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S H A P E – R I S K

SHARING EXPERIENCE ON RISK MANAGEMENT (HEALTH, SAFETY AND ENVIRONMENT) TO DESIGN FUTURE INDUSTRIAL SYSTEMS

Co-ordination Action

Priority 3 : **Nano-technologies and nano-sciences, knowledge-based multifunctional materials, and new production processes and devices – 'NMP'**

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Synthesis document on WP 6

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WP 6	Public Perception and Communication of Risk

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Abstract

The present report represents the final deliverable of SHAPERISK WP6 and addresses the main mechanisms which are at the basis of the perception of risks, and the risk communication strategies and practices to establish public trust of certain industrial activities, and to promote public participation. The main intention is to devise a framework document on the abovementioned issues, to gather the information necessary to produce an up-to-date, state-of-the-art document on risk perception studies and risk communication practices in the EU. An exhaustive list of relevant publications, relevant organisations and specific documentation was produced, analysed and annexed to this report.

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Summary

Work Package 6 of SHAPE-RISK focused on public perception and communication of risk, which are fundamental aspects in any risk management processes. In this sense the activities conducted within this Work Package are entirely in the scope of SHAPE-RISK, which aims at optimising the efficiency of integrated risk management in the context of the sustainable development of the European process industry.

The general goals of Work Package 6 where:

- to create a discussion platform to share available knowledge and experience on risk perception and risk communication;
- to identify currently existing studies on risk perception and risk communication;
- to underline the main differences between expert and public perception of risks related to technological activities;
- to structure a basis for possible approaches to risk communication, aimed at raising and sustaining the public awareness of technological risks, trust building, and elaborating effective and efficient emergency plans.

The present report represents the final deliverable of this Work Package and addresses the main mechanisms which are at the basis of the perception of risks, and the risk communication strategies and practices to establish public trust of certain industrial activities, and to promote public participation. The main intention was to devise a framework document on the above-mentioned issues and to gather the information necessary to produce an up-to-date state-of-the-art document on risk perception studies and risk communication practices in the EU.

More specifically, the main purpose of this report was:

- To provide a state-of-the art document on risk perception and risk communication to the public
  - ✓ To identify the principles of risk perception;
  - ✓ To identify the principles, methods and tools for public communication;
  - ✓ To discuss the role of public participation in the decision-making process;
- To describe the general regulatory and policy framework in the EU and in the Member States on this topic;
- To provide information on existing empirical studies on risk communication;
- To identify future research needs in this area and provide general recommendations.

Although risk communication principles are applicable to many situations, the focus of this report was on (*i*) environmental pollution (IPPC) and on (*ii*) potential major accidents of Seveso type installations (SEVESO).

However, most of the general results and conclusions from risk communication studies are often conceived as independent from specific risk or hazard sources, and therefore, many knowledge claims obtained in other sectors/applications can be related to our field of interest, though care needs to be taken regarding the extent that these knowledge claims are context specific,

and can be directly transferred to different situations. For this reason, sources outside these sectors have been consulted when appropriate.

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Introduction to public perception and communication of risk

General

It is acknowledged that risk has a 'dual nature' that relates to the extent it is understood as existing 'objectively', or is a product of mental processes. Integrating these two understandings is problematic, and is one of the central difficulties in incorporating public perceptions of risk into risk policy decision-making.

Within the general public[1], attitudes towards particular risks can vary widely. Moreover, often the point of view of the lay individual can be vastly different from that of the risk expert. The perspective of a lay individual is not normally formed on the basis of a technical assessment of probability and consequence. Instead, a lay individual tends to assess risk in a multi-dimensional way, by taking account of a range of contextual factors. Examples of these contextual factors include: (i) judgement about the trustfulness of the information or the information source and (ii) judgement on ethical and value issues associated with the hazard, for instance whether the hazard is voluntary or imposed, or whether there are some common benefits associated with the hazardous activity; (iii) judgement of the potential for disasters (better safe than sorry).

Whilst individuals might not be in the position of risk analysts in terms of the factual information they can access, they may be able to provide complementary information, which could make the overall analysis more complete, thus overcoming criticisms levelled at the so called 'deficit model' of an over reliance on expert opinion. There are many forms that this 'lay' input to risk analysis might take. For instance, formal risk calculations often use expected number of fatalities as the outcome variable of interest. The public, on the other hand, may care about multi-dimensional outcomes such as non-fatal injuries, environmental damage, and the relationship between risks and benefits. A richer representation of the problem may, therefore, be arrived at by considering such issues in the decision process.

In addition, the public may also represent a plurality of perspectives unlikely to be found in a group of risk professionals. There is potential tendency for risk analysts to represent a similar cultural perspective (at least in terms of their working lives). This suggests that other cultural viewpoints may be underrepresented in formal risk analysis, or decision-making processes.

Studies have indicated that the public is concerned with such issues as the trustworthiness of risk managers, the feasibility of evacuation plans, and the plausibility of probability estimates. All these variables are influential upon evaluations of risk, but are not readily or typically modelled in formal risk assessments. Of course, the philosophical problem still remains of how multiple value systems should be integrated into an overall decision or valuation.

The public may also possess knowledge not readily available to experts, corporations or government. This knowledge can potentially give insight into possible hidden or inadequate assumptions on which the risk assessment is based. For instance, knowledge of the actual conditions under which a hazardous product will be used in the real world. In such instances, special

[1] The term 'public' is used as a matter of convenience. The limitations of the term are acknowledged, especially the implication of an undifferentiated, homogeneous group.

interest groups (SIGs) may have collected large amounts of data and expertise concerning the problem under investigation. SIGs are likely to have a different emphasis and approach to data collection than establishment institutions (which might regard quantitative data with undue authority), leading their data collection and interpretation to have different emphases (e.g. suspected, but not formally documented, safety violations). The SIGs may also have access to different forms of information (e.g. from whistle-blowers) than those directly available to establishment bodies.

For all the above reasons, risk communication strategies that emphasise 'public misconceptions', and try to change or influence public beliefs or divert public attention away from their actual concerns, are unlikely to be successful in achieving their aims.

A point to note is that the most critical issue is associated with the acceptability of risk by the public. If decisions are taken, which impose risks that the public is not prepared to accept, it is very likely that these decisions will be unpopular and therefore difficult to implement successfully. Also decisions to remove accepted risks (e.g. no-smoking rules) are not very popular within those groups that take the risk. By contrast, if people feel that a certain risk does not affect them it could be very difficult to educate and motivate them to take the proper measures to confront it.

Definitions

Risk Perception

According to ISO/IEC Guide 73, "Risk Management – Vocabulary – Guidelines for use in standards" (ISO/IEC GUIDE 73:2002(E/F), 1st edition 2002), risk perception is defined as the:

"Way in which a stakeholder views a risk, based on a set of values of concern".

With the explicit consideration that (i) it depends on the stakeholders' needs, issues and knowledge and (ii) it can differ from objective data.

In other terms, risk perception describes the appraisal of a risk situation on the basis of intuitive judgment, personal experience, and acquired information (e.g. from the media).

Risk Communication

According to ISO/IEC Guide 73, "Risk Management – Vocabulary – Guidelines for use in standards" (ISO/IEC GUIDE 73:2002(E/F), 1st edition 2002), risk communication is defined as the:

"exchange or sharing of information about risk between the decision-maker and other stakeholders",

with the underlying note:

"the information may relate to the existence, nature, form, probability, severity, acceptability, treatment or other aspects of risk".

This exchange or sharing of information is addressed to the possible consequence of unattended events, actions or technologies on human health, environment or properties. The functions of risk communication can range from improving knowledge about risks (e.g. the presence of dangerous activities), through bringing about changes in attitude and conduct (e.g. behaviour in an emergency), to resolving conflicts. In this context, essential elements are: (*i*) the establishment of trust and credibility, (*ii*) the conveying of information and knowledge, and (*iii*) the two-way communication approach. Stakeholders are all the individuals, social groups or industries potentially affected or concerned by certain technological activities.

Relationship between risk perception and risk communication

Risk communication and risk perception are interrelated. One of the key findings from risk perception research is that general public concern can differ significantly from the considerations and conclusions made by risk experts.

Any risk communication strategy that is intended to address risk situations should account of how the receivers process the information, how risk perceptions are formed and how the intended audience makes risk decisions. All these aspects play an essential role in the definition of an effective risk communication programme.

Public perception of risk

General

A number of broad distinctions can be made regarding the level at which risk is investigated and how it is conceived within social science. A great deal of the research into risk perception seeks either explanation at the level of the individual, or at the wider social level. Less research is aimed at integrating these two levels or understanding the interaction that takes place.

Social science has traditionally explored the judgements made by lay people and experts regarding negative events, costs and benefits of the hazardous activity, to better understand risk perception related mechanisms. At the level of the individual, risk perception is a result of many factors, as opposed to rational judgements based on the likelihood of harm. There are a number of explanations for why the perception of risk is not based on these rational judgements. These reasons include: systematic biasing of risk information, the use of mental shortcuts, and the way that risk information can be presented.

Psychological factors that are based on a much wider range of hazard characteristics are also important. These characteristics include: voluntariness , familiarity, dread, immediate or delayed effects, uncertainty and novelty; trustworthiness of the operating organisations; and many others. However, substantial theoretical progress towards explaining risk perceptions in terms of psychological/social factors is far to be totally achieved.

