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OECD GUIDANCE DOCUMENT ON RISK COMMUNICATION FOR CHEMICAL RISK MANAGEMENT

OECD Environment, Health and Safety Publications

Series on Risk Management

No. 16

OECD Guidance Document
on Risk Communication
for Chemical Risk Management

IOMC

INTER-ORGANIZATION PROGRAMME FOR THE
SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among
UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD

Environment Directorate
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
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The work of the OECD related to risk management is carried out by the Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology, with Secretariat support from the Environment, Health and Safety Division of the Environment Directorate. As part of its work on risk management, the OECD has issued 'status report' monographs on five substances that were, or continue to be, the subject of review: lead, cadmium, mercury, selected brominated flame retardants and methylene chloride. It has also published two volumes of the proceedings of the OECD Cadmium Workshop held in Saltsjöbaden, Sweden, in 1995 and a survey report on methylene chloride, supplementing the information presented in the Risk Reduction Monograph on methylene chloride (see list of publications on page 4). In 1996, OECD Environment Ministers endorsed a Declaration on Risk Reduction for Lead to advance national and co-operative efforts to reduce the risks from lead exposure.

OECD has also published, as part of its work on risk management, workshop reports and guidance documents concerning methodologies on non-regulatory initiatives, collection and recycling of nickel-cadmium batteries, sustainable chemistry and socio-economic analysis.

The Environment, Health and Safety Division publishes documents in several different series, including: Testing and Assessment; Good Laboratory Practice and Compliance Monitoring; Pesticides; Risk Management; Harmonization of Regulatory Oversight in Biotechnology; PRTRs (Pollutant Release and Transfer Registers); and Chemical Accidents. More information about the Environmental Health and Safety Programme and EHS publications is available on the OECD's web site (see next page).

This publication was produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC)

This publication is available electronically, at no charge.

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or contact:

OECD Environment Directorate, Environment, Health and Safety Division

**2 rue André-Pascal
75775 Paris Cedex 16
France**

**Fax: (33) 01 45 24 16 75
E-mail: ehscont@oecd.org**

The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO, UNITAR and the OECD (the Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

FOREWORD

In 1999, the OECD initiated a project to identify practical ways to make risk communication an integral and effective part of chemical risk management decision-making and implementation. This guidance document is the culmination of work on the project.

The first phase of work on the project involved conducting a survey of Member countries, academia, industry, and other stakeholders to collect relevant risk communication information and to prioritise those issues that would benefit from discussion at the international level. The results of the survey, and information collected from the open literature, were compiled into a background document on risk communication –(available at the German Federal Institute for Health Protection of Consumers and Veterinary Medicine (BgVV) http://www.bgvv.de/publikationen/sonstige/index-e.htm). The survey highlights various issues and identifies gaps and areas for improvement in risk communication for chemical risk management. Following this phase, and based on the information included in the background document, a workshop was held in Berlin, Germany (18-20 September 2000) to provide the necessary information for developing a practical guidance document on risk communication and to discuss the best way to structure such a document. Material from the background report and the workshop discussions has been compiled into this guidance document.

The aim of this guidance document is to provide practical approaches to risk communication for chemical risk managers, with a particular focus on communication programmes aimed at consumers of chemical products. The document identifies the various stages in the chemical risk management process in which risk communication plays a role; it defines the types of situations faced by chemical risk managers - from dealing with non-controversial to highly controversial issues including approaches in crisis situations; and then it suggests approaches for responding to these situations. Finally, in six annexes, the document provides general guidance for risk communication and discusses related topics and other sources of information.

ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

In 1999, the OECD initiated a project to identify practical ways to make risk communication an integral and effective part of chemical risk management decision-making and implementation.

The first milestone of this project was the publication of a background paper that describes why and in what way appropriate risk communication is an essential element of an effective risk management programme. This document also offers a "state of the art" risk communication bibliography; available at http://www.bgvv.de/publikationen/sonstige/index-e.htm under the title: "*Risk Communication Chemical Product Risks. An OECD Background Paper.*"

The second and final milestone of this project is the publication of this Guidance Document. The aim of this document is to provide practical approaches to risk communication for chemical risk managers, with a particular focus on communication programmes aimed at consumers of chemical products. In addition, it aims to increase understanding among target audiences of the rationale underlying risk management decisions. The document identifies the various stages in the chemical risk management process in which risk communication plays a role; it defines the types of situations faced by chemical risk managers, from dealing with non-controversial to highly controversial issues; and finally, it provides guidance for responding to these situations.

Although this document focuses primarily on the communication needs of consumers of chemical products, the guidance refers also to other target audiences such as journalists, workers, employees of companies and public authorities, stakeholders, medical community and health care providers, and members of risk-related organisations. The major issues addressed are how to:

- provide information to the public about chemical products and their risks (emphasising the difference between *hazards* and *risks*);

- provide information to the public about the process for conducting risk assessments and making risk management decisions, including a description of the various actors and procedures involved in both tasks;

- organise effective two-way communication;

- enhance trust and credibility of all actors in the risk assessment and management process; and

- involve stakeholders in the process and resolve conflicts.

Section 1 offers general guidance for initiating an effective risk communication programme. Specific types of guidance and approaches are listed in Annex I for choosing an approach that best matches the context, the capabilities of the risk communicating organisation, the political culture of the targeted audiences and the different levels of risk debates. Section 2 describes general guidance for best practices in risk communication, in terms of designing the strategy and the message, including guidance for crisis

situations. Section 3 offers arguments and practical guidance for evaluation of risk communication programmes. In Annexes II to VI, specific information is listed that will enhance the chances of success for such programmes. This guidance document is designed to assist government agencies and other stakeholders improve their efforts at communicating more effectively and efficiently.

To reach this goal, general and specific guidance is offered to follow the most important principles of good risk communication practice:

- Start with a critical review of your own performance.

- Design an integrative risk management and communication programme that ensures a continuous effort to communicate with the most important stakeholders, including consumers, during the management process.

- Tailor communication according to the needs of a targeted audience and not to the needs of the information source.

- Adjust and modify the communication programme in an organised effort to collect feedback and to sense changes in values and preferences.

All advice given in this document rests on empirical evidence and research studies.

INTRODUCTION

The ultimate goal of risk communication is to assist stakeholders in understanding the rationale behind a risk-based decision, so that they may arrive at a balanced judgement, that reflects the factual evidence about the matter at hand, in relation to their own interests and values. Risk communication should not be seen as an attempt to convince people, such as the consumers of a chemical product, that the communicator (e.g., a government agency that has issued advice concerning the product) has done the right thing.

Communicating risk appropriately to consumers is a very challenging task. Consumers are often unfamiliar with the approaches used to assess the risk posed by a product. They face difficulties when asked to differentiate between the potentially dangerous properties of a substance (hazards) and the risk estimates that depend on both the properties of the substance, the exposure to humans, and the scenario of its uses (risk). Also difficult to communicate is the fact that some risks are acute, with severe effects that are easy to recognise, whereas others exert adverse effects only over a long period of time. The possible synergies of exposures to industrial substances, together with other factors that relate to lifestyle (e.g., nutrition, smoking, use of alcohol), also presents difficulties for effective communication.

Consumers are also often unfamiliar with the regulatory and non-regulatory tools used for managing the risk posed by a product (e.g., the voluntary application of labels by industry, licensing, authorising, and regulating the use of chemicals by governments). Moreover, consumers are often unaware of the role that they can play in affecting the selection and application of these tools. Similarly, they may not be aware of the concepts involved in, or the extent to which, a decision to allow the sale of a product has been made. Such decisions may be based on assessments of the benefits and risks associated with the use of a product, including the likely effectiveness of preventive and control measures in mitigating risks on a life cycle basis.

Limited knowledge of, and involvement in, the risk management process by consumers can lead to less than effective implementation by them of a risk management decision. For instance, some consumer products (e.g., disinfectants) have to be labelled because of the presence of special chemicals. The label content is highly regulated. In most OECD countries, the wording, colour, font, size, package placement, package inserts, and other factors are all subject to regulation. But, without consumer input into the design of these labels, the labels may end up conveying a message that is not understood, and hence not properly followed.

Thus, 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 (context dependent) and hazard (property bound);

- to deal with cancer and other illnesses that trigger additional fears and concerns;

- to cope with long-term effects;

- to improve literacy in risk-based thinking, including the development of priority lists;

- to provide an understanding of synergistic effects with other lifestyle factors;

- to address the problem of remaining uncertainties;

- 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);

- to cope with the diversity of stakeholders and parties in the risk management phase;

- to cope with inter-cultural differences within pluralist societies and between different nations and cultures.

Effective risk communication can make a strong contribution to the success of a comprehensive and responsible risk management programme. Through effective risk communication one can: (1) ensure that consumers are aware of the risks associated with a product and thereby use it safely; (2) build public confidence in appropriate risk management decisions and the associated related risk/benefit considerations; (3) contribute to the public's understanding of acceptable risks; and (4) provide fair, accurate, and appropriate information, so that consumers are able to choose among a variety of products that can meet their own "risk acceptance" criteria.

This document is not a recipe book. Even if one was to piously follow all the advice given, the success of communication could not be guaranteed. Communication deals with individuals and groups. All efforts of communicating with them are attempts to initiate a rational and fair dialogue about the potential benefits and risks of certain activities and products, but cannot determine by itself the outcome of this dialogue.

Although this document focuses primarily on the communication needs of consumers of chemical products, the guidance refers also to other target audiences such as journalists, workers, employees of companies and public authorities, stakeholders, medical community and health care providers, and members of risk-related organisations.

SECTION 1: GENERAL GUIDANCE: TAKING STOCK OF THE SITUATION AND INITIATING WORK

1.1   What is a risk communication programme?

Risk communication includes all exchanges among interested parties (individuals, social groups, industry, and governments) about health and environmental concerns. Any interested party may initiate activities in this area. Engaging in such activities brings with it some corresponding responsibilities for all parties. However, it is industry and governments, which have an explicit duty to engage in good risk communication practices in a timely fashion. This duty derives from their associated responsibility to manage risks in the public interest. Some of the specific areas of responsibility are as follows:

Industry and its representing associations have the primary responsibility for risks associated with consumer products, the processes that produce them, and the substances they contain.

Governments have a co-responsibility for those products and process risks that are the subject of regulations, and primary responsibility for all public health risks and environmental risks (to humans, other species, and habitats) broadly considered, especially where multiple causative factors may be involved.

Public interest groups, as well as non-governmental organisations, have a responsibility to alert public officials, industry, and consumers about potential risks and to communicate their evaluations of risks and practices to the various actors involved.

The media and public educators have a responsibility to convey the messages that they receive or that they have actively investigated to their targeted audiences.

Finally, consumers have a responsibility to be aware of the risk communication information about products, and to notify appropriate authorities of their concerns about possibly harmful effects, which they associate with product usage. Consumers should inform industry and public authorities promptly about such concerns, so that potential risks can be evaluated and, if necessary, corresponding management measures taken.

All actors have the responsibility to convey their messages without over-dramatising or downplaying the effects that are part of the message.

Many benefits may result from these mutual risk communication efforts: First, consumers may be better informed of how to protect themselves and how to distinguish between reliable and unreliable information. Second, risk managers can gain a better idea of the concerns and preferences of consumers, stakeholders, and other public partners. Third, through effective risk communication, early warning signals can be delivered to the appropriate agencies enabling them to take actions that can limit any occurring damage.

Finally, ongoing continuous multi-party risk communication enhances an atmosphere of trust and mutual respect that is essential for co-operation and joint problem solving, in particular in crisis situations.

1.2 How the right approach is selected for specific audiences

1.2.1 Factors to consider when choosing an approach

One of the main aims of this document is to provide guidance on the approaches that can be used to communicate risk information to an audience. To that end, Annex I includes descriptions of a number of approaches that a risk communicator could choose from (e.g., developing brochures, holding public meetings, press releases, using the Internet, etc.). The choice of the appropriate approach will depend on (1) the stage of a risk management process in which the risk communication will occur, (2) the type of risk situation (i.e., from routine risks to those that have a high potential for controversy), and (3) the audience.

1.2.2 Determining the stage of a risk management process

Today, effective risk communication is regarded as being an indispensable component of the risk management process throughout all its stages. Therefore, it is necessary to initiate a risk communication programme as soon as one has begun to be engaged in the first stage of a risk assessment process, and to maintain that programme until the whole management process is complete.

The typical stages in the risk management process are outlined in the *OECD-Technical Guidance Document on the Use of Socio-economic Analysis in Chemical Risk Management Decision Making* [ENV/JM/MONO(2002)10]. They may be summarised as follows:

> *Stage 1: Identifying the problem:* Risk issues may enter onto a decision maker's agenda through a number of different avenues, including: legislative requirements, previous government policy decisions, public concerns raised by the media, experts, interest group pressure, the availability of new scientific information or the availability of new technologies. Tasks at this stage include identifying the risk, collecting data, and undertaking either a screening-level (targeted) or a full risk assessment.

> *Stage 2: Setting up the objectives of the risk management process and undertaking the analysis of options and trade-offs:* The objectives of risk management are to control the risk within acceptable limits. Different management options for the requisite level of risk control must be generated and evaluated with respect to the performance of each management option on each objective. This trade-off analysis is likely to involve stakeholder input.

> *Stage 3: Making recommendations:* This stage begins with the comparative analysis of the different decision options, peer or expert review of analytical results, and involvement of stakeholders in order to provide a comprehensive set of recommendations to decision makers.

> *Stage 4: Implementation and evaluation*: The preferred option is implemented and performance is monitored and evaluated with respect to meeting the objectives specified in Stage 2.

