Bundesinstitut
Für gesundheitlichen Verbraucherschutz und Veterinärmedizin

RISK COMMUNICATION FOR CHEMICAL RISK MANAGEMENT

OECD-WORKSHOP
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Ortwin Renn, Hans Kastenholz

In cooperation with
Anne Brüggemann, Philip Gray, Carsten Henschel,
Bernd Rohrmann, Peter Wiedemann

Risk Communication
Chemical Product Risks

An OECD Background Paper

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PREFACE

At the 29th OECD Joint Meeting of the Chemicals Committee and Working Party on Chemicals, the delegates expressed their support for a project on risk communication.

The aim of the project is to develop generic principles of effective risk communication with regard to risk management of industrial chemicals. The governments of Austria, Canada, Germany and Switzerland, in co-operation with BIAC, have agreed to co-sponsor a workshop to discuss communication tools and approaches that can help OECD Member countries achieve their chemical risk management objectives in the most efficient and effective manner.

For this workshop, a background paper has been prepared in order to describe why and in what way appropriate risk communication is an essential element of an effective risk management programme. The second objective was to identify the issues and questions pertinent to the Panel Discussions and Break-Out sessions at the Workshop. An annex to the background paper includes a 'State of the Art Report on Risk Communication', a 'Risk Communication Resource Book', the 'Report for the OECD – Results of the Study on Risk Communication', and a 'Selected Bibliography' on Risk Communication. The background paper is now distributed in advance to persons who will be attending the Workshop.

Together, the background paper and the consolidated report of the Workshop presentations and the discussions at the break-out sessions will provide the Joint Meeting with an opportunity to address the question as to whether and how to proceed with the preparation of a guidance document on risk communication that could be published by the OECD.

To date, the scope of the project has been on risk communication issues related to consumers of chemical products. However, the Issue Team recognises the importance of drawing on risk communication work conducted for other relevant issues (e.g., chemical releases from industrial facilities), other sectors (e.g., the food industry) as well as other target groups (e.g., workers), as there may be experiences and 'lessons learned' that could be of value to the project. It is hoped and expected that the outputs from the OECD Risk Communication project will be developed in such a way that they can be applicable to, or can serve as templates for, other relevant issues, sectors or target groups. Experts interested in risk communication issues beyond chemicals as well as a broad range of stakeholder groups should thus be encouraged by such an approach to participate in the project.

In the course of the preparations, the OECD Issue Team was careful to ensure that as broad a spectrum of opinions as possible was voiced on all subjects to be addressed at the Workshop. Therefore, we have provided in the agenda one day for contributions by the participants in addition to the papers and this background document.

It will be a great pleasure to welcome you as a participant and I look forward to many lively and fruitful discussions.

Dr. Rolf F. Hertel
Director and Professor
Chair
OECD Issue Team on Risk Communication

OECD Issue Team on Risk Communication

William Bishop	BIAC
Ulrich Bornewasser	BIAC
Jacques De Peyer	Swiss Federal Office of Public Health
Teruyoshi Hayamizu	Japanese Environmental Agency
Rolf F. Hertel (Chair)	BgVV, Germany
Scott Houston (Secretary)	BIAC
Hans Kastenholz	Center of Technology Assessment, Germany
Paul Kreuzer	STTV-National Product Control, Finland
Edmund Plattner	Ministry of Agriculture, Forestry, the Environment and Water-management, Austria
Ortwin Renn	Center of Technology Assessment, Germany
Richard Sedlak	Soap & Detergent Association, USA
Richard Sigman	OECD
Joel Weiner	HCSC Canada
Julie Wyeth	HSE, UK
Maged Younes	WHO/PCS

Corresponding participants

Roccio Alatorre	Mexico
Karel Blaha	ENV Szechien
Cristina Cortinas de Nava	Mexico
Karen Cronin	Newzealand
Alessandro DiDomenico	ISS Italy
Marion R. Evans	HSE, UK
Andrew Fasey	HSE, UK
Jeongue Park	Korea

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INTRODUCTION TO THE BACKGROUND PAPER

Risk communication emerged out of research in risk perception that showed that public concerns about hazards did not correspond with the risk assessments of most experts. Experts and the governmental regulatory bodies manage hazards based on scientific assessments of their potential risks. Risk in this context is defined as a combination of magnitude and probability of a hazard event occurring. Risk perception research showed that most members of the public share a different understanding of the term risk. They employ a number of qualitative risk characteristics, such as voluntariness, dread, control options, and familiarity, when confronted with hazardous situations and asked to evaluate risks (Slovic 1987). The field of risk communication developed as a means to research how best expert assessments could be communicated to the public so that the tension between public perceptions and expert judgement could be reduced (Plough and Krimsky 1987). During the last two decades, numerous risk communication projects were launched as a response to both the environmental regulation requiring open information policies as well as to the increasing demands by the public to be informed about the potential hazards that they face. Consumers of chemical products as well as neighbors of chemical facilities all over the world have become more sensitive when it comes to exposure to chemical risks. They demand to gain better access to information about the potential risks and want to be involved in two-way-communication programs.

Based on these demands, the practice of risk communication evolved over several stages: In a recent article, Baruch Fischhoff identified six phases in risk communication. It first started with the notion that risk communicators wanted to convey the correct numbers. This approach obviously failed. So risk communication practices evolved over five additional steps of changing risk communication paradigms, until the professional risk community came to the conclusion that risk communication entails making the public a partner in the mutual attempt to manage risks. The recent report by the U.S. National Academy of Sciences echoes this new understanding of risk communication and encourages risk professionals to foster stakeholder participation and involvement in risk management (Stern and Fineberg 1996). The report emphasizes the need for a combination of assessment and dialogue which the authors have framed the "analytic-deliberative" approach. Two-way communication and stakeholder involvement are the two major instruments of the latest stage in risk communication.

The popularity associated with the concepts of two-way-communication, trust-building, and stakeholder participation, however, obscures the challenge of how risk communicators can and should put these noble goals into practice and ensure that risk management reflects competence, efficiency, and fair burden sharing. How can and should risk managers collect public preferences, integrate public input into the management process, and assign the appropriate

roles to technical experts, stakeholders (i.e., socially organized groups that are or perceive themselves as being affected by the decision) and members of the public? Who represents the public? The elected politicians, administrators, stakeholders, or all persons who will be affected by the risk? There is a large amount of individual variance when lay persons are asked to give their best risk estimate (Drottz-Sjöberg 1991; Dake 1991). Which estimate should be used for risk management? Which concerns are legitimate for being used in decisions that may determine life or death of many people?

There are no simple answers to these questions. This was one of the main reasons why OECD began work in this area. The OECD Risk Management Programme of Work calls for the development of ”methodologies and technical tools for socio-economic analysis and management of communication of risks”. To meet this mandate, an Issue Team was formed to:

– identify what Member countries are doing in the field of communication and management of the risks posed by chemicals (i.e., identifying the different approaches and communication tools being used, lessons learned, and possible areas where improvements could be made and that could benefit from future international cooperation); and,
– develop basic principles or generic tools which could be used as guidance to improve communication among stakeholders.

The Issue Team is chaired by Germany with the assistance and support of the International Council on Metals and the Environment (BIAC). The Issue Team also includes representatives from Canada, DG24 of the European Commission, Japan, New Zealand and the United Kingdom.

One of the first tasks of the Issue Team was to survey experts in Member countries (government, industry, academia and other NGOs) to ascertain their interest in having the OECD do work in the field of risk communication. In addition, the survey was designed to collect information that would help prioritize those issues that would benefit from discussion at the international level, keeping in mind the important differences in social and cultural values that exist between OECD Member countries. The Issue Team asked a group of social scientists directed by Ortwin Renn (Center of Technology Assessment, Germany) to develop the survey and report on the results (see Annex III).

The results of the survey revealed an overwhelming support for the continuation of the project, and, in particular the organization of an OECD Workshop on risk communication for the chemical sector. The report of the workshop, could serve as input into the preparation of a guidance document that could be published by OECD. OECD Member countries will review the workshop report at the November 2000 Joint Meeting of the Chemicals Committee and

Working Party on Chemicals, Pesticides and Biotechnology, and decide whether and how to continue work on the development of a guidance document on risk communication.

In support of the workshop, the Issue Team began work on a background document on risk communication (this report) to:

- describe why and how good risk communication is an essential element of an effective risk management program;
- identify those issues and questions that will be pertinent to the panel discussions and break-out sessions during the workshop in September of 2000;
- point out the opportunities of risk communication in the chemical sector from a practical perspective;
- make communicators aware of the problems, risks, and pitfalls of risk communication;
- list relevant resources that are available for risk communicators (i.e., books, articles, videos, websites, etc.) and
- provide initial thoughts on the key points which could appear in guidance for successful risk communication efforts.

Meeting these broad objectives requires first a clear focus for composing a meaningful and useful background document and secondly a stringent and economical structuring of the material in line with the chosen focus.

While there are many important aspects of risk communication, the OECD Member countries decided that the background document (and later the workshop) should focus primarily on chemical products for consumer use, including some considerations about the public perception of chemical risks in general. None-the-less, OECD Member countries recognize the importance of drawing on risk communication work conducted for other relevant issues (e.g., chemical releases from industrial facilities) other sectors (e.g., the food industry) or for other target groups (e.g., workers) as there may be experiences and lessons learned that could be of value to this project. To meet the second requirement, i.e. to propose a clear and consistent structure of the background paper, the following overall structure of the document has been used:

- *Part 1* serves as an executive summary for the whole document. It covers the main areas of the background paper and provides a clear and precise set of practical advice for different risk communication purposes.
- *Part 2* contains the main body of the background paper. In order to make it as useful as possible for the participants of the workshop, it is organized in accordance with the themes of each break-out session of the proposed workshop in September of 2000. Part

2 provides background material on all the major issues that will be addressed during the workshop. Each subchapter includes a precise description of the results and practical implications of risk communication research with respect to each session topic.

– *Part 3* consists of a set of practical orientations for risk communicators with respect to chemical risks.
– *Annex I* comprises a ”state of the art” report on risk communication. This part serves as a primer for anyone interested in the research results of risk perception and communication studies. The material presented there represents an overview of the major accomplishments and insights with respect to risk communication research and practice. It contains all the scientific evidence for the conclusions drawn in Part 2 of the background document. Since the survey revealed that most participants had a strong interest in getting more information on the main objectives of risk communication (enlightenment, trust-building, behavioral adaptation, conflict resolution), we structured this part in accordance with these main communication functions. Less importance has been given to behavioral adaptation so that the material collected in Annex I is primarily focused on enlightenment (perceiving and processing risk information); trust-building (credibility of communicators) and conflict resolution (stakeholder involvement).
– *Annex II* serves the function of a resource book. It lists the main manuals on risk communication and provides a brief description of what potential users can expect to find there with respect to communicating chemical risks. It also provides an overview of case study material. In addition, Part 3 includes useful addresses and Internet links where interested risk communicators can get more information or assistance.
– *Annex III* summarizes the main results of the OECD survey on risk communication.
– *Annex IV* includes a bibliography of all relevant literature.

The Annexes of the background paper should be used like an encyclopedia. Each chapter in Annex 1 is written in a way that it does not build upon the material presented in the previous chapters. So if somebody, for example, wants to know more about the effects of the media on risk perception, the main insights can be found in main body of Part 2. For more and detailed information, one can look up the corresponding chapter in Annex 1. For all those readers interested in existing manuals or information links, Annex 2 provides the necessary material. Finally, if one would like to know what the exact references, the bibliography in Annex IV could be consulted.

PART I

EXECUTIVE SUMMARY

1. PURPOSE OF PAPER

Considering the need for risk communication in the chemical sector and the new developments in the practice of communication, the OECD Risk Management Programme of Work calls for the development of ”methodologies and technical tools for socio-economic analysis and management of communication of risks”. To meet this mandate, an Issue Team was formed.

The Issue Team is chaired by Germany with the assistance and support of the International Council on Metals and the Environment (BIAC). The Team also includes representatives from Canada, DG24 of the European Commission, Japan, New Zealand and the United Kingdom.

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chemical products for consumer use, including some considerations about the public perception of chemical risks in general.

Chemicals in products are as much part of modern life as are electronic devices or communication tools. Public concerns about the health and safety implications of chemical products have been primarily targeted towards food items and pharmaceuticals. Pesticides and herbicides have also been in the focus of public debate. Regulations have been in place as a means to minimize risks to the consumers. In spite of major regulatory actions by specialized agencies and risk communication efforts by companies, the public perception of chemical risks has remained critical over the last two decades. Risks from chemicals are difficult to communicate because they are usually effective only over a longer time period, may induce negative impacts only in combination with other risk factors (such as lifestyle and nutrition) and can hardly be detected by human senses. Risk communication in this area needs to address the following major challenges:

– to explain the concept of probability and stochastic effects;
– to explain the difference between risk and hazard;
– to cope with long-term effects:
– to provide an understanding of synergistic effects;
– to improve the credibility of the agencies and institutions that provide risk information (which is crucial in situations in which personal experience is lacking and people depend on neutral and disinterested information).

As modern economies rely on safe and reliable products, it is essential that all users of chemicals be informed about potential risks and the necessary precautionary measures to protect themselves. At the same time, it is necessary to communicate with people about their worries and concerns even if they are not backed up by scientific evidence. Risk communication is a mandatory step in the chain of responsible management. Governmental agencies, industry and NGOs are all required to take part in this communication effort.

This report focuses primarily on the issues and challenges facing risk communicators involved with risk management of chemical products for consumer use. Communication to the needs of consumers include three major elements: information about the risks of the product, the circumstances of the production and transportation of these products, and the beliefs and associations with respect to the producers or regulators. In addition, many consumers want public stakeholders to be involved in the regulatory and communication process. The importance of communication will be demonstrated from the standpoint of the regulatory agencies of the OECD member countries, but the lessons provided below are also useful for other communicators in the field, i.e. industry, consumer associations, and other NGOs.

2. RISK PERCEPTION

One of the most prominent obstacles towards effective risk communication about chemical products is the intuitive process of risk perception. Regardless whether consumers prefer industrial or environmental values, their cognitive frame is marked by the concept of chemicals as pollutants and poisons. What does this situation mean for risk communication?

– Risk information should be related to the qualitative characteristics that people associate with risk. These characteristics include: dread, familiarity, personal or institutional control, perception of fairness in risk-benefit distribution, assignment of blame, and others. It is important to address these concerns rather than focussing on probabilities and magnitude of risk only. Consumers perceive risks of chemical products predominantly under a health perspective; environmental considerations play a role only if they are amplified by mass media or induced into the debate through political mobilization. In addition, production methods (such as using methods of genetic engineering) do matter for consumers when judging risks and their acceptability.

– Often consumers associate hazards with consumer products and underestimate the dependency of effects from dose and circumstances of exposure. If a product contains an ingredient, which might be toxic or carcinogenic at a higher dose, most people judge the mere presence of this ingredient as sufficient proof for its immanent danger. Since consumers have to rely on experts for providing them reliable information on dose-effect-relationships, trust becomes a crucial issue for risk management. In low trust situations, consumers usually demand the absence of known hazards from anything they might be exposed to. As a consequence, trust-building becomes a major task for all communication efforts (see Section 5).

– Any communication program should avoid linking the risk communication effort to vested interests. If risk communication is being perceived as a new strategy of industry to avoid risk reduction measures and to avoid being subjected to the precautionary principle, the communication program will be rejected by most observers. There would be little chance for a regulatory reform. Rather risk communication programs should stress the potential benefits of a regulatory regime that takes all serious risks into account and that makes sure that the benefits are equally shared by industrialists, environmentalists, and the consumers. It needs to be proven that public health is served better if risk regulation is based on thorough assessments rather than on suspicions.

Risk communication is particularly difficult for high-consequence low- probability risks, which are associated with involuntariness, dread, lack of control, and unfamiliarity. To address these negative risk characteristics, it may be helpful to point to functional equivalents of these characteristics in a broader societal context. Potential equivalents are the assurance of a democratic decision-making process to counteract the impression of involuntariness and, as a replacement for personal control, the independence and impartiality of operating and regulating institutions. This may produce trust in their capability to monitor routine emissions, check safety devices, and intervene if safety of consumer products is jeopardized.

3. THE ROLE OF THE MEDIA

All mechanisms of risk perception are contingent on information derived from either personal experience, interaction with others or intermediary sources. A vast amount of information about risks stems from intermediary sources. People develop attitudes and positions with respect to risky technologies and or activities on the basis of second-hand information. This information is transmitted by the mass media. Many beliefs about risks and risk sources are hence shaped or at least influenced by the information and evaluations that the media transmit to their consumers. The media perform a dual role in the communication process: first, they collect information from primary sources and process this information by applying professional and institutional rules that govern the selection of received messages and their interpretation. Second, they send information to the final receiver. What can risk communicators do in dealing with the media?

– With respect to handling the media, risk communicators should be aware of the major selection rules of the media. Media report about events, not continuous performance. Hardly any journalist is interested, for example, in writing a story about a long safety record of a hazardous waste facility. If such a facility, however, faces an accidental release of hazardous material, one can be sure that this event will become headline news. To get a message across, communicators need to link their message to events, not necessarily physical events. Social events such as a celebration of 25 years of safe performance of a chemical factory or a completion of a scientific study can also meet the event requirement.

– Another major characteristic of the media is their interest in eyewitness reports. These testimonies relate abstract issues or events to unique human experiences (which journalists assume help readers to identify with the victims or managers of the risk). Information that emphasizes the human component and personalizes abstract material is

more likely to be accepted by the media than documents about the sequence of events or organizational competence. However, risk communicators should be aware that "packaging" the information for the purpose of pleasing the transmitter always faces the risk of creating suspicion and distrust. Transmitters often associate good packaging with the intent to manipulate the audience. One should never forget that social transmitters of information processing are not computers or radios that operate according to prestructured rules, but they constitute thinking beings who reflect the messages they receive and change their selection rules to fit the circumstances.

4. TOOLS AND APPROACHES

After looking at risk perception and the media, this subchapter will focus on the communicator and his or her role in the risk communication process. Although topics vary from risk source to risk source, most risk debates center around three themes:

– factual evidence and probabilities;
– institutional performance, expertise, and experience;
– conflicting conceptions about world views and value systems.

The first level involves factual arguments about risk probabilities and the extent of potential damage. If the problem is a lack of technical knowledge on the part of the public, procedures of communication should focus on informing the public with the consensual expert opinions. The second, more intense, level concerns institutional competence to deal with chemical risks. At this level the focus of the debate is on the distribution of risks and benefits, and the trustworthiness of the risk management institutions. At the third level the conflict is defined along different social values, cultural lifestyles, and their impact on risk management. In this case, neither technical expertise nor institutional competence and openness are adequate conditions for public involvement. What can risk communicators do to address these three levels adequately?

a. If the problem is located on the first level, i.e. the information needs are centered around technical information, the best tools are:
   – brochures that are well tested with the target audience;
   – information videos or Internet presentations (again tested for comprehensibility and attractiveness);
   – direct lectures or learning experiences (hands-on experiments, evening school, consumer training, etc,).

b. If the problem is located on the second level, these tools and approaches do not suffice. Institutional performance and trustworthiness demand additional means of communication. Among them are:
   - inspection tours of facilities;
   - face-to-face meeting between skeptics of the organization and organization leaders;
   - open book procedures (no secrecy, no hidden agendas);
   - data link of environmental performance values from a company to environmental; groups (so they can see the performance);
   - inclusion of skeptical stakeholder in an advisory board or expert committee.

c. If the problem is located on the third level, values and lifestyles are the main issues of communication. This level demands instruments and tools that are directed towards discourse and two-way-dialogue. Among them are:
   - Round Tables with representatives of different stakeholder groups;
   - mediation, arbitration or alternative dispute resolution mechanisms;
   - direct citizen participation through advisory boards, panels, juries, etc.;
   - involvement in governmental programs for priority setting and regulatory actions;
   - participation in public debates and open forums.

The idea behind third level debates is to find a common understanding of the goals and visions for the future development of industry, society and social affairs. Consumer protection is one element in this larger framework of social concerns ranging from social justice to societal responsibility for personal growth and well-being. Regulatory agencies as well as industrial representatives are expected to participate in such debates as this is part of the legitimizing efforts of social forces in a plural society. At the same time, issues of risk-taking and risk tolerance demand discourse-based activities that provide reassurance to each actor that all views are taken into account and that provide sufficient incentives for reaching common grounds or even a common consensus.

5. TRUST AND CREDIBILITY

What kind of advice can we give to risk communicators of how to design and implement a risk communication program that incorporates the findings of past research on trust and credibility? If OECD regulatory agencies want to reach a situation where confidence is placed in the efficiency and effectiveness of their actions, they will have to fulfill some preconditions, which determine their prospective role in risk communication. These requirements can be structured according to the target element to which trust should be assigned.

a) To improve the *trust in a message,* we recommend explaining the rationale of risk analysis and its role for risk management so that the audience is better prepared as to what to expect. In addition, the decision making process and the past record of the institution should be included in the message so that people can assign competence to the actors and get a better feeling of the trade-offs that had to be made in meeting the specific risk management task. Evidence of competence, fairness towards other viewpoints, and references to commonly shared values and beliefs will make a message more attractive and could help to address the centrally and peripherally interested audience at the same time. Conclusions should be made explicit and vested interests should not only be admitted but justified in terms of public mandate or economic function.

b) To improve *trust in a personal communicator,* the major goal is to develop a communication climate that enables the audience to identify with the communicator and to share his or her experiences and beliefs. The more a communicator manages to avoid the mask of an institutional spokesperson and the more he or she can express compassion and empathy for the audience, the more likely the audience will identify with the speaker and feel compelled to the arguments. Conveying probabilistic information is a real challenge, but can be done in reference to everyday experience of budget constraints and consumer products. Furthermore, evidence of successful use of risk analyses in hazard management can serve as demonstration to define the role and limitations of risk analysis in improving public health and the environment. Reference should be made to commonly shared symbols, appealing formats, and to previous performance record of openness and honesty. One should definitely avoid negative labeling of potential opponents or typical advertising gimmicks

c) To improve the *credibility of an institution,* the vital factor is performance, not public relations. Confidence has to be gained by meeting the institutional goals and objectives. In addition, credibility is linked to the evidence of being cost-effective and open to public demands. These two goals are often in conflict with each other, however, they have to be treated as complementary, and not as substitutive goals. Fairness and flexibility are major elements of openness. In addition to assuring sufficient external control and supervision, public participation may be implemented as a means to demonstrate the compliance with the political mandate and to avoid the impression of hidden agendas. On the premise of good performance, communication programs can be designed that reflect these accomplishments. Such programs should provide honest, complete, and accurate information that is responsive to the needs and demands of the prospective audience. This can only be done if the source engages in an organized effort to collect feedback from the audience and establish a two-way communication process. Involvement of citizens, open house

policies, discussion forums, open TV channels, or other means should be explored to assure the functioning of the two-way communication structure.

d) To *improve the social climate* is not within the realm of possibilities for a single communicator. But large-scale organizations or association of organizations can affect the overall climate. One way to improve the climate is to accept and even endorse checks and balances in the control of the organization. The other obvious solution is to demonstrate the flexibility and foresight of the organization in meeting and anticipating new public claims and values. The impersonal nature of institutions may be mitigated by providing special local services and by engaging in community activities and programs. Governmental institutions will receive more credibility if they do not leave the impression of permanent crisis management, but of competence and preparedness for long-term threats and challenges (in particular pertaining to environment and technology).

Without credibility, governmental agencies to regulate chemical risks will not play any role in establishing reasonable standards, whatever institutional form they will have. Successful communication begins before imparting information; it creates the institutional and structural preconditions for information and resulting recommendations to be accepted.

6. STAKEHOLDER INVOLVEMENT

What advice can we give to risk communicators of how to design and implement a risk communication program that incorporates the main findings of past research on stakeholder involvement? The first lesson is to distinguish among the three levels of the debate as mentioned above. Nothing is more detrimental and frustrating for all participants involved than addressing an audience who expects a third level debate and is confronted with a detailed technical analysis of the issue. The risk communicator should investigate the level of debate beforehand and design different communication programs for each level.

When organizing communication programs for stakeholder involvement, several criteria should be met. Among those criteria are:

– *Variability of options:* Do the participants have the choice to select one option out of a variety of options that are all feasible in the specific situation? This is particularly important, if government agencies organize involvement processes, as the participants expect several options from which they are allowed to choose. If the purpose is only to

convey a message or to improve understanding among the constituencies, stakeholder participation via discourse is not the right format.

– *Equity of exposure*: Are all stakeholders or the respective constituency exposed in some way to the potential disadvantages of the proposed options? (so to avoid a distinction between affected and indifferent stakeholders). If stakeholders are invited to participate, they should have an equal interest in the matter. Otherwise, people will question the legitimacy of peripheral stakeholders to be present at the discourse table.

– *Personal experience*: Do participants have some experience with the problem and do they feel competent to give recommendations after they are further educated about the problem and the remedial options? This is particular relevant if consumer issues are at stake. Participating stakeholders should be knowledgeable about major consumer issues and have a basic understanding of chemical risk management.

– *Personal relevance:* Do participants judge the problem as serious enough to sacrifice their time to work on solutions? It might be frustrating for a governmental agency to invite stakeholders to a common problem-solving discourse, but most of the invitees do not show up. The organizers have to make sure that all relevant stakeholders have an interest in and a commitment to the process.

– *Seriousness and openness of agency:* Is the managerial level of the inviting agency willing to accept or at least carefully consider the recommendations of the discourse or does s/he pursue hidden agendas? Often, agency personal responsible for risk communication are enthusiastic about stakeholder involvement, this enthusiasm is, however, not shared by the upper management. Again, it is very frustrating for all participants, if the recommendations are not taken seriously by the decision-makers.

The mere desire to initiate a two-way-communication process and the willingness to listen to public concerns are nor sufficient for involving stakeholders. Discursive processes need a structure that assures the integration of technical expertise, regulatory requirements, and public values. These different inputs should be combined in such a fashion that they contribute to the deliberation process the type of expertise and knowledge that can claim legitimacy within a rational decision making procedure. It does not make sense to replace technical expertise with vague public perceptions nor is it justified to have the experts insert their own value judgments into what ought to be a democratic process. These arguments have motivated the recent U.S. Panel on Risk Characterization to advocate an "analytic-deliberative approach by which expertise and deliberations are systematically linked with each other.

7. EVALUATION

Evaluation of risk communication is crucial for the measurement of success or failure. Risk communicators are well advised to have an evaluation program at hand before they launch a risk communication program. The empirical analysis of the effects and side-effects of communication will help them to redesign the communication process over time and to improve their communication efforts. With respect to the study *design for evaluation of risk communication programs*, crucial issues include:

– the specification of target populations (representing all relevant parties in the communication process),
– a longitudinal design, appropriate timing of data collections and the inclusion of control groups.

There are two focal issues of causality to be considered: (1) to show that intended effects are actually induced by the intervention under examination (and not other concurring extraneous influences); and (2) to clarify whether unintended impacts are caused by the program.

In a wider perspective, the researcher needs to explicate whether conclusions about the content, process and outcomes of the RC campaign are valid beyond the specific circumstances and participants of the study.

8. CONCLUSIONS

The objective of this executive summary was to review the current knowledge about risk communication with respect to chemicals for consumer use, to present the empirical evidence with respect to the effectiveness of risk communication, and to delineate some practical guidelines for risk communicators based on psychological or sociological research.

Almost all risk communication studies have one message in common: Risk communication is not a public relations problem. Advertisement and packaging of messages can help to improve risk communication, but they will be insufficient to overcome the problems of public distrust in risk management institutions and to cope with the incapability of the present risk arena to produce rational and consistent risk policies. The potential remedies to these two problems lie in a better performance of all institutions dealing with or regulating risks and in a restructuring of the risk debate to meet the requirements of a two-way communication process.

With respect to performance, it is well understood that many risk management institutions complain that their specific task is not well understood and that public expectations do not match the mandate or the scope of management options available to these institutions. This is specifically prevalent in the risk arena because the issue at stake, health and environment, tops the concerns of the public of all OECD countries and because the stochastic nature of risk impedes an unambiguous evaluation of management success or failure. In addition, chemicals are often associated with artificial ingredients that cause suspicion and fear.

In spite of these difficulties, careful management, openness to public demands, and continuous effort to communicate are important conditions for gaining trustworthiness and competence. They cannot guarantee the success, but they make success more probable. Therefore, the *first major lesson of risk communication is to start with a critical review of one's own performance.* Is the performance good enough to justify public trust? Are mechanisms in place that help to discern the needs and requests of stakeholders and the general public? Is a two-way communication program implemented? Is the communication honest, clear, comprehensive, and timely?

If these questions can be positively answered, the designing of communication can be optimized. The *second major lesson of risk communication is to tailor communication according to the needs of the targeted audience and not to the needs of the information source.* Providing information that people request is always more effective than providing answers to questions that nobody has asked. Most of the guidelines in Part III ”Orientations” specify the premises and conditions for a receiver-focused communication program.

The *third major lesson of communication is to adjust and modify one's communication program as a result of an organized effort to collect feedback and to sense changes in values and preferences*. Many successful programs of the past have turned out inappropriate to address the audience of today. Constant adjustment requires efforts to collect systematic feedback from the community, the relevant stakeholders, and the general public. This calls for a continuous evaluation program.

By carefully reviewing in-house performance, by tailoring the content of the communication to the needs of the final receivers, and by adjusting the messages to the changes in values and preferences of a pluralist public, risk communication can convey a basic understanding for the choices and constraints of risk management and thus create the foundations for trustworthy relationship between the communicator and the audience. Although many receivers of risk information may not agree with the actual decisions institutions have made in setting priorities

or selecting management options, they may realize that these decisions are results of open discussions and the assignment of painful but reasonable trade-offs.

Even if all these suggestions are followed, risk communication may not work. External influences, the overall climate of distrust, management failures in the past, and specific incidents can transform risk communication into a never-ending frustration. This frustration -so familiar to most risk managers- is an indication of the need for a more fundamental risk discourse. Such a discourse can help to resolve the fundamental choices with respect to basic values and preferred lifestyle, i.e., the contents of a third level debate, as described in section 4 of this summary.

The ideal target of risk communication is not the person who readily accepts and believes all the information given, but who processes all the available information to form a well-balanced judgment in accordance with the factual evidence, the arguments of all sides, and his/her own interests and preferences. To accomplish this goal, a risk communication program is needed to provide the necessary qualifications to all participants and empower them to be equal partners in making decisions about risk. The ultimate goal of risk communication is reconciliation of expertise, rational management strategies and public preferences.

PART II

BACKGROUND PAPER

1. FOCUS OF THE BACKGROUND PAPER

Chemicals in products are as much part of modern life as are electronic devices or communication tools. Many consumers, however, are often not aware of the multitude of chemical ingredients in almost any product of their choice, and if they are, they are often concerned about the potential side effects of these chemicals for human health and the environment. Chemical products are often perceived as ”unnatural” and associated with hidden risks. As modern economies rely on safe and reliable products, it is essential that all users of chemicals are informed about potential risks and the necessary precautionary measures to protect themselves. At the same time, it is necessary to communicate with people about their worries and concerns even if they are not backed up by scientific evidence. Risk communication is a mandatory step in the chain of responsible management. Governmental agencies, industry and NGOs are all required to take part in this communication effort.

In addition, the chemical industry (producers of organic and inorganic chemicals) as well as governmental agencies for regulating chemicals are faced with increasing requirements by the public, customers and politicians concerning the production, use, and disposal of chemicals. A highly differentiated and complex system of regulations exists on the regional, national, and international level. In Germany alone, chemical manufacturers are confronted with more than 10,000 regulations. Companies that trade all over the world have to comply with a multitude of laws and regulations, which in part conflict with each other. The legal situation is thus another major incentive to meet all information requirements.

Based partially on legal requirements and partially on public concerns, chemical manufacturers face increasing demands for more information and participation from the consumers, special stakeholder groups, and the public at large. The need for risk communication has been voiced since the late 1960s. Although the chemical industry was not the prime target of public interest in risk issues (as was, for example, the nuclear industry), it became more and more involved in risk controversies and public debates. A series of hazardous incidents (Bhopal, Seveso, Basel) increased public awareness of chemical risks and pressured governments and regulators to reduce or control risks. Public authorities reacted by tightening the regulation. Most prominent examples are the SARA Title III in the United States and the Seveso Directives in the EU. In both instances, chemical manufacturers are required to set up management procedures to describe and reduce plant related risks, to cooperate closely with local authorities, to improve emergency planning and to communicate risks and behavioral guidelines for coping with emergencies to the neighbors.

The chemical industry has responded to these new initiatives by launching its own program on Responsible Care. It started in the United States in the mid 1980s and has been extended to all OECD countries since then. The goal is to make health, safety and the environment part of decision making culture within the company and beyond. The Responsible Care Program includes emergency response plans, community advisory panels and local emergency planning committees. It addresses environmental protection, occupational health, product stewardship and communication with public. Responsible Care is only but one program of risk communication. Reference could also be made to ICME‘s Environmental Charter as well as to the ongoing activities of the chemical manufacturers of metals and metal products to provide information and better data to improve the understanding of their products and facilitate proper risk assessments.

Parallel to the issues of risks from chemical facilities, societies have been preoccupied with the notion of risks associated with consumer products. Public concerns about the health and safety implications of chemical products have been primarily targeted towards food items and pharmaceuticals. Pesticides and herbicides have also been in the focus of public debate. Regulations have been in place as a means to minimize risks to the consumers. In spite of major regulatory actions by specialized agencies and risk communication efforts by companies, the public perception of chemical risks has remained critical over the last two decades and has become even more critical in many countries over this time period. Most risks implied by chemical products are closely related with sensible use. Side effects of pharmaceuticals, toxicological or eco-toxicological effects of pesticides or herbicides, potential negative impacts of textile colors or plastic toys are all linked to the ”wise” use of these products by professionals or consumers. These risks can be significantly reduced if users know more about the characteristics of the product and its risks. For this matter, risk information and consumer labels (distinct from material safety data sheets required for commercial trade) have been a major challenge for the chemical industry for a long time. In addition, regulators have been active in providing information to consumers themselves or demanding manufacturers or distributors to attach information to their products.

For most chemical companies, product labeling such as data sheets and consumer information constitute two different domains. Most buyers of chemical products are other chemical companies that use basic chemical commodities as intermediates to produce final products such as detergents, paints, polymers, pharmaceuticals, and others. Even the customers of these final products are more often other companies, such as car manufacturers, the hardware industry, the appliance industry, the homebuilders etc., than private consumers. Labeling requirements for intermediate or industrial products are directed towards other professionals who have experience with the product and are trained to deal with risks. The labels normally include de-

tailed descriptions of physical or chemical properties, required handling procedures and other safety information (for example the material safety data sheets). These labels are not comprehensible for a private consumer unless this person happens to be a professional in the field.

Most of the regulatory effort has been directed towards the labeling requirements. Agencies demand more comprehensive assessments of all chemicals that are introduced into the market. The chemical industry has intensified its efforts to assess its main products. Between 1988 and 1993, the German Chemical Industry checked about one thousand High Volume Products (HVP) that make up for 90 % of the production. More recently, the International Chemical Companies Association (ICCA) launched a program to assess 1.000 HVP by OECD criteria. The Association of the German Chemical Industry (VCI) announced a voluntary program that would provide data on toxicological as well as eco-toxicological characteristics and the persistency of all products with more than one ton per year, including intermediates. Providing all this information for regulatory agencies and producers further downstream is not a trivial task. Considering the mere number of many thousand intermediates, the complexity and uncertainty connected with exposure pathways and effects, the implications of the whole life cycle of the products involved, and the cross-national trade of these products, labeling requirements are still a major challenge for industry and regulators alike.

The requirements for risk assessment and labeling are not the main focus of this report, however. Our attention is to concentrate our analysis on the second major partner in risk communication, i.e. the consumer. Consumer information has a different purpose compared to labeling products: It is directed towards the end user of a product who is not a professional in the field and is likely to respond in line with his or her risk perceptions. Information for this purpose needs to be basic, attractive for a lay audience and understandable. It should also reach its main objectives, i.e. to educate consumers to use the product in a safe and reliable manner. In addition, consumers are not only concerned about the risks coming from the product, they also raise concerns about downstream and upstream handling of the product that they purchase. Many consumers in Europe reject, for example, the use of genetic modification in agriculture and the food industry, even if they are convinced that the final product is safe for them. Perceptions of safety and health risks rely on the perceived priorities of the product, the circumstances of the production method and transportation modes, and the credibility and trustworthiness of the producer and the regulator.

All of these issues will be addressed in the report. In addition, many consumers want public stakeholders to be involved in the regulatory and communication effort. Therefore the report also highlights the opportunities and problems of stakeholder involvement. Other topics to be addressed include the role of government in ensuring the successful interface between all

stakeholders, recent trend towards greater transparency and access to information legislation. The importance of communication will be demonstrated from the standpoint of the regulatory agencies of the OECD member countries, but the lessons provided below are also useful for other communicators in the field, i.e. industry, consumer associations, and other NGOs.

2. CHALLENGES OF RISK COMMUNICATION IN THE CHEMICAL SECTOR

Risks from chemicals may influence the physical, natural and human environment. Most private consumers are concerned about the health risks, environmental impacts and the safety of chemicals. Risks from chemicals are difficult to communicate because they are usually effective only over a longer time period, may induce negative impacts only in combination with other risk factors (such as lifestyle and nutrition) and can hardly be detected by human senses. Risk communication in this area needs to address the following major challenges:

- to explain the concept of probability and stochastic effects;
- to explain the difference between risk and hazard;
- to cope with long-term effects;
- to provide an understanding of synergistic effects;
- to improve the credibility of the agencies and institutions that provide risk information (which is crucial in situations in which personal experience is lacking and people depend on neutral and disinterested information).

Risk communication to consumers is a necessary and demanded activity, which is partly prescribed by governmental requirements and regulations, partly required by stakeholder demand and public pressure. In the light of new activism by consumer and environmental groups, chemical companies as well as governmental agencies feel obliged to provide more information and guidelines for consumers (as well as workers and bystanders). This new challenge is embedded in a new industrial and political paradigm of openness and ”right to know” policy framework. In addition, globalization and international trade make it mandatory that products are properly labeled and potential end users in different countries have sufficient information to handle the products safely.

There are different sources for potential human or environmental damage that have been associated with the use of chemicals. Among them are:

- endocrine disrupters (pseudo-estrogens);
- pesticides and herbicides;

– softeners;
– Persistent organic pollutants;
– genetically engineered products;
– carcinogenic substances;
– complex mixtures with links to multiple chemical syndrome and other related diseases.

The risks of all these potentially dangerous chemicals have been assessed by scientists within industry, universities and regulatory agencies. The normal assessment process follows a well-defined protocol of toxicological or epidemiological procedures, which ensure that regulatory or other management actions are based on significant evidence of a potential damage. The new trends in risk management go beyond efforts to assess risks, however. The EU Environment Commissioner Margot Wallstrom has announced that the EU chemicals policy will be among the top priorities of the coming EU Sixth Environmental Action Program. She favors a shift from a risk-based assessment to the application of the precautionary principle). In its recent communication, the EU Commission stated: ”Applying the precautionary principle is a key tenet of its policy, and the choices it makes to this end will continue to affect the views it defends internationally, on how this principle should be applied” (Commission 2000, p.3). Although the EU-paper specifies some of the major requirements for the application of the precautionary principle, a scientifically sound, politically feasible and legally unambiguous concept that spans all relevant risk fields is still missing. As demanded by the EU, tapplying the precautionary principle needs to be in line with traditional methods of scientific risk assessments and, at the same time, to include compelling responses to the challenges of uncertainty and ambiguity as part of the management agenda (Commission 2000). Currently, DG IX works on a priority list of dangerous substances and the application of the precautionary principle to the regulation of chemicals. This policy shift has been welcomed by some and criticized by others. At this point it is not quite clear, what the application of the precautionary principle means for risk communication and information.

Most analysts agree that most consumers are confused in this debate. Consumers demand healthy and safe products and like to act on the assumption ”better safe than sorry”. This attitude is likely to enhance the application of the precautionary principle. At the same time, however, consumers have an interest in a large variety of products, low prices and job opportunities. Unless risk information addresses explicitly aspects of benefits and social needs, it will likely fail to convince anyone that some residual risks are worth while taking since they are associated with highly appraised benefits.

Given the political background and the current needs of consumers, this document will address the following major issues:

- How do people perceive risks from chemicals? How do they evaluate safety and environmental impacts? Do they make a difference between risk and hazard? What kind of actions do they demand from the major actors, i.e. industry, regulators, stakeholder groups?
- What is the role of the media? How do they transport risk information? What can risk communicators do to improve their relationships with the media?
- Which tools and approaches have been proven successful in the chemical risk arena? What can risk communicators do to address the needs of the target audiences?
- How can risk communicators build up trust and credibility? What can they do to gain more trustworthiness in a social environment in which distrust has become more prominent?
- What is the most promising procedure to improve stakeholder participation? What needs to be done to ensure a fair and competent discourse among the participants of involvement programs?
- How can we evaluate risk communication programs? Which programs habe been proven successful, which have been a failure and why?

These questions that also govern the subjects of discussion during the OECD Workshop in Berlin will be the guiding principles of the following subchapters. These subchapters provide a brief overview of the research results and a summary of practical implications that follow from the analysis.

3. HOW DO PEOPLE PERCEIVE RISKS?

3.1 RESEARCH RESULTS

Today's society provides an abundance of information, much more than any individual can digest. Most information to which the average person is exposed will be ignored. This is not a malicious act but a sheer necessity in order to reduce the amount of information a person can process in a given time. Once information has been received, common sense mechanisms process the information and help the receiver to draw inferences. These processes are called intuitive heuristics. They are particularly important for risk perception, since they relate to the mechanisms of processing probabilistic information. One example of an intuitive strategy to evaluate risks is to use the mini-max rule for making decisions, a rule that many consumers and people exposed to chemical hazards prefer to apply. This rule implies that people try to minimize post-decisional regret by choosing the option that has the least potential for a disas-

ter regardless of probabilities. The use of this rule is not irrational. It has evolved over a long evolution of human behavior as a fairly successful strategy to cope with uncertainty (better safe than sorry).

This heuristic rule of thumb is probably the most powerful factor for rejecting or downplaying information on chemical risks. If any exposure above zero or above a defined threshold (minus safety factor) is regarded as negative, the simple and intuitively reasonable rule to minimize exposure makes perfect sense. Most regulatory regimes are based on this simple rule ranging from the ALARA principle (as low as reasonably achievable) to the application of the best available control technology (BACT). Such principles imply that any exposure might be negative so that avoidance is the most prudent reaction.

Psychological research has revealed different meanings of risk depending on the context in which the term is used. Whereas in the technical sciences the term risk denotes the probability of adverse effects, the everyday use of risk has different connotations. With respect to human-induced risks *Table 1* illustrates the main semantic images.

Risks from chemical products are mostly to be found in the category of slow agents. This has far-reaching implications. Most agents belonging to this category are regarded as potentially harmful substances that defy human senses and "poison" people without their knowledge. Risks associated with food additives, air pollutants, water impurities, and other chemical agents are mostly invisible to the person exposed. They require warning by regulators or scientists. Food additives, chemicals or pharmaceuticals are always associated with negative side effects. Along with that image people tend to believe that toxicity depends less on the dose than on the characteristics of the substance. Hence they demand a regulatory approach that mandates interventions at any level above zero-risk independent of dose-response-relationships.

Most surveys show that people demand zero-risk-levels, at least as the ideal target line. Chemical risks which are characterized by high ubiquity, high persistency and high irreversibility (risk class ”Pandora”, see Annex I, Chapter 2) hence trigger responses of avoidance and desires for strict regulatory prohibitions. The former US food regulations (the so called Delaney clause) reflect this public sentiment. Something that is regarded as truly bad and vicious is almost impossible to link with a positive connotation. The only exception may be the exposure to "natural" agents. Most people believe that anything that exists in nature cannot be harmful for people if consumed in modest amounts. That is why alleged natural drugs are associated with fewer or even none negative side effects compared to alleged chemical drugs.

The perceptions of natural toxins as benign reflect the modern impression or myth of "Mother Nature" who offers an invaluable set of beneficial resources to humankind in response for taking good care of her. Chemical compounds, however, are associated with artificiality and seen as threats to human health.

TABLE 1: The four semantic images of risk in public perception

1. *Pending Danger*
   - artificial risk source
   - large catastrophic potential
   - inequitable risk-benefit distribution
   - perception of randomness as a threat

2. *Slow Agents*
   - (artificial) ingredient in food, water, or air
   - delayed effects; non-catastrophic
   - contingent on information rather than experience
   - quest for risk management intervention above zero-level risk exposure
   - strong incentive for blame

3. *Cost-benefit Ratio*
   - confined to monetary gains and losses
   - orientation towards variance of distribution rather than expected value
   - asymmetry between risks and gains
   - dominance of probabilistic thinking

4. *Avocational Thrill*
   - personal control over degree of risk
   - personal skills necessary to master danger
   - voluntary activity
   - non-catastrophic consequences

In addition to the images that are linked to different risk contexts, the type of risk involved and its situational characteristics shape individual risk estimations and evaluations. Psychometric methods have been employed to explore these qualitative characteristics of risks. *Table 2* lists the major qualitative characteristics and their influence on risk perception.

Furthermore, the perception of risk is often part of an attitude that a person holds about the cause of the risk, i.e. industrial activity, consumption of food, production method (such as genetic engineering) and others. Attitudes encompass a series of beliefs about the nature, consequences, history, and justifiability of a risk cause. Due to the tendency to avoid cognitive dissonance, i.e. emotional stress caused by conflicting beliefs, most people are inclined to perceive risks as more serious and threatening if the other beliefs contain negative connotations and vice versa. Often risk perception is a product of these underlying beliefs rather than the cause for these beliefs.

TABLE 2: List of important qualitative risk characteristics

	Qualitative Characteristics	*Direction of Influence*
1.	Personal control	increases risk tolerance
2.	Institutional control	depends on confidence in institutional performance
3.	Voluntariness	increases risk tolerance
4.	Familiarity	increases risk tolerance
5.	Dread	decreases risk tolerance
6.	Inequitable distribution of risks and benefits	depends on individual utility, strong social incentive for rejecting risks
7.	Artificiality of risk source	amplifies attention to risk, often decreases risk tolerance
8.	Blame	increases quest for social and political responses

With respect to the qualitative characteristics, one would expect that chemical products are associated with many of the negative qualitative characteristics. First, most chemicals are associated with negative risk characteristics such as dread, lack of personal control, and artificiality. These characteristics make people even more concerned about the negative impacts than warranted by the predicted health effects alone. Second, the beliefs associated with the risk source, for example industry, center around greed, profit-seeking and alleged disrespect for public health. Fourth, the possibility of consumers being exposed to risks without their consent touches upon serious equity concerns if susceptibility to these risks vary considerably among individuals or rest on probabilistic balancing.

3.2 IMPLICATIONS FOR RISK COMMUNICATORS

One of the most prominent obstacles towards effective risk communication about chemical products is the intuitive process of risk perception. Regardless whether consumers prefer industrial or environmental values, their cognitive frame is marked by the concept of chemicals as pollutants and poisons. What does this situation mean for risk communication?

– Risk information should be related to the qualitative characteristics that people associate with risk. These characteristics include: dread, familiarity, personal or institutional control, perception of fairness in risk-benefit distribution, assignment of blame, and others. It is important to address these concerns rather than focussing on probabilities and mag-

nitude of risk only. Consumers perceive risks of chemical products predominantly under a health perspective; environmental considerations play a role only if they are amplified by mass media or induced into the debate through political mobilization. In addition, production methods (such as using methods of genetic engineering) do matter for consumers when judging risks and their acceptability.

– Often consumers associate hazards with consumer products and underestimate the dependency of effects from dose and circumstances of exposure. If a product contains an ingredient, which might be toxic or carcinogenic at a higher dose, most people judge the mere presence of this ingredient as sufficient proof for its immanent danger. Since consumers have to rely on experts for providing them reliable information on dose-effect-relationships, trust becomes a crucial issue for risk management. In low trust situations, consumers usually demand the absence of known hazards from anything they might be exposed to. As a consequence, trust-building becomes a major task for all communication efforts (see Section 6).

