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A PRELIMINARY STATEMENT ON THE  
DIFFERENT WORLDS OF SCIENCE AND MASS  
COMMUNICATION: IMPLICATIONS FOR  
INFORMATION FLOW BETWEEN THEM

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Introduction

What follows is the presentation of a perspective on a problem. While research observations are used to support my argument, there is no systematic setting forth of findings from or summaries of studies on the topic. Instead I mostly try to indicate the implications that stem from my view.

The research base from which my remarks are drawn is not substantial but has been recently growing (for other than sources indicated later see Dunwoody and Ryan, 1985; McGowan, 1985; Friedman, Dunwoody and Rogers, 1986; Jerome, 1986; Nelkin, 1987). Most of it deals with the physical sciences and engineering, and the literature examined by me almost exclusively refers to the American scene. While I do think my observations are generally applicable in Europe and elsewhere, perhaps in this meeting we will be able to see if my assumption is correct.

The Problem

Now I could summarily and very simply state my thesis. It would go as follows.

The world of mass communication and the world of science are two different social worlds. The members of these worlds have different values and beliefs. This makes interaction between journalists and scientists difficult. The result is poor information flow between them. There is no easy solution to the problem. However, there are possibilities for improvement if scientists change some of their behavior.

Now if I were a journalist this might be the end of my remarks. For among the basic differences between the two areas is what constitutes good communication. To the journalist, simple and nonqualified but attention catching and unexpected statements provide the best information. In that framework, my initial 62 words have said it all.

But being a scientist, you will have to listen to me another 15 minutes (hardly a 20 second television sound bite!) and later read a 25-30 page final draft paper (which will contain more words on this one topic than will be used in the typical half hour news telecast or in the totality of daily news stories in many

newspapers which report on everything ostensibly important that occurred in the world that day!). In the scientific framework I can not adequately convey the information I want to in the 62 simple and nonqualified words I initially used even though they may have been attention catching and unexpected.

Therefore let me immediately indicate the qualifications necessary to what I have already stated and start to indicate the complexities involved in my initial simple statements. After indicating, at least to this audience--notice my qualifying phrase--some of the qualifications and complexities, I will turn to indicating some of the contrasting differences between the world of journalism and the world of science. Then the implication of this will be considered, leading into what might be avenues to improve the information flow between the two areas, especially with respect to disaster phenomena. Some concluding remarks address what the future might bring that will affect information flow between the worlds of science and of mass communication.

### The Two Worlds Involved

What two worlds are we talking about?

Nearly three decades ago C. P. Snow (1965) proposed looking at the natural sciences and the humanities as two separate cultures. The sociological specialty of the sociology of knowledge had even earlier proposed considering different areas of intellectual and work activities as distinctive social worlds (Merton, 1949). Such areas have their own particular sets of norms, values, beliefs and expectations with respect to their central phenomena whatever it may be. More recently Holzner (1978) suggested that a sociology of knowledge approach should be interested not only with the social basis of intellectual productions but also the social consequences of knowledge. As such the conditions under which knowledge is produced, diffused and applied should be examined. Thus, there is:

need for understanding the multiple frames of reference with which actors perceive knowledge and the discrepancies between the frames of reference of knowledge producers and knowledge users (Weiss and Bucuvalas, 1980: 302).

In this kind of framework, for our purposes, it is possible to talk of a scientific community and a comparable mass communication social institution, and the factors which will influence the kind of information flow which can occur between them. Our discussion tries to indicate the nature of the two worlds and to show the difficulties of transmitting scientific knowledge via the mass communication system.

What constitutes the worlds of mass communication and of science?

Mass communication is the social institution or system of producing and distributing general information that uses a particular technology, the mass media. We distinguish, as increasingly is becoming the case in the literature on the area, between mass communication which has reference to the social aspects, and mass media which refers to the technology involved. In more everyday terms we are talking of the social organizations involved in producing and distributing newspapers, television and radio programs, magazines, films, the content of wire services and cable systems and so on (the development of computers and other high technology raises a series of questions which will be discussed later). The general information is intended for a non-specialized audience usually of fairly large size (for more technical discussions of mass communication see Wright, 1986; DeFleur and Ball-Rokeach, 1989).