Timeliness is one of the essential keys to discharging the responsibility for effective risk communication, and it is also one of the most commonly neglected factors. This is because attitudes and beliefs, once formed, are resistant to change, and the reception of new information is also shaped by existing habits of mind.

Ideally, a risk communication programme should be initiated in a specific area at the time when either a credible expert group calls attention to a potential risk, or the first broadly based expression of public concern is heard.

Such a programme should be continued for the duration of any widespread concern. Institutions willing to initiate a risk communication programme should always be aware of the resources in terms of money, personnel, and time that they can afford to invest in such programmes. Early investment in risk communication is almost always cost-effective over longer time periods. However, this is especially so in crisis situations (which can erupt at any time), in which prior investments in establishing trust and credibility can turn out to be the decisive asset for sustaining or regaining public confidence.

In every case the best risk communication programme is *proactive* communication. The success of such a programme depends in part on (a) initiating it early in the cycle of concern, (b) devoting sufficient resources and attention to the task to ensure that key messages are communicated effectively to interested parties, and (c) making risk communication an ongoing and continuous activity in order to establish an atmosphere of mutual trust and respect.

1.2.3   *Determining the type of risk situation*

The communicator has to identify at which stage of the risk management process he or she is. The next step is to determine what type of risk situation has to be faced. For the purposes of this document, a risk situation can be defined as:

- "*Routine Risk Situations*" These risks are well known to scientists; risk managers are aware of the potential consequences and few uncertainties remain. In addition, conventional methods such as using the chemical in the prescribed way are sufficient to protect oneself. Communication for this type of risk requires mainly the assurance that the risk is indeed a routine case and that all management organisations are well equipped to perform the necessary tasks for consumer protection. Specific information about the risk includes guidance on the proper use of this specific chemical.

- "*Risks with high uncertainty*" These risks are less known and may lead to consequences that are not fully understood. Some health impacts and the full scope of environmental impacts may still be under debate. In these situations, risk managers need to address the fears of the unknown. The main goal here is to address the competence of risk management organisations to monitor impacts, to reverse decisions if negative impacts become visible, and to proceed using a precautionary approach in order to avoid irreversible damages. A detailed discussion on how risk communicators can deal with the three major challenges of complexity, uncertainty, and ambiguity is given in Annex III.

- "*Risks with high potential for controversy*" These risks may be uncertain or not, but they trigger highly controversial or emotional responses. Often public outrage is associated with these risks. The controversies are often caused by different views about the legitimacy of the product or its release. A good example may be the exposure to electromagnetic fields from mobile phone base stations. Many people feel involuntarily exposed to this risk, fear long-term health impacts and regard this risk as a violation of fairness since they might not use mobile phones themselves. Risk perception research has identified the main risk characteristics that trigger or amplify public concern and anxiety. Risk communication in highly controversial settings requires the discussion of public values, lifestyles, and world-views. Stakeholder involvement is an inevitable element of an effective communication programme, if highly controversial risks are at stake.

- *"Communication in crisis situations"* Crisis situations require communication under major time constraints. It is therefore essential that risk management units establish a system for detecting symptoms in the early stages of a crisis, have a well prepared and trained team ready, and have all the material at hand necessary to deal with the crisis effectively and competently. Risk communication should be guided by the primary goal of reducing the impacts of the crisis and by the secondary goal of providing assurance that the organisation is able and capable of handling the crisis in the interest of the public good.

1.2.4   Determining the audience

In general, the audiences for risk communication efforts are:

- the general public, informal citizen associations, and concerned individuals who identify themselves (including consumers of specific products);

- organised social or public-interest groups and other institutional stakeholders, such as business, churches, government agencies, etc.;

- the media.

These audiences have a variety of different requirements that are relevant to the design of risk communication programmes. Moreover, audience needs may vary according to the type of risk situation as well as the various stages in the risk management process. These different requirements make it necessary for the risk communicator to select the proper resources for different audiences, risk situations, and risk management stages.

1.2.5   Choosing the right approach

Once the stage of a risk management process, the type of risk situation, and the audience have been identified, it is possible to consider the various approaches that are available for communicating risk information. Specific types of guidance and approaches are listed in Annex I for choosing that approach which best matches the context, the capabilities of the risk communicating organisation, the political culture of the targeted audiences, and the different levels of risk debates.

SECTION 2: GENERAL GUIDANCE: DESIGNING AND IMPLEMENTING A RISK COMMUNICATION PROGRAMME

2.1 Designing the strategy for a risk communication programme

1.   Find a common denominator between the risk communicator and the audience(s).

If public concerns are focused on technical issues, your message should contain mainly factual evidence. Communicators on this level should include technical or organisational experts. You should be aware, however, that many risk debates appear to be at the technical level, but the underlying conflict is about issues concerning trust in institutional performance or societal values and world-views. A debate on trust in institution performance 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 concerning societal values and world-views require a consensus building approach, concentrating on values and fundamental policy directions and involving the various stakeholders. Most institutions will have problems conducting such exercises; a political facilitator or mediator may be needed. Additional guidance on audiences is given in Annex V.

2.   Understand the socio-political and cultural context of your communication programme.

Because risk management decisions are important for many people, serious concerns about them can arise, leading to intense controversy about which decisions are appropriate. This is why a broad understanding of the social context for risk management decision-making is important for the risk communicator. In addition, the analysis of the socio-political context helps to find the right stakeholders that should be consulted during the communication process. (Annexes IV and VI provide further background analysis of different types of socio-political context that you can use to understand the specific needs of your audiences.)

3.   Consider the likely costs and resource requirements when designing a communication programme.

Think about your budget and your time schedule. Effective risk communication demands resources and commitment. Often, staff workers need to spend their evenings in town meetings and other communication forums, and these activities can be stressful and costly. Be realistic when designing a communication programme. Each setting may be characterised according to the resources required to use it effectively. Of course, depending on the size of the targeted audience (special group, community, region, country, continent or the world) and the method of evaluation chosen to test the effectiveness of the communication programme, resource requirements may vary considerably.

4.   Make sure that the same risk communication programme is throughout the organisation and has the support of senior management.

Effective risk communication demands consistency and clear focus throughout the duration of the programme. Inform all members of your organisation about the communication and its messages, and enlist their support in the effort to reach the widest number of people. The programme's content and strategy must have the full support of senior management before it is launched.

5.   *Ensure that the selection of approaches that you plan to use is well integrated and that each complements the others.*

The programme should include a plan (related to available budgets) that seeks to maximise its effectiveness though a judicious selection of appropriate settings and formats (see Annex I, Introductory note). In case of limited resources, try to diversify the programme without having it appear fragmented or disconnected.

6.   *Do what you believe in and avoid approaches that you are not convinced of!*

If you select an approach, you need to be convinced that you can participate effectively in it. For example, if you do not believe in the value of public involvement, it does not make sense to use an approach that requires a citizens advisory committee. Members of the committee will soon detect your feeling that all of this is a waste of time, and the situation could become counter-productive and damaging to the organisation.

7.   *Take sufficient time and financial resources to rehearse and practice your performance in a variety of approaches, and learn from others who have become successful in them.*

Effective performance in a wide variety of approaches requires both expertise and experience. It is especially necessary to learn to cope with "open" communication processes. Genuine two-way risk communication is not completely predictable or even controllable. Instead, it presupposes that you continuously ask for feedback from your audience regarding its needs and interests and take this feedback into account for the next round of interactions. If there is concern about the expertise or experience of the communicator, then rigorous training will be needed. Adequate finances will need to be available for such training.

8.   *Evaluate your risk communication programme.*

Observe responses, collect feedback, and organise different means of evaluation. Learning still basically results from trial and error. Without errors there will be no improvement. Even if resources are limited, reserve at least 10% of the total budget for evaluation. This investment can probably be the most productive of your total investment.

2.2   Designing an effective risk communication message

2.2.1   General rules

There are a number of general rules for all types of risk communication challenges that, if followed, will assist risk communicators in achieving the maximum impact for their messages.

9.   *Be clear about your intentions and make them the central message of your communication effort.*

Most people have little time to read long essays or detailed descriptions. Be sure that the central message is given in the beginning and that all other material is always related to the central message. Clarity and an unequivocal position are the two major conditions for reaching your audience.

10.   *Simplify your message as much as you can without being inaccurate.*

Messages will be simplified by your audience regardless of how well written the text is. Rather than have the audience simplify the text their way, the communicator can perform a more accurate simplification which is also in accordance with his/her original intentions. Factual information should be made as simple as possible, but information about the decision making 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.

11.   *Place your simple messages (general information) in the beginning of a text and gradually add the complex issues (specifics).*

This structuring of the information serves two purposes: gaining the attention of the peripherally interested audience while at the same time pleasing the well-educated audience that expects detailed argumentation and sufficient evidence.

12.   *Never assume technical knowledge about the issue unless the audience is clearly a technical community.*

It is usually not the case that the terms or concepts being used in chemistry, natural sciences or risk assessment procedures reflect basic knowledge. Therefore, avoid technical jargon, do not presuppose any systematic knowledge on the subject, explain those knowledge elements that are essential for understanding the message but avoid presenting details that are not essential for understanding the message.

13.   *Anticipate the interests of your target audiences and design your communication programme to match their needs.*

This is the most violated rule in risk communication. Experts in institutions have the irresistible tendency to package a whole education programme in each attempt to communicate with the public. But most people have neither the desire nor the time to become chemical experts, toxicologists or statisticians. 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.

2.2.2   *Rules addressing specific risk issues*

Apart from the general guidance for designing and composing effective messages, there are additional points of advice for dealing with specific risk issues such as probabilities, hazards, risk comparisons, and low-probability, high-consequence risks.

14.   *Place risk in social context and report numerical probabilities only in conjunction with verbal equivalents.*

Most people have difficulty understanding the meaning of probabilities and tend to focus on the maximum perceivable consequences. A verbal explanation of numerical probabilities is therefore needed. This verbal explanation should attempt to put risk in perspective to other risky activities. Still, numerical probabilities should be mentioned because they are the most accurate indicators for the relative seriousness of the risk, thus being 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. Empirical research suggests that the form of numerical information (such as 1 out of x or 4 times 10 to the minus x) does not make any difference.

15. *Be cautious with using risk comparisons in the message. Risk comparisons should be used only for those risks that are perceived as being comparable by the public.*

Risks with identical benefits are better suited to risk comparisons than risks with divergent benefits. Comparisons should only serve the purpose of illustrating the meaning of abstract probabilities. Risk comparisons for the purpose of suggesting judgements about acceptability should be avoided: they are neither logically defensible nor convincing in the eyes of the public. 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.

16. *Relate risk information to the real world of the audience.*

Audience attention is almost guaranteed if they perceive the risk as a potential threat to themselves or their primary group. Moreover, the audience can relate to and remember messages more easily, if they are conveyed in a narrative rather than analytical format. Dramatic and unfamiliar messages, as well as risks from consumer products are likely to arouse special public concern. In case of low probability of harm, these concerns should be met by focusing communication on the unlikely circumstances under which the risk may indeed materialise. One can also point to positive experiences of the past.

17. *Address in your information the qualitative characteristics that people associate with risk.*

These characteristics can include, among others, the nature of risk, artificiality, dread, familiarity, controllability, catastrophic potential, perception of fairness in risk-benefit distribution, and assignment of blame. For example, risks that are perceived to be voluntary are accepted more readily than those that are perceived to be imposed; risks that are perceived to be under individual control are accepted more readily than those perceived to be under governmental control; risks that are perceived fair are accepted more readily than those perceived to be unfair. It is important to address these concerns rather than focusing on probabilities and magnitude of risk only. Demonstrate how some of these qualitative characteristics have been considered when designing the risk management programme. Risk communication should also address how deficiencies in those qualities have been compensated or will be compensated. Be sure to address the associations that are linked to the semantic images of the respective risk as well.

18. *Point out the importance of exposure and dose when communicating about risks.*

Often consumers may confuse hazards with risks, and they may be unaware of how dose and circumstances of exposure determine risk. If a product contains a substance, which may have been found to be toxic or carcinogenic at a higher dose than is present in the product, most people will be concerned that the presence of this substance poses a risk to the user of the product. Provide simple examples that show the difference between risk and hazard.

19.   *Avoid linking the risk communication effort to a non-health-related interest.*

If risk communication is being perceived as a new strategy of industry to avoid risk reduction measures or a clever plot of risk regulators to put the responsibility on the back of the consumers, the communication programme will be rejected by most observers. Rather, risk communication programmes 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.

20.   *Be sure to include all the relevant information in your risk communication portfolio.*

The content of any risk communication programme will depend upon the specific circumstances of the case at hand, including (a) the precise nature of the hazard(s) associated with a substance, process, or product, and (b) the nature of the exposures. On the basis of the general rules listed in section 2.2.1, every effective programme must address, in as much detail as possible, the particular concerns of affected or interested parties in the specific case at hand. However, prior experience with risk issues about chemicals tells us, that they also have many aspects in common, no matter what the differences in hazards or exposures are. Therefore, it is possible to specify on this basis the *minimum required content* of any effective risk communication effort dealing with chemicals, as follows:

- Include a statement of commitment to maintaining a communications flow of information *pertinent to public concerns* about the case at hand.

- Distinguish clearly between hazard (the type(s) of possible harms) and risk (the likelihood for individuals or populations to suffer those harms).

- If the type of possible harms has special qualities (e.g. sensitising properties, neurotoxicity), eliciting feelings of "dread" or heightened fears, be aware of them and acknowledge them in the communications.

- Specify what is known about exposures and whether sensitive populations (especially children) are likely to be exposed.