– Any communication program should avoid linking the risk communication effort to vested interests. If risk communication is being perceived as a new strategy of industry to avoid risk reduction measures and to avoid being subjected to the precautionary principle, the communication program will be rejected by most observers, and there would be little chance for a regulatory reform. Rather risk communication programs should stress the potential benefits of a regulatory regime that takes all serious risks into account and that makes sure that the benefits are equally shared by industrialists, environmentalists, and the consumers. It needs to be proven that public health is served better if risk regulation is based on thorough assessments rather than on suspicions.

Risk communication is particularly difficult for high-consequence low- probability risks, which are associated with involuntariness, dread, lack of control, and unfamiliarity. To address these negative risk characteristics, it may be helpful to point to functional equivalents of these characteristics in a broader societal context. Potential equivalents are the assurance of a democratic decision-making process to counteract the impression of involuntariness and, as a replacement for personal control, the independence and impartiality of operating and regulating institutions. This may produce trust in their capability to monitor routine emissions, check safety devices, and intervene if safety of comsumer products is jeopardized. In addition, unfamiliarity can partially be compensated by better functional knowledge about the risk and the associated technology.

With respect to the final receiver, risk communication must address the qualitative characteristics of risk and the mechanisms of risk perception. It is not sufficient to confine the communication process to the discussion of probabilities and consequences. Communication should include aspects such as whether the exposure is voluntary, what possibilities exist to exert personal control (or if that is not feasible what institutions can fill that gap and monitor and control risks on behalf of the public), how the risk and its consequences are managed, and how catastrophic events can be avoided.

Risk communication will not perform any miracles. It can help to overcome some of the perception biases that we outlined above and it has the potential to make people more susceptible to the need for balancing risks and benefits. But it should be up to them and the legitimate policy bodies to decide on how to use this new information for policy making and regulation. The ideal target of risk communication is not the person who readily accepts and believes all the information given, but who processes all the available information to form a well-balanced judgment in accordance with the factual evidence, the arguments of all sides, and his/her own interests and preferences.

4. ROLE AND FUNCTIONS OF THE MEDIA IN SHAPING RISK PERCEPTION

4.1 REVIEW OF RESEARCH RESULTS

All mechanisms of risk perception are contingent on information derived from either personal experience, interaction with others or intermediary sources. A vast amount of information about risks stems from intermediary sources. People develop attitudes and positions with respect to risky technologies and or activities on the basis of second-hand information. This information is transmitted by the mass media. Many beliefs about risks and risk sources are hence shaped or at least influenced by the information and evaluations that the media transmit to their consumers. The media perform a dual role in the communication process: first, they collect information from primary sources and process this information by applying professional and institutional rules that govern the selection of received messages and their interpretation. Second, they send information to the final receiver.

The transformation process of messages during transmission has been a popular topic of communication research. From a theoretical point of view, many different concepts about the nature of this transformation have been suggested in the literature. The basic differences be-

tween these approaches may be confined to two major questions: First, are the media creating new messages or are they reflecting existing messages; second, how biased are journalists in their coverage vis-a-vis their own social convictions and external pressures? Both questions have not found a final answer yet.

With respect to the first question, the literature suggested a strong influence of the media on public opinion in the early years of communication research. Through extensive testing, however, this hypothesis was later substituted by the hypothesis that the media set the agenda, but do not change the attitudes or the values of the audience with respect to the issues on the agenda. Only in the long term have media a lasting effect on the attitude and value structure of their consumers. With respect to the second question evidence has been gathered to support almost all possible viewpoints. Political and commercial pressures have been detected in media coverage as well as courageous news reports in conflict with all vested interests. Cultural biases within the journalistic community have been found, but also a variety of different political and social attitudes among journalists. Some journalists perceive their job as a mere translation of events into verbal or visual expressions, while other believe they should play a more active role in shaping and explaining the issue.

In short: the extremes that media are mere reflectors of reality or that they are docile instruments of social pressure groups may occasionally be true, but they are not the rule. In reality, the situation is more complex: Media coverage is neither dependent on external pressures nor an autonomous subsystem within society. The media reflect internalized individual values, organizational rules and external expectations. It depends on the issue itself, the institutional context and the political salience of the issue, which of these three factors is likely to dominate the transformation process. A universal theory of how this transformation takes place is therefore not likely to evolve. Some of the common characteristics of media coverage deserve some attention, however:

– Media construct reality as well as readers construct their understanding of the media report. These constructions are results of mental and professional frames that journalists use in selecting and coding information. Construction does not imply that the coverage is independent of the real events. But there is ample evidence that the media amplify some elements and downplay others when processing information. For example, the number of fatalities is a rather weak indicator for amount of coverage in risk issues, while the degree of social conflict arising from a risk debate correlates high with media coverage.

– Media direct their attention to events, not continuous developments. An accident-free performance of a technology over many years is not newsworthy, unless it is framed as an event (such as a public celebration). Likewise slow changes of the climate become hot news issues only if they can be linked to a conference, an exceptional hot summer (such as 1998) or political agreements. Consumers being harmed by chemical products can be highly amplified in the public media if many consumers feel that the same incident could happen to them. In 1999, a warning by the British Health Board to be aware of thrombosis risks in connection with the third generation of contraceptives lead to enormous overreactions, such as a 25,000 additional abortions and more than ten thousand additional teenage pregnancies.

– Media have no internal mechanism to resolve conflicts among experts. Journalists have neither the time nor the qualification to find out who is right in a scientific debate. The most frequently used method to handle competing scientific evidence in the media is to give each side room to state or justify claims. Most journalists have lists of people who will provide counter-statements to any statement that they encounter when working on a story. Neither quality of evidence nor proportionality (with respect to number of dissidents or professional qualification) determines the amount of coverage that each side will receive. The amount is either equally distributed among camps or biased towards the preferences of the journalist or towards the editorial style of the respective medium. Media in a pluralistic society tend to reinforce diversity, dissent, and relativity of values.

Is there any evidence about specific media treatment of risk-related information? The media collect information from direct eyewitnesses of hazard events (anecdotal evidence) as well as systematic information from risk management institutions. Displaying anecdotal experience (such as feeling ill or dizzy) contrasts with the statistical evidence provided by risk experts. This contrast reinforces the constructive nature of media coverage and its reception (same event through two very different lenses), and often contributes to the erosion of trust in experts (see below). In addition, the nature and the magnitude of the original hazard are only of minor interest to most journalists. They prefer to focus on the way institutions handle risks and communicate about their activities. The media emphasize hazards that are relatively serious and relatively rare; it is the combination that gives them their punch. For example, the Chernobyl accident with 31 acute deaths cases received 129 minutes of CBS News coverage while the 1976 Tandshan earthquake leaving 800,000 people dead received less than 9 minutes on the average TV evening news.

The literature contains endless lists of factors that are assumed to determine the attractiveness of risk-related messages for transmitters, including: technologically induced hazard (versus

natural hazard), possibility to blame someone for the outcome, cultural distance from the place of occurrence, human interest component, drama and conflict, exclusiveness of coverage, proximity to politically hot issues, prestige of information source, and degree of conflict among stakeholders.

Reviewing the abundance of theoretical suggestions and partially confirmed empirical results, one might come to the conclusion that the information processing in the media is almost random or at least void of any systematic pattern. However, some insights have been gained as a result of the media studies undertaken so far. The major components of risk studies, probabilities and magnitudes, seem to play only a minor role in the media coverage; they are hence attenuated. Intensified, however, are messages relating to conflicts among social groups (assigning blame), competing claims of evidence, risk events that could have been prevented or mitigated, and the involvement of individuals or organizations with high prestige and political influence.

Interaction among transmitters, plural input from different sources, the co-existence of personal, professional, and institutional amplification criteria, and interaction among different target audiences create enough complexity and uncertainty that the final effect of the communication process can hardly be measured at all, let alone be effectively controlled. Reception studies of media coverage are therefore rare and often very restricted in the experimental design. It is clear, however, that people tend to form opinions and attitudes by a selection process in which parts of news stories are taken out and rearranged in accordance with personal preferences, existing attitudes, and values. Media consumers create puzzles constructed by many elements (cognitive and evaluative) from a variety of media reports. It is not so much the intention of the message that consumers take for granted, but their preexisting viewpoint that make them select and interpret the messages. This is why in some experiments individuals draw different, sometime even opposite conclusions from identical new reports to which they were asked to write comments.

4.2 LESSONS FOR RISK COMMUNICATORS

With respect to the transmitters, risk communicators should be aware of the major selection rules of the media. Media report about events, not continuous performance. Hardly any journalist is interested, for example, in writing a story about a long safety record of a hazardous waste facility. If such a facility, however, faces an accidental release of hazardous material, one can be sure that this event will become headline news. To get a message across, communicators need to link their message to events, not necessarily physical events. Social events such as a celebration of 25 years of safe performance of a chemical factory or a completion of a scientific study can also meet the event requirement.

Another major characteristic of the media is their interest in eyewitness reports. These testimonies relate abstract issues or events to unique human experiences (which journalists assume help readers to identify with the victims or managers of the risk). Information that emphasizes the human component and personalizes abstract material is more likely to be accepted by the media than documents about the sequence of events or organizational competence. However, risk communicators should be aware that "packaging" the information for the purpose of pleasing the transmitter always faces the risk of creating suspicion and distrust. Transmitters often associate good packaging with the intent to manipulate the audience. One should never forget that social stations of information processing are not computers or radios that operate according to pre-structured rules, but they constitute thinking beings who reflect the messages they receive and change their selection rules to fit the circumstances.

Interaction among transmitters, plural input from different sources, the coexistence of personal, professional, and institutional selection and amplification criteria, and interaction among different target audiences create enough complexity and uncertainty that the final effect of the communication process can hardly be measured at all, let alone be effectively controlled. Even the rather simple step of making a message known to and understood by the target audience faces the chaotic conditions of the communication market. Guidelines and recipes to improve risk communication can help to increase the probability that a message will reach its audience, but will never guarantee its success.

5. TOOLS AND APPROACHES TO RISK COMMUNICATION

5.1 RESEARCH RESULTS ON RISK DEBATES

After looking at risk perception and the media, this subchapter will focus on the communicator and his or her role in the risk communication process. Although topics vary from risk source to risk source, most risk debates center around three themes:

– factual evidence and probabilities;
– institutional performance, expertise, and experience;
– conflicts about world views and value systems.

The first level involves factual arguments about risk probabilities and the extent of potential damage. If the problem is a lack of technical knowledge on the part of the public, procedures of communication should focus on informing the public with the consensual expert opinions. In this case, communication is equivalent to successful risk information. Two-way-communication is needed only to make sure that the message has been understood and that the technical concerns of the audience have all been addressed. One of the main problems of risk communication with respect to the first level of risk debates is the issue of framing. Depending on the wording of the questions or the framing of the probabilistic information (for example: stating probabilities in terms of losses or gains), people will change their preference order for decision options with identical outcomes. The effects of framing occur first after the introduction of the issue and later when the factual information is compared with the values of the respondents. To avoid confusion about the effects of framing, risk communicators should use the same framing rationale throughout the information process and enlighten respondents about the effects of framing so that they become aware of the ambiguities that are inherent in the way probabilistic information is presented.

The second, more intense, level concerns institutional competence to deal with chemical risks. At this level the focus of the debate is on the distribution of risks and benefits, and the trustworthiness of the risk management institutions. This type of debate does not rely on technical expertise, although reducing scientific uncertainty may help. Risk communication on the second level requires evidence that the risk managers have met their official mandate and that their performance match public expectations. In a complex and multifaceted society such evidence is difficult to provide.

Gaining trust requires a continuous dialogue between risk managers, stakeholders, and representatives of the public. The chemical industry‘s program on "responsible care" may serve an

example for such a dialogue. The participants express their position on aspects such as emergency planning or accident management, they exchange interpretations about the current situation or future threats and work on mutually acceptable means to improve existing risk management practices. In such dialogues, trust can be gained by showing that the risk management institution has been and continues to be competent, effective, and open to public demands. Instruments such as citizen advisory committees, joint risk managing boards, or institutionalized exchange of risk-related information have been proven effective in facilitating a dialogue on the second level of risk debates.

At the third level the conflict is defined along different social values, cultural lifestyles, and their impact on risk management. In this case, neither technical expertise nor institutional competence and openness are adequate conditions for public involvement. Decision making here requires a fundamental consensus on the issues that underlie the risk debate. This implies that the communication requirements of the first and second level, i.e. risk information or involvement in a two-way dialogue, are insufficient to find a solution that is acceptable to all or most parties. Third level conflicts require dialogue-based models of communication, such as mediation processes, citizen panels, or consensus conferencing.

As long as value issues remain unresolved, even the best technical expertise and the most profound competence cannot overcome social, cultural, and political value conflicts. Furthermore, knowledge, values, and worldviews are not independent from each other. Many groups have constructed a coherent body of beliefs that integrate cognitive, evaluative and normative claims about the world. These belief systems can form epistemic communities, which offer a complete, often holistic view of the world and define the legitimate realm of rules for evaluating claims of evidence. Once such a belief system is established, it is almost immune against any type of counterclaims. The only path to agreement will be through the creation of mutual gains for all parties (win-win-situation) or the generation of overarching values that are evoked or generated through dialogue-based sessions. Both resolution strategies require that the value issues are taken as the starting point of discourse and not the level of factual knowledge. This strategy does not guarantee a resolution of conflict. Many value conflicts that arise on the third level of conflict cannot be resolved at all. In such a case collectively binding decisions rely on compromises or majority votes rather than consensus.

There is a strong tendency for risk management agencies to re-frame higher level conflicts into lower levels ones: third level conflicts are presented as first or second level conflicts, and second level conflicts as first level. This is an attempt to focus the discussion on technical evidence, in which the risk management agency is fluent. Stakeholders who participate in the

discourse are thus forced to use first level (factual) arguments to rationalize their value concerns.

5.2 LESSONS FOR RISK COMMUNICATORS

The selection of tools and approaches strongly depend on the level of the risk debate that the communicator wants to address. If the problem is located on the first level, i.e. the information needs are centered around technical information, the best tools are:

- Brochures that are well tested with the target audience;
- information videos or Internet presentations (again tested for comprehensibility and attractiveness);
- direct lectures or learning experiences (hands-on experiments, evening school, consumer training, etc,).

The effectiveness of these tools depends on the ability of the target audience to understand and comprehend the information and the motivation of the target group to commit time and effort into consuming the information. Motivation can be enhanced if the learning experience is organized as a dialogue. If people can voice their concerns, they are more inclined to engage in mutual learning.

If the problem is located on the second level, these tools and approaches do not suffice. Institutional performance and trustworthiness demand additional means of communication. Among them are:

- Inspection tours of facilities;
- face-to-face meeting between skeptics of the organization and organization leaders;
- open book procedures (no secrecy, no hidden agendas);
- data link of environmental performance values from a company to environmental groups (so they can see the performance):
- inclusion of skeptical stakeholder in an advisory board or expert committee.

The tools and approaches of the second level are geared towards gaining confidence in the sincerity and honesty of the risk communication effort. The normal means of communication (paper, pictures, and multimedia) are necessary but insufficient conditions for a successful communication effort. Level II risk problems require personal and authentic efforts to demonstrate commitment and trustworthiness. This is rather difficult in consumer affairs because the target audience is widely dispersed and the originators of the risk may be difficult to identify. In these

circumstances, prominent members of the industrial or regulatory community need to take the responsibility and invest their personal credibility in the risk communication program.

If the problem is located on the third level, values and lifestyles are the main issues of communication. This level demands instruments and tools that are directed towards discourse and two-way-dialogue. Among them are:

- Round Tables with representatives of different stakeholder groups;
- mediation, arbitration or alternative dispute resolution mechanisms;
- direct citizen participation through advisory boards, panels, juries, etc.;
- involvement in governmental programs for priority setting and regulatory actions;
- participation in public debates and open forums.

The idea behind third level debates is to find a common understanding of the goals and visions for the future development of industry, society and social affairs. Consumer protection is one element in this larger framework of social concerns ranging from social justice to societal responsibility for personal growth and well-being. Regulatory agencies as well as industrial representatives are expected to participate in such debates as this is part of the legitimizing efforts of social forces in a plural society. At the same time, issues of risk-taking and risk tolerance demand discourse-based activities that provide reassurance to each actor that all views are taken into account and that provide sufficient incentives for reaching common grounds or even a common consensus.

6. TRUST IN INSTITUTIONS AND INFORMATION SOURCES

6.1 RESEARCH RESULTS

With the advent of ever more complex technologies and the progression of scientific methods to detect even smallest quantities of harmful substances, personal experience of risk has been more and more replaced by information about risks and individual control over risk by institutional risk management. As a consequence, people rely more than ever on the credibility and sincerity of those from whom they receive information about risk. Thus, trust in institutional performance has been a major key for risk responses. Trust in control institutions is able to compensate for even a negative risk perception and distrust may lead people to oppose risks even when they are perceived as small.

Trust can be substructured in five components. These five components are listed and explained in *Table 3*.

TABLE 3: Components of trust

Components	*Description*
Perceived competence	degree of technical expertise in meeting institutional mandate
Objectivity	lack of biases in information and performance as perceived by others
Fairness	acknowledgment and adequate representation of all relevant points of view
Consistency	predictability of arguments and behavior based on past experience and previous communication efforts
Sincerity	honesty and openness
Faith	perception of "good will" in performance and communication

Trust relies on all five components, but a lack of compliance in one attribute can be compensated for by a surplus of goal attainment in another attribute. If objectivity or disinterestedness is impossible to accomplish, fairness of the message and faith in the good intention of the source may serve as substitutes. Competence may also be compensated by faith and vice versa. Consistency is not always essential in gaining trust, but persistent inconsistencies destroy the common expectations and role models for behavioral responses. Trust cannot evolve if people experience inconsistent responses from others in similar or even identical situations

Trust on a personal level is a subjective exception that a person will refrain from behavioral options that may harm the trusting person. Trust necessarily entails risk-taking, but, in contrast to the scientific endeavor of predicting the probability of identified outcomes, trust implies that the selection of options is left to the entrusted person or institution. Due to the perceived competency and honesty of the entrusted entity, one does not need to bother with assessing the outcomes of actions and with controlling the decision making process of that entity. This saves time and effort.

In risk debates issues of trust evolve around institutions and their representatives. People's responses to risk depend, among others, on their confidence that they have in risk initiating and controlling institutions. Since the notion of risk implies that random events may trigger accidents or losses, risk management institutions are always forced to legitimate their action or inaction when faced with an accident. On one hand they can cover up mismanagement by referring to the alleged randomness of the event (labeling it as unpredictable or an act of God),

on the other hand they may be blamed for events for which they could not possibly provide protective actions in advance.

The stochastic nature of risk demands trustful relationships between risk managers and risk bearers, since single events do not prove nor disprove management failures; at the same time they provoke suspicion and doubt. The slightest mistake by a risk management agency can be sufficient to destroy the delicate balance of trust. The handling of risk by private corporations and governmental agencies has been crucial for explaining the mobilization rate of individuals for taking actions. The more individuals believe that risks are not properly handled (in addition to being perceived as serious threats) the higher is the likelihood that people will be politically active. It has been shown that in the nuclear case the disillusionment of the US-population with the nuclear option as well as the number of people becoming political advocates of antinuclear policies grew simultaneously with the growing distrust in the nuclear regulatory agency. Negative attitudes are a necessary but by far not a sufficient reason for behavioral responses. Public confidence in institutional performance is another and even more important element in triggering behavioral responses.

6.2 LESSONS FOR RISK COMMUNICATORS

What kind of advice can we give to risk communicators of how to design and implement a risk communication program that incorporates the findings of past research on trust and credibility and includes the more anecdotal evidence of risk communication efforts in the past? Using the popular distinction between message, person, institution, and social climate, one can develop a set of conditions and prerequisites for gaining trust in communicating with the public, in particular the customers of chemical products. These refer to preconditions for risk communication and provide orientations for analyzing and designing communication programs:

a) To improve the *trust in a message*, we recommend explaining the rationale of risk analysis and its role for risk management so that the audience is better prepared as to what to expect. In addition, the decision making process and the past record of the institution should be included in the message so that people can assign competence to the actors and get a better feeling of the trade-offs that had to be made in meeting the specific risk management task. Evidence of competence, fairness towards other viewpoints, and references to commonly shared values and beliefs will make a message more attractive and could help to address the centrally and peripherally interested audience at the same time. Con-

clusions should be made explicit and vested interests should not only be admitted, but justified in terms of public mandate or economic function.

b) To improve *trust in a personal communicator,* the major goal is to develop a communication climate that enables the audience to identify with the communicator and to share his or her experiences and beliefs. The more a communicator manages to avoid the mask of an institutional spokesperson and the more he or she can express compassion and empathy for the audience, the more likely the audience will identify with the speaker and feel compelled to the arguments. As noted previously, conveying probabilistic information is a real challenge, but can be done in reference to everyday experience of budget constraints and consumer products. Furthermore, evidence of successful use of risk analyses in hazard management can serve as demonstration to define the role and limitations of risk analysis in improving public health and the environment. Reference should be made to commonly shared symbols, appealing formats, and to previous performance record of openness and honesty. One should definitely avoid negative labeling of potential opponents or typical advertising gimmicks

c) To improve the *credibility of an institution,* the vital factor is performance, not public relations. Confidence has to be gained by meeting the institutional goals and objectives. In addition, credibility is linked to the evidence of being cost-effective and open to public demands. These two goals are often in conflict with each other, however, they have to be treated as complementary, and not as substitutional, goals. Fairness and flexibility are major elements of openness. In addition to assuring sufficient external control and supervision, public participation may be implemented as a means to demonstrate the compliance with the political mandate and to avoid the impression of hidden agendas. On the premise of good performance, communication programs can be designed that they reflect these accomplishments. Such programs should provide honest, complete, and accurate information that is responsive to the needs and demands of the prospective audience. This can only be done if the source engages in an organized effort to collect feedback from the audience and establish a two-way communication process. Involvement of citizens, open house policies, discussion forums, open TV channels, or other means should be explored to assure the functioning of the two-way communication structure.

d) To *improve the social climate* is not within the realm of possibilities for a single communicator. But large-scale organizations or association of organizations can affect the overall climate. One way to improve the climate is to accept and even endorse checks and balances in the control of the organization. The other obvious solution is to demonstrate the flexibility and foresight of the organization in meeting and anticipating new public claims

and values. The impersonal nature of institutions may be mitigated by providing special local services and by engaging in community activities and programs. Governmental institutions will receive more credibility if they do not leave the impression of permanent crisis management, but of competence and preparedness for long-term threats and challenges (in particular pertaining to environment and technology).

These general remarks can be transferred to the situation of regulatory agencies within the OECD countries. If these regulatory agencies want to reach a situation where confidence is placed in the efficiency and effectiveness of their actions, they will have to fulfill some preconditions, which determine their prospective role in risk communication. Among them are:

– *Perceived expert knowledge:* As a rule, expert authority is perceived in connection with successfully carried out tasks (e.g., correct prognoses, successful crisis management, congruence of institutionally proclaimed objectives and their realization). In cases where success is hard to assess, peripheral patterns of evaluation become important. Then, the reputation of the institution and its members and their status in the political framework serve as an orientation for an assessment of expert knowledge. At this point, a conflict situation might arise for the chemical risk agencies: They rank relatively low in the political hierarchy so as not to raise too high expectations regarding its efficiency; but a high status within the system of institutions will be of particular advantage for acquiring a better visibility and reputation. This conflict could, for instance, be resolved by the fact that the agency appoints an advisory board with highly prominent individuals who help to bring the agency more in the focus of public attention.

– *Perceived objectivity:* As long as there are criteria according to which the truth of statements can easily be proved or disproved, there is no difficulty in perceiving objectivity. In complex situations, people again rely on peripheral indicators. They often substitute fairness for objectivity. Then, the institution is thought to be objective if its proposals are situated in the center between extreme demands of groups. This interpretation of objectivity will become problematic for regulating agencies if this 'mean value' is not congruent with the scientifically ascertained truth. The perception of objectivity can be improved by independence of the information source, reputation of the experts, and by taking social groups into deliberation processes in which each claim has to be justified and defended.

– *Perceived fairness:* The readiness of an institution to examine, without reservation, all relevant points of view in the course of the decision process, does not mean that its judgment has to result in the 'mean value' of all opinions from different parties (although

this is often seen as the indicator of a fair solution). What is important is rather the readiness of the institution to accept concerns and claims of all relevant groups and to integrate them into the judgment process. For this reason, it is recommendable that each agency gives the substantiated impression of a fair consideration of all aspects put forward by relevant groups, by means of hearings and other procedures of participation.

– *Predictability:* With similar facts and boundary conditions, institutions should reach equal results, independent of actors and points of time. Such a continuity of formation of judgment, and hence of accomplishment of functions, increases credibility. On a meta-level, predictability creates confidence in the system in a positive sense, on the institutional level it decreases the need of control as a kind of organized distrust. The basis of predictability is the consent of the participating persons to voluntarily comply with procedural and decision rules, which are acknowledged as rational and reasonable. Such predictability is achieved by binding agencies to certain procedural and decision rules.

– *Expediency:* If a certain institution is considered to be necessary for accomplishing a socially important function, it will also meet with the corresponding confidence. Many agencies have particular problems in this respect, since they seem to be of no relevance in the public eye. Thus, it will be important to point out that its expediency goes beyond the so far established institutional procedures in risk-related or environmental policy. An objectivation alone will probably not suffice as basis for a legitimation here. Rather, the integrative character of the decision process within the agency and its position as a "scientific clearing house" will have to be emphasized towards the public (that is why stakeholder participation is quite important).

Without credibility, governmental agencies to regulate chemical risks will not play any role in establishing reasonable standards, whatever institutional form they will have. Credibility is the product of a complex structure of influences, among which efficiency is the most important component, and perceived expert knowledge, objectivity, fairness, predictability and expediency determine public reputation. Successful communication begins before imparting information; it creates the institutional and structural preconditions for information and resulting recommendations to be accepted.

7. COPING WITH RISK: STAKEHOLDER INVOLVEMENT

7.1 RESEARCH RESULTS

There is a need for a structure or organizational model for involving stakeholders in the risk debates and provide a platform for different interest groups to voice their preferences and wishes with respect to desired regulations and the appropriate handling of chemical risks. Most authors agree that such a debate should be organized according to the rules of a rational discourse. The phrase "discourse" has different meanings in the social sciences. Discourse is often used to mean either language texts as wholes in their context of use or the world-views which inform our understanding. In the theory of communicative action the term discourse denotes a special form of a dialogue in which all affected parties have equal rights and duties to present claims and test their validity in a context free of social or political domination. Within the context of risk communication, a discourse provides a platform to resolve a conflict or engage in joint problem solving by a specific set of rules. The success or failure of a discourse depends on many factors. Among the most influential are:

(1) A clear mandate for the discourse participants: Participation of stakeholders requires a clear and unambiguous mandate of what the deliberation process should produce or deliver. Since discourses are informal instruments, there should be a clear understanding that the results of such a discourse cannot claim any legally binding validity (unless it is part of a legal process such as arbitration). All the participants, however, should begin the discourse process with a clear statement that specifies their obligations or promises of voluntary compliance once an agreement has been reached. As a pre-decisional tool the results of such discourses should be regarded as consultancy reports similar to the scientific consultants who articulate technical recommendations to the legitimate authorities. Risk managers from the public or private sector need to acknowledge and to process the outcome of the deliberations, even if they are not obliged by law to follow the recommendations. However, the process will fail its purpose if deviations from the recommendations are neither explained nor justified to the discourse participants.

(2) Openness of result: Discourses will never accomplish their goal if the decision has been made (officially or secretly) and the purpose of the communication effort is to "sell" this decision to the other parties. Individuals have a good sense whether a decision-maker is really interested in their point of view or if the process is meant to pacify potential protesters.

(3) *A clear understanding of the options and permissible outcomes of such a process:* The world cannot be reinvented by a discourse nor can historically made decisions be deliberately reversed. All participants should be clearly informed about the ranges and limits of the decision options that are open for discussion and implementation. If for example, the technology is already in existence, the discourse can only focus on issues such as emission control, monitoring, emergency management or compensation. But the range of permissible options should be large enough to provide a real choice situation to the participants.

(4) *A predefined time table:* It is necessary to allocate sufficient time for all the deliberations, but a clear schedule including deadlines is required to make the discourse effective and product-oriented.

(5) *Equal position of all parties:* A discourse needs the climate of a "powerless" environment. This does not mean that every party has the same right to intervene or claim a legal obligation to be involved in the political decision making process. However, the internal rules of the discourse have to be strictly egalitarian; every participant must have the same status in the group and the same rights to speak, make proposals, or evaluate options. Two requirements must be met: First, the decision about the procedure and the agenda must rely on consensus; every party needs to agree. Second, the rules adopted for the discourse are binding for all members and no party is allowed to claim any privileged status or decision power. The external validity of the discourse results are, however, subject to all legal and political rules that are in effect for the topic in question.

(6) *Neutrality of the facilitator of the discourse:* The mediator who facilitates such a process should be neutral in his/her position on the respective risk management issue and respected and authorized by all participants. Any attempt to restrict the maneuverability of the mediator should be strictly avoided.

There are also discourse requirements pertaining to the behavior of the participants that are necessary for facilitating agreement or at least a productive discussion. Among these requirements are:

(7) *Willingness to learn:* All parties have to be ready to learn from each other. This does not necessarily imply that they have to be willing to change their preferences or attitudes. Conflicts can be reconciled on the basis that parties accept other parties' position as a legitimate claim without giving up their own point of view.

(8) Resolution of allegedly irrational responses: Discourses, in which the public interest groups or affected individuals are represented, frequently demonstrate a conflict between two contrasting modes of evidence: The public refers to anecdotal and personal evidence mixed with emotional reactions, whereas the professionals play out their systematic and generalized evidence based on abstract knowledge. A dialogue between these two modes are rarely accomplished because experts regard the personal evidence as a typical response of irrationality. The public representatives perceive the experts often as uncompassionate technocrats who know all the statistics, but couldn't care less about a single life lost. This conflict can only be resolved if both parties are willing to accept the rationale of the other party's position and to understand and maybe even empathize with the other's party view. If over the duration of the discourse some familiarity with the process and mutual trust among the participants have been established, role playing can facilitate that understanding. Resolving alleged irrationalities means to discover the hidden rationality in the argument of the other party.

(9) De-moralization of positions and parties: The individuals involved in a discourse should agree in advance to refrain from moralizing each other or each other's position. Moral judgments on positions or persons impede compromise. Something cannot be 30 % good and 70 % bad; either it is good, bad, or indifferent. As soon as parties start to moralize positions, they cannot make tradeoffs between their allegedly moral position and the other parties' immoral position without losing face. A second undesired result of moralizing is the violation of the equality principle stated above. Nobody can assign equal status to a party, which is allegedly morally inferior. Finally, moralizing masks deficits of knowledge and arguments. Even if somebody knows nothing about a subject or has only weak arguments to support his/her position, assigning blame to other actors and making it a moral issue can help to win points. The absence of moralizing other parties or their position does not mean to refrain from using ethical arguments, such as "this solution does not seem fair to the future generation" or "we should conserve this ecosystem for its own sake". Ethical arguments are essential for resolving environmental disputes.

7.2 LESSONS FOR RISK COMMUNICATORS

What advice can we give to risk communicators of how to design and implement a risk communication program that incorporates the findings of past research on stakeholder involvement? The first lesson is to distinguish among the three levels of the debate as mentioned above. Nothing is more detrimental and frustrating for all participants involved than addressing an audience who expects a third level debate and is confronted with a detailed technical

analysis of the issue. The risk communicator should investigate the level of debate beforehand and design different communication programs for each level. When organizing arenas for stakeholder involvement, several criteria should be met. Among those criteria are:

a) *Variability of options:* Do the participants have the choice to select one option out of a variety of options that are all feasible in the specific situation? This is particularly important, if government agencies organize involvement processes, as the participants expect several options from which they are allowed to choose. If the purpose is only to convey a message or to improve understanding among the constituencies, stakeholder participation via discourse is not the right format.

b) *Equity of exposure*: Are all stakeholders or the respective constituency exposed in some way to the potential disadvantages of the proposed options? (so to avoid a distinction between affected and indifferent stakeholders). If stakeholders are invited to participate, they should have an equal interest in the matter. Otherwise, people will question the legitimacy of peripheral stakeholders to be present at the discourse table.

c) *Personal experience*: Do participants have some experience with the problem and do they feel competent to give recommendations after they are further educated about the problem and the remedial options? This is particular relevant if consumer issues are at stake. Participating stakeholders should be knowledgeable about major consumer issues and have a basic understanding of chemical risk management.

d) *Personal relevance*. Do participants judge the problem as serious enough to sacrifice their time to work on solutions? It might be frustrating for a governmental agency to invite stakeholders to a common problem-solving discourse, but most of the invitees do not show up. The organizers have to make sure that all relevant stakeholders have an interest in and a commitment to the process.

e) *Seriousness and openness of agency:* Is the managerial level of the inviting agency willing to accept or at least carefully consider the recommendations of the discourse or does s/he pursue hidden agendas? Often, agency personal responsible for risk communication are enthusiastic about stakeholder involvement, this enthusiasm is, however, not shared by the upper management. Again, it is very frustrating for all participants, if the recommendations are not taken seriously by the decision-makers.

The objective of this section was to address and discuss the role of stakeholder involvement for risk management. The mere desires to initiate a two-way-communication process and the

willingness to listen to public concerns are nor sufficient. Discursive processes need a structure that assures the integration of technical expertise, regulatory requirements, and public values. These different inputs should be combined in such a fashion that they contribute to the deliberation process the type of expertise and knowledge that can claim legitimacy within a rational decision making procedure. It does not make sense to replace technical expertise with vague public perceptions nor is it justified to have the experts insert their own value judgments into what ought to be a democratic process. These arguments have motivated the recent U.S. Panel on Risk Characterization to advocate an "analytic-deliberative approach" by which expertise and deliberations are systematically linked with each other. The transformation of the risk arena into a cooperative risk discourse seems to be an essential and ultimately inevitable step to improve risk policies and risk communication. The ideal target of risk communication is not the person who readily accepts and believes all the information given, but who processes all the available information to form a well-balanced judgment in accordance with the factual evidence, the arguments of all sides, and his/her own interests and preferences.

8. EVALUATING RISK COMMUNICATION CAMPAIGNS

8.1 RESEARCH RESULTS

Risk communication campaigns are dealing with important objectives: human safety, health and sometimes even survival may be at stake, as well as social relations between customers, regulators, and providers of chemicals. Consequently it is crucial that pertinent risk communication activities actually achieve their goals. To provide evidence for this, empirical evaluation research is indispensable. *"Evaluation"* means the scientific assessment of the content, process and effects (consequences, outcomes, impacts) of an intervention (measure, strategy, program) and their assessment according to defined criteria (goals, objectives, values). Systematic empirical investigations are required in order to prove the effectiveness of risk communication – simple experience is not sufficient. There are both substantive and methodological reasons for evaluation studies:

- It is a matter of responsibility to check whether risk information and hazard preparedness efforts are successful and sufficient.
- Evaluation results can demonstrate not only whether but also *why* a program works (or not) and thus guide the improvement of risk communication (RC).
- Intuitive assessments of the program's effectiveness can easily fail because of wrong cause-effect attributions (spurious causality).
- Evaluation provides an empirical basis for a decision between alternate RC programs.

– As campaigns are laborious and usually rather expensive (in terms of costs, personnel and time), evaluation can help to justify the efforts.

Existing evaluation studies differ considerably in their approach; the main options for a researcher are summarized in *Table 4*.

The most important decision is which aspect of a risk communication program one intends to evaluate. There are three principal perspectives: *Content*-orientation (i.e., input and message evaluation), *process*-orientation (i.e., formative evaluation), and *outcome*-orientation (i.e., impact evaluation). In each case advanced research designs are required, usually a longitudinal study, possibly including control groups. Evaluative data can be gathered in an analytical assessment done by experts or in an empirical investigation in which relevant participants are surveyed. Evaluations may be designed ”in-house” or (preferably) conducted by external researchers. It is important that the principal decision about an evaluation study is made *before* the campaign is conducted, and that the conceptualization of program assessments is embedded in the risk communication plan.

TABLE 4: Evaluation of risk communication basic considerations

Focus of evaluation:	– content-oriented (substantive correctness) and/or – process-oriented (formative/developmental view) a/o – outcome-oriented (summative effectiveness)
Study design:	– longitudinal before/after study – control group (not exposed to the intervention)
Information sources:	– risk information/communication targets (receivers) – sender/author/agency
Type of criterion:	– knowledge & competence gain – change of attitudes & mind-sets – risk-reducing behavior – joint conflict resolution
Reference for comparisons:	– normative program goals (as stated by institution) – previous situation – alternative information/communication strategies

Table 5 shows the steps of a typical planning process and locates risk communication evaluation within the course of action.

TABLE 5: Steps of a risk communication program

– Hazard identification/specification
– Clarification of responsibilities within organization – Identification of exposed people, areas etc (according to various scenarios) – Identification of relevant parties, 'actors', institutions/individuals) to be involved – Analysis of information necessities/needs
– Explication of the objectives of the RC program – Critical assessment of resources – Selection of the target audience(s) – Determination of the RC content – Selection of communication means & channels
– Designing message format & layout – Check of substantive correctness of information to be disseminated – Pre-examination of comprehensibility and credibility
– Principal decision about conducting empirical evaluation research – Survey and documentation of "before" situation
Implementing/conducting the RC program
– Monitoring the RC process & context factors – Evaluation of effectiveness with respect to stated RC objectives – Identification of implications for future risk management – Revision of the RC program

Once the objectives of a particular risk communication campaign have been stated by those responsible for the program, an evaluator needs to operationalize them and investigate whether or not they have been achieved.

"*Effectiveness*" as the overall criterion has to be explicated by characteristics of the content, process and outcomes of the risk communication program employed as well as by procedural criteria (i.e. financial efficiency, training needs for the personnel involved). Even if content and process of the program meet their respective objectives, achieving the intended effects cannot be guaranteed. Sufficient information dissemination and reception by the defined target group are preconditions for being effective. But a good program should then actually improve the receiver's comprehension, knowledge, problem awareness and involvement, and eventually change beliefs, attitudes and behaviors. In this context it is relevant whether the recipients develop sufficient confidence in the information source and accept the message. Thus increased trust in authorities needs to be considered as well.

All criteria must be defined in advance (prior to the execution of the program) and be measurable before and after the intervention in order to allow for quantitative comparisons. Otherwise a theoretically sound and valid evaluation of the observed effects will be difficult. Empirically evaluating the impact of risk communication programs requires careful conceptual

planning and proper research designs. Approaches too simple are not appropriate in the rather complex case of risk communication.

8.1 LESSONS FOR RISK COMMUNICATORS

Evaluation of risk communication is crucial for the measurement of success or failure. Risk communicators are well advised to have an evaluation program at hand before they launch a risk communication program. The empirical analysis of the effects and side-effects of communication will help them to redesign the communication process over time and to improve their communication efforts.

With respect to the s*tudy design for evaluation of risk communication programs,* crucial issues include: the specification of target populations (representing all relevant parties in the communication process), a longitudinal design, appropriate timing of data collections and the inclusion of control groups. There are two focal issues of causality to be considered: (1) to show that intended effects are actually induced by the intervention under examination (and not other concurring extraneous influences); and (2) to clarify whether unintended impacts are caused by the program. In a wider perspective, the researcher needs to explicate whether conclusions about the content, process and outcomes of the RC campaign are valid beyond the specific circumstances and participants of the study. *Table 6* gives a list of main points to be considered in this regard.

TABLE 6: Critical considerations for planning risk communication evaluations

– Base the conceptualization of an evaluation on a risk communication model
– Integrate evaluation research early into the risk communication campaign
– Use rigorous 'state-of-the-art' methodology
– Employ an interdisciplinary research team
– Collect data from several sources (including experts and lay-people)
– Carefully distinguish between attitudinal and behavioral outcomes
– Investigate and analyze reasons for success *and* for failure
– Check for intended *and* unintended effects of a campaign
– Consider differences among cultural/ethnic subgroups in the target population
– Assess the stability of effects over time
– Reflect alternative explanations for effects
– Strive for the dissemination and utilization of findings

Finally, since evaluation research is useless if ignored, the comprehensive dissemination of findings is also critical – especially as evaluation results are the best means to improve hazard

information and communication programs. In fact, evaluation research should be an integral part of any serious risk communication campaign.

9. CONCLUSIONS

The objective of this background paper was to review the current knowledge about risk communication with respect to chemical products for consumer use, to present the empirical evidence with respect to the effectiveness of risk communication, and to delineate some practical guidelines for risk communicators based on psychological or sociological research.

Almost all risk communication studies have one message in common: Risk communication is not a public relations problem. Advertisement and packaging of messages can help to improve risk communication, but they will be insufficient to overcome the problems of public distrust in risk management institutions and to cope with the incapability of the present risk arena to produce rational and consistent risk policies. The potential remedies to these two problems lie in a better performance of all institutions dealing with or regulating risks and in a re-structuring of the risk debate to meet the requirements of two-way communication process.

With respect to performance, it is well understood that many risk management institutions complain that their specific task is not well understood and that public expectations do not match the mandate or the scope of management options available to these institutions. This is certainly not unique for risk management agencies. Lipset and Schneider (1983) found out that elites in America complain regularly about the ignorance and misconceptions of the public with respect to their mandate and performance. Regardless of whether this claim is true, there is a clear gap between the self-perception of most institutions and the public perception of these institutions. This is specifically prevalent in the risk arena because the issue at stake, health and environment, tops the concerns of the public of all OECD countries and because the stochastic nature of risk impedes an unambiguous evaluation of management success or failure. In addition, chemical products are often associated with artificial ingredients that cause suspicion and fear.

In spite of these difficulties, careful management, openness to public demands, and continuous effort to communicate are important conditions for gaining trustworthiness and competence. They cannot guarantee the success, but they make success more probable. Therefore, the *first major lesson of risk communication is to start with a critical review of one's own performance.* Is the performance good enough to justify public trust? Are mechanisms in

place that help to discern the needs and requests of stakeholders and the general public? Is a two-way communication program implemented? Is the communication honest, clear, comprehensive, and timely?

If these questions can be positively answered, the designing of communication can be optimized. The *second major lesson of risk communication is to tailor communication according to the needs of the targeted audience and not to the needs of the information source.* Providing information that people request is always more effective than providing answers to questions that nobody has asked. Most of the guidelines in Part III specify the premises and conditions for a receiver-focused communication program.

The *third major lesson of communication is to adjust and modify one's communication program as a result of an organized effort to collect feedback and to sense changes in values and preferences*. Many successful programs of the past have turned out inappropriate to address the audience of today. Constant adjustment requires efforts to collect systematic feedback from the community, the relevant stakeholders, and the general public. This calls for a continuous evaluation program.

By carefully reviewing in-house performance, by tailoring the content of the communication to the needs of the final receivers, and by adjusting the messages to the changes in values and preferences, risk communication can convey a basic understanding for the choices and constraints of risk management and thus create the foundations for trustworthy relationship between the communicator and the audience. Although many receivers of risk information may not agree with the actual decisions institutions have made in setting priorities or selecting management options, they may realize that these decisions are results of open discussions and the assignment of painful but reasonable trade-offs.

Even if all these suggestions are followed, risk communication may not work. External influences, the overall climate of distrust, management failures in the past, and specific incidents can transform risk communication into a never-ending frustration. This frustration -so familiar to most risk managers- is an indication of the need for a more fundamental risk discourse. Such a discourse can help to resolve the fundamental choices with respect to basic values and preferred lifestyle, i.e., the contents of a third level debate, as described in Section 5 of this paper.

Before the third level issues are not adequately addressed, all communication on the second and first level will fail or succeed only temporarily. The ideal target of risk communication is not the person who readily accepts and believes all the information given, but who processes

all the available information to form a well-balanced judgment in accordance with the factual evidence, the arguments of all sides, and his/her own interests and preferences. To accomplish this goal, a risk communication effort is needed to provide the necessary qualifications to all participants and empower them to be equal partners in making decisions about risk. The ultimate goal of risk communication is reconciliation of expertise, rational management strategies and public preferences.

PART III

ORIENTATIONS

PRACTICAL ORIENTATIONS FOR SUCCESSFUL RISK COMMUNICATION

On the basis of risk perception and risk communication studies, several authors have already developed guidelines for designing and evaluating risk communication (Covello et al. 1986; Keeney and von Winterfeldt 1986; Zimmerman 1987a; Covello and Allan 1988; Kasperson and Palmlund 1988; Renn 1988; 1992; Hance et al. 1988; National Research Council 1989; Chess et al. 1998). These orientations are not all substantiated by empirical research; they rely to a large extent on common sense, expert judgment, and personal experience. They provide, however, some useful criteria for developing an effective and consistent information and communication program.

The suggestions listed below will be practical conclusions from the theoretical and empirical results described in the background paper (particularly in Annex I). They might include some common sense reasoning, but each suggestion is linked to one of the theoretical concepts discussed in the literature. The compiled suggestions should not be regarded as recipes, but as normative information of what to take into account when approaching the public with risk-related information. Social interaction is too complex for designing "fool-proof" guidelines. Different hazards and risks demand different approaches. But the most important reservation is that the best communication process will not lead to any success if it is meant to compensate shortcomings or failures in the task performance of the communicator or to hide management mistakes.

1. *Be clear about your intentions and make them the central message of your communication effort.* As obvious as this may sound, many risk information attempts are clear violations of this principle. Many agencies are forced to react before they have made up their mind about an issue. Sometimes different units of a single organization voice different opinions and the text of the information constitutes a poor compromise between the diverse viewpoints. If a fast reaction is required, the message of the first response may be that there is still too much uncertainty about risk to produce sound judgments and that the institution needs more time to assess the data. Although this message may not be very attractive, it still is better than pretending to have a degree of certainty which is unjustified and may need correction later. Clarity and unequivocal position are two major conditions to pass the attention filter of the respected audience.

2. *Simplify your message as drastically as you think you can do without being inaccurate.* Messages will be simplified regardless how well written the text may be. Rather than have the transmitters and final receivers simplify the text their way, the sender may perform a

more accurate simplification which is also in accordance with his/her original intentions. Simplification is a very delicate job and needs careful editing and re-editing. Factual information should be made as simple as possible, but information about the decision process, the values that were used to make trade-offs, and the remaining uncertainty should not be omitted, as this information is crucial for building credibility and trust.

3. *Place your simple messages in the beginning of a text and gradually add the complex issues.* Although simplicity is a virtue for the whole information process, it is advisable to start with the simple and easily understandable messages and add more complex and detailed information at the end. This structuring of the information serves two purposes: gaining the attention of the peripherally interested audience and at the same time pleasing the well-educated audience which expects detailed argumentation and sufficient evidence. The only way to please both audiences (aside from splitting the information) is to to give the general information first and add the specifics later.

4. *Anticipate the interests of your target audiences and design your communication program to match their needs.* This guideline is the most often violated rule in risk communication. Experts in institutions have the irresistible tendency to package a whole education program in each attempt to communicate with the public. But most people have neither the desire nor the time to become nuclear engineers, immune system specialists, or experts on radon. Most people want to know the consequences of a risk, the circumstances of its occurrence, the possibilities to mitigate the risk, and the management efforts by the respective institutions. Depending on the desired level of the risk debate, the communication should focus on the scientific evidence, the management record of the institution, or the world views and philosophies that govern the institutional performance.

5. *Devise different communication programs for different target audiences.* In addition to structuring texts, a communication program can operate with different packages containing the same message, but using different channels for transmission. A message to the national wire services should contain only the basic facts and some general conclusions, a press release to daily newspaper may also incorporate some discussion of the results, anecdotal evidence if suitable and reference to actual events (otherwise it will not pass the selection filters of these transmitters). Manuscripts for science supplements in newspapers or specialized journals should be more problem oriented and offer a novel or interesting perspective in the analysis of the issue.

6. *Messages should be distributed on different channels and feedback communication should be stimulated and encouraged as much as possible.* A good communication program

should not only address different audiences by using different transmitters, but should also take advantage of the different available channels. Press releases are one major medium for communication, but press conferences, participation in talk shows, appearance in hearings and public events, letters to the publisher, and direct mailings are often complementary ways of conveying a message. Press conferences and talk shows allow immediate feedback from the transmitter so that the information can be better tailored to the needs of the receiver. Sending out brochures with reply envelopes is another method of collecting information about the communication needs of the public and bypassing the transmitters. Models for public involvement have been proposed and tested to assure constant feedback from the risk bearers or bystanders. In addition, monitoring the process of re-coding (through content analysis of media messages) and of receiver's responses (through evaluating letters to the editor or direct survey methods) provide valuable information about the comprehensibility of the original information and its effects on the receiver.