There is indication that hazards should be judged on a case-by-case basis to account for the separate contexts of each hazard. There is little indication of the relative weights that should be afforded each characteristic, and the extent this varies with contextual factors. Future research into public perception of risk will need to be focused on the relationship between the qualities of the hazard that influence individual perceptions of risk, and the explanation of risk perception as a result of social processes, i.e. it will be beneficial for research to examine the interaction between individual and social explanations of risk perception.

There is wide support for the idea that risk perception is influenced by social relations and trust in risk management institutions, and increasing concern over the limitation of approaches that do not account for social explanations. Though there is little understanding of how these social factors interact with the range of risk characteristics identified by the psychometric tradition.

A number of criticisms are raised regarding the methodologies used to investigate risk perception that are relevant to high hazard industries, principally:

- It is problematic to measure perception of risk without acknowledging the context in which it is experienced.
- It is also problematic to measure what someone has not experienced or considered previously.
- It is important that data collection methods do not impose conceptualisations on the participants, nor researchers frame the problem according to their own values.
- When the public is asked to compare risks, care should be taken on how the information is presented. There are also problems in comparing risks, as ‘real world’ risks are multi-faceted and not identical.

– Care should be taken when aggregating individual judgements of risk as indicative of group responses, as the process of individual decision-making, and group decision-making are not synonymous.

The psychometric paradigm and the quality of hazard

The psychometric approach involves the use of multivariate statistical techniques with attitudinal data to examine peoples' expressed risk evaluations and acceptance of a range of hazards. The approach was developed to investigate the variables that determine people's judgement of risk. The evidence shows that human judgements of hazards and their benefits involve multiple qualitative dimensions related in quite subtle and complex ways, to the extent that there is now an emerging consensus that acceptance of a hazard is related systematically to qualitative characteristics of the hazard. A number of factors have been considered as the most likely to trigger public concern about risks. These are summarised in the following list:

– The nature of the hazard – familiarity and experience of the risk; understanding of the cause-effect mechanism; uncertainty; voluntary exposure to the risk; artificiality of the hazard; violation of equity of benefits arising from hazard.
– The risk's consequences – ubiquity of the consequences of the risk (geographically and across time); fear of the risk consequences (catastrophic potential); delay effect (e.g. the salience of the risk is a function of delay in deleterious consequences); reversibility (potential to restore original state); negative impact on individual; social and cultural values.
– Management of the risk – personal control over the risk; trust and distrust in perceived institutional control of the risk.

These qualitative dimensions can have varying importance for different hazards, indicating that the profile of a hazard should be taken on a case-by-case basis, and that its context should also be accounted for.

Social and cultural influences on risk perception

As perceivers of risk are rarely isolated individuals, several aspects such as social, cultural and institutional features play an essential role in the perception of risk. Society consists of many groups with very different attitudes towards risk and the criteria to be considered when making acceptability decisions. In acknowledging the importance of a wider cultural perspective, the perception of risk becomes socially situated, and not just determined by the characteristics of the risk event itself, or individual understanding. There is potential for the perception of risk to extend beyond the actual hazard itself, and to assume a 'cultural profile' related to broader social issues. The risk perception studies that adopt this social perspective highlight the importance of socio-demographic profiles of how an individual's history or position in society can influence their perception of risks. The following issues show some of the possible social distinctions:

Attitudes and world-views towards risk

- Prior orientation, for example cornucopian/industrialist vs. catastrophist/environmentalist are distinctions that are often related to aspects of environmental risks.

Socio-demographic variables

- There is some suggestion of the influence of gender on the evaluation of risk. For example, in some studies women tend to give higher ratings of general or societal risk, whereas men give higher ratings for threat to the environment. However, there are also indications that some reported gender differences in risk perception studies are not universal differences as implied, but disappear in deprived communities.
- Age, occupational affiliation, ethnic and socio-economic status are also important in some contexts.

Cross national aspects

- In general cross-national research is aimed at investigating and explaining differences and similarities in beliefs and behaviours between different cultural (national, ethnic, institutional) groups.
- The studies show that certain similarities exist, with minor, local differences.

The cultural theory of risk

One of the first attempts to investigate risk from a sociological perspective was Cultural Theory. Cultural Theory describes the cultural groupings that people belong to partly accounting for group members' perception of risk through their shared 'worldview'. Within Cultural Theory the domains of 'cultural bias' and 'social relations' are taken to explain differences in risk perception. Cultural bias is conceived as the shared values within a group. Social relations are defined as five patterns or types observed within interpersonal relations: hierarchical, egalitarian, individualist, fatalist, and hermit. The variations of combinations that can occur within these two domains are seen to relate to differences in perception of risk across groups, or 'worldviews'. Risks are selected for attention that reinforce the group's position or way of life, relative to other groups. It is the context of the group that determines which hazards attention is focused on; the acceptability of risk; and the reactions to risk that are legitimised.

The general framework provided by Cultural Theory allows the identification of a range of possible reactions to the risks for different categories or groupings of individuals, and can help in the selection of suitable approaches for communication. It can also be used to anticipate and resolve conflicting views between different opposing groups, or members of 'world views', for instance:

- Fatalists believe that life and nature are capricious, and their decisions are not guided by clear principles. They might not consciously accept risks, but will accept what life provides for them. For this category it is very hard to engage in a constructive dialogue and to be persuasive regarding the actions to be taken to cope with the risks. (suggested that a more effective communication strategy is to emphasise the benefits to individuals of actions taken to tackle the risks) . As a more effective communication strategy it is important for fatalists to understand the positive outcomes of efficient risk management.
- Hierarchists are favourable to well-established rules for regulating risks. They rely much less on solutions involving social participation in the decision making process. In this case, it is easier to engage in discussions, especially if technical evidence and empirical data are given.
- Individualists are associated with the spirit of initiative and competition. They tend to see risks as presenting opportunities, with the exception of situations that limit the

freedom of action.

- Egalitarians are strongly linked with the concept of equity. They are particularly sensitive to environmental risk and tend to distrust expertise and demand public participation in decisions.

Criticism is raised of this approach due to the lack of interaction between these groupings, and the extent to which they are discrete and imply single perspectives (as opposed to plural rationalities). Cultural Theory highlights important aspects of risk such as 'accountability' and 'blame', but criticism exists that the approach is an oversimplification that reduces socio-cultural context to a small number of general groups. Further criticism of the cultural approach relates to it being a static model that does not account for change over time. Research considering risk perception at the social level is moving away from generalised descriptions of the cultural context to more specific ones.

Social amplification of risk

Sociological risk research is increasingly rejecting approaches based on any single theoretical perspective. The framework for the social amplification of risk is becoming a focus for integrating multi-disciplinary approaches to risk, especially how characteristics of a hazard interact with social, cultural and psychological processes that strengthen or weaken perception of risk. In this sense, hazardous events hold a "signal value" which crucially may differ for different people or social groups. Within this framework (partly in order to avoid the problems of relativism) 'risk' is conceptualised as both a social construct and an objective property of the hazard. The focus is not only on the direct experience of risk but how interpretations of risk are acquired. Research in this area is especially concerned with the social processes (the mass-media and sources of risk information) that increase public concern and socio-political activity over some hazards and events that experts judge as low risk, and the secondary effects that these interpretations have (e.g. the resulting decisions or actions such as boycott of sales, financial consequences, regulatory constraints, litigation, community opposition and investor flight).

Signals may undergo transformations as they are filtered through a variety of social amplification stations. Amplification stations include scientists, mass media, government agencies, politicians and activist groups within a community. This transformation results in intensification and attenuation of aspects of risk in ways that can be acknowledged as being associated with social structure and circumstances.

Some key findings regarding perception of risk from research within the social amplification of risk framework include:

- Public responses to hazards are more rational than might be thought.
- Several factors may need to be present for the amplification of risk, such as, media coverage, signal potential, and perception of incompetence for risk management.
- Risk signals that are attributable to incompetent risk management are important for public concern.
- Similarly, trust and perception in institutional risk management handling of risk are important.
- Important differences between individuals who amplify risk, and individuals who attenuate risk relate to the perception of individual risk (for amplifiers), and satisfaction with

institutional responses to risk (for attenuators).

- There can be a discrepancy between risk amplification on a national/regional scale, and attenuation at the local level. This can relate to such issues as economic benefits associated with the risk at a local level (see Walker et al 1998, Social, Cultural and Institutional processes).
- Some hazards may be hidden and not subject to amplification effects. Characteristics of these 'hidden' hazards include: diffuse effects of the hazard; time lag between the hazardous event and the onset of deleterious consequences; assumptions made about the hazard obfuscate the potential for harm; the hazard affects people at the margins of society; and the fast pace of change that introduces the hazard is too quick for society to respond.
- The stigmatisation of a hazard is in part due to it being perceived to have such qualitative characteristics as: dread consequences; involuntary exposure; inequitable impact; unbounded impact; and the violation of a natural standard.

Role of media in influencing risk perception

The perception of risk is subject to individual experience, social interactions and other information sources. The relationship between mass-media coverage and the formation of risk opinion is not unidirectional, but complex. There is some indication that public concern regarding a hazard does not necessarily mirror media coverage, i.e. sustained media coverage does not in itself ensure amplification.