- Indicate the quality of the knowledge base, how it is expected to improve through further research, and who is responsible for improving it.

- Describe qualitatively the uncertainties in the knowledge base and what further steps might reduce these uncertainties, and when.

- Describe both quantitatively and qualitatively the estimates of probability that have been made, if available, or if not available when they might be expected.

- Provide a justification for what is thought to be a tolerable or acceptable level of risk in this case, using either risk/risk or risk/benefit trade-offs, or both and communicate a willingness to discuss alternative viewpoints on where this line should be drawn.

- Provide a clear and compelling justification for the type of action response that has been chosen or recommended in this case.

- Specify how the consumers may protect themselves against the known or potential risk and if and how suspected substances may be handled, used, recycled or disposed of in order to protect public health and the environment; provide contact information where responses to questions may be obtained.

2.3 Communication in crisis situations

Even in organisations with excellent performance records, risk managers may face sudden crisis situations. A crisis may evolve because of:

- a technical failure such as an explosion or an accidental release of chemicals with high risk potential;

- a human or organisational failure such as an operator's error, a false order or a disaster caused by negligence;

- an external natural event such as an earthquake or a flood;

- an external human event such as sabotage or terrorism;

- a political or institutional crisis due to system breakdown or social unrest;

- public hysteria or outrage based on false or distorted information.

The main characteristics of a crisis is that immediate and effective actions are required in order to avoid major damage or losses under a situation of extreme time constraints and internal and external stress. If communication is needed to reduce the impacts of the crisis (such as emergency notifications), communicating is one crucial part of the overall management plan. Communication as a means to inform the public is certainly relevant but should not be given any priority before all measures to cope with the crisis have been ascertained.

What do crisis situations demand from risk managers? First, they need to make available all information necessary to enable or support all measures necessary to deal with the crisis. Many guidebooks and manuals are on the market to assist risk communicators in providing important information on the most effective wording of alarms or evacuation orders, the best channels for distribution, and the most useful strategy to collect feedback results. In addition, emergency agencies and relief organisations can offer direct advice to crisis managers and risk communicators. Providing more specific guidance for this type of crisis information is beyond the scope of this document.

Second, in times of crisis effective risk communication is in high demand from the general, non-affected public. Journalists want to know what happened; politicians are eager to receive more information; communities may be in high alert because they might think they are at risk; consumers might be frightened; boycotts of products may occur; and NGOs might take the opportunity to voice their opinion and ask for reactions from the risk management agencies. In essence, during a crisis the demand for information, statements, and other forms of communication is highly elevated. Effective and timely communication is therefore a crucial challenge for public risk communication.

In general, the guidance for effective and responsible risk communication does not change just because a crisis has occurred. With respect to risk communication, however, practitioners should take into account specific guidance for crisis situations, listed below.

21.   *Be well prepared for crisis situations and ensure that all necessary resources to communicate effectively in a crisis are at hand.*

A crisis management team should include two risk communication specialists: one for the crisis information targeted at those at risk and one for risk communication directed towards the observers and general public. As time is the most valuable and scarcest resource in a crisis, the crisis management team needs to be well prepared. Regular exercises and rehearsals are absolutely mandatory. Make sure that all the necessary resources can be mobilised instantly (sufficient number of dedicated telephone or video lines, adequate computer facilities, functional briefing rooms, and direct connections to the location of the crisis).

22.   *Anticipate potential crisis situations and have contingency plans and materials ready before the crisis occurs.*

For a crisis situation, anything that can be prepared ahead of time (general text elements and language as well as background material on the chemical or the product) should be done and the material stored in a format that one can retrieve easily and quickly. In addition, risk communicators should have at their disposal different protocols based on a variety of credible crises scenarios. These protocols can help prepare staff members for what to do in a crisis situation.

23.   *All communication must either protect people or reduce risks. Priority must be given to this over the needs of the observers to be well informed.*

One of the main tasks during a crisis is to ensure that observers do not interfere with the necessary management activities. Between journalists wanting authentic information and the need for risk managers to devote all their efforts in coping with the crisis, you need to provide opportunities for journalists to be where the action is and to let them talk to people who have been affected by the crisis. Yet, the priority must be clear: reducing the risk is and remains the first priority task. There must be a balance between serving the desires of the media and, at the same time, preventing all unnecessary interventions into the emergency operation.

24.   *Do not give premature explanations or statements that you cannot substantiate. Rather, report about all measures undertaken to cope with the crisis.*

It is essential to be available and accessible to public inquiries at the beginning of the crisis. The media as well as representatives of political or social institutions will demand fast and comprehensive information. Provide your audience only with information that you know is reliable, cross-checked, and accurate. Never speculate about reasons or causes. Never deny any responsibility for a crisis before you know for sure that the crisis was caused by something or someone else. Never convey comments or statements from third parties without mentioning the source. In a crisis people are extremely sensitive to nuances in information and anything that turns out to be incorrect will be interpreted as an attempt to consciously lie or betray. The most important message is that all necessary risk management measures have been taken; that assistance to potential victims has been organised or delivered; that all actions have been taken to reduce the risk or to limit exposure; that experts are searching for the cause.

25.   *Always be available to brief the media, provide a climate of confidence and competence, and make sure that your organisation speaks with one voice during a crisis.*

During the course of a crisis, it is extremely important that the media face the same person and receive from that person consistent, univocal, and competent information. This position of spokesperson (or several depending on the nature of a possible crisis) needs to be created before a

crisis occurs. Only one person should speak for the organisation about anything related to the crisis and make sure that their statement is consistent with the organisation's position, is compatible with all potential legal implications, and always up-to-date with respect to new insights and results of the ongoing investigations.

26.   *Avoid bureaucratic or legal language, show empathy and compassion for the potential victims. Be aware, however, of any legal implications of your statements.*

Communicators in crisis situations should express leadership, signs of responsibility, and empathy with the victims. In all communications, one should use ordinary, clear and easy-to-understand language, mistakes if made should be admitted, and competence in dealing with the crisis should be shown to assure all victims that the organisation will try to assist them. At the same time, however, it may be needed to consult legal advisers when making promises or dealing with causes and potential guilt.

27.   *Advise the risk manager to respond in an expeditious and comprehensive manner.*

Particularly in crisis situations that relate to consumer products, the risk manager is advised to react quickly, proactively, and comprehensively. All evidence collected in the past years clearly shows that consumers regain confidence in organisations that took bold and often expensive steps to overcome the crisis. In the end, the costs for crisis management were still considerably lower than the costs that would have occurred if consumer confidence had been lost. For example, the reaction of a producer taking all their products from the shelf, even if only few were contaminated or deliberately poisoned, was a response which consumers not only required but also applauded. They also granted loyalty to the product during and after the crisis situation, keeping overall losses very low. The same is true for governmental agencies or public risk management institutions. Within legal constraints, a fast, bold, and active response shows a sign of leadership, a sense of responsibility, and a clear concern for public needs.

28.   *Learn from past crisis situations: review all your procedures and materials and redesign your approach in light of the experiences of the past crisis.*

After a crisis, make sure that all persons in the crisis management team reconvene and reflect on their experiences and performance. It may be advisable to consult a specialist on crisis management and communication to review the material and to redesign the protocols and procedures for the next crisis situations.

SECTION 3: GENERAL GUIDANCE: EVALUATING RESULTS

3.1   Why evaluation?

Risk communication campaigns deal with important issues: human safety, health (sometimes even survival may be at stake), social relations between producers, regulators, down-stream users, and consumers of substances or products. Consequently, it is crucial that pertinent risk communication activities actually achieve their goals. To this end, empirical evaluation research is indispensable. *"Evaluation"* means the scientific assessment of the content, process, and effects (consequences, outcomes, impacts) of an intervention (measure, strategy, programme) and their assessment according to defined criteria (goals, objectives, values). Systematic empirical investigations are required to prove the effectiveness of risk communication – simple experience or common sense is not sufficient. There are both substantive and methodological reasons for evaluation studies:

- It is a matter of accountability with respect to one's organisation's resources and time to check whether risk information and communication efforts have met the needs of the recipients.

- Evaluation results can demonstrate not only whether but also *why* a programme works (or not) and thus guide further improvement efforts.

- Intuitive assessments of the programme's effectiveness can easily be misleading because of anecdotal cause-effect attributions (spurious causality).

- Evaluation provides an empirical basis for decisions on alternate risk communication programmes.

- 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 summarised in Table 3.1.

TABLE 3.1: **Evaluation of risk communication (basic considerations)**

Focus of evaluation:	– content-oriented (substantive correctness) and/or – process-oriented (formative/developmental view) and/or – 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 behaviour – joint conflict resolution
Reference for comparisons:	– normative programme goals (as stated by institution) – previous situation – alternative information/communication strategies

The most important decision is which aspect of a risk communication programme one intends to evaluate. If the evaluation focuses on the three principal perspectives: *content*-orientation (i.e., input and message evaluation), *process*-orientation (i.e., evaluation of selected approaches), and *outcome*-orientation (i.e., impact evaluation), advanced research designs are required. Evaluative data can be gathered in an analytical assessment done by experts or in an empirical investigation in which relevant participants are surveyed.

Once the objectives for the evaluation have been stated an evaluator needs to determine the criteria for measuring success or failure. The main criteria are as follows. Effectiveness, did it reach the predefined goal? Efficiency, were the costs in proportion to the accomplishments? Persistence, did the effect last over time? Mutuality, did all participants involved, including the risk manager, learn more about the issue? Different approaches to evaluation are given in Annex I.

3.2 Guidance for evaluation

Systematic evaluations of risk communication programmes should be delegated to professionals. They know how to devise a questionnaire, how to conduct focus groups, and how to deal with inevitable biases in people's responses. It is therefore not necessary to provide more than one additional guideline for evaluation:

29.   *Make sure that all evaluations of risk communication programmes are evaluated in-house and if possible, also by outside professional evaluators.*

   The right method for evaluation depends on the communication context and the target audiences. Improvement of risk communication depends on continuous learning through evaluation.

SECTION 4: CONCLUSIONS

Risk communication must be viewed as an integral part of risk management. While advertisements and message packaging should be part of, and can help improve, risk communication, they alone are not sufficient for overcoming the problem of public distrust in risk management institutions. Nor are they sufficient at coping with the concerns, worries, or complacency of consumers. A more diverse set of tools is needed. The tools provided in this document should help risk communicators in acquiring the necessary background knowledge to better understand the concerns and needs of their audiences, so that they can design the most effective risk communication programme.

The ultimate goal of a risk communication programme is to enable audiences and stakeholders to process risk information and form a well-balanced judgement that is based on factual evidence, their own interests and preferences, and the arguments of different parties. The goal is not to ensure that everyone readily accepts and believes all information given. To accomplish this goal, a risk communication programme must provide the necessary information to all participants and empower them to be equal partners in making decisions about risk.

This goal suggests that the public perception of risk, at least the underlying concerns governing this perception, be adopted as a legitimate perspective for drafting risk communication programmes. The specific circumstances of the risk-related situation, equity issues, catastrophic potential, and other qualitative aspects of risk deserve the same attention in the communication package as the calculation of numerical probabilities and consequences. Thus, risk communication must incorporate a broad conception of risk, and operate with the realisation that communication is a process in which all participants have something to give and to learn

ANNEX I: SPECIFIC GUIDANCE AND APPROACHES FOR COMMUNICATING RISKS

Introductory Note: The approaches described in this annex are divided into three groups according to the three main types of audiences (Individuals and the General Public, the Media, and Institutional Stakeholders). Added is a section describing approaches for evaluating risk communication programmes. However, it is important for the risk communicator to realise that any approach can be used for any situation or audience, depending on particular circumstances. Approaches can also be characterised by the types of settings or communications format they represent. *Settings* refer to the different social situations in which communication occurs, for example, a town hall meeting, citizen advisory committee with invited participants, telephone interview with a media representative, press conference, panel discussion including a variety of institutional stakeholders, and so on. *Formats* refer to the variety of communications vehicles that can be selected, for example, brochures, news releases, videos, websites, and so forth. The approaches listed in this section are the ones most familiar and widely used, but new ones are always being developed, and there are many variations and nuances for each of them.

I.1   Communicating with individuals

I.1.1   *General Comment on two-way communication*

Risk communication has to address public expectations and public knowledge about the risk under consideration. It must include public preferences about risk reduction measures before it can deal with actual management results and before it can hope to gain trust. Such an approach implies that the communicator makes an honest effort to listen to public concerns and to demonstrate clearly that concerns have been adequately addressed.

Two-way communication is clearly a prerequisite for all forms of successful communication, 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. Forms of two-way communications include:

- public meetings;

- public forums or panel discussions;

- written or A/V materials (including incorporation of feedback);

- talk Shows on TV or Internet Chat Rooms;

- exhibitions;

- inspection tours of facilities (open houses, special events in-house, etc.).

What all these forms of two-way-communication have in common is that the risk communicator is in direct contact with the targeted audience and the members of the audience are equal partners in the exchange of arguments, ideas, impressions, evaluations, and statements. The interaction among the communication partners follows the route of action and reaction, stimulus and response, questions and answers, claims and counter-claims. The main feature is the constant change of roles between being an active listener and a responsive presenter. Two-way communication can only succeed if all partners respect each other and are willing to engage in mutual learning.

The main practical guidance for conducting and participating in two-way communication programmes is as follows.

I.   *Be honest, complete, and responsive in your contact with the target audience.*

Honesty is a vital condition for gaining credibility. Honesty will not automatically be rewarded, but dishonesty will certainly create negative repercussions among the members of your audience. 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, credibility. 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 programme are more likely to attract better qualified personnel, to enhance their corporate reputation, and to avoid costly litigation. Regulators can make the argument that effective and efficient regulation helps the agency to get a better reputation, to get more resources, and to be consulted if major political decisions are made. This is not to say that they should be shy about their public duty to protect the consumers, but they should show that this task is also in the best interest of the agency itself.

