list them and then go into details.

The first point or theme is that much social research does not fit into the classic scientific research model as many people think about it, but nonetheless is of substantial value. That is, what is involved goes beyond researchers doing a particular study, the specific results of which are directly applied by research users. As we shall discuss, research can have more than instrumental use. The findings of studies can be used in conceptual and in symbolic ways also.

The second point I will make is that the application of research in the disaster area partly depends on which disaster problem is the focus. In the United States at least, there is a growing tendency to divide disaster planning and managing in terms of mitigation or prevention measures, emergency preparedness, emergency response, and recovery activities. Whether you want to slice the problems in this or some other way, the fact is that there are some markedly different groups and activities involved in each of the four aspects. I will suggest that in terms of the kinds of disaster problems being addressed both the research strategy and the research use have to be somewhat different.

The third point or theme I want to develop is that, at least with respect to the emergency time period of disasters, there is a basic difference between *planning* for emergency and *managing* the emergency. There is a fundamental difference between a strategical approach to a problem, as against a tactical approach to the problem. Planning in many respects should be equated with the strategy and managing should be equated with the tactics used. Research and research use will differ depending on whether strategical or tactical issues are being addressed. Research is better for asking strategical questions, while research users are more capable of applying tactical answers.

I will then move on to the notion that research has an often overlooked function, that is, of forecasting the future. Too often planning and management look to the past, but it is really the future disasters we need to consider. The future is not the past repeated. Research and application which in a sense is too oriented to past disasters is not that good for planning and managing. We need to be future oriented in both research and research use because as I will indicate we face both more and worse disasters.

My concluding theme is that there is often an inherent and built-in divergence of goals and interests, or gaps, between researchers and many research users. Not only is the difference to be recognized as legitimate one, but another implication is that there is a need for a social role that will bridge this gap. While for the most part this role does not presently exist, it and other social mechanisms are in the process of being created and that can allow more effective use of research by the research user.

Different Research Uses

To start developing my first theme, let me again present another story. But this time I know it is definitely true since it involves a personal experience! About 15 years ago the National Weather Service asked me if I would be interested in attending a hurricane conference they were sponsoring in Miami. I asked what they wanted me to talk about. They said they would want me to discuss why people often did not pay attention to the disaster warnings issued by the Weather Service. I told them I would like to come to the conference but they had the questions backwards; the issue that should be addressed is not why persons frequently ignored the warnings issued by the Weather Bureau but why did the Weather Bureau not issue warnings people could take seriously. I was saying that the problem lay not in receiving the warnings but in the organization issuing the warnings. Despite my position, an invitation to attend the conference was issued. I pushed my position very hard but the Weather Bureau personnel kept

saying, for instance, that the technical information included in their warning messages was very accurate. My point remained, however, that technical correctness was not the issue.

At the end of the conference, a very high ranking official of the National Weather Service said to me: "Henry, I don't agree with what you said, but I will think about it." Well, he was true to his word and in a few months he became convinced that I was pushing the right approach—the problem was in the *issuing* of warning messages. If anything was to be changed, it was not the victims but the group trying to help them. To his credit, this official led a movement within the organization and even hired sociologists to help with modifying their whole approach to the issuing of warnings! While what the Weather Service did was influenced by other than ourselves, this is one of the more explicit success stories in the disaster area where social scientists affected practical or everyday disaster-relevant operations.

But the important point I want to make here is that my position, my reversal of the question, was not based on any particular study or piece of research. This is the so-called "silver bullet conception" of research; a particular study giving a specific answer to a concrete question. In fact, my general position was not derived from any set of empirical studies. Rather it had informally developed in the course of years of research doing where we generally observed that sometimes research users tend to ask the wrong questions, that the source problem was sometimes placed in the wrong context, and even more generally, to understand disaster problems it is necessary to go beyond what might seem to be obvious.

Scientific research is sometimes simply thought of as primarily producing specific answers to specific questions. But in many respects this is a misconception—that research mostly provides instrumental answers. It is even one that some researchers hold, not to mention outsiders.

What I want to do now is indicate (in a somewhat "ideal type" way) three major and rather different uses of the findings of studies. Basically we are going to call them (following the lead of Pelz 1978):

- (1) the instrumental or action uses of research,
- (2) the conceptual or understanding uses, and
- (3) the symbolic or political uses of research.

Without getting into technical definitions, *instrumental* or action uses of research refers to a specific study or set of studies which can be used as a basis for specific policy or operational decision. It is research which can lead to direct actions.

When one speaks of *conceptual* uses of research, reference is made to research that provides background information and perspective that can influence views on an issue. In many ways, this is research which provides understanding or enlightenment rather than specific knowledge.

The third use has been characterized as a *symbolic* use of research. In some ways this is research that can be used for other than instrumental or conceptual uses. Put in a more positive sense, it is research results which can serve a legitimating or political (in the broad sense of the term) function; such as justifying a new program or providing support for a policy decision.

Of the three uses, interestingly, studies (none of which have been done in the disaster area but mostly in industry) have consistently shown that most organizations tend to use research more in a conceptual than in an instrumental way, for understanding more than direct application. Thus, discussion starts with the conceptual uses of research. I will primarily use examples from studies of the delivery of emergency medical services (EMS) and of the delivery of mental health services in disasters, but many of the ideas involved can be applied to most other disaster related questions and issues.