But can we talk of mass communication systems generally or as if the specific institutions in all countries were basically the same?

Are there not some major cross-societal differences between mass communication systems in different countries with respect to their linkages to other social institutions? For example, in Europe many newspapers have strong links with if they are not actual outlets for political parties; also, as here in Italy (for example, the three major TV news channels) and elsewhere such as in the Netherlands, television and radio stations are divided by political party orientation and controlled by those with different political ideologies. This is rather different from the situation in Canada and the United States. In the latter too almost all the mass communication outlets are privately owned, whereas in Europe there is considerable variety ranging from total state control to a typical mixture of public and private enterprises to mostly private enterprise. In addition, the situation in Eastern Europe, despite some major transformations that are occurring, has a dimension of political influence somewhat different than that in the West.

Nevertheless there is accumulating evidence mass communication systems are less culturally bound than many other social institutions. For example, a collaborative study the Disaster Research Center (DRC) undertook with Japanese colleagues found far more similarities than differences in emergency time news reporting in the two societies. These range from equal lack of specific disaster planning by mass media organizations, to similar alterations in mass media organizational structures and processes during disasters, to an equal use in both societies of the mass media, especially radio for personal messages (see Quarantelli and Wenger, 1990).

Others have similarly argued a universalistic tendency for mass communication systems. For example:

Journalism has idiosyncratic tendencies in

various countries, but these are more than outweighed by the common usages of the profession. The announcer on the Nigerian Broadcasting Company network has a different audience in the village of his country from that of the announcer in...Chile, but much of the techniques and content of broadcasts in their two countries are startlingly similar.

Cinema from the great producing centres in the United States...the USSR, the United Kingdom, India, Japan, France, and Italy is likely to find an outlet in any countries of the world. And when a public event of world-wide importance occurs, such as the projecting of a human being in a space vehicle into orbit around the world, or the detonation of a nuclear device, there are few places where the news does not penetrate quickly.

The authors note that the similarity of patterns include certain aspects of the audiences and contents as well as the communicators.

Not only is the basis for the network already established, but the responses to the communication media have come to assume common patterns. There are certain segments in society that have greater access to communications than others. The various mass media seem characteristically to have accepted a division of labor in the spread of information that crosses national and cultural boundaries.

Necessarily, all of these phenomena occur in conjunction with a standardization of the content of communication so that there is neither the variety nor the unique flavour in subject matter that would be expected from the immense diversity of peoples. Partly because of the history of the professional training in mass media techniques, and partly because of the organization and interrelationships of the great new agencies, what is news in London seems also to be news in Buenos Aire (Jacobson and Deutschmann, 1962: 151-152).

If this analysis is correct, it follows that what has been learned of mass communication system behaviors anywhere, have applicability in other places. At least that is going to be my assumption.

Studies indicate that scientific information consists only a

minuscule of all that is transmitted on an everyday basis by mass communication systems, with radio coverage being the most (Cronholm and Sandell, 1981: 86). But this does not include news reporting of disasters where at the height of such occasions in the United States and Canada, radio and television stations that operate may provide in their programs only information on the disaster (Wenger and Quarantelli, 1989).

We should also note that there are a variety of activities or functions that mass communication systems can carry out relevant to disasters. Without pretending that the following are totally inclusive, mutually exclusive or denying that they may at times overlap one another, we can note four general ones. Mass communication systems can:

- 1) report news about proximate disaster happening;
- 2) provide information about disaster planning;
- 3) undertake education about disaster behavior; and
- 4) project imagery about disasters.

The first three are relatively self explanatory, but the fourth perhaps should be further explained. I have in mind that mass communication systems besides providing cognitive content, also convey parallel affective tones. This is particularly important in the disaster area for my impression is that unlike many other foci of attention of mass communication which are presented in dispassionate or neutral terms, disasters are frequently depicted in negative emotional tones as well, implicitly it not explicitly. As I have written elsewhere:

there is an expressive or visual imagery of what is communicated, such as the use of photographs to supplement text in disaster news reporting or the use of special effects in film...the expressive and symbolic nature of disaster content, as opposed to its instrumental or denotative nature, might be explored (Quarantelli, 1980: 297).