II.   *Try to escape from role expectations by using a personal approach and by framing the communication to the personal experience of the targeted audience.*

Communication partners, in particular peripherally interested persons are inclined to select information that contains surprises or unexpected insights. (The term "peripherally interested or oriented person" is explained in Annex VI.) 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 personalising the message. This is particularly effective in face-to-face interactions, panel discussions or talk shows. Without denying their affiliation to 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 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. Being honest is an absolute condition for such an attempt because most people have developed a good sensitivity to acting and displays of fake feelings.

III.   *Demonstrate your competence and have empathy when dealing with highly dreaded risks.*

Building trust is particularly difficult for risks with dreadful consequences such as cancer or children suffering. These risks are associated with dread, unfamiliarity, lack of control, and people are confronted with them involuntarily. To address these negative risk characteristics, it may be helpful to emphasise the competence, independence, and impartiality of operating and regulating

institutions. And show, at the same time, compassion for those who are suffering from the disease or fear that they could be affected. This may produce trust in the capability of the regulator to monitor health impacts, check safety devices, and intervene if the safety of consumer products is jeopardised.

IV.   *Be personal, caring, but also decisive and inspirational in your performance.*

The major goal is to develop a communication climate that enables the audience to fully process the provided information. The more a communicator manages to avoid the mask of an institutional spokesperson and the more he or she exercises compassion and empathy for the audience, the more likely the audience will feel compelled to consider the arguments.

V.   *Don't be reluctant to act as the spokesperson of the institution that you are representing, but do not sell institutional viewpoints if you do not believe in them.*

The best way to elicit trust in the institution is to demonstrate that the institution has met the goals and objectives assigned to it. In addition, credibility is linked to the evidence of being cost-effective and open to public demands. These two goals have to be treated as complementary and not as substitutive goals. A conflict arises if the communicator does not fully share the decisions or policies of his or her home institution. In this case, the communicator should never lie or try to defend a position that he does not share. Either she or he explains the institutional position mentioning that the communicator in this specific case would have made another decision (yet identifies with the institution in general) or ask another person from the institution who shares the institutional perspective to explain and defend this position. It must be clear that the communicator is in line with the overall performance and perspectives of his or her home institution, but may have different opinions on specific issues. Over-compliance with institutional policies makes people sceptical about the validity and honesty of the messages and will, in the long run, destroy trust.

VI.   *Share technical information, laboratory results, hazard data or any other relevant product information with the consumer and public interest groups.*

If you claim that you have nothing to hide, then demonstrate it by being open to public scrutiny. Many chemical companies, for example, send their laboratory data or toxicological results directly to public interest groups and ask for their feedback. Even if one or the other group may misuse such an open book policy, the net effect of such a policy outweighs by far the potential damages. There should be ways to provide this information without compromising legitimate confidentiality concerns.

VII.   *Publish risk-related results in the daily newspapers or the journals that consumers read.*

Even if many consumers do not understand the exact meaning of the data, the mere fact that you publish results in highly visible journals enhances your credibility and demonstrates that you have nothing to hide.

VIII.   *If labels are required on the product or if hazard information is necessary to warn people of potential health-effects or possibilities of misuse, do not pursue the "fine print option".*

Make the label highly visible, make sure it is comprehensible and place it on a prominent spot on the package. You should be aware, however, of all the legal prescriptions and requirements for designing and wording the desired information on the product labels. Negative labels do not deter committed customers, but give them the information they need to protect themselves which thereby demonstrates that the industry or institution is committed to making their product as safe as possible.

I.1.2 Guidance on the use of specific types of approaches

Following are three tables that suggest approaches to use for the various situations a risk manager may face. For instance, if a risk manager is faced with a relatively "routine risk situation", he would look at Table 1A. If the manager is still collecting data (i.e., section 1.2.2 in Stage 1, *Identifying the problem*), and would like to communicate risk information to the public, one could choose to apply the approaches listed A (Brochures and written leaflets), O (Pre-test of the material or the discourse procedure), or P (Systematic feedback from users of communication material).

It is important to note that the approaches identified in the tables are merely suggestions; each situation is different and other approaches described may still be appropriate. Once approaches have been selected, a manager should consider the best way they can be applied.

Table 1A: Approaches to use in cases of routine risks

		AUDIENCES		
		Individuals and General Public	**Media**	**Institutional Stakeholders**
STAGES IN THE RISK MANAGEMENT PROCESS	Stage 1: Problem Identification	A*, O, P		C
	Stage 2: Setting up the Objectives	E		C, M
	Stage 3: Making Recommendations	A, C, D	I	C, M
	Stage 4: Implementation/ Evaluation	R, S	P	P

*listed in Annex I and described below

A--Brochures and written leaflets

C--Public presentations and discussions

D--Exhibitions, educational fairs, participation in science centres, visits to schools

E--Surveys and focus groups

I--Press releases

M--Round Tables

O--Pre-test of the material or the discourse procedure

P--Systematic feedback from users of communication material

R--Surveys and polls

S--Internet chat rooms

Table 1B: Approaches to use in cases of risks with high uncertainty

			AUDIENCES		
			Individuals and General Public	*Media*	Institutional Stakeholders
STAGES IN THE RISK MANAGEMENT PROCESS		Stage 1: Problem Identification	A, B, C, O, P		M
		Stage 2: Setting up the Objectives	E, F	P	K.1 – K.2
		Stage 3: Making Recommendations	A, B, C, O, P	I, J	K.3 – K.4
		Stage 4: Implementation/ Evaluation	R, S	P	Q, T

Table 1C: Approaches to use in cases of risks with high potential for controversy

			AUDIENCES		
			Individuals and General Public	*Media*	Institutional Stakeholders
STAGES IN THE RISK MANAGEMENT PROCESS		Stage 1: Problem Identification	A, B, C, O, P	I, P	L
		Stage 2: Setting up the Objectives	G, H	I, P	K.1 – K.4
		Stage 3: Making Recommendations	**A, B, C, D, Q, R, S**	J, P	N
		Stage 4: Implementation/ Evaluation	Q, R, S, T	P	**Q, T**

Approach A: Brochures and written leaflets

Written material is still the most popular form of communicating with different audiences on a large scale. The material should be designed in a way that it corresponds with the audience's needs, concerns, and level of knowledge. These are the first steps in preparing a written statement:

- define the major messages that you would like to convey;

- determine the types of audiences that you like to address;

- get a feeling of the social and political context in which the issue is placed;

- articulate the message in a way that fits the needs of the audience and corresponds to the social and political context;

- compose the whole communication package;

- determine the channel of transmission.

Before sending out any information, it is important to test the effectiveness of your statement in meeting the needs of the audience for information. (This is why even provisional written materials should be regarded as a form of two-way communication.) Have you provided all the information that is available and necessary for the audience to reach their own conclusions about the risk? One way of doing this is to conduct a pre-test, exposing the material to small samples of the targeted audiences. One could also organise focus groups, which upon reading the material, are free to voice their impressions, opinions, and criticism in a group context. You may choose to use the cultural categories of entrepreneurs, egalitarians and bureaucrats to form the composition of the focus groups. (These different subgroups are explained in Annex VI.) Sending out brochures with reply envelopes is another method of collecting information about the communication needs of the public; it is also fairly inexpensive. One may also combine this method with a sweepstakes contest or some other form of incentive. The most important element here is to test the understanding of the message and the comprehension of the communicator's intention.

Approach B: Internet website materials

In addition to the normal written information, new channels of multimedia presentations (videos, web) may also be used as a means to communicate with the consumer. All the practical guidance listed above also apply to multimedia presentations, but there is a set of additional requirements that one needs to take into account:

IX. *Be fast, responsive, and brief when using the opportunities of the new media.*

The web and other electronic channels of communication rely on speed and intuitive comprehensibility. Customers expect routinely updated information, a good graphical design, and little text to go with it. You can add longer texts for downloading, but these text elements should be clearly separated from your message part. Be sure to update your information at least once a month. Many search engines list the entries in the order of the dates of last change. A frequent update enhances the visibility of your message.

X.   *Make sure that the main search engines register your entry.*

It is advisable to place important risk information not only under your normal homepage but to install a separate page for this purpose. This is a good strategy to get registered in the search engines. In addition, add a list with keywords at the beginning of your message. Many search engines look for keywords when conducting a search.

XI.   *Provide sufficient links to other organisations and information sources that deal with the same issue.*

This allows viewers to get another opinion or to get more detailed information. You may demonstrate fairness and openness by including links to organisations that do not share your point of view.

XII.   *Be sure to provide opportunities for viewers to respond.*

At minimum, provide an e-mail address where people can voice their opinion. If you offer this opportunity, make it clear whether or not you intend to respond to all feedback: a task that is not trivial and may consume considerable resources. Whether or not you respond to everything, such feedback can provide important insights and help establish a productive dialogue with your audience.

Approach C: Public presentations and discussions

Personal contact and appearance is certainly more convincing than anonymously written information. In addition to the message (form and content), lectures allow the audience to associate a human face with the message. It is therefore essential that the two match. Most people have developed a fine sensitivity for people who role-play or try to sell them something. Formal training in speech and rhetorical skills is certainly helpful in addressing public audiences, but it is far more important that the communicator personally believes in what he or she is saying.

Being sincere, honest, open-minded, caring for the concerns of the audience, and responsive to people's questions and comments makes it more likely that the audience will be open to considering the communicator's message, rather than being elaborate, smooth, and well-spoken. With respect to risk communication, the effectiveness of lectures and public appearances can be improved by following additional practical guidance:

XIII.   *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 options 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. This helps people assign competence to the actors and get a better feeling of the trade-offs that are proposed, or accepted by the communicator in meeting the specific objective. Evidence of competence, fairness towards other viewpoints, and references to commonly shared values and beliefs may make the audience more open to hearing the message. At the same time, it could help to address the centrally and peripherally interested audience. Conveying probabilistic information is a real challenge, but can be done in reference to everyday experience of budget constraints and consumer products. Furthermore, demonstrating the successful use of risk analyses in hazard management can help define the role and limitations of risk analysis in improving public health and the environment.

XIV.   *Use visual aids when presenting technical information, but limit your central messages to fewer than seven for each presentation.*

Psychological research shows that most people in an audience will not follow a presentation for more than 20 minutes (at least then they should have a break); will not read a viewgraph that contains more than 20 words; and will not absorb more than a maximum of seven central messages during the entire presentation. That is why conclusions should be limited to seven or fewer main points. The most effective lectures have one focal message that is explained and illustrated throughout the talk.

XV.   *Allow sufficient time for discussion when giving lectures to public audiences.*

If you address a small audience (fewer than 50 people) it is wise to spend half of the time of your total presentation on questions and answers. This helps the communicator address the issues that people are interested in rather than lecturing on points that may not be relevant to the audience. The effectiveness of a lecture depends on the ability of the target audience to understand the information, hear answers for their concerns, and develop their own point of view. Motivation to learn can be enhanced if the lecture is organised in the form of a dialogue. If people can voice their concerns, they are more inclined to engage in mutual learning. That is why a dialogue approach to public lectures are much more effective than straight talks (as good as they may be). Immediately after the lecture, however, people may feel hesitant to ask the first question. You can ask a person in advance, whom you know and trust, to raise the first question so that the "ice is broken". If you face a larger audience, discussions often become mere rituals of window dressing, performed by representatives of interest groups. In this case, it may be better to organise small discussion groups of ten or less and have spokespersons of each group pose the questions to you later in a plenary session.

XVI.   *Be available after the lecture for further requests or inquiries, and distribute a handout after the talk.*

Many people who attend lectures need some time to digest what they have heard and to articulate questions or doubts about the content of the lecture. Therefore, it is important to convey to them that you or somebody else is available if these questions arise after the talk. You may distribute leaflets containing some major points of your presentation and your e-mail address or a telephone number (much better than the usual business cards). A one-page leaflet is normally sufficient if it contains sources for further information (or websites). You should close your presentation with a slide showing opportunities for further information.

Approach D: Exhibitions, educational fairs, participation in science centres, visits to schools

Being involved in an educational effort is a long-term strategy to improve risk literacy among the population. This is an ineffective strategy if it is meant to get a timely message about a risk or a risk management effort out to the consumers. One should also keep in mind that education is not a one-way-street where students absorb what it is fed into them. Students select what they find interesting, forget what they find boring, and evaluate information according to their own sets of values and beliefs. Nevertheless, being involved in educational programmes has the advantage that basic knowledge in applied sciences and basic understanding of probabilistic reasoning can be made the main target of the communication effort. Sponsoring educational programmes is usually expensive and requires a long-time commitment. One single science fair does not fully inform about the topic.

XVII.   *Develop educational programmes and projects with professionals in the field.*

There is a lot of anecdotal knowledge of what works and what does not work in education and student learning. And one can waste a lot of money relying on this anecdotal wisdom. There is sufficient reliable and valid knowledge in the field of education and didactics that allows risk communicators to design educational programmes effectively and efficiently. Professionals in this field are available and can assist the communicator with specific knowledge and know-how.

XVIII.   *Co-operate with institutions that specialise in education or training.*

Almost all countries have a broad infrastructure of educational institutions ranging from schools, training centres, evening schools, universities, colleges, science centres, museums to community centres or health clinics. All these institutions offer facilities and access to different audiences. There is no need to add another educational facility or centre unless you have a strong commitment from your organisation to build an educational programme of your own.