Conceptual Uses Of Research

Let me next explain in a general sense how research can be conceptually useful. For instance, in the medical sector area, when disasters occur there is almost always a maldistribution of victims to hospitals. One or two hospitals typically tend to get the great majority of the patients. As studies by ourselves and others have shown, the explanation at one level is very simple. You do not really need many profound, detailed or specific studies to show what occurs. Simply put, what is involved is that the emergency medical services (EMS) system essentially lose control of entry of patients into the system. The injured are brought into the system through nonsystem means (e.g., by relatives) and outside of the system planning (e.g., to the closest known hospital). Injured victims are not brought in by EMS system personnel to system designated hospitals.

When this notion, derived from rather simple observations of the handling of the injured in disasters was communicated to hospital and medical area professionals, it conveyed to them a view they had not previously considered as the source of the problem. The research users finally understood that a basic assumption they had implicitly made—namely that the EMS system could always control the input of patients into the system—led them to have an incorrect model for the delivery of EMS at times of disasters. The problem was not in the specifics of their model,

but in a major assumption of their approach. (If you think the explanation is an obvious one, the fact of the matter is that there are still EMS systems today that plan with that incorrect assumption, see Auf der Heide 1989.) These are the kinds of problems that once they come to the fore, almost everyone will say: "oh yes, it's obvious." But the fact of the matter is that this is usually hindsight; until researchers get around to it, not too many will have thought about the problem before.

Disaster research can also be conceptual in that it can focus attention on neglected issues. For example, in the mental health area it is being increasingly argued and accepted that it is the initial relief workers who are potentially the greatest mental health victims in the situation. They are said to be "burnt out" and "psychologically spent" as they frequently have to deal with very disturbing emergency situations (e.g., handling many dead or dismembered bodies) or dealing for long periods of time with victims that have many problems. So in some ways such helpers are often subjected to far more stress than individual victims and suffer accordingly. And you say: "well, that should have been recognized earlier!" However, the fact is that initially it was assumed by professionals that the major mental health problem area was the disaster victims, those directly impacted by the disaster and not the first responders who are trying to help them. But actually along many lines, it seems that helpers are more vulnerable and likely to need psychological help, at least in the long run. To some extent, this insight was generated by researchers asking the question of "who is a victim?" This query then opens up a number of very interesting paths if one seriously sits down and thinks the question through. (An even more interesting question is: "what is a disaster?" If one can struggle with that concept, it is possible to reach all sorts of far from obvious conclusions).

The conceptual use of research can also create new uncertainties in the sense that it can raise new questions or new issues. For example, disaster research has consistently shown that hospitals as a whole and most community medical systems around the world are unable to handle burn cases if they are of any scale; we are not talking of hundreds but just of several dozen cases. That is, the facilities that are needed to handle such kinds of numbers of burn cases are quickly overwhelmed. Therefore, what does a system do when there are a number of burn cases? It is not an answer, but an important question that the research has generated although it is not based on any systematic series of studies focused on the particular problem of burn cases. In fact, I am not aware of a single study *per se* on the difficulties generated by burn cases. But researchers looking at the difficulties hospitals have in handling more routine disaster generated medical problems reached the conclusion that there would be considerable magnification of problems in

dealing with medical care cases requiring *specialized* treatment and handling.

Another conceptual use of research is that it can force a rethinking of taken-for-granted priorities. For instance, in the medical health area, particularly in relation to EMS, speed of response is considered to be crucial. The idea is that the injured person has to be treated as quickly as possible. But the research on disaster EMS suggests that speed should be a far less important criteria for action than in normal times. Far more important than speed is getting an accurate assessment of the number of injured, the nature of their injuries, and the location and nature of the medical and hospital resources available. In other words, the criteria of speed which is crucial in terms of everyday emergencies becomes of much less importance or secondary at a time when there are mass casualties. The sheer number of casualties in a major disaster, and the problems that research has shown are generated by that situation, has forced a reconsideration of certain medical priorities. (At the practical level, the triage system is actually an intuitive effort to deal with the problem).

Another conceptual use of research, and the last one illustrated, is that it sometimes provides a sense of how the world actually works. The example again is from the medical health area. In disasters when there are a fair number of casualties coming into hospitals, the institutions slowly get overwhelmed by the number of cases in their emergency rooms. Now in terms of organizational structure, overall decisions about patient intake, the clearing of beds, and other functions are to be done by the administrative staff. Thus, information first goes up to the top of the bureaucracy and then orders proceed down through the chain of command. However, in disasters what often happens is a decentralization of decision making. Thus, the Chief Nurse at the Emergency Room of one hospital—seeing it being slowly overwhelmed by incoming victims—will place a phone call to a Chief Nurse in another hospital, and ask the other nurse about their load. If the other hospital can take the overload, the first nurse will redirect subsequent patients to the second hospital, something which even if it is in the hospital planning usually is the responsibility of the chief administrator. Actually this decentralization in decision making is very functional. Of course to this day there are some administrators who do not know why their hospital stopped getting victims and why they were able to handle the patient load that they had. The crucial decision was made at a much lower level than usual in the organization.

This is a general principle that applies to many organizations; decision making in disasters often drops lower down than usual in the organizational

hierarchy. The point of the matter is that decentralized decision making contributes substantially to an effective organizational response in disasters. In this particular instance, a very general research generated principle (i.e., the decentralization of organizational decision making) not only shows how the world works, but also how it can work better.