Research emphasises how the public interprets media in an active way, from a number of sources, and that public views on risk are contingent and continually negotiated. A distinction can be made between members of the public who are engaged with, or knowledgeable about an issue, and those who are not. The media is felt to play a more important role for people's interpretation of an event when they have less direct experience or knowledge of it, a finding which is in part supported by the wider literature on social communication.

Factors within the process of media production that can contribute to the amplification of a risk object include: commercial pressure to promote stories that secure increased audiences; the lack of reporting of 'real science'; the use of templates to pre-frame a story; and the private agendas of individual journalists and editors. There is also criticism that some sections of the media give importance to lay perceptions and testimonies, to the exclusion of science.

Risk communication

General

The advent of risk-informed regulation has created new challenges for risk communicators, which include developing approaches for risk assessment and risk-informed decision-making processes. In addition, a change in the focus on policy strategy has recently emerged, by which the traditional, legislative-oriented top-down approach, has been substituted by a bottom-up approach. This method aims at enlarging the basis of consensus, by including societal input in policy related decisions, with the involvement a larger audience. This includes economic and social representatives, authorities, industry and the general public. The different methodologies for eliciting consensus on risk issues can be categorised along the continuum of high and low deliberative input. Deliberation is the process of discussion between parties to arrive at consensus that results in decisions. Survey methodologies are seen as low in deliberative input, whereas citizens' juries are high.

One of the objectives of risk communication is to inform and alert people about risk issues and to aid their understanding of the complex aspects of new technology and emerging risk issues. In addition it aims at promoting appropriate behaviour and responses (e.g. self-protective) towards hazards by, in part, enhancing the ethic of responsibility. This can be facilitated by the communication of information through social networks.

The recognition by EU citizens of their right to be informed, and to have access to the policy decision making process, regarding the risks on health and environment, are currently well established in the EU policy guiding principle, and are reflected in many directives. However, current practices for implementing these guiding principles are not always adequate, and risk communication related activities are possible instruments for improving the situation.

Risk communication is always a very demanding task. There is an acceptance within the social sciences that lay conceptions of risk are based on a broader range of variables than those implied by technocratic approaches based on estimates of likelihood and consequence. Consequently there is potential for traditional concepts and methods used to address risk assessment, risk management and risk informed decision-making to overlook the variables on which public perception of risk can be based.

Purpose of risk communication

Some of the purposes of risk communication can be to:

- Establish a trusting relationship between the 'sender'[1] and the 'receiver' of risk communication (***'building trust'***).
- Provide information about the potential risks of certain activities (***'raising awareness'***).
- Increase understanding amongst all involved parties of the underlying principles of risk assessment, risk management and risk based decision-making. (***'education'***).
- Gain acceptance of certain activities by the public (***'reaching agreement***').
- Establish attitude and behavioural change with respect to specific causes or classes of risk (***'motivating action'***).

[1] The terminology used to indicate the risk communication actors (i.e. 'sender' and 'receiver') is just conventional and should not be misinterpreted as if risk communication be a one-way process.

Means

A number of overarching methods exist for communicating risk, which can be to:

- Set up a system by which the message of risk communication is properly received and understood by the target audience.
- Set up a constructive two-way communication.
- Make sure that effective stakeholder involvement is established, in order to reduce all possible misunderstandings and conflicts amongst the involved parties.

Target audiences

The target audience of risk communication can include:

- People living outside of the hazardous establishment's boundary, who could potentially be affected by the risks,
- Employees,
- External workers,
- Media operators,
- Public authorities,
- Rescue operators,
- Medical care operators,
- Other stakeholders.

Trust building / Credibility

Risk communication and trust have received considerable academic interest as they provide an important link between risk perception and the engagement of the public in decisions on risk management. To some extent the perception of risk is mediated through communication with and from the regulatory bodies that play a part in the social construction of risk. Effective risk communication frequently has as much to do with the perceived characteristics of the source of this information as features of the hazard itself. Risk communication strategies need to acknowledge that public risk perception is not about an individual's unmediated judgement of a hazard, but that this judgement is in part formed by their perceptions of trust and credibility in science, government and state institutions. The issue of trust extends beyond the actual management of the hazard itself, understanding how distrust arises becomes central to risk communication and also risk management.

There are criticisms of the 'deficit' model of risk communication, namely that simply focusing on issues of improving communication (i.e. the transfer of information) is not sufficient to overcome issues of distrust. The perceived impartiality and independence of the information source is another factor associated with trust. There are also suggestions that perceptions of trust are partly based on perceptions of the wider social organisation (e.g. the legislature) in which the hazard is situated, as well as specific institutions and organisations, none of which remain static.

Other goals of risk communication (e.g., education, behavioural change, consensus building) can only be established after having obtained and consolidated trust and credibility by the audience in the source of the risk information. It is essential to avoid the risk communication

message being received as an attempt to convince the audience that no risk is present, and the people responsible for the risk based activity have necessarily done the right thing.

Barriers to trust and credibility arise when some of the following aspects/attitudes are present:

- Inability of parties to acknowledge opposing points of view.
- Disagreement amongst risk experts.
- Aversion to acknowledge risk.
- Insensitivity of those responsible for managing the risk to public participation.
- Reluctance to disclose or share information.

Stakeholder participation

One of the key elements for setting effective risk communication is to establish a two-way communication system between the risk regulator and all the involved stakeholders. To achieve such an objective it is essential to clearly identify who are the main stakeholders, to pinpoint their concerns and interests, and to assess who amongst them might be most influential over the decision-making process under discussion. A point to note is that stakeholders' positions might vary over time, therefore, stakeholder analysis is always a dynamic process and has to be submitted to continuous review.

Several criteria have been identified by the OECD for involving stakeholders in the risk communication process:

- All participants should be able to select an option amongst a variety of possible solutions.
- All participants should be equally exposed to the potential disadvantages of the proposed options.
- All participants should feel competent to give their recommendations; otherwise they should be properly educated.
- All participants should judge the raised problem as serious enough to justify the resources allocated.
- All participants have to perceive that the outcome of the exercise will be taken seriously into account in the decision making process and not just in the communication process.

Tools and Methods for effective risk communication

Introduction

The efficacy of tools and methods for risk communication are dependent on the specific risk debate involved. The main risk debates can be classified under three general themes:

- *Factual evidence* Technical issues regarding the risks, such as assessing the likelihood and the consequences of undesired events.
- *Experience and Competence* of the involved organisations (trustworthiness of the regulatory authority, plant management, etc).
- *World views and value systems* Different social values and their implications for risk management.

Communication addressing the first theme should focus on technical aspects of the risks, and has to be designed for 'educational' and 'awareness raising' purposes. In this case common methods are:

- Information brochures,
- Lectures and learning experiences,
- Information videos.

Communication focused on trust building is more complex and requires some extra effort. Gaining trust requires an open and continuous dialogue between all the stakeholders involved. To reach such an objective some possible approaches include:

- An open door policy (e.g., access to safety and/or environmental related information, open procedures, visits to the hazardous installations etc);
- Dedicated meetings with public interest groups (i.e. public representatives who meet with operators and/or regulators to discuss the social impact of certain industrial activities).

With regard to the third theme, which concerns the influence of different social values on risk management, the above approaches do not necessarily provide a solution to resolve potential conflicts. In particular, all the messages clarifying technical aspects of certain hazardous activities and that are designed to ensure the trustworthiness of the organisations involved, cannot fill in the information gaps due as they are the result of different social, cultural and political values, as opposed to deficit of information. In such cases communication should focus on social and lifestyle values through the following possible methods:

- The organisation of specific round tables with the representation of different social groups;
- The creation of specific mechanisms for consensus building and resolving disputes;
- The involvement of public representatives in the decision-making process through advisory boards, panels, juries, etc;
- The involvement of public representatives in regulatory programmes.

Format of messages

Several empirical studies have demonstrated that no single presentation format of the communication message can be considered generally preferable. Some examples of the possible alternatives include:

- Qualitative (i.e. verbal) vs. quantitative (i.e. verbal, numerical and graphical) messages;
- 'Command' vs. 'cajole' approaches;
- Printed formats (i.e. brochures) vs. computer based formats.

However, the choice of the communication message format depends on the specific goal for which risk communication is intended, the specific target audience to which the communication is addressed, and the specific context in which communication will take place. This highlights the necessity of pilot testing the communication prior to formal implementation.

Risk comparison

When the uncertainty and dread associated with certain hazardous activities is considerable, risk communication makes use of risk comparison techniques in order to anchor the risk in comparison to other risks, so its extent can be more easily comprehended by the target audience. This can be undertaken by providing examples from daily life, which are more familiar and with lower ratings of dread. This approach is commonly used when dealing with risks characterised by high consequence and low probability. Although this approach is intuitively appealing, it is often quite impracticable and questionable in practical terms. Many empirical studies have indeed demonstrated that the identification of the proper comparison for each specific application is very difficult to achieve. When the public is asked to compare risks, care should be taken on how the information is presented, e.g. risks presented as probabilities can be difficult for people to understand as they focus on issues of consequence. There are also problems in comparing risks, as in the 'real world' risks are multi-faceted and not identical.