XIX.   *Focus on interactive, lifeworld-related learning programmes.*

Most professionals of the educational sciences agree that effective learning depends on an interactive exchange of ideas, arguments, and observations between teacher and student. This is also true for artefacts in science centres. Stuffed animals as shown in old natural science museums have no appeal to modern students. Artefacts should provide opportunities for interactive learning through experimentation and observation. In addition, students need to get involved in the material that is presented to them. Involvement is enhanced through intensive discussions about the messages received and through associations with the everyday lifeworld of the student. Again, it is advisable to link educational experience with written material, personal lectures, and Internet presentations.

Approach E: Surveys and focus groups

Surveys of the general public or special groups of the public are excellent approaches to explore the concerns and worries of the targeted audience. If they are performed professionally, the results are usually valid and reliable. Surveys do no tell us something about the possible pathways to conflict resolution or even the fate of positions once they enter the public arena. Surveys describe the starting position before a conflict may unfold. Focus groups go one step further by exposing arguments to counter-arguments in the setting of a small-group discussion. The moderator introduces a stimulus (for example, some statements about the risk) and lets the member of the group react to the stimulus and to the statements of each other. Focus groups provide not only data about people's positions and concerns, they also can measure the strength and social resonance of each argument vis-à-vis counter-arguments.

The major disadvantage of surveys and focus groups is their lack of real interaction among the participants. Both instruments are advisable as preliminary steps for understanding the context and expectations, but they do not assist risk managers in resolving a pressing issue. In addition, both instruments are fairly expensive.

Approach F: Citizen advisory committees (ombudsman, neighbourhood associations, citizen boards)

The chemical industry has been using Citizen Advisory Committees for a long time in the framework of its Responsible Care Programme. This programme is directed towards people in the vicinity of chemical installations. Such an approach is also feasible with consumers if companies or agencies would like to involve their ultimate clients in the risk management process. The problem here is selection: either one invites representatives of stakeholder groups (such as the consumer associations) or one tries to find a

sample of "representative" consumers of the specific products or chemicals under review. Both approaches have their merits and drawbacks.

Stakeholder groups are often distant from the members they are supposed to represent. This is particularly true for consumer associations. Consumers form a very heterogeneous group, and in most countries the majority of them do not belong to consumers associations. Different options for effective consumer representation and involvement are currently being developed by the National Consumer Council/United Kingdom.

A representative sample of consumers is difficult to obtain and it is questionable whether such a sample can speak in the interest of all consumers. In spite of these difficulties, such advisory committees can be very effective in detecting potential conflicts (early warning function) and getting the concerns of the consumers heard and reflected in the respective organising institutions. In addition, the creation of citizen advisory committees is fairly inexpensive and easy to do.

Approach G: Citizen consensus conferences

The Danish Board of Technology introduced a new form of citizen involvement, which they called "consensus conferencing." Six to ten citizens are invited to study a risk issue in detail and provide the legal decision-maker or an agency with a recommendation at the end of the process. An equal amount of women and men are required as well as a cross-section of the population in terms of age, social class, and political preferences. This team receives a substantial amount of material before convening for the first time and, during the meeting, shares reflections with regulators or decision-makers (often members of parliament). Finally, the team meets behind closed doors and makes recommendations, which are presented to the decision-makers who then have an opportunity to give further comments.

At the end, the team writes the final draft of the recommendations and presents this to the media at the end of the third day. The advantage of consensus conferencing is the transposition of a major conflict to a small team of lay-people, which are educated about the subject and are asked to make recommendation, based on their knowledge and personal values. The main disadvantage is the small number of people who are assigned such an important task. The restricted number of 6-10 participants has been the main issue of criticism. Consensus conferences appear to yield a compelling legitimacy effect within countries that are small and emphasise consensus over conflict. The most successful trials were reported in Denmark, Norway, and Switzerland. The experiences in more adversarial countries, such as the United Kingdom, France, and Germany, are less encouraging. The results of the deliberations were not widely published in the media; the decision-makers were not willing to give sufficient time to small teams of lay-people; and the administrators paid only lip-service to the conference statements.

Approach H: Citizen panels, planning cells, or citizen juries.

Planning cells or citizen panels (juries) are groups of randomly selected citizens who are asked to compose a set of policy recommendations on a specific issue. The objective is to give citizens the opportunity to learn about the technical and political aspects of risk management options, and allow them to discuss and evaluate these options and their likely consequences according to their own set of values and preferences. The participants are informed about the potential options and the corresponding consequences before they are asked to evaluate these options.

Since the process requires time for the educational programme and the evaluation of options, the panels are conducted in seminar form over three to five consecutive days. All participants are exposed to a standardised programme of information, including hearings, lectures, panel discussions, videotapes, and field tours. Since participants are selected at random, every individual in the affected population has an

equal opportunity to participate in the process. In reality, however, only 5-40% of the randomly selected citizens choose to become active participants. In contrast to consensus conferences, however, the number of people who can participate is limited only by available resources and time.

Several hundred citizens can be involved in one exercise. All participants are grouped in panels of 20-25 with an identical educational programme and evaluative tasks. If most of the panels come up with similar conclusions, one can be sure that this is or would be the will of the informed public. Planning cells require a large investment of time and money and are not suitable for all types of problems and all contexts. If the problem is highly technical, it may be impossible to bring citizens up to the necessary level of understanding. Furthermore, if the decision options are too narrowly restricted and there is not enough room to allow trade-offs on decision criteria, then the process will fail. In adversarial and often corporate settings, citizen panels can face problems in being legitimate consultants to policy makers, where organised stakeholders as well as elected officials may claim to represent the public interest. (The different cultural settings for regulatory styles are explained in Annex IV.) In corporate, consensual or fiduciary cultures, they have proven to produce valuable, creative, and well-balanced solutions to problems of ambiguity.

I.2   Communicating with the media

I.2.1 General Comment on public relation managers vs. risk communicators

There are many other forms of communicating with the media that belong to the area of public relations rather than risk communication. Public relation managers are experts in building bridges between the media and the managers of the communicating organisations; they cultivate contacts, make sure that the needs of the media are met, and provide background briefings for the journalists they trust.

I.2.2 Guidance on the use of specific types of approaches

Approach I: Press releases

A press release is a written communication between the risk communicator and the media. Most of the time, press releases are distributed to all the relevant media at the same time. One can also design special versions of press releases for different media types. A press release to a major tabloid may look different than a release sent to a specialised economic journal. One should be careful, however, in trying to anticipate the interest of the respective press organ. Many journalists are very sensitive to real or alleged attempts at manipulation.

Press releases should state the most important aspects in the beginning (the famous who, when, what, to which purpose, why) and the details at the end. With respect to risk communication, press releases do not lend themselves to educating the public about science, toxicology, probabilities, or complex regulatory issues. They should be linked to special events (otherwise they will be ignored), provide some background information as to why special decisions have been made, and add special context features such as legal requirements, past observations, and institutional responsibilities. Following is additional guidance:

XX.   *Devise different communication programmes for different target audiences.*

In addition to designing different texts for different media types, one can use 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 a daily newspaper may also include 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 specialised journals can be more problem oriented and offer a novel or interesting perspective in the analysis of the issue.

XXI.   *Be aware of the major selection rules of the media.*

The media reports about events, not continuous performance. Hardly any journalist is interested, for example, in writing a story about a long safety record of a product or a production process. If an accident happened or someone was affected by a chemical, even if somebody claims that a hazard is present, 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.

XXII.   *Use the media as resonance board for your risk communication programme.*

Press releases should be distributed through different channels and feedback communication should be stimulated and encouraged as much as possible. A good press release strategy 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. 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) provides valuable information about the comprehensibility of the original information and its effects on the receiver.

XXIII.   *Be careful in selecting the right cues for appealing to the peripheral audience without offending your central audience.*

Peripheral cues in press releases should be confined to commonly shared symbols, appealing formats, and a high degree of openness and honesty. They should definitely avoid negative labelling 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. (For further comment see Annex V.)

XXIV.   *Allocate enough time for packaging your message, but do not change your message in order to make the package more attractive (advertisement vs. information).*

The packaging of the message is important for the success of your press release. A good package implies that the formal requirements for a news story are met and that the message contains the relevant cues 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 compromised by adjusting it to the most attractive package. This is the major difference between advertising, where people do not expect strictly factual information but entertaining persuasion. Risk communication is based on different expectations: most receivers expect honest, clear, and complete information. This kind of information can 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.

Approach J: Press conferences

The second most popular form of communicating with the media is through press conferences. Journalists will only attend such conferences if they are sure to get new and newsworthy information there. Press conferences are mandatory in crisis situations. In direct contact with journalists, many risk managers have difficulty getting their messages across. Journalists are always eager to "squeeze" information from the risk manager and to lure them into making statements that they might regret later on. This is why press conferences should be organised and managed by the professional Press Office Manager of the organisation. They know the interests and the strategies played out by journalists and can provide training before the conference and protection during the conference. With respect to risk communication, the following guidance should be considered:

XXV.   *Focus on the event and its implications during a press conference.*

Press conferences as well as press releases are the wrong instruments for conveying detailed scientific background information or introductions to probabilistic reasoning. Journalists want to find out what happened, who was at fault, and what will be done next. You need to address these issues even if they are painful. Be precise, clear, and straightforward when responding to questions.

XXVI.   *Admit uncertainties and demonstrate concern for unknown impacts.*

There is nothing more detrimental than stating something is absolutely safe and then admitting later, that at the time of the statement, not all the information was available and the judgement had to be revised. The media expect fast and accurate responses. But you can allude to the remaining uncertainties as long as you assure the audience that your organisation is doing everything to reduce uncertainty and get more reliable information (see also section 2.3).

XXVII.   *Rely on systematic evidence and eyewitness reports.*

A 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). Information that emphasises the human component and personalises abstract material is more likely to be accepted by the media than documents about the sequence of events, the scientific background, or organisational competence. Therefore, risk communicators should try to find eyewitnesses for the message that they want to convey (for example people who had major benefits from a product, or people who have been saved due to present regulations etc.). 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. Journalists often associate good packaging with the intent to manipulate the audience.

I.3   Communicating with institutional stakeholders

The idea behind stakeholder involvement is to find a common understanding of the goals and visions for future development. 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 legitimising efforts of social forces in a plural society. At the same time, issues of ambiguity in risk management demand discourse-based activities. These activities reassure stakeholders that all views are being taken into account in order to provide sufficient incentives for reaching common ground or even a common consensus.

I.3.1   General Comments on cognition oriented, reflective, and participatory discourses

Relations with institutional stakeholders can endure over long periods of time, covering many different types of risk situations, and the interactions with them can take on a high profile for the organisation. Therefore, special care should be taken in choosing appropriate resources for these interactions and devoting the necessary level of attention to good organisational performance in these engagements.

The most important aspect to keep in mind is that stakeholder involvement is a form of risk communication that should be undertaken before any final decisions are made within the risk management process. Nobody likes to be involved to approve something that has been predetermined by the organiser. Timing of involvement is therefore a crucial task. Cognition-oriented (i.e. spread knowledge) discourses should be organised at the beginning of the process. Reflective discourses should be placed right after the completion of the assessment process, when it comes to balancing the pros and cons and choosing the right management options. Participatory discourses are more difficult to fit into the risk assessment and management schedule. It depends here on the nature of the ambiguity.

If the risk situation is one that is likely to be highly controversial, an early stage of involvement is recommended. If the ambiguities refer to specific management options (such as labelling versus risk reduction), the point at which those options are being generated and evaluated is obviously the best one for engagement in a participatory exercise.

The list of approaches that is described below is structured according to the three major goals of stakeholder involvement: reducing complexity, dealing with uncertainty, and coping with ambiguity. Since each of them refers to some form of consensus-seeking exercise, the practical guidance has been pooled at the end. This guidance applies to all approaches described in this section.

A discourse to get an agreement on the knowledge level may start with the following questions: What are the right criteria to characterise risks? What should be labelled an adverse effect? How should the exposure data be assessed? Which model of extrapolation from high dose to low dose should be used? These questions need input from experts, and the following approaches are available:

I.3.2 Guidance on the use of specific types of approaches

Approach K: Interactions with experts representing various Institutional Stakeholders

Approach K.1: Expert hearing

This is the most popular form of pointing out the different understandings of experts. Experts with different positions are asked to testify before the representatives of the organising institution (most often a regulatory agency). The organisers ask specific questions to each expert and let them develop their line of arguments. Occasionally, hearings allow for open discussions among the experts, but the final judgement is left to the organising committee. Hearings are excellent and fairly inexpensive approaches if the objective is to get a clearer picture of the variability of expert judgements and to become aware of the arguments supporting each position. Hearings do not provide consensus and may not resolve any conflict. However, they may clarify the basis of the conflict or the different points of view in a conflict. The authority of the organising institution to make the final judgement on the evidence presented depends on the legal power to make final judgements and the trust that society has invested in them. In low trust situations, hearings may be helpful, but they are insufficient to legitimise binding decisions.

Approach K.2: Expert committees

Expert committees, advisory boards, and scientific commissions are also very popular forms of involving external knowledge carriers in the risk management process. They have the advantage that experts can discuss freely with each other, have more time to learn from each other, and are able to consult other experts if deemed necessary. They work independently from the agency or organisation to which they report. The main disadvantage is that expert committees may not reach consensus, may take too much time in reaching a conclusion, may not respond to the urgent needs of the risk managers, and may "live a life of their own". In addition, many expert committees can only come to an agreement, if the members have similar backgrounds and positions. Thus, biased results may be the consequence. The public is also very sceptical when it comes to the legitimate power of these committees. In adversarial climates in particular, recommendations of expert committees do not carry much weight in the public eye.