At any rate, what I have been trying to illustrate is that useful research does not necessarily require providing specific answers to specific questions or the generation of particular knowledge. Conceptual research use can throw a different light on the problems that are involved in the disaster area. This feeds into the thinking of organizational personnel. They can in some cases be made to question the priorities they have. They can be made to think through the questions that they think are important. Maybe they discover they are not that important. They can be forced to clarify their thinking.

The things I have mentioned were the indirect result of studies. That is, they provide a kind of nonspecific understanding by throwing general light on a problem, lead to a focus on neglected issues, make sense of what occurs, create new questions and issues, force a rethinking of priorities, provide a sense of how the world exists, and so on.

Instrumental Uses of Research

Research can of course be used in a very instrumental fashion. That is, for the influencing of decision making, the setting of policy, or the taking of specific actions. But even that involves different kinds of uses. Let me illustrate in the following way. Research, for example, can clarify the relative advantages of alternative courses of action. For instance, in the medical health area a basic policy question is: should victims be brought to hospitals or should hospitals (care and equipment) be brought to the victim? This is a fundamental question and clearly of very practical concern. On the basis of the research record, the relative pluses and minuses of doing it either way can be stated. Incidentally, the research evidence is that the second course of action is probably better. That is, in most large mass casualty situations, bringing the hospitals to the victims is the better way of delivering reasonable treatment.

Research can also be instrumental in that it can stimulate review of basic policies and the institution of new ones. For example, in the mental health area there are some studies which suggest policy regarding the emergence of certain kinds of postimpact psychological problems among victim populations. Although this is a controversial matter, most of the data indicate that most of the so-called psychological and mental health problems in disasters

do *not* stem from the disaster itself. Instead they essentially stem from what is known as response problems. It is the organizational effort to respond to the disaster that generates conditions which then can generate psychological problems. For example, to illustrate this very simply, people may be homeless because of the disaster impact, but that in itself seldom or necessarily creates psychological problems. What is more likely to create such problems are bureaucratic mistakes such as taking victims away from their social support system or forcing residents to live with unfamiliar people in an unfamiliar setting. In other words, that is where the real problems are generated; not by the disaster itself but from the postdisaster response patterns. From a policy point of view, the research indicates efforts ought to be made to improve the efficiency of organizational relief responses rather than simply providing crisis intervention psychological counseling for victims.

Research results can also provide new knowledge of the social and organizational arrangements that might be best for coping with a disaster related problem. For example, a frequent question asked is about the value of using regular psychological or mental health personnel at times of disasters. The issue is whether they can be very effective or really very useable at such periods of time. The evidence is somewhat complicated, but most researchers would say that people used to playing traditional roles will not be able to effectively proceed during disasters. What is needed, for instance, are outreach programs which in some ways can best be undertaken by nontraditionally trained mental health workers. Studies indicate that in postdisaster occasions the turbulent social environment is such that new and different ways of delivering psychological services are better than trying to employ traditional mental health personnel providing traditional mental health services.

Another instrumental use of research is the incorporation of research results into planning to reduce the uncertainties in the situation. For example, studies have fairly clearly established in the majority of cases (I am talking here of the health area but it applies elsewhere also) that the absence of resources is *not* a major problem in anything except catastrophic disasters. There are usually enough resources around, or substitute resources that can be brought to bear. The basic problem in most situations is the locating and mobilizing of those resources, not their absence. If the research findings are correct, the implications are important. If there is not a lack of resources, there is no need to plan for a non-problem. If the resources can be usually assumed to be at hand, then in a sense, it is possible to go down a different direction in terms of planning and managing.

Another instrumental use of research is that it can indicate that certain *assumed* problems are not *real* problems. For example, a hotly debated issue with respect to emergency planning around nuclear plants is whether workers can be depended upon to do their job in case of a dangerous incident. Will the bus drivers, for instance, be available to evacuate school children if they have their own children or families to worry about? This is part of the more general issue of *role conflict*. If an official is caught between family responsibilities and work responsibilities, will the person opt to help his or her family or will they do their organizational job? Can hospital personnel be depended upon to do their jobs if they are apart from their families when the disaster occurs? Contrary to widespread beliefs that persons will overwhelmingly choose their family role, the research evidence points conclusively in the opposite direction. Key officials who feel they are important in an emergency response situation will stay at their jobs or go to their work stations as quickly as possible after impact. In a sense, the research studies indicate that role conflict in the sense of being dysfunctional for work behavior is not a problem.

Thus, research can instrumentally be used for the clarifying of the relative advantages of alternative choices, stimulating review and institution of operational policies, indicating the best organizational arrangements to cope with problems, reducing uncertainties in the planning process, and indicating what are real and nonreal disaster problems. Normally, specific studies can provide relevant instrumental information, unlike the more general research observations which contribute to conceptual uses of findings.

Symbolic Uses Of Research

Symbolic uses of research are initially difficult to grasp because most people do not think of research as serving a symbolic or political function. But there are cases where general research results can be used to broadly justify, legitimate or support certain kinds of orientations or points of view regarding disaster planning. Conceptual research can provide understanding and instrumental research can provide knowledge. Symbolic research can provide a political (in the broad sense of the term) rationale for doing or not doing something.

One author, Pelz, has written that:

Weis (1977) cites additional uses of research that illustrate symbolic or legitimative functions: to provide political ammunition, gain recognition for a successful program, or discredit a dislike policy. She argues that using research to support a predetermined

position is neither unimportant nor improper, provided there is no distortion...In the domain of policy making, one suspects that this third mode—symbolic or legitimative use—may in fact be even more prevalent than conceptual use, with instrumental use appearing rarely (Pelz 1978, p. 352).