While our remarks are relevant to all four functions, they are perhaps most applicable to news reporting. Certainly all four have not been equally studied even in terms of everyday operations; we should therefore be cautious in extrapolating across all four and to all disaster related activities.

As to the world of science, since it is presumably more familiar to this audience, I will only say the following. The label of science here encompasses the generation and application of knowledge primarily obtained through scientific procedures. As

such, the social as well as the physical sciences are included as well as engineers and other technologically oriented practitioners.

While it is naive to assume that work in the scientific world is independent of socio-cultural influences, most would agree that the general enterprise does have universalistic features that are roughly the same across all societies. Some might dispute this especially for the social sciences. (For example, Bertrand Russell once ironically commented in the heyday of behavioral psychology in the United States and Gestalt psychology in Germany, that he found it strange that the laboratory mice in America seemed in experiments to solve problems through much trial and error efforts whereas those in Germany appeared to wait and suddenly evolve a solution out of their inner consciousness!). But I would argue that generally the two institutional complexes of science and mass communication are less culturally influenced than others. It should be noted that it is one thing to say that work in all institutions are socially influenced, and another to say that particular institutions in specific societies reflect primarily the given society. It is the latter not the former that is being denied.

Now the picture I have depicted so far of science and mass communication bothers me somewhat. It is too simplistic and clearcut in terms of my knowledge of the areas. For example, there are reporters who in their work and end product are not that different in their means and goals from social scientists. Conversely, there are scientists, sometime disdained by their colleagues as popularizers, who convey information in the same way as do journalists. To get out of this dilemma this would pose for sharply contrasting the two fields of science and mass communication, and operating in a scientific framework myself and addressing primarily a scientific audience, I will therefore qualify my remarks and state that my depiction of course is of an ideal type nature, that is, as the phenomena would be if it existed in pure form rather than the murkier reality it actually is.

It should also be noted that I agree with those who take the position that:

the use of...science research in the sphere of public policy is an extraordinarily complex phenomenon. Authors who have addressed the subject have evoked diverse images of the processes and purposes of utilization...seven different meanings...have been associated with the concept (Weiss, 1979: 427).

This author then goes on to state the problem-solving is only one of the usefulness of research. For purposes of this meeting and paper I will assume nevertheless that this is our major interest in the problem of information flow from science to the area of mass

communication. However, my view is that the other uses of the results of scientific research, bear much more attention than they are normally given in most discussions of this matter (for other uses, see Weiss, 1979, Pelz, 1978). To focus solely on the problem solving function of scientific research is too narrow a view. There are conceptual, political, symbolic, enlightenment and other uses of research that are equally important if not more so in certain contexts. At any rate, more recently:

The older idea that research utilization occurs only when the layperson/utilizer understands and adopts a fixed set of recommendations prescribed by the scientist is replaced by a much larger notion, encompassing a broad array of reactions to scientific knowledge and research information. "Instrumental" or "decision oriented" use of research is by no means the standard form (Sunesson and Nilsson, 1988: 142; see also Nelson et al., 1987).

#### A Comparison

For our purposes, to compare the world of science and of mass communication, it would be very helpful if we had a series of situations where both at the same time attempted to provide information about the same phenomena or happenings. While there does not seem to be many such cases in the literature, I want to briefly describe three of them (which were first noted and discussed by Weller, 1979). They are all from the social science area, this being a function of both my background and what surfaced in my literature search. The first has to do with a non-disaster social setting; the second with civil disturbances or riots which some would treat as conflict types of disasters. The third is a very unique situation where both a journalist and a social scientist reported not only on the same disaster but used the same general data base.

Sommers (1975) contrasted the work of a journalist (Tom Wolfe) and a sociologist (Erving Goffman) who both made participant observations and wrote about Las Vegas gambling casinos. The contrast is in what is selectively drawn from what is before them and what they crafted from it. Thus:

What distinguishes the two authors is not the situations they study, nor their methods, so much as what they do with their observations. Goffman's approach is academic or scholarly without being hardnosed science. He fits what he sees into predetermined categories (face-saving, risk-taking, involvement reduction) as well as using his observations to evolve new categories of social intercourse. He links his

impressions to what other people have found in the past...tie[ing] together seemingly disparate encounters by identifying common threads or patterns (1975: 147-148).