Approach K.3: Expert consensus conference

In the medical field, experts gather in workshops to discuss treatment options and decide on a general standard that should be applied in comparable cases throughout the world. Workshops are organised into group sessions, to prepare common standards and in plenary sessions, to find a common agreement. One could envision consensus conferences in the risk area for the purpose of setting and articulating common conventions for risk assessment and evaluation.

Approach K.4: Delphi exercises

A Delphi exercise is aimed at reaching a clear distribution of opinions among a group of experts. The exercise is organised in four steps: In step 1, a questionnaire asking to assess the seriousness or the scope of a risk is sent to a group of distinguished scientists. The scientists provide their best estimate and assign a confidence interval to their answers. In step 2, the organising team feeds back to each participant the scores of the whole group, including medians, standard deviation, and aggregated confidence intervals. Each individual is then asked to perform the same task again, but now with the knowledge of the responses of all other participants. In step 3, this procedure is iterated until individuals no longer change their assessment. In step 4, the organiser summarises the results and articulates the conclusions.

A variation of the classic Delphi is the group Delphi. During a group Delphi, all participants meet face to face and make the assessments in randomly assigned small groups of three and four. The groups whose average scores deviate most from the median of all other groups are requested to defend their position in a plenary session. Then the small groups are reshuffled and perform the same task again. This process can be iterated three or four times until no further significant changes are made. At the end of a Delphi process, one gets either a normal distribution of assessments around a common median, a two- or three-peak distribution (signalling a majority and one or more minority votes) or a flat curve (which means that knowledge is insufficient to make any reliable assessment).

The advantage of Delphi is the serious effort invested into finding the common ground among experts and finding the reasons and arguments that cause differences in assessments. Their disadvantage is that they depend on the quality and completeness of the expertise and information brought into the process. There have been several positive experiences with Delphi exercises, in particular the group Delphi.

Approach L: Stakeholder hearings

Most regulatory institutions require hearings with stakeholders or directly affected citizens under specific circumstances. Such hearings can serve a useful purpose if they are meant to give external stakeholders the opportunity to voice their opinions and arguments. Hearings also provide opportunities for stakeholders to understand the position of the regulatory agencies or other direct players (such as industry). Hearings have

proven very ineffective, however, for resolving conflicts or pacifying heated debates. On the contrary, hearings normally aggravate the tone of the conflict and lead to polarisation. This is particularly the case in adversarial regulatory arenas. (The different types of regulatory styles are described in Annex IV.) Other than for the purpose of investigating the concerns and objections of organised groups, stakeholder hearings should be avoided.

Approach M: Round Tables (advisory committees, negotiated rule making)

Round Tables are very popular settings for stakeholder involvement in corporate and consensual regulatory arenas. Normally, the participants represent the major social groups such as employers, unions, professional associations, and others. The advantage is that the ritual window dressing activities (typical for classic hearings) can be overcome through the continuity of the process and a strict working atmosphere. The major disadvantage is that groups outside the Table and representatives of the general public are left out. They can only trust that the process is fair and effective.

If the debate is heated and adversarial elements govern the political climate, Round Tables will face severe difficulties in legitimising their agreements. For many regulatory issues and risk management decisions, however, such Round Tables have been very effective and also cost-efficient at bringing in the perspective of organised groups and suggesting adequate management options. There are also good techniques available (such as value-tree-analysis, multi-attribute-decision-structuring, meta-planning exercises) to make these heterogeneous group meetings more productive. Essential for organising a successful Round Table is the involvement of a professional moderator. The moderator function should be performed by a neutral institution rather than by the organiser.

Approach N: Mediation (arbitration, alternate dispute resolution methods)

If conflicts are already clearly visible and unavoidable, the procedures of alternate dispute resolution are effective and also less costly instruments compared to legal litigation. Mediation and similar procedures rest on the assumption that stakeholders can find a common solution, if they do not insist on positions but try to meet their crucial interests and underlying values. Under these circumstances win-win solutions may be available that would please all parties. Mediation requires the involvement of a skilled and professional mediator. Similar to Round Tables, such mediators should be recruited from neutral professional services. It is advisable, that the mediator has sufficient knowledge about the issue to understand and evaluate all participants' statements but not a clear commitment to one side or the other.

The advantage of mediation is that conflicts among participants can be reconciled before they reach the legal arena. The disadvantage is that depending on the composition of the group, interests not present at the Table will not be considered. Most alternate dispute resolution methods work well under the condition of adversarial and corporate styles; they may be unnecessary in more trustful environments where conflicts are rare and stakeholders less agitated.

I.3.3 Guidance for organising discourses

In common among all these approaches is that the participants meet to have a discourse on open questions. The main structuring advice is to give all participating individuals the feeling that they have something to contribute, that their opinion counts, but that there is also a need for mutual learning and creative consensus building. The following guidance may help organisers of such discourses to make them more effective and productive:

XXVIII.   *Try to find out the basic perceptions of the risk issue under dispute among the stakeholders or the participants of the discourse.*

One way of expanding your knowledge about the concerns of participating stakeholders and members of the public is to focus on face-to-face, in-depth ethnographic interviews with experts on one side and targeted groups or stakeholders on the other. The interviews are then used to steer the drafting of the textual risk communication message as well as the agenda for the discourse setting that was selected. This approach is a more recent risk communication tool and is presently being successfully used in practical and theoretical settings in North America.

XXIX.   *Make sure that whatever discourse you are organising all participants must be aware of the common mandate and the objectives of the deliberations.*

Participation of stakeholders and the public 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 authority (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 is reached. As a pre-decisional setting, 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.

XXX.   *Make sure that there is still openness with respect to the options discussed in the discourse.*

Discourses will never accomplish their goal if a decision has been made beforehand (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.

XXXI.   *Make sure that all participants are aware of the legitimate options and the permissible outcomes of such a process.*

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 product is already on the market and fully licensed, the discourse can only focus on issues such as labelling, voluntary actions, or long-term substitution plans. But the range of permissible options should be large enough to provide a real choice situation to the participants.

XXXII.   *Make sure you allocate sufficient time for the discourse but also definite time limits.*

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.

XXXIII.   *Treat all members of the discourse with mutual respect and give them equal opportunities to make claims and react to claims by others.*

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 superior 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.

XXXIV. *Be sure to engage a professional, neutral, and knowledgeable moderator or mediator.*

The mediator or moderator who facilitates such a process should be neutral in that position and respected and authorised by all participants. Any attempt to restrict the manoeuvrability of the mediator should be strictly avoided.

I.3.4 Guidance for facilitating a productive discussion

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

XXXV. *Make sure to create an atmosphere where all participants can engage in a mutual learning experience.*

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.

XXXVI. *Make sure that all parties have the opportunity to include their knowledge and experience.*

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 generalised evidence based on abstract knowledge. A dialogue between these two modes is rarely accomplished; often experts regard personal evidence as a typical response of irrationality. The public representatives often perceive the experts as uncompassionate technocrats who know all the statistics, but who do not care whether 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 empathise with the other party's view. Role-playing can facilitate that understanding. Resolving alleged irrationalities means to discover the hidden rationality in the argument of the other party.

XXXVII. *Make sure that all participants refrain from "moralising" each other.*

The individuals involved in a discourse should agree in advance to refrain from moralising each other or each other's position. Moral judgements on positions or persons impede communication and hamper one's ability to negotiate. Consensus is almost never reached between an allegedly moral position and a party's immoral position. A second undesired result of moralising is the violation of the equality principle stated above. Nobody can assign equal status to a party, which is allegedly morally inferior. Finally, moralising 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 moralising other parties or their position does not mean to refrain from using a moral judgement as a basis for

one's position, such as "this solution does not seem fair to the future generation" or "we should conserve this ecosystem for its own sake". Scientific information alone cannot dictate all there is to know and consider about a risk. Indeed, moral arguments are essential for resolving risk disputes.

I.4 Approaches to evaluation of risk communication programmes

With respect to the s*tudy design for evaluation of risk communication programmes,* crucial issues include: the specification of target populations (representing all relevant parties in the communication process); the design for tests and re-tests; appropriate timing of data collections; and the inclusion of control groups. There are two focal issues of causality to be considered:

- showing that intended effects are actually induced by the intervention under examination (and not other concurring extraneous influences);

- clarifying whether unintended impacts are caused by the programme.

Approach O: Pre-test of the material or the discourse procedure

It is highly recommended to undertake pre-tests of all risk communication programmes as a means to optimise the material and to enhance the probability for an effective exchange of information. It is often difficult to understand why organisations spend millions for elaborate risk communication programmes without ever testing the effectiveness of the programme in advance. Such pre-testing can take different forms depending on the size, the format, and the purpose of the communication. Organising focus groups appears to be the most effective and cost-efficient way of pre-testing material. Simulations and role-plays are excellent settings for testing key messages. Pre-tests are not very expensive and should be a mandatory element of any risk communication programme.

Approach P: Systematic feedback from users of communication material

This is a low-budget option if there is not enough money for a more comprehensive evaluation programme. Feedback can be collected in almost all forms of communication. Attach a response sheet to all written information, provide a feedback channel on all Internet presentations, hand out evaluation sheets on personal presentations, and make sure you operate an open forum on the Internet. In addition, most PR-departments conduct systematic evaluations of press coverage and letters to the editor. This material can also be used by a risk communicator to collect and process feedback. One should be aware, however, that these feedback channels are systematically biased. People who love or hate the communication effort are more likely to respond than people in the middle. All respondents with lots of free time are also over-represented. Being aware of these biases helps risk communicators avoid misinterpretation.

A specific form of feedback analysis, often used by industry and governments, is the tracking and analysis of media coverage of salient issues. The results can be very valuable in the design and redesign of message content and message delivery. This type of feedback is most useful when it is gathered and analysed systematically over extensive periods of time.

Approach Q: Experimental designs

The classic form of evaluation is the social experiment. One group is exposed to the risk communication programme (stimulus) while another group, the so-called control group, is being surveyed without the stimulus being present. For many risk communication purposes, an elaborated experimental design with many stimuli and different approaches appears to be an "overkill" in terms of evaluating a single programme. However, it would be wise to spend research resources on generic risk communication

problems such as finding the most effective way to convey probabilistic reasoning or searching for the most intuitively appealing process of putting risks in perspective.

Approach R: Surveys and polls

One of the most popular forms of evaluation is the organisation of surveys among the target population. Systematic surveys are the only means of getting a representative cross-section of the people who have been exposed to the communication. There is not much value in conducting surveys of the total population (although polling companies will tell you otherwise), unless you had launched a nation-wide, multi-channel communication programme. Rather, risk communicators should direct the questionnaire to the targeted audiences. Members of the audience will be the only ones directly exposed to your programme. Even then, most of the audience may not remember anything if asked some time after the event. In contemporary societies there is an abundance of information floating around. More than 99% of everything that one receives is forgotten within minutes or hours.

Approach S: Internet chat rooms

Internet chat rooms can be used for three purposes: first, to get a message to the consumers; second, to engage in a dialogue with the consumers; and third, to collect and process information about one's own performance. There are software programmes available that analyse website users and show their profile. In addition, a chat room provides direct opportunities for communication partners to voice their impressions and to critique the communication effort. Although such critique may not be systematic and representative, it is a fast, effective, and fairly inexpensive way to get an evaluation from the targeted audience.

Approach T: Supervision and training

Risk communicators who have personal contacts with the targeted audience or moderate stakeholder involvement sessions need continuous training and advice. Training courses as well as role exercises are an effective means to be better prepared for face-to-face interactions. In addition, communicators who are highly visible in the public eye and are faced with numerous requests for participating in TV shows or public forums, are advised to engage a professional supervisor. Supervisors watch all appearances, analyse each performance, provide detailed critique, and train the communicator, giving special consideration to his or her special talents and shortcomings. Supervising is not cheap but it may help to save a lot of resources if the front man or woman of an organisation is well trained for the public communication arenas.

ANNEX II: ENHANCING TRUST AND CREDIBILITY

With the advent of ever more complex technologies and the progression of scientific methods to detect even the smallest quantities of harmful substances, personal experience of risk is being replaced more and more 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 while distrust leads people to oppose risks, even when they are perceived as small. Indeed, some research clearly shows that there is a direct correlation between low perceived risk and public trust.

Trust can be divided in six components. These components are listed and explained in Table II.1. 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 can 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 behavioural responses.

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 legitimize 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 (labelling 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 against.

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 mobilisation 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 the likelihood of them becoming 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 behavioural responses. Public confidence in institutional performance is another and even more important element in triggering behavioural responses.

TABLE II.1: 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	Acknowledgement and adequate representation of all relevant points of view
Consistency	Predictability of arguments and behaviour based on past experience and previous communication efforts
Sincerity	Honesty and openness
Faith	Perception of "good will" in performance and communication

Establishing and gaining trust is a complex task that cannot be accomplished simply by applying certain operational guidance (such as declaring empathy) in a mechanical fashion. There is no simple formula for producing trust. *Trust grows with the experience of trustworthiness.* Nobody will read a brochure, attend a lecture, or participate in a dialogue if the purpose is solely to enhance trust in the communicator. Trust is the invisible product of a successful and effective communication on issues and concerns. The less the word is alluded to in a communication, the more likely it is that trust will be sustained or generated.

There is only one general rule for building trust: listening to public concerns and, if demanded, getting involved in two-way communication. Information alone is never sufficient at building or sustaining trust. Without systematic feedback and dialogue there will be no atmosphere in which trust can grow.