Perhaps we can make this clearer by giving some examples. A symbolic use of research can lead to the emphasis that disasters are essentially "people-created" rather than the result of technological malfunctions or supernatural interventions. Whether we are talking of technological or natural agents, the point of view here is that disasters are occasioned by human actions. In the aftermath of some noteworthy disasters—the Three Mile Island nuclear plant accident, the radiation fallout from Chernobyl, the Bhopal gas poisoning, and the Love Canal chemical pollution—the argument has been that the main source of trouble was not the technology involved, but the misuse of it by human beings. The failure to follow rules, have adequate inspections, as well as poor decision and policies were the basic social conditions responsible for these and similar disasters.

The notion that disasters are *people created* is not derived from any specific study or set of studies (certainly not any that follow the orthodox research model of asking a specific question and coming up with a specific answer). Instead, the general view has developed that disasters are occasioned by human actions and can neither be attributed to technological malfunctions or supernatural happenings. Acceptance of such a view forces a more proactive and intervening position regarding planning for disasters, and it emphasizes where the source of the problems of disasters lay. There are certainly practical consequences from taking this position, which is neither derived from the understanding provided by conceptual research of the knowledge derivable from instrumental research.

Research can be and is used to justify new programs. Thus, if research indicates that there is poor preparedness and response with respect to disasters, then it can be used to justify consideration of the problem. Bureaucrats and politicians often allude not to specific studies but to a general research consensus there is a problem to justify the development of new disaster programs or policies. To some extent, this is how the disaster-relevant crisis intervention program in the National Institute of Mental Health was established. Having been peripherally involved in its establishment, I know that no specific studies as such were used to argue for the program; rather it was justified on the grounds that research generally showed that people were subjected to considerable psychological stress at times of disaster impacts. In more general terms, research can obviously be

used to support or, for that matter, attack already established policies. This is not an inconsequential matter although researchers tend to be bothered by such manifestly political uses of their research results. Nonetheless, it is a significant use of research because it is important to research funders, policy and decision makers, disaster planners and bureaucrats, to keep in mind that research will be and has been used in symbolic or legitimizing ways.

Research can alert one to certain kinds of changes that are going on and when certain trends are coming to the fore. For example, in the United States until recent times, when actions were taken in terms of planning for and particularly in terms of managing disasters, there usually was not too much objection on the part of citizens and citizen groups. But in the last two decades studies have shown that actual and potential disaster victims will at the present time not put up with what they did not overtly object to in the past. Currently there are all kinds of interest and advocacy groups that get involved in disaster planning and response. Different groups of organized citizens make demands with respect to all aspects of disaster planning and managing. In part, this is a reflection of a social movement in the direction of greater citizen participation in the lives of their society, particularly in democratic types of societies. In itself, this has nothing to do with disasters per se; but it is a background condition which has forced certain changes in terms of what is going on. The general research observations which has shown this has been used to legitimate, even if only in nominal or symbolic ways, a call for greater citizen involvement in all phases of disaster planning and response. (A specific example of this is the law that requires citizen input into the Corps of Engineering flood planning projects before they are actually initiated).

A symbolic use of research also allows one to make sense of what is done or has happened. In looking at the mental health area, it can be observed that the preimpact system for delivering mental health services frequently does not function well in the aftermath, especially with disaster victims. So frequently an *emergent* mental health service delivery system develops. This is a system that informally comes together. The research done has led to a perception of why certain things happen, why the traditional system often cannot work well, and why an emergent system is necessary in many situations, at least in certain societal contexts. The more general research derived principle here is that emergent behavior is almost a universal characteristic of the emergency time period of disasters. This can be used to argue for certain kinds of planning.

Also from a symbolic point of view, research helps one understand why the situation is the way it is. For example, it was once assumed in the United States that a system for the delivery of EMS in disasters could be built on the system normally used to handle the injured in such everyday situations such as traffic accidents or heart attack cases. The belief existed that at times of disasters, there was simply more of what is normally involved. However, general observations by researchers of disasters showed that the difference is not only of degree but also of kind. In disasters, there is not only a quantitative difference but also a qualitative difference when compared with the handling of patients in everyday medical emergencies. Therefore, a different kind of EMS delivery system has to be used in disasters. Again, the general principle is that disasters are qualitatively different from routine emergencies; if so, planning and managing of disasters has to be approached differently.

Without going through any more examples of the conceptual, instrumental and symbolic uses of research, I think I have illustrated that research results are not just unidimensional. To be sure, research is often thought of only in the narrow sense of the term. A particular study is done with particular questions that seek particular answers. This is the more instrumental kind of research. I would suggest that in the disaster area, as has been found in other areas of social research, that instrumental research is only one and not necessarily the most important kind of research.

Research Used for Different Purposes

My second point or theme is that when discussing disaster research, reference to findings can be relevant to four related but, nevertheless separate planning activities. One can talk about mitigation or prevention, about emergency preparedness, about emergency response, or about recovery kinds of activities.

Now what is important is not that there are different kinds of activities, but that in each of these four kinds of planning there typically are different offices or agencies, and different staffs or personnel. For example, organizations or persons concerned with mitigation and recovery measures are interested in different matters than those interested in preparedness and response. For instance, mitigation measures are of concern and the responsibility of building inspectors or of city engineers, not of police and fire officers. Recovery measures are the concern and the responsibility of social welfare agencies and housing organizations and not of hospitals or emergency management agencies. Officials or groups interested in mitigation and preventive measures (e.g., in building codes and zoning ordinances) are

obviously different than those who are concerned with the issuance of warnings or those who are concerned with the relocation of the homeless.