7. *Be honest, complete, and responsive in the composition of your message.* Honesty is a vital condition for gaining credibility. Honesty will not automatically be rewarded, but dishonesty will certainly create negative repercussions among transmitters and final receivers. The same effect will take place when sources withhold relevant information or tell only one side of the story. The goals of honesty and completeness include another, often overlooked aspect. Institutions with vested interests should put their cards on the table and justify their position. Credibility is often assigned by speculating about the true motives of the source. If profits or other vested interests are obvious motives, it is better to address these issues and make clear that such interests do not automatically preclude public interest or the common good. Industries could for example make the argument that companies with a good risk reduction and control program are more likely to attract better qualified personnel, to enhance their corporate reputation, and to avoid costly litigation.

8. *Try to escape from role expectations by using a personal approach and by framing the communication to the personal experience of the addressed receiver.* Receivers, in particular peripherally interested persons, are inclined to select information that contains surprises or unexpected insights. Even if the material of the message does not offer anything new, a communicator can attract attention by avoiding the stereotypes of his or her role and by personalizing the message. This is particularly effective in face-to-face interactions, press conferences or talk shows. Without denying their home institution, communicators may report about their personal feelings when they first heard about the risk source and what kind of actions they took to protect themselves. They even may convey their own feelings and show compassion for the anxieties and fears of the addressed audience showing his respect for their rationality. In addition, avoiding role stereotypes confronts

the audience with some cognitive dissonance which may be resolved by accepting the new message. To be honest is an absolute condition for such an attempt because most people have developed a good sensitivity for acting and displaying fake feelings.

9. *Allocate enough time for packaging your message, but do not change your message in order to make the package more attractive.* The packaging of the message is important for the success of the communication effort. A good package implies that the formal requirements for a news story are met and that the message contains the relevant clues that are attractive to your target audience. But packages are not ends in themselves. If the message has been simplified and tailored to the needs of the receiver, it should not be further compromised by adjusting it to the most attractive package. This is the major difference compared to advertisement where people do not expect truthful information, but entertaining persuasion. Risk communication is based on different expectations: most receivers expect honest, clear, and complete information. This kind of information may generate trust in the communicating institution. People do not mind if advertisement for margarine is entertaining or even silly, but they expect information on risks to be honest and serious.

10. *Be careful in selecting the right cues for appealing to the peripheral audience without offending your central audience.* Peripheral cues should be confined to commonly shared symbols, appealing formats, and surprises in openness and honesty. They should definitely avoid negative labeling of potential opponents or typical advertising gimmicks. Peripheral cues are important for successful communication, but they have to be selected carefully to please the peripherally and centrally interested audience alike.

11. *Explain the risk rationale to your audience and demonstrate the logic and adequacy of this rationality without claiming superiority.* Explaining the rationale of risk analysis and its role for risk management prepares the audience to acknowledge the basic principles of risk management decisions. The decision making process and the past record of the institution should also be included in the message so that people can assign competence to the actors and get a better feeling of the trade-offs that had to be made in meeting the specific objective. Evidence of competence, fairness towards other viewpoints, and references to commonly shared values and beliefs will make a message more attractive and could help to address the centrally and peripherally interested audience at the same time. Conveying probabilistic information is a real challenge, but can be done in reference to everyday experience of budget constraints and consumer products. Furthermore, evidence of successful use of risk analyses in hazard management can serve as demonstration to define the role and limitations of risk analysis in improving public health and the environment.

12. *Place risk in social context and report numerical probabilities only in conjunction with verbal equivalents.* The functioning of the intuitive heuristics and biases in processing probabilistic information mandates a verbal explanation of numerical probabilities since most people have difficulties in understanding the meaning of probabilities and tend to focus on the maximum perceivable consequences. This verbal explanation should attempt to put risk in perspective to other risks. Risk comparisons often create confusion and are likely to be rejected by the audience if they do not match the receivers' perception of comparable risks. Therefore a few rules for using these comparisons are appropriate:

    – Risk comparison should rely only on risks that are perceived as comparable by the public. Risks with identical benefits are certainly better suited to risk comparisons than risks with divergent benefits. It has also been suggested to base comparisons on the situation with and without the cause of risk or include only risks that lead to an identical set of consequences. But the major point is the purpose of risk comparison. Comparisons should only serve the purpose of illustrating the meaning of abstract probabilities. Risk comparisons for the purpose of suggesting judgments about acceptability should be avoided because they are neither logically defensible nor convincing in the eyes of the public.

    – Risk communication must address the basic qualitative properties of different risks and explain how deficiencies in those qualities have been compensated or will be compensated.

    – It may be useful to insert anecdotal evidence or report about identifiable victims when communicating about familiar and unspectacular risks, such as radon or high blood pressure. Attention is almost assured if the receivers perceive the risk as a potential threat to themselves or their primary group. Dramatic, unfamiliar, and technological risks with high catastrophic potential are likely to be overestimated. Instead of emphasizing the low probability of severe accidents, communication should focus on the technical and organizational structures (such as the multi-barrier system or redundancy in safety devices) to prevent such accidents and demonstrate the preparedness of the community in the unlikely, but not impossible, event of an accident.

    – It seems advisable to link numerical probabilities with verbal expressions of likelihood or risk comparisons. The perception of probabilities is characterized by so many biases that it is almost impossible to convey their meaning in risk analysis and risk management to a larger audience. Still they should be mentioned because they are the most accurate indicators for the relative seriousness of the risk, thus a vital

component of all risk policies. In addition, the more interested and well-educated audience demands such information and will suspect an attempt to hide relevant facts if the numerical data is withheld.

13. *Institutional performance is the major key to trust and credibility. The more you can demonstrate that you did a good job the more you can expect trust in your message.* Confidence has to be gained by meeting the institutional goals and objectives. Credibility is linked to the evidence of being cost-effective and open to public demands. These two goals are often in conflict with each other, but they have to be treated as complimentary, and not as substitutional goals. Fairness and flexibility are major elements of openness. In addition to assuring sufficient external control and supervision, public participation may be implemented as a means to demonstrate the compliance with the political mandate and to avoid the impression of hidden agendas. On the premise of good performance, communication programs can be designed that reflect these accomplishments.

14. *Risk managers have to learn from the public as much as the public can learn from them:* Risk communication has to address public expectations and public knowledge about the risk management rationale first before it can deal with actual management results and before it can ask for trust in the management effort. Such an educating approach is only acceptable to most people if the education process is mutual and if the essence of public concerns is adequately addressed. Two-way communication is clearly a prerequisite of successful information campaigns, but it is often hard to implement and requires flexibility and the willingness to adapt to public concerns on the side of the communicating institution.

15. *You can only convince the receivers of your message if it addresses their concerns and interests.* Try to investigate in advance on what level the risk communication will occur. If public concerns are focussed on technical issues (first level), your message should contain mainly factual evidence. Communicators on this level should be technical experts. You should be aware, however, that many risk debates appear to be on the first level, but the underlying conflict is about issues of the second (trust in institutional performance) or third level (societal values and worldviews). A debate on the second level has to address the institutional qualifications and the past performance record for risk management. The desired communicators here are the institutional policy makers or risk managers. Risk debates on the third level require a consensus building exercise focussing on values and fundamental policy directions. Most institutions will have problems to conduct such exercises; a political facilitator or mediator may be needed to initiate a discourse aimed at a consensus building.

16. *Encourage or initiate attempts to conduct a rational discourse, in particular for third level debates.* Rational discourses are one of the very few means to overcome conflicts on the third debate level. They are also useful in second level debates, if institutional performance and management capabilities are uncertain and controversial. They require careful planning and preparation and rely on the willingness of the communicator to learn from the participants and to adjust his/her preferences if deemed necessary. Several procedures lend themselves to organizing a discourse, such as public hearings, mandatory participation requirements, or conflict mediation processes. However, it is not so much the structure of the process that determines the success or failure of a risk discourse than the willingness of all participants to meet the conditions of adequate time allocation, openness of the process, willingness to learn, acceptance of different rationalities, and demoralization of positions.

These guidelines should not be regarded as recipes, but as normative suggestions of what to take into account when approaching the public with risk-related information. Social interaction is too complex for designing "fool-prove" guidelines. Different hazards and risks demand different approaches. But the most important reservation is that the best communication process will not lead to any success if it is meant to compensate shortcomings or failures in the task performance of the communicator or to hide management mistakes.

Risk Communication for Chemical Product Risks

An OECD
Background Paper

- ANNEX -

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ANNEX I

"STATE OF THE ART" REPORT ON RISK COMMUNICATION

Ortwin Renn and Hans Kastenholz

1. DEFINITION AND OBJECTIVES OF RISK COMMUNICATION

What is risk communication? After reviewing several suggestions, the definition of risk communication by Covello, von Winterfeldt, and Slovic seems to be the most appropriate for the background paper:

> *"Risk communication is defined as any purposeful exchange of information about health or environmental risks between interested parties. More specifically, risk communication is the act of conveying or transmitting information between parties about (a) levels of health or environmental risks; (b) the significance or meaning of health or environmental risks; or (c) decisions, actions, or policies aimed at managing or controlling health or environmental risks. Interested parties include government agencies, corporations and industry groups, unions, the media, scientists, professional organizations, public interest groups, and individual citizens" (Covello, von Winterfeldt, and Slovic 1986, p. 172).*

Thus risk communications fits into classic concepts of communications as a purposeful exchange of information between actors in society based on shared meanings (DeFleur and Ball-Rokeach 1982, pp. 133). Purpose is required to distinguish the sending of a message from noise in the communication channel. The term "message" implies that the informer intends to expose the target audience to a system of meaningful signals, which in turn may change their perception of the issue or their image of the sender. Acoustic signals without any meaning do not constitute communication.

If one accepts the premise, that risk communication implies an intentional transfer of information, one must specify what kind of intentions and goals are associated with most risk communication efforts. The literature offers different sets of objectives for risk communication, usually centered on a risk management agency as the communicator and groups of the public as target audiences (Covello, von Winterfeldt, and Slovic 1986, p. 172; Zimmerman 1987a, pp. 131/132; Kasperson and Palmlund 1988; National Research Council 1989). For the purpose of the background paper, the variety of objectives can be collapsed into four general categories (cf. Zimmerman 1987a, p. 131; National Research Council 1989):

(1) to make sure that all receivers of the message are able and capable of understanding and decoding the meaning of the messages sent to them;

(2) to establish a trustful relationship between the sender and the receiver of risk communication

(3) to persuade the receivers of the message to change their attitudes or their behavior with respect to a specific cause or class of risk (for example: workers‘ protection, consumer behavior);

(4) to provide the conditions for an effective stakeholder involvement on risk issues so that all affected parties can take part in a conflict-resolution process.

The four main sections of the “state of the art” report will be organized according to these four objectives. Each section introduces major theoretical issues, presents empirical results related to the discussed objective, and articulates some conclusions for risk communication.

2. THE WBGU RISK CLASSIFICATION

Many risk communication needs are the same or similar among a large range of risk types. The German Council on Global Environmental Change (WBGU) has proposed to classify risks according to eight criteria (WBGU 1999, pp.44). These criteria include:

– Damage potential, i.e. the amount of damage that the hazard can cause;
– probability of occurrence, i.e. the likelihood that a specific damage will occur;
– incertitude, i.e., the remaining uncertainties that are not covered by the assessment of probabilities (subdivided in statistical uncertainties, genuine uncertainty, and ignorance);
– ubiquity which defines the geographical dispersion of potential damages (intra-generational justice);
– persistency which defines the temporal extension of potential damages (inter-generational justice);
– irreversibility which describes the impossible restoration of the situation to the state before the damage occurred (possible restoration are e.g. reforestation and cleaning of water);
– delay effects which characterize the time of latency between the initial event and the actual impact of damage. The time of latency could be of physical, chemical or biological nature and

– potential of mobilization which is understood as violation of individual, social or cultural interests and values generating social conflicts and psychological reactions by affected people.

Theoretically a huge number of risk types can be constructed by combining the eight criteria. Such a huge number of cases would not be useful for the purpose to develop a comprehensive risk classification. In reality, some criteria are tightly coupled together and other combinations are certainly theoretically possible, but there are not any or only few empirical examples. Answering the question of risk priority, risks with several extreme qualities play a special role. The Council has chosen a classification where single risks are classified as risk types in which they particularly reach or exceed one of the possible extreme qualities. This classification is derived from the Greek mythology (WBGU 1999, pp. 58).

– *Risk type "Sword of Damocles"*
  According to the Greek mythology Damocles was invited for a banquet by his king. At the table he had to sit under a sharp sword hanging on a wafer-thin thread. Chance and risk are tightly linked up for Damocles and the Sword of Damocles became a symbol for a threatening danger in luck. The myth does not tell about a snapping of the thread with its fatal consequences. The threat rather comes from the possibility that a fatal event could occur for Damocles every time even if the probability is low. Accordingly, this risk type relates to risk sources that have very high potentials of damages and at the same time very low probability of occurrence. Many technological risks belong to this category.

– *Risk type "Cyclops"*
  The Ancient Greek knew enormous strong giants who were punished despite their strength by only having a single eye. They were called Cyclops. With only one eye only one side of reality and no dimensional perspective can be perceived. Concerning risks it is only possible to ascertain either the probability of occurrence or the extent of damage while the other side remains uncertain. In the risk type Cyclop the probability of occurrence is largely uncertain whereas the maximum damage can be determined. Some natural events like floods, earthquakes, volcanic eruptions and El Nino, but also the appearance of AIDS belong to this category as long as it does not exist any or only contradictory information.

– *Risk type "Pythia"*
  The Greeks of the antiquity asked their oracles in cases of uncertainty. The most known is the oracle of Delphi with the blind prophetess Pythia. Pythia‘s prophecies were however ambiguous. It certainly became clear that a great danger could threaten, but the probabil-

ity of occurrence, the extent of damage, the allocation and the way of the damage remained uncertain. Human interventions in ecosystems, technical innovations in biotechnology and the greenhouse effect belong to this risk type where the extent of changes is still not predictable.

– *Risk type "Pandora‘s box"*
  The old Greeks explained many evils and complaints with the myth of Pandora‘s box — a box which was sent to the beautiful Pandora by the king of the gods Zeus. It only contained many evils and complaints. As long as the evils and complaints stayed in the box, no damage at all had to be feared. However, when the box was opened, all evils and complaints were released which than irreversibly, persistently and ubiquitously struck the earth. This risk type is characterized by both uncertainty in the criteria probability of occurrence and extent of damage (only presumptions) and high persistency. Here, ozone-destroying substances can be quoted as examples.

– *Risk type "Cassandra"*
  Cassandra was a prophetess of the Troys who certainly predicted correctly the victory of the Greeks, but her compatriots did not take her seriously. The risk type Cassandra describes a paradox: the probability of occurrence as well as the extent of damage are known but it hardly emerges dismay in the present because the damages will occur after a long time. Of course risks of the type Cassandra are only interesting if the potential of damage and the probability of occurrence are relatively high. That‘s why this type is lying in the intolerable area (area of permission). A high degree of the delay effect is typical, i.e. a long period between the initial event and the impact of the damage. An example of this effect is the anthropogenic climate change.

– *Risk type "Medusa"*
  The ancient mythology tells that Medusa was one of three snake-haired sisters of the Gorgon whose appearance turns the beholder to stone. Similar to the Gorgon who spread fear and horror as an imaginary mythical figure some new phenomena have an effect on modern people. Some innovations are rejected although they are hardly assessed scientifically as threat. Such phenomena have a high potential of mobilization in public. Medusa was the only sister who was mortal — if we transfer the picture to risk policy — Medusa can be combated by rational arguments, further research and clarification in public. According to the best knowledge of risk experts, risks of this type are lying in the normal area. Because of specific characteristics these risk sources frighten people and lead to heavy refusal of acceptance. Often a large number of people are affected by these risks but harm-

ful consequences cannot statistically proved obviously. A typical example would be electromagnetic fields.

TABLE 1: Risk types, criteria and examples (WBGU 1999, p. 11)
p signifies the probability of occurrence and *d* the extent of damage

Type 1	Sword of Damocles	*p* low (towards 0); *d* high (towards infinite); *confidence intervals of p* and *d* low	nuclear energy, chemical plants, dams, meteorite impacts
Type 2	Cyclop	*p* uncertain; *d* high; *confidence interval of p* high; *confidence interval of d* rather low	floods, earthquakes, volcanic eruptions, AIDS, El Nino, mass developments of anthropogenicly affected species
Type 3	Pythia	*p* uncertain; *d* uncertain (potentially high); *confidence intervals of p and d* high;	increasing greenhouse effect, endocrine effective substances, release and spread of transgene plants, BSE
Type 4	Pandora's box	*p* uncertain; *d* uncertain (only presumptions); *confidence intervals of p and d* uncertain (unclear); *persistency* high (several generations)	ozone destroying substances
Type 5	Cassandra	*p* rather high; *d* rather high; *confidence interval of p* rather high; *confidence interval of d* rather low; *delay effect* high	anthropogenic climate change for vulnerable areas
Type 6	Medusa	*p* rather low; *d* rather low (exposition high); *confidence interval of p* rather high; *confidence interval of d* rather low; *potential of mobilization* high	electromagnetic fields

For each of the six risk classes special risk management strategies were developed (Klinke und Renn 2000). Three different management regimes were distinguished: classic risk management (dealing with risk avoidance and reduction): uncertainty management (dealing with precautionary measures and warning systems); and ambiguity management (dealing with measures to deal with conflicts among experts and between experts and social groups). The two risk classes Damocles and Cyclops require mainly risk-based management strategies, the risk classes Pythia and Pandora demand a prudent application of the precautionary principle, and the risk classes Cassandra and Medusa necessitate discursive strategies for consciousness- and confidence-building. This distinction does not mean that within each risk class the other strategies and instruments have no place, but they take a "back seat" (Klinke and Renn 1999).

What does that entail for the analysis and management of chemical risks? Under which category do they belong? If the probabilities and the potential damage are well known, the risks may either be acceptable without any need for further reduction or they are large enough so that regulatory actions needs to be taken. In both cases, the remaining uncertainties are not large and the other properties of the risk do not warrant any increased attention. Risk communication in both cases would demand routine methods of informing potential users about the correct way of handling the product. More attention is necessary if any of the main properties of the risk are quite uncertain or if the exposure to the specific risk is ubiquitous and irreversible. Then the risk would be best subsumed under the risk class of Pythia or Pandora. In addition, even a small objective risk can be amplified by the public or the media (Medusa). For these three risk classes specific risk communication strategies are necessary.

The “state of the art” report will address these various risk communication strategies and develop orientations for industry, regulators and consumers to handle the risk communication process in accordance with the requirements of the specific risk class under question and the possibilities that each of the two actors have available.

3. RESEARCH INSIGHTS FROM RISK COMMUNICATION STUDIES

3.1 UNDERSTANDING RISK MESSAGES: THE SOCIAL AND PSYCHOLOGICAL CONTEXT OF RISK COMMUNICATION

3.1.1 INTRODUCTION: THE SOURCE-MESSAGE-RECEIVER MODEL

The traditional approach to study and analyze risk communication is based on the communication model of information transfer among sources, transmitters, and final receivers. Although the model was originally developed in the late 1940s (Shannon and Weaver 1949; Lasswell 1948), it is still the most prevalent framework for communication studies up to date and has been recommended by risk managers (Thomas 1987). In a comprehensive review of 31 communication textbooks, P.J. Schoemaker concluded that nearly half of the books used the Shannon and Weaver model (Shoemaker 1987, p.120). Another approach was the transactional view that emphasizes the creation of shared meaning among senders and receivers. Both approaches can obviously be combined.

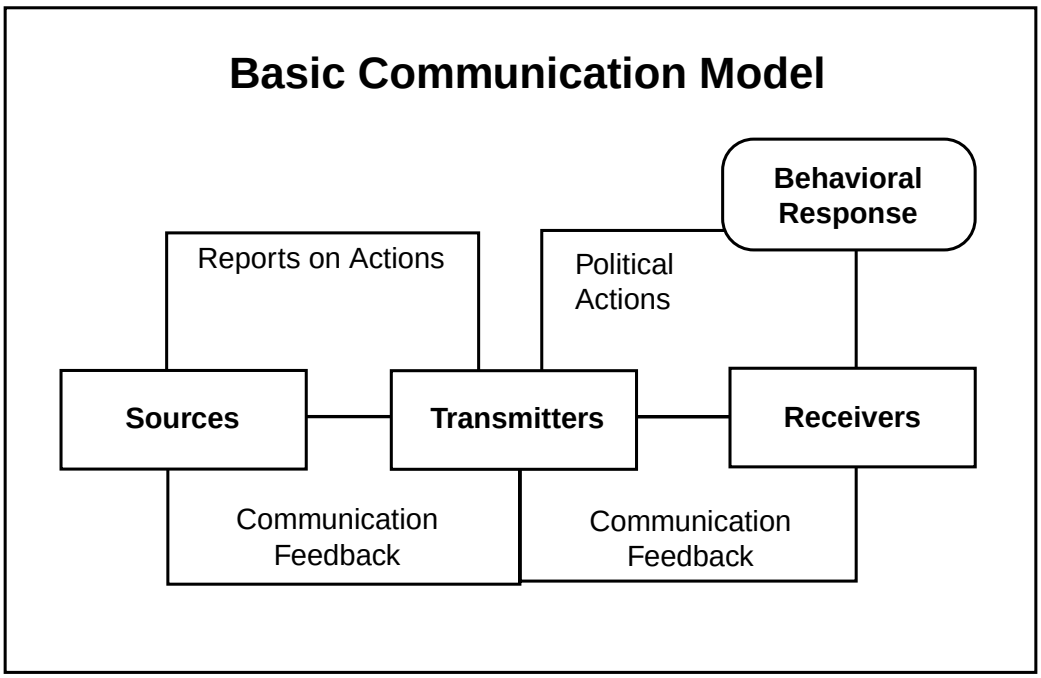

Fig 1: Source-Transmitter-Receiver-Model

Figure 1 illustrates the classic sender-receiver model. A message is composed by the communication source and then sent to a transmitter. The transmitter decodes the message and re-codes it again for its target audience. The new message is then forwarded to the final receiver who decodes the message and deciphers its meaning. The receiver may respond to the message by sending out his/her own message either to the original sender or to other constituents. S/he may also feel compelled to take direct actions in response to the message(s) received. The original source may collect or process the receivers' responses. Feedback messages may pass through a transmitter station before they reach the original sender. The original messages and even more so the feed-back messages are distorted with background noise when they are sent through several channels via transmitters and signal amplifiers (see Renn 1991 for an detailed discussion of the signal amplifying process).

The sender-receiver model has drawn fire for promoting a mechanistic understanding of communication and for emphasizing a one-way communication route (Otway and Wynne 1989; Kasperson and Stallen 1991). Yet if the model is used only as a sequential illustration of the transfer of messages from one party to another and if the roles of sources and receivers can be mutually exchanged, it can serve as a powerful tool in the analysis of communication processes. It is a structuring tool to illustrate the communication process, and not an empirical model of how communication is factually organized in a society.

Figure 2 shows the major actors of risk communication as embedded into the classical communication model. Sources for risk-related information are basically scientists or scientific institutions, public agencies such as the U.S. Environmental Protection Agency (EPA), interest groups such as industries or environmentalists, and in the case of hazardous events (physical changes caused by hazardous activities) eyewitnesses. These primary sources code information in form of reports, press releases, or personal interviews and send them to transmitters or occasionally directly to the final receivers (Renn 1988, p. 101ff).

The second step of communication is the coding and re-coding procedure at the transmitting stations. The media, other public institutions, interest groups, and opinion leaders are potential transmitters for risk-related information. A press release from EPA may stimulate industry to hold a press conference or to write an open letter to the agency. Interaction among social groups, in particular among adversaries, often takes place through the media and not via direct communication. The goal is to mobilize public support and to initiate public pressure (Peters 1984, pp.304; Peters 1990).

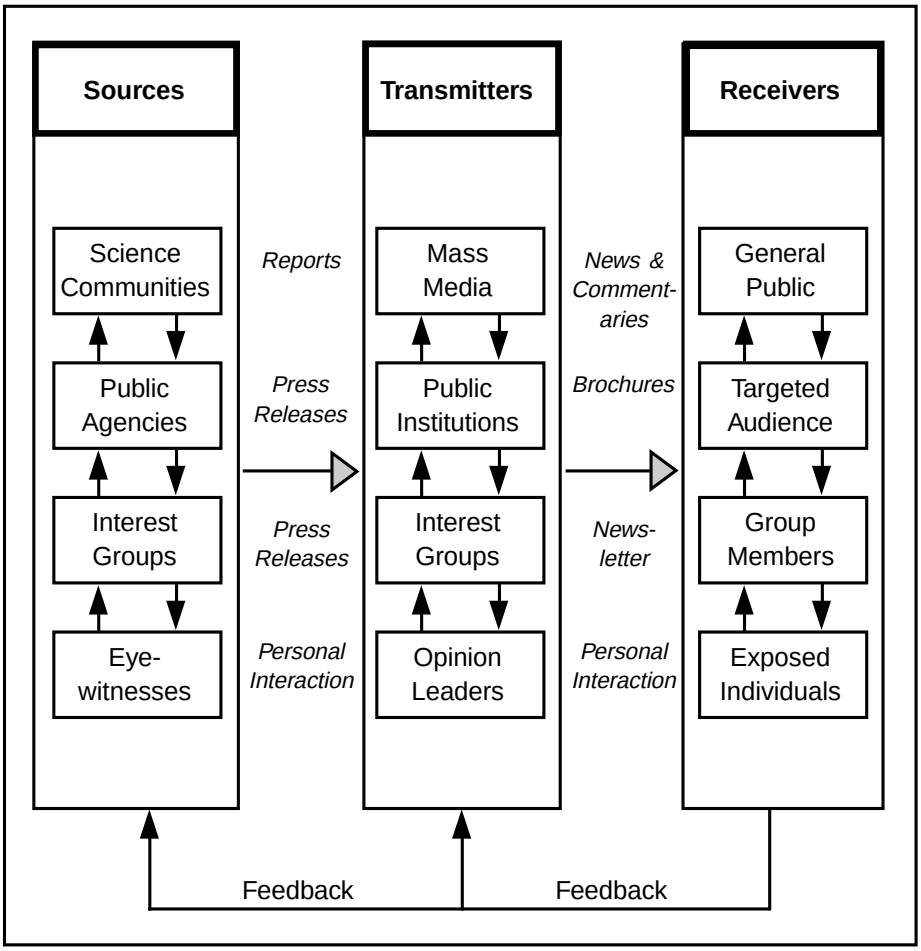

Fig 2: Organizational structure of risk communication

The last step is the processing of the re-coded messages at the receiver. Again, it is helpful to distinguish between different types of receivers. The media usually serve the general public, but many journals are targeted to specific audiences within the general public. Specialized journals tend to be either appealing to professional standards (science communities, business circles, risk assessors), leisure activities (culture, sports, travelling etc), or value groups (environmentalists, religious groups, political camps etc). The information will be framed for each audience in a different manner to assure their attention and to please their expectations.

3.1.2 THE SOURCES OF MESSAGES

The first stage of communication is the framing of a message by an information source. As H.P. Peters has pointed out, topics can be brought and sustained on the public agenda only if the mass media report about the topic and a social institution or group adopts the topic as part of its own agenda (Peters 1986, p.9).

Indoor radon is a good example. In spite of good relationships with the national press, Joel Nobel, a physician of Philadelphia, who detected a concentration of 55 Pico-Curie per liter (nearly 14 times the benchmark of 4 Pico-Curie per liter often regarded as "safe' level) in his private home in 1981, was unable to gain more than cursory attention of public institutions and the press because he could not interest an agency or social group to share his concern (Mazur 1987, p. 89). Not before the State of Pennsylvania, alarmed by another even more dramatic case in 1985, acknowledged the problem and initiated a state-wide survey program did the national press cover the topic in length and trigger more attention of federal agencies, such as EPA (Mazur 1987, p.90; Fisher 1987, p. 27-28).

In addition to the social support a message receives, the components of the message themselves play a vital role for the effectiveness of the communication effort. Among the most important are symbols and metaphors, which trigger attention of potential receivers and shape the decoding process (Hovland 1948, pp. 371; Kasperson et al. 1988). If for example the information source is described as a group of Nobel laureates, the content of the message may well command public attention. Messages from such sources may successfully pass through the selection filters of the transmitters and receivers and be viewed as credible. A press release by the nuclear industry, by contrast, may command much less credibility unless other aspects of the message compensate doubts about the impartiality of the source.

Sources or transmitters can amplify the different components of the message by taking advantage of the symbolic connotations. Assume an industrial spokesperson provides the information that a specific chemical substance has been leaking from a waste repository for two years. One journalist may portray this incident by using phrases such as "leak in waste disposal at a high-tech-park" or "state-of-the-art technology for monitoring emissions“. Another journalist may describe the same incident by using phrases such as "air pollution by toxic waste dump" and "poisoning the air we breath and the water we drink".

The following subsections will deal with each of the three major communication stations separately. The focus will be on the roles and functions of sources, transmitters, and receivers in coping with risk information. The special circumstances of risk communication are illustrated in *Figure 3*, which serves as a basic guide for the verbal explanations in the following subsections.

3.1.3 THE PRIMARY SOURCES OF RISK COMMUNICATION

Nature and technology are both sources of hazardous events, such as earthquakes, fires, explosions, pollution, or radiation. Scientific analyses attempt to determine the physical impact of such events (accident analyses) or to hypothesize about the magnitude and the probability of potential impacts (risk analyses). Observation and analysis of actual events and simulation of potential events lead to an estimate of the magnitude of the impacts, the probability of their occurrence, and the distribution of these impacts over time, space, and population subgroups (Rowe 1977). These estimates are coded in the language that the target group, usually other scientists or regulators, use for communication.

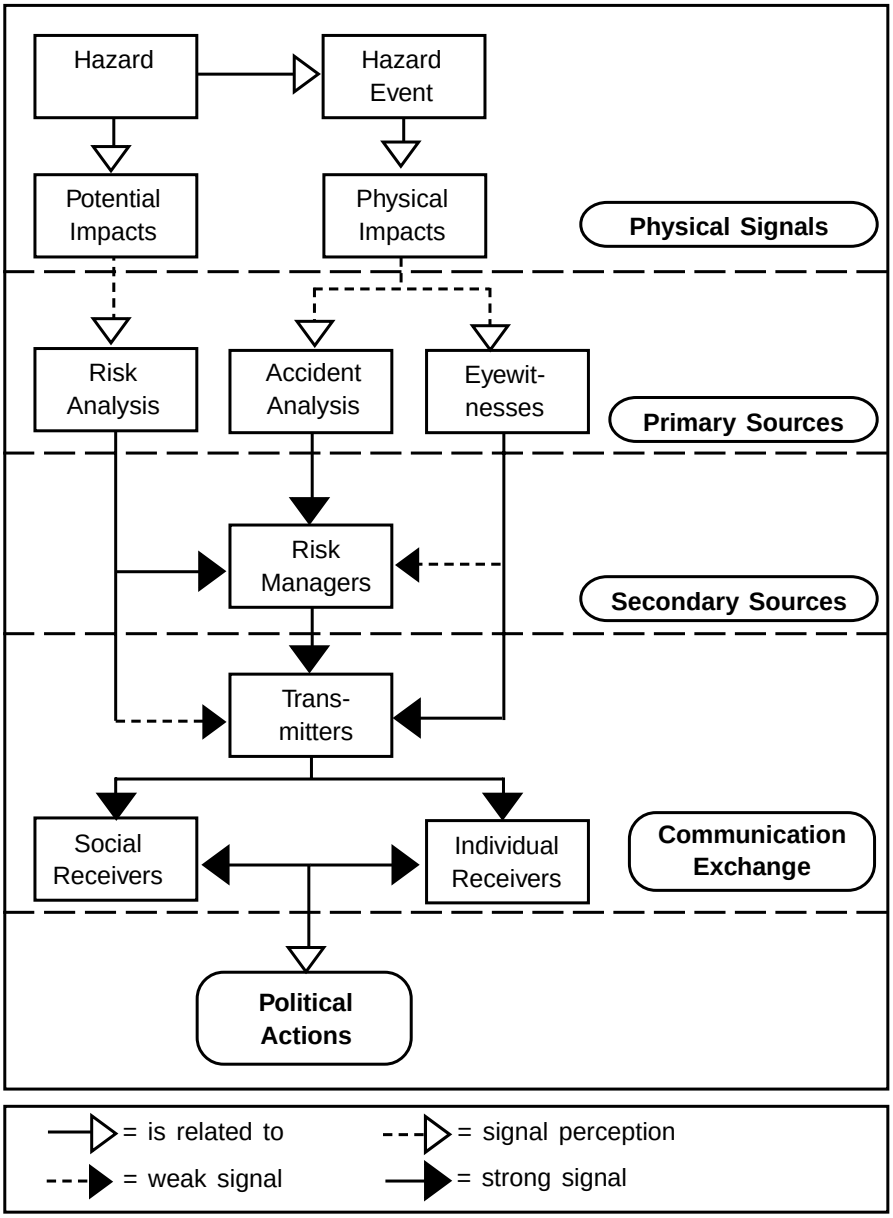

Fig 3: Signal flow model for risk communiation

In the risk field as in many other scientific areas, mathematical expressions and special jargon dominate the professional communication process. Such a specialized language is not --as many observers have speculated-- a tool to keep outsiders from entering the elite community of scientists, but serves a valuable function by providing a common and precise meaning of all expressions used within the community. The inner scientific communication process is usually not meant to convey information to the public, but to transmit messages to peers. However, in a plural society, such messages are screened by public interest groups and professional transmitters for "hidden" messages (Peters 1990). One of the consequences of this mismatch between intention and availability is the wariness of experts of sharing information with non-scientists and the distrust of many public groups toward the scientific community (Lipset and Schneider 1983).

In addition to the problem of shared meaning of messages between an expert community and outside observers, the communication process is further complicated by the difference in assigning importance to different segments of events or pieces of information. Each physical event is a source for millions of signals that an observer can collect and process. The collection, however, is necessarily selective and subjective. If two witness the same event, such as a car accident, seldom do their reports match. The selection of what types of signals are collected from a physical event or are created by a hypothetical simulation of hazardous events involves individual or group judgments about relative importance. The scientific convention to restrict one's attention to probabilities and magnitude reflects a special strategy, i.e., to abstract and deduct the typical and universal characteristics from a unique event as a means for comparing this event with other similar events or designing measures for reducing the risk of future similar events (Peters 1990, p. 13).

Scientific risk assessment constitutes a deliberate selection of signals that, based on past experience, provide information about the relative potential of hazardous events to produce adverse effects. Events, such as earthquakes or chemical spills, are scanned for signals that provide the data to construct probability distributions of adverse effects. Other signals about human sufferings, responsibility for the disaster, inequities in the experience of risk, and political implications are deliberately excluded from the signal collection process (Dietz et al. 1989).

A parallel signal selection and transformation process of an event occurs in the perception of direct eyewitnesses or affected persons. These individuals produce anecdotal evidence of the hazardous event (Keeney and von Winterfeldt 1986). This evidence is coded in another language consisting of elements with a different signal value. Here one encounters expressions for personal anxieties and fear, courage and heroism of individuals, anger and blame, compas-

sion and charity. Anecdotal evidence competes with the systematic and abstract evidence provided by scientists. Both forms of evidence stem from the identical physical phenomena, but they differ in the selection of signals from that event and their mental processing. The language used by both groups to describe the event and its consequences are reflections of different clusters of shared meaning (Rayner 1987). These reflections are governed by cultural norms and values that characterize the self-image and world-view of different groups or society as a whole. The search for human involvement, be it in form of exceptionally brave behavior or blame for the culprits, characterizes the common cultural sensitivity of the contemporary Western societies for an activist perspective. This world-view implies that human interventions are capable of preventing, mitigating or aggravating any type of disaster. Other cultures or predecessors of modern western cultures have perceived disaster frequently as signs of inevitable fate or God's punishment and have searched accordingly for signs of collective sins rather than individual faults (Renn 1984, p. 13ff).

The selection process is part of the cultural process of constructing reality. Social constructions harmonize the mental models of the world with the actual observations (Dietz et al. 1989; Seiderberg 1986). The deliberate, axiomatic nature of the selection rules holds true for the scientific community as well as for any other social group. For example, the scientific convention of assigning equal weight to probability and magnitude in risk equations is a "non-scientific" value judgment that can neither be derived from purely logical reasoning nor empirical evidence (Haefele et al. 1990). Primary sources therefore collect and select signals from the physical world, re-code them into verbal expressions according to their mental models and assign them different degrees of significance and often symbolic value. Some properties of the risk situation may evoke special attention, while others may easily be ignored or attenuated.

3.1.4 SOCIAL AMPLIFICATION OF RISK IN MESSAGE FORMATION

The process of amplifying some signals of the physical event while attenuating others has been a major element of the recently developed metaphor of social amplification of risk (Kasperson et al. 1988, Renn 1991, Kasperson and Kasperson 1996). The concept rests on the thesis that events pertaining to hazards interact with psychological, social, institutional, and cultural processes in ways that can intensify or attenuate individual and social perceptions of risk and shape behavioral responses. Behavioral responses, in turn, generate secondary social or economic consequences. These consequences extend far beyond direct harms to human health or the environment and may include significant indirect impacts such as liability, insurance costs, loss of confidence in institutions, or alienation from community affairs (Kasperson et al.

1988). Integrating the communication model into the social amplification concept provides a useful model of signal transformation.

As a starting point, the transformation of physical signals into meaningful verbal expressions forms messages, which are then transmitted through various channels of communication by different societal actors who partially amplify or attenuate them during several transformation processes. The transformed and amplified messages exert a specific incentive for social groups or individuals to take actions or modify behavior. Individuals and social actors serve as amplification stations, which process and respond to the information in various ways. Attitudes may change, institutions may decide to redirect their efforts, political pressure may be exerted to imitate political changes, and the risk management system may be reformed. Ultimately, social actions result in changes in the social structure and the physical world. These secondary and tertiary effects of the amplification process can then result in technological and social change. This change triggers the development of new technologies, new control institutions, and risk policies. The cycle can start anew. This process is illustrated in *Figure 4*.

On the level of primary sources of communication, the selection of signals by at least two divergent groups, the scientists and the eyewitnesses, leads already to different routes of social amplification. Scientific conventions focus on specific aspects of risk. They help to identify the typical elements of all covered risk situations, but may obscure the uniqueness of the specific event or hazard under consideration. Reversely, anecdotal evidence seems to center on the uniqueness of the situation and the specific circumstances of the event and to neglect the typical patterns that characterize risk in general. One major problem of risk communication is therefore the integration of scientific and anecdotal evidence, a problem that is aggravated by the stochastic nature of risk (Keeney and von Winterfeldt 1986; Renn and Levine 1991).

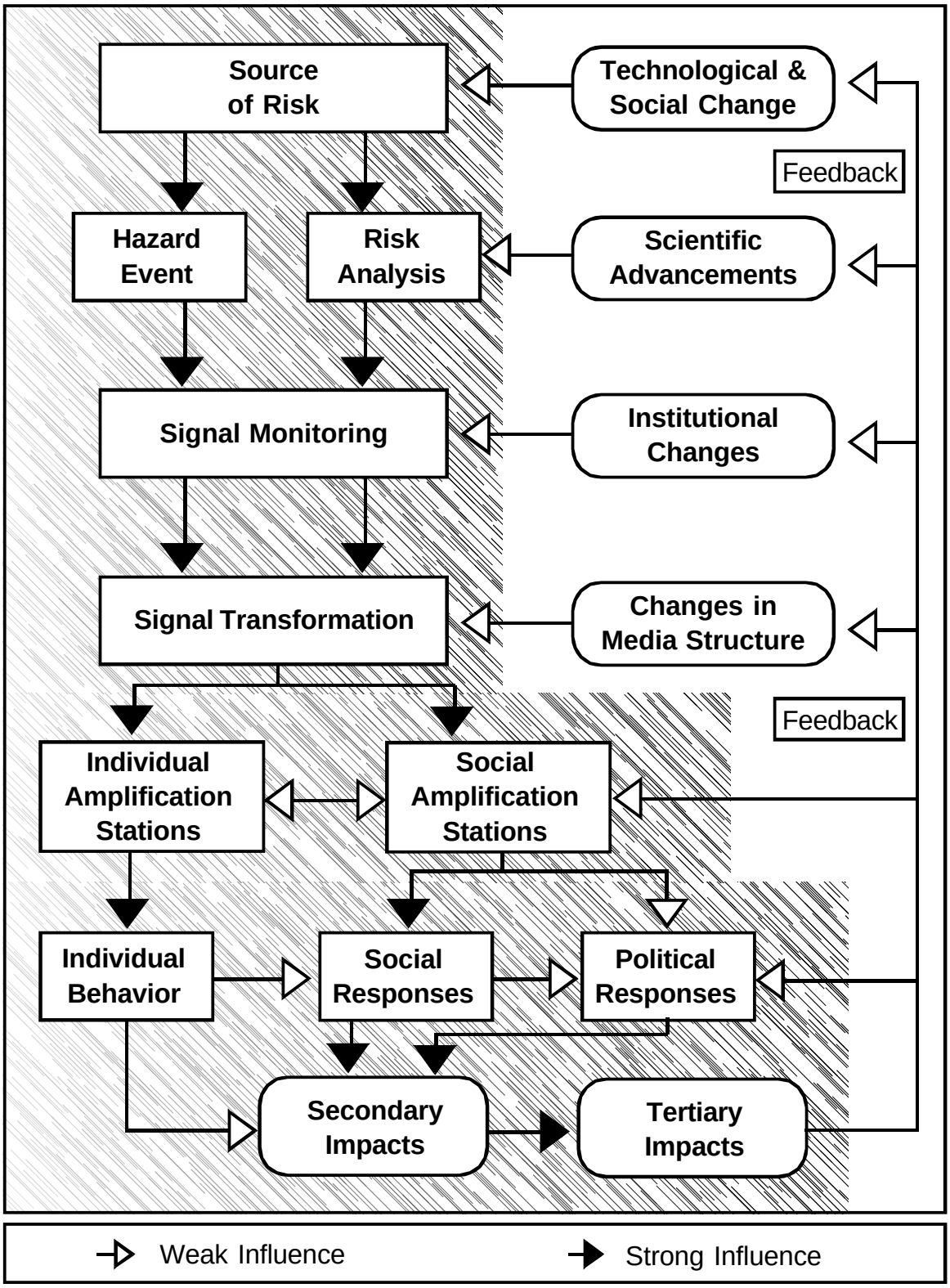

Fig 4: Risk communication according to the concept of the social amplification of risk

3.1.5 THE SECONDARY SOURCES OF RISK COMMUNICATION

Following the process of risk communication illustrated in Figures 3 and 4, the messages of the primary sources are sent to secondary sources, mainly risk managers, but also scientific institutions and special interest groups (Renn 1988). These organizations are interested primarily in the scientific investigations focusing on dose-effect relationships and probabilities of adverse events. The main objectives of the concerned institutions are to forecast, analyze, or manage the hazard. In this respect they act on the basis of a similar mental model as the scientific community.

However, transmitters and the public are in general more interested in the specific circumstances of the one incident reported or the consequences of a single hazard event. The intention of the source to communicate the common lessons and to put the risk in perspective conflicts with the interest of the receiver to learn more about the incidence and the real or potential victims (Peters 1990). Furthermore, each institutional source will likely collect and pass on information that supports its designated service and provides good arguments to legitimize its existence and performance (Perrow 1984; Dietz and Rycroft 1987, p. 54f). Since institutions have different purposes, they will likely differ in the selection and processing of signals stemming from primary sources. This difference in interpretation may be aggravated by different competing risk assessments which reflect adversarial science camps or result from scientific advocacies within interest groups. But even if all these sources relied on the same primary sources or cited the same evidence, the messages would still look as though they were drawn from completely unrelated data bases.

Industry, regulators, scientists, and environmental watchdogs focus on different aspects of the problem, amplify signals that each of them regards as confirmation of their basic philosophy, and that emphasize their role and function in the assessment and management of the respective risk (Lynn 1986). In most cases, competing messages are not a product of misinformation, manipulation, or even lying. Rather every communicator has a different perspective in perceiving and evaluating the issue and is interested in conveying that perspective to the outside world. Fragmentation of information is therefore an inevitable side effect of plural interest articulation (Peters 1990). The process of signal reception and recoding in this stage is less related to the properties of the hazard, although this information may be packaged within the message, but rather to the efforts of the institution to assess, analyze, or manage the respective risk.

3.1.6 ROLE OF TRANSMITTERS IN COMMUNICATION

The transmitter has two roles in the communication process: first, transmitters receive and process information. In addition to personal selection filters and evaluation strategies, professional and institutional rules govern the selection of received signals and their interpretation. Journalists, for example, follow specific professional guidelines such as hearing both sides in a controversy, as well as institutional rules such as the required editorial style and the expectations of the perceived target audience for the respective medium.

Second, the transmitter acts as an information source by sending information to the final receiver. The re-coding of messages involves conscious or unconscious changes of the original information material. Messages from several sources may be integrated into one new message or comments may be added. Obviously, both processes take place simultaneously, i.e. understanding and re-coding the incoming message is an integral part of the transmitting process.

Study of the transformation of messages flourished in communication research. The theoretical literature suggests many different concepts about the nature of this transformation (Peters 1984; 1990; Peltu 1985, pp. 129-130; 1989; Sood et al. 1987, p. 30; Shoemaker 1987, p.125; Lee 1986, p. 175). Most of these concepts are related to two crucial questions. First, are the media creating new messages or are they reflecting existing messages; second, how biased are journalists in their coverage vis-a-vis their own social biases and external pressures? Neither question has found a final answer yet (Peltu 1985, pp.140-141; Mazur 1987, p. 86; Lichtenberg and MacLean 1988, pp. 33-48).

Communication research in the 1950s and 1960s suggested a strong influence of the media on public opinion. Extensive testing in recent years, however, showed that the media are more likely to set the agenda rather than creating new issues or changing the issues on the agenda.(McCombs and Shaw 1972; Peltu 1985, p. 140; Lichtenberg and MacLean 1988).
With respect to the second question evidence exists to support almost all possible viewpoints ranging from political and commercial pressures to courageous news reports in conflict with all vested interests. Cultural biases within the journalistic community have been found, but also a variety of different political and social attitudes among journalists. Some journalists perceive their job as a mere translation of events into verbal or visual expressions while other believe they should play a more active role in shaping and explaining the issue (cf. the controversy about the studies of Kepplinger in the review by Lichtenberg and MacLean 1988, pp.37-45; Koecher 1986; Peters 1990).

In short: the extremes that media are mere reflectors of reality or that they are docile instruments of social pressure groups may occasionally be true, but they are not the rule. In reality, the situation is more complex: Media coverage is neither a product of external pressures nor an autonomous subsystem within society (Lowry and DeFleur 1983; Raymond 1985). It reflects internalized individual values, organizational rules, and external expectations. The issue itself, the institutional context, and the political salience of the issue determine which of these three factors is likely to dominate the transformation process. A universal theory that explains how transformation takes place is therefore not likely to evolve.

All transmitters convert the original message into a new message according to institutional rules, professional standards, role requirements, anticipated receivers' interests, and personal preferences. The final product is a mix of original and re-coded message, thus leaving it to the final receivers to distinguish between the informational elements provided by the original source and the additions or deletions undertaken by the various transmitters.

3.1.7 THE TRANSMITTERS OF INFORMATION ON RISKS

Is there any evidence about specific media treatment of information on risks and particularly on chemical risks? The media elicit information from direct eyewitnesses of hazard events (anecdotal evidence). They have usually access to the primary scientific reports (scientific evidence) but may prefer to use its popular derivations (such as articles in popular science journals). In addition, they will be exposed to a bombardment of press releases and other information from managing institutions or socially relevant groups. This abundance of material has to be collected, selected, digested, dissected, and finally re-coded.

The transmitters face a diversity of incoming messages caused by different perspectives on the nature of the risk and its best management. This diversity itself is useful to convey to the final receivers and to add to the impression that the risk issue is a controversial topic with lots of confusing and often contradictory messages. The widely accepted rule of fairness in news coverage demands equal treatment for all points of views. This conflicts with the widely accepted rule in scientific conflicts that professional dissent should be reconciled through methodological conventions, factual evidence, and peer review, notwithstanding genuine uncertainty about predictions. It also conflicts with the political conflict resolution mechanism of majority vote. The media, in contrast, transmit the claims of the different camps to the audience regardless how much scientific evidence each of them has been able to compile and whether it represents a majority or minority opinion. Transmitters in a pluralistic society tend to reinforce diversity, dissent, and relativity of values (Rubin 1987, p. 53). Even specialized

journals tend to focus on controversies that fit into their general philosophy. Thus dissent and ambiguity are inevitable and irreversible parts of risk information in addition to the uncertainty of the consequences.