There are different ways of using risk comparisons within risk communication strategies, ranging from (*i*) the comparison of risks of the same nature but in different situations/times to (*ii*) the comparison of risks that are of different types. Also in this case, the effectiveness and/or the applicability of the risk comparison techniques depend very much on the specific goal of the risk communication, the target audience and the nature of the risks. However, as a rule of thumb, the following list provides some information about the effectiveness/applicability of risk comparisons for risk communication purposes:

Least effective (rarely acceptable and not recommended. To be used with extreme caution!)

- Comparison of unrelated risks (e.g., environmental contaminant risks with risks from smoking, driving a car, lightning)
- Comparison of hazards with different qualitative characteristics that affect perception of risk

More effective- Comparison:

- Of the risk of doing something versus not doing it;
- Of alternative solutions to the same problem;
- With the same risk experienced in other places;
- Of the same risk at two different times;

- With a standard;
- With different estimates of the same risk.

Mental models

As mentioned in the previous sections, there is no unique method for presenting risk communication messages. The choice of an appropriate format or the use of risk comparisons does not always guarantee the effectiveness of the proposed message for risk communication purposes. Besides, the evidence concerning individual differences with regard to their knowledge and attitude toward risk, suggests that there is no single approach to designing effective communication messages.

The use of mental models can be used as a methodology to define appropriate risk communication messages. These methods are based on the systematic assessment of the information necessary to be conveyed to the public in order to create messages commensurate with their needs. This perspective shares some commonality with more cultural approaches, though it is fundamentally cognitive and rooted within the psychology of the individual. This approach compares expert and lay models of risk in order to identify gaps in understanding of hazards, so that risk communication can be effectively targeted at these gaps. A central assumption is that people understand the world by creating internal representations of it. It is these representations that people use to reason with and so understand their environment and impose order and predictability on it. The construction of mental models comprises the acquisition of knowledge and the understanding of complex information. A mental model integrates pre-knowledge, facts and relations to an "image" which more or less corresponds to an extract of the real or possible "world". Typically the approach focuses on eliciting lay understandings of hazards, without imposing expert conceptualisations,. It is an essentially ‘bottom up’, data driven process, as opposed to a ‘top down’ conceptually driven one, which is reflected in many of the other approaches.

By using a mental model method is possible to tailor risk communication messages to different audiences by accounting for their different views and attitudes. This approach has proven beneficial in a number of situations, including when:

- Risk communication is primarily intended to encourage behavioural change, by indirectly conveying information about the risks and not trying to execute a direct influence on the target audience.
- Risk communication regarding new risks, for which pre-existing mental schemes have not yet been formed.
- Risk communication targets quite non-controversial issues and not particularly emotional situations.

Risk communication to decision-makers

The communication of risk specifically addressing decision-makers, such as authorities and regulators, has never received the same level of attention as the communication of risk to the general public. This is despite the increasing importance of risk-informed approaches to decision-making and the consequent need for decision-makers to process highly technical risk analysis information.

Due to the lack of knowledge about possible approaches and strategies for risk communication to decision-makers, it is advisable to share the results of existing programmes together and their effectiveness as widely as possible.

Needs for decision-makers

As for any communication strategy, risk communication to decision-makers has to be structured in such a way that the following aspects are achieved:

- The outcome of the risk analysis has to be comprehensible even for 'non-experts' in the field of application;
- The applicability of the risk analysis results for the decision-making process has to be clearly discussed;
- The uncertainties associated with the risk analysis process and their possible implications on the outcome of the risk analysis have to be clearly addressed. With regard to uncertainties, a specific strategy on the possible use of this information should be in place, especially in comparing possible alternative options (e.g. the choice of a conservative approach).

In addition the following key issues have to be considered when risk informed decisions have to be taken:

- The legal framework;
- The potential adverse effects of a specific hazard;
- The level of concern on a specific hazard for the general public;
- The available alternative measures to control, reduce or mitigate the risks;
- The reliability of the risk analysis outcome.

State of knowledge and uncertainty

Risk analysis is always characterised by the uncertainties associated with the input data, and the assumptions and methods used to calculate the risk. The use of a risk informed approach for decision-making should therefore account for the uncertainties of the risk analysis outcome. This can mean that the problem of decision-making under uncertainty is very complex and characterised by a highly technical content, which is normally very difficult to communicate. Due to the complexity of this subject, there are several ways in which uncertainty can affect decision-making.

Possible approaches to decision making under uncertainties include:

- Standard decision analysis theory, which is scientifically recognised;
- Point estimates, such as the mean values or most likely (median) values of the uncertain quantity;
- Deterministic analysis.

Decision analysis theory is normally indicated as the most rigorous approach, as it provides guidance not only for selecting the best option amongst uncertainties, but also for deciding whether it is better to make the final decision, or to postpone the decision until further complementary information is made available ('the value of the information').

Uncertainty also makes the comparison of risks more complex, which is a fundamental activity in decision-making. In this case, it is often suggested to present not only risk estimates, but also a distribution for the difference between the compared risks, in order to avoid possible misinterpretations of risk comparisons.

Structuring a risk communication programme for decision-makers

A risk communication programme should be structured by taking account of aspects including the:

- Legal framework and importance of specific actions.
- Potential consequences of not taking any action.
- Consideration of the main stakeholders and the size of the potentially affected population.
- Severity of potential hazards.
- Level of confidence in the risk analysis.
- Relative cost-benefit trade-offs of the alternative risk management options.

For the format of the information, an effective way seems to be characterised by a level of intermediate complexity, and the use of graphic representations such as sequence diagrams, simple graphs, clear tables, etc. More complex and detailed formats as well as very simplistic formats have been identified as not suitable for this purpose. Excessive emphasis on statistical or very technical aspects should be avoided, as decision-makers might not have the proper training to follow this type of content. By contrast, decision makers have to be briefed on the essence and consistency of the risk analysis, by including the specific assumptions made in the approach and the reasons for the results. However, the most effective presentation format should be one that is adapted to the target audience and particularly to their specific background and the nature of the potential hazards. Attention should be paid to ensure that topics considered as relevant by the specific target audience are treated with the proper emphasis.

Regulatory and Policy framework in the EU

Background

This section focuses primarily on the EU legislation for the environment, health and safety in relation to the public involvement in decision-making processes. In particular, the gradual evolution from information supplied to the public (‘*right to be informed*’), to public participation in environmental decision-making process (‘*right to participate*’) is discussed. The information provided in this section was mainly extracted from the review article by B. de Marchi, S. Funtowicz and A.G. Pereira “From the right to be informed to the right to participate: responding to the evolution of European legislation with ICT”, Int. J. Environment and Pollution, Vol. 15, No 1, 2001 pp 1-21.

According to the general principle of democratic governance, the involvement of the public in the decision-making process in environmental management has been a major objective in the EU environmental policy arena. For this reason several EU initiatives were launched, based on the principle that policies and projects should involve the communities and individuals affecting and affected by the policies, throughout the whole process of design or decision. The regulatory promotion of public involvement in decision processes is based on the principles of subsidiary and shared responsibility, dialogue and partnership, as expressed in several Action Programmes of the European Communities on the environment.

In particular, the regulation that established the European Environment Agency (EEA) in 1990 (see Table 1) considers in its Article 6 a specific mission for disseminating and making available environmental information to the public:

“Environmental data supplied to or emanating from the Agency may be published and shall be made accessible to the public subject to compliance with the rules of the Commission and the Member States on the dissemination of information, particularly as regards confidentiality”

Guidelines on access to environmental information and public participation in environmental decision-making were set in the Environment for Europe Ministerial Conference held in Sofia in October 1995. These guidelines are grounded in Principle 10 of the Rio Declaration on Environment and Development mentioned above. They not only address public access to environmental information, but they also advocate the need for public participation in environmental decision-making.

Finally, COM/98/0344 is a recent proposal by the European Commission for a Council Decision on the signature by the European Community of the UN/ECE, concerning a Convention on access to information, public participation and access to justice in environmental matters.

Information to the public

There are a number of EU legal documents referring to the obligatory provision of information to the public on environmental, health and consumer protection related issues. The next table lists a selected set of these documents, which are specific to the scope of the SHAPE-RISK WP6 framework document. These documents are associated with situations in which the public has the 'right to be informed', since the obligation derives from the assumption that the information provided is necessary to preserve the health and safety of the target audience. In addition

the awareness of the public of a hazardous activity, to which they could be potentially affected, is also considered important as a matter of principle. The public has to be informed about what is needed to be known and has the right to ask the detail of these issues.