Reference is sometimes made to "plan *ahead*" and "plan *after*" disaster organizations. That is not a bad distinction. In other words, mitigation and preparedness organizations are the "plan ahead" kind, those that have to project into the future. On the other hand, if the focus is on emergency response and recovery, it is "plan after" other organizations involved, those reacting to something which has happened. My general point is that in terms of the products of research, it must be directed at groups that have different organizational time frames.

Now it follows that if there are varying research uses, there can be different audiences for research results. If this is kept in mind, then it seems to me to be obvious that one has to couch presentations in different ways for different audiences, such as operational personnel, political office holders, special interest groups, disaster planners, government bureaucrats, legislators, different sectors of the public, the various disciplinary fields, policy setters, the mass media, just to mention some. These all need and use different kinds of information.

Whether we are talking about the four different planning activities, about different kinds of organizational time frames, or about different kinds of research users, it makes a difference. However, if the remarks that I made much earlier are valid, then there are some questions about whether most researchers can do a good job on communicating to most audiences. They have different interests, use different languages, and they live in worlds different than the great majority of research users. But at least in principle, when considering the question of how research is to be made useable, perhaps one of the things to keep in mind is that we are also talking about different user audiences as well as different uses.

The point is that the research information and knowledge that can be used needs to be fed into different clusters of officials and groups. The notion that somehow or other one report even on the same topic can be useful to all of them, it seems to me is not a valid idea. The material has to be structured in different ways for the different groups.

The existence of different audiences has an important implication, namely that those trying to present reports of research have to take those audiences into account. Unfortunately, most researchers write their reports for other researchers. That is worthwhile for a whole variety of reasons, but basically it means that they are not going to communicate very well to many others. For example, there is a great tendency among researchers to spend a great deal of time and space justifying and explaining the method that they

used to gather data and to show the scientific validity of the methodology they used. Most research users could not care less about the methodology *per se*. Yet if you look at research reports they are frequently unbalanced with a great emphasis on the methodology, but pointing out very little of the implications, whereas the research users want to know more about the practical applications of the study.

Planning Not Managing

To go on to my third point, I will indicate the necessity of making a distinction between planning and managing in the disaster area. This has implications for both research and research use. About 15 years ago the DRC did a whole series of studies for the Federal Emergency Management Agency (FEMA). We looked at the functioning of the local emergency offices at the community, municipal level. We studied their emergency preparedness and their response to disasters. Somewhat oversimplified, our first overall conclusion 15 years ago was that you had extreme heterogeneity in structure and functions in the local agencies. That is, how they organized and what kinds of activities they undertook. Second, their preparedness was fairly bad, and third, there were all kinds of problems in responding to actual disasters.

Several years ago DRC redid the study. This time we found three important points. First, we found that the heterogeneity still exists; there is still considerable variations in structure and function. But—and still is one of those conceptual rather than instrumental research results we talked about earlier—we told FEMA this is for the good, not for the bad. The variability may create problems in terms of national policy and planning. However, the fact is that at the local community level, the reason you have variations is because the variation reflects local conditions and circumstances. If you were to impose an artificial structure and function in a locality, then it would no longer be rooted in the local community and would not really be very effective.

Second, when DRC looked at preparedness it came to the conclusion that disaster preparedness has markedly increased and for the better. It was rare a decade ago for most American communities to have a stand-by emergency operating center (EOC). It is the unusual community today that does not have an EOC. If other indicators of disaster preparedness are considered, the overall picture is that the preparedness status of the typical community is definitely better than 15 years ago.

Finally, when DRC examined responses at times of disasters, the conclusion was that the response was fundamentally the same as 15 years

ago. The same problems still surfaced. Of course one of the questions FEMA asked was: how in the world can you say there is better preparedness but that the response is still as bad as it was? (There is a bit of an overstatement here: responses are a little bit better than they once were, but in terms of generalizing we can say they are still problem plagued).

What did DRC say to FEMA? We did have several answers for them. One was that in talking about preparedness, we used different evaluation and measurement bases. Along one line, we measure the present against the situation of 15 years ago. On the basis, things were better. On the other hand, if we measure the situation against some ideal standard, then the preparedness status was not very good even 10 years later. So that is part of the explanation why there is a gap between preparedness and response. Research results can be evaluated or measured against different standards, so seemingly different or even contradictory assessments can be properly made (e.g., better, the same or worse has to be in comparison to something).

Another basic point we made was that even if preparedness is good, it does not follow that managing a disaster will also be good. In other words, preparedness and response are linked, but it is not a perfect correlation. Good planning does not automatically translate into good managing.

There is a parallel between the difference between strategy and tactics as the terms are used in the military. Again, without getting into any technical discussion of this, when talking about the strategic approach to something, one is talking about the overall approach to whatever the problem, issue or question is. On the other hand, in talking about tactics, one is talking of ways for coping with situational contingencies; that is, things that are specific to the particular situation one is faced with (e.g., capturing a particular hill).

There is a parallel here to the disaster area in that planning essentially can be thought of in the strategic sense and that managing should be thought of in the tactical sense. That is why there is a difference and only an indirect link between the two. It is therefore possible to have a good overall strategic approach or emergency preparedness, but when a disaster occurs, it may not be handled very well. Planning deals with the general approach, managing with the specifics (e.g., a disaster happening in the middle of the night when most high level personnel are not normally in their organizations, or it happens to certain groups that have three shifts instead of only one shift of workers).