In contrast to the scientific community, the nature and the magnitude of the original hazard are only of minor interest to most transmitters who prefer to focus on the way institutions handle risks and communicate about their activities. Empirical studies demonstrate that neither the number of victims in an event nor the expected number of fatalities are correlated with the volume and intensity of media coverage (Adams 1986; Singer and Endremy 1987, p. 14; Wilkins and Patterson 1987, pp. 84; Sood et al. 1987, pp. 36-37). As Singer and Endremy have pointed out, the media emphasize hazards that are relatively serious and relatively rare; it is the combination that gives them their punch (Singer and Endremy 1987, p.13). For example, the Chernobyl accident with 31 acute deaths cases received 129 minutes of CBS News coverage while the 1976 Tandshan earthquake leaving 800,000 people dead received less than 9 minutes on the average TV evening news (Sood et al. 1987, p.37).

The literature contains endless lists of factors that are assumed to determine the attractiveness of risk-related signals for transmitters. Such factors include: technologically induced hazard (versus natural hazard), possibility to blame someone for the outcome (Sandmann et al. 1987, p. 105), cultural distance from the place of occurrence (Adams 1986), human interest component, drama and conflict, exclusiveness of coverage (Peltu 1985, pp. 137-138), proximity to politically hot issues, prestige of information source, and degree of conflict among stakeholders (Peters 1984 and 1990).

Reviewing the abundance of theoretical suggestions and partially confirmed empirical results, one might conclude that the information processing in the media is almost random, or at least void of any systematic pattern. However, some insights have been gained as a result of the media studies undertaken so far. The major components of risk studies, probabilities and magnitudes, seem to play only a minor role in the media coverage; they are hence attenuated. Intensified, however, are signals relating to conflicts among social groups, contradictions between primary and secondary sources of information, risk events that could have been prevented or mitigated, and the involvement of individuals or organizations with high prestige and political influence.

3.1.8 THE RECIEVERS: RISK PERCEPTION MECHANISMS

3.1.8.1 ATTENTION AND SELECTION FILTERS

Today's society provides an abundance of information, much more than any individual can digest (Renn 1998). It is assumed that the average person is exposed to 7,000 bits of information each day of which s/he perceives around 700, acknowledges 70, stores seven in the short term memory and may remember less than one in the longer term. Most information to which the average person is exposed will be ignored. This is not a malicious act but a sheer necessity in order to reduce the amount of information a person can process in a given time.

The attention and selection process is not random although random elements may play a role. People have developed special strategies to select information that they feel is relevant to them. This is also true for risk information. The major criteria for selection are ability and motivation (Chaiken and Stangor 1987). Ability refers to the physical possibility that the receiver can follow the message without distraction, motivation to the readiness and interest of the receiver to process the message. Three conditions have to be met to satisfy the criterion of ability*:* the information has to be accessible, the receiver must have the time to process the information, and other sources of distraction should be absent.

Applying these insights on selection procedures to information on chemical risks, it is quite obvious that chemical product and their risks haven been main targets of communication. Special interest has to be given to small amounts of chemicals and risks below any threshold or national standard. Although anecdotal knowledge suggests that small amounts of a "bad agent" might create no problems as experienced with many medical drugs or even alcohol, it is rather unlikely that such effects are associated with "artificial" chemicals in the product chain or even environmental pollutants. Even if the information would be made accessible to the public, most people would probably judge this information as not very credible. The main reason for the rejection would be the fact that chemicals as well as environmental pollutants are commonly regarded as negative outcomes of an industrialized society. People believe that these chemicals are the price we have to pay for the benefits of living in an mostly affluent society. There is a wide disagreement among stakeholders and members of the public whether this price is too high or justified compared to the benefits, but everybody shares the notion that any substance released into the environment that is not part of the desired product has a negative impact on the quality of human health and the environment.

3.1.8.2 INTUITIVE HEURISTICS

Once information has been received, common sense mechanisms process the information and help the receiver to draw inferences. These processes are called intuitive heuristics. They are particularly important for risk perception, since they relate to the mechanisms of processing probabilistic information. One example of an intuitive strategy to evaluate risks is to use the mini-max rule for making decisions. This rule implies that people try to minimize postdecisional regret by choosing the option that has the least potential for a disaster regardless of probabilities. The use of this rule is not irrational (Lee 1981). It has evolved over a long evolution of human behavior as a fairly successful strategy to cope with uncertainty (better safe than sorry).

This heuristic rule of thumb is probably the most powerful factor for rejecting or downplaying information on chemical risks. If any exposure above zero or above a defined threshold (minus safety factor) is regarded as negative, the simple and intuitively reasonable rule is to minimize exposure makes sense. Most regulatory regimes are based on this simple rule ranging from the ALARA principle to the application of the best available control technology (BACT). Such principles lose their justification if one expects no effect or no adversarial effect (NOEL) from exposure to specific concentration of the chemical in question. The task of determining acceptable limits or standards is further complicated by the fact that there may be considerable inter-individual variances in susceptibility and that stochastic effects may be in place that allow only probabilistic inferences. Most individuals would probably be simply overtaxed by taking all these factors into account. It is unlikely that each individual will be given the opportunity to explore his or her individual profile of susceptibility with respect to chemical agents. Regulatory actions can set limits but cannot force individuals to accept exposures that may be detrimental to some individuals while of no harm to the vast majority. Public health officials have no other choice but define reasonable limits of acceptable exposure that ensure no harmful effects for almost everyone regardless of individual or social sensibility.

In addition to the "better safe than sorry" rule, risk perception researchers have identified other biases in people’s ability to draw inferences from probabilistic information. These biases are summarized in *Table 2* (Festinger 1957; Kahneman and Tversky 1979; Ross 1977).

Risk managers and public health professionals should be aware of these biases because they are found in public perception and may be one of the underlying causes for the observed public responses. For example, the frequent media coverage about the exposure of children to potentially toxic substances in toys has alarmed the public and promoted a response of outrage

based on the availability bias. As information on the negative impacts of these chemicals are widely disseminated in the media and any poisoning or even cancer case among youngsters will be associated with the exposure to these chemicals. It is almost impossible to convey the message that such small doses do not have the potential to initiate toxic effects and provide only a marginal risk increase with respect to carcinogenesis.

TABLE 2: Intuitive biases of risk perception

BIASES	DESCRIPTION
Availability:	Events that come to people's mind immediately are rated as more probable than events that are less mentally available.
Anchoring effect:	Probabilities are adjusted to the information available or the perceived significance of the information.
Representativeness:	Singular events experienced in person or associated with properties of an event are regarded as more typical than information based on frequencies.

The public perception of chemicals in products is often linked to disease and destruction. It will be extremely difficult to overcome this availability bias even if the scientific evidence tells otherwise. The stochastic nature of the effect implies that at least one individual might be harmed even if most individuals experience no negative health impacts.

3.1.8.3 SEMANTIC IMAGES

Psychological research has revealed different meanings of risk depending on the context in which the term is used. Whereas in the technical sciences the term risk denotes the probability of adverse effects, the everyday use of risk has different connotations. With respect to technological risk, *Table 3* illustrates the main semantic images (Renn 1985, 1989).

Chemical agents that are likely to trigger public attention are mostly to be found in the category of “slow” Agents. This has far-reaching implications. Most chemical risks belonging to this category are regarded as potentially harmful substances that defy human senses and "poison" people without them knowing about it. Risks associated with food additives, air pollutants, water impurities, and chemical byproducts are mostly invisible to the person exposed and thus requires warning by regulators or scientists. In contrast to medical drugs where people are aware of the beneficial effects at the prescribed dose, chemical byproducts are never associated with intended positive impacts but always as negative side effects of an activity

that provides some utility to society or groups of society. Along with that image people tend to require a deterministic regulatory approach when it comes to chemicals in the environment. Most surveys show that people demand zero-risk-levels, at least as the ideal target line. Risks belonging to the other categories are subject to deliberations between benefits and risks and allow the development of trade-offs. Risk within the category of slow agents, however, trigger feelings of avoidance and strict regulatory prohibitions. The former US food regulations (the so-called Delaney clause) reflect this public sentiment. Something that is regarded as truly bad and vicious is almost impossible to link with a connotation of public acceptance.

TABLE 3: The four semantic images of risk in public perception

1. *Pending Danger*
   - artificial risk source
   - large catastrophic potential
   - inequitable risk-benefit distribution
   - perception of randomness as a threat

2. *Slow Agents*
   - (artificial) ingredient in food, water, or air
   - delayed effects; non-catastrophic
   - contingent on information rather than experience
   - quest for deterministic risk management
   - strong incentive for blame

3. *Cost-benefit Ratio*
   - confined to monetary gains and losses
   - orientation towards variance of distribution rather than expected value
   - asymmetry between risks and gains
   - dominance of probabilistic thinking

4. *Psychological Thrill*
   - personal control over degree of risk
   - personal skills necessary to master danger
   - voluntary activity
   - non-catastrophic consequences

The only exception may be the exposure to "natural" agents. Most people believe that anything that exists in nature cannot be harmful for people if consumed in modest amounts. That is why alleged natural drugs are associated with fewer or even none negative side effects compared to alleged chemical drugs. The perceptions of natural toxins as benign reflect the modern impression or myth of "Mother Nature" who offers an invaluable set of beneficial resources to humankind in response for taking good care of Her. Chemical compounds, however, are associated with artificiality and constitute threats to human health. They are only beneficial for humans in exceptional situations such as in cases of severe illness. In all other applications they should be avoided or minimized as they disturb the purity of natural resources such as water or food. If any of these "chemical" compounds turn out to be harmless

or even beneficial (as the hormesis thesis is claiming) if consumed in small amounts, it would contradict anything that most modern people believe in. It would turn the beliefs of the intuitive toxicologists upside down.

3.1.8.4 QUALITATIVE RISK CHARACTERISTICS

In addition to the images that are linked to different risk contexts, the type of risk involved and its situational characteristics shape individual risk estimations and evaluations (Slovic 1987; Renn 1990a/1990b). Psychometric methods have been employed to explore these qualitative characteristics of risks (Slovic et al. 1981; Vlek and Stallen 1981; Renn 1985; 1990a; Covello 1983; Gould et al. 1988; Slovic 1992):

Surveys and experiments based on the psychometric paradigm have revealed that perception of risks is influenced by a series of perceived properties of the risk source or the risk situation. These properties are called qualitative characteristics. *Table 4* lists the major qualitative characteristics and their influence on risk perception.

TABLE 4: List of important qualitative risk characteristics

	Qualitative Characteristics	*Direction of Influence*
1.	Personal control	increases risk tolerance
2.	Institutional control	depends on confidence in institutional performance
3.	Voluntariness	increases risk tolerance
4.	Familiarity	increases risk tolerance
5.	Dread	decreases risk tolerance
6.	Inequitable distribution of risks and benefits	depends on individual utility, strong social incentive for rejecting risks
7.	Artificiality of risk source	amplifies attention to risk, often decreases risk tolerance
8.	Blame	increases quest for social and political responses

In addition to the qualitative risk factors, equity issues play a major role in risk perception. The more risks are seen as unfair for the exposed population, the more they are judged as severe and unacceptable (Kasperson and Kasperson 1983; Short 1984). The perception of health risks induced by chemicals is usually linked to an absence of personal control and the preponderance of dread thus amplifying the impression of seriousness.

Furthermore, the perception of risk is often part of an attitude that a person holds about the cause of the risk, i.e. industrial activity, consumption of food, energy production and others. Attitudes encompass a series of beliefs about the nature, consequences, history, and justifiability of a risk cause (Thomas et al. 1980; Otway and Thomas 1982). Due to the tendency to avoid cognitive dissonance, i.e. emotional stress caused by conflicting beliefs (Festinger 1957), most people are inclined to perceive risks as more serious and threatening if the other beliefs contain negative connotations and vice versa. Often risk perception is a product of these underlying beliefs rather than the cause for these beliefs (Clarke 1989).

With respect to the qualitative characteristics, one would expect that risks from chemical products are likely to be amplified rather than attenuated. First, most chemicals are associated with negative risk characteristics such as dread, lack of personal control, and invisibility making people even more concerned about their negative impacts than warranted by the predicted health effects alone. Second, the beliefs associated with the risk source, for example industry, center around greed, profit-seeking and alleged disrespect for public health. The ongoing debate on the role of the tobacco industry in deceiving public opinion may be a good illustration of this negative image. The same impression dominates the perception of chemicals in the food or water chain. Fourth, the possibility of chemical risks touches upon serious equity concerns if susceptibility to negative effects vary considerably among individuals or rest on probabilistic balancing. For all these reasons, it cannot be expected that risks from chemicals are regarded as inevitable byproducts of one‘s own lifestyle. This is one reason for the need of risk communication programs.

3.1.8.5 PERCEPTIONS AND PSYCHOSOMATIC RESPONSES

A major body of literature exists on how people assimilate information about hazards and transform them into somatic or psychological effects (Colligan et al 1982; Aurand et al. 1993). If a person feels threatened by a risk, stress and other somatic effects are likely to occur.

Psychosomatic reactions can manifest themselves in two different forms: suppression of a real health threat and amplification of perceived health risks. In both cases, psychological factors govern the human response and may induce somatic reactions. It is well known that many patients respond with real improvements of clinical symptoms when exposed to placebos. On the other hand, many people feel threatened by environmental pollutants although dose-response-studies would not suggest any health effect. *Table 5* provides an overview of the causes of stress, suppression of health impacts and amplification of such impacts (taken from Renn 1997).

TABLE 5: Psychosomatic impacts

1. *Psychological Stress*
   - Real or alleged exposure to a hazard
   - Competing information
   - Reliance on information from others
   - Insufficient time to cope with risk
   - loss of trust
   - loss of personal control

2. *Suppression of Health Hazards*
   - Personal interest in risk source
   - Linkage between risk and highly esteemed benefit or habit (such as home)
   - Fatalism
   - Perception of unavoidability

3. *Amplification of Health Hazards*
   - Conflicting information (better safe than sorry)
   - Blame (inflicted by others)
   - Exposure to stochastic effects
   - Non-familiarity with hazard
   - Media induced hysteria

The inducement of stress is likely to be linked to three major influences: real or perceived exposure to a risk agent, the perception of confusion about the risk level and appropriate reaction and finally the perception of insufficient time to make the necessary adjustments. If one of these factors is present, people tend to respond with heightened concern and worry. If all these factors are present combined with symbolic connotations of environmental threats and the perception of technological hubris, a response as strong as observed in the aftermath of the Alar controversy is not so surprising.

One of the most challenging questions surrounding the response to the public revelations of chemical risks is the question on the interaction between risk perception and psychosomatic reactions. In popular medicine, treatments based on homeopathy have gained wide acceptance because it presupposes that extremely small concentrations of a natural substance can have large effects on improving human health. Most established physicians and biochemists attribute the success of homeopathy to placebo effects. They claim that people believe in the positive effects of these substances and activate their immune system to fight the disease. This article is not the place to discuss the arguments for or against homeopathy. But studying the perception of alternative medical treatments may provide some clues of how small exposures to chemical risks are perceived in the wider population. Similar to the placebo effect that may explain therapeutic success, nocebo effects may result from fear and negative expectations with respect to small amounts of potentially toxic or carcinogenic agents. Diffuse syndromes such as the sick-house syndrome or the multiple chemical syndrome have often been associ-

ated with an interactive effect triggered by the combination of actual exposure and psychological distress and anxiety.

Such individual case studies do not prove anything, but they exert strong repercussions on public opinion. If special advocates provide sufficient anecdotal evidence that they became sick after being exposed to a dose that most experts would regard as entirely harmless, most people would tend to reject the systematic claims and respond in the usual "better safe than sorry" mentality.

3.1.9 LESSONS TO IMPROVE THE UNDERSTANDING OF RISK INFORMATION

What are the general lessons to be learned from the research based on the traditional communication model and its application for risk communication? How can one design or channel a message so that it is likely to be selected by a transmitter and adopted by the final receiver without major distortions of the original intent of the message?

The common thread running through most risk communication studies is that public understanding is hampered by the complexity of the risk concept (Short 1984). Furthermore, the multi-stage coding and re-coding process during the transmission of messages accounts for numerous errors and misconceptions conveyed to the final receiver. Transmitters and receivers reduce complexity by simplifying the message and focusing on those aspects that they regard as relevant. This is part of the communication reality in modern societies and provides the social framework in which messages are sent and received.

The communication process can be compared to a free market system in which goods are produced, transported, purchased, and consumed. Over the long run, most good products will find their market niche, whereas most bad products will eventually fail to meet the market test. Similarly, messages that contain important information are more likely to reach their destination, but many trials may be needed to assure this success. In addition, packaging can help to sell the message faster and to overcome the obstacles on the way from the source via the transmitter to the final receiver. The package can help if the message is worth transmitting, but even the best package will fail in the longer term if the message is poor, dishonest, or simply irrelevant.

With respect to the final receiver, risk communication must address the qualitative characteristics of risk and the mechanisms of risk perception. It is not sufficient to confine the communication process to the discussion of probabilities and consequences (Renn 1990). Communi-

cation should include aspects such as whether the exposure is voluntary, what possibilities exist to exert personal control (or if that is not feasible what institutions can fill that gap and monitor and control risks on behalf of the public), how the risk and its consequences are managed, and how catastrophic events can be avoided.

Risk communication is particularly difficult for slow agents, which are associated with involuntariness, delayed effects, inability to sense by human organs, lack of control, and unfamiliarity. To address these negative risk characteristics, it may be helpful to point to functional equivalents of these characteristics in a broader societal context. Potential equivalents are the assurance of a democratic decision-making process to counteract the impression of involuntariness and, as a replacement for personal control, the independence and impartiality of operating and regulating agencies. This may produce trust in their capability to monitor routine emissions, check safety devices, and intervene if safety in the risk producing facility is not managed properly (Lipset and Schneider 1983). In addition, unfamiliarity can partially be compensated by better functional knowledge about the risk and the associated technology.

With respect to the transmitters, risk communicators should be aware of the major selection rules of the media. Media report about events, not continuous performance. Hardly any journalist is interested, for example, in writing a story about a long safety record of a hazardous waste facility. If such a facility, however, faces an accidental release of hazardous material, one can be sure that this event will become headline news. To get a message across, communicators need to link their message to events, not necessarily physical events. Social events such as a celebration of 25 years of safe performance of a chemical factory or a completion of a scientific study can also meet the event requirement.

Another major characteristic of the media is their interest in eyewitness reports. These testimonies relate abstract issues or events to unique human experiences (which journalists assume help readers to identify with the victims or managers of the risk). Information that emphasizes the human component and personalizes abstract material is more likely to be accepted by the media than documents about the sequence of events or organizational competence (Peltu 1989). However, risk communicators should be aware that "packaging" the information for the purpose of pleasing the transmitter always faces the risk of creating suspicion and distrust. Transmitters often associate good packaging with the intent to manipulate the audience. One should never forget that social stations of information processing are not computers or radios that operate according to prestructured rules (Rayner 1988), but they constitute thinking beings who reflect the messages they receive and change their selection rules to fit the circumstances.

Interaction among transmitters, plural input from different sources, the coexistence of personal, professional, and institutional selection and amplification criteria, and interaction among different target audiences create enough complexity and uncertainty that the final effect of the communication process can hardly be measured at all, let alone be effectively controlled. Even the rather simple step of making a message known to and understood by the target audience faces the chaotic conditions of the communication market. Guidelines and recipes to improve risk communication can help to increase the probability that a message will reach its audience, but will never guarantee its success.

3.2 RISK COMMUNICATION AS A PROCESS OF ESTABLISHING TRUST AND CREDIBILITY

3.2.1 INTRODUCTION

Institutions and social actors that are involved in managing risk have the problem of legitimating their decisions and policies in a political arena, in which the major stakeholders are still defining their social role and in which the public is observing a confusing mix of controversial and often contradictory information. In this situation all parties rely on trust and credibility for their communication effort to impress the audience or even to influence their attitudes (Blair 1987; Zimmerman 1987). Credibility of information sources is, therefore, a key issue in risk communication. At the same time it is the major social resource that may determine which group or fraction will finally shape social risk policies and enhance its social power. Credibility is still a scarce resource for which different groups compete in their communication process.

Since trust is one major objective in risk communication and also a prerequisite for many other objectives, risk communicators need a better understanding of the meaning and implications of the term trust. If we consult the literature, we can find the following definitions:

a) "the confidence that one will find what is desired from another, rather than what is feared" (Deutsch 1973);
b) an "Actor's willingness to arrange and repose his or her activities on Other because of confidence that Other will provide expected gratifications" (Scanzoni 1979);
c) "a generalized expectancy held by an individual that the word, promise, oral or written statement of another individual or group can be relied on" (Rotter 1980);

d) "a generalized expectation related to the subjective probability an individual assigns to the occurrence of some set of future events" (Rempel, Holmes, and Zanna 1985);
e) "assured reliance on a person or thing" (Webster's Third International Dictionary).

Apparently all definitions emphasize the reliability of information and the conviction by the receiver that the source of a message has given truthful and complete information. For our purpose of defining trust in the context of communication, we suggest the following definition:

Trust refers to the generalized expectancy that a message received is true and reliable and that the communicator demonstrates competence and honesty by conveying accurate, objective, and complete information.

Although trust and confidence are often used interchangeably, confidence in a source can be distinguished from trust as a more enduring experience of trustworthiness over time. Accordingly *confidence denotes the subjective expectation of receiving trustworthy information from a person or an institution.* People have confidence in a source if their prior investment of trust in that source has not been disappointing over a longer period of time. If many persons share such a confidence in a communication source, they assign credibility to this source. So we can define *credibility as the degree of shared and generalized confidence in a person or institution based on their perceived performance record of trustworthiness.* All three terms imply a judgment of others about the quality of a message or a source. So they are all based on perceptions (Midden 1988). These perceptions, however, can be linked to special structural and performance characteristics of institutions.

To make these terms more operational, it makes sense to identify the major attributes that constitute trust, confidence, and credibility. The literature includes several approaches (Garfinkel 1967; McGuire 1985; Barber 1983; Lee 1986; Sheridan 1987). We decided to amalgamate some of the proposed suggestions from the literature and developed the following classification scheme. Trust can be substructured in the following six components:

a) Perceived *competence* (degree of technical expertise assigned to a message or a source);
b) *Objectivity* (lack of biases in information as perceived by others);
c) *Fairness* (acknowledgement and adequate representation of all relevant points of view);
d) *Consistency* (predictability of arguments and behavior based on past experience and previous communication efforts);
e) *Faith* (perception of "good will" in composing information).
f) *Empathy* (sharing a common feeling with the receiver of one‘s information)

Trust relies on all six components, but a lack of compliance in one attribute can be compensated for by a surplus of goal attainment in another attribute. If objectivity or disinterestedness is impossible to accomplish, fairness of the message and faith in the good intention of the source may serve as substitutes. Competence may also be compensated by faith and vice versa. Consistency is not always essential in gaining trust, but persistent inconsistencies destroy the common expectations and role models for behavioral responses. Trust cannot evolve if social actors experience inconsistent responses from others in similar or even identical situations.

For analytical purposes it seems appropriate to differentiate between different levels of trust, confidence, and credibility, depending on the source and the situation. It makes sense, therefore, to distinguish five levels of analysis: trust in a message, confidence in a communicator, confidence in an institution based on source perception, credibility of institutions based on institutional performance, and climate for trust and credibility in a macro-sociological context.

3.2.2 LEVELS OF TRUST

For analytical purposes it seems appropriate to differentiate between different levels of trust, confidence, and credibility, depending on the source and the situation. We developed, therefore, a classification scheme that is composed of five distinctive levels of analysis: trust in a message, confidence in a communicator, confidence in an institution based on source perception, credibility of institutions based on institutional performance, and climate for trust and credibility in a macro-sociological context.

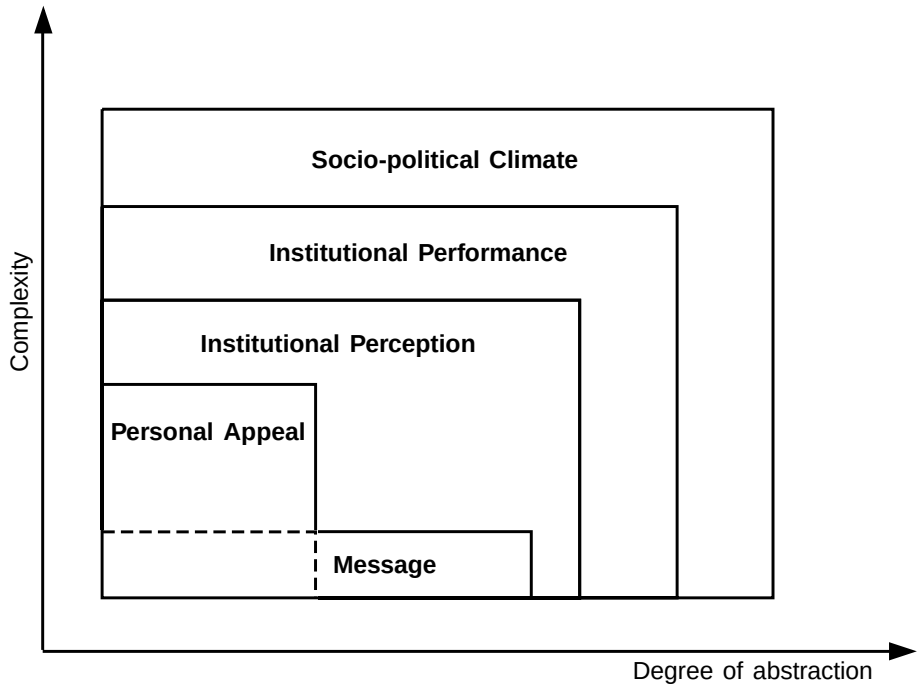

Fig 5: Different levels of trust in risk communication

Figure 5 illustrates the cumulative nature of these five levels. The figure is a simple illustration of the interrelations among the five levels. Each level is embedded in the next higher level. Consistent violation of trust-building efforts on one of the lower levels will eventually impact the next higher level. Distrust on a high level sets the conditions and determines the latitude of options for gaining or sustaining trust on a lower level. The order of levels is also associated with an ascending order of complexity and abstraction. It is therefore easier to predict how changes in communication may affect trust on the lower levels compared to changes on the higher levels. But the circumstances prevalent in the higher levels operate as constraints on any effort to improve trust on a lower level.

The levels of analysis enable us to identify the elements within each level that may contribute to trust, confidence, or credibility. *Table 6* illustrates the key variables in each of the levels and shows their interrelations. The "message" rubric includes all the variables that influence the perception of competence, fairness, consistency, and faith. Personal variables, such as appearance, appeal, style, and responsiveness, affect the trust and confidence that a person conveys to his or her audience. Furthermore, institutional performance and image color the acceptance and evaluation of a message and influence the reception of the communicator by the targeted audience. All variables that we identified as relevant on this level are summarized in the two rubrics representing image and performance of institutions. Last, the social political climate shapes the readiness of receivers to give credit in terms of prior confidence to a communicator. In times of predominant distrust in institutions, the expectation that communica-

tors are trying to betray their audience is the default option in receivers' attitudes toward a communication source. Under such conditions, active trust management is certainly required. In times of a positive climate of confidence in institutions, trust is given as an initial investment or credit to new sources but may easily be lost if abused.

Table 6: Factors of credibility for different levels of analysis

MESSAGE:	
Positive	***Negative***
Timely disclosure of relevant information[1]	Stalled or delayed reporting[1]
Regular updating with accurate information[1]	Inconsistent updating
Clear and concise[1]	Full of jargon[2]
Unbiased[3]	Biased[3]
Sensitive to values fears and concerns of public[4,5]public perception[3]	Inconsiderate of
Admits uncertainty[1] Claims the absolute truth	
From a legitimate reputable source[3,4]	From a questionable source
Organized message[5]	
Use of metaphors[5] Too abstract[5]	
Explicit conclusions[5]	Receiver derive own conclusion[5]
Positive information recorded in early part of message[5]	
Forceful and intense[6]	Dull[6]
PERSON*:*	
Positive	***Negative***
Admits uncertainty[1,3]	Cockiness
Responds to emotions of public[3]	Indifference
Appears competent[1,6]	
Similarity with receiver[5,6]	Perceived as outsider[3]
Has some personal stake in the Issue[3]	
Clear and concise[1]	Too technical[2]
Perceived as 'expert'[5,6]	
Perceived as 'attractive'[5]	
Charismatic[5]	
Trustworthy-honest, altruistic, and objective[6]	
Empathetic with receiver	Displays no empathy

INSTITUTIONS:	
Positive	***Negative***
a) abstract	
Healthy economy	Recession[7]
Low Inflation, unemployment[7]	High inflation, high unemployment[7]
New administration- new ideas[7]	Corruption[7]
	Domestic violence or unrest[7]
Period of relative tranquility[7]	
Perception of competent leadership[7]	Poor leadership[7]
Perception of altruistic motivation[7,8,9]	Image of self-serving motivation[7,8,9]
Peace[7]	War[7]

INSTITUTIONS:	
Positive	***Negative***
b) concrete	
Positive personal experience[7]	Negative personal experience[7]
Strong, competent leadership[7]	Perceived Incompetence[7]
Positive labor relations[7]	Layoffs/hiring freeze strikes[7]
Sound environmental policy[7]	Irresponsible environmental policy
Produces safe and good/services[7]	Poor quality goods/services[7]
Positive past record of performance[7]	Negative past record of performance[7]
Reasonable rates[8]	Exorbitant prices[8]
Undertakes socially relevant tasks[9]	
Practical contributions to every day life[10]	
Benefits outweigh costs[11]	Magnitude of risk taking greater than benefits[11]

POLITICAL / CULTURAL CONTEXT	
Positive	***Negative***
Faith in institutional structures[7]	Perception of structural decline[7]
Checks and balance System functioning well[7]	Poor leadership/incompetence[7]
	Corruption/scandal[7]
	Energy crisis
	Perception of unfair taxation
New and innovative ideas[7]	
	Perception of worsening Financial situation[7]
	Social unrest[7]
	Terrorism[7]

Notes for Tables:

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3.2.3 A REVIEW OF SOCIOLOGICAL STUDIES ON TRUST

This section presents some of the interesting findings of sociological and organizational research with respect to trust and credibility of institutions. These findings are derived from surveys and other statistical data. On the one hand, they are more applicable to "real" world situations than the laboratory experiments used in psychological research; on the other hand, they involve verbal reflections of respondents in surveys and may be influenced by other factors than the proposed verbal stimuli. In addition, survey results leave more room for subjective interpretation of data than laboratory results. Caution is also advised in translating these results from the arena in which they were observed to the arena of risk management.
In this section, we will focus on the results of various studies and omit the description of the methodology and their specific design. For a more detailed review, the reader should consult the respective literature (e.g., Lipset and Schneider 1983; Rourke et al. 1976; Katz et al. 1975):

a) Researchers found a *low correlation between the perception of institutional competence and the desirability of the tasks and goals that the institutions were performing.* The institutions people like most received low ratings on competence and vice versa. Although sympathy helps to attain credibility, perceived competence alone may be sufficient for gaining trust. But the lack of sympathy makes people more critical towards the actual performance of the institution. Mistakes are more likely to be forgiven if the communicator can count on a sympathetic audience (Lipset and Schneider 1983).

b) *Perceived competence of institutions was most likely associated with the perception of a successful task performance and the perceived cost-benefit ratio in meeting these tasks.* In addition, the public image and the social prestige assigned to an institution serve as preliminary heuristic strategies to assign credibility (Matejko 1988).

c) *Perceived fairness and openness,* the second prerequisite for institutional credibility, *is closely linked to the transparency of the decision making process, the opportunities for public scrutiny and institutional control (check and balances), and the degree of personal satisfaction* with the rationale and procedures for decision making in the respective institution. Surprisingly, the amount of actual opportunities for public involvement and participation was hardly correlated to perceived openness (Lipset and Schneider 1983; cf. theoretical concept Luhmann 1980).

d) Institutional case studies demonstrated that the *erosion of credibility was often linked to: incompetence, poor performance, incomplete or dishonest information, withholding of information, obscure and hidden decision making processes, denial of obvious problems, and denial of vested interests* (Midden 1988; Matejko 1988; Lipset and Schneider 1983; Bergesen and Warr 1979).

e) *Credibility can be enforced by: good performance, fast responses to public requests, consonance with highly esteemed social values, availability for communication with outsiders, unequivocal and highly focussed information transfer, flexibility to respond to crisis situations or new public demands, and demonstration of public control over performance and money allocation* (Lipset and Schneider 1983; Rourke et al. 1976; Pinsdorf 1987).

Success stories of communication efforts in the pharmaceutical and chemical industry demonstrate clearly that overreacting to public requests never hurts (Pinsdorf 1987). Taking a product off the market even if only a tiny fraction of the product is contaminated or poisoned has helped companies in the past to manage a credibility crisis and to regain public confidence. Private institutions were more often able to show such flexibility and immediacy in their response compared to governmental institutions. But the involvement of tax money in public institutions adds a potential risk factor in the trust building effort. If too much money is spent for communication, the intended effect may be counteracted by the outrage over the spending of public money.

3.2.4 THE SOCIAL CONTEXT OF RISK COMMUNICATION

The social context in which risk communication takes place is also an important factor for gaining credibility. Although the primary variables are related to the performance of the institution and its perception in the public, the overall climate towards institutions in general has a definite impact on the trust that people have in specific institutions. Research in the last two decades has produced some of the factors that influence the social climate of trust:

a) Confidence in business and economic organizations depends on the perceived quality of their services, but also on the employment situation, the perception of power monopolies in business, the observation of allegedly unethical behavior, and the confidence in other institutions, such as government or press (inverse relationship; cf. Lipset and Schneider 1983).

b) Confidence in political institutions depends on their performance record and openness, but in addition on the perception of a political crisis, the belief that government is treating everyone fair and equally, the belief in the functioning of checks and balances, the perception of hidden agendas, and the confidence in other institutions, such as business or press (inverse relationship; cf Rourke et al. 1976).

c) The more educated people are, the more they express confidence in the system, but the more they are also disappointed about the performance of the people representing the system. Less educated people express more confidence in leadership, but show less trust with respect to the system or institutions in general (Lipset and Schneider 1983).

d) Political conservatism correlates positively with confidence in business and private enterprise, and negatively with confidence in government and public service (this may be US-specific). Liberal positions are correlated with lack of confidence in both, business and government (Lipset and Schneider 1983).

In summary, social climate pre-structures the conditions under which an institution has to operate for gaining or sustaining trust. In a positive social climate, people tend to invest more trust in institutions from the beginning and may be more forgiving if part of this trust is abused. In a negative social climate people tend to be very cautious in investing trust in any institution and request to have more control over the performance of the affected institution. If trust is misused, it takes much time and effort to encourage people to start investing in the trustworthiness of the institution.

3.2.5 LESSONS FOR RISK COMMUNICATORS

What kind of advice can we give to risk communicators of how to design and implement a risk communication program that incorporates the findings of past research on trust and credibility and includes the more anecdotal evidence of risk communication efforts in the past? Using our analytical model for distinguishing between message, person, institution, and social climate, we have developed a set of conditions and prerequisites for gaining trust in communicating with the public, in particular the customer of chemical products. These refer to preconditions for risk communication and provide orientations for analyzing and designing communication programs:

a) To improve the *trust in a message* , we recommend explaining the rationale of risk analysis and its role for risk management so that the audience is better prepared as to what to expect. In addition, the decision making process and the past record of the institution should be included in the message so that people can assign competence to the actors and get a better feeling of the trade-offs that had to be made in meeting the specific risk management task. Evidence of competence, fairness towards other viewpoints, and references to commonly shared values and beliefs will make a message more attractive and could help to address the centrally and peripherally interested audience at the same time. Conclusions should be made explicit and vested interests should not only be admitted, but justified in terms of public mandate or economic function.

b) To improve *trust in a personal communicator,* the major goal is to develop a communication climate that enables the audience to identify with the communicator and to share his or her experiences and beliefs. The more a communicator manages to avoid the mask of an institutional spokesperson and the more he or she can express compassion and empathy for the audience, the more likely the audience will identify with the speaker and feel compelled to the arguments. As noted throughout this book, conveying probabilistic information is a real challenge, but can be done in reference to everyday experience of budget constraints and consumer products. Furthermore, evidence of successful use of risk analyses in hazard management can serve as demonstration to define the role and limitations of risk analysis in improving public health and the environment. Peripheral cues should be confined to commonly shared symbols, appealing formats, and surprises in openness and honesty and should definitely avoid negative labeling of potential opponents or typical advertising gimmicks. Peripheral cues are important for successful communication, but cues have to be selected carefully to please the peripherally and centrally interested audience.

c) To improve the *credibility of an institution,* the vital factor is performance, not public relations. Confidence has to be gained by meeting the institutional goals and objectives. In addition, credibility is linked to the evidence of being cost-effective and open to public demands. These two goals are often in conflict with each other (Kasperson 1987), but they have to be treated as complementary, and not as substitutional, goals. Fairness and flexibility are major elements of openness. In addition to assuring sufficient external control and supervision, public participation may be implemented as a means to demonstrate the compliance with the political mandate and to avoid the impression of hidden agendas. On the premise of good performance, communication programs can be designed to reflect these accomplishments. Such programs should provide honest, complete, and accurate information that is responsive to the needs and demands of the prospective audience. This can only be done if the source engages in an organized effort to collect feedback from the audience and establish a two-way communication process. Involvement of citizens, open house policies, discussion forums, open TV channels, or other means should be explored to assure the functioning of the two-way communication structure.

d) To *improve the social climate* is not within the realm of possibilities for a single communicator. But large-scale organizations or association of organizations can affect the overall climate. One way to improve the climate is to accept and even endorse checks and balances in the control of the organization. The other obvious solution is to demonstrate the flexibility and foresight of the organization in meeting and anticipating new public claims and values. The impersonal nature of institutions may be mitigated by providing special local services and by engaging in community activities and programs. Governmental institutions will receive more credibility if they do not leave the impression of permanent crisis management, but of competence and preparedness for long-term threats and challenges (in particular pertaining to environment and technology).

Many different factors affect credibility. On the personal level, appearance, communication style, honesty, and creating an atmosphere of identification of the audience with the communicator are major variables that influence credibility. On the institutional level, the actual performance in terms of role fulfillment, cost-effectiveness and public expectations as well as openness to new claims and demands constitute confidence and help to build credibility. Furthermore, the social climate and the level of controversy associated with the issue affect the assignment of credibility independent of the performance of the actors involved.

3.3 RISK COMMUNICATION AS PERSUASION: THE ROUTE TO ATTITUDE AND BEHAVIORAL CHANGES

3.3.1 REVIEW OF PSYCHOLOGICAL RESEARCH

Psychological research about attitude and attitude change has shed some light on the conditions under which receivers of information assign trust or one of its building blocks, such as competence, to a communicator. These research results are usually discussed in the framework of persuasion: What elements of a message or a communication context are likely to enhance or diminish the persuasive effect of a message? What elements of the message are remembered and which trigger changes in opinions or attitudes?

Before reporting on some results of these studies, we should mention the restrictions and limitations of these studies to avoid misinterpretation (McGuire 1985; Anderson 1983; Meinefeld 1977). Most of the research in attitude change has been performed in laboratory settings with student populations. Most experiments were done with a limited set of issues or topics so that it is not clear whether the revealed relationships can be extended to other topics or audiences. Many experiments were conducted in the 1950s and 1960s, both time periods in which the social climate for trust and credibility differed considerably from today's climate. For example, experiments involving experts as communicators resulted usually in considerable persuasion effects in the early 1960s whereas more recent experiments demonstrate more ambiguous results depending on the existence of a social controversy over the issue and the social perception of the expert's own interests (Eagly et al. 1981; Heesacker, Petty and Cacioppo 1983). But at the same time many of the research findings are consistent over long time periods and have been tested with a variety of subjects and topics (Chaiken and Stangor 1986; Eagly and Chaiken 1984). So they can be regarded at least as well founded hypotheses for application in risk communication until more specific research studies are conducted.

The following review of research results is based on psychological experiments on persuasion. For the purpose of this chapter, we will only present the conclusions and omit the methodology or design of these studies. Readers interested in a more detailed review should consult the respective review articles (McGuire 1985; Chaiken and Stangor 1987; Eagly and Chaiken 1984; and specifically for risk communication Lee 1986). Among the factors that have been found to enhance the persuasiveness of a communication are:

– *Attractiveness of information source:* attractiveness is composed of similarity of positions between source and receiver; likability of source; and physical attraction (Lee 1986; McGuire 1985; Chaiken and Stangor 1987).

- *Sympathy or empathy of the receiver with the source:* this refers to the possibility of a receiver to identify with the source or its motivations (Mc Guire 1985; Eagly and Chaiken 1984).
- *Credibility of source:* among the components tested are perceived competence, expertise, objectivity, impartiality, and fairness (Lee 1987; Tyler 1984; Rempel and Holmes 1986).
- *Suspicion of honest motives:* receivers do not detect any hidden agendas or motives behind the communication effort (Rosnov and Robinson 1967; Eagly et al. 1981).
- *High social status or power of communication source:* the effect of these two variables depend heavily on the issue and the composition of the audience (Mc Guire 1985; Chaiken and Stangor 1987; Lee 1986).

These factors seem almost intuitively plausible. A communicator is likely to leave a more lasting impression on the audience if the message appears honest, accurate, and fair and if the communicator is a likable person with whom the audience can easily identify. The more difficult question, however, is how a communicator can accomplish to impart these impressions on the audience under real life conditions. What do we know about the effectiveness of message composition and personal appeal that would allow us to tailor information programs to seek more persuasive power?

(Un)fortunately, we do not have any recipes to enhance credibility or to increase the persuasiveness of a message. But psychological research in the past two decades has yielded some interesting, sometimes even counter-intuitive, findings that link specific aspects of message composition or personal style of communication with persuasive effect. These findings are summarized in Table 6 under the two rubrics of "message" and "personal factors". Some of the more counter-intuitive factors deserve special mentioning:

a) *High credibility sources, such as scientists or opinion leaders, produce more opinion change, but no difference in message learning.* The learning of a message is more related to the similarity of the message than to existing attitudes and beliefs (Hovland and Weiss 1967; McGuire 1985).

b) *Perceived expertise depends on* many factors. Among them are *status, education, perception of technical authority, age, and social class.* If expertise of a communicator is challenged in public, people tend to focus on substitutes for expertise, such as suspected interests or reliance on reference group judgments (Heesacker et al. 1983; Renn 1984).

c) *Stating explicitly the persuasive intent is usually more convincing than hiding such an intent* and leaving it to the audience to make their own inferences. People like to know

what the communicator wants them to believe. If it is not openly stated, they will suspect a hidden agenda (Lee 1986; McGuire 1985).

d) *Perceived fairness and social status* are both variables that *can compensate lack of objectivity.* Even if people are aware that the communicator has a vested interest in the issue and that s/he argues from a specific viewpoint, they may believe the message or develop confidence in the communicator provided that the information presented appears to be fair to potential counter-arguments and that it is presented with technical authority (Lee 1986; McGuire 1985).

e) *Being explicit* when drawing conclusions *and presenting counter-arguments* to potential objections *have been proven more effective than operating with implicit conclusions or presenting only one side of the story.* The two often conflicting goals of fairness to the opponents of the communicator's view and of honesty about one's own motives have to be reconciled in each communication effort in order to be most persuasive (Lee 1986; McGuire 1985).

f) *The perception that the goals and motives of the source serve a common interest* or refer to highly esteemed social values, such as protection of the environment or public health, *enhances public confidence* in the communicator but reinforces distrust if the task performance of the communicator is perceived as weak. People invest more trust in these institutions in the beginning, but tend to be more disappointed if the outcome does not match their expectations (Tetlock 1986).

g) *The agreement to listen to disliked sources increases the probability of attitude change.* Although likableness of a source usually enhances the persuasive effect, the mere acceptance of listening to a non-likable source may motivate the audience to focus on the message instead of the source of communication. The psychological mechanism involved here is called avoidance of cognitive dissonance (Festinger 1957). One can only justify spending time with a disliked source if at least the message is worth the effort. However, the motivation to engage in communication with a disliked person may also serve as a reassurance of how bad the source and the message are. Which of the two reactions is likely to emerge as a result of a communication with a disliked source? This depends on the degree of commitment to one's previous attitude, the strength and salience of the attitude with respect to other beliefs and values, and the perception of vested interests of the source (Fazio et al. 1977; Chaiken and Stangor 1987).

All these insights are helpful to design communication programs and to train communicators for their task. But it should be kept in mind that most of these results were accomplished in rather artificial laboratory environments and may not be valid for the specific risk communication arena. Risk communicators who are familiar with the persuasion literature have assured us, however, that many of the findings from persuasion research match very well their personal experience with risk communication. So these studies provide some helpful clues of how to design a more effective communication program and may serve as a starting point to conduct more specific research projects on trust in risk communication.

3.3.2 THE ELABORATION LIKELIHOOD MODEL

One of the most prevalent models of attitude and opinion change is the "elaboration-likelihood model of persuasion," developed by Petty and Cacioppo in the late 1970s (overview in Petty and Cacioppo 1986). The major component of the model is the distinction between the *central or peripheral route of persuasion.* The central route refers to a communication process in which the receiver examines each argument carefully and balances the pros and cons in order to form a well-structured attitude. The peripheral route refers to a faster and less laborious strategy to form an attitude by using specific cues or simple heuristics. When is a receiver likely to take the central route and when the peripheral route?

The *peripheral route* is taken when the issue is less relevant for the receiver and/or the communication context is inadequate to get the message across. In this case, the receiver is less inclined to deal with each argument, but forms an opinion or even an attitude on the basis of simple cues and heuristics. In *Figure 6* these peripheral cues are integrated into the source-receiver model and assigned to each step in this model (*source-related, message-related, and transmitter-related cues).* In addition, the context in which the communication occurs provides additional cues for the receiver to generate interest in the message (*context-related cues.*).

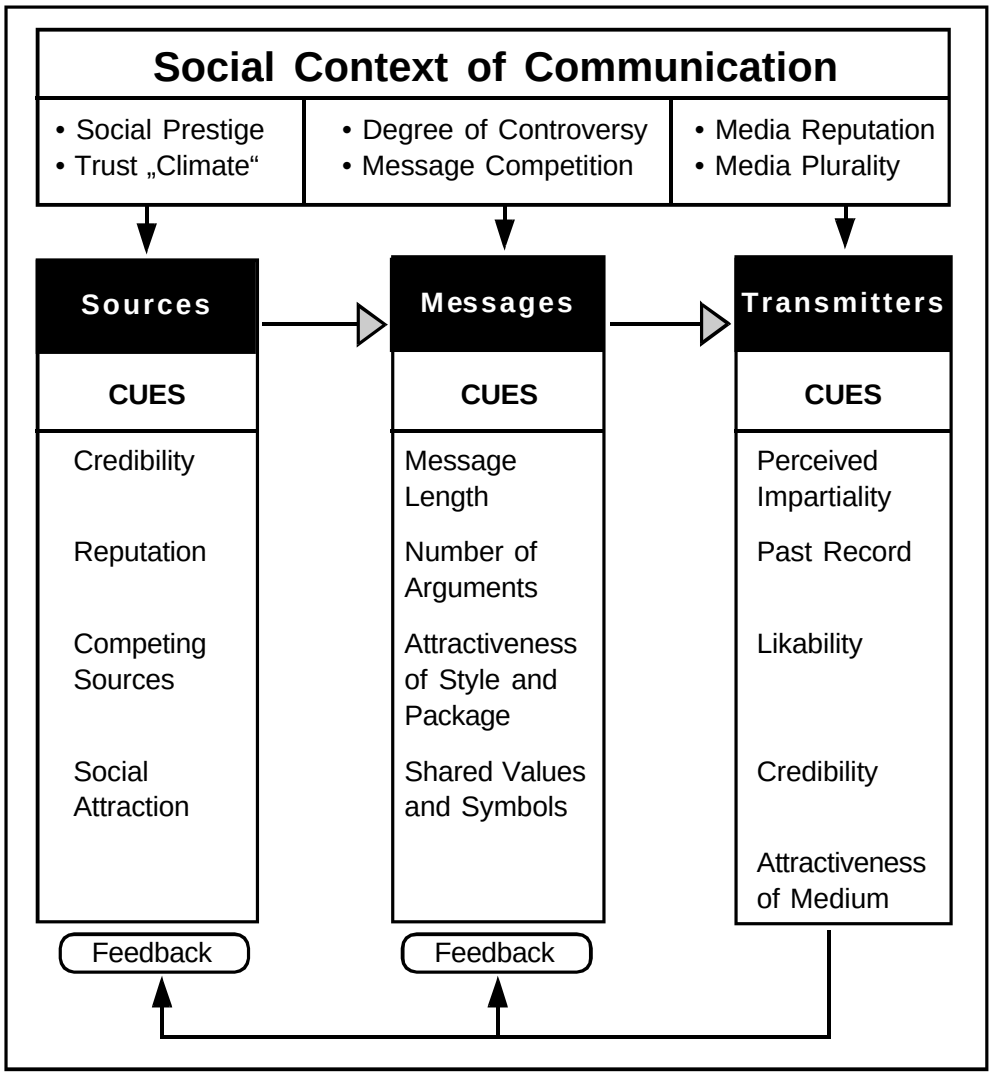

Fig 6: The peripheral cues of persuation in communication

With respect to the source, aspects such as credibility, reputation, and social attractiveness are important cues for receivers to adopt a specific message. It also helps to have the message sponsored by multiple sources (Midden 1988). The message factors include the length of a message, the number of arguments, the package (color, paper, graphic appeal, and others), and the presence of symbolic signals and cues that trigger immediate emotional responses (cf. Kasperson et al. 1988). The transmitter of a message may also serve as carrier for specific cues: the perceived neutrality and fairness, the personal satisfaction with the transmitter in the past (this magazine is always right), the similarity with the political or ideological position of the transmitter, and the social credibility assigned to a transmitter are major elements in the formation of opinions or attitudes. In addition, specific channel-related aspects, such as visual impressions from the TV screen, are readily accessible cues.