Wolfe instead focuses on the particular and the unusual. He describes the vivid specifics of the situation and people he observed. He tries to portray fascinating particularities in contrast to Goffman who wants to link the admittedly unusual social setting of Las Vegas gambling casinos with general sociological categories and theories. In one sense what Goffman uses only as an example from which to generalize, Wolfe treats as the only thing which he wants to describe.

In another more systematic piece of research, a comparison was made of the journalistic accounts and the social scientific reports of 526 riots in the late 1960s in the United States (Stump, Dotter and Shiflet, as cited in Weller, 1979; see also Burke, Stump and King, 1978). It was found that the journalists focused on the violence and emphasize its non-routine, particularistic features. In contrast, the social scientists examined patterns of riot control and riot participation in an attempt to discern general patterns. The press accounts almost exclusively described whereas the social science research reports mostly analyzed.

Finally, a rather unusual although unintended comparison was made at the DRC with respect to two treatments of the individual and organizational behavior in the city of Anchorage to the 1964 Alaskan earthquake. Norton, a journalist was the primary author of a descriptive account of the response in the city to the disaster. Yutzy, a sociologist, was the primary author of a series of sociological reports of the same response. What is more, both did their work at DRC at about the same time and worked from exactly the same body of interview and documentary information. Weller (1979) in looking at their writings observed that:

Both the sociological and journalistic accounts are primarily descriptive. The main difference...is in Norton's greater attention to characterizing as individual personalities those that enter his narrative. Yutzy, while identifying individuals did so more briefly and primarily by mentioning their statuses within the community or the disaster response. The most important difference between the two works is just as the foregoing literature would lead us to expect. Norton's is a particularistic recounting of the tribulations of many individuals and groups caught in a web of disaster and response. Its focus is upon the recovery of the community, but as it is expressed through the unique experiences of the

people and groups that contributed to it.

Yutzy's work, while highly descriptive relative to other social science, clearly intends to interpret Anchorage's response in terms of general sociological concepts and theoretic perspectives. He searches for clues to how value priorities are defined the city's response or how functional areas of social life are revived. The focus is not really upon better understanding of the fate and adaptation of Anchorage but upon what this case can suggest might happen in general in communities struck by major disasters (1979: 60-61).

A number of the key differences between science and mass communication have been noted and illustrated in these descriptive accounts. While it is not yet possible to provide a systematic listing, I think the major dimensions can be noted. Further analysis will undoubtedly lead to refinements and possibly additions, but it is unlikely that the following ten comparative differences will not be on the list in some form or other.

1. The mass communication area emphasizes reporting of the unusual or the different. Relevant here is the old story that it is not news when "dog bites man" but only when "man bites dog." The latter is what is considered newsworthy. In contrast, scientists look for regularities or universals in whatever they study. The anomaly or the negative case may catch attention but is then used to look for a different set of regular patterns. The norms operative in the two worlds on what is to be examined and communicated about differ with emphasis on opposite ends of a continuum of unique-general.

2. Scientists try to root whatever they report in the context of what others have earlier found. Thus, the whole scholarly apparatus of references, footnotes, bibliographies, review of the literature, etc., to inform users of the link between the present and the past. The mass communication world operates with a much more ahistorical framework. Thus, as Weiss has written:

In the media, each story is discrete, unique, isolated. Even if the same paper ran a story on directly related research a few weeks or months earlier, the new story almost never mentions it. The earlier research is not new; therefore, it is not news. There is little effort to go back and compare or synthesize. ...Media practice focuses on the new...Newsroom procedures push toward timeliness, impact, significance, and uniqueness. Each report is a "story" in itself (Weiss, 1985: 40-41).

3. There are differences in the two worlds as to who can handle information. The science world is one of specialists, of experts who are very knowledgeable but along very narrow lines. They do not see themselves as competent as scientists outside of their own particular specialized spheres; note how this meeting has been structured whereas a journalist would not hesitate to write on anything presented. Journalists do not claim any expertise but instead take the position that as generalists they can deal with what is needed. Thus, those in mass communication do not see stories about disasters as different from any other kinds of stories. They present no special problems, responsibilities or opportunities for the journalist (see Wenger and Quarantelli, 1989). The beginning of specialization in the mass communication area (e.g., science reporters) does not change the overall picture but might create, as discussed later, an avenue for improving the information flow from science to the mass communication area.