	EU Document	Topic
1	Council Directive 82/501/EEC. Official Journal No. L 230 05/08/1982 p. 0001-0018.	*On the major-accident hazards of certain activities (Original SEVESO)*
2	Council Directive 88/610/EEC, amending Directive 82/501/EEC. Official Journal No. L 336 07/12/1988 p. 0014-0018.	*On the major-accident hazards of certain activities*
3	Council Directive 90/313/EEC. Official Journal No. L 158, 23/06/1990 p. 0056-0058	*On the freedom of access to information on the environment*
4	Council Decision 93/731/EC. Official Journal No. L 340, 31/12/1993 p. 0043-0044	*On public access to Council documents*
5	Council Regulation (EEC) No 1836/93. Official Journal No. L 168. 10/07/1993 p. 0001-0018	*Allowing voluntary participation by companies in the industrial sector in a Community eco-management and audit scheme (EMAS)*

1. Council Directive 82/5001/EEC (the original Seveso Directive) established the requirement to actively inform the public who are potentially affected by major-accident hazards. However, analysis of its implementation suggested that this requirement was largely ignored.
2. For the above reason, in the following amendment of the Directive (88/610/EEC), new provisions were included concerning public information. In particular it was decided to better clarify this obligation. An explicit requirement was made, that besides actively informing the public at regular intervals, the information on safety measures and on the correct behaviour to adopt in case of an accident should be publicly available. The combination of the two requirements constitutes a 'right to be informed' principle, which is not merely instrumental for those at risk, but extends to the general public.
3. The Council Directive 90/313/EEC is a key instrument by which environmental information held by the authorities should be disseminated to the public.
4. The possibility for the public to have access to unpublished Council documents on the basis of Council Decision 93/731/EC constitutes one of the components of the general policy of openness and transparency outlined in the Birmingham Declaration in October 1992 with a view to bringing Europe closer to its citizens.
5. The Council Regulation 1836/93 encourages industry to engage in an eco-management and audit scheme (known as EMAS) through which, environmental performance of industrial activities is evaluated and relevant information to the public is made available. The proposed scheme is totally voluntary, and the rationale is that of an open dialogue with the public, who can provide observations and feedback. This was a first bridge from the 'right to be informed' to the 'right to participate'.

Public participation

The second set of documents listed in the present section refers to situations in which the public is explicitly required to be part of the decision-making process. The evolution of the SEVESO Directive and the resulting debate anticipated many of the issues that are nowadays essential in any discussion concerning risks and the environment. In particular the development from public information to public participation that occurred in the new Directive had a knock-on effect, encouraging a substantial revision of risk management practices throughout the EU, in technical as well as social and political terms.

The recognition of the right of EU citizens to take part in policy decisions on risks and the environment is by now strongly established as a guiding principle of the EU legislation and policy for risk governance, management and appraisal. However, full realisation of this model of participative governance is far from completely established, and broad changes in term of professional and institutional practices are required.

	EU Document	Topic
1	Council Directive 96/82/EC Official Journal No. L 359/, 31/12/2003 p. 0097-0105 Directive of the European Parliament and of the Council 2003/105/EC amending Council Directive 96/82/EC Official Journal No. L 359/, 31/12/2003 p. 0097-0105	*On the control of major-accident hazards involving dangerous substances (SEVESO II and its amendment)*
2	Council Directive 96/61/EC Official Journal No. L 010, 14/01/1997 p. 0013-0033	*Concerning integrated pollution prevention and control (IPPC)*
3	Council Directive 85/337/ EEC Official Journal No. L175, 05/07/1985 p. 0040-0048 Council Directive 97/11/EC amending Directive 85/337/ EEC Official Journal No. L 073. 14/03/1997 p. 0005-0015	*On the assessment of the effects on certain public and private projects on the environment (EIA)*
4	Commission Recommendation 88/41/EEC Official Journal No. L 023, 28/01/1988 p. 0026-0026.	*On the involvement and improvement of consumer participation in standardisation*
5	Council Regulation (EEC) No 880/92 Official Journal No. L 09, 11/04/1992 p.0001-0007	*On a Community Eco-label award scheme*

1. Council Directive 96/82/EC (SEVESO II) differs significantly from its predecessor

(82/501/EEC & 88/610/EEC), and is the result of a long consultation process between the European Commission and the competent authorities of the Member States, and further subjected to the co-decision procedure involving the European Parliament. Article 13 of the new Directive, designated as 'information on safety measures', concerns public information. It reproduces Article 8.1 of the previous directive in its amended version of 1988, but with some important additions. They concern the time limits defined for the revision of the information (three years), and its repetition (maximum five years). Also the permanent qualification is added to specify the requirement for providing information to the public. The new Directive also contains a significant novelty, specifying that the safety report be made available to the public, though assuring at the same time confidentiality on certain parts, if so required by the operator. This is an innovative feature showing how arguments about the lack of competence by the general public to make use of such information have been abandoned. Another novel feature is the recognition of the right of the public to provide an opinion in some special cases such as: (i) planning for new establishments covered by Article 9 of the directive, (ii) modifications to existing establishments under Article 10, (iii) developments around such existing establishments. Specifically the updated inventory of the dangerous substances used or stored in the establishment is to be made available to the public. Article 13 goes beyond the provision of 'public information' by establishing 'public participation' in the sense of promoting the involvement of the interested public in the management of risks. This gives rise to the permanent political requirement to manage the process of commentary, query, alarm and critical evaluation that may arise from this new information appraisal process. The establishment of adequate governance procedures, providing for the exchange of views, consultation with stakeholders, and deliberation on appropriate responses to situations of urgency and gravity, is now a new challenge for all the Member States, both in legal and in practical terms. In many other parts of the Directive 96/82/EC, one can envisage principles and measures devoted to improve public safety and to favour extended collaboration in the prevention and management of industrial risk. A comprehensive declaration of the preference granted to extended collaboration can be found in point 20 of the Preamble to the new Directive, where it is stated that “the staff of an establishment must be consulted on the internal emergency plan and the public must be consulted on the external emergency plan”. Here, the legislator seems to recognize that the local knowledge, of a lay type and derived from everyday experience, ought to supplement technical, expert competencies. Finally, a further extension of the obligation to actively inform the public directed at all establishments serving the public (such as schools and hospitals) was added in the recent Directive amendment (2003/105/EC) (Article 13).

2. Council Directive 96/61/EC (IPPC) aims at preventing and reducing the impact of large industrial installations on the environment as a whole. IPPC industrial sites must undergo a permitting procedure prior to their operation, in which the impacts of the installation are considered in a co-ordinated way. The permit should be based on the “Best Available Techniques” (BAT), defined for each industrial sector in the “BREF documents”. In the scope of public participation, the IPPC Directive (Article 15) requires from industrial installations the provision of information to the public, and public participation in the permit procedure, thereby ensuring that applications for permits for new installations, or modifications of the existing ones, are made available to the public, to enable them to comment on the application before the competent authority reaches its decision. The authority’s decision must also be made available to the public. The results of monitoring of releases (as required under the permit conditions referred to in Article 9 of the same Directive and held by the competent authority) must also be made available to the public. Although the IPPC

Directive is aimed at continuous pollution prevention and control, it does not ignore the safety issues. Namely, as part of the basic obligations of the operator that “the necessary measures are taken to prevent accidents and limit their consequences” (Article 3).

3. Both Council Directives 85/337/EEC and the newer 97/11/EC (regulating Environmental Impact Assessment), ensure that environmental consequences of a project are identified and assessed before authorisation is given. The public concerned with the project can give its opinion and all results are taken into account in the authorisation procedure. The public is informed of the decision afterwards. However, a 'nuance' in what constitutes public involvement makes the latter directive more effective in terms of the actual possibilities for the public to influence the decision. In the former directive it is stated that public opinion should be given 'before the project initiates' whereas in the latter, 'before the development consent is granted'.

5. The council Regulation about eco-labelling considers in its Article 6 the consultation of interest groups to define specific ecological criteria for awarding such labels.

EU Initiatives with regard to risk communication

The present chapter provides a collection of initiatives and information exchanges on risk perception and risk communication related matters.

Workshop on Emergency Management - Ispra, 23/24 June 1992

The workshop organised by the Joint Research Centre of the European Commission was held in Ispra on 23-24 June 1992. Amongst the several aspects discussed, it addressed some risk communication aspects, which are specifically relevant for emergency purposes. The main objective of the workshop was to allow experts operating in different professional
capacities and with a range of experiences to exchange information and to compare the different techniques and methodologies to manage natural and technological disasters, by also tacking into account political and social dimensions.

The conclusions of the workshop confirmed that similar risk management systems apply both for natural and technological accidents, even though the methods and techniques of control may be different being hazard-specific. For risk communication addressed to emergency management, it was emphasised that its effectiveness is conditional to the level of participation and interaction of all involved parties aimed at finding consensual policy decisions.

"French-German Expert Meeting on Risk Communication in Context with Seveso II Directive".

The workshop, held on 16-17 December 1999 in Bergkamen (Germany), was organised by the German Federal Ministry for the Environment and Reactor Safety (BMU - Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit) and the Federal Environmental Agency (Umweltbundesamt).

The proceedings of the workshop address the following topics:

- The effectiveness of risk communication procedures - a survey of the German approach;
- The German guideline on risk communication in the vicinity of "Seveso" plants;
- The risk communication function of the French "Permanent Secretariats for the Prevention of Industrial Pollution" ("Secretariats Permanents pour la Prévention des Pollutions Industrielles");
- A case study from the French region Rhône-Alpes;
- Practical experience collected by the company Schering AG in Bergkamen (Germany);
- Practical experience acquired by the State Environmental Agency Lippstad (Germany) with the implementation of Art 11a of the German "Ordinance on Accidents" ("Störfallverordnung").

A detailed description of the procedures and recommendations on how to implement risk communication in Germany are annexed to this report (Annex I).

Risk Communication for Chemical Risk Management: OECD Initiative

Delegates at the 29th OECD Joint Meeting of the Chemical Committee and Working Party on Chemicals expressed their support for a new project on risk communication to make the risk

management process more transparent, and to ensure better implementation of risk management decisions.

The project was intended to develop generic principles of effective risk communication with regard to risk management of industrial chemicals.