Social context variables that serve as peripheral cues are often neglected in the discussion of the peripheral route. The social climate for trust and credibility and the image of institutions in a society may evoke a specific predisposition to accept or reject the arguments of a source (Lipset and Schneider 1983). With respect to the risk arena, the dominant impression of expert controversy and the presence of competing messages are significant cues that initiate a skeptical or at least cautious reception mode (Slovic 1987). Other variables can be added to this category, as, for example, the plurality of transmitters or the social reputation of specific media.

3.3.3 A MODIFICATION OF THE ELABORATION-LIKELIHOOD MODEL

Inspired by the elaboration-likelihood model and based on previous work on stages of attitude formation, Debra Levine and Ortwin Renn have developed a modified version of the elaboration likelihood model (Renn and Levine 1991). This model is less specific in terms of identifying the factors that lead either to a central or peripheral route of information reception, but more elaborate with respect to the different sequential stages in selecting, assimilating, and evaluating information. The major thrust of this model is the simultaneous presence of central and peripheral elements in the different stages of attitude formation.

Figures 7 and 8 illustrate this model of attitude formation or change. The left column describes the sequential steps of attitude formation starting with the reception of a message and ending with the post-rationalization of the beliefs (the cognitive components of an attitude). This multi-step decomposition of the attitude formation process is based on attitude theories by Rokeach (1969) and Fishbein and Ajzen (1975) and was developed and graphically displayed in Renn (1984). The right column lists the factors that influence each stage of this process and that determine whether the attitude formation process is terminated prematurely. In concordance with the elaboration-likelihood model, two routes of persuasion exist: a central and a peripheral route.

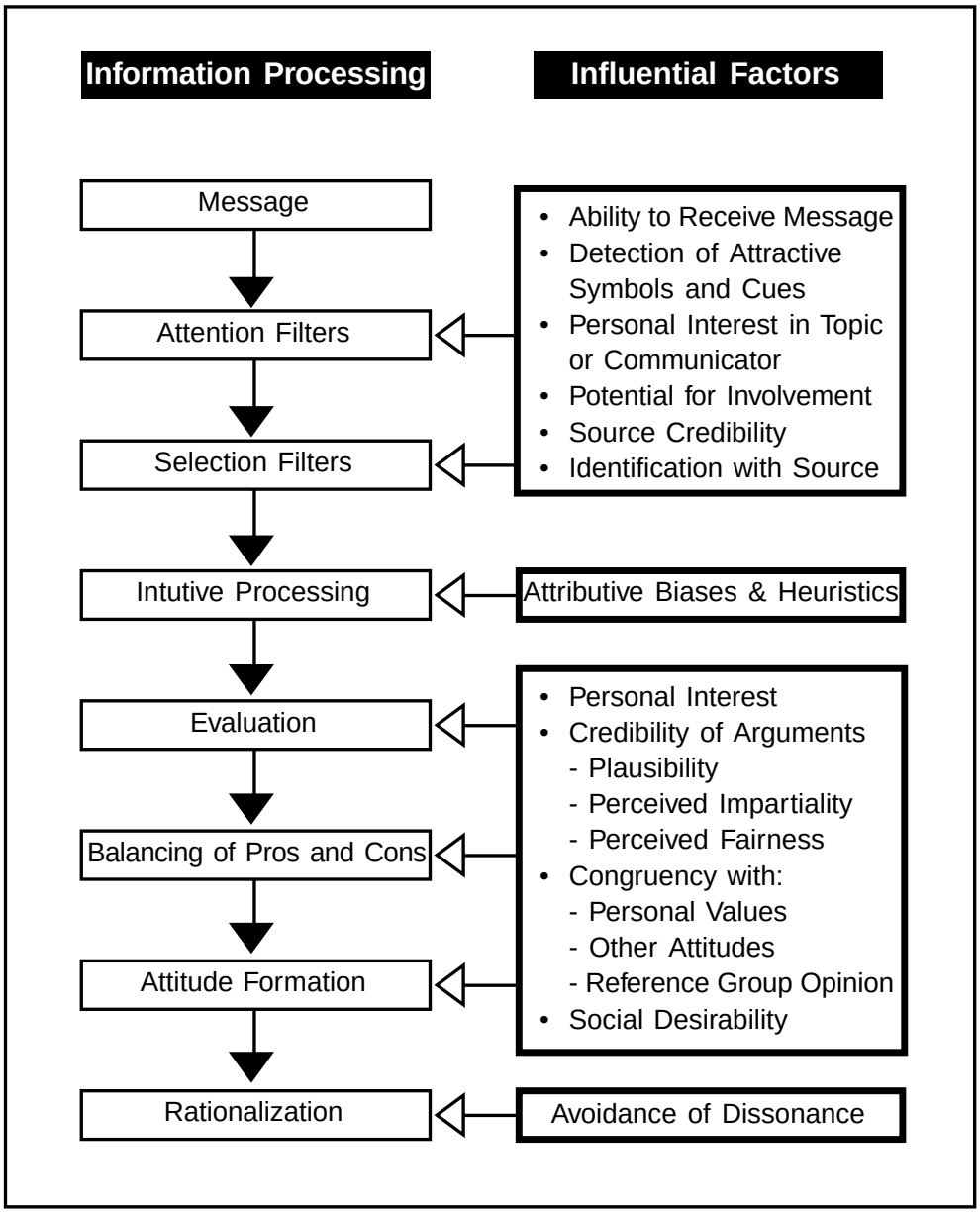

Fig 7: The central route of persuasion

The first three stages are identical for both routes of persuasion. They refer to the process of becoming aware of the information (attention filters), selecting the relevant parts of the information, and processing its cognitive content. The receiver will decide during these three stages whether the issue is of central interest to him/her and whether s/he will terminate the further processing of the information. If the interest is low and if other compensatory cues are missing, then the person is likely to reject or ignore the information. Medium interest or the presence of specific cues will initiate a peripheral route to process the information further. High interest and the presence of many reinforcing cues are likely to produce enough involvement for a recipient to choose the central route. The important factor here is that both routes, the central and peripheral route, are dominated by peripheral cues in the early process

of attitude formation. In addition to the receiver's prior experience and interest in the subject, awareness of a message is enforced by a special set of peripheral cues, such as novelty of the information, the mentioning of prestigious persons or institutions, or specific symbolic key-words or clues that link emotional involvement to the subject (Frey 1986).

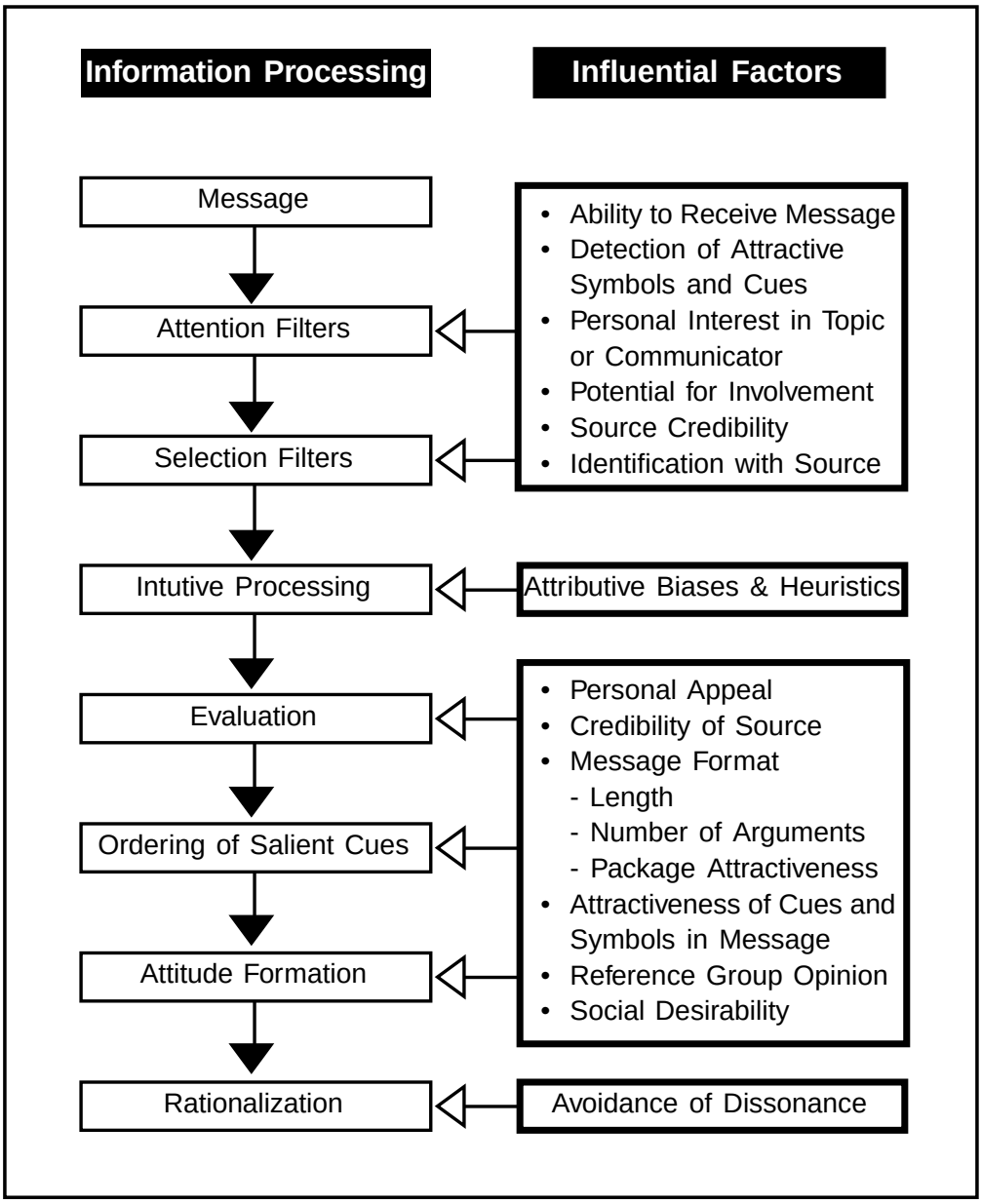

Fig 8: The peripheral route of persuasion

The third step of intuitive processing of cognitive information refers to the heuristics and common sense mechanisms of drawing inferences or attributing linkages to the information received (see Section 3.1.8). Although one cannot classify these heuristics as peripheral cues, they are still representations of simple rules to cope with complex information. In the periph-

eral route, these cognitive heuristics may be replaced partially by even simpler cues like credibility of the source. If cognitive information is processed at all, these heuristics will govern the intuitive generalization process regardless what route of information processing is pursued.

The major difference between the peripheral and the central route lies in the process of evaluation, the fourth step of the model. In the central mode, the receiver performs two types of evaluations: first, an assessment of the probability that each argument is true; and second, an assignment of weight to each argument according to the personal salience of the argument's content. The credibility of each argument can be tested by referring to personal experience, plausibility, and perceived motives of the communicator. In modern societies with highly professionalized and differentiated knowledge, experience and plausibility are often weak instruments to evaluate the truth of a statement (Renn 1986a). No lay person, for example, has any empirical evidence to prove or disprove an expert's claim that low-level radiation causes cancer. Rather recipients use secondary cues, such as prestige of the source, suspicion of vested interests, to evaluate the accuracy of a statement (Eagly et al. 1981; Heesacker et al. 1983). It is important to note that in these instances, where personal experience is lacking, both, the central and the peripheral route are almost identical because they rely on judgment of trust or credibility. However, this judgment is made for each argument in the case of the central route but is made for the total message or holistically for the source in the case of the peripheral route.

The evaluation of the salience of each argument is performed by a comparison of the message with one's personal interests, one's own value system, other major attitude and beliefs, reference group judgments and the perceived social desirability of the intent of the message (Chaiken and Stangor 1987; Renn and Swaton 1984). This process may be more or less pronounced and not all comparisons have to be made for each argument. But the major incentives for changing an attitude in the central mode are the proximity with and the affinity to one' own interests, values, and world views. In the peripheral mode, receivers do not bother to deal with each argument separately, but look for easily accessible clues to make their judgment on the whole package.

The last two stages refer to attitude formation and rationalization. After the formation process in which the receiver incorporates the message into his/her attitude system, the potential negative arguments are frequently suppressed or re-directed into a positive view. This is done more intensely if the balancing act requires more mental work and pain. This process of bolstering helps to avoid cognitive dissonance and post-decisional regret (Janis and Mann 1977). The two routes do not differ in these last two stages.

3.3.4 ATTITUDES AND BEHAVIOR

Once attitudes are formed, they generate a propensity to take actions. As known from many attitude studies, the willingness to take actions, however, is only partly related to overt behavior (Allport 1935; Rokeach 1969; Fishbein and Ajzen 1975; Wicker 1979). A positive or negative attitude is a necessary but not sufficient step for corresponding behavior. A person's decision to take action depends on many other variables, such as behavioral norms, values, and situational circumstances. Hence, the communication process will influence the receiver's behavior, but the multitude of sources, the plurality of transmitters, and the presence of situational forces on personal behavior render it almost impossible to measure, not to mention to predict, the effect of a single communication activity.

The weak correlation between attitudes and behavior is one of the major problems in risk communication that aims to change behavior (for example, for emergency responses). Most analysts agree that it is difficult enough to change or modify attitudes through information, but that it is even more difficult to modify behavior. Some success stories (Salcedo et al. 1974; Pinsdorf 1987. pp. 47ff; Fessenden-Raden et al 1987; McCallum 1987) in the area of health risks (for example, reducing cholesterol and pesticide use) as well as some failures (Mazur 1987; Sandman et al. 1987) to promote actions (for example, protection against indoor Radon) suggest that three factors are crucial for increasing the probability of behavioral changes:

– the *continuous transmission of the same information* even after a positive attitude has been formed towards taking that action (need for constant reinforcement);
– the *unequivocal support of most relevant information sources* for the behavioral change advocated in the communication process (need for consistent and consensual information);
– *adoption* of the behavioral changes *by highly esteemed reference groups or role models* (social incentive for imitation).

Information about emergency responses may in addition require actual exercises or practices before the desired behavioral responses are internalized (Covello et al. 1989). Behavioral changes, particularly if they involve painful changes of habits, are rarely triggered by information alone. Rather, information may be effective only in conjunction with other social factors, such as changes of social norms, roles, and prestige.

3.3.5 LESSONS FOR RISK COMMUNICATION

How can studies on persuasion be helpful for analyzing and designing risk communication programs? First, it points out the differences in information processing between the peripheral and the central route of persuasion. The centrally interested audience will collect information pro and con while the peripherally interested are keen on obtaining easily available clues for orientation.

The perception of credibility is a major component of the attention and selection filter in both routes and, at the same time, a heuristic tool to assess the probability that an argument is indeed accurate and valid. Functional equivalents are available for both routes of persuasion, but specifically for issues in which personal experience and intuitive plausibility are lacking, trust in the communicator plays a major role. In the central mode trust is important for judging the credibility of each argument, in the peripheral mode it is important for evaluating the sources of information.

Second, an effective risk communication program must contain a sufficient amount of peripheral cues to initiate interest in the message, but also enough "rational" argumentation to satisfy the audience with central interest in the subject. The problem is how to avoid anger and rejection by centrally interested persons if they are confronted with "superficial" cues, such as advertising gimmicks, and how to sustain the interest of the peripherally interested persons if they are confronted with lengthy argumentation. The problem can be resolved if the message avoids to include "obvious" cues, but relies on cues that are acceptable for both audiences, the centrally and the peripherally interested persons.

Third, the complexity and multitude of influential factors that govern attitude formation make it impossible to design fool-proof recipes for influencing (or even worse: manipulating) people. Internal values, the perception of own interests, external pressures, and role models, as well as personal experience, are the most powerful agents in attitude formation. The design and packaging of the message may help to make people aware of the message and to appear at least more credible. But the desired effect of changing people's attitudes or opinions will occur only if the powerful evaluation agents, on which the communicator has hardly any influence are already directed in favor of the message.

3.4 CONDITIONS FOR SUCCESSFUL STAKEHOLDER INVOLVEMENT

3.4.1 A GENERAL INTRODUCTION INTO THIS FIELD OF RESEARCH

The fourth major objective of risk communication is to provide the conditions for organizing procedures of stakeholder involvement on risk issues (Covello et al. 1986; Zimmerman 1987a; National Research Council 1989, 1996). Inviting the major actors to be part of the decision making process from the beginning improves the likelihood that the resulting decision will be accepted (Presidential/Congressional Commissions 1997). Unfortunately, early public involvement may compromise, however, the objective of efficient and effective risk management or violate the principle of fairness. As economists have pointed out, preferences of people with respect to public goods are often driven by short-term interests and objectives and reflect people‘s expectation of immediate pay-offs rather than of investments in a sustainable future (Cansier 1995; Fritsch 1992).

In many instances, informing the public about risks and demonstrating the hazards of dangerous habits are mandated by law and refer to beneficial tasks of risk management agencies in their pursuit to reduce potential harm to their constituency. The recent debates on technological risks, including nuclear energy and genetic engineering, and the growing public concern about environmental risks, such as food additives or air pollutants, however, point to the necessity of a communication process beyond conveying information on hazards. Risk communication focusing on large technological systems or widely distributed environmental threats requires a more direct input from stakeholders and members of the public. The objective of such a communication process is to provide a common platform for members of the public, representatives of stakeholder groups, professionals, and regulators. This joint effort may help to reach three goals: to include the best available expertise on existing risk levels and reduction methods, to ensure that the concerns and values of those affected by risk management decisions are integrated in the deliberation process, and to adjust regulations to the values and visions of those who need and want to be protected from hazards.

A dialogue among experts, stakeholders, regulators, and the public at large can be organized in many different forms. Practical experiences have been made with advisory committees, citizen panels, public forums, consensus conferences, formal hearings, and others (cf. the contributions in Renn et al. 1995). Democratic values can provide the means by which to construct this dialogue and the social science perspectives can help to make these forms of dialogue work, i.e., to make sure that each group can bring their own interest and values to the

process and yet reach a common understanding of the problem and the potential solutions (Fiorino 1989; Kunreuther and Slovic 1996). Participation is not only a normative goal of democracy, it is also a requirement for rational decision making in situations in which evaluating uncertainty is part of the management effort. If all society would care about this to reduce the amount of physical harm done to its members, technical expertise and some form of economic balancing would suffice for effective risk management. However, society is not only concerned about risk minimization (Douglas and Wildavsky 1982). People are willing to suffer harm if they feel it is justified or if it serves other goals. At the same time, they may reject even the slightest chance of being hurt if they feel the risk is imposed on them or violates their other attitudes and values (MacLean 1986; Kasperson 1986). Context matters. So does procedure of decision making independent of outcome. “Real” consequences are always mediated through social interpretation and linked with group values and interests. Responsive risk management needs to incorporate public values into the decision making process.

Value judgments enter risk management decisions on at least three levels (Keeney 1996; Fischhoff 1996). The first set of value judgments refer to the list of criteria on which acceptability or tolerability of risks should be judged, the second set of value judgments determine the trade-offs between criteria, and the third set of values should assist risk managers in designing resilient strategies for coping with remaining uncertainties. Using informed consent on all three value inputs does not place any doubt on the necessity of applying the best of technical expertise for defining and calculating the performance of each option on each criterion. As much as the best available expertise is needed, public input is equally important because it provides a foundation for determining the objectives of risk policies and for weighing the various criteria that ought to be applied when evaluating different options.

Before discussing an organizational proposal of how to integrate expertise, regulatory considerations, and public values in risk communication, it is necessary to sharpen the analytical view on the risk communication environment and take a closer look at the political arenas in which risk debates usually take place.

3.4.2 THE POLITICAL ARENA OF RISK

There are different ways of conceptualizing risk debates within the social sciences. An interesting candidate for such a concept is the arena metaphor (Lowi 1964; Kitschelt 1980; O'Riordan 1983; Renn 1992a). Using the metaphor of an arena, social conflicts can be described as a struggle between various actors on the arena stage, controlled by a rule enforcement agency

(usually a governmental institution) and observed by professional "theater critics" (the media) who interpret the actions on the stage and transmit their reports to a larger audience.

To be successful in a social arena, it is necessary to mobilize social resources. These resources can be used to gain attention and support of the general public, to influence the arena rules, and to "score“ in the arena in competition with the other actors. *Social resources include: money, power, social influence, value commitment, and evidence* (cf. Parsons 1963; Münch 1982). Money provides incentives (or compensation) for gaining support; power is the legally attributed right to impose a decision on others; social influence produces a social commitment to find support through solidarity; value commitment induces support through persuasion and trust; and evidence can be used to convince persons about the likely consequences of their own actions. Resources are not the ends of the actors, but the means to accomplish their goals. An overview of the resources and their respective media are illustrated in *Figure 9*.

Resources	Dominant Sector	Generalized Medium	Motivator
Money	Economy	Transfer of Capital	Economic Incentives
Power	Politics	Force	Punishment
		Authority	Compliance
Social Influence	Social System	Reputation	Trust
		Reward	Prestige
Value Committment	Culture	Persuasion	Solidarity
		Meaning	Cultural Unity
Evidence	Science	Methodology	Expected Impacts
		Rhetoric	

Fig 9: Sectors of resource mobilization and their media

Actors will enter risk arenas if they expect this will provide them with an opportunity to gain more resources (Renn 1992a; Kitschelt 1980; Dietz et al. 1989). Beyond their reservoir of resources at any time, they can gain more resources by exchanging one resource for another (for example, winning public trust by sharing power through participation or exchanging evidence for prestige) and by communicating to other actors and the media. The objective of communication is to receive public support and to mobilize other groups for one's own cause. The more resources a group can mobilize in an arena, the more likely it is that it dominates the conflict resolution process and gets its point of view incorporated in the final decision.

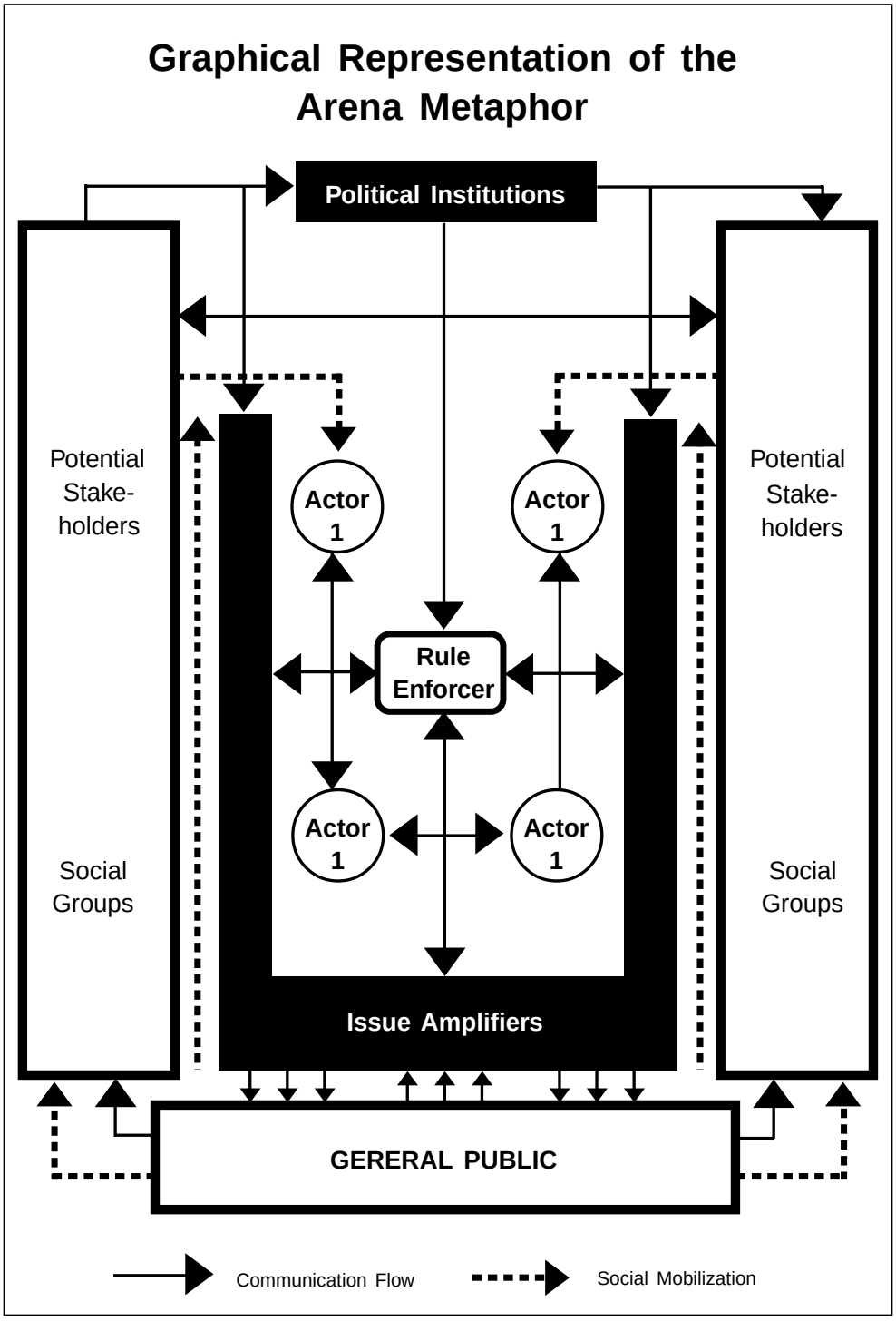

Figure 10 illustrates the arena metaphor (cf. Hilgartner and Bosk 1988; Renn 1992a). The center stage of the arena is occupied by the principal actors, i.e., those groups in society that seek to influence policies. Groups often focus on several issues at once and are hence involved in different arenas; others focus only on one issue in a single arena. Each arena is characterized by a set of rules: formal rules that are coded and monitored by a rule enforcement agency and informal rules that are learned and developed in the process of interactions among the

actors. Among the formal rules are laws, acts, and mandated procedures; among the informal rules are regulatory styles, political climate of group interactions, and role expectations. In most cases the rules are external constraints for each single actor. Formal rule changes require institutional actions, informal changes occur as a result of trial and error and may change according to whether or not rule bending is penalized. Several actors may join forces to change the rules even if they disagree on the substance of the issue.

The rule enforcement agency ensures that the actors abide by the formal rules and often coordinates the process of interaction and negotiation. In many arenas the rule enforcement agency is also the ultimate decision-maker. In this case, all actors try to make their claims known to the decision-makers and to convince them by arguments or through public pressure to adopt their viewpoint. In an adversarial policy style, which is typical for the United States (O'Riordan and Wynne 1987; Renn 1995), rule enforcement agencies regard themselves more as brokers or mediators than as sovereign administrators who are consulted by various social actors, which tends to be the European policy model (Coppock 1985).

Issue amplifiers are the professional "theater critics" who observe the actions on stage, communicate with the principal actors, interpret their findings, and report them to the audience. Through this communication process they influence the allocation of resources and the effectiveness of each resource to mobilize public support within the arena. The audience consists of other social groups who may be enticed to enter the arena and individuals who process the information and may feel motivated to show their support or displeasure with one or several actors or the arena as a whole. Part of the political process is to mobilize social support by other social actors and to influence public opinion.

The outcome of the arena process is undetermined. On one hand, various actors may play out different strategies that interact with each other and produce synergistic effects (*game theoretical indeterminacy*). Strategic maneuvering can even result in an undesired outcome that does not reflect the stated goal of any actor and may indeed be suboptimal for all participants. On the other hand, interactions in the arena change the arena rules (*structural indeterminacy*).

Novel forms of political actions may evolve as actors experience the boundaries of tolerance for limited rule violations. Therefore, arenas often behave like undetermined or non-linear systems; small changes in strategies or rules are capable of producing major changes in conflict outcomes. It is also difficult to predict who is going to benefit from potential rule changes induced by trial and error. Both characteristics of arenas limit the use of arena theory for predictions, but do not compromise its value for explanation and policy analysis.

Risk arenas operate under similar structural rules and constraints like any other arena. Risk debates focus on two issues: what is an acceptable level of risk (or how safe is safe enough) and how are risks and benefits distributed in society (or how safe is fair enough)? All social groups which feel that their interests or values are affected by a specific risk source may be compelled to enter the arena. Success in the risk arena relies on the social actors' ability to mobilize resources. Beyond these commonalties that risk arenas share with all other arenas, there are some specific characteristics of risk arenas that are worth mentioning (Renn 1992a):

1. *The evidence trap:* Finding a consensus or a viable compromise in conflicts requires an agreement on the validity of presented evidence. If each group provides conflicting evidence about factual impacts, it is hard to reach a consensus. The less maneuverability groups have in making factual claims without being "falsified", the more likely it is that they will reach similar conclusions in terms of evidence. This increases the value of evidence for social mobilization. In risk issues this normalizing effect of evidence through reality checks is less powerful than in other arenas, because the stochastic nature of the potential consequences (uncertainty) does not allow any inference with respect to a single facility or event. Consequently, there are competing and rationally defensible strategies for coping with risk, such as using the expected value as an orientation for risk acceptability or taking the Minimax approach (minimize your maximum regret).

2. *The symbolic nature of risk issues for distributional conflicts:* Risk arenas attract social groups which demand legitimation of existing distributional practices. The risk as such may not be the trigger for entering the stage but rather its symbolic meaning for decision-making processes in society and for existing power structures. Such groups use the risk arena to mobilize social resources for affecting policies in other arenas. They may oppose big business or favor deregulation. Regardless of their motives or goals, actors in risk arenas are not always interested in the generic risk issue, especially if it has become a symbol for other issues.

3. *Social desirability:* The tendency to use a risk arena for other purposes is also reinforced by the saliency of the risk issue for the audience. Affluent societies show strong concerns for health, safety, and environment. Mobilization strategies that build on common concerns can be very effective in generating value commitment and social influence. Risk issues are excellent candidates for piggybacking one's own claims with the respective "hot" risk issue.

4. *Structural weakness of risk management agencies:* Risk management agencies face the dilemma of dealing with ambiguities and thus often do not succeed in exchanging power

for other desired resources. In particular, they have difficulties exchanging institutionally provided evidence for trust, since evidence is so contested. As a result they are unable to mobilize social resources beyond their power reservoir. Because of the weak position of the rule enforcement agencies, risk arenas tend to experience more rule innovations than other arenas where strong enforcement agencies are present. At the same time agencies in risk arenas have less influence to resolve conflicts and to persuade the actors to participate in negotiations.

The plurality of evidence, the weak role of rule enforcement agencies, the tendency of the risk debate to attract symbolic connotations, and the public responses of moralization and polarization have all contributed to the importance of the risk issue in contemporary societies. Beyond the individual perception of risks and dangers, risk debates serve as catalysts for more fundamental debates on social and political institutions and distribution of social resources (Luhmann 1990; Beck 1992).

3.4.3 THE THREE LEVELS OF RISK DEBATES

After looking at the structure of risk debates, it is important to focus on the substance of risk debates. Although topics vary from risk source to risk source, most risk debates center around three themes (Funtowicz and Ravetz 1985, Rayner and Cantor 1987):

– factual evidence and probabilities;
– institutional performance, expertise, and experience;
– conflicts about world views and value systems.

Figure 11 is a graphical representation of this model using a modified version of the original categories (taken from Renn and Levine 1991). The first level involves factual arguments about risk probabilities and the extent of potential damage. If the problem is a lack of technical knowledge on the part of the public, procedures of communication should focus on informing the public with the consensual expert opinions. In this case, participation is equivalent to successful risk information. Two-way-communication is needed only to make sure that the message has been understood and that the technical concerns of the audience have all been addressed.

One of the main problems of risk communication with respect to the first level of risk debates is the issue of framing. Depending on the wording of the questions or the framing of the probabilistic information (for example: stating probabilities in terms of losses or gains), people will change their preference order for decision options with identical outcomes (Kahneman

and Tversky 1984). The effects of framing occur first after the introduction of the issue and later when the factual information is compared with the values of the respondents. To avoid confusion about the effects of framing, risk communicators should use the same framing rationale throughout the information process and enlighten respondents about the effects of framing so that they become aware of the ambiguities inherent in the way probabilistic information is presented.

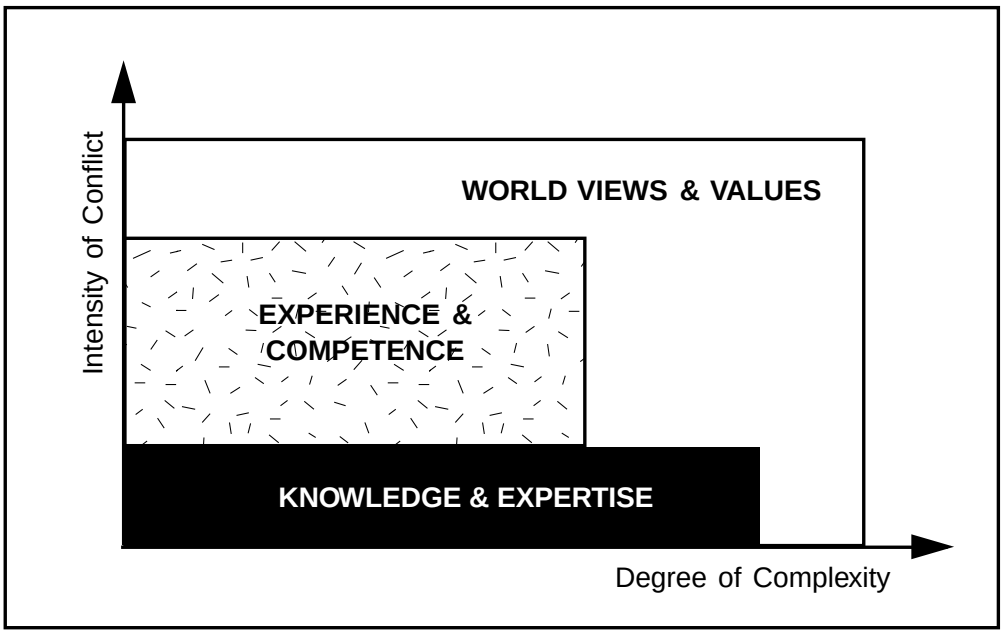

Fig 11: The three levels of risk debate

The second, more intense, level of debate concerns institutional competence to deal with the risks. At this level the focus of the debate is on the distribution of risks and benefits, and the trustworthiness of the risk management institutions. This type of debate does not rely on technical expertise, although reducing scientific uncertainty may help. Risk communication on the second level requires evidence that the risk managers have met their official mandate and that their performance match public expectations. In a complex and multifaceted society such evidence is difficult to provide.

Gaining trust requires a continuous dialogue between risk managers, stakeholders, and representatives of the public (Barber 1983). The chemical industry‘s program on "responsible care" may serve an example for such a dialogue. The participants express their position on aspects such as emergency planning or accident management, they exchange interpretations about the current situation or future threats and work on mutually acceptable means to improve existing risk management practices. In such dialogues, trust can be gained by showing that the risk management institution has been and continues to be competent, effective, and open to public demands. Instruments such as citizen advisory committees, joint risk managing boards, or

institutionalized exchange of risk-related information have been proven effective in facilitating a dialogue on the second level of risk debates.

At the third level the conflict is defined along different social values, cultural lifestyles, and their impact on risk management. In this case, neither technical expertise nor institutional competence and openness are adequate conditions for public involvement. Decision making here requires a fundamental consensus on the issues that underlie the risk debate. This implies that the communication requirements of the first and second level, i.e. risk information or involvement in a two-way dialogue, are insufficient to find a solution that is acceptable to all or most parties. Third level conflicts require dialogue-based models of communication, such as mediation processes, citizen panels, or consensus conferencing. Table 7 summarizes the three levels of risk conflicts and their communication requirements.

As long as value issues remain unresolved, even the best technical expertise and the most profound competence cannot overcome social, cultural, and political value conflicts (Plough and Krimsky 1987). Furthermore, knowledge, values, and worldviews are not independent from each other. Many groups have constructed a coherent body of beliefs that integrate cognitive, evaluative and normative claims about the world. These belief systems can form epistemic communities, which offer a complete, often holistic view of the world and define the legitimate realm of rules for evaluating claims of evidence (von Schomberg 1995; Lynch 1996). Once such a belief system is established, it is almost immune against any type of counterclaims. The only path to agreement will be through the creation of mutual gains for all parties (win-win-situation) or the generation of overarching values that are evoked or generated through dialogue-based sessions (Renn and Webler 1996). Both resolution strategies require that the value issues are taken as the starting point of discourse and not the level of factual knowledge. This strategy does not guarantee a resolution of conflict. Many value conflicts that arise on the third level of conflict cannot be resolved at all. In such a case collectively binding decisions rely on compromises or majority votes rather than consensus.

There is a strong tendency for risk management agencies to re-frame higher level conflicts into lower level ones: third level conflicts are presented as first or second level conflicts, and second level conflicts as first level. This is an attempt to focus the discussion on technical evidence, in which the risk management agency is fluent (Dietz et al. 1989). Citizens who participate in the discourse are thus forced to use first level (factual) arguments to rationalize their value concerns. Unfortunately, this is often misunderstood by risk managers as "irrationality" on the part of the public. Frustrated, the public retreats to due process and routinization of the process, abscising it of substance, and departs with disillusion and distrust of the system (Hadden 1989).

Table 7: The three levels of risk debates and their communication needs and evaluation criteria

Levels	*Issue of Conflict*	*Communication Needs*	*Evaluation Criteria*
1	Technical expertise	Information transfer	– access to audience – comprehensibility – attention to public concerns – acknowledgment of framing problems
2	Experience, trustworthiness	Dialogue with stakeholders and the public	– match between performance and public expectations – openness to public demands – regular consultations - commonly agreed procedures for crisis situations
3	Values, Worldviews	Dialogue, Mediation	– fair representation of all affected parties – voluntary agreement to obey rules of rational discourse – inclusion of best available expertise – clear mandate and legitimation

3.4.4 COPING WITH RISK: REQUIREMENTS OF A RATIONAL DISCOURSE

There is a need for a structure or organizational model of risk debates that acknowledges the formal conditions of the respective risk arena and addresses all three levels of risk conflicts. Most authors agree that such a debate should be organized according to the rules of a rational discourse (cf. McCarthy 1975; Habermas 1984; Kemp 1985; Bacow and Wheeler 1984: 190-194; Burns and Überhorst 1988; Fiorino 1990; Renn 1992b; Webler 1995). The phrase "discourse" has different meanings in the social sciences. Discourse is often used to mean either language texts as wholes in their context of use or the world views which inform our understanding. In the theory of communicative action the term discourse denotes a special form of a dialogue in which all affected parties have equal rights and duties to present claims and test their validity in a context free of social or political domination. Within the context of risk communication, a discourse provides a platform to resolve a conflict or engage in joint problem solving by a specific set of rules. The success or failure of a discourse depends on many factors. Among the most influential are :

(1) *A clear mandate for the discourse participants:* Risk communication on the third level requires a clear and unambiguous mandate of what the deliberation process should produce or deliver. Since discourses are informal instruments, there should be a clear understanding that the results of such a discourse cannot claim any legally binding validity (unless it is part of a legal process such as arbitration). All the participants, however, should begin the discourse process with a clear statement that specifies their obligations or promises of voluntary compliance once an agreement has been reached. As a predecisional tool the results of such discourses should be regarded as consultants‘ reports similar to the scientific consultants who articulate technical recommendations to the legitimate authorities. Risk managers from the public or private sector need to acknowledge and to process the outcome of the deliberations, even if they are not obliged by law to follow the advice. However, the process will fail its purpose if deviations from the recommendations are neither explained nor justified to the discourse participants.

(2) *Openness of result:* A discourse will never accomplish its goal if the decision has been made (officially or secretly) and the purpose of the communication effort is to "sell" this decision to the other parties. Individuals have a good sense whether a decision-maker is really interested in their point of view or if the process is meant to pacify potential protesters (Fiorino 1989).

(3) *A clear understanding of the options and permissible outcomes of such a process:* The world cannot be reinvented by a discourse nor can historically made decisions be deliberately reversed. All participants should be clearly informed about the ranges and limits of the decision options that are open for discussion and implementation. If for example, the technology is already in existence, the discourse can only focus on issues such as emission control, monitoring, emergency management or compensation. But the range of permissible options should be large enough to provide a real choice situation to the participants.

(4) *A predefined time table:* It is necessary to allocate sufficient time for all the deliberations, but a clear schedule including deadlines is required to make the discourse effective and product-oriented.

(5) *Equal position of all parties:* A discourse needs the climate of a "powerless" environment (Habermas 1984). This does not mean that every party has the same right to intervene or claim a legal obligation to be involved in the political decision making process. However, the internal rules of the discourse have to be strictly egalitarian; every participant must have the same status in the group and the same rights to speak, make proposals, or evalu-

ate options (Kemp 1985). Two requirements must be met: First, the decision about the procedure and the agenda must rely on consensus; every party needs to agree. Second, the rules adopted for the discourse are binding for all members and no party is allowed to claim any privileged status or decision power. The external validity of the discourse results are, however, subject to all legal and political rules that are in effect for the topic in question.

(6) *Neutrality of the facilitator of the discourse:* The mediator who facilitates such a process should be neutral in his/her position on the respective risk management issue and respected and authorized by all participants. Any attempt to restrict the maneuverability of the mediator should be strictly avoided.

There are also discourse requirements pertaining to the behavior of the participants that are necessary for facilitating agreement or at least a productive discussion. Among these requirements are:

(7) *Willingness to learn:* All parties have to be ready to learn from each other. This does not necessarily imply that they have to be willing to change their preferences or attitudes. Conflicts can be reconciled on the basis that parties accept other parties' position as a legitimate claim without giving up their own point of view. Learning in this sense entails:
   - Recognition of different forms of rationality in decision making (Perrow 1984; Habermas 1984);
   - Recognition of different forms of knowledge, be it systematic, anecdotal, personal, cultural, or folklore wisdom (Habermas 1971);
   - Willingness to subject oneself to the rules of argumentative disputes, i.e. provide factual evidence for claims; obey the rules of logic for drawing inferences; disclose one's own values and preferences vis-a-vis potential outcomes of decision options, and others (Webler 1995).

(8) *Resolution of allegedly irrational responses:* Discourses in which the public, interest groups or affected individuals are represented frequently demonstrate a conflict between two contrasting modes of evidence: the public refers to anecdotal and personal evidence mixed with emotional reactions, whereas the professionals play out their systematic and generalized evidence based on abstract knowledge (Lynn 1986; Keeney and von Winterfeldt 1986; Dietz et al. 1989). A dialogue between these two modes are rarely accomplished because experts regard the personal evidence as a typical response of irrationality. The public representatives perceive the experts often as uncompassionate technocrats who know all the statistics, but couldn't care less about a single life lost. This conflict can only

be resolved if both parties are willing to accept the rationale of the other party's position and to understand and maybe even empathize with the other's party view (Bacow and Wheeler 1984: 191). If over the duration of the discourse some familiarity with the process and mutual trust among the participants have been established, role playing can facilitate that understanding. Resolving alleged irrationalities means to discover the hidden rationality in the argument of the other party.

(9) *De-moralization of positions and parties:* The individuals involved in a discourse should agree in advance to refrain from moralizing each other or each other's position (Bacow and Wheeler 1984; Renn 1992a). Moral judgments on positions or persons impede compromise. Something cannot be 30% good and 70% bad; either it is good, bad, or indifferent. As soon as parties start to moralize positions, they cannot make tradeoffs between their allegedly moral position and the other parties' immoral position without losing face. A second undesired result of moralizing is the violation of the equality principle stated above. Nobody can assign equal status to a party, which is allegedly morally inferior. Finally, moralizing masks deficits of knowledge and arguments. Even if somebody knows nothing about a subject or has only weak arguments to support his/her position, assigning blame to other actors and making it a moral issue can help to win points. The absence of moralizing other parties or their position does not mean to refrain from using ethical arguments, such as "this solution does not seem fair to the future generation" or "we should conserve this ecosystem for its own sake". Ethical arguments are essential for resolving environmental disputes.

3.4.5 THE MODEL OF COOPERATIVE DISCOURSE

Is there any procedure that would meet the requirements for such a discourse and at the same time assure the incorporation of expertise and social values? Many models for public participation have been suggested in the literature that promise to facilitate a rational discourse (Crosby et al. 1986; Amy 1987; Kraft 1988; Burns and Überhorst 1988; see reviews in: Nelkin and Pollak 1979; Pollak 1985; Fiorino 1990; Renn et al. 1995).

This is not the place to discuss these models in detail. I would like to focus on one hybrid model of citizen participation that Thomas Webler and I have termed "cooperative discourse". With several modifications, we have applied this model to studies on energy policies and waste disposal issues in West Germany, for waste-disposal facilities in Switzerland and to sludge-disposal strategies in the United States (Renn et al. 1985, 1989; 1991; 1993; 1995). The model entails three consecutive steps:

(1) *Identification and selection of concerns and evaluative criteria.* The identification of concerns and objectives is best accomplished by asking all relevant stakeholder groups to reveal their values and criteria for judging different options. It is crucial that all relevant value groups be represented and that the value clusters be comprehensive and include economic, political, social, cultural, and religious values. To elicit the values and criteria for such a list the technique of value-tree analysis has proven appropriate (Keeney et al. 1987; von Winterfeldt and Edwards 1986; von Winterfeldt 1987). The resulting output of such a value-tree process is a list of hierarchically structured values that represent the concerns of all affected parties.

(2) *The identification and measurement of impacts and consequences related to different policy options.* The evaluative criteria derived from the value-tree are operationalized and transformed into indicators by the research team or an external expert group. These operational definitions and indicators are reviewed by the participating stakeholder groups. Once approved by all parties, these indicators serve as measurement rules for evaluating the performance of each policy option on all value dimensions. Experts from varying academic disciplines and with diverse perspectives on the topic of the discourse are asked to judge the performance of each option on each indicator. For this purpose, a modification of the Delphi method has been developed and applied (Webler et al. 1991). This method is similar to the original Delphi format (Turoff 1970), but based on group interactions instead of written responses. The objective is to reconcile conflicts about factual evidence and reach an expert consensus via direct confrontation among a heterogeneous sample of experts. The desired outcome is a specification of the range of scientifically legitimate and defensible expert judgments and a distribution of these opinions among the expert community with verbal justifications for opinions that deviate from the median viewpoint.