4. Both worlds are in one sense audience-driven, but in different ways as to expectations. Those in the mass communication area do not expect viewers or readers to provide any direct feedback. In fact, there is a strong belief among journalists, at least in American society, that they as professionals rather than their audiences can be the only judges of their own work. In contrast, scientists are very attuned to what their peers will think and expect to be directly evaluated as to the quality of their work. Stated in more sociological terms, it is not only that there are different audiences or reference groups, but they use different criteria of what is valid and worthwhile.

5. Conceptions of objectivity differ in the two worlds. It has been said that objectivity is the paradigm of journalism (Hackett, 1984). But it also has been written that:

mass journalism today implies a norm of objectivity that differs widely from the social scientist's understanding of that norm (Phillips, 1977: 73).

The importance of this is not that there are two referents of the term, but that different norms are involved. Mass communication emphasis is on fairness; almost always there is an assumption that there is a second or opposite side. Science stresses correctness, accuracy, validity and not balance, impartiality or neutrality.

Or as Sandman notes:

Journalism, like science, attempts to be objective, but the two fields define the term very differently. For science, objectivity is tentativeness and adherence to evidence in the search for truth. For journalism, on the other

hand, objectivity is balance. In the epistemology of journalism, there is no truth (or at least no way to determine truth); there are only conflicting claims, to be covered as fairly as possible (Sandman, 1986: 6).

6. What is used to evaluate information is different in the two worlds. Practitioners in the mass communication area judge information in terms of their personal experiences and their understanding of the phenomena (Phillips, 1977). The conception of having a "nose for news" rests on this ground. Scientists instead evaluate in terms of how the information has been produced, such as whether the right research techniques were used to obtain the data, and whether the results make sense in terms of existing knowledge. To some extent there is an understanding versus knowledge difference between the two worlds.

7. What is valued also differs in the two worlds. Timeliness is very important in the mass communication area, and thus a focus on the immediate. In contrast, in science the significance of the information is much more valued. Related to this is that scientific information is never seen as final or conclusive. Thus, scientists charge journalists write in such ways as to imply certainty.

8. The mass communication area attempts in various ways to personalize a story. Human beings are woven into the story in some way. In science, depersonalization is the norm as can be seen even in stylistic conventions on writing style for professional journals. In fact, the use of the passive voice sometimes leaves unclear how anything happened.

In a discussion of environmental risk the following was written:

Perhaps nothing about media coverage of environmental risk so irritates technical sources as the media's tendency to personalize. "Have you stopped drinking it yourself?" "Would you let your family live here?" Such questions fly in the face of the source's technical training to keep oneself out of one's research, and they confuse the evidentiary requirements of policy decisions with the looser ones of personal choices. But for reporters, questions that personalize are the best questions. They do what editors are constantly asking reporters to do: bring dead issues to life, make the abstract concrete, focus on real people facing real decisions (Sandman, 1986: 9-10).

9. In reporting information there are also differences in the two

worlds. The mass communication area strives for simplicity. Much is deleted. Scientific information tends to be complex with the use of jargon being an attempt to attain precision. Also, there is the use of many qualifiers. Given this, it is not surprising that judged from the scientific side, press reports on scientific information is sometime seen as inaccurate. The complexity of the picture however is indicated by the fact that scientists are less critical of the reporting of their own work than of scientific reporting in general (Cronholm and Sandell, 1981: 89). Nevertheless, it is recognized that there are differences. As Weiss reports:

the social scientists interviewed...recognize the stringent constraints under which journalists work, and they take these constraints into account in judging the stories that appear. Many also explicitly recognize that the media are engaged in a pursuit different from that of the social sciences, and thus do not hold them accountable to the canons of the academy...With tempered expectations for the what the media can and should report about social science, they find themselves satisfied with the stories that mention their research or quote their opinions.

Nonetheless,

a number...stated explicitly that while individual stories may be fine one by one, overall coverage of social science leaves much to be desired...The main concerns are: oversimplification of social science complexities. Undue closure and certainty in the reporting of social science results. Inadequate scrutiny of the quality of social science studies and the expertise of quoted social scientists. Biased selection from the range of available social science (Weiss, 1985: 39-40).