This distinction between planning and managing has implications for research and research users. For one, until recently much research has not taken this distinction into account. There is the assumption made that if

studies show planning is good or has improved over the past, that the response in an actual disaster will be good. But studies have consistently shown this is not true. The planning may provide a good or a better strategic approach to preparing for a disaster. However, it does not follow that the tactics which will necessarily have to be used to cope with the specifics of an actual disaster will automatically be the right ones. Research can be unintentionally misleading in this respect.

From the research user side, the problem can be seen in another way. Disaster planners sometimes undertake a disaster exercise or simulation of some kind. But the planners will write out a very elaborate script for how the actors and organizations should perform in the exercise or drill. Unfortunately, this is the wrong way to proceed. Pat or packaged solutions for potential problems or difficulties should not be provided. Instead, those in a disaster exercise should be made to think about the questions or issues they will be faced with in actual disasters, especially the issues they will be faced with in actual disasters, especially the tactical matters they will have to consider. In other words, disaster simulations or tests should teach officials the questions rather than answers, provide more of a road map than a script or blueprint.

The Future Will Not Be the Past

We have to look at the future rather than just the past. This applies both to disaster researchers and disaster planners and managers. In terms of experience we can of course learn from the past. But we should not be bound by the past in at least two senses of the term.

One is that the next disaster that is going to occur is in some ways going to be different. In fact, there is even some danger that if there has been success in coping with a past disaster that may be more of a disadvantage than not having any experience at all. Let me illustrate from an incident in the 1960s in New Orleans. There were very professional officials who had good disaster planning, and who did good managing of disasters when they occurred, especially hurricane threats and disasters. At any rate, Hurricane Betsy came over the city. The eye of the hurricane passed over the city at about two o'clock in the middle of the night. What happened? Well, the various organizations in the city did what they had done in many previous hurricanes. For example, the Red Cross opened up shelters for people to stay overnight. The utilities took all their trucks and equipment and put them in low lying areas to avoid flying debris. But they ended up being faced with a flood and not with a hurricane. Shelters which had opened up just for overnight use suddenly had to be reopened to handle thousands of evacuees.

The trucks and equipment placed in low lying areas were of course mostly flooded. Preparations had been made for a hurricane occasion because of past experiences and the flood possibility had been generally ignored. So the past can be misleading for what might happen in the future.

But the past can also be misleading in another way. Even if disaster planning and response was perfect at the present time, that would not solve the problems that will be present in the future. This is because the nature of disasters is changing. There are going to be more and worse disasters in the future. Why? We can note the five different categories of threats that will bring this about.

First, old kinds of natural disaster agents will simply have more to impact. While such physical agents as floods, hurricanes, tornadoes, earthquakes and volcanic eruptions are probably not increasing (at least on any observable human time scale), what they can socially impact is changing. Population growth, building of structures and economic development means that in most places, more people, more property, more wealth are increasingly at risk. For example, there are more people and settlements than ever before in riverain flood plains. Where in the past there was marsh or swampy areas, there are now housing complexes and industrial parks. Where empty space might have been hit in the past, in the future people and developed areas will be hit. There is practically nothing of the reverse—abandonment or withdrawal from dangerous localities.

Second, new and increasing kinds of technological accidents and mishaps that were almost nonexistent prior to World War II. To the category of so-called natural hazards has been added a relatively newer category of technological accidents and mishaps. These are the disasters resulting from human errors and collective mistakes of groups. To the so-called Acts of God, the human race is increasingly adding Acts of Men and Women.

There are the increasing risks associated with the production, transportation and use of dangerous chemicals. Bhopal has shown what can happen. An interesting aspects of the appearance of these threats is that even localities which in the past had none or few risks from natural disaster agents, are now vulnerable to toxic chemical spills, explosions or fires, if they have any roads, railways or navigable waterways. To the in-plant and transportation kinds of *acute* chemical types of disasters, we have also been adding the more slowly developing and diffuse types associated with hazardous waste sites such as seen in Love Canal.

Then there are of course the risks associated with nuclear power. Three Mile Island suggested the potential; Chernobyl presented the reality. Apart from the problem of aging nuclear plants around the world, there is the

danger that will be increasingly generated by the handling and transporting of nuclear wastes all over the world (and the often overlooked transportation of military generated radioactive material). One abandoned cancer treatment machine in Goiania, Brazil, not only created casualties but massive economic disruption.

These kinds of disasters can be qualitatively different than other kinds of disasters. For example, chemical poisonings and radiation contaminations require complex and sophisticated kinds of medical treatment, require far more costly cleanups and require more specialized knowledge than necessary for natural disasters. Also, in some instances, there are second order effects; for example, health consequences such as cancer cases can surface years after the initial event.

There are other interesting implications of these kinds of disasters. We will simply note that increasingly natural disaster agents will generate concurrent technological disasters, e.g., a flood impacting a chemical complex or an earthquake affecting a nuclear plant. Also, increasingly localities are facing disastrous conditions from disaster sources that may be quite distant, as seen in the radiation fallout from Chernobyl that affected much of Europe.

Third, technological advances add complexity to old threats. There are two aspects to this: (a) preventive or protective measures which indirectly can lead to possible disasters, and (b) the scale of chain reactions possible in modern societies which can turn a little accident into a catastrophic disaster.