This project involved three stages. Firstly, information was collected from member countries (via a survey and a literature search), in order to identify and describe risk communication approaches that have been or are currently being used. Secondly, a Workshop took place in Berlin, Germany on 18-20 September 2000, to discuss the results from the first stage and develop an outline for a guidance document on risk communication. Finally, a guidance document was developed on generic principles of risk communication.

Committee of the Competent Authorities (CCA) for Implementation of the Seveso II Directive: Seminar on Risk Communication

On 16 May 2001 in conjunction with the fifth semi-annual meeting of the Committee of the Competent Authorities (CCA) for Implementation of the Seveso II Directive, the Swedish Rescue Service and the European Commission's Major Accident Hazards Bureau (MAHB), and Directorate of Research (DG-Research), jointly hosted a seminar on risk communication in Gothenborg, Sweden.

The theme of the seminar was 'The relationship between the 'active communication' obligation under the Seveso II Directive and trust-building, risk tolerability and behavioural change.'

The seminar consisted of presentations from researchers and competent authorities from several Member States, including Italy, Belgium, Germany, France, Sweden and the United Kingdom. Representatives from the Organisation for Economic Co-operation and Development (OECD) and the European Commission's Joint Research Centre (JRC) also contributed a presentation. The seminar was followed by a round-table discussion concerning the role of competent authorities in promoting active communication and potential ways the CCA might support such efforts.

The participants discussed common principles arising from the research presented and possibilities for the future direction of research. They also discussed the implications the research held for the way national authorities promoted risk communication under Seveso II. It was recognised that such communication was primarily a local effort, shared by local authorities and installations, but that the national authorities have responsibility for helping such communication efforts be as effective as possible, through funding, research and educational efforts. In addition, the national government has direct responsibility for communicating risk information in a more global way, for example, educating the public about particular hazards, and also promoting dialogue in the public domain about how to manage different risks.

The participants identified the following as common themes arising from the presentations:

– Risk communication conducted as an active dialogue between multiple interested parties has proved to be a more effective approach than one-way communication in which authorities and the installation (educate) the population about the risk. The enhanced view of risk

communication as multi-party dialogue with important social implications has broadened the field of risk communication to include a wider variety of expertise.

- Dialogue about risk within a particular society is part of a much greater dialogue concerning the future character of the society. In this context, the public holds government authorities and industry accountable for handling risk management responsibly and in accordance with accepted social values. Thus, the information delivered as part of risk communication must show competence in this regard.
- Effective delivery of risk information requires understanding the audience so that both the subject matter and mechanisms of communication guarantee a certain level of interest and receptivity. Hence, it is generally agreed that identifying the various social characteristics of the population and targeting risk information accordingly can enhance the probability that such information will be understood and retained. In fact, it is often necessary or desirable to divide communities into subgroups, for example, aged populations vs. young families, for targeting risk information, as concerns about the risk and avenues of effective communication may be very different between certain groups.
- In the same way certain subgroups of the population react to risk information in different ways. Differences in perception may also influence the degree to which different segments of the population follow emergency response instructions. Previous experience, confidence in local authorities and industry, and other local factors can all have a bearing on the choices that citizens make during a crisis.
- Providing individuals with some common experience with emergencies, developing a common (emergency culture), can help shape more uniform responses to crisis situations among the population.

Finally, the direct involvement of national authorities in risk communication was also discussed. Some participants expressed the view that national governments can enhance overall trust and confidence in technological hazards by communicating more openly about technological hazards themselves. In particular, sharing information collected nationally about chemical risks and pollution present at industrial installations is a way of demonstrating openness and transparency at the national level. It can also lead to citizens perceiving a greater control over the risks as they have the opportunity to understand and analyse them for themselves. Some Member States have already implemented, or are in the process of implementing, programs that allow the public access to information on technological risks at their hazardous installations.

Workshop on Communication related to Chemical Releases Caused by Deliberate Acts

The Workshop co-sponsored by OECD (Organisation for Economical Co-operation and Development) together with NATO, UNEP WHO (World Health Organisation) and other organisations, was host by the *Istituto Superiore Antincendi,* Rome, Italy on 25-27 June 2003.

The workshop had the objective of exchanging experiences and solutions concerning polices tools and practices on risk communication and public information to chemical threats as the result of deliberate acts and addressed the following main subjects:

- Community right-to-know versus information security;
- Public/private communication partnership;
- Chemical facilities security: communication challenges;
- Crisis communication;

- Capacity building;
- Development of guidance on risk communication and public information related to chemical releases caused deliberately.

As a result of the discussions several general conclusions were drawn:

- In the light of the recent terrorist attacks deliberate acts are emerging threats.
- Precautionary and Preventive measures for security have to be put in place. The responsibility is of the operators of the industrial & transportation facilities, as well as of the Member States.
- Security related information should be shared between the different countries and between the different agencies involved in prevention, preparedness and response activities. Countries should reinforce their collaborations in order to improve their capacities for detection decontamination and destruction of biological and chemical agents and for providing suitable medical treatment.
- A proper communication action on the threats of possible chemical releases should be shared between operators and regulatory authorities in order to keep the public informed. Risk based decisions should be made transparent for the public. Public participation in the decision-making process is advisable.

Conference on Risk Perception: Science, Public Debate and Policy Making (http://europa.eu.int/comm/food/risk_perception)

A major international conference was organised by the European Commission – Directorate General Health and Customer Protection to explore how the public's perceptions of risk are formed, and what this means in a complex democracy such as the European Union (4-5 December 2003, Charlemagne Conference Centre, Brussels).

Amongst the several issues addressed by this workshop were:

- The roles that scientists and politicians should play in communicating about risk to the general public;
- Whether policy-making based on scientific risk assessment could be made more open, more understandable and more inclusive;
- How should communication and debate at national, EU and international level interact;
- How should science, industry, government and civil society interact in public debates about risk.

Building on previous European Commission conferences on risk management and European governance the event incorporated a stakeholder forum on risk perception looking at genetically modified crops and food.

Special attention was given on the understanding of the process of risk perception and on practical ways in which governance can be improved and the public's trust in science based regulation can be increased.

European Commission's funded projects

The next section provides general information on a series of studies funded by the European Commission, which involve relevant aspects for risk communication and/or risk perception.

Public Perception of Agricultural Biotechnologies in Europe

Fourth Framework Programme
Environment and Climate, Shared Cost Action, 1998-2000.

Objective
The project aimed to provide policy makers with insights into the conditions necessary for improving levels of public trust in agricultural biotechnology policies. Findings of the report suggest that most policy makers' conceptions of public attitudes and perceptions turned out to be mere 'myths'. There was no evidence for the claim that public resistance to biotechnologies can be explained by a mixture of ignorance and a desire for zero-risk. Rather, people felt strongly that inherent and unavoidable uncertainties should be acknowledged by expert institutions, and taken into account in decision-making. Most people were sceptical that the benefits of genetically modified organisms in agriculture would constitute a worthwhile social need that could justify even a remote chance of experiencing long-term risks.

Web site: http://www.lancs.ac.uk/depts/ieppp/pabe/

Environmental Valuation in Europe (EVE)

Fourth Framework Programme
Environment and Climate, Concerted Action, 1998-2000.

Objective
The purpose aimed at analysing effective methods to represent the values associated with environmental goods and services, ecosystem functions, and natural capital with a view to the achievement of the goals summarised in the concept of sustainability. Specifically this concerted action addressed the input of information to policy decisions and the diversity of research currently being undertaken. The appropriate role for policy makers and citizens in environmental policy formation takes on a central focus in the debate over how different values should be expressed. The type of information relevant to the decision process extends from ecological functioning to moral values.

Amongst the several policy relevant topics covered by the project (i.e., national accounting, natural capital, cost- benefit analysis, sustainable development) the issue of public participation was specifically treated. The proposed interdisciplinary approach has allowed to overcome some of the problems identified with typical environmental valuation research in Europe, and exposes the variety of ways in which environmental values influence individual choice.

Web site: http://www.landecon.cam.ac.uk/eve/

Urban Lifestyles, Sustainability and Integrated Environmental Assessment (ULYSSES)

Fourth Framework Programme

Environment and Climate - Shared Cost Action

Objective
The central theme of ULYSSES is the exploration of the interface between Integrated Assessment (IA) models and citizens focusing on the issues of urban lifestyles and sustainability in the context of climate change. Integrated Assessment is concerned with the integration of knowledge from diverse sources as part of the policy making process. The involvement of relevant stakeholders, including lay citizens, is an essential part of the IA process. Attempts to resolve issues characterised by conflict and uncertainty cannot depend on formal scientific enquiry alone, but require the inclusion of those affecting and affected by the issue of concern to supply knowledge and information in order to enhance understanding of the problem and potential responses.

Frequently, IA exploits the use of computer models but generally these are accessible to and used by only a limited range of scientists or within expert circles. The aim of ULYSSES, therefore, is to explore the potentials, shortcomings and challenges associated with the use of IA models by an extended peer community, with a view to improving and supporting the application of decision support methods in participatory contexts.