10. There is a difference in the two worlds as to the emphasis given to the abstract and the concrete. The mass communication area tends to use a logic of the concrete, setting forth specific facts, and not venturing too far from them by staying at a descriptive level. It is almost as if "facts speak for themselves", a position scientists find difficult to accept. Science while it may deal with details is using them as part of pre-determined categories or building new categories. In this respect the criticism of a reporter of scientists she dealt with unwittingly had an element of validity to it; she said they "produce more theories than facts" (quoted in Glessner and Ettema, 1989: 14).

## The Implications

What are the implications if our impressions and observations are correct?

One is that it will be very difficult to quickly institute any significant changes in mass communication reporting about disaster aspects (assuming that it would be desirable to do so in some degree). The reason is simple: the reporting process about disasters is a reflection of the very social structure of mass media organizations and of the subculture of the world of journalism (as is also true of everyday reporting, see Epstein, 1973; Tuchman, 1978; Gans, 1979; Ettema and Whiteny, 1982). The reporters, editors and other staff members involved in news gathering and other information flow have been socialized into a world and occupational subculture whose values, beliefs and norms as I tried to illustrate above, are different from those in science. Journalists are not operating outside of some social setting. Just the opposite, they are following the framework of their world which they have learned as a result of becoming members of mass communication organizations.

Social structures and subcultures of course are not static, and changes can be brought about in both. But alterations in the disaster reporting of journalists in the field today will not be significantly altered by just telling them disaster mitigation measures are important or that they should follow different procedures in their coverage of disasters. Journalists will only consistently act differently if they are socialized or resocialized into different behavior patterns.

This in turn requires structural alterations in mass communication organizations and in journalistic subcultures. For example, changes in disaster reporting could follow, if as a result of preimpact planning, there was a strengthening rather than weakening of organizational gatekeeping during the emergency time period (actually newspapers in contrast to radio and television do increase their gatekeeping procedures, see Wenger and Quarantelli, 1989). Similarly, there might be alterations in emergency time reporting if, in the curricula of journalism schools, some negative consequences of disaster myths were systematically taught such as officials failing to issue warnings about threats because of a mistaken concern about generating "panic" (Dynes, 1990). Likewise, changes in reporting could result if journalistic norms and values stressing speed of reporting and "beating the competition" were downplayed for those emphasizing accuracy and gaining a reputation as a legitimate source--in more popular terms, a New York Times rather than National Inquirer approach. There are merely examples of possible ways of trying to influence the structures and cultures within which journalists operate (for other possible examples, see Wenger, 1985). Without such changes the existing institutionalized

social and cultural patterns will continue to guide reporters and editors in their reporting of disasters.

It is of interest that to the extent changes in the situation are advocated, it is frequently assumed that mass communicators should primarily change. But I am not too sanguine that prime reliance should be placed on such a strategy. There is not that much by way of incentives or payoffs for the area of mass communication to give high priority to initiating changes to improve information flow for disaster purposes. At a more complex level, mass communication organizations operate much like other organizations which means their actions are characterized, if we take the work of the Noble Prize winner, Herbert Simon (1976) seriously, by bounded rationality and satisficing. That is, groups limit the information they process and do not seek to maximize achievements of their goals (Weiss, 1981).

Actually, it might be easier to institute changes on the scientific side. Why do I say this? Because I think there are certain operative social factors which could facilitate if not encourage changes in the information flow from science to the mass communication area, provided advantage was taken of them.

First, we should note that there are some success stories wherein scientific information is passed on relatively well by the mass communication system. For instance, in the United States the system does a respectable job in issuing warnings about certain kinds of disasters such as hurricanes and tornadoes. The situation is far from perfect, but most of the existing difficulties exist because of gaps in the communication flow from monitoring systems of scientists to mass media personnel. This stems from a structural problem of going from a state or governmental system over into the private sector; most of the problems here do not result from the above mentioned differences in the two worlds. But leaving the problematical aspects aside, the success partly stems from the actions of social scientists convincing National Weather Service personnel they were issuing warning messages, which while technically correct, were not too meaningful for the general populace (see McLuckie, 1973, 1974). Our peripheral personal participation in this effort suggests that a case study of the change that occurred in the relationship between social scientists and the weather service could indicate what might be used to improve information flow for other problems.