As to the first, take this as an example: fires in high-rise buildings, in combination with the highly combustible and toxic construction and furnishing materials presently used, have brought an additional threat dimension to that kind of situation. People are prevented from being burned up by raising the probability of their being asphyxiated. The MGM hotel fire in Las Vegas is an example of what is more likely to occur in the future.

Another quotation will illustrate our point about the increasing scale of disasters. It goes as follows: "small scale failures can be produced very rapidly, but large scale failures can only be produced if time and resources are devoted to them." For example, we have always had, since their coming into being, electric power and telephone system failures. However, the 1965 blackout in northeastern United States suggest how, in the modern world, large areas of a country can become vulnerable to electric grid system malfunctions. Not only can something in a far distant place have local effects, but the complicated linkages almost insure that sooner or later there will be large scale effects.

Also, new versions of past dangers continue to grow. In some instances we can see *new* manifestations of old kinds of threats. Droughts used to be thought of as rural problems. This is no longer the case. Increasingly, in different countries, urban and metropolitan localities will find themselves faced with shortages or reduced water supplies. So far we have had only emergencies coped with by reducing industrial water usage, but one day there will be a disaster if a major part or all of an urban area runs out of water or has enough only for the most necessary of water needs.

This is most likely to occur in combination with the collapse of a major tunnel, pumping station or other critical facilities of a water supply system. This brings us also to the fact that there is an increasing problem generated by the deteriorating physical and public works infrastructures of lifeline systems. The prevalence of decaying bridge and tunnel structures, crumbling highways, obsolete and overloaded waste water and sewerage treatment plants, worn out sewer and water mains, aging subways and rail systems, all suggest a variety of many disastrous possibilities beyond the isolated and occasional accidents of the past.

Next, we will confront developing kinds of new risks that have not been traditionally thought of as in the province of emergency management. Let us indicate two very major hazardous situations that will certainly occur in the future: biotechnological accidents and computer failures that will result in disasters.

There is the newly developing area of biotechnology, especially genetic engineering. Basically this involves altering the blueprint for any living organism—plant, animal or human—and creating new characteristics, some of which are very useful (e.g., various kinds of oil and chemical waste eating bacteria that can be used to clean up spills). However, there can and will be the creation of, or the escape from control of, some altered organism that cannot be checked by present known means. Some of the oil chomping organisms that have been created for cleanup purposes could go ahead and attack lubricants in all machinery. Our ability to custom design living organisms almost insures that one day there will be some almost Frankenstein-like bacteria, plant or animal let loose on the world. This is not science fiction; as one commentator on this coming problem wrote:

The advocates of recombinant DNA technology claim that it is safe because they cannot see how a disaster would occur and because no disaster has ever happened yet. That amounts to saying that the technology is as safe as the Titanic, the Chernobyl reactor, or the space shuttle. (Robert J. Yaes letter in 1987 *New York Times*)

Then there are all the disastrous consequences that are linked to the computer revolution. Use of computers have improved disaster planning and managing. But our increasing dependence on computer technology will magnify future disasters and turn some minor ones into major ones. When the technology fails, and it will fail at times, what will those who have come to depend on them do? We know of one chemical plant disaster, because the computer monitoring system failed, where it took hours before the surrounding population was warned; in pre-computer days the warning would almost certainly have been issued much earlier.

More important, many sectors of government and business are increasingly computer based for the data and information they need to function, sometimes literally from minute to minute. It can be predicted with certainty that in the future such systems will fail or function incorrectly. We will then have a really new kind of disaster—a computer disaster. Many will have very complex reactions. One scenario of a computer failure in California indicates there would be serious problems in the international banking and financial community within 24 hours.

My general point in giving these examples is to suggest that research can be helpful for disasters that have not yet occurred, and that have no exact counterparts in the past. In fact, for those who argue that they rather trust experience rather than anything else, there can be no experience for some of the future disasters we may expect.

Different Goals and Interaction Between Researchers and Research Users

Let me start on this point by again going back to the Benjamin Franklin anecdote with which we started. Implied by the story is that practical workers doing certain things could only achieve certain results, whereas other people doing more theoretical work could achieve other results. However, *another* implication and the one I want to discuss is that there is some sort of inherent gap between research and application. They may be far apart.

The people involved in both areas are usually operating in rather different worlds both as to competence and goals. The worlds of scientific research and practical application are different. For example, to make the point even more sharply, we all recognize that physicists do not design or build radios or television sets, engineers do. We also know that the repairing or maintaining of radios and television sets is not done by physicists or engineers, but basically by technicians. Without trying to follow through completely on the possible parallel we can ask: why expect social and

behavioral scientists to design disaster plans, or act as social engineers or technicians? Researchers have particular goals and skills; engineers and technicians also have particular goals and skills. There is no necessary overlap between them and normally there is no expectation that one kind of worker would or could do the work of the other.

It should also be noted that most research tends to be done within some disciplinary framework. That is, the work is within geography or sociology, public administration or psychiatry, etc., and we are only talking here about the social and behavioral sciences in the broad sense of the term. However, most practical applications of research requires a multi or interdisciplinary view of the problem. In other words, in terms of dealing with a practical issue one has in a sense to look at it from very many angles (e.g., evacuation planning and managing requires input from a range of persons, from highway engineers to sociologists). Most researchers come to a problem from a particular disciplinary and thus limited perspective. Since very few scientists in any area have much confidence about explaining anything outside of their own disciplinary competence, you can see again how there can be a lack of a meeting of minds when research users try to communicate.