This is realised through citizens groups held across core regions represented by five of the partner institutions, encompassing some of the cultural heterogeneity of the EU. Comparability between the core regions is achieved through certain common threads running through the citizens panels. Each region shares the characteristic of being an urban area of international importance with a high potential for shaping future economic activities and urban lifestyles in Europe. Certain models have been made available to ULYSSES allowing the use of common ICT (Information and Communication Technology) between the groups (details may be found later in this document). Collaboration within ULYSSES allows the participation of research partners in citizen groups in more than one region, and the use of common presentation material. All groups meet several times to give the opportunity for in-depth discussions to develop and produce some form of citizen report at the end of the sessions. Thus, a majority of the participatory groups of ULYSSES are concerned with the interaction between lay citizens and different forms of expertise (through computers and otherwise). In addition, however, panels directly involving the policy community and others exploring the role of the media will also be held in some regions.

Web site: http://alba.jrc.it/ulysses

Social Processes for Environmental Valuation (VALSE)

Fourth Framework Programme
Environment and Climate - Shared Cost Action, 1996-1998

Objective
The project addressed the effectiveness of social processes for valuation of environmental amenities and natural capitals for conservation and sustainability policy purpose. Valuation and choice have been approached "from the point of view of complexity" — that is, in a multi-

dimensional perspective reflecting the variety of scales and perspectives from which a problem may be considered and the range of individual and collective interests that may be involved.

Value statements about the environment often emerge out of social processes of controversy and conflict. All choices, individual and collective, can be seen as value statements (implicit and explicit), but there is not a simple aggregation of preferences. Different social processes for environmental valuation will tend to elicit different evaluative responses. Valuation practices have a greater chance of social legitimacy and policy usefulness when implemented with awareness of these social and institutional dimensions of value formation.

The VALSE project aimed to demonstrate these contentions through the design and implementation of effective procedures for eliciting environmental valuation statements and for addressing the conflicts that arise, in four real situations of natural resource and environmental decision-making.

Web site: http://alba.jrc.it/valse

Public Risk Perception and European Union Environmental Policy (PRISP)

Fourth Framework Programme
Environment and Climate, Shared Cost Action, 1996-1998

Objective
The PRISP project was developed through case studies in different European Countries with the main objective of investigating the 'social framing' of risk perception addressing the local cultural, socio-economic and historical factors that influence the public perception of risks.

The risks considered in this study were those associated to possible major accidents of industrial installations of the chemical industry, i.e. those subjected to the Seveso Directive.

Although not policy driven, the project was somewhat policy oriented as it aimed at providing indications for risk management practices and civil protection policies.

A variety of methods of investigation specifically targeted at understanding local dynamics in relation to risk issues were compared.

Food Risk Communication and Consumers' Trust in the Food Supply Chain (Trust)

Fifth Framework Programme
Quality of Life and Management of Living Resources. Shared Cost Action 2003-2005

Objective
- To contribute to a more in depth understanding of the nature, determinants and processes of social diffusion of trust in food risk information and food risk management, namely regarding BSE and GMOs;
- To evaluate the strategies brought about by consumers to assess the reliability of the message, in particular the way consumers process risk information with regards to different food hazards, and the cultural gaps between professional risk managers and laymen

- To assess the economic impacts of different risk communication strategies in the food chain;
- To discuss and communicate research findings with policy makers, risk managers, consumers' organisations, and representatives of farmers and food industries at national and European level, concerning ways to promote more effective and ethically appropriate mechanisms for managing risk information about food related hazards.

Web site: http://www.trust.unifi.it

Study on the Impact of Scientific Advice on Risk Communication (SARC)

Sixth Framework Programme
Science and Society 2004-2005

Objective
The purpose of the study is to examine how risk communication issues impact on the public after they have been reported in the print media. The project will also analyse how risk-related scientific advice flows between scientists, policy-makers and society at large. The following specific objectives characterise the project:

- Literature review on existing research on risk communication;
- Analysis of 'risk-related reporting' of scientific advice in a sample of newspapers, using two test subject areas – GMOs and SARS;
- Validation of a scientific advice assessment model developed in a previous Commission-backed study;
- Recommendations to ensure that the results of the project can be transformed into lasting practical activities in areas such as education and training.

The making of inclusive risk governance: TRUSTNET-IN-ACTION

Sixth Framework Programme
Concerted Action 2003-2006

Objective
The purpose of the project is the creation and the promotion of an inclusive risk governance culture by:
- Exploring new roles and mutual trust relationships of all categories of actors,
- Developing and testing structures for active participation of actors in risk governance,
- Developing guidance documents for each group of actors as a means to assist them in finding their role in an inclusive risk governance culture.

Web sites: www.trustnetgovernance.com ; www.trustnetinaction.com

Stakeholders in Risk Communications (STARC)

Sixth Framework Programme

Science and Society – Coordination Action 2005 - 2007

Objective
The project examines the role and place of risk communications in the risk governance structures and processes of modern society. The project will identify how risk decision-makers, stakeholders, the media and the public should be involved and able to participate in the development of a more dynamic risk governance culture and how to ensure interaction between all stakeholders and the public. While the focus of the project is on risk communications, other risk governance issues (e.g., risk detection, risk assessment, risk management, mitigation measures) are also addressed in relation to risk communications.

European Risk Communication Network (ERCN)

Sixth Framework Programme
Science and Society - 2005 - 2007

Objective
The 'ERCN Network aims to strengthen communication and dialogue on risk issues. It brings together scientists, risk managers and science communicators to examine risk in two areas: biodiversity, and genomics as it relates to health. The project is intended to:

- Produce four case studies on genomics genetically modified organisms, biodiversity and risk. These studies are intended to examine the societal impact of each subject, provide an analysis of risk, and look into ethical, legal, social and economic considerations.
- Develop films to be distributed to schools, science museums and broadcasters.
- Create a website for network members that will store documents in a searchable database. (A regular e-newsletter will keep members up to date about project progress.)
- Hold three workshops during which the network will examine ways to forge closer ties between science, society and the media.

Empirical studies and practical implementation of Risk Communication

WHO (World Health Organisation) case studies

Several case studies on risk communication are presented in a publication commissioned by the WHO Regional Office in Europe: "*Communicating about Risks to Environment and Health in Europe* (Technology, Risk and Society), Edited by Philip C.R. Gray, Richard M. Stern, Marco Biocca, Springer; 1st edition (May 31, 1998).

These case studies refer to different sources of hazards having a potential effect on health and environment. Besides they show that public experience with risk communication differs greatly in the different Member States and that there has been little opportunity for the transfer of experience amongst the different countries.

The specific risk types, which were considered within the different case studies, were those presenting a special interest for the World Health Organisation Regional Office of Europe. Specifically, they included: AIDS infection, use of tobacco, SEVESO related hazards, Nuclear, Food contamination, Pesticides, Electromagnetic fields, and waste and contaminated lands.

The general intention was to represent the following aspects:
- Assessed risk magnitudes.
- Perceived risk magnitudes.
- Discrepancy between expert and public opinions.
- Risk having different geographical impact. The different geographical impact of risk.
- Voluntary and involuntary risks.
- Potentially catastrophic and not catastrophic risks.

Amongst the several indications and information provided by these case studies, the following issues arise as a general and transversal outcome of the studies:

- Uncertainty as a critical issue in emergency risk communication, which gives rise to the question when to tell the public about a possible risk and how much to tell them about the uncertainty of the data and/or of the risk assessment.
- Problems associated with the difficulty of explaining the concept of risk to the general public, who is attending 'yes or no answers' to scientific questions. Besides, the public understands better the concept of hazard than risk.
- Necessity of tailoring messages and risk communication campaigns to the needs of the specific target audience.
- Importance of credibility for trust building.
- Importance of the role played by the media.
- Importance of the linkage of risk communication with the overall risk management process.

Empirical studies within the Seveso framework

European Commission funded studies

Several empirical studies were funded by the European Commission with regard to the implementation of risk communication within the framework of the Seveso Directive[1]. These studies provided guidance on how to implement effective risk communication and the practical problems therewith. The studies formed the basis for discussion for the future development of the Directive concerning information to the public related matters (88/610/EEC, amending Directive 82/501/EEC and Seveso II Directive 96/82/EC).

A positive outcome of these studies was that, although the information campaigns involved had a quite different character, some of the general conclusions and recommendation had many commonalities. In addition, they provided a valuable empirical data set on the involved matters.

With regard to public information within the Seveso contest, it was clearly underlined that some analytical divisions should be made. In particular:

Pre-pre information Information provided to inform the public about measures to prevent hazards.

Pre-post information Information provided on how to behave when an accident happens. It mainly consists of recommendations for people to remain indoors, not using the telephone, and to tune the radio in order to be prepared to receive and follow further instructions. The aim of the initiative is to prepare people in case of emergency.