ANNEX III: COMPLEXITY, UNCERTAINTY, AND AMBIGUITY

A more detailed approach to analysing different types of risks refers to the three major challenges of complexity, uncertainty, and ambiguity.

Complexity refers to the difficulty of identifying and quantifying causal links between a multitude of potential candidates and specific adverse effects. The nature of this difficulty may be traced back to interactive effects among these candidates (synergisms and antagonisms), positive and negative feedback loops, long delay periods between cause and effect, inter-individual variation, intervening variables, and others. It is precisely these complexities that make sophisticated scientific investigations necessary since the dose-effect relationship is neither obvious nor directly observable. Nonlinear response functions may also result from feedback loops that constitute a complex web of intervening variables. Complexity requires therefore sensitivity to non-linear transitions as well as to scale (on different levels). It also needs to take into account a multitude of exposure pathways and the composite effects of other agents that are present in the exposure situation. Under these conditions, scientific models of risk assessment (including hazard identification, exposure characterization, risk characterization and risk quantification) are the most appropriate instruments to gain a better (but never) complete picture of the relative risks associated with these complex causal chains. To communicate complexity, scientific expertise and technical skills are needed. Uncertainty is different from complexity. It is obvious that probabilities themselves represent only an approximation to predict uncertain events. These predictions are characterised by additional components of uncertainty, which have been labelled with a variety of terms in the literature such as ignorance, indeterminacy, incertitude, and others. All these different elements have one feature in common: uncertainty reduces the strength of confidence in the estimated cause and effect chain. If complexity cannot be resolved by scientific methods, uncertainty increases. Even simple relationships, however, may be associated with high uncertainty if either the knowledge base is missing or the effect is stochastic by its own nature. If uncertainty plays a large role, in particular indeterminacy or lack of knowledge, the public becomes concerned about the possible impacts of the risk. These concerns express themselves in the request to be consulted when choosing management options. Uncertainty comprises different and distinct components. These can be classified as follows:

- *variability:* observed or predicted variation of individual responses to an identical stimulus among the individual targets within a relevant population such as humans, animals, plants, landscapes, etc.; in risk management, safety factors have been used to cover this variability;

- *measurement errors:* imprecision or imperfection of measurement, problems of drawing inferences from small statistical samples, extrapolation from animal data, bio-surveys or other experimental data onto humans, uncertainties of modeling, including the choice of functional relationships for extrapolating from large to small doses; all of these usually expressed through statistical confidence intervals;

- *indeterminacy:* resulting from a genuine stochastic relationship between cause and effect(s), apparently non-causal or non-cyclical random events, or badly understood non-linear, chaotic relationships;

      − *lack of knowledge:* resulting from ignorance, from the deliberate definition of system boundaries and hence exclusion from external influences, measurement impossibilities, and others.

The last term in this context is ambiguity. This term denotes the variability of (legitimate) interpretations based on identical observations or data assessments. Most of the scientific disputes in the fields of risk analysis and management do nor refer to differences in methodology, measurements, or dose-response functions, but to the question of what all this means for human health and environmental protection. Hazard data is hardly disputed. Most experts debate, however, whether a specific hazard poses a serious threat to the environment or to human health.

How can risk communicators deal with complexity, uncertainty, and ambiguity in risk communication, in particular if there are signs of dissent and conflict concerning one or all three aspects of risk? The first challenge is complexity. Resolving conflicts of complexity requires deliberation among experts. Within a discourse which focuses on cognition, experts (not necessarily scientists) argue over the factual assessment with respect to the criteria that are proposed. The objective of such a discourse is the most adequate description or explanation of a phenomenon (for example, the question of which consequences should be labelled as adverse). The more complex, the more multi-disciplinary, and the more uncertain a phenomenon appears to be, the more necessary a communicative exchange of arguments among experts occurs.

If risks are associated with high uncertainty, scientific input is only the first step of a more complex evaluation procedure. It is still essential to compile the relevant data and the various arguments for the positions of the different science camps. However, coping with uncertainties requires the inclusion of stakeholders and public interest groups, if there are different views in society about the adequate level of protection. The objective of this discourse is to find the right balance between too little and too much protection. There is no scientific answer to this question and even economic balancing procedures are of limited value, since the stakes are uncertain. This type of deliberation may be coined "reflective discourse". *Reflective discourse* deals with the clarification of knowledge (similar to the cognition-oriented) and the assessment of trade-offs between the competing extremes of over- and under-protection. Reflective discourses are mainly appropriate as means to decide on risk-averse or risk-prone approaches to innovations and new products.

The last type of deliberation, which may be called *participatory discourse,* is focused on resolving ambiguities and differences about values. Established procedures of legal decision-making, but also novel procedures, such as mediation (procedure of conflict resolution by reconciliation of interests) and direct citizen participation belong to this category. Participatory discourses are mainly appropriate as a means to search for solutions that are compatible with the interests and values of the people affected. Also, to resolve conflicts among them. This discourse involves weighting of the evaluative criteria and an interpretation of the results. Issues of fairness and environmental justice, visions on future technological developments, and societal change and preferences about desirable lifestyles and community life, play a major role in these debates.

It is clear that these different types of discourse need to be combined or even integrated when it comes to highly controversial risks. Our experiences, however, have been that it is essential to distinguish the type of discourse that is needed to resolve the issue in question. Cognitive questions, such as the right extrapolation method for using animal data should not be resolved in a participatory discourse. It seems advisable to separate the treatment of complexity, uncertainty, and ambiguity in different discourse activities, since they need other forms of resolution. Often they need different participants, too.

ANNEX IV: ASSESSING THE SOCIO-POLITICAL AND CULTURAL CONTEXT OF AN INTENDED AUDIENCE

One of the most important context variables refers to the socio-cultural conditions under which the risk communication programme is launched. Most analysts agree that many of the cognitive factors that govern risk perception are similar throughout the world. In addition, risk management styles are also becoming more homogenous as the world becomes more globalised. In spite of the distinct cultural differences among nations and the variations with respect to educational systems, research organisations, and structures of scientific institutions, regulation of risks has become a universal enterprise in which nationality, cultural background, or institutional setting, play a minor role only. This is particularly due to the role of science in proposing and justifying regulatory standards. Research establishments as well as universities have evolved into multinational and cosmopolitan institutions that speak identical or at least similar languages and exchange ideas on world-wide communication networks.

This is not to say that national culture and heritage have not formed individual scientists and influenced their style of research and writing. As a collective enterprise, however, science has become one of the most powerful and effective agents for providing a universal base for generating and evaluating systematic knowledge. If "hard" evidence is needed anywhere in the world, one can be sure that scientists will be involved in providing the expertise, and that this expertise will be constructed and challenged on the ground of internationally accepted rules of inquiry.

Risk management depends not only on scientific input, rather it rests on three components: knowledge, legally prescribed procedures, and social values. Even if the same knowledge is processed by different regulatory styles, the prescriptions may differ in many aspects concerning selection rules, interpretative frames, different action plans for dealing with evidence, and others. National culture, political traditions, and social norms influence the mechanisms and institutions for integrating knowledge and expertise in the policy arenas. Policy analysts have developed a classification of governmental styles that highlight different clusters in applying these four sets of characteristics. These styles have been labelled inconsistently in the literature, but they refer to common procedures in different nations. These styles are summarised in Table IV.1.

Table IV.1: **Characteristics of policy making styles**

Style	Characteristics	Role of risk communication
Adversarial approach	open for professional and public scrutiny	main emphasis on mutual agreements on scientific evidence and pragmatic knowledge
	need for scientific justification of policy selection	integration of adversarial positions through formal rules (due process)
	precise procedural rules	little emphasis on personal judgement and reflection on the side of the risk managers
	oriented towards producing informed decisions by plural actors	stakeholder involvement essential for reaching communication objectives
Fiduciary approach (patronage)	closed circle of "patrons"	main emphasis on enlightenment and background knowledge through experts

	no public control, but public input	strong reliance on institutional in-house "expertise"
	hardly any procedural rules	emphasis on demonstrating trustworthiness
	oriented towards producing faith in the system	communication focused on institutional performance and "good record"
Consensual approach	open to members of the "club"	reputation most important attribute
	negotiations behind closed doors	strong reliance on key social actors (also non-scientific experts)
	flexible procedural rules	emphasis on demonstrating social consensus
	oriented towards producing solidarity with the club	communication focused on support by key actors
Corporative approach	open to interest groups and experts	main emphasis on expert judgement and demonstrating political prudence
	limited public control, but high visibility	strong reliance on impartiality of risk information and evaluation
	strict procedural rules outside of negotiating table	integration by bargaining within scientifically determined limits
	oriented towards sustaining trust to the decision making body	communication focused on fair representation of major societal interests

The *adversarial approach* is characterised by an open forum in which different actors compete for social and political influence in the respective policy arena. The actors in such an arena use and need scientific evidence to support their position. Policy makers place specific attention on formal proofs of evidence, as their decisions can be challenged by social groups on the basis of insufficient use or negligence of scientific knowledge.

Risk communication is essential for risk regulation in an adversarial setting. First, all stakeholders regard it as their right to be informed about all potential side effects. Furthermore, they demand to be consulted within the deliberation process. Even if the debate is only about factual issues, stakeholder involvement is a mandatory element of risk management within this socio-political context.

The strongest contrast to the adversarial approach is provided by the *fiduciary approach*. The decision making process is confined to a group of patrons who are obliged to make the "common good" the guiding principle of their action. Public scrutiny or involvement of the affected public are both alien to this approach. The public can provide input to and arguments for the patrons but is not allowed to be part of the negotiation or policy formulation process. The system relies on producing faith in the competence and the fairness of the patrons involved in the decision making process. Advisors are selected according to national prestige or personal affiliations. In this political context, stakeholder involvement may even be regarded as a sign of weakness or a denial of personal accountability. Risk communication in this context should be focused on ensuring the public that the risk management agencies have the scientific potential, the institutional means, and the societal credibility to deal with all risk effectively.

The two remaining styles are similar in their structure but they are not identical. The *consensual approach* is based on a closed circle of influential actors who negotiate behind closed doors: social groups and scientists work together to reach a predefined goal. Controversy is not present and conflicts are reconciled on a one-to-one basis before formal negotiations take place. Risk communication in this context serves two major goals: it is supposed to reassure the public that the "club" acts in the best interest of the public good and to convey the feeling that the relevant voices have been heard and are adequately considered. Stakeholder participation is only required to the extent that the club needs further insights from the affected groups or if the composition of the club is challenged.

The *corporative approach* is similar to the consensual approach, but is far more formalised. Well-known experts are invited to join a group of carefully selected policy makers representing the major forces in society (such as employers, unions, churches, professional associations, environmentalists). Similar to the consensual approach, risk communication is mainly addressed to the outsiders: they should gain the impression that the club is open to all "reasonable" public demands and that it tries to find a fair compromise between protection and innovation. Often, the groups represented within the club are asked to organise their own risk communication programmes as a means to enhance the credibility of the whole management process.

These four approaches cannot be found in pure form in any country. However, using such prototypes is helpful in characterising and analysing different approaches to policy making. The American system is oriented towards the adversarial approach, the Japanese system is characterised by a strong consensual mode of using expertise. The policy approach of northern Europe comes closest to the corporative approach, whereas most southern European countries exercise a fiduciary approach. All these systems are in transition, however. Fiduciary approaches tend to become more corporative, and those tend to become more adversarial. One interesting fact is that the United States is trying to incorporate more consensual policies into its adversarial system, while Japan is faced with increasing demands for more public involvement in the policy process.

ANNEX V: HOW TO DIFFERENTIATE AMONG VARIOUS AUDIENCES

For risk communication to be effective, one needs to be aware of the different types of audiences that one wishes to address. For practical purposes, it is helpful to have a classification of potential audiences at hand. The classification that is offered here refers to two dimensions: the interest of the audience in the subject and the type of arguments that different audiences may find appealing or, for that matter, appalling. For the first classification, i.e. specifying different degrees of interest, our preferred choice is the "elaboration-likelihood model of persuasion," developed by Petty and Cacioppo in the late 1970s. 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? According to the two authors, route selection depends on two factors: *ability and motivation. Ability* refers to the physical availability of the receiver to follow the message without distraction, *motivation* to the readiness and interest of the receiver to process the message. The central route is taken when the receiver is able and highly motivated to listen to the information; 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. One can order the cues into four categories: *source-related, message-related, transmitter-related, and context-related cues.* These are illustrated in the following Table V.1.

Within each route, the mental process of forming an attitude follows a different procedure. The central route is characterised by a systematic procedure of selecting arguments, evaluating their content, balancing the pros and cons, and forming an attitude. The peripheral route, however, bypasses the systematic approach and assigns credibility to a message by referring to the presence of cues.

TABLE V.1: Clues relevant for peripheral communication

Type	*Examples*
Source-related	credibility, reputation, social attractiveness, perceived impartiality
Message-related	length, number of arguments, package such as colour, paper, graphical appeal, illustrations, layout, presence of highly appreciated symbolic signals
Transmitter-related	perceived neutrality, past performance of transmitter, perceived credibility, reputation
Context-related	crisis situation, conflict situation, dependence on "zeitgeist", social and cultural setting, circumstances of transmission

Unfortunately, the communication process is more complex than the model implies. First, the audience of a communicator may be mixed and consist of persons with central and peripheral interests in the subject. Many cues that are deliberately used to stir peripheral interest (e.g., using advertising methods for risk communication) can be offensive for people with a central interest in the subject. Second, most people are not predisposed to exercise a central or peripheral interest in a subject. Rather, it may depend on the message itself whether it can trigger central interest or not. Third, and most important, the two routes are prototypes of attitude formation and change, and therefore only analytically separable. In reality, the two routes are intertwined: persons may tend to respond primarily to the cues or primarily to the arguments presented, but they will not exclusively pursue one route or the other.