(3) Conducting a rational discourse with randomly selected citizens as jurors and representation of interest groups as witnesses: The last step is the evaluation of potential solutions by one group or several groups of randomly selected citizens (Dienel 1978; Dienel 1989, Dienel and Renn 1995). These panels are given the opportunity to evaluate and design policy options based on the knowledge of the likely consequences and their own values and preferences. The participants are informed about the options, the evaluative criteria, and the consequence profiles. The representatives of interest groups and the experts take part in the process as witnesses; they provide their arguments and evidence to the panels who ultimately decide on the various options. This deliberation process takes time: citizen panels are conducted as seminars over three to five consecutive day or over a longer period of up to six months. All participants are exposed to a standardized program of infor-

mation, including hearings, lectures, panel discussions, videotapes, and field tours. The process is similar to a jury trial with experts and stakeholders as witnesses and advisers on procedure as "professional" judges.

Figure 12 illustrates the functions and procedure of this model. The figure shows that all three groups (experts, stakeholder groups, and the general public) play a role in each step, but that they are encouraged to impact the decision process with the specific knowledge with which they are most proficient. This division of labor provides a check-and-balance process and a sequential order for multiple actor involvement.

Organizing a cooperative discourse requires careful planning and preparation and relies on the willingness of the communicator to learn from the participants and to adjust his/her preferences if deemed necessary. Several procedures lend themselves to organizing a cooperative discourse. However, it is not so much the structure of the process that determines success or failure of a risk discourse as the willingness of all participants to meet the conditions specified in section 3.4.4.

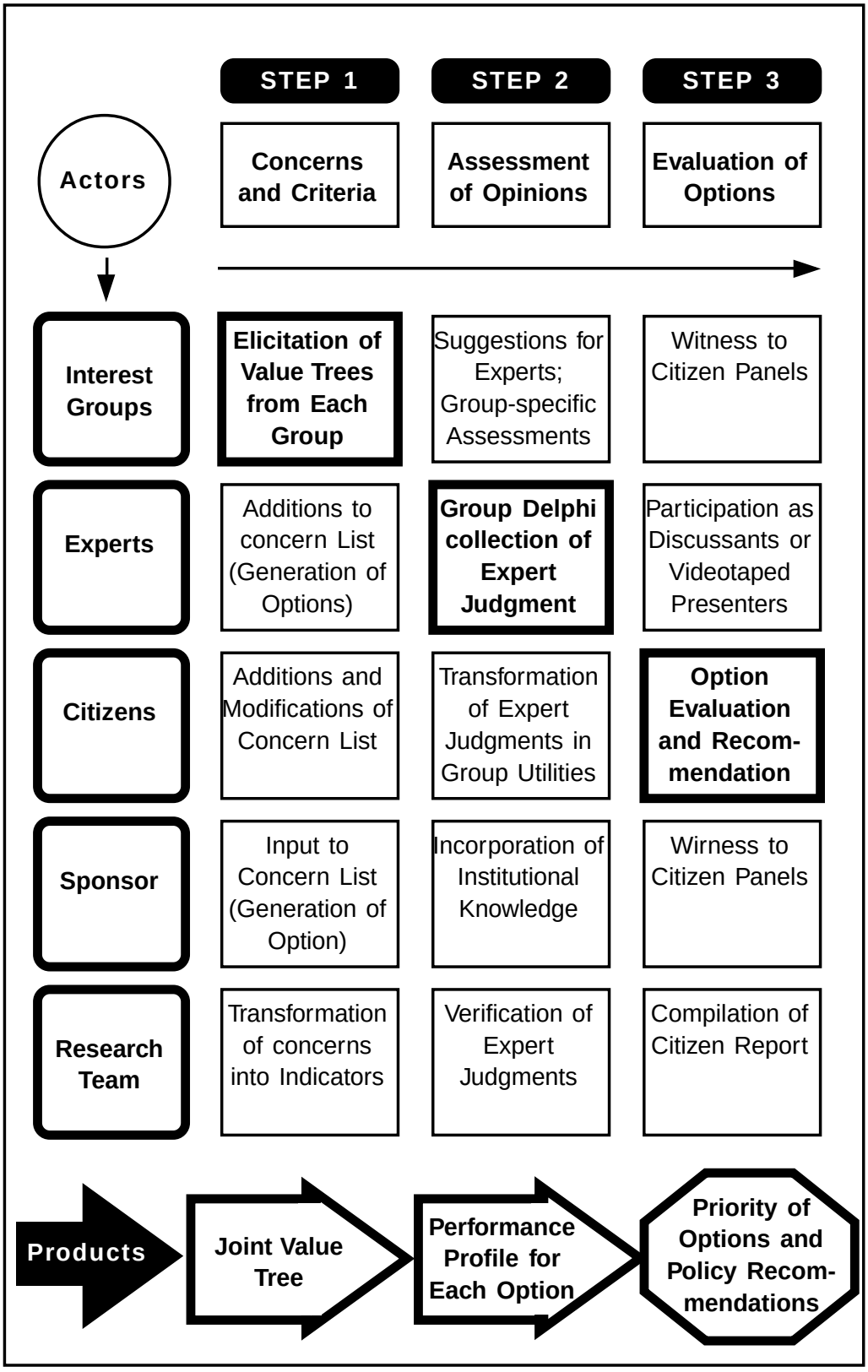

Fig 12: Basic concept of the three-step participation model

3.4.6 EXPERIENCES WITH THE COOPERATIVE DISCOURSE MODEL

Applications of the cooperative discourse model in Germany, Switzerland and the United States emerged from the early experiences with citizen panels in urban planning in different German cities and communities (Dienel 1978). From the 1970ies to today approximately 26 cities or communities used citizen panels as a method of local planning. More than 2,600 adults were involved in these panels for an average of 3-5 days each. Based on this experience, Renn and several of his colleagues experimented with the cooperative discourse method, first in Germany and later in other countries. The following paragraphs describe several large-scale applications in three countries:

– The most comprehensive study dealt with the evaluation of national energy policies in Germany. In August 1982, the German Ministry of Research and Technology initiated a large research project to investigate the preferences of the German population with respect to four energy policy options developed by a parliamentary commission in 1979 (Renn et al. 1985; Renn et al. 1986; Dienel and Garbe 1985). The Government was interested in eliciting reliable information on which energy scenario was most appealing to the population and on what basis citizens would evaluate the policy options laid out in each scenario. A research team in which one of the authors served as senior investigator conducted a three-year study to collect data on public preferences and to analyze the motivations and underlying reasons for the judgment process of evaluating the predefined energy scenarios. The study operated with 24 citizen panels (each including approximately 25 participants) drawn from seven communities in different parts of West Germany. The panels unanimously rejected a high energy supply scenario and opted for an energy policy that emphasized energy conservation and efficient use of energy. Nuclear energy was perceived as non-desirable but – at least for an intermediate time period – as a necessary energy source. The panelists recommended stricter environmental regulation for fossil fuels even if this meant higher energy prices. They developed a priority list for policies and drafted recommendations for implementing high priority policies (Dienel and Garbe 1985).

– A regional study was conducted from 1994-1996 in the northern part of the black forest (Southern Germany). The objective was to have stockholders and citizens take part in planning a waste-management program (Akademie 1996; Carius et al. 1996). A round table with 16 major stakeholder group was organized in 1994 to develop waste reduction policies and to assess the potential recycling potential of the area. The same group also was asked to find the most suitable technical solution for waste processing before final disposal. After these decisions were made, 200 randomly selected citizens from potential

host communities were asked to find the most appropriate site for the types of facilities that had been chosen previously. The most outstanding result was that panelists were willing to approve a siting decision that would affect their own community. The decision was given to the regional planning board which approved the recommendations with some minor modifications. The different county parliaments and the city council of the largest city within the region, however, have been reluctant to accept the recommendation as of now.

– In 1992, the Building Department *(Baudepartement)* of the canton Aargau (Northern part of Switzerland) asked the author (at that time affiliated with the Swiss Federal Institute of Technology) to organize a cooperative discourse for siting one or several landfills in the eastern part of the canton. The mandate of the research team was to organize a cooperative discourse with four citizen panels. These panels were asked first to develop criteria for comparing the different sites; second, to evaluate the geological data that were collected during that period; third, to eliminate the sites that should not be further considered; and fourth, to prioritize the remaining sites with respect to suitability to host a landfill (Webler 1994). The selection of representatives for the citizen panels differed from our theoretical approach. Rather than use random selection, we gave an oversight committee (consisting of the mayors of each eligible town and the head of the Building Department) the task to recruit and select citizen participants. Once the representatives were chosen, four panels were formed, each consisting of two representatives from each potential site community. With the exception of one community, every town sent eight people to the panels. Not a single one of these people dropped out during the process. Between January and June 1993 the panels met 7-9 times before they attended a workshop of two days to come up with the final decision. All participants rated each site on the basis of their self-selected evaluative criteria, their personal impressions, the written and oral information, and the results of consultations with experts on the basis of a Group Delphi. All four panels composed a list of prioritized sites for the landfill. The most remarkable outcome was that each panel reached a unanimous decision. In December of 1993, the result of the participation process was made public. The canton government approved the results and entered the next phase of the licensing procedure. As of today, the selected site is still considered but the erection of a landfill has been postponed as the amount of waste has sharply decreased over the last few years.

– There has been one major attempt to implement the original version of the cooperative discourse in the United States[1]. In July 1988 the Department of Environmental Protection

[1] Using randomly selected citizens for policy making and evaluation is not alien to the United States. The Jefferson Center in Minneapolis has conducted fourteen projects with citizen panels similar to the planning cells

of New Jersey asked a research team of Clark University directed by the author to apply the model to sewage sludge management problems (Renn et al. 1989). The objective of the project was to give citizens of Hunterdon County, New Jersey, the opportunity to design the regulatory provisions for an experimental sludge application project on a Rutgers University research farm located in Franklin Township (New Jersey). Although much smaller in scale, the project provided many new insights and experiences that partially confirmed our German observations and partially documented the need for adjustments to the U.S. political culture. The citizen panels were conducted on two consecutive weekends. The desired goal was to elicit recommendations for regulatory provisions that should be included in the permit for the land application of sewage sludge on the site in question. The factual issues were discussed in a Group Delphi with eight sludge experts (Webler et al. 1991). The results of the Delphi were fed into the deliberation process of the panels. The envisioned program for the citizens panel was radically altered after the participants, in particular the land owners abutting the site, made it clear that they rejected the project of land application and that they felt more comfortable conducting their own meetings without assistance of a third party. The citizens met several times without the assistance of a facilitator and formulated recommendations that were forwarded to the sponsor (New Jersey Department of Environmental Protection). In addition to the policy recommendation to reject the proposal of land application, the process provided valuable information about citizen concerns and values. Whereas most of our consulted experts were convinced that citizen concerns focused on issues such as odor, traffic, and contamination of ground water, the value tree analysis of the citizens revealed that their major concerns were the expected change of community image from an agricultural community to a "waste dump" and the long-term effects of pollutants on farmland (Webler et al. 1995). In addition, the questions of equity and fairness played a major role in the citizen deliberations. The unexpected change of the panel's structure to exclude the facilitators from further meetings was clear evidence that the U.S audience is more sensitive to due process and methods of participation than the panelists in West Germany or Switzerland

In summary, the applications of cooperative discourse method provided some evidence and reconfirmation that the theoretical expectations linked to this method can be met on the local, regional and also the national level. It is a valid instrument to elicit preferences and educated responses of citizens in a rather short time period. Evaluation studies by independent scholars confirmed that the objectives of fairness and competence were met in the Swiss as well as German case studies, i.e. the main interests and value groups were adequately represented and

(Crosby et al. 1986). Several community planners have experimented with citizen panels which were composed to reflect a representative sample of the population (cf. Kathlene and Martin 1991).

the outcomes of the process were judged as reasonable suggestions by technical experts (Buser 1995; Vorwerk and Kämper 1997; Roch 1997).

The US-experience has shown that it is necessary to have participants design the agenda and the focus of the sessions before the actual meetings take place. While participants in Germany and Switzerland were almost grateful and pleasantly surprised that someone made the effort to pre-plan and structure a procedure for their participation, U.S. citizens distrust pre-fabricated participation models and suspect hidden agendas with such an approach (Lynn 1986). The main problem in Europe has been that organized stakeholder groups as well as elected public officials did not feel compelled to implement the results of the citizens‘ recommendations. As much as they used the recommendations in the public arena to demonstrate their openness to public input, the final decisions that were made in each of the cases varied remarkably from the suggestions by the citizen panels. All decision makers felt enlightened by the expressed preferences of the affected population, but, due to political concerns and pressures, were unable to implement the suggestions as stated by the citizens. Obviously the collected resources of value commitments and evidence were insufficient to have a decisive influence on the outcome of the political arena. The recommendations played a major role in the arena deliberations, they were commented by all stakeholders and discussed in public; the effect, however, was that they became one part of a “messy“ policy process among other competing suggestions.

What does this experience tells us about the political value of the cooperative discourse method? It depends on one‘s political position whether this deviation of the political practice from the citizens‘ recommendations is regarded as an expression of strength or weakness with respect to democratic ideals. If one adheres to the concept of representative democracy, suggestions by citizens should not carry more weight than suggestions by any other group and are supposed to help policy makers to be reflective and informed about potential value violations. If one believes in direct democracy, the lack of power and pressure that comes with the model of citizen recommendations can be used as an argument against this method. They might prefer models that create direct “political“ channels into the core of decision making or mobilize public pressure to an extent that policy makers are forced to accept the recommendations. Cooperative discourse is based on the assumption that it enhances the political process of representative government and provides incentives for increased rationality, competence, and fairness in the legitimate decision process. Far from being an established planning tool, the method of cooperative discourse has proven its viability and feasibility in different contexts and constitutes at least a serious alternative to other forms of public involvement.

3.4.7 IMPLEMENTATION OF A COOPERATIVE DISCOURSE

If one recalls the characteristics of the arena metaphor, different actors in society have different sets and quantities of resources available to mobilize political support and to influence the outcome of the decision making process. Since resources are not divided equally among the main actors, the more powerful actors will be reluctant to enter a cooperative discourse in which all participants are entitled to the same rights, duties and privileges. How could one motivate powerful interest groups to participate in a discourse and accept equal footing with other, often less powerful groups? If actors do not perceive any advantage in participating in such an endeavor, how might they be convinced to take part? Communication among actors with different portfolios of resources tends to reflect and often reinforce the existing power structures (Majone 1989).

Experience has shown that such asymmetric communication efforts did not reach their goals in particular if they are publicly announced as efforts of participation or public involvement. A large body of literature exists for example on the pitfalls of hearings in which regulators and experts take on a privileged position as panelists and the intervenors the position as "beggars" (Hadden 1989). Asymmetries like those experienced in public hearings are often transformed into theatrical performances which are displayed to mobilize public support and extended press coverage. Hardly do they resolve any problem.

If a position of equal power within the discourse (outside of the discourse, the world is different) is desired, three major strategies are available that might help to persuade potential actors to get involved in a rational discourse (cf. Bacow and Wheeler 1984: 193 and 126ff; Renn 1992b) :

(1) *Wait until actors are frustrated with the arena outcome.* In arenas with actors having a similar arsenal of social resources, the struggle continues over long time periods without any resolution in sight. The deadlock results in political paralysis as none of the actors is able to mobilize enough resources to force others to accept a compromise. In this situation all actors lose unless "doing nothing" is in the strategic interest of one or more of the parties involved. The frustration over the immobility of the political system to respond to the competing claims creates a favorable climate to engage in direct negotiations based on the cooperative discourse model.

(2) *Emphasize the openness and fairness of the process:* Many actors are convinced that their point of view would prevail in a social contest if they only had a fair chance to have their

arguments and claims presented to an unbiased audience. A cooperative discourse promises such a fair forum and helps all parties to make their viewpoint known to other parties.

(3) *Create social support for the discourse idea:* This is probably the most powerful instrument for promoting a discourse. If participation in a discourse is associated with gaining more social resources, and refusal to participate is linked to losing vital resources, actors may feel they can only win by participating in the discourse even if that implies to give up power.

The discourse organizers should be willing to allocate sufficient clout for the recommendations of the discourse participants. Although it is not possible to make the recommendations legally binding, it is essential that all participants and the observers gain the impression that the recommendations are implemented if technically and politically feasible. Ignoring recommendations or changing them without a compelling reason is worse than having no discourse at all.

3.4.8 LESSONS FOR STAKEHOLDER INVOLVEMENT

What advice can we give to risk communicators of how to design and implement a risk communication program that incorporates the findings of past research on stakeholder involvement? The first lesson is to distinguish among the three levels of the debate. Nothing is more detrimental and frustrating for all participants involved than addressing an audience who expects a third level debate and is confronted with a detailed technical analysis of the issue. The risk communicator should investigate the level of debate beforehand and design different communication programs for each level.

Debates change frequently in nature and it is important to have the means available to switch from a technical, to an institutional and moral debate. Whereas technical expertise is vital on the first level and evidence for institutional competence and openness on the second, there is no clear medium of communication available for the third level. A more general discourse focused on value issues may be the appropriate tool. If the objective of such a debate is to reconcile existing conflicts, the involvement of an outside mediator may be helpful in setting the agenda and in identifying the concerns and values that the communicator is supposed to address.

When organizing arenas for stakeholder involvement, several criteria should be met. Among those criteria are:

a) *Variability of options:* Do the participants have the choice to select one option out of a variety of options that are all feasible in the specific situation? This is particularly important, if government agencies organize involvement processes, as the participants expect several options from which they are allowed to choose. If the purpose is only to convey a message or to improve understanding among the constituencies, stakeholder participation via discourse is not the right format.

b) E*quity of exposure*: Are all stakeholders or the respective constituency exposed in some way to the potential disadvantages of the proposed options? (so to avoid a distinction between affected and indifferent stakeholders). If stakeholders are invited to participate, they should have an equal interest in the matter. Otherwise, people will question the legitimacy of peripheral stakeholders be present at the discourse table.

c) *Personal experience*: Do participants have some experience with the problem and do they feel competent to give recommendations after they are further educated about the problem and the remedial options? This is particular relevant if consumer issues are at stake. Participating stakeholders should be knowledgeable about major consumer issues and have a basic understanding of chemical risk management.

d) *Personal relevance*. Do participants judge the problem as serious enough to sacrifice their time to work on solutions? It might be frustrating for a governmental agency to invite stakeholders to a common problem-solving discourse, but most of the invitees do not show up. The organizers have to make sure that all relevant stakeholders have an interest in and a commitment to the process.

e) *Seriousness and openness of agency:* Is the managerial level of the inviting agency willing to accept or at least carefully consider the recommendations of the discourse or does s/he pursue hidden agendas? Often, agency personal responsible for risk communication are enthusiastic about stakeholder involvement, this enthusiasm is, however, not shared by the upper management. Again, it is very frustrating for all participants, if the recommendations are not taken seriously by the decision-makers.

Given these notes of caution, it is important to acknowledge that stakeholder participation has been a valuable asset for more effective risk management and improved risk communication. In most cases, it has been justified to bring representatives of stakeholder groups together and initiate a common dialogue or discourse. This is particularly necessary if highly controversial risks are at stake. Organizing a common platform for mutual exchange of ideas, arguments, and concerns does not suffice, however, in order to assure fair and competent results. Mixing

all these knowledge and value sources into one, implies the danger that each group trespasses its legitimate boundary of expertise. If perceptions replace assessments and the rhetoric of powerful agents replace value input by those who have to bear the risks the discourse goes into the wrong direction (Majone 1989). An organizational model is to be used that assigns specific roles to each contributor but makes sure, at the same time, that each contribution is embedded in a dialogue setting that guarantees mutual exchange of arguments and information, provides all participants with opportunities to insert and challenge claims, and to create active understanding among all participants (Webler 1995). The model of cooperative discourse is one among other candidates that has been designed to meet that challenge.

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ANNEX II

RISK COMMUNICATION RESOURCE BOOK

COMMUNICATING WITH CONSUMERS ABOUT CHEMICAL RISKS

Philip C.R. Gray and Peter M. Wiedemann

1. INTRODUCTION

This resource book provides an overview of existing sources of advice and information on communication with consumers about chemical risks. It focuses on communication between governments or manufacturing industry, NGOs representing consumer interests, and consumers. The main sorts of risks which will be considered are direct health risks, and risks to the environment arising in production, product use, or waste disposal.

Communication with consumers occurs in multiple, complex ways, not always intended or controllable. It is particularly important to realize that people obtain information and form views not only in their role as consumers or purchasers of products, but also as citizens, newspaper readers, neighbors of a plant, employees and so on. For this reason it is important first of all to take a broad view of risk communication with consumers, before narrowing in on consumer-specific aspects. Each section of the review will therefore cover sources dealing with risk communication in general and in other relevant contexts, as well as material more specifically relevant to consumer communication.

The main section of the resource book (Chapter 2) consists of brief summaries of the most important and relevant manuals and key reports on risk communication. These summaries are organised into various groups, which are explained in the next section. A table at the beginning of the Chapter provides an overview of the manuals covered.

The following Chapter (3) is a guide to selected case studies on risk communication.

Chapter 4 provides a brief listing of some major international programmes of work on risk communication, both completed and ongoing. Finally, Chapter 5 contains the addresses of relevant organizations, as well as an annotated list of useful resources in the Internet – including both information on risk communication itself, and examples of the opportunities offered by the new media to communicate risk information.

1.1 ANALYSIS OF RISK COMMUNICATION MANUALS

1.1.1 CATEGORISATION

The heart of the resource book consists of an annotated bibliography of risk communication manuals. "Manual" is interpreted as meaning primarily practical guides and handbooks. However a limited number of key reports and research papers are also included, where these provide essential insights or background information, often with important practical implications, that significantly augment the handbooks. As far as possible the materials are selected to be accessible to non-specialists.

The manuals are classified as follows. In addition to a section on General risk communication advice, there are three main categories: Information Provision, Emergency Communication, and Participation and Dialogue. This categorization is closely related to the classic distinction between the functions of risk communication as the provision of information, the encouragement of appropriate behaviour in relation to a hazard, issuing emergency warnings, and participation or joint decision-making. However, the 'pure' provision of information and the encouragement or enabling of safe behaviour overlap and are often hard to separate clearly in practice[2] (especially for consumer products), so these two functions are both covered here in the category "Information Provision".

Within the General category, most of the manuals are "cross-cutting", i.e. are relevant to communication with more than one target group and to several (or all) risk communication functions. They are hence categorized pragmatically here according to the user group or readership which they are aimed at: General Users, Government and Industry. A fourth subcategory here is the subject of Issues Management (which could also be treated as a complete category of its own). This is a much broader topic than risk communication, which provides extremely useful insights and practical guidelines by setting risk communication in the overall context of organizational strategy and responses to the organizational environment.

Each of the three remaining categories are sub-divided into manuals providing General Guidance, those referring to communication with Communities and Neighbors (as mentioned above), and those which directly concern communication with Consumers.

[2] With the exception of the area of emotive advertising and campaigns (e.g. against smoking or drinking while driving), which is clearly more than neutral information provision. However this area will not be included in this review.

1.1.2 DESCRIPTION OF RISK COMMUNICATION MANUALS

Each risk communication manual is described according to a fixed scheme which is explained below. A similar scheme is also used in the case study section.

The scheme begins with a commentary on the manual's most important messages, its significance for (chemical or general) risk communication, and so on, and a description or listing of its contents[3]. The remaining sections of the scheme are as follows:

1. *Background* refers to the direct or indirect motivation for the risk communication manual, where known, e.g. risk communication problems in a given area, or a new law. Where the "author" is an organization which employed consultants to write the manual, the latter are named if known.

2. *Intended Readership:* This section describes to whom the manual is addressed, i.e. the communicators who are most likely to use the manual - e.g. government officials (not to be confused with the target audience or communication partners for any subsequent risk communication).

3. *Type of Risk:* The risk source, whether a substance, product, plant, activity… For communication about chemical risks it is interesting to note, among other things, whether the risk is related to production processes, or to product characteristics, product use or disposal.

4. *Type of Situation:* Much of risk communication concerns "crises" of one kind or another. We differentiate however between actual emergencies – where planning and speed of reaction are critical elements – and "normal" risk communication, which is everything else. In relation to production, this difference corresponds to "normal operation" compared to "emergencies". In terms of products, it relates to "normal use" compared to "product recall". In practice there is often a grey area between the two extremes, for instance in the case of the discovery of contaminated land.

5. *Special focus:* This point indicates the special focus of the manual in terms of communication tasks or issues. This is intended to provide a quick hint as to what the book is about and why it might be particularly worth reading. This section supplements the more general, comprehensive evaluation under point 7. Examples of a manual's special focus might

[3] Chapters such as "Introduction" are omitted from listings.

be "explaining technical aspects of EMF to consumers", "interacting with the media", "designing warning labels" or "running a mediation process".

6. *Empirical foundation:* This indicates what specific kind of basis there is for the advice contained in the manual. This may be e.g. expert judgement, case studies, RC/ RP literature, other literature, or a survey.

7. *Relevance:* This section indicates the relevance or value of the information in the manual for the main aspects of communication with consumer about chemicals. These aspects or communication functions are:
   - Building/ maintaining trust in organisations
   - Providing information about products/ substances
   - Encouraging safe product use etc.
   - Crisis communication about products/ substances
   - Conducting dialogue, increasing participation and resolving conflicts (about products/ substances)

The relevance of the manual for each of the functions is rated on a scale from A (very relevant) to C (slightly relevant). No rating means that the manual is not relevant at all to the particular function.

1.2 A NOTE ON RISK PERCEPTION

In order to provide a clear focus for this review, it does not cover the subject of risk perception explicitly. However, for those who wish to learn more about this topic, many of the publications described in this report do contain useful information. These are listed below, together with selected additional publications for the more interested.

(1) Publications covered in this report:

- Hance, Chess and Sandman (1988). *Improving Dialogue with Communities: A Risk Communication Manual for Government.* Environmental Communication Research Program Rutgers University, New Jersey.

- Soby, B.A., Simpson, A.C.D and Ives, D.P. (1993). *Integrating public and scientific judgements into a tool kit for managing food-related risks, Stage 1: Literature review and feasibility study.* Research Report No. 16, Centre for Environmental and Risk Management (CERM), School of Environmental Sciences, University of East Anglia, UK.

– UK Department of Health (c. 1998). *Communicating About Risks to Health: Pointers to Good Practice.* UK Department of Health, London.

– Wiedemann, P.M., Carius, R., Henschel, C. et al. (in press, 2000) *Risikommunikation für Unternehmen: Ein Leitfaden (A Guide to Risk Communication for Companies).* Verein Deutscher Ingenieure. VDI-Verlag, Düsseldorf. [In German].

(2) Additional key publications

– Royal Society Study Group (1992). *Risk: Analysis, Perception and Management*. Chapter 5: Risk Perception. Prepared by N. Pidgeon, C. Hood, D. Jones, B. Turner and R. Gibson. The Royal Society, London. pp. 89-134.

– Slovic, P. (1992). Risk perception: reflections on the pychometric paradigm. In: S. Krimsky and D. Golding (eds.) (1992). *Social Theories of Risk*. Praeger Publishers, Westport CT, USA. pp. 117-152.

– Slovic, P.(1987). Perception of risk. *Science* 236, pp. 280-285.

2. RISK COMMUNICATION MANUALS

2.1 LIST OF MANUALS COVERED BY CATEGORY

2.1.1 GENERAL RISK COMMUNICATION GUIDANCE

2.1.1.1 GENERAL RC GUIDANCE: ALL USERS

Authors	*Title/ ref*

MANUALS ON RISK COMMUNICATION

Covello, V.T. and Allen, F.W. (1988)	*Seven Cardinal Rules of Risk Communication.* OPA-87-020. April 1988. US Environmental Protection Agency, Washington, D.C. (leaflet)
Gray, P.C.R., Stern, R.M. and Biocca, M. (eds.) (1998)	*Communicating about Risks to Environment and Health in Europe*. Published on behalf of the World Health Organisation Regional Office for Europe in collaboration with the Centre for Environmental and Risk Management, University of East Anglia, UK.
Lundgren, R.E. (1994)	*Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks*
Mulligan, J., McCoy, E., Griffiths, A. (1998).	*Principles of Communicating Risks.* The Macleod Institue for Environmental Analysis, Calgary, Alberta.
Wiedemann, P. and Schütz, H. (2000).	Developing Dialogue-Based Risk Communication Programmes. *Studies on Risk Communication* 79, Research Centre Jülich, Germany.

MANUALS ON ISSUES MANAGEMENT

Affleck, M.E. (1998).	*RadarScan Issues Management.* Issue Action Publications, Leesburg, Virginia.
Sopow, E. (1994)	The Critical Issues Audit. Issue Action Publications, Leesburg VA.
Susskind, L. and Field, P. (1996)	*Dealing with an Angry Public: The Mutual Gains Approach to Resolving Disputes*. Free Press, New York.

KEY REPORTS ON RISK COMMUNICATION

Bennett, P. and Calman, K. (1999).	*Risk Communication and Public Health.* Oxford University Press, Oxford.
Gutteling, J.M. and Wiegman, O. (1996).	*Exploring Risk Communication.* Kluwer Academic Publishers, Dordrecht.
National Research Council (1989)	*Improving Risk Communication.* National Academy Press, Washington., D.C.
National Research Council Committee on Risk Characterization (1996)	*Understanding Risk. Informing Decisions in a Democratic Society*. P.C. Stern and H.V. Fineberg, eds. National Academy Press, Washington D.C.

2.1.1.2 GENERAL RC GUIDANCE: GOVERNMENT & GOVERNMENT AGENCY USERS

Agency for Toxic Substances and Disease Registry (ATSDR) (1997)	*A Primer on Health Risk Communication Principles and Practices*. ATSDR Website: http://atsdr1.atsdr.cdc.gov/HEC/primer.html#FACTORS
Chess, C. (1988)	*Encouraging Effective Risk Communication: Suggestions for Agency Management.* Submitted to New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.
Chess, C. (1992)	*How to plan for Communication with the Public: Development of a Seminar for Environmental Managers.* Environmental Communication Research Program, Rutgers University, New Brunswick, Jersey, pp. 45.
Chess, Hance, Sandman (1988)	*Improving Dialogue with Communities: A Short Guide for Government Risk Communication.* Submitted to New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.
Covello, V.T. McCallum, D.B. and Pavlova, M. (eds.) (1989a)	*Effective Risk Communication: The role and responsibility of governmental and nongovernmental organisations*. New York and London: Plenum Press.
Covello, V.T. McCallum, D.B. and Pavlova, M. (1989b)_	Principles and Guidelines for Effective Risk Communication. Chapter 2 in: Covello, V.T. McCallum, D.B. and Pavlova, M. (1989) (eds.) *Effective Risk Communication: The role and responsibility of governmental and nongovernmental organisations*. New York and London: Plenum Press.
Hance, Chess and Sandman (1988)	*Improving Dialogue with Communities: A Risk Communication Manual for Government.* Submitted to New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey.
ILGRA (Inter-Departmental Liaison Group on Risk Assessment) (UK) (1998)	Risk Communication: A Guide to Regulatory Practice. Health and Safety Executive, London.
UK Department of Health (c. 1998).	*Communicating About Risks to Health: Pointers to Good Practice.* UK Department of Health, London.

2.1.1.3 GENERAL RC GUIDANCE: INDUSTRY USERS

Covello, V.T., Sandman, P.M. and Slovic, P. (1988)	*Risk Communication, Risk Statistics and Risk Comparisons: A Manual for Plant Managers.* Chemical Manufacturers Association, Washington, D.C.
Wiedemann, P.M., Carius, R., Henschel, C. et al. (in press, 2000)	*Risikommunikation für Unternehmen: Ein Leitfaden (A Guide to Risk Communication for Companies).* Verein Deutscher Ingenieure. VDI-Verlag, Düsseldorf. [In German]

2.1.2 SPECIFIC RISK COMMUNICATION GUIDANCE: PROVISION OF INFORMATION

2.1.2.1 PROVISION OF INFORMATION: GENERAL

See Section 1

2.1.2.2 PROVISION OF INFORMATION TO COMMUNITIES AND NEIGHBOURS

American Chemical Society (ACS) (1988)	*Chemical Risk Communication: Preparing for Community Interest in Chemical Release Data*. American Chemical Society, Washington, D.C., October 1988, pp. 28.
Chemical Manufacturers' Association (1988)	*Title III Community Awareness Workbook*. CMA, Washington, D.C.
Wiedemann, P., Schütz, H. and Brüggemann, A. (1999).	*Leitfaden zum Umgang mit Problemen elektromagnetischer elder in den Kommunen (Guidelines on dealing with EMF problems in municipalities)*. BMU, Berlin/ Research Centre Jülich, Jülich. [In German]

2.1.2.3 PROVISION OF INFORMATION TO CONSUMERS

Soby, B.A., Simpson, A., Ives, D.P., Hedegard, J.B.O. (1992)	*Consumer Attitudes to Risk and the Effectiveness of Home and Leisure Safety Campaigns in the European Community*. Research Report No. 15. Centre for Environmental Risk, School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK.
Soby, B.A., Simpson, A.C.D and Ives, D.P. (1993)	*Integrating public and scientific judgements into a tool kit for managing food-related risks, Stage 1: Literature review and feasibility study*. Research Report No. 16, Centre for Environmental and Risk Management (CERM), School of Environmental Sciences, University of East Anglia, UK.
Wogalter, M.S., DeJoy, D.M. and Laughery, K.R. (eds.) (1999)	*Warnings and Risk Communication.* Taylor and Francis, London/ Philadelphia, pp. 365.

2.1.3 SPECIFIC RISK COMMUNICATION GUIDANCE: EMERGENCY COMMUNICATION

2.1.3.1 EMERGENCY COMMUNICATION: GENERAL

Crisis Management	
Fearn-Banks, K. (1996a)	*Crisis Communications: A Case book Approach.* Lawrence Erlbaum Associates, Mahwah, New Jersey.
Mitroff, I. and Pearson, C. (1993)	*Crisis Management: A Diagnostic Guide for Improving Your Organization's Crisis-Preparedness.* Jossey-Bass Publishers, San Francisco.

2.1.3.2 EMERGENCY COMMUNICATION WITH COMMUNITIES AND NEIGHBOURS

Chemical Manufacturers' Association (1991)	*Crisis Management Planning for the Chemical Industry*. CMA, Washington, D.C., pp. 82.
Chemical Manufacturers' Association (1992)	*Community Emergency Response Exercises Guidebook.* CMA, Washington, D.C., pp. 62.
Verband der Chemischen Industrie (1994)	*Leitfaden "Krisenmanagement" für die Öffentlichkeitsarbeit* [Guide to crisis management for public relations work]. VCI, Frankfurt. Pp. 15. [In German]
Claus et al. (1999)	Handlungsempfehlungen zur Information der Öffentlichkeit (nach §11a Störfall-Verordnung). (Recommendations on Informing the Public under the Hazardous Incidence Ordinance/ Seveso Directive). Umweltbundesamt, Berlin, 1999, pp. 40. [In German]

2.1.3.3 EMERGENCY COMMUNICATION WITH CONSUMERS

See also Case Studies	
Boeing Commercial Airplane Group (1992)	*Crisis Communications: A Guide for Planning.* 1992 Edition. Boeing Commercial Airplane Group, Public Relations, Seattle, pp. 96.

2.1.4 SPECIFIC RISK COMMUNICATION GUIDANCE: PARTICIPATION AND DIALOGUE

2.1.4.1 PARTICIPATION: GENERAL

Renn, O., Webler, T. and Wiedemann, P. (1995)	*Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse*. Kluwer, Dordrecht.

2.1.4.2 PARTICIPATION INVOLVING COMMUNITIES AND NEIGHBOURS

BASF Corporation (1989)	*Community Advisory Panel Handbook.* BASF Corporation, Public Affairs, September 1989, pp. 48.
Chemical Manufacturer's Association (1994)	*Community Advisory Panel Handbook.* CMA, Washington, D.C.
EEI Public Participation Task Force (1994)	*Public Participation Manual (2e.)* Edison Electric Institute (EEI).
Office of Intergovernmental and Public Accountability, US DOE (Undated)	*How to Design a Public Accountability Program.* Year unknown. EM-22, US Department of Energy.

2.1.4.3 PARTICIPATION INVOLVING CONSUMERS

Joss, S. and Durant, J. (eds.) (1995)	*Public Participation in Science: The Role of Consensus Conferences in Europe*. Science Museum, London

2.2 RISK COMMUNICATIO MANUALS

2.2.1 GENERAL RISK COMMUNICATION GUIDANCE

2.2.1.1 GENERAL RISK COMMUNICATION GUIDANCE: ALL USERS

MANUALS ON RISK COMMUNICATION

RC Manual 1: Covello, V.T. and Allen, F.W. (1988).

***Seven Cardinal Rules of Risk Communication.* OPA-87-020. April 1988. US Environmental Protection Agency, Washington, D.C. (leaflet)**

Summary: A classic of the early advice on risk communication. These rules have been widely reproduced and quoted. They represent a "behavioural code" for public and private sector managers in relation to risk communication, which was clearly lacking at the time of publication. The fact that many of the rules now seem obvious implies that the situation has moved on over the last decade; most of the ideas covered in these rules are now widely accepted as norms. The rules are thus only a very basic starting point for modern risk communication, and must be supplemented by detailed practical advice. Nevertheless, it can be observed that even these rules are still regularly broken by individual companies or government agencies.

Contents: Seven general rules are presented, covering (i) the communicator's fundamental attitude to communication, for instance "Accept and involve the public as a legitimate partner", "Be honest frank and open" and "Speak clearly and with compassion", and (ii) practical advice such as "Plan carefully and evaluate your efforts" and "Meet the needs of the Media". For each rule, brief Guidelines and Points to Consider are provided.

Feature	*Details*	
1. Background, Consultants	– Resulted from US EPA's efforts to address risk communication (e.g. about Superfund sites) during mid-late 1980s	
2. Intended readership	– "These rules apply equally well to the public and private sectors". – Government/ agency officials – Corporate managers, plant managers	
3. Type of risk	– General (any risk for which human actors or organisations might be held responsible)	
4. Type of situation	– Not specified	
5. Special focus	– General rules for maintaining trust in organisation and avoiding antagonising public or media in potentially sensitive risk-related situations.	
6. Empirical foundation	– RC/ RP literature (see also related manuals by Covello), authors' experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	B

RC Manual 2: Gray, P.C.R., Stern, R.M. and Biocca, M. (eds.) (1998).

Communicating about Risks to Environment and Health in Europe.
Published on behalf of the WHO Regional Office for Europe.
Kluwer Academic Publishers, Dordrecht, pp 409.

A book of case studies and general advice on risk communication, intended to act as a source of practical information and with a special focus on European countries. Contains 13 case studies of communication about different types of risk source, as well as general overviews of risk communication and risk perception. The hazards covered range from AIDS to electromagnetic fields and asbestos to nuclear energy. Most of the case studies are overviews of communication about a given risk in one or more countries; a few concentrate on specific communication efforts. Each case study also contains a brief summary of the scientific risk assessments for the risk involved.

The book's introduction places risk communication in the context of risk management. The nature of risk communication is described in detail in Chapter 2, which also provides an 'executive summary' of the case studies, conclusions from them for practical communication, and the relevance of each study to specific aspects of communication. The case studies themselves take up the bulk of the book. Most of the studies are reviews of communication about the risks from particular sources, e.g. AIDS, waste incineration and radon gas, with more or less specific examples. Each case study also contains a brief review of current scientific assessments of the risks involved.

Following the case studies there is a discussion of the local risk management system, a chapter on risk perception, and a further chapter providing guidelines for risk communication (public information campaigns and participatory methods). The final chapter describes three 'public debates' held during the book's drafting, in order to gather stakeholder (e.g. NGO, government) views for incorporation in the book, as well as some conclusions from them.

Feature	*Details*	
1. Background, Consultants	– Grew out of initiatives by the WHO and the Society for Risk Analysis (Europe) in early 1990s; financially supported by the health service in Emilio Romagna, Italy, and the German federal environment ministry. – Written by team from Canada, Germany, Hungary, Italy, the Netherlands and the UK under the auspices of the WHO's European Centre for Environment and Health, Bilthoven.	
2. Intended readership	– Decision-makers, government/ agency officials – Corporate managers – General non-specialist audience – Affected groups	
1. Type of risk	– Various health and environmental risks, including production (e.g. energy), distribution (e.g. electricity), product (e.g. tobacco) and disease risks (e.g. AIDS).	
1. Type of situation	– Main focus is on "normal" communication situations, including conflict situations (e.g. over nuclear power). Some "crises" are also covered (e.g. Salmonella outbreaks, small high-risk areas).	
2. Special focus	– Advice about RC content and process	
3. Empirical foundation	– Expert experience, case studies, RC/ RP literature	
4. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	A
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	C

RC Manual 3: *Lundgren*, R.E. (1994).

Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks.
Battelle Press, Columbus, Ohio (pp. 175)

This is intended as a practical guide for "front-line" communicators, and is very much a "hands-on" manual. Risk communication is treated as a subset of technical communication which consists of three areas: care, consensus and crisis communication (a framework which is unfortunately not further developed). Apart from a brief discussion of applicable approaches to communicating risk, the book focuses very much on communication technique, understood relatively narrowly. Its weaknesses include a lack of discussion of the reasons for risk communication problems, and of concrete examples or case studies. Contains some useful material and ideas but is qualitatively weak.

- Understanding Risk Communication (Approaches, Laws, Ethical issues etc.)
- Planning the Risk Communication Effort
- Developing Risk Communication Messages
- Evaluating Risk Communication Efforts
- Resources and Glossary

Feature	*Details*	
1. Background, Consultants	– Author is technical communications specialist with Battelle Institute.	
2. Intended readership	– Writers, editors and communication specialists – Scientists, engineers and health risk professionals who have to communicate results of health risk assessments – Representatives of organisations who must present risk management decisions	
3. Type of risk	– General health, environmental and safety risks	
4. Type of situation	– Mainly communication in "normal" situations, although crisis communication is also mentioned briefly.	
5. Special focus	– Advice about practical aspects of providing risk information to the public	
6. Empirical foundation	– Expert guess/ judgement – Draws on specialist literature including ⇨ Covello, Sandman and Slovic (1988) and ⇨ NRC (1989).	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	B

RC Manual 4: Mulligan, J., McCoy, E., Griffiths, A. (1998).

Principles of Communicating Risks. **The Macleod Institue for Environmental Analysis, University of Calgary, Alberta, pp. 57.**

Summary: This manual approaches risk communication in the context of organisational management structures and procedures. Risk communcation's purpose is to improve (organisational/ societal) performance based on "informed, mutual decisions" about managing risks. Four key factors in risk communication are discussed: multiple stakeholders, multiple messages, information content, and the nature of risk. The principles of risk communication – seen here as the interactive exchange of information and opinion, shared decision-making, active partnerships and an improved atmosphere of trust – should be applied at each stage of risk management decision-making. The report usefully reviews the phases in the evolution of risk communication and illustrates them using examples from the Canadian petroleum industry. The third chapter deals with the integration of risk communication into existing management systems, especially environmental management. Problems and barriers to implementing risk communication are discussed in the fourth chapter.

A useful guide and one of the relatively few pieces of work available in English to approach risk communication from an organisational and management viewpoint.

Contents:

Feature	*Details*	
1. Background, Consultants	– Authors are researchers in corporate environmental management	
2. Intended readership	– Corporate managers and plant managers – Government/ agency officials – Communications specialists (public relations managers and staff)	
3. Type of risk	– Environmental, health and safety risks	
4. Type of situation	– Normal or crisis situations	
5. Special focus	– Integration of risk communication into management structures and procedures	
6. Empirical foundation	– Expert experience – Mini-case studies from Canadian petroleum industry – Literature on RP, RC, RM, issues management, corporate environmental management	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	A

RC Manual 5: Wiedemann, P. and Schütz, H. (2000).

Developing Dialogue-Based Risk Communication Programmes. Prepared for WHO-Monograph on EMF risk communication. *Studies on Risk Communication* 79, Research Centre Jülich, Germany, March 2000, pp. 50.

Summary: Overview of approaches to risk communication, basic problems and issues, and advice on effective risk communication. An interesting aspect is the section on evaluating scientific information.

Contents:
- Risk Communication: Definitions, Objectives and Tasks
- Approaches to Risk Communication
- Risk Communication Basics
- Weighing the Evidence: A Framework for Evaluating Scientific Knowledge….
- Effective Risk Communication
- Summary: Essentials to Remember

Feature	*Details*	
1. Background, Consultants	– Prepared as part of an ongoing WHO project on risk communcation about electromagnetic fields (see chapter on risk communication programmes)	
2. Intended readership	– General risk managers – Decision-makers – Government/ agency officials – Corporate managers general – Laypeople	
1. Type of risk	– General (chronic) environmental health risks	
2. Type of situation	– Mainly normal communication situations rather than crises	
3. Special focus	– General advice on dialogue-oriented risk communication – Evaluating scientific information about health effects – Interaction with journalists	
4. Empirical foundation	– Expert experience – Specialist literature review	
5. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	C

MANUALS ON ISSUES MANAGEMENT

RC Manual 6: Affleck, M.E. (1998).

RadarScan Issues Management.
Issue Action Publications, 207 Loudon St., SE, Leesburg, VA 20175, pp. 98.

Summary: The basic tenet of this punchy booklet is that companies which fail to respond to early to issues in the "Change Age" will inevitably respond late – and go out of business. The author offers numerous examples of losers and winners in managing issues. The solution which he puts forward is what he terms "RadarScan" issues management (note that the term "RadarScan" is used metaphorically, referring to scanning for issues, and has nothing to do with dangers from radar apparatus). This is a six-part process for scanning the business environment for relevant issues, and identifying responses to them:

The RadarScan Issues Management Model:

Soul – What does the organisation stand for?

Scan – "What will sink the ship?"

Analyse – Where is the issue in its life cycle, analysis of risks, etc.

Strategy – Organisational goals, response options, resources

Action – including communication programme

Review – Evaluation tools, performance of IM programme, etc.

Fundamentally this is simply an introduction to issues management (the variability of terminology in the field may reflect its youth as well as the communicative bent of those involved), but it is an especially readable one. One section that requires a word of caution in relation to risk communication is "The Persuasion Purpose". In most cases, risk communication and persuasion should be carefully separated from each other. With this caution in mind, this booklet can be recommended, especially for the reader in a hurry.

Contents:

Feature	*Details*	
1. Background, Consultants	– Author is CEO of California Avocado Commission where he has been involved in managing various major issues	
2. Intended readership	– Corporate managers, public relations/ communications managers – Also relevant for public sector officials	
3. Type of risk	Risks to organisational image or business	
4. Type of situat.	– Development of issues with possibly serious negative consequences for organisation	
5. Special focus	– Detecting and responding to important developing issues, especially through communication measures	
6. Empirical foundation	– Author's experience – Numerous "mini-case studies" mentioned	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-

	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

RC Manual 7: Sopow, E. (1994).

The Critical Issues Audit.
Issue Action Publications, 207 Loudon St., SE, Leesburg, VA 20175, pp. 122.

Summary: A guide to corporate survival in an environment of rapidly changing public values (in north America) written by a former government communications specialist. The six "critical issues" at the book's core are company performance in relation to the environment, safety and security, gender/ equity issues, service quality/ value for money, institutional accountability and empowerment (of employees, customers etc.). The book contains practical tools for assessing your organisation's position in each of these areas, for identifying and ranking issues, and for dealing with them in communication terms – including the use of "ESP": keeping messages emotive, simple and personal. The manual's deep sensitivity to potentially dangerous issues is guaranteed to strengthen the reader's "issue awareness". A good practical "toolkit" for those who want to assess and manage the issues facing their organisation.

Contents:

Feature	*Details*	
1. Background, Consultants	– Author is issues management consultant and former junior minister for communications in Government of British Columbia.	
2. Intended readership	– Communications specialists (public relations managers and staff) – Government/ agency officials – Corporate managers and plant managers	
1. Type of risk	– Risks to organisation from its performance regarding environment, safety and security, gender/ equity issues, service quality/ value for money, institutional accountability, empowerment (of employees, customers etc.).	
1. Type of situation	– Typically relates to risks that could produce crisis situations if not successfully managed	
2. Special focus	– The identification and management of issues with high relevance to an organisation	
3. Empirical foundation	– Expert experience – Case study – Specialist literature	
4. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	-

RC Manual 8: Susskind, L. and Field, P. (1996).

Dealing with an Angry Public: The Mutual Gains Approach to Resolving Disputes.
Free Press, New York, pp. 276.