Second, leaving aside any theoretical importance, local disaster planners need to get certain information out to various sectors of the public and different organizations. They have a strong motivation to do so. The better ones have good links with their local mass media operations (see Drabek, 1985). What is being suggested is that there are social units already in place who can serve as catalysts for change. Perhaps scientists ought to try to move such persons to deal with the mass communication system in

addition to interacting directly with it.

Third, within the mass communication area there are some activities that come close to science or at least have a strong affinity with it. For example, there is the prestigious activity of investigative reporting (see Glasser and Ettema, 1989) within the mass communication system; there has also been the development of the specialization of science writers. The scientific area should see them as target audiences, a more specific focus than the general populace or mass communication generally. Investigative reporting is especially interested in most anything of a socially dubious nature or where there might be much social conflict. Certainly there are aspects of disaster planning, whether in mitigation, emergency preparedness, response or recovery which scientists could call to the attention of investigative reporters. Science reporters, while often not well trained (Cronholm and Sandell, 1981: 86-87) are nonetheless especially attuned to issues in their field of specialization. Again, this could be used by scientists as target audiences.

Finally, disasters are inherently interesting to almost all human beings, and most people will also agree that it is an important policy topic to consider. Disasters are not esoteric matters of interest to only a few. This is an advantage this subject matter has over many others. To be sure, much scientific information about disasters may not easily fall into such a category. But it should be possible to link almost any information to the more interesting aspects of disasters. This will be particularly possible if it is remembered that the ultimate goal or use of the scientific enterprise is to save lives and otherwise reduce the tolls and disruptions of disasters; it is not to increase scientific knowledge per se or satisfy only the intellectual curiosity of scientists.

#### The Future

However, while we have some valuable knowledge and understanding, there is much that we do not know about the relationship of mass communication and science. To the extent that is true, we are operating in the dark as to what actually goes on. Meaningful recommendations about linkages and interactions between the two worlds can only come out of a valid base, which essentially means research results.

How small our knowledge base on the topic is, probably is unknown to most people. In a survey of research on mass communication in disasters in the United States and Canada (Quarantelli, 1989) I could only identify only several dozen systematic studies on relevant topics prior to 1986. To be sure, there has been a small stream of research since that time, and I did not include most European and Japanese studies in the area in my survey. Nevertheless when all is said and done, we have only a small

knowledge base both as to quantity and quality.

A variety of new studies are needed:

1) On many topics we need exploratory work to even understand what the problems might be. For example, descriptive accounts of wire service activities in the disaster area are nonexistent as far as I know, even though they provide the great bulk of the information all of us obtain about non-local disasters. As another instance, even though I once made a limited examination of disaster movies (Quarantelli, 1985), we know practically nothing about the role of popular culture in informing people about disasters, although more generally it is known that scientists in television drama tend to be depicted as forbidding and dangerous characters (see Gerbner et al., 1980).

2) On other topics we presently have enough description that ought to allow us to generate some hypotheses. For example, what accounts for the fact that disaster mitigation measures are very seldom made part of the agenda setting operations of mass communication systems? It could be hypothesized if scientists stressed the social forces in opposition to such changes rather than viewing it as something on which there would be consensus, journalists would see it as a conflict story, and therefore much more likely to be covered. Similarly we now know that the command post notion about where reporters will go for information at the height of emergencies needs to be modified; my initial formulation (Quarantelli, 1981) might be restated in a more qualified way as later suggested:

...the generality of the "command post view" must be qualified somewhat. Radio stations appear to increase their use of public or citizen sources in an attempt to fill their expanded news time. Particularly in news/talk outlets, citizen input was openly sought and often aired with little of the normal gatekeeping activities taking place. Generally television ignored this possible citizen input. Newspapers primarily relied upon citizens for sources for features stories and human interest copy. Therefore, although the views of officials is certainly strongly represented by local media organizations, at least radio and newspapers also tend to present citizen generated content (Wenger and Quarantelli, 1989: 45-46).