An effective risk communication programme must therefore contain a sufficient number 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 arguments. The problem can be resolved if the message eschews "obvious" cues, but includes cues that are acceptable for both types of audiences.

What cues are acceptable for both audiences? First, cues that make information easier to understand, digest, and apply are always appreciated by both audiences. Second, cues that relate to commonly shared beliefs and values will enhance the interest of the centrally concerned receiver and improves the chance for finding attention among the peripherally concerned receivers. Third, cues that link highly esteemed individuals, groups, or institutions to the issue will normally be welcomed by both groups, unless the link appears unnatural (for example, having a well-known football player advertise nuclear power).

ANNEX VI: HOW TO ADDRESS DIFFERENT SUBCULTURES IN SOCIETY

Another major problem of risk communication is tailoring the content of the communication process to the interests and concerns of the different social and cultural groups within a society. Tailoring the context is not only a pathway to avoid the fuzziness of peripheral cues in persuasion, but also to address the arguments that the audience understands and finds "acceptable"(see Annex V). Often, using too few words without much further thought may ignite public outrage; whereas long arguments may not be followed by those who are centrally interested in the subject. Again, it is futile to find a classification that provides a full representation of all potential audience types. But it has been helpful to work with a classification that has been labelled "cultural approach to risk".

Aaron Wildavsky, Mary Douglas, and Michael Thompson have investigated the social response to risk and identified four to five patterns of value clusters that separate different groups in society from each other. These different groups form specific positions on risk topics and develop corresponding attitudes and strategies. They differ in the degree of *group* cohesiveness (the extent to which someone finds identity in a social group), and the degree of *grid* (the extent to which someone accepts and respects a formal system of hierarchy and procedural rules).

This theory has been criticised on several grounds. This is not the place to review the critical remarks and the counter-evidence provided by many scholars. The debate is still proceeding without clear consensus in sight. Most risk communicators have assured us, however, that this classification has helped them tremendously in preparing communication programmes for different audiences. There is sufficient anecdotal evidence that people with an entrepreneurial attitude react very differently to specific arguments compared to people with an egalitarian or bureaucratic attitude. For example, a reference to cost-benefit ratios makes perfect sense when presented to an audience of entrepreneurs but would trigger outrage when being referred to in a group of egalitarians.

There are four major groups in modern society that are likely to enter the risk arena as stakeholders or as passive audiences: entrepreneurs, egalitarians, bureaucrats, and stratified individuals. They can be localised within the group-grid space (see Figure VI.1). Organisations or social groups belonging to the *entrepreneurial* prototype perceive risk taking as an opportunity to succeed in a competitive market and to pursue their personal goals. They are characterised by a low degree of hierarchy and a low degree of cohesion. They are less concerned about equity issues and would like the government to refrain from extensive regulation or risk management efforts. This group contrasts most with organisations or groups belonging to the *egalitarian* prototype, which emphasises co-operation and equality rather than competition and freedom. Egalitarians are also characterised by low hierarchy, but have developed a strong sense of group cohesiveness and solidarity. When facing risks, they tend to focus on long-term effects of human activities and are more likely to abandon an activity (even if they perceive it as beneficial to them) than to take chances. They are particularly concerned about equity.
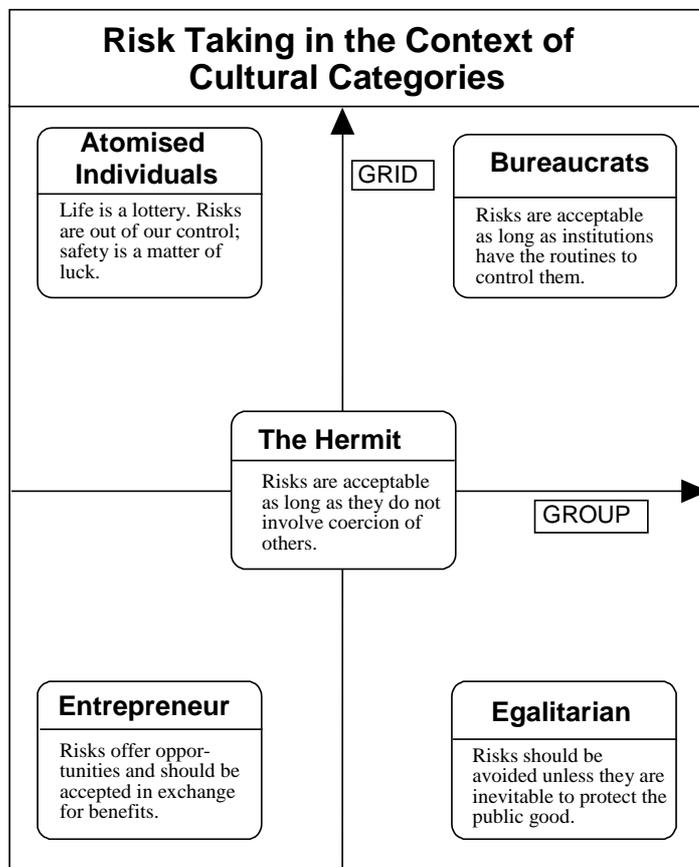
The third prototype, i.e. the *bureaucrats,* relies on rules and procedures to cope with uncertainty. Bureaucrats are both, hierarchical and cohesive in their group relations. As long as risks are managed by a

capable institution and coping strategies have been provided for all eventualities, there is no need to worry about risks.

Bureaucrats believe in the effectiveness of organisational skills and practices and regard a problem as solved when a procedure to deal with its institutional management is in place. The fourth prototype, the group of *atomised or stratified individuals,* principally believes in hierarchy, but they do not identify with the hierarchy to which they belong. These people trust only themselves, are often confused about risk issues, and are likely to take high risks for themselves, but oppose any risk that they feel is imposed on them. At the same time, however, they see life as a lottery and are often unable to link harm to a concrete cause.

In addition to the four prototypes, a hybrid group called the *hermits* can be grouped at in the centre of the group-grid co-ordinates. Thompson describes autonomous individuals as self-centred hermits and short-term risk evaluators. They can also be referred to as potential mediators in risk conflicts, since they build multiple alliances to the four other groups and believe in hierarchy only if they can relate the authority to superior performance or knowledge.

Figure VI.1

Risk Taking in the Context of Cultural Categories

| Atomised Individuals | GRID | Bureaucrats |
| Life is a lottery. Risks are out of our control; safety is a matter of luck. | | Risks are acceptable as long as institutions have the routines to control them. |

The Hermit
Risks are acceptable as long as they do not involve coercion of others.

GROUP

| Entrepreneur | Egalitarian |
| Risks offer opportunities and should be accepted in exchange for benefits. | Risks should be avoided unless they are inevitable to protect the public good. |

REFERENCES

A risk communication bibliography is given in the OECD Background Paper published in 2000, Risk Communication for Chemical Product Risks. Renn. O., Kastenholz, H. in co-operation with A. Brüggemann, P. Gray, C. Henschel, B. Rohrmann, P. Wiedemann. BgVV, Berlin. It is available electronically at: *(http://www.bgvv.de/publikationen/sonstige/index-e.htm)*.

Further references are:

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

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.

Bennett, P. and Calman, K. (1999). *Risk Communication and Public Health.* Oxford University Press, Oxford, pp. 272.

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

Chemical Manufacturers' Association (1988). *Title III Community Awareness Workbook.* Chemical Manufacturers' Association, Washington, D.C., pp. 74.

Chemical Manufacturers' Association (1991). *Crisis Management Planning Manual for the Chemical Manufacturing Industry.* CMA, Washington, D.C., pp. 82.

Chemical Manufacturers' Association (1992). *Community Emergency Response Exercises Guidebook.* CMA, Washington, D.C., pp. 62.

Chemical Manufacturer's Association (1994). *Community Advisory Panel Handbook.* CMA, Washington, D.C.

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 Programme, Rutgers University, New Brunswick, New Jersey, pp. 9.

Chess, C. (1992). *How to plan for Communication with the Public: Development of a Seminar for Environmental Managers.* Environmental Communication Research Programme, Rutgers University, New Brunswick, New Jersey, pp. 45.

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 Programme, Rutgers University, New Brunswick, New Jersey, pp. 30.

Chess, C., Hance, B.J. and Sandman, P.M. (1989). *Planning Dialogue with Communities: A Risk Communication Workbook.* Environmental Communication Research Programme, Rutgers University, New Brunswick, New Jersey, pp. 40.

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.

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.

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)

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.

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.

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.

Douglas, M. and Wildavsky, A. (1982). Risk and Culture. Berkeley: University of California Press.

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.

Fearn-Banks, K. (1996a). *Crisis Communications: A Case book Approach.* Lawrence Erlbaum Associates, Mahwah, New Jersey, pp. 330.

Gottschalk, J.A. (ed.) (1993). *Crisis Response: Inside Stories on Managing Image under Siege.* Visible Ink Press, Detroit, pp.463.

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. Kluwer Academic Publishers, Dordrecht, pp.409.

Gutteling, J.M. and Wiegman, O. (1996). *Exploring Risk Communication.* Kluwer Academic Publishers, Dordrecht, pp. 221.

Hance, B.J., Chess, C. and Sandman, P.M. (1988). *Improving Dialogue with Communities: A Risk Communication Manual for Government.* Environmental Communication Research Programme, Rutgers University, New Brunswick, New Jersey, pp. c. 91.

Henry, R.A. (2000). You´d better have a hose if you want to put out the fire. Professional Tips, Tactics, Dos, Don´ts and Case Histories. Windsor: Gollywobler Productions.

Interdepartmental Liaison Group on Risk Assessment (ILGRA) (1998). Risk Communication. A Guide to Regulatory Practice. Health and Safety Executive, London, pp. 22.

Kasperson, R.E., Renn, O., Slovic, P. et al (1988). The social amplification of risk: a conceptual framework. *Risk Analysis*, Vol. 8 (2), 1988, pp 177-187.

Leiss, W. (2001). *In the Chamber of Risks: Understanding Risk Controversies.* Montréal: McGill-Queen's University Press.

Leiss, W. and C. Chociolko (1994). *Risk and Responsibility.* Montréal: McGill-Queen's University Press.

Leiss, W. (ed) (1989). *Prospects and Problems in Risk Communication.* Waterloo, Ontario (Canada): University of Waterloo Press, Canada.

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.

Lundgren, R.E. (1994). *Risk Communication: A Handbook for Communicating Environmental, Safety, and Health Risks.* Battelle Press, Columbus, Ohio, pp. 175.

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.

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.

Morgan, M.G., Fischhoff, B., Bostrom, A., Lave, L., Atman, C. (1992). Communicating risk to the public. *Environmental Science and Technology*, 26 (11), pp. 2049-2056.

Morgan, M.G., Fishhoff, B., Bostrom, A., Atmann, C.J. (2001). Risk Communication. A Mental Model Approach. Cambridge: Cambridge University Press.

Mulligan, J., McCoy, E., Griffiths, A. (1998). *Principles of Communicating Risks.* The Macleod Institute for Environmental Analysis, University of Calgary, Alberta, pp. 57.

National Research Council (1989). *Improving Risk Communication.* National Academy Press, Washington, D.C., pp. 332.

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.

Obermeier, O.-P. (1999). *Die Kunst der Risikokommunikation (The Art of Risk Communication).* Gerling Akademie Verlag, München, pp. 211.

Office of Intergovernmental and Public Accountability (EM-22), US DOE (Undated). *How to Design a Public Accountability Programme.* US Department of Energy (DOE), Office EM-22.

Powell, D. and W. Leiss (1997). *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication.* Montréal: McGill-Queen's University Press.

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

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.

Renn, O., Webler, T. and Wiedemann, P. (eds.) (1995). Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse. Kluwer, Dordrecht, pp. 381.

Sadar, A.J., and Shull, M.D. (2000). Environmental Risk Communication. Principles and Practices for Industry. Boca Raton: Lewis Publishers.

Sopow, E. (1994). *The Critical Issues Audit.* Issue Action Publications, 207 Loudon St., SE, Leesburg, VA 20175, pp. 122.

Susskind, L. and Field, P. (1996). *Dealing with an Angry Public: The Mutual Gains Approach to Resolving Disputes.* Free Press, New York, pp. 276.

UK Department of Health (1998). *Communicating About Risks to Health: Pointers to Good Practice.* UK Department of Health, London, pp. 30 (ISBN 0113222572)

Verband der Chemischen Industrie (1994). *Leitfaden "Krisenmanagement" für die Öffentlichkeitsarbeit (Guidelines on crisis management for public relations work).* VCI, Frankfurt, pp. 15.

Viscusi, W.K. (1993). *Product-risk labelling. 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.

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

Wildavsky, A.,and Dake, K. (1990). Theories of Risk Perception: Who Fears? What and Why? Daedalus, Vol 119 (4), pp. 41-60.

Wildavsy, A. (1995). But is it rue? A Citizen´s Guide to environmental health and safety issues. Cambridge: Harvard University Press.Wiedemann, P.M., Carius, R., Henschel, C., Kastenholz,

H., Nothdurft, W., Ruff, F. and Uth, H.-J. et al. (2000). *Risikommunikation für Unternehmen: Ein Leitfaden (A Guide to Risk Communication for Companies).* Verein Deutscher Ingenieure. VDI-Verlag, Düsseldorf, pp. 101.

Wogalter, M.S., DeJoy, D.M. and Laughery, K.R. (eds.) (1999). *Warnings and Risk Communication.* Taylor and Francis, London/ Philadelphia, pp. 365.