The book describes an approach to public disputes over corporate plans based on negotiation rather than conflict. It discusses why the public reacts "angrily" to certain projects and events, and presents six principles (the "mutual gains approach") for dealing with them – e.g. acknowledge the concerns of the other side, encourage joint fact finding, focus on long-term relationships. The central chapters show how these principles work using cases related to major accidents (e.g. Three Mile Island reactor), products (e.g. Alar, breast implants), value conflicts, and dealing with the media. The book is an invaluable approach to solving conflicts from outside the narrow field of risk communication, which both confirms and greatly extends the approaches advocated within the field.

Contents
- Why is the Public Angry; The Mutual Gains Approach.
- Accidents will Happen; Risky Business; When Values Collide; The Media.
- Principled Leadership.

Feature	*Details*	
1. Background, Consultants	– The authors are respectively Professor and Senior Researcher in MIT-Harvard's Public Disputes Program; Susskind is a leading academic in the field of conflict resolution, and a well-known mediator.	
2. Intended readership	– Government/ agency officials – Executives and managers – Public relations professionals – Legal professionals	
1. Type of risk	– Any "public" risks, e.g. major accidents (e.g. Three Mile Island reactor), products (e.g. Alar, breast implants), environmental conflicts.	
1. Type of situation	– Any communication situation (normal or emergency) where members of the public are angry with those held responsible for a risk (or other condition).	
2. Special focus	– Dealing with conflicts with the public, including conflicts over products or production. Also covers interaction with journalists, participation and mediation.	
3. Empirical foundation	– Expert experience and research – Case studies	
4. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	A

KEY REPORTS ON RISK COMMUNICATION

RC Manual 9: Bennett, P. and Calman, K. (1999).

Risk Communication and Public Health.
Oxford University Press, Oxford, pp. 272.

Summary:

Contents: Papers divided into four Parts:
- Research perspectives (5 chapters introducing risk communication research, by various UK researchers)
- Lessons from prominent cases (4 chapters covering *E. Coli*, BSE and environmental health issues in Wales, mainly written by public health scientists)
- Institutional issues: some perspectives (6 chapters wrestling with institutional reasons for risk communication failures in UK, including views of Greenpeace and Consumers' Association - see McKechnie and Davies).
- Pulling the threads together (5 chapters on "key themes" including risk communication as a decision process, influence of the media, and evaluation).

Feature	*Details*	
1. Background, Consultants	– Most papers were presented at 1997 Department of Health conference.	
2. Intended readership	– Primarily aimed at government officials and decision-makers – Also of interest to private sector (especially food or health-related industries)	
3. Type of risk	– Public health risks, especially associated with foodstuffs	
4. Type of situation	– Especially crisis situations	
5. Special focus	– The book focuses on risk communication problems between government and consumers in relation to foodstuffs in the "post-BSE" era.	
6. Empirical foundation	– Authors' research (in case of social scientists) or direct experience (in case of government officials and scientists)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	C

RC Manual 10: Gutteling, J.M. and Wiegman, O. (1996).

***Exploring Risk Communication*. Kluwer Academic Publishers, Dordrecht, pp. 221.**

Summary: This book is "an attempt to present the state of the art in risk communication research", and is less of a manual than an academic review. It forms a useful contrast to the bulk of the risk communication manuals, which tend to present risk communication as "discipline" with a good empirical basis. This book shows that things are not really so simple nor so well-founded. Among other things, the book draws upon the authors' own empirical studies in the Netherlands on public risk perception, the effects of media reports, and the effects of different sorts of risk message (the latter in connection with a fictional new chemical plant). A systematic planning model for risk communication is also presented.

Contents:

(1) These chapters draw upon a field experiment in the Netherlands about the effects on risk perception of different messages concerning a fictitious chemical plant.

Feature	*Details*	
1. Background, Consultants	– The authors are psychologists at the University of Twente, Netherlands – The book draws upon the authors' research since the early 1980s for various Dutch government Ministries and institutes	
2. Intended readership	– Risk scholars and students – Risk communication practitioners	
3. Type of risk	– Natural and man-made risks	
4. Type of situation	– In principle any kind of risk situation; however many of the examples concern production processes and crisis situations, e.g. related to hazardous industrial facilities	
5. Special focus	– The book particularly focuses on the empirical evaluation of the content, source, and effects of messages about various kinds of risk.	
6. Empirical foundation	– The authors' own empirical studies on public risk perception, the effects of media reports, effects of different sorts of risk message (the latter in connection with a fictional new chemical plant), and so on, for various Ministries and institutes in Netherlands since the early 1980s.	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	-

RC Manual 11: National Research Council (1989).

Improving Risk Communication.
National Academy Press, Washington, D.C., pp. 332.

Summary: An important landmark within the early risk communication literature, this report tries to approach risk communication as a form of dialogue ("an interactive process of exchange of information and opinion …"). It represents a slightly uneasy synthesis of natural science approaches with psychological findings. Although not a manual as such, it contains many useful and serious reflections on the nature of risk communication – pointing out, for instance, that good risk communication will not always reduce conflict, but may even increase it. On the negative side, the book is not particularly clearly structured, and it does not discuss social aspects of (nor sociological approaches to) risk issues. For most readers today, it will suffice to read the Summary and Introduction, which cover virtually all the main conclusions.

Feature	*Details*	
1. Background, Consultants	– Drawn up by NRC Committee on Risk Perception and Communication from mid-1997 to mid-1998.	
2. Intended readership	– Scientists who have to communicate about risk – Government/ agency officials – Corporate managers – Interested laypeople	
3. Type of risk	– Environmental and health risks in general	
4. Type of situation	– Normal or crisis situations	
5. Special focus	– The book focuses on risk communication as an interactive process, on common misconceptions about the subject, and problems of risk communication	
6. Empirical foundation	– Expert experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	C

RC Manual 12: National Research Council Committee on Risk Characterization (1996).

Understanding Risk: Informing Decisions in a Democratic Society.
P.C. Stern and H.V. Fineberg, eds. National Academy Press, Washington D.C. pp. 249.

Summary: This report may seem an "outsider" in the current context, since it contains only the briefest of explicit references to "risk communication". However implicitly, much of the book is about communication between different stakeholders, and the participation of affected groups in the "characterization" of risk. In fact it represents an attempt to establish a new paradigm for risk assessment/ management, in which experts, officials and "interested and affected parties" are all involved in each stage of risk assessment/ management. On this understanding, both "analysis" and "deliberation" play essential roles in risk characterisation.

Contents:
- The Idea of Risk Characterization; Judgment in the Risk Decision Process; Deliberation; Analysis; Integrating Analysis and Deliberation; Implementing the New Approach; Principles for Risk Characterization.
- Appendices: Six Cases in Risk Analysis and Characterization; Common Approaches to Deliberation and Public Participation; Biographical Sketches.
- Glossary

Feature	*Details*	
1. Background, Consultants	– NRC's Committee on Risk Characterization (including many major names in research on risk perception, communication and management).	
2. Intended readership	– Government policymakers, officials – Scientists, risk researchers – Other stakeholders	
3. Type of risk	– General (especially environment and health-related)	
4. Type of situation	– Mainly "normal" situations	
5. Special focus	– Communication within process of risk characterization/ assessment	
6. Empirical foundation	– Authors' experience and research in risk perception, communication, management – Case studies (Appendix 1)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	B

2.2.1.2 GENERAL RISK COMMUNICATION GUIDANCE: GOVERNMENT AND GOVERNMENT AGENCY USERS

RC Manual 13: Agency for Toxic Substances and Disease Registry (ATSDR) (1997).

A Primer on Health Risk Communication Principles and Practices. **The ATSDR Website: http://atsdr1.atsdr.cdc.gov/HEC/primer.html#FACTORS**

Summary: This document basically recapitulates some of the early recommendations on risk communication from Chess, Hance and Sandman, 1988, Covello and Allen 1988 etc. It concentrates on a relatively narrow view of risk communication as "presenting information to the public". As such it is not up to date and does not reflect the full range of risk communication tasks; in addition, the individual sections are very brief. This should therefore not be relied upon as the sole guide to risk communication, but it can serve as a brief introduction to certain aspects. The document's most useful aspect is its presentation in online (html) format (see also UK Department of Health's online advice).

Contents:
- The ATSDR Mission: Role and Importance of Community Involvement in ATSDR Health Risk Communication
- Overview of Issues and Guiding Principles for Health Risk Communication (including RC myths and actions, Seven Cardinal Rules of RC, Factors influencing risk perception, etc.)
- Presenting Information at Public Meetings
- Working with the Media
- References

Feature	*Details*	
1. Background, Consultants	– Author not stated. – ATSDR's mission is to protect against adverse health effects arising from exposure to environmental pollutants	
2. Intended readership	– Agency officials (ATSDR and other) "who must respond to public concerns about exposure to hazardous substances in the environment".	
3. Type of risk	– Environmental health risks arising from pollutant exposure	
4. Type of situation	– Normal or crisis situations	
5. Special focus	– Informing concerned public about health risks from pollutant exposure	
6. Empirical foundation	– Specialist literature	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	-

RC Manual 14: Chess, C. (1988).

Encouraging Effective Risk Communication: Suggestions for Agency Management.
Submitted to New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey. Environmental Communication Research Program, Rutgers University, New Brunswick, New Jersey, pp.9.

Also printed as Appendix to ⇨ Covello, McCallum and Pavlova, 1989a.

Companion to ⇨ Hance, B.J., Chess, C. and Sandman, P.M. (1988). This paper addresses a problem discovered during the research for its companion: lack of support/ understanding from senior officials (managers) for the risk communication problems of front-line staff.

Contents: Organizational Climate, Decisionmaking, Organizational Structure, Staff Support, Planning and Evaluation, Resource Allocation, Interagency Cooperation.

Feature	*Details*	
1. Background, Consultants	– See HCS 1988	
2. Intended readership	– Middle/ senior managers in government agencies	
3. Type of risk	– General environmental etc.	
4. Type of situation	– Not specific	
5. Special focus	– Focus is on creating organisational (background) conditions for good front-line risk communication	
6. Empirical foundation	– Survey data	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	B
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	B

RC Manual 15: Chess, C. (1992).

How to plan for Communication with the Public: Development of a Seminar for Environmental Managers.
Environmental Communication Research Program,
Rutgers University, New Brunswick, New Jersey, pp. 45.
CHE 1992

Summary: Description and evaluation of a seminar on RC for EPA officials.

Contents: Three case studies/ exercises: decommissioning a nuclear power plant; urban air pollution control; and communication management/ planning.

Features	All basically similar to features of the related manuals. However greater emphasis on *planning* risk communication and on *dialogue* with communities.	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	B

RC Manual 16: Chess, C., Hance, B.J. and Sandman, P.M. (1988).

Improving Dialogue with Communities: A Short Guide for Government Risk Communication.
Submitted to New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey. Environmental Communication Research Program,
Rutgers University, New Brunswick, New Jersey, pp. 30.

Summary: This is a short, distilled version of ⇨Hance, Chess and Sandman (1988). Omitted here are (a) full explanation of rationale for suggestions; (b) quotations from interviewees; (c) illustrative anecdotes and examples. Included are most of guidelines and "Yes, But..." (answers to common objections to carrying out RC etc.) sections.

Features	*See Hance, Chess and Sandman (1988) for features not listed below.*
2. Intended readership	– Front-line communicators with urgent communication problem and little time to prepare.
4. Type of situation	– Especially crisis situations.

RC Manual 17: Chess, C., Hance, B.J. and Sandman, P.M. (1989).		
Planning Dialogue with Communities: A Risk Communication Workbook. **Environmental Communication Research Program, Rutgers University, New Brunswick, New Jersey, pp. 40.**		
Summary: Workbook to accompany ⇨ Hance, B.J., Chess, C., and Sandman, P.M. (1988) and ⇨ Chess, C., Hance, B.J. and Sandman, P.M. (1988), to help agency staff to learn how to apply the guidelines. In contrast to the related manuals, focus is on "how" rather than "why".		
Features	All basically similar to features of the related manuals. However greater emphasis on *planning* risk communication and on *dialogue* with communities.	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	C

RC Manual 18: Covello, V.T., McCallum, D.B., Pavlova, M. (eds) (1989a).

Effective Risk Communication: The Role and Responsibility of Government and Non-Government Organizations. **Plenum Press, New York, 1989. (pp. 370).**

A valuable collection of papers, case studies and manuals on risk communication, focussing mainly on the government-public interface. Incorporates as appendices several manuals discussed elsewhere in this bibliography.

Six sections:
- Overview: Principles and Guidelines for Improving Risk Communication, by the editors (14pp) – see a concise practical overview of the state of the art at the time
- Perspectives on Government Risk Communication
- Government Risk Communication Programs
- Case Studies of Government Risk Communication
- The Risk Communication Process
- Appendixes: Inventory of Government Risk Communication Programs (⇨ Covello, McCallum and Pavlova, 1989b); ⇨ Hance, Chess and Sandman, 1988; ⇨ Covello, Sandman and Slovic, 1988; ⇨ Chess, 1988.

Feature	*Details*	
1. Background, Consultants	– "…rising public concerns about health and environmental risks" (p.3). – Workshop on "The Role of Government in Health Risk Communication and Public Education". – Sponsor: Task Force on Environmental Cancer and Heart and Lung Disease.	
2. Intended readership	– Decision-makers – Government/ agency officials – Plant managers – Affected groups	
3. Type of risk	– General – Case studies on communication about food risk, dioxins, hazardous waste landfills, accidental release of chemicals, exposure of workers.	
4. Type of situation	– Covers mainly production and waste-related risks, but some product risks (chemicals in food). Both "normal" and crisis communication are discussed.	
5. Special focus	– Communication by government agencies – Case studies on communication of chemical plant / substance risks	
6. Empirical foundation	– Varies depending on contribution; includes case studies	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	B

RC Manual 19: Covello, V.T., McCallum, D.B., Pavlova, M. (1989b).

Principles and Guidelines for Effective Risk Communication. Chapter 2 in: V.T. Covello, D.B. McCallum, M. Pavlova (eds) (1989a). ***Effective Risk Communication: the role and responsibility of Government and Non-Government Organizations.*** **Plenum Press, New York, 1989. (pp. 14)**

Summary: A concise practical overview of the state of the art of risk communication at the time.

Contents: The paper provides concise "bullet point" guidelines on:
- Guiding Risk Communication Philosophy and Orientation
- Planning and Evaluation
- The Risk Communication Process (Message Sources, Message Design, Delivery Channels, Target Audiences)

Feature	*Details*	
1. Background, Consultants	– See Covello, McCallum and Pavlova (eds), 1989a	
2. Intended readership	– Decision-makers and government/ agency officials – Plant managers – Affected groups	
3. Type of risk	– General	
4. Type of situation	– Not specific	
5. Special focus	– Content of risk communications	
7. Risk Communication Function	– Informing and explaining – Encouraging proper use – Enhancing trust and credibility	
6. Empirical foundation	– Draws on authors' experience as well as the texts in the rest of the volume	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	B
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	-

RC Manual 20: Hance, B.J., Chess, C. and Sandman, P.M. (1988).

Improving Dialogue with Communities: A Risk Communication Manual for Government.
Submitted to New Jersey Department of Environmental Protection, Division of Science and Research, Trenton, New Jersey. Environmental Communication Research Program, Rutgers University, New Brunswick, New Jersey, pp. c. 91.
Also printed as Appendix to ⇨ Covello, McCallum and Pavlova, 1989a.

Summary: A classic of risk communication literature, this practical guide was intended to help agency officials cope with the increasing difficulties in communication with the public (communities) experienced during the mid-1980s in the USA. It adopts a quick-to-read, user-friendly style based on (a) sets of guidelines (behavioural maxims or "golden rules") and (b) replies to common objections to recommendations ("Yes, But..." sections). The Manual, which was developed on the basis of extensive interviews with officials, also contains illustrative examples and anecdotes, and explanations of the reasons for the guidelines.

Contents:

Feature	*Details*	
1. Background, Consultants	– Controversies over various environmental issues, notably Superfund hazardous waste remediation sites, for which government agencies (held) responsible, and resultant communication challenges for officials.	
2. Intended readership	– Government agency officials, especially those in "front line" i.e. with frequent direct public contact.	
3. Type of risk	– General environmental and public health risks (e.g. "Superfund" hazardous waste sites)	
4. Type of situation	– Especially long-term crisis situations in local areas	
5. Special focus	– Interaction with affected people in sensitive risk-related situations by representatives of regulatory authorities. Particular focuses include the need for early information release, and minimising "outrage" effects.	
6. Empirical foundation	– Main source was a survey consisting of interviews about risk communication successes and failures with 50+ academic experts, industry reps., citizen leaders, agency staff in USA (names listed). Interviews were analysed qualitatively (authors attempted to distil experience, judgements etc. of interviewees in ways helpful for audience) – Authors' experience of media research (Sandman).	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	B

RC Manual 21: Interdepartmental Liaison Group on Risk Assessment (ILGRA) (1998).

Risk Communication. A Guide to Regulatory Practice. Health and Safety Executive, London, pp. 22.

This brochure is intended to provide guidance on risk communication to UK government officials and departments. Although the immediate background was one of spectacular public health scares in the UK - which might be considered as failures of risk communication - such as the BSE crisis, the brochure points out that Government also often communicates well about risk, and it seeks to draw upon 'good practice' in various departments (it reflects the conclusions of a specially commissioned study, "Risk Communication Benchmarking in Government"). The brochure sets out a useful framework for risk communication from the government viewpoint, and provides only very basic advice on risk communication as such. The main messages concern the need to integrate risk communication into decision-making processes.

Contents:

- Chapters cover risk communication in the regulatory context, integrating risk communication and regulation (principle 1), developing good practice (principles 2-4), responding to events, and a "Five-Minute Guide" for those who have to speak to the public or press on a risk issue.
- The brochure's central principle is that risk communication must be integrated with risk regulation, i.e. making and implementing decisions about risk management. The approach to communication differs between "individual choice" risks and "government-regulated" risks.
- The supporting principles of listening to stakeholders, tailoring messages, and managing the process are also related in the brochure to the various stages of risk management decision-making. The "ECCB" formula ("Empathy Concern, Commitment and Benefit") is also mentioned.
- A further section deals with responding to events e.g. new information on risks, or crises.
- The Five-Minute Guide gives hints to those who have to speak about risks.

Feature	*Details*	
1. Background, Consultants	– Various public health scares in UK in mid-late 1990s; long-standing concern with development of risk management on part of HSE.	
2. Intended readership	– Government/ agency officials - especially policy/ management levels, not primarily intended for staff "in the field"	
3. Type of risk	– All government-regulated risks (occupational health and safety, public health risks, plant-related risks, food safety, medical risks etc.)	
4. Type of sixtuation	– The discussion covers both general and crisis communication. It differentiates sharply between "individual choice" and "government-regulated" risks (see below).	
5. Special focus	– Advice about RC process, especially its planning and organisation. – Listening to public concerns. – "Five-Minute Guide" for speaking to public at short notice on risk issue.	
6. Empirical foundation	– Commissioned study of good practice in government departments: "Risk Communication Benchmarking in Government", HSE, London, 1997. – Some standard (USA) risk perception/ communication references	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	
	– Dialogue, participation, conflict resolution	

RC Manual 22: UK Department of Health (1998).

Communicating About Risks to Health: Pointers to Good Practice.
UK Department of Health, London, pp. 30 (ISBN 0113222572)
Available in Internet (pdf and html format) at: http://www.doh.gov.uk/pointers.htm

This is a brief guide to the area of risk perception and risk communication, written by an official in the UK's Department of Health against the background of several huge and costly risk-related controversies in the UK in recent years (e.g. BSE). These cases revealed serious inadequacies in the UK Government's traditional approach to risk communication, in the face of novel, highly uncertain risks. This has led to considerable interest in better risk communication in Britain, especially in the area of food risk (see also ILGRA, 1998). This paper concisely draws together existing findings (including recent ones) from several areas, and provides some basic aids for those who have to familiarise themselves quickly with this area.

Contents
- Need to understand communication difficulties; communication as a two-way process
- Implications of research findings on risk perception, risk comparisons, media etc.
- Risk communication as a decision process: scanning, setting objectives, planning, monitoring and review.
- Embedding Better Practice
- Checklist of Key Points
- Bibliography (in sub-sections corresponding to first three sections of paper)

Feature	*Details*	
1. Background	– Health scares in UK, 1980s-1990s	
2. Intended readership	– Decision-makers – Government/ agency officials – General professional audience	
3. Type of risk	– Public health risks, including clinical risks; mainly concerned with the effects of products, diseases etc., not production processes.	
4. Type of situation	– Implicitly covers both normal and crisis situations.	
5. Special focus	– Public perceptions of (NB health) risks; explaining risks; risk communication as a decision process (cf. issue management)	
6. Empirical foundation	– Cites many of the central papers on risk perception, cultural theory, risk comparisons, media triggers etc.	
7. Relevxance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	-

2.2.1.3 GENERAL RISK COMMUNICATION GUIDANCE: INDUSTRY USERS

RC Manual 23: Covello, V.T., Sandman, P.M. and Slovic, P. (1988).

Risk Communication, Risk Statistics and Risk Comparisons: A Manual for Plant Managers.
Chemical Manufacturers Association, Washington, D.C., pp. 75.
Also printed as Appendix to ⇨ Covello, McCallum and Pavlova, 1989a.

Summary: This manual was intended to help plant managers deal with the expected demands for information on emissions and risks arising from the SARA Title III (Right-to-Know) legislation and similar local/ state laws. It focuses mainly on the content rather the process of communication.

This is one of a series of manuals, reviews and papers produced by these authors and their co-workers in various constellations in the late 1980s (see below). At this time in the USA both government health and environment officials in various administrations, and chemical industry managers were experiencing increasing difficulties in communication with the public regarding risk-related problems - in particular the risks highlighted by the "Superfund" contaminated land remediation program, risks linked to specific consumer products (e.g. apples affected by pesticide), and the risks associated with chemical and petrochemical production sites. Although further sources of activity in risk communication included the electricity (electric power) industry, the needs of government officials and the chemical industry and their problems dominate the early risk communication manuals.

Covello, Sandman and Slovic's (1988) advice in relation to risk comparisons has "classic" status, but should be applied with caution and common sense. The manual's most famous contribution was to rank different types of comparison in terms of acceptability. This is a pragmatic approach, but the authors probably underestimated the importance of context in selecting risk comparisons (see No. 6 below). In a broader sense, there is a certain contradiction between the stress laid on the topic of risk comparisons, and the warnings given about using them (see Contents).

Contents: The content of risk communication messages forms the main focus of the manual. The first chapter covers general aspects of risk communication and perception including
Covello and Allen's "Seven Cardinal Rules". Chapter 2 deals with different ways to present numerical data to laypeople. The next two chapters as well as the Appendices focus on risk comparisons, including a ranking of comparison types from "most" to "rarely" acceptable. Each table in the Appendices carries a "warning" that use of the data presented for risk comparison purposes "can severely damage your credibility".
Chapters:
- Effectively Communicating Risk Information
- Guidelines for Providing and Explaining Risk-Related Numbers and Statistics
- Guidelines for Providing and Explaining Risk Comparisons
- Concrete Examples of Risk Comparisons
- Anticipating Objections to Explanations of Chemical Risks

Appendix A: Concentration and Quantity Comparisons
Appendix B: Risk Comparison Tables and Figures

Feature	*Details*
1. Background, Consultants	– Public concern and protest over hazardous waste sites, incinerators etc.; increasing opposition to certain chemical industry products and activities; resultant communication challenges for corporate managers
2. Intended readership	– Plant managers (also relevant to most other risk communicators).
3. Type of risk	– Long-term health risks; general risks; chemical risks.
4. Type of situation	– Normal plant operation.
5. Special focus	– Advice for plant managers about communicating with plant neighbours, but much of the advice potentially relevant to the presentation of risk information in general.
6. Empirical foundation	– The manual builds on the authors' considerable experience in research on risk perception (Slovic), mass media (Sandman) and risk management/ risk comparisons (Covello). It

	draws on other papers by the authors including ⇨ Covello and Allen's "Seven Cardinal Rules" of RC (1988) and ⇨ Hance, Chess and Sandman (1988). – It is not narrowly based on research findings and much of it has a qualitative, hands-on basis, drawing heavily on common sense. Most specific advice on the presentation of information is not clearly backed up by research. The ranking of risk comparisons – a useful starting point for the defined target audience – appears too simple in the light of later findings (e.g. that responses to risk comparisons vary according to communication context and level of controversy).
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight
	– Building/ maintaining trust in organisations: A
	– Providing information about products/ substances: A
	– Encouraging safe product use etc.: B
	– Crisis communication about products/ substances: C
	– Dialogue, participation, conflict resolution: -

RC Manual 24: Wiedemann, P.M., Carius, R., Henschel, C., Kastenholz, H., Nothdurft, W., Ruff, F. and Uth, H.-J. et al. (in press, 2000).

***Risikommunikation für Unternehmen: Ein Leitfaden (A Guide to Risk Communication for Companies)*. Verein Deutscher Ingenieure. VDI-Verlag, Düsseldorf, pp. 101. [In German]**

Summary: This guide seeks to provide information about the meaning and goals of risk communication, and how to implement it organisationally in the corporation. It begins from the basic insight of risk perception research, that risk is perceived differently by lay people and experts. While experts see risks mainly in terms of cause, effect and uncertainty, lay people tend to see risks in a social context, concentrating on victims and perpetrators. This difference creates the need for risk communication. In order to bridge this gap, qualitative risk communication is required which takes account of possible deficits in trust and tries to develop a suitable form of two-way communication. The three basic elements in this risk communication are quality of relationship, design of information and the organisation of dialogue. Practical steps in a risk communication programme are explained, including analysing the risk issue, performing a trust audit and determining key messages, as well as the related area of crisis management and communication. A further chapter concentrates on the organisation of risk communication in the corporation. The book rounds off with a consideration of how risk communication may develop in the future.

This is an attractively produced, user-friendly brochure which integrates both classical and recent findings of risk perception and risk communication research with practical approaches and concepts from other fields.

Contents[4]:

Feature	*Details*	
1. Background, Consultants	– Sponsored by VDI, the main professional association for engineers in Germany – Authors include communication researchers, officials and company representative	
2. Intended readership	– Corporate managers – Public relations managers and staff – Government and agency officials	
3. Type of risk	– Any environmental or health risk associated with company activity, products – Risks to the organisation from the above, or from outside influences	
4. Type of situat.	– Normal and crisis situations	
5. Special focus	– Improving the company's capacity for risk communication with lay people and other stakeholders	
6. Empirical foundation	– Authors' experience in research, government and business – Literature on risk perception, risk communication, risk management, crisis management	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	A

[4] Translated from German by Resource Book authors

2.2.2 SPECIFIC RISK COMMUNICATION GUIDANCE: PROVISION OF INFORMATION

2.2.2.1 PROVISION OF INFORMATION: GENERAL

See Section 1.

2.2.2.2 PROVISION OF INFORMATION TO COMMUNITIES AND NEIGHBOURS

RC Manual 25: American Chemical Society (ACS) (1988).

Chemical Risk Communication: Preparing for Community Interest in Chemical Release Data. **American Chemical Society, Washington, D.C., October 1988, pp. 28**.

This brochure has the same basic motivation as the CMA's (1988) Workbook, namely ensuring an effective response by the chemical industry to the EPCRA regulations. The ACS brochure, however, is briefer and somewhat less practically focused. It is also aimed at a different target audience (in this case, public health officials), and, unlike the CMA Workbook, includes a section on the assessment of chemical risks. This is a concise and sensible summary of risk communication advice applied to chemical plant emissions.

Contents:
- Background: SARA Title III
- Framework for Making Data Relevant: chemical risk assessment, risk perception
- Guidelines for Communicating about risks (based on ⇨ Covello & Allen's Seven Cardinal Rules of Risk Communication)
- Preparing for Community Interest (identifying chemicals held, obtaining technical data, identifying concerns, perceptions and potential questions)
- Resources

Feature	*Details*	
1. Background, Consultants	EPCRA (SARA Title III), 1986.	
2. Intended readership	– Government/ agency officials	
3. Type of risk	– Chemical substances	
4. Type of situation	– Risks of chemical substances released to environment from production plants (in normal production and potential accidents).	
5. Spxecial focus	– Communication with the communities living near chemical plants about the risks of plant emissions	
6. Empirical foundation	– Expert judgement/ knowledge – Specialist literature	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	-

RC Manual 26: Chemical Manufacturers' Association (CMA) (1988).

Title III Community Awareness Workbook.
Chemical Manufacturers' Association, Washington, D.C. pp 74.

This guide is intended to help chemical plant personnel respond to the requirements of the Emergency Planning and Community Right-to-Know Act (EPCRA 1986 or "SARA Title III"[5]), for communication of emissions information to the community near their chemical plant. It attempts to prepare staff for practical communication, rather than spell out the letter of the law (which is done in separate publications for managers). The communication activities have two goals: improving local emergency planning, and informing the public about chemical plant operations. The guide identifies the risk communication issues involved and suggests approaches for addressing them. It stresses the need for proactive, open communication and "bridge-building" with local residents and officials in advance of the formal deadline in mid-1988, when full emissions information was to be published by EPA. It is worth noting that the CMA's voluntary "Responsible Care" programme, which addresses many of the same issues, had already began in 1985.

Contents:
- SARA (EPCRA) communication requirements
- Factors affecting chemical industry's ability to communicate
- Community relations as bedrock of successful implementation
- Media relations
- Timetable for implementation

Feature	*Details*	
1. Background, Consultants	– Legal requirements for plants (or by default the EPA) to inform local communities about plant emissions and emergency planning (EPCRA 1986).	
2. Intended readership	– Plant managers	
3. Type of risk	– Chemical plants and production processes, emissions, bulk chemicals, emergencies	
4. Type of situation	– Normal and crisis situations	
5. Special focus	– Communication with the communities living near chemical plants about the risks of plant emissions	
6. Empirical foundation	– SARA requirements – Report on risk comparisons (see Covello et al.) – Data on plant-community relations from Center for Communication Dynamics, Washington D.C. – Experience of specific plants/ programmes in USA	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	B

RC Manual 27: Wiedemann, P., Schütz, H. and Brüggemann, A. (1999).

Leitfaden zum Umgang mit Problemen elektromagnetischer Felder in den Kommunen
(A Guide to dealing with EMF problems in municipalities).
BMU, Berlin/ Research Centre Jülich, Jülich, pp. 92. [In German]

[5] Title III of the Superfund Amendment and Reauthorisation Act (SARA), 1986.

Summary: This is a guide to understanding and communicating about the issue of potential risks from electromagnetic fields (EMF), intended primarily for office-bearers in small local authorities, but also of interest to the lay reader. It has three aims: to give practical guidance to avoiding conflicts over EMF on the municipal level through information and dialogue; to motivate the municipalities to analyse their role in conflicts and their own scope for action; and to enable an understanding of the scientific and legal issues involved. The main part of the guide deals with practical methods for carrying out a dialogue with citizens.

Contents:
The main part of the guide provides an insight into the sources of conflicts over EMF and how to prevent or reduce them, including especially advice on how to carry out communication (dialogue) with citizens. Three supplementary chapters for the (more) interested reader cover respectively the evaluation of EMF's effects on health, Frequently Asked Questions about EMF and health, and legal aspects. The final chapter contains resources for obtaining further information.

Feature	*Details*	
1. Background, Consultants	– This guide was funded within the German Federal Ministry of the Environment's programme on EMF.	
2. Intended readership	– Local office-bearers or officials (e.g. local mayors) – Interested lay people	
3. Type of risk	– Risks from stationary sources of EMF, particularly mobile phone transmission masts	
4. Type of situation	– Normal situations, often connected with applications to build mobile phone masts	
5. Special focus	– Methods for conducting dialogue about risks with citizens in smaller communities; scientific knowledge about EMF and health.	
6. Empirical foundation	– Expert experience – Specialist literature	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	B

2.2.2.2 PROVISION OF INFORMATION TO CONSUMERS

RC Manual 28: Soby, B.A., Simpson, A.C.D., Ives, D. and Hedegård, J.B.O. (1992).

Consumer Attitudes to Risk and the Effectiveness of Home and Leisure Safety Campaigns in the European Community. **Research report No. 15. Centre for Environmental Risk, School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK. pp. 201.**

This report deals with the broader context of communication with consumers regarding home and leisure accidents, and not specifically with consumer products. However the practical contexts overlap to some extent. The report provides a valuable review of knowledge on risk perception and communication, and shows how these can be applied to consumer safety issues. It introduces a view of risk management as a cyclic process in which risk communication plays a central role. It also provides brief summaries of campaigns in various countries, and the addresses of the relevant government agencies in EU member states.

Contents:
- Chapters: Project description; Theoretical background; Managing Home and leusre risks; Home and Leisure Safety Strategies; Evidence from a European Community Review; Conclusions and Recommendations.
- Appendix: 1-page summaries of c. 45 safety campaigns on various issues including child safety, sports and leisure, fires/ burns, seat belt use/ car safety, etc.

Feature	*Details*	
1. Background, Consultants	– Commissioned report for European Commission's Consumer Policy Service and Statistical Office. as part of its programme to promote consumer safety and improve utilisation of related statistical data. – Consultants: researchers with background in environmental risk management/ communication.	
2. Intended readership	– EU and government officials, particularly in departments responsible for consumer safety campaigns	
3. Type of risk	– Home and leisure accident (i.e. semi-acute, individual) risks	
4. Type of situation	– Accident situations.	
5. Special focus	– Advice about RC content and process: information provision – Advice on safety campaigns	
6. Empirical foundation	– Specialist literature review – Interviews with safety authorities / organisations in 7 EU member states – Reviews of individual safety campaigns	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	-
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	B
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	-

RC Manual 29: Soby, B.A., Simpson, A.C.D. and Ives, D. (1993).

Integrating public and scientific judgements into a tool kit for managing food-related risks, Stage 1: Literature review and feasibility study. **Research Report No. 16, Centre for Environmental and Risk Management (CERM), School of Environmental Sciences, University of East Anglia, UK. pp. 125.**

Summary: This report is included here, despite its apparently obscure title and the fact that it only deals very briefly with risk communication in an explicit way, for three reasons. First, it contains an excellent discussion of risk perception. Secondly, it applies this information to specific cases of food risk management/ communication. Thirdly, it presents a model for integrating risk communication and risk management which in retrospect was highly innovative and is still a useful framework. Overall this forms an excellent sourcebook for considering risk issues. The cases discussed are all related to food contamination in the late 1980s-early 1990s in the UK: *Salmonella* in eggs, *Listeria*, BSE and food irradiation. Although the BSE case is only covered up to 1992, this case study is still valuable and even appears somewhat prophetic in the light of later events.

Contents: Introduction; Perception of Risk; Case Studies of Public Reactions to Food-Related Risks; Risk Management; Review of Decision-Making Models; Conclusions and Recommendations.

Feature	*Details*	
1. Background, Consultants	– Consultants: researchers in environmental risk management/ communication.	
2. Intended readership	– Government officials – Researchers	
3. Type of risk	– Food-related risks (contamination, disease)	
4. Type of situation	– Focus on food ”scares”, i.e. crises.	
5. Special focus	– Communication with public in general and during crises, in relation to food risks	
6. Empirical foundation	– Literature review of risk perception, risk communication, risk management and decision-making – Case study material	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	B

RC Manual 30: Wogalter, M.S., DeJoy, D.M. and Laughery, K.R. (eds.) (1999).

Warnings and Risk Communication.
Taylor and Francis, London/ Philadelphia, pp. 365.

A comprehensive academic treatment of the topic of risk communication using hazard warnings (i.e. signs and symbols, with or without wording). The book contains 15 chapters by various authors. It sets out a psychological model of how warnings function, and presents research on each of the model's stages. The most important chapters in the current context discuss, respectively, standards and regulations for warnings in the USA, and practical considerations in designing and evaluating product warnings.

Contents:

- Overview and organising framework (two chapters)
- Methodological issues (two chapters)
- Research on Warnings: Stages of the Model (seven chapters).
  - NB Chapter on Comprehension and Memory (Leonard, S.D. et al., 149-187) includes illustrations and colour plates of "good and bad" warning signs .
- Practical Issues of Warning Design (two chapters):
  - Standards and Government Regulations in the USA. Collins, B.L., 265-290.
    Discusses the US regulations on warnings for hazardous goods transport, drugs, food, controlled substances, tobacco and alcoholic products, and various sorts of safety sign. Detailed but clear introduction, including problems, current issues and informative examples.
  - Practical Considerations Regarding the Design and Evaluation of Product Warnings.
    Frantz, J.P., Rhoades, T.P. annd Lehto, M.R., 291-311. Concise introduction which places warnings in planning/ hazard analysis (risk management) framework. Useful information on developing messages, selecting channels etc., and on evaluating warnings. References are given to further guidelines on developing messages.
- Legal aspects (two chapters).

Feature	*Details*	
1. Background, Consultants	– Psychologically oriented research into warnings	
2. Intended readership	– Government/ agency officials (concerned with regulation of hazardous goods, occupational and public safety, medicines etc.) – Safety managers, product managers – Warnings designers – Corporate legal advisers – Warnings researchers	
3. Type of risk	– Various semi-acute hazards, ranging from road signs to radiation hazards – Relates both to production (e.g. occupational safety) and to products (e.g. warnings to consumers or users, e.g. on roads).	
4. Type of situation	– Warnings play a role both in normal communication and in the event of an emergency (e.g. emergency exit signs).	
5. Special focus	– Communication with consumers using warning signs and logos	
6. Empirical foundation	– Experimental research – Specialist literature – Expert knowledge of legal aspects/ standards	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	-
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	A
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	-

2.2.3 SPECIFIC RISK COMMUNICATION GUIDANCE: EMERGENCY COMMUNICATION

2.2.3.1 EMERGENCY COMMUNICATION: GENERAL

CRISIS MANAGEMENT

RC Manual 31: Fearn-Banks, K. (1996a).

Crisis Communications: A Case book Approach.
Lawrence Erlbaum Associates, Mahwah, New Jersey, pp. 330.

Summary: A solid introduction to crisis communication, with a plethora of cases under various headings ranging from product tampering to natural disasters. Conclusions are drawn from groups of related cases.

Contents: In four general chapters the book discusses the nature of crises, crisis communication planning, the sources of crises, and crisis management. The remaining two-thirds of the book present sets of cases under the headings product tampering, environmental crises, natural disasters, crises of violence, and celebrities. Most of the cases stem from the USA.

Feature	*Details*	
1. Background, Consultants	– Author is on the staff of the School of Communications, University of Washington.	
2. Intended readership	– Communications specialists (public relations managers and staff) – Government/ agency officials – Corporate managers and plant managers	
3. Type of risk	– Risks to organisational image, or to people/ things for which the organisation is responsible. These may arise from organisation's activities, its products, or outside influences depending on the nature of the organisation (e.g. government or commercial).	
4. Type of situation	– Crisis situations	
5. Communication focus	– How to communicate in a crisis affecting an organisation	
6. Empirical foundation	– Expert experience – Case study – Specialist literature	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	C

RC Manual 32: Mitroff, I. and Pearson, C. (1993).

Crisis Management: A Diagnostic Guide for Improving Your Organization's Crisis-Preparedness.
Jossey-Bass Publishers, San Francisco, pp. 139.

Summary: This book presents the general concepts underlying crisis management (Part One) and, in Part Two, a set of practical exercises (tools) for evaluating the strengths and weaknesses of organisations in relation to potential crises. The third Part describes how to prepare for a crisis, how to act during a crisis, and the elements of an ideal crisis management plan. The book combines elements of an academic textbook and a practical manual. It includes interesting findings by the Center for Crisis Management; for instance, that there is a mismatch between most large companies' own assessments of the greatest threats they face, and the threats for which they have a crisis management plan in place.

Contents:
- Part One: The Basics of Crisis Management (2 chapters)
- Part Two: Tools for Diagnosing your Crisis-Preparedness (5 chapters covering crisis types, phases, systems, stakeholders, and how to chart your organisation's crisis profile)
- Part Three: Shaping Your Crisis Management Program (3 chapters).
- Appendix: Current Crisis Management Practices Among the Fortune 1000 Companies.

Feature	*Details*	
1. Background, Consultants	– Authors are researchers at the Center for Crisis Management, University of Southern California.	
2. Intended readership	– Senior executives and managers – MBA students	
3. Type of risk	– Risks to organisation arising from a "simultaneous breakdown in interactions among technology, people and organisations"	
4. Type of situation	– Crisis situations and preparation for them	
5. Special focus	– The book's particular focus is on analysing the company's crisis preparedness, as an essential element of crisis response planning.	
6. Empirical foundation	– Research by authors and others	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

2.2.3.2 EMERGENCY COMMUNICATION WITH COMMUNITIES AND NEIGHBOURS

RC Manual 33: Chemical Manufacturers' Association (1991).

Crisis Management Planning Manual for the Chemical Manufacturing Industry.
CMA, Washington, D.C., pp. 82.

A "hands-on" introduction to crisis management for chemical industry managers. Crisis management is a proactive process, going beyond emergency management, which aims to influence any crisis before, during and after it takes place, rather than just respond to it. Communication plays a critical role in this process.

- Section I: Planning and preparation
- Section II: Response and Recovery
- Appendices I-II: Glossary; Bibliography
- Appendix III: Basic Steps in a Crisis Management Plan (22 pp.):

  Planning and Preparation, Mobilization, Response, Recovery, Post-Incident Evaluation.

Feature	*Details*	
1. Background, Consultants	– Prepared by Corporate Response Group Inc.	
2. Intended readership	– Chemical manufacturing industry managers	
3. Type of risk	– Chemical risks	
4. Type of situation	– Production risks in crisis situations	
5. Special focus	– Advice about communication (with communities/ neighbours and other parties) in chemical plant emergencies, including planning, providing information and warnings, and interacting with journalists	
6. Empirical foundation	– Member company experience (through collaboration with CMA working group etc.)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

RC Manual 34: Chemical Manufacturers' Association (1992).

Community Emergency Response Exercises Guidebook.
CMA, Washington, D.C., pp. 62.

Book of practical guidance on running emergency response exercises for chemical plants.

Contents:
- Developing an Exercise Program
- Steps in Developing an Exercise
- Where to Go for Help
- Appendices containing practical tools e.g. list of possible participants, scenarios, sample messages, guidance on tabletop exercises.

Feature	*Details*	
1. Background, Consultants	– CMA's Community Awareness and Emergency Response (CAER) programme. – ICF Kaiser Engineers/ ICF Incorporated	
2. Intended readership	– Chemical plant managers	
3. Type of risk	– Chemical plants	
4. Type of situation	– Production risks, emergency situations	
5. Special focus	– Organising and running exercises for responding to potential chemical plant emergencies	
6. Empirical foundation	– Industry/ expert experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

RC Manual 35. Verband der Chemischen Industrie (1994).

Leitfaden "Krisenmanagement" für die Öffentlichkeitsarbeit (Guidelines on crisis management for public relations work). **VCI, Frankfurt, pp. 15. [In German]**

Summary: This short guide is subtitled "A German contribution to the chemical industry's world-wide Responsible Care programme".

Contents[6]:
- Planning and Precautions
- When an emergency occurs
- Aftercare (analysing and learning from events, dealing with aftermath - internally and externally)

Feature	*Details*	
1. Background, Consultants	– Chemical Industry's Responsible Care programme in Germany	
2. Intended readership	– Chemical Plant managers	
3. Type of risk	– Chemical plant risks	
4. Type of situation	– Production risks in crisis situations	
5. Special focus	– Advice on communication about chemical plants with their neighbours, before, during and after emergencies	
6. Empirical foundation	– Chemical industry experience (sources not given) – Literature: Issue management, emergency risk communication	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

[6] Translated from German by Resource Book authors

RC Manual 36: Claus, F. Wiedemann, P.M., Bloser, M., Matzke, M., Schütz, H., Voßebürger, P. (1999)

Handlungsempfehlungen zur Information der Öffentlichkeit (nach §11a Störfall-Verordnung). (Recommendations on Informing the Public under the Hazardous Incidence Ordinance/ Seveso Directive). **Umweltbundesamt, Berlin, 1999, pp. 40.**
[In German]

Summary:
A manual for the affected companies and authorities on how to fulfil the spirit, and not just the letter, of the German "Seveso Directive" regulations, which require the public to be informed about possible plant emergencies. The recommendations are based on specific research. The authors argue that providing emergency information is an opportunity for companies to strengthen their image, if they target the information appropriately to different groups. They also recommend public relations measures such as open days or school projects to accompany the basic information and improve people's understanding and retention of it. Openness and transparency are essential ingredients in designing the accident scenarios used in the emergency plan. Research demonstrates that rather than awaking fears among the population, such open communication can help to increase trust in the company.

Contents:
The introduction discusses the brochure's intended users and the results of the research project on which it is based. The development and contents of the emergency information are discussed in the next chapter, followed by a chapter on information distribution and accompanying measures. Finally a flow diagram summarising the actions needed, a bibliography, an "11-point checklist", and examples of emergency leaflets are provided.

Feature	*Details*	
1. Background, Consultants	– Commissioned by the German Federal Environment Agency (Umweltbundesamt) – Consultants: IKU, Dortmund and MUT, Jülich.	
2. Intended readership	– Corporate and plant managers – Government/ agency officials	
3. Type of risk	– Risks from plants falling under the "Seveso" Directive for "industrial major hazards"	
4. Type of situation	– Production-related risks, especially before and during crisis situations	
5. Special focus	– Advice about RC content and process	
6. Empirical foundation	– Research project "Testing the Effectiveness of Emergency Information" for Federal Environment Agency – Authors' experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	B
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	C

2.2.3.3 EMERGENCY COMMUNICATION WITH CONSUMERS

RC Manual 37: Boeing Commercial Airplane Group (1992).

Crisis Communications: A Guide for Planning.
1992 Edition. Boeing Commercial Airplane Group, Public Relations, Seattle, pp. 96.

Summary: Tool to assist airlines in planning their communications response to (future) crises, against the background of expected rises in the absolute numbers of aeroplane accidents (worldwide) in the coming years because of the increasing number of flights. This document won a "Golden Quill Award" from the International Association of Business Communicators. Early reactions to the Guide within the industry were positive.

Contents: Main elements of the Guide are an overview of communications planning and of working with the media; specific organisational issues for the airline industry; and a set of tools and checklists which can be adapted to local needs. There is also a Glossary, and an Appendix containing further advice on airline crisis communication and relationships with the media.

Feature	*Details*	
1. Background, Consultants	– Approach by several airlines to Boeing's PR department for communications assistance; predicted rise in absolute numbers of airline accidents (not risks) – Boeing Commercial Airplane Group Public Relations	
2. Intended readership	– Corporate managers (communications/ PR staff, senior managers)	
3. Type of risk	– Aeroplane crashes	
4. Type of situation	– Risks related to service (transportation) industry, crisis situations	
5. Special focus	– Preparing for and implementing crisis communication in response to airline crashes (NB: Airline crashes differ from chemical product crises in that communication typically concerns relatives and media rather than direct potential victims; however many broader similarities, e.g. dealing with outrage, uncertainty about cause, etc.)	
6. Empirical foundation	– Discussions with world airlines; internal company experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	-

2.2.4 SPECIFIC RISK COMMUNICATION GUIDANCE: PARTICIPATION AND DIALOGUE

2.2.4.1 PARTICIPATION: GENERAL

RC Manual 38: Renn, O. Webler, T. and Wiedemann, P. (eds.) (1995).

***Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse.* Kluwer, Dordrecht. pp. 381.**

A comprehensive critical evaluation of most of the main methods of public participation, and one of the few attempts to study these methods from a theoretically coherent viewpoint (i.e. Habermas' discourse theory). However the individual chapters can be read without going into theoretical details. Unusual is the structure, in which each participation method is first presented, often by one of its leading exponents, and then discussed critically in a separate chapter by a different author. This leads to a lively and many-faceted discussion, which is nevertheless coherent and concise.

Contents:

- Introductory chapters covering the aims and structure of the book, and an introduction to participation
- An evaluative yardstick (application of Habermas' critical theory). Basic criteria deduced and explained are Fairness and Competence.
- Pairs of chapters (presentation & evaluation) on: Citizens' Advisory Committees; Planning Cells(2); Citizens' Juries(2); Citizen Initiatives; Regulatory Negotiation; Mediation; Voluntary Siting/ Compensation; Dutch National Debate on Energy Policy.
- Conclusion: The Pursuit of Fair and Competent Citizen Participation.