The gaps also show in the problem of the specialized language of any discipline. The scientific jargon, as it is frequently called, *contrary* to the view of people outside of the discipline, actually makes for precise and clear communication. The jargon is not simply the expression of common sense views expressed in esoteric or abstract language. Therefore, all disciplines are very loath and reluctant to drop "jargon" because of the consequent loss of precision and clarity. The jargon allows the researchers to see a world otherwise be blind to, but the jargon does get in the way of outsiders understanding what is being said. (Actually all fields have their own jargon, be this baseball and football players, painters and plumbers, police or fire personnel, etc.)

If you put these things together—the different goals and interests of researchers and research users, the disciplinary and therefore limited views of researchers, and the jargon used—all these make direct communication between researchers and research users in the disaster area very difficult. In other words, there are two worlds here; there are the practical and the rather more theoretical workers with different interests, perspectives and languages. Direct communication in either direction is thus very complicated.

But that does not mean there are not ways around the problem. What is essentially needed, of course, are translators or social roles that will bridge the gap. We need someone who can understand the jargon of the researcher and the jargon of the operational personnel, the goals of the researcher and

the goals of the operational personnel. In my view, there are three possibilities here.

The first two I would argue exist more in principle than in reality. For example, you can find occasional researchers who are also in some way research users or practitioner's. Clearly such persons have the advantage of having in single head the particular knowledge, perspective and language of researchers and also has the ability to look at the problem from the practitioner's or user's point of view. This is a rather rare combination to find in a single head and it is not possible to find many such people. You can of course also have the reverse pattern. That is, you can have planners and operational personnel, who know the scientific jargon and otherwise can understand and see the problem from the research perspective. Again, for a whole variety of reasons, such individuals will be very rare creatures.

We would be expecting the impossible if we expect many researchers to provide too much useful information directly to research users. Similarly, we would be going down the wrong path if we expect too many research users to operate with the framework of researchers. We need someone in the middle.

So what does that leave if you can not use most researchers or research users to make the bridge? It suggests to me that we need to develop some kind of work or occupational roles for people who, in a sense, are neither researcher nor research users, but who can operate in both worlds. My impression is that the Institute of Emergency Administration and Planning here at the University of North Texas is trying to train such people. A somewhat similar although not identical effort is going on in certain schools of public administration. To the extent that such attempts to develop such trained personnel, who can bridge the two areas, are successful they are on the right track, in my mind.

Another way of making the bridge is more indirect, but it is through conferences and workshops such as this one, where there is person to person contact. Representatives from the different sectors or constituencies can learn the perspective and competencies of all. We can all learn from one another if we but listen.

Important in this connection is what has been called *understanding or knowledge creep*. What is meant by "creep" in the context? Essentially it means that initially if one looks at an organization that becomes aware of or even sponsors various kinds of studies, it will be very difficult to see any direct consequences for organizational behavior. But as time goes on, it can be seen that directors and managers and other personnel involved in the organization start to shift slowly their ways of looking at the world. In other

words, their understanding and knowledge is changed: the way they look at the world, the way they think about it, the questions they pose, the answers they have, etc. The specific and general research ideas and findings they are exposed to alters their ways of coping with the world. Certain ideas creep into their thinking and seeming almost unnoticed. One implication of this is that the more one exposes oneself to research and research findings, the more likely there will be a slow accretion of understanding and knowledge.

A Concluding Comment

It is one thing to raise the possibilities and limitations of research and researchers. We have tried to indicate something of both in our remarks. But research users have also possibilities and limitations. Some have been implied in our remarks. I started out with the Benjamin Franklin story which said something about research. I want to conclude with another story, about the sinking of the *Titanic* which says something about research use.

First, we should note certain statistics about the lifeboats available and their use at the time of the disaster. There were 2,207 people on board the ship—1,316 passengers and 891 crew members. Out of this number, only 705 persons were saved, about 32%. Why such a low figure? The immediate reason was that only 1,178 life boat spaces were available. So even if all lifeboats had been filled with the additional 473 individuals they could have held, 1,029 persons still would have died since no rescue ship got to the area of the *Titanic* sinking before it sank. There simply were too few lifeboats. Not only were there not enough life boats, but there had been no drills and the crew members had been insufficiently trained to use them so spaces were left unfilled at the time of the sinking. In addition, the ship sailed at excessive speed and with insufficient lookouts in waters known to be full of icebergs. The sending out of an SOS was not well handled.

Put another way, those running the *Titanic* had available all kinds of information, some of it based on scientific studies, which could have helped avert the sinking and helped saved all on the ship. But what in principle existed, could not make up for bad planning and bad managing. In fact, the sinking of the *Titanic* is almost a classical example of a disaster resulting from the wrong decisions being made by the wrong people at the wrong time.

Good information and knowledge are not enough; they must be correctly applied. Whatever is handed on by research and researchers needs to be used by people like yourselves. That responsibility is yours.

References

- Auf der Heide, Erik. 1989. *Disaster Response: Principles of Preparation and Coordination*. St. Louis, Missouri: Mosby.
- Pelz, Donald. 1978. "Some Expanded Perspectives on Use of Social Science in Public Policy." Pp. 171-196 in *Major Social Issues: A Multidisciplinary View*, edited by J. Milton and Stephen Cutler. London: Collier Macmillan Publishers.