3) On a few topics we have enough knowledge so that we should be able to move on to test specific hypotheses. For instance, we have progressed enough in our understanding of the gatekeeping process (see the initial ideas in Waxman, 1973) to know that it increases

in newspapers and decreases in radio and television stations during the emergency time period of disasters. Is this related, as has been hypothesized:

to be the result of different technologies and time frame across media...Both electronic and print media face the similar problems of gathering and processing information in a dramatically altered and nonroutine environment. However, the time frames for their activities differ. The electronic media have the technological capability for immediacy of coverage; the print media generally do not. Because of the contrasting time frames, the former truncates the gatekeeping process, while the latter elaborates it. However, both of these alterations are in response to the same problem, i.e., collecting and processing news content in an altered environment (Wenger and Quarantelli, 1989: 14).

Finally, cross societal studies are badly needed so we can distinguish the more universal versus the more societally specific aspects of the problem. Even if both science and mass communication are generally universalistic rather than specifically societally rooted social institutions, it does not mean there are no other significant social differences which need examination. For example, it might be hypothesized that societies that are "rich" in science and mass communication, have different information flow problems than those who are "poor" in both (to some extent this is correlated with a developed -developing society distinction). From a methodological viewpoint, it should also be noted that content analysis, a well developed social science research technique (see Krippendorff, 1980; McCormick, 1982), lends itself very well to cross-societal studies.

Finally, the nature of mass communications is changing so rapidly that current studies will not possibly provide a good picture of both the near and distant future. Researchers must recognize that the recent changes and development of new electronic technologies in mass media are basically altering the whole phenomena of mass communication in disasters (see Quarantelli, 1989). Many new technologies, from cellular telephones to direct broadcast satellites to videocassette recorders, intervene in new ways between the initial communicator and information recipient. As a social commentator has noted:

The basic direction of change in the media since at least 1970 has been toward the breakup of mass audiences into segments and subgroups, each receiving a different configuration of programs and messages via traditional TV,

cable, satellite, VCR and, soon, interactive hybrids of video and computer (Toffler, 1990: 92).

These phenomena are rather different from the traditional view of mass media use in disasters.

According to some, the new media mean:

new ways of encoding, transmitting, distributing, and displaying information most overtly in the form of new communication technologies. For example, digital, as compared to analog encoding dramatically increases the speed, accuracy, and volume of information that can be exchanged. It efficiently integrates voice, data, and video. It facilitates signal processing and coding techniques. It offers greater privacy and security. But more important, humans are beginning to communicate in new ways as well. New media--from videotext to personal computer networks, from communication satellites to fiber operations--are blurring distinctions that seemed so clear and useful a generation ago (Rice et al., 1984: 34).

Of course, the importance of such technological developments is that they add an interactive and feedback element absent from the one-way media of the past. What will the increasing addition of computers and interactive media technologies do to the operation of emergency management agencies as they attempt to mobilize resources, exchange information, and coordinate activities in disasters? How will the whole process of warning people and communities about disasters be changed by these changes? The new technologies will certainly make a difference, but we have few notions of how they will do so and in what way. At an anecdotal level, it is very interesting to learn that in the Loma Prieta earthquake, the inability to reach San Francisco by phone created the potential for major fire damage and loss of life since a number of smoke detectors in the city are monitored in locations outside of San Francisco and as far away as Chicago, Illinois (A Review, 1990: 4). Future research needs to be done on such matters. There is a tendency for both disaster planners and disaster researchers to look at past disasters. If they are to improve their performances, they would be better off projecting likely scenarios of the future, in which both the nature of disasters and of the mass communications involved will be different in some significant ways from the past and the present.

A Postscript

Actually along some lines I doubt the future will be that much different. This is because, as I tried to indicate earlier, some of the problems are inherent in the very nature of the fields involved. Thus, I think we will continue to have to struggle with the problem indicated in the following anecdote. Sandman in a recent writing wrote:

Virtually everyone outside his or her own field prefers simplicity to complexity, precision to approximation, and certainty to tentativeness. As Senator Edmund Muskie complained to an aide when the experts kept qualifying their testimony "on the other hand": "Find me an expert with one hand." (Sandman, 1986: 8).

I doubt that request will ever be fulfilled in the scientific world.

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