(2) *See also Consensus Conferences; these related models may be particularly relevant to conducting broad debates about chemicals, especially novel ones.*

Feature	*Details*	
1. Background, Consultants	– International workshop on public participation in Morschach, Switzerland, in 1992, financed by the Humboldt Foundation (Bonn, Germany) and the Swiss Institute of Technology (Zürich). – The authors include some of the best-known researchers in risk communication and public participation in Europe and the USA.	
2. Intended readership	– Anyone interested in studying or applying public participation techniques	
3. Type of risk	– Explicitly aimed at discourse over environmental issues, but the methods can in principle be applied to collective decisions or conflicts over any kind of risk, or indeed other issues.	
4. Type of situation	– No specific focus: public participation methods may be applied either to avoid, or to solve crises, or in connection with broader risk-related issues	
5. Special focus	– Comparison and evaluation of different models of public participation for improving discourse about environmental issues (e.g. by resolving disputes)	
6. Empirical foundation	– Experts' experience and research – Case studies (e.g. Dutch Energy Study Groups, citizens' initiatives)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	A

2.2.4.2 PARTICIPATION INVOLVING COMMUNITIES AND NEIGHBOURS

RC Manual 39: BASF Corporation (1989).

Community Advisory Panel Handbook.
BASF Corporation, Public Affairs, September 1989, pp. 48.

Practical handbook to encourage and guide BASF plant managers to implement Community Advisory Panels. Although modestly produced, the manual's contents are obviously based on solid experience and are presented in a clear and readable way.

Contents:
- CAPs' Benefits to BASF Corporation
- Community Audit and Start-Up Planning
- Selecting BASF Team
- Selecting CAP members
- Setting the Agenda for the First Meeting
- Conducting Regular Meetings
- Appendices: sample CAP guidelines [i.e. "constitution"]; sample meeting minutes; facilitator contacts

Feature	*Details*	
1. Background, Consultants	– Growing need to win community support for plant modernisation (and operation); successful promotion of CAPs by Chemical Manufacturers' Association as (voluntary) method for implementing Responsible Care programme; positive reports about CAPs from other users	
2. Intended readership	– BASF plant managers and public relations staff	
3. Type of risk	– Chemical plants	
4. Type of situation	– Plant-related risks, mainly from normal operation (and plant extension/ modernisation)	
5. Special focus	– Practical aspects of setting up and running a CAP as a forum for two-way communication with local communities	
6. Empirical foundation	– Not stated (company/ industry experience, presumably incl. CMA literature)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	A

RC Manual 40: Chemical Manufacturer's Association (1994).

Community Advisory Panel Handbook.
CMA, Washington, D.C.

A loose-leaf folder containing background materials for setting up, running and participating in Community Advisory Panels (CAPs). The Handbook is intended for use by CMA member companies, and for free distribution to all members of CAPs. The Guide may be copied and distributed in its entirety free of charge. The Handbook is designed as a resource book for both managers and community participants.

Contents:
The Guide has a loose-leaf format, with space to add local materials, and includes numerous (22) short case studies.

- Introduction to Responsible Care programme
- Advice on membership and running of CAPs
- Involving employees
- Options for small plants
- Appendices: Sample Guidelines, Bylaws, Agenda, Minutes
- Citizens' Guide for Environmental Issues (NICS, 1993). This 65-page guide to environmental issues is produced by a non-profit centre in West Virginia. It covers substantive issues such as air quality and hazardous waste as well as methodologies such as risk assessment, a 24-page Glossary, and a directory of organisational contacts.

Feature	*Details*	
1. Background, Consultants	– The CAP is a (voluntary) tool developed by the CMA which can help member companies to implement its Responsible Care programme. – Ann Green Communications, Inc., Charleston, WV.	
2. Intended readership	– Corporate managers general – Plant managers – Participants in CAPs, e.g. community representatives	
3. Type of risk	– Chemical plant risks	
4. Type of situation	– Mainly during normal operation, and plant extension/ modernisation	
5. Special focus	– Practical aspects of setting up and running a CAP	
6. Empirical foundation	– Expert judgement (consultant's experience)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	B

RC Manual 41: EEI Public Participation Task Force / Creighton, J.L. (1994).

***Public Participation Manual (2nd Edn.)*.**
Edison Electric Institute (EEI). *(Place of publication n/k)*. pp. 97.

This loose-leaf manual is a clear and practical resource covering the main aspects of why and how to involve the public in decisions affecting the development of energy transmission systems.

Contents:
- Principles of public participation.
- Designing a public participation program
- Public participation techniques
- The decision-making process and public participation
- Evaluating public participation programs
- Communicating with the public about risk
- Three case studies: Transmission line siting (Florida), substation siting (Niagara), distribution systems (Sacramento)

Feature	*Details*	
1. Background, Consultants	– Increasing tensions with local communities over operation of electricity plants, new projects etc. – Consultant: J.L. Creighton	
2. Intended readership	– Corporate managers general – Plant managers	
3. Type of risk	– Public exposure to electromagnetic fields (EMF) from power lines and facilities	
4. Type of situation	– Production and (especially) distribution of electricity, normal operation (including building new distribution systems)	
5. Special focus	– (Avoiding) community relations problems associated with existing or planned electricity facilities	
6. Empirical foundation	– Expert experience – Case studies	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	B

RC Manual 42: Office of Intergovernmental and Public Accountability (EM-22), US DOE (Undated).

How to Design a Public Accountability Program.
US Department of Energy (DOE), Office EM-22.

This booklet deals with the planning of public participation activities within DOE decision-making processes. It is specially designed for use in a large bureaucracy where decisions are often a result of complex processes involving several internal decision-makers.

Contents:
The core of the booklet is a three-stage planning model consisting of decision analysis, public participation planning, and implementation planning; however the booklet only discusses the first two stages. Decision analysis focuses on clarifying what decisions need to be made, who are the internal decision-makers, the stages in making the decision, and whether public participation is required. Public participation planning includes setting up a planning team, identifying issues and stakeholders, setting objectives and selecting techniques. The need to consider and involve internal (DOE) stakeholders is emphasised.

Feature	*Details*	
1. Background, Consultants	– Consultant: J.L. Creighton – Background: The US's nuclear weapons program has led to the accumulation of hazardous and radioactive wastes at 120 Department of Energy (DOE) sites in 36 states and territories over a period of 50 years. The assessment and remediation of these sites raises serious public relations issues, not least because of the DOE's traditional reputation for secrecy. Further problems exist in relation to the proposed disposal site for high-level nuclear waste (at Yucca Mountain, Nevada). As a result the DOE has begun to initiate various public participation programs (see e.g. NRC (1996): Hanford case study, pp. 196-198).	
2. Intended readership	– Decision-makers – Government/ agency officials	
3. Type of risk	– General (not specified)	
4. Type of situation	– Not specified	
5. Special focus	– Planning public participation in the context of a large, complex bureaucracy with a poor record of public openness in the past	
6. Empirical foundation	– Expert judgement (consultant's experience). Draws on material for a course developed by contractor for Battelle Laboratories.	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	B

2.2.3.3 PARTICIPATION INVOLVING CONSUMERS

RC Manual 43: Joss, S. and Durant, J. (eds.) (1995)

Public Participation in Science: The Role of Consensus Conferences in Europe.
Science Museum, London, pp 144.

The consensus conference is a model for allowing members of the public to contribute to decisions or debates, for instance about new technologies, in an informed and structured way. A group of 10-16 randomly selected citizens write a report on the issue involved, based mainly on a conference at which relevant expert witnesses present them with information. This collection of papers forms a good introduction to the technique. Most of the contributions concern experiences in Denmark, where the model is used regularly, in the Netherlands, or connected with the United Kingdom's 1994 National Consensus Conference on Plant Biotechnology.

Contents:
- Danish beginnings: three papers on consensus conferences in Denmark
- European developments: papers on consensus conferences in the Netherlands and the UK
- Evaluation: three papers on evaluation of consensus conferences

Selected highlights: Grundahl, J. The Danish consensus conference model, 31-40 (summary of Danish experience). Durant, J. An experiment in democracy, 75-80; Lee, G. A consensus conference from the point of view of a lay-panel member, 81-86 (two papers on UK biotechnology conference).

Feature	*Details*	
1. Background, Consultants	– Papers presented at international meeting at Science Museum, London, June 1995.	
2. Intended readership	– Decision-makers – Government/ agency officials – Senior corporate managers – General non-specialist audience – Affected groups	
3. Type of risk	– Various, including biotechnology risks	
4. Type of situation	– Mostly applied in early stages of "normal" communication about a topic; not appropriate in crises.	
5. Special focus	– The focus here is on the consensus conference technique, as applied to various issues in Denmark, and to biotechnology in the UK, as well as its evaluation	
6. Empirical foundation	– Expert experience – Case studies and evaluation of cases	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	A

3. CASE STUDIES

Case studies are a valuable, indeed essential, tool for learning about risk communication. This chapter describes briefly a range of case studies that in the judgement of the authors are particularly well suited to this purpose. "Case study" refers here to an account of the sequence of events involved in a communication episode or case. The case study should focus on the communication aspects of the case, in particular the flow of critical information and/ or the procedural arrangements for communication, and the reactions of the parties involved. In general the case study should not go into detail about the scientific aspects of the risk itself, apart from the basic information required to understand the issue and the major conflicts or uncertainties which it involves. Ideally a case study is written by a social scientist or other neutral outsider; "insider" views have the benefit of direct experience, but the disadvantage of only expressing one viewpoint on the events involved.

The case studies are organized broadly according to the same categories used in the review of risk communication manuals. The majority of case studies tend to involve crises and are retrospective: plant-related emergencies, the discovery of acute contamination, public health scares. Exceptions are case studies involving public information campaigns or participation methods, where communication is studied proactively. In addition some studies of particular methods have been carried out (e.g. warning labels).

The case studies are mainly of two kinds. One is basically a chronological account of a (in hindsight) relatively discrete communication event, often a crisis. The other focuses more on particular procedures, structures or methods set up to promote better communication in a real situation, for instance citizen advisory panels (CAPs). Some cases are a mixture of both (e.g. mediation cases).

Where there was a choice of case studies, preference was given to studies that are well structured, clearly written, and which included specific evaluation techniques. However the proportion of case studies that can really be considered of high quality is surprisingly small; many are little more than a brief summary of the most basic facts. This suggests that there is still a need for closer collaboration between social scientists and practizing risk communicators to evaluate experiences gained.

3.1 LIST OF CASES COVERED BY CATEGORY

CASE STUDY COLLECTIONS

Lieberman, A.J. & Kwon, S.C. (1998, 3rd Ed.).	*Facts versus Fears: A Review of the Greatest Unfounded Health Scares of Recent Times.* ACSH, New York.
Powell, D.A. and Leiss, W. (1997)	*Mad Cows and Mother's Milk. The Perils of Poor Risk Communication.* McGill-Queen's University Press, Montreal.
Renn, O. and Hampel, J. (eds.) (1998)	*Kommunikation und Konflikt: Fallbeispiele aus der Chemie.* Königshausen und Neumann, Würzburg.
Gottschalk, J.A. (ed.) (1993)	*Crisis Response: Inside Stories on Managing Image under Siege.* Visible Ink Press, Detroit.

CASE STUDIES: PROVISION OF INFORMATION TO CONSUMERS

Cvetkovich, G. and Earle, T. (1995)	Product warnings and information processing: The case of alcohol warning labels. *European Review of Applied Psychology* 45 (1), 17-20.
McKechnie and Davies (1999).	Consumers and risk. In: Bennett, P. and Calman, K. (1999). *Risk Communication and Public Health.* Oxford University Press, Oxford, New York, Paris. pp. 170-182.
Viscusi, W.K. (1993)	*Product-risk labeling. A federal responsibility*. AEI Press, American Enterprise Institute, Washington, D.C.
See further cases in: Powell and Leiss (1997); Soby, Simpson and Ives (1993).	

CASE STUDIES: CRISIS COMMUNICATION

Fearn-Banks, K. (1996b)	Product tampering crises. Chapter Five in: Fearn-Banks, K. (1996a) *Crisis Communications: A Case book Approach.* Lawrence Erlbaum Associates, Mahwah, New Jersey.
See further cases in: Gottschalk (ed.) (1993); Lieberman and Kwon (1998); Renn and Hampel, eds. (1998) Soby, Simpson and Ives (1993).	

CASE STUDIES: PARTICIPATION AND DIALOGUE

Cohen, N., Chess, C., Lynn, F. and Busenberg, G. (1995).	*Improving Dialogue: A Case Study of the Community Advisory Panel of Shell Oil Company's Martinez Manufacturing Complex.* Center for Environmental Communication, Rutgers University, New Brunswick, New Jersey.
Lee, G.	A consensus conference from the point of view of a lay-panel member. In: Joss, S. and Durant, J. (eds.) (1995) *Public Participation in Science: The Role of Consensus Conferences in Europe*. Science Museum, London, pp 81-86.
Portier, C.J. and Wolfe, M.S. (1998).	Risk communication: The focus in the NIEHS RAPID program's review of EMF health hazards. In: R. Matthes, J.H. Bernhardt and M.H. Repacholi (eds.), *Risk perception, risk communication and its application to EMF exposure*. ICNIRP 5/98, Proceedings International Seminar on Risk Perception, Risk Communication and Its Application to EMF Exposure, Vienna, Austria, Oct. 22 and 23, 1997, 295-301.

3.2 CASE STUDY COLLECTIONS

Case Study Collection 1: Gottschalk, J.A. (ed.) (1993).

Crisis Response: Inside Stories on Managing Image under Siege.
Visible Ink Press, Detroit, p. 463.

Summary: This is a large collection of quite detailed case studies of responses to both famous and lesser-known crises. Most of the cases are written by a key participant in the particular crisis (e.g. company executive, public relations agent). The case studies are arranged in three categories: Business Calamities (e.g. Three Mile Island), Consumer Troubles (including product tampering and environmental disasters such as *Exxon Valdez*) and Human Tragedies (e.g. Pan Am and the Lockerbie bombing, Bhopal). A few more general chapters are dotted around within the book, e.g. on the "anatomy of a crisis", media aspects and crisis planning. An interesting and well-presented collection which provides the reader with plenty of material for forming conclusions. The book's strength and simultaneously its weakness is the reliance on "involved" narrators.

Contents:
- Foreword, Introduction
- Business Calamities (8 cases, 1 general chapter)
- Consumer Troubles (4 cases, 2 general chapters)
- Human Tragedies (9 cases, 1 general chapter)
- Appendix: The Ultimate Crisis Plan

Feature	*Details*	
1. Background, Authors	– Editor is attorney and public affairs consultant	
2. Intended readership	– Corporate managers – Communications specialists (public relations managers, journalists) – Government/ agency officials	
3. Type of risk	– Risks to organisational image through environmental damage, product tampering, public health and safety issues, violence in workplace, etc.	
4. Type of situation	– Crisis situations	
5. Special focus	– Focus is on coping with the acute phase of a crisis situation (plus brief discussion of crisis response planning)	
6. Case study method	– Mainly authors' direct experience of the particular cases	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

Case Study Collection 2: Lieberman, A.J. and Kwon, S.C. (Third edition, 1998).

Facts versus Fears: A Review of the Greatest Unfounded Health Scares of Recent Times.
Prepared for the American Council on Science and Health. June 1998-03000. ACSH, New York, pp. 52.

Summary: A review of 25 significant "unfounded" health scares of the last fifty years in the USA, in chronological order from the 'Cranberry Scare' of 1959 (pesticide residues) through to the issue of perchloroethylene in a Harlem school, 1997. All concern artificial products. Each case describes the allegations against the product or substance, the basis for the charges, the reactions of public and media, and "the actual facts as to what risk (if any) ever existed." Only cases that are "closed" in regulatory and public terms are included - not those such as breast implants, where the "final chapter has yet to be written". The authors detect four common themes in the cases: (i) the "indiscriminate presumption" that laboratory tests on rodents can be extrapolated to humans; (ii) ignorance of the basic principle of toxicology, that effects depends on dose; (iii) "The acceptance... of the United Nations-conceived 'precautionary principle'..." (iv) the fear of "synthetic" chemicals, even where the same substances exist in nature without causing harm.

This is a detailed, conscientiously assembled piece of research. Its central tenets may well find an echo with many in the chemical industry and many scientists faced with public concerns. It forms a distinct contrast to most of the risk communication advice reviewed in the rest of this resource book. Rather than take the public's concerns seriously, the report dismisses them on the basis that either they are ignorant of scientific information or principles (as mentioned above), or have actually been disproved by science. Unfortunately this overlooks many critical issues, such as scientific uncertainty, differences between scientists, lack of data at the time many health scares erupt, the importance of trust in communication, and the responsibility of government and industry to try to maintain or develop it.

Contents:
- Introduction
- 25 chapters, each of approx. 1½-2 pages, on various health scares (see above)
- Conclusions

Feature	*Details*	
1. Background, Authors	– Aim of the ACSH is to separate "real, proven health risks - such as cigarettes - from unfounded health 'scares' based on questionable... or even nonexistent evidence".	
2. Intended readership	– Company/ Government agency – General public, communities	
3. Type of risk	– Health risks from (synthetic) chemicals	
4. Type of situation	– Crisis situations (”health scares”)	
5. Special focus	– Communication about product and substance risks during ”health scares”, especially where expert and lay perceptions differ	
6. Case study method	– Based on press articles and scientific papers relating to the risks (social science literature not mentioned)	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	-
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	-

Case Study Collection 3: Powell, D.A. and Leiss, W. (1997).

Mad Cows and Mother's Milk. The Perils of Poor Risk Communication.
McGill-Queen's University Press, Montreal.

This is a critical analysis of communication about the risks associated with (mainly) food items, based on seven case studies, and highlighting fundamental errors. It is not only academically serious and practically useful, but also very readable. In addition to the case studies it presents both a framework for analysing risk communication problems, and ten important practical lessons or guidelines.

Contents:
- Part One: Waiting for the Science. Diagnostic [analytic tool] for Risk Communication Failures. Case studies of: BSE in beef; Dioxins; E. Coli (food poisoning); Silicon breast implants.
- Part Two: Waiting for the Regulators. Case studies of: Bovine Somatotrophin; Plant biotechnology; PCBs in human breast milk. Ten Lessons.
- Appendix: The Use of Media Analysis in Risk Communication Research

Feature	*Details*	
1. Background, Authors	– Authors were at the time of writing the book respectively Assistant Professor in Food Science, University of Guelph, and holder of the Eco-research Chair in Environmental Policy, Queen's Uuniversity, Ontario (both in Canada).	
2. Intended readership	– Decision-makers – Government/ agency officials – Corporate managers – General non-specialist audience	
3. Type of risk	– Health risks from food contamination	
4. Type of situation	– Mainly product-related crises	
5. Special focus	– Deficiencies in the management of (mainly) food product-related crises, and the consequences for trust and credibility, based on recent case studies.	
6. Case study method	– Case studies	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	C
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	B

Case Study Collection 4: Renn, O. and Hampel, J. (1998).

Kommunikation und Konflikt: Fallbeispiele aus der Chemie. (Communication and Conflict: Case Studies from the Chemical Industry). **Königshauser und Neumann, Würzburg.**
[Language: GERMAN]

Summary: This book is aimed particularly at helping chemists and other practitioners better to understand conflicts over technology, as a contribution to improving communication in disputes about chemicals or the chemical industry. Although it is not a manual as such, it provides highly relevant background for those who are involved in practical communication in the chemical industry, whether in relation to products or production. As well as expert analyses of conflicts about chemicals, and three case studies, the book reports the discussions about them at a workshop held in the mid-1990s for chemists and social scientists. Another aim of the workshop and of the book is the promotion of interdisciplinary dialogue as a means of problem-solving.

Contents: The volume contains the main lectures and case studies presented at a workshop for young chemists, sociologists and other participants from academia and industry (28-30 October 1995, Schloß Haigerloch, Germany). These articles provide, first, an analysis of public conflicts about chemical products and processes from a sociological point of view (O. Renn). The second paper (H.-C. Röglin) looks critically at current approaches to public relations in connection with technology, and describes an alternative, dialogue-based approach. T. Barbian then looks at mediation as a specific form of conflict resolution. Case studies on three issues follow: (i) the effects of implementing the public information requirements of the "Seveso Directive" in Germany; (ii) the conflict over the German beer purity laws in the late 1980s; and (iii) a conflict over plans by Hoechst to construct a GM insulin production facility.
At the end of the book conclusions from the working groups are presented, and a concluding chapter by the Editors on opportunities for a new culture of mutual understanding in relation to the chemical industry.

Feature	*Details*	
1. Background, Consultants	– Workshop held within programme "Chemistry and Social Sciences" of the Stifterverband für die deutsche Wissenschaft (German Science Donors' Association). – Editors are from the Center for Technology Assessment in Baden-Württemberg, Stuttgart.	
2. Intended readership	– Young scientists in chemical industry – Chemical industry managers – Social scientists interested in conflict over technology – General non-specialist audience	
3. Type of risk	– Chemical production processes and products (including 'life science' products and genetic engineering)	
4. Type of situat.	– Mainly "normal" (but controversial) communication situations	
5. Special focus	– Conflicts between companies and public over various aspects of chemical risks (products or production, crisis or normal situations)	
6. Case study method	– Expert judgement – Case study – Sociological and RC/ RP literature	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	A

3.3 CASE STUDY EXAMPLES

CONSUMER INFORMATION / GENERAL

Case study 1: McKechnie, S. and Davies, S. (1999).

Consumers and risk. In: Bennett, P. and Calman, K. (1999). *Risk Communication and Public Health.* Oxford University Press, Oxford, New York, Paris. pp. 170-182.

Summary: Although not strictly a "case study" like the others presented here, this is a useful discussion of the deficiencies in current approaches to risk communication from the viewpoint of a consumers' lobby group. The authors make the key assertion that government and its agencies who regulate risks "are out of touch with the changed environment in which they are operating" (an assertion that fits well with the concepts of issue management: see relevant references under Risk Communication Manuals). Changes include the decline in deference towards all forms of authority, and specifically towards scientists (in the UK), and the information revolution, which means that "we are all experts now – or think we are" while governments often continue to guard their own information very closely. Attempts to modernise government often fail to solve these problems because they neglect the "hidden substructure" of committees and unaccountable bodies which actually take risk management decisions. A new approach to risk communication would include involving consumers from the start of the risk analysis process; increasing transparency (e.g. through a Freedom of Information Act); and increasing public participation in regulation by appointing consumer representatives to expert advisory committees, and considering novel methods such as referenda and citizens' juries.

Feature	*Details*	
1. Background, Authors	– Paper appears in book collated by UK Department of Health – Authors are respectively Director and Principal Policy Researcher of the Consumers' Association, the main interest group for consumers in the UK.	
2. Intended readership	– Government/ agency officials – Corporate managers – Interested lay people	
3. Type of risk	– Consumer product risks	
4. Type of situation	– Normal or crisis situations	
5. Special focus	– Consumer's viewpoint	
6. Case study method	– NGO experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	B
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	B
	– Dialogue, participation, conflict resolution	A

CONSUMER INFORMATION/ PACKAGING INFORMATION

Case Study 2: Viscusi, W.K. (1993)

Product-risk labeling. A federal responsibility. **AEI Studies in Regulation and Federalism. AEI Press, American Enterprise Institute, Washington, D.C. (distributed by UPA, Inc., Lanham, MD/ London, UK), pp. 83.**

Summary: The main focus of this study is to investigate the economic ramifications of hazard warnings of food and drug products. The authors argues that federal regulations requiring the labeling of food, drugs, cosmetics and medical devices impose substantial burdens on firms, in terms of risk assessments and risk communication (labeling). The author also investigates whether such hazard warnings are useful for the intended beneficiaries: the consumers. This question is addressed in an experimental study (chapter 5). In the study, participants had to compare different types of labels for implied risk level. The reference type of hazard warning was based on California's Proposition 65 which mandated hazard warnings for risks of cancer and reproductive toxicity from products, jobs and the environment. Specifically, Proposition 65 requires firms to label the products if the life time risk for cancer is 1/100,000 (or higher), that is one case of cancer for every 100,000 product users over lifetime product use. The other types of warning labels refer to risks (saccharin, cigarettes) which are substantially higher than the threshold of 1/100,000 used in Proposition 65. The results how that a majority of the subjects view the risks expressed in the Proposition 65 label as equal or higher to the risks expressed in the other warnings (which are actually much higher).

The results of this experiment suggest that consumers may severely misperceive (overestimate) the risks of a product when these risks are very low but hazard warnings are nevertheless required and given to the consumers.

Contents

1. Background, Authors	– California's "Proposition 65" law from 1986, requiring manufacturers to inform public about risks of cancer or reproductive toxicity from their products – Author is G.E. Allen Professor of Economics at Duke University	
2. Intended 3. readership	– Regulators, decision-makers and opinion-formers – Corporate managers – Researchers – Interested lay people	
3. Type of risk	– Chemical (cancer or reproductive toxicity)	
4. Type of situation	– Use of warning labels for food and drug products; specifically California's Proposition 65	
5. Special focus	– Design (content) of warning labels	
6. Case study method	– Experiment	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	-
	– Providing information about products/ substances	A
	– Encouraging safe product use etc.	A
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	-

CONSUMER INFORMATION/ EMERGENCIES

Case study 3: Fearn-Banks, K. (1996b) Product tampering crises.

Chapter Five in: Fearn-Banks, K. (1996a) *Crisis Communications: A Case book Approach.* Lawrence Erlbaum Associates, Mahwah, New Jersey.

Summary: This chapter tells the story of how companies responded to some well-known cases of product tampering (mainly in the USA), including: the Tylenol case (Johnson and Johnson, 1982); the Alpac and Pepsi "syringe-in-the-can" cases, 1993; and the glass allegedly found in Gerber baby food jars, 1982. The most useful aspect is perhaps the comparison between the cases, which shows that (i) no one kind of response is correct: it depends on the case, e.g. whether the company produces many products or mainly one kind of product; (ii) a company's existing reputation for safe products, but also its reputation for openness, and good relations with the media, etc. all count in its favour in a crisis; (iii) it is essential for the company to ascertain the facts as fully and rapidly as possible.

Contents: Case 7: Johnson & Johnson and the Tylenol Murders; Case 8: Alpac Corporation and the Original Syringe-in-the-Can; Case 9: Pepsi and the National Syringe-in-the-Can Scare; Case 10: Pepsi/ Seven-Up Beverage Group of Louisiana and the Syringe Hoaxes; Discussion of Chapter 5.

Feature	*Details*	
1. Background, Authors	– Author is on the staff of the School of Communications, University of Washington.	
2. Intended readership	– Communications specialists (public relations managers and staff) – Government/ agency officials – Corporate managers and plant managers	
3. Type of risk	– Product tampering risks as a threat to the corporation	
4. Type of situation	– Crisis situations	
5. Special focus	– How to communicate in cases of alleged product tampering	
6. Case study method	– Case literature, media reports	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	A
	– Dialogue, participation, conflict resolution	-

PARTICIPATION/ SITE-RELATED

Case Study 4: Cohen, N., Chess, C., Lynn, F. and Busenberg, G. (1995).

Improving Dialogue: A Case Study of the Community Advisory Panel of Shell Oil Company's Martinez Manufacturing Complex. Center for Environmental Communication, Rutgers University, New Brunswick, New Jersey. August 1995, pp. 66.

Summary: Community Advisory Panels (CAPs) are one method for implementing the CMA 's Responsible Care program. The program is mandatory for all 190 member companies, which represent roughly 90% of US chemical production capacity. CAPS are not a mandatory form of implementation, but have spread widely with CMA promotion (the total number of CAPs nationally in 1994 was estimated at 215). This report claims to be the first systematic evaluation of a CAP (along with a companion volume covering the Vulcan Chemical Company's CAP). Shell's CAP in Martinez is rated a success in terms of its impact on company behaviour, communication and trust. Problems include maintaining interest in the CAP, and extending communication to the wider community. It is noted that the CAP has not yet been tested by any major accident or oil spill.

Feature	*Details*	
1. Background, Authors	– Funded by Hazardous Substance Management Research Centre, New Jersey – Researchers: Rutgers University and University of North Carolina	
2. Intended readership	– Plant managers and public relations staff – Researchers	
3. Type of risk	– Petrochemical (oil refinery)	
4. Type of situation	– Mainly normal situations (may also help prepare emergency response)	
5. Special focus	– Effectiveness of CAP for managing relations between a plant and its community	
6. Case study method	– Interviews, questionnaire, analysis of documents/ reports	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	C
	– Dialogue, participation, conflict resolution	A

PARTICIPATION/ SUBSTANCES AND CONSUMER PRODUCTS

Case study 5: Lee, G. (1995).

A consensus conference from the point of view of a lay-panel member. In: Joss, S. and Durant, J. (eds.) (1995) *Public Participation in Science: The Role of Consensus Conferences in Europe.* Science Museum, London, pp 81-86.

Summary: An account of the experiences of one member of the lay panel at the UK's first National Consensus Conference on Plant Biotechnology, held in London from 2-4 November 1994. After selection for the panel in July 1994 via a newspaper advertisement, panel members were sent information about the topic and then sent on two preparatory weekends (September and October) where various experts made presentations and the panel began to plan its written report. A facilitator provided by the organisers proved to be a mixed blessing: although he was successful in keeping the group "on course" during the weekends, the panel felt that he became too involved in the subject matter, and later decided, at the conference, to finish the report without his assistance. Lee's report makes clear that the task of dealing with the flood of information and turning it into a report also placed the panel members under some pressure. The conference itself took place in the Science Museum and consisted of two further days of presentations to the panel from experts, companies, and environmental and consumer groups, in front of an invited audience. The panel was to present its report on the final day. The result was a drafting session lasting until 05:30 in the morning, for which Lee was elected chairman. This was a considerable challenge for the group, which they mastered successfully (the report itself is reproduced in Joss, S. and Durant, J. (eds.) 1995, 135-139). The report was received positively by most of the audience, "particularly by the industry representatives present who breathed an audible sigh of relief". Lee concludes that he definitely enjoyed the experience (and would even accept the role of chairman again). However the time-scale ought to be adjusted for future conferences, allowing more time for preparation and report writing.

Contents: The first preparatory weekend; The second preparatory weekend; The conference; Reaction to the report; Reflections.

Feature	*Details*	
1. Background, Authors	– Conference funded by UK's Biotechnology and Biological Sciences Research Council and organised by Science Museum, London – Author was participant in the Conference	
2. Intended readership	– Government/ agency officials – Senior executives and managers – Researchers – Interested lay people	
3. Type of risk	– Potential risks of genetic engineering (plant biotechnology)	
4. Type of situat.	– Highly uncertain risks	
5. Special focus	– Public participation in technology/ risk assessment using consensus conference method	
6. Case study method	– Personal experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	C
	– Providing information about products/ substances	-
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	A

Case Study 6: Portier, C. J. and Wolfe, M.S. (1998).

Risk communication: The focus in the NIEHS RAPID program's review of EMF health hazards. In: R. Matthes, J.H. Bernhardt and M.H. Repacholi (eds.), ***Risk perception, risk communication and its Application to EMF exposure*****. ICNIRP 5/98, Proceedings International Seminar on Risk Perception, Risk Communication and its application to EMF Exposure, Vienna, Austria, Oct. 22 and 23, 1997, 295-301.**

Summary: This paper describes an innovative effort to involve citizens' groups in a highly technical risk assessment process. It concerns the US's Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-RAPID), which began in 1992. This programme has apparently, from its inception, actively sought input from both experts and lay people regarding its policies and who should participate. The programme's process of analysis and deliberation involves scientists, advocacy groups and regulatory agencies. Two-way communication with advocacy groups is achieved mainly through a national EMF advisory committee, on which these groups are represented. This committee also has a say in the membership of the EMF-RAPID toxicological review process. Some of the advocacy groups representatives also participate directly in the toxicological reviews, which seems to have positive effects. Another productive means for two-way communication has been publication of findings on the World-Wide Web, with the opportunity for comment, which has been extensively used.

This programme seems to illustrate well some of the key concepts advocated by the NRC Committee on Risk Characterization (1996). Deliberation and analysis are clearly intertwined, and efforts have been made to broaden the range of input into the deliberative processes. Importantly, the results of this broadening are rated by the organisers as having positive effects on both the process's quality, and its acceptability to advocacy groups.

Feature	*Details*	
1. Background, Authors	– The authors work for the National Institute of Environmental Health Sciences, USA and service the EMF-RAPID Program.	
2. Intended readership	– Government/ agency officials – Researchers	
3 Type of risk	– Electromagnetic fields risks (especially low-frequency fields)	
4. Type of situation	– Normal communication situations	
5. Special focus	– Communication between scientists and citizens' groups within the risk assessment process	
6. Case study method	– Personal experience	
7. Relevance	Relevance to following functions in relation to consumers and chemicals: A high, B moderate, C slight	
	– Building/ maintaining trust in organisations	A
	– Providing information about products/ substances	C
	– Encouraging safe product use etc.	-
	– Crisis communication about products/ substances	-
	– Dialogue, participation, conflict resolution	A

4. MAJOR INTERNATIONAL PROGRAMMES ON RISK COMMUNICATION

4.1 WHO-EUROPE ENVIRONMENTAL AND HEALTH RISKS COMMUNICATION PROGRAMME

Dates: 1990-1998.
Region: Europe
Summary: This programme was organised by the WHO-Europe's Centre for Environment and Health in collaboration with the Society for Risk Analysis-Europe and the Centre for Environmental Risk Management, University of East Anglia (see Center for Environmental Risk). It organised a seminar in Ulm, Germany in 1990 and commissioned a book of case studies and guidelines on risk communication. The WHO's interest in risk communication as such has not been maintained; however WHO-Europe does continue to sponsor a health communication network.
Output: Gray, P.C.R., Stern, R.M. and Biocca, M. (1998).

Contact: WHO Regional Office for Europe
Communication and Public Affairs
Scherfigsvej 8, DK-2100 Copenhagen, Denmark
Tel. (45) 39 17 13 36 and 39 17 13 44
Fax (45) 39 17 18 80

4.2 EMF RISK PROJECT: RISK COMMUNICATION

Dates: 1996 - (ongoing)
Region: World (NB Europe, north America, Australia).
Summary: The EMF Risk Project coordinates efforts to research the risks of electromagnetic fields. A major part of its work is concerned with understanding public perceptions of EMF risks and how to communicate about them. The Program has held two major international seminars on these topics in Europe and North America respectively and is in the process of producing, with an international team of experts, further publications as below.
Output: Two sets of conference proceedings are available (Vienna 1997, Ottawa 1998). A monograph on risk perception and communication, and a practical handbook on communication about electromagnetic fields risks are in production.

Contact: Dr. Michael H Repacholi
Radiation Protection and Global Hazards Assessment
Office of Global and Integrated Environmental Health
World Health Organization, CH-1211 Geneva 27, Switzerland
Tel: +41 22 791 3427, Fax:+41 22 791 4123

4.3 TRUSTNET

Dates: 1997- 2000
Region: European Union
Summary: TRUSTNET is a program on the "social management of risk" sponsored by the European Commission's Radioprotection Directorate. Its aim is "to develop more coherent, comprehensive and equitable approaches for evaluating, comparing and managing health and environmental risks". Specifically it is intended to determine the factors influencing the credibility, effectiveness and legitimacy of the regulation of hazardous activities; to set up a European network of experts and decision makers in government departments and corporations; and to develop an interdisciplinary approach and the basis for a future research programme into risks management and protection of health and the environment.
Output: The Programme has run a number of international seminars (involving speakers such as the President of the Society for Risk Analysis) which have been summarised as reports for the participants. Unfortunately the Network's activity seems to have dropped off recently. The Website has some useful documents on social trust and other topics.
Website: http://trustnet.cepn.asso.fr/

Contact: Mutadis Consultants
14 rue de Belzunce 75010
PARIS
Tel: 33 1 45 96 09 19
Fax: 33 1 45 96 07 26
E-Mail: mutadis@wanadoo.fr

4.4 WHO HEALTH COMMUNICATION NETWORK

A Network for health care professionals, journalists, policymakers and so on, launched in 1998. Its most recent report (1999) is available as a book.
Website: http://www.who.dk/London99/cpa01.htm

Contact: WHO Regional Office for Europe
Communication and Public Affairs
Scherfigsvej 8, DK-2100 Copenhagen, Denmark
Tel. (45) 39 17 13 36 and 39 17 13 44
Fax (45) 39 17 18 80

5. ADDRESSES AND INTERNET SITES

5.1 RELEVANT ORGANISATIONS

RESEARCH CENTRES AND INSTITUTES

Center of Technology Assessment in Baden-Württemberg
Industriestr. 5
D-70565 Stuttgart
Germany
Tel.: ++49-711-9063-0
http://www.ta-akademie.de

Centre for Environmental Risk
School of Environmental Sciences
University of East Anglia
Norwich NR4 7TJ United Kingdom
Tel (+44) (0)1603 593129
Fax (+44) (0)1603 507719
http://www.uea.ac.uk/menu/acad_depts/env/cer

CONSENSUS BUILDING INSTITUTE
131 Mt. Auburn Street,
Cambridge, MA 02138 USA;
Tel: 617 492 1414; fax: 617 492 1919
E-mail: cconsensus@igc.org
www.cbi-web.org

The Macleod Institue for Environmental Analysis
ES 1040, 2500 University Drive NW
Calgary, Alberta
Canada T2N 1N4
Tel: +403-220-5271
Fax: +403-282-1287
E-mail: macleodi@acs.ucalgary.ca

Program Group Humans, Environment, Technology
Research Centre Jülich GmbH
D-52425 Jülich –
Germany
Tel: +49-2461-615890
Fax: +49-2461-612950
www.fz-juelich.de/mut

PROFESSIONAL ASSOCIATIONS

American Chemical Society
1155 Sixteenth Street, NW
Washington DC, 20036
Phone: 800-227-5558 (US only)
+1-202-872-4600 (outside the US)
Fax: 202-872-4615
E-mail: help@acs.org
http://www.acs.org

Issue Management Council
www.IssueManagement.org
207 Loudoun St., S.E.
Leesburg, VA 20175-3115
U.S.A.
Tel: +1-703-777-8450

Risk Assessment and Policy Association
http://www.fplc.edu/tfield/rapa.htm
Carol Ruh, Assistant Secretary-Treasurer
Risk Assessment & Policy Association
Franklin Pierce Law Center
2 White Street
Concord, NH 03301
Tel: +1-603-228-1541
Fax +1-603-224-3342

Society for Risk Analysis (SRA)
1313 Dolley Madison Blvd., Suite 402
McLean VA 22101
www.sra.org

SRA's European Section (NB: membership is dealt with centrally at US headquarters):

SRA-Europe
Professor Joyce Tait, Treasurer,
SUPRA,
The University of Edinburgh,
High School Yards,
Edinburgh EH1 1LZ
Tel. +44 (0)131 650 9174
Fax +44 (0)131 650 6399
email joyce.tait@ed.ac.uk
www.sraeurope.com

Verein deutscher Ingenieure (German Engineers' Association)
Postfach 101139
D-40002 Düsseldorf
Germany
Tel.: ++49-(0)211-6214-0
Fax: ++49-(0)211-6214-575
http://www.vdi.de/
E-Mail: vdi@vdi.de

INDUSTRY ASSOCIATIONS

Chemical Manufacturer's Association
1300 Wilson Boulevard
Arlington, Va.,
Tel: +1-703-741-5000
http://www.cmahq.com/

Verband der chemischen Industrie (German Chemical Manufacturer's Association)
Karlstraße 21
D-60329 Frankfurt
Germany
Tel: +49-69-2556-1564
Fax: +49-69-2556-1612
www.vci.de

NGOS

American Council on Science and Health (ACSH)
1995 Broadway, 2nd Floor, New York NY 10023-5860
+1-212-362-7044
+1-212-362-4919
acsh@acsh.org
www.acsh.org

INTERNATIONAL ORGANISATIONS

See Chapter 4, Major International Programmes on Risk Communication.

5.2 WEBSITE REVIEWS

5.2.1 ADVICE ON RISK COMMUNICATION AND RISK MANAGEMENT

ATSDR Primer on Health Risk Communication Principles and Practices
http://atsdr1.atsdr.cdc.gov/HEC/primer.html
See RC Manuals for review.

Center of Technology Assessment in Baden-Württemberg
http://www.ta-akademie.de (German and English)
This well laid out site contains service information, descriptions of the Centre's work, individual projects and findings, and an extensive publications list (a small number of which can be downloaded in PDF format). The Centre's publications include many, mainly in German, on risk communication and public participation in decision-making. The main pages are available in English.

Centre for Environmental Risk
http://www.uea.ac.uk/menu/acad_depts/env/cer
Describes the Centre's projects and publications on risk management, risk communication and other areas.

Consensus Building Institute

www.cbi-web.org

This site provides an attractive overview of the work of the Institute in environmental and other forms of dispute resolution, and plenty of leads for obtaining further information. The Institute's Newsletter *Consensus* since April 1997 is available online, and further publications can be ordered.

Program Group Humans, Environment, Technology
www.fz-juelich.de/mut (German and English)
The site contains service information, descriptions of the Group's work, and a publications list (some of which can be downloaded in PDF format). The Group has published extensively on risk communication, risk perception, public participation, mediation etc. The main Web pages and some key reports are available in English.

Issue Management Council
www.IssueManagement.org
Official site of the Issue Management Council, a professional organisation for issues managers or their companies; member companies include many of the biggest names on the US corporate scene. Public part of site provides information on the Council and its member companies, notices about events, and a useful Products section including details of IMC publications (Issue Action Publications). Members have access to additional pages.

Risk Analysis Center
http://www.risk-analysis-center.com/
This is a commercial site run by ITC publications, a UK-based company. After registering (free of charge) the user has access to a database of articles drawn from both the general and the scientific media, on a wide range of risk-related topics. The database is

searchable by index (hierarchical categories) or full text (keyword) search; however the term "risk communication" produced no hits. There is also a fairly good list of Web links on risk. Overall, has the makings of an extremely useful site, but needs broader balance.

Risk Assessment and Policy Association

http://www.fplc.edu/tfield/rapa.htm

This Web site introduces the Association and provides the usual information. The outstanding feature of the site is the link to the Associations's Journal, Risk *(see below).*

RiskWorld

www.riskworld.com

An important reference point for natural science information on risk assessment and management in the USA. It opens with comprehensive news stories on risk-related science, and has a wide range of services including bookstore, jobs, searchable news archives, an abstracts library, and announcements about events, courses and positions of interest. It is updated daily and is maintained by a professional technical communications company. Risk communication is not highlighted as a separate issue, but many individual relevant items can be found using search facility. Who actually funds the site is not clear, although it was originally closely associated with the Society for Risk Analysis.

Society for Risk Analysis

www.sra.org

NB: Material prior to March 1997 is held on RiskWorld site.

This site contains basic information about the Society, and some resources including an extensive glossary of risk terms, and selected links including one to the RISKANAL E-mail discussion list. See also *Risk Analysis* below.

UK Department of Health

www.doh.gov.uk/pointers.htm

See review in RC Manuals chapter.

JOURNALS

Journal of Risk Research

www.sraeurope.com

Official interdisciplinary journal of the Society for Risk Analysis – Europe. The web address provides information for authors and on subscriptions.

Journal of Risk, Decision and Policy

A broad-based journal with input from various social sciences. Instructions for authors are available on the Cambridge University Press site.

http://www.cup.cam.ac.uk/journals/rdp/rdpifc.htm

Risk. Official journal of the Risk Assessment & Policy Association, RAPA.

www.fplc.edu/RISK/rskarts.htm

This journal forms a contrast to the other risk-related journals in having a stronger orientation towards law, policy and social sciences. The web site is outstandingly useful: it

not only provides, free of charge, annotated indices to the articles, but the full texts as well.

Risk Analysis

This is the best-known professional professional journal for risk researchers from the natural and social sciences. However although it certainly has an interdisciplinary range, natural science analyses tend to predominate. Contents from Dec 1996-Dec 1998 posted at: www.sra.org. Contents and abstracts after Dec 1998 posted at: http://www.wkap.nl/journalhome.htm/0272-4332 (link available on SRA site).

5.2.2 INFORMATION FOR CONSUMERS, COMMUNITIES AND NEIGHBOURS

PLANT EMISSIONS AND ENVIRONMENTAL INFORMATION

Environmental Defense Fund's Chemical Scorecard

www.scorecard.org

The Chemical Scorecard provides users with information about industrial emissions in their (or any other) area, or rank and compare pollution between areas anywhere in the USA. In addition, the database contains (apparently up-to-date) information on 6,800 chemicals' health and environmental effects. The site has an innovative layout and good usability. EDF claims that the Scorecard provides ”the most up-to-date and extensive collection of environmental information available on the web today”. The site is intended to enable individuals: ”Information is power – once you learn about an environmental problem, Scorecard encourages and enables you to take action - you can fax a polluting company, contact your elected representatives, or volunteer with environmental organizations working in your community.”

Factory Watch (UK)

www.foe.co.uk/factorywatch/intros/local.html

Information on emissions from plants controlled by Environment Agency in England and Wales, made available by Friends of the Earth (UK). Similar idea to EDF's Chemical Scorecard. 'Right-to-know' is much less comprehensive in UK than in USA, so information is somewhat more limited.

European Commission, Directorate-General "Environment"

http://europa.eu.int/comm/dgs/environment/index_en.htm [English]

A highly informative and well-maintained site about environmental issues and policy in the European Union. Current EU Policy is covered under Environment => Policy Areas. Under more specific titles, e.g. => Chemicals and Biotechnology, the EU policies and legislation in each area are explained. Sub-areas under Chemicals/ Biotechnology are Dangerous Substances, Plant Protection Products, Chemicals and genetically modified organisms, Chemical Accident Prevention, Preparedness and Response, and Dioxin exposure and health. A wealth of material is buried under these titles, e.g. a whole ”mini-site” on the Seveso Directive, a large report on dioxins in PDF format, etc.

(For a complete list of all European Commission DGs, see: http://europa.eu.int/comm/dgs_en.htm)

GENERAL CONSUMER INFORMATION

Federal Consumer Information Center

www.pueblo.gsa.gov/

Information on consumer topics, including food and health. No specific chemicals section. Full-text versions of brochures available in html and/or pdf.

European Commission, Directorate-General "Health and Consumer protection"

http://europa.eu.int/comm/dg24

This site is presently under reconstruction, but nonetheless a good source of information (in various languages). It contains general information about the DG, a Library of legislation, press releases, publications, surveys etc., an Events list, and an Internet Forum which is intended to provide Consumer Associations with the opportunity to debate upcoming legislation, Commission actions etc., discuss topics among themselves and exchange information (membership restricted to Consumer Associations). There is a free E-mail news subscription service. Quick links are provided to the ”Most Popular Topics” including Agriculture, Foodstuffs and Health, and BSE. The former includes information on e.g. the agricultural use of hormones. Quality of presentation and response time are also good.

LABELLING SCHEMES

Food and Drug Administration (FDA)

www.fda.gov/opacom/backgrounders/foodlabel/newlabel.html#nutri

Explanation of new food label in USA.

Blauer Engel (German "Blue Angel" Eco-Label)

www.blauer-engel.de [Deu, Eng]

EU Eco-Label

http://europa.eu.int/comm/environment/ecolabel

HEALTH AND CHEMICALS INFORMATION

See also Factory Watch under "Plant Emissions", above.

CFSAN/ FDA Chemistry links

Center for Food Safety and Applied Nutrition (CFSAN) and Food and Drug Administration (FDA).

http://vm.cfsan.fda.gov/~dms/chemist.html

Verband der chemischen Industrie (German Chemical Manufacturers' Association)

www.vci.de

A glossy site with plenty of material (slightly hard to locate) on German "Responsible Care" programme, statements on sustainable development etc. In German only.

6. ABBREVIATIONS

ABBREVIATION	**Term**
ATSDR	Agency for Toxic Substances and Disease Registry
CMA	Chemical Manufacturer's Association
DOE	Department of Energy (USA)
EEI	Edison Electric Institute
EMF	Electromagnetic fields
EPA	Environmental Protection Agency
ILGRA	Inter-Departmental Liaison Group on Risk Assessment
NRC	National Research Council (USA)
RC	Risk communication
RP	Risk perception
SARA Title III	Title III of the Superfund Amendment and Reauthorisation Act (SARA), 1986
SRA	Society for Risk Analysis
UK	United Kingdom
VCI	Verein der chemischen Industrie (German Chemical Manufacturers' Association)
VDI	Verein Deutscher Ingenieure (German Engineers' Association)
WHO	World Health Organisation
WHO-Europe	WHO Regional Office for Europe

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