Post-post information Information provisions after an accident has occurred. The appropriate behaviours to adopt in the event of an accident may vary considerably according to a number of specific circumstances and the accident evolution. This may require complex and specific actions on which the public cannot be a-priori instructed. Experience has demonstrated that emergency planning is most effective when it allows a high degree of flexibility in the actual management of accidents

Amongst the several conclusions of the mentioned empirical studies the following issues have are relevant:

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[1] - Implementation of Article 8 of the Directive 82/501/EEC a study of public information. Unpublished report for the Commission of the European Communities, Contract 86B66411100611N (ed by B Wynne, 1997)
- Empirical evaluation of public information on major accident hazards. Study Contract No 3646-89-03 ED ISP GB (EUR 14443 EN, ed by B Wynne, 1992)
- Risk Information needs of communities near Seveso sites: A pilot study (EUR 12887 EN, ed B. De. Marchi & E. Rota, 1990)
- Unconscious disinformation process in Major Technical Hazards – any remedies? (MTH project report, ed. B. de Vanssay, 1990)

- Despite the common belief that making the public aware of potential hazards does contribute to increased social apprehension and aversion to industry, empirical studies have clearly demonstrated just the opposite. Such a phenomenon is instead generated when provision of information appears to be contradictory, inaccurate or insincere. A typical example is when an accident occurs which had been deemed impossible by experts or regulators.
- Authorities tend to overestimate possible secondary and negative effects of information campaigns such as an increase of unnecessary apprehension from the general public . By contrast people tend to be well aware of the fact that they live in a risky environment but they are commonly misinformed about the reactions and the measures to take in case of an accident. Official information initiatives could significantly improve the public attitude and behaviour toward risky situations. Additionally, they could contribute to a better preparedness in case of an emergency should they incorporate notions and beliefs of the public itself.
- During an emergency, the behaviours of people is strongly dependent on: (i) a large number of beliefs, attitudes and notions that shape their capability of response; (ii) the specific circumstances of that particular emergency and (iii) the response of others.
- During the organisation of information campaigns, the joint efforts of the communicators of risk, the authorities and the general public clearly contribute to improve the necessary skills and attitudes that are essential for an effective response to emergencies. In addition, all the different stakeholders gradually learn the needs and priorities of one other, start to adopt new and diverse habits, and stable relationships are developed. The result of which, is a process of risk management whereby a number of different social actors (including the public) are responsible.
- Credibility and trust building are central issues in any risk communication process. However, it is very difficult to empirically assess the achievement of such an objective. This is mainly because it depends on several complex factors and is influenced by a large number of personal and social variables. The mere launch of information campaigns cannot build trust unless positive social relationships, bringing together a number of different stakeholders are established. This is a longstanding process that is built up over time.
- Both experience and research have proved that after an accident, several factors of differing natures (psychological, organisational and social) contribute to the negative consequences of the technological disaster (amplification of risk). These factors include the incorrect evaluation of one's own capabilities and responsibilities, the poor definition of tasks, the overlapping of competences, and delays and failures in communicating the accurate information to the proper bodies and services and to the general public.
- During any risk communication campaign, the quality and the extent of the social relationships established in the process play a key role. The effectiveness of the information campaign has to be evaluated by also considering this aspect.
- The evaluation of the information campaign is a very important activity that is necessary to assess its effectiveness. The main difficulty in conducting this assessment is that people are normally exposed to a large number of information, which also contribute to form their attitude and knowledge, but which is not specifically a result of the information campaign under evaluation. The retention of information by the target audience on specific issues might be assessed through purpose-designed questionnaires. More difficult is the empirical? measure of the retained ‘risk culture’ as a consequence of the information campaign.

Other models/experiences (taken from http://www.galson-sciences.co.uk/risk5.htm)

European Chemical Plant Expansion – Community anxiety About Benzene

A major US petrochemicals company needed to manage its public communications associated with a licensing application for a major process expansion in Belgium. The company was facing intense local opposition due to the perception that the expansion would mean more benzene on site and a greater health risk to the local community. Recent political scandals in Belgium had undermined the electorate's faith in the Government, and national political support for the plant did not carry much weight locally. At the same time, local elections were leading to the planning application becoming a local 'political football'.

The company needed to clarify its commercial and reputational objectives, as well as the internal and external hazards and opportunities for achieving its aspirations. A strategy was developed following focus group research. The research provided a valuable insight to the dynamics driving local perceptions, the effectiveness of existing communications from the plant, and the local community's preferred communication approaches. The research showed that the community did not trust the company's existing communication / enquiry routes, and employees did not feel equipped with key messages and arguments to be ambassadors for the company in the local community.

An internal and external communication strategy was developed. This included developing key messages to address local concerns, establishing employee forums, the development of a quarterly community roundtable, media and political briefing, and the identification of independent third parties to credibly contextualise health risks and help to balance debate. The company secured its planning application.

European LNG Facility - Societal Risk Assessment

A multi-national petrochemical company was assisted in the communication of a quantitative assessment of societal risks associated with one of its LNG plants. The risk assessment had been undertaken with a view to expanding the plant. Although the company eventually decided not to proceed with the expansion, it felt it should share the findings of the risk assessment with the local communities, but was sensitive that poor communication could cause alarm.

Historically, the plant's operations were not well understood by the nearby communities and over time, a sense of dread and anxiety had built up regarding the operations. The societal risk assessment gave reasons for confidence in the plant's safety management, and the plant wanted to communicate the findings as part of a process to begin to build bridges with the local community.

The company and the local community were helped to identify key issues, trusted third parties and preferred communication approaches. Communications materials and initiatives were developed. Plant managers were given training and advice on risk communication. Presentations and dialogue with community representatives were initiated and are beginning to build trust and routes for dialogue. The company was advised on the longer term strategy for community outreach and relationship-building, which is proving successful.

Risk Communication Manual

A major study was undertaken to advise on improving the UK Environment Agencies' understanding of public perceptions of environmental risks, particularly in relation to contaminated land.

Focus group research was undertaken to understand different perceptions of environmental issues and preferred communication approaches. A user-friendly training manual was written to help Agency staff identify potentially controversial issues, and to plan communication and dialogue approaches to build understanding and consensus. The manual was welcomed by the client as an essential building block in the Agencies' approach to dealing with complex environmental and social issues.

COMAH – Risk Communication

GSL (Galson Sciences Ltd.) has worked closely with Dow Corning Limited in the development of its approach to the communication of off-site accidental impacts in the light of the COMAH (Control of Major Accident Hazards) regulations in the UK. The regulations, which respond to the European Community Seveso II Directive, require the development and publication of a Safety Report. The company recognised the need to communicate its safety management of off-site risks both internally within the company and to the affected local communities. The company was sensitive that the issue could cause anxiety amongst certain parties. The company has also the subject of general media interest, and was sensitive to the potential for media escalation of the issue.

GLS worked with the company to scope the issue and identify best and worst case scenarios. A strategy that aimed to achieve the best case, but prepared the company for a worst case has been developed. The strategy, key issues, messages and communication approaches were tested on a series of focus groups. Communication initiatives were developed to demonstrate the company's responsible management of the issue. A key innovation was the generation of a Non-Technical Executive Summary to support the Safety Report by providing an accessible overview of the difficult and sensitive technical risk materials to be placed on the Public Register.

Research and development needs

Brief overview of the problem

As it is broadly acknowledged, risk perception and risk communication have a very multi-disciplinary character, which involve several disciplines such as psychology, sociology, social anthropology, urban planning, political science, decision-making, marketing and media studies. The associated activities also cover a quite broad area, ranging from simple education (about potential hazards, risks and risk assessment and action plans for emergency situations), to more complex aspects such as raising trust in certain technological activities and aiding in decision-making and conflict resolution.

The 'dual nature' of risk that relates to the extent to which risk is understood as existing objectively or as a product of mental processes is a further cause of differences in the general attitude toward risks between the experts and the general public, and between decision-makers and those affected by decisions. Risk perception research has demonstrated that the initial strategies which focussed on public misperceptions of risks, which tried to change or influence peoples' attitudes or divert their attention away from their actual concern, were unlikely to be successful. Any effective risk communication strategy should take account of this aspect.

For risk communication, the two-way communication approach has recently been addressed as the only possible way forward to effectively achieve its main objectives and the focus has gradually moved to what the concerns of the public actually are by emphasising a dialogue oriented approach. Emphasis has been shifted from information and educational purposes to consensus building and conflict resolution (right to be informed – right to participate).

Critical issues and directions to move forward

Despite the large list of research studies and initiatives on risk perception and communication, there are a number of general issues which were considered as particularly relevant by the SHAPERISK members for defining a general policy on risk communication. These aspects are specifically treated in this session. In particular, the complexity of modern society and the dynamism associated therewith suggest the need of further work in this area. The progression of scientific knowledge together with the evolution of social requirements and expectation impose that the main achievements on risk communication strategies and practices should be properly readjusted to account of changes in society.

Amongst the several factors which are influential in this process, the following list has been drafted by the SHAPERISK group by indicating a series of critical aspects in this framework. These aspects should be considered for the definition of research topics to complement the current state-of-the-art, particularly in the light of new circumstances and recent developments within our current society.

Issue n.1: 'Potential conflict between transparency and increased risk'

This issue is associated with the conflict on providing information to the public -as intrinsically connected to any risk communication action- and security. In the light of the emerging threats associated with possible deliberate acts of terrorism, there is the growing concern that providing information to the public might also provide terrorists with key information they could use. This debate has gained importance in many countries, and some initiatives have been taken to

maintain the security of information that might facilitate deliberate acts of terrorism. For instance, in the UK after September the 11th, public information campaigns have been reduced considerably, and safety reports of Seveso-type establishments are not accessible to the public anymore. For instance, in the Netherlands, there is still an ongoing debate whether to maintain some information contained in the Registry of Dangerous Activities as accessible to the public.

There is not a clear way forward to tackle this problem, and a common understanding on how to resolve this conflict is far from being achieved. At present, the only approaches made in the different member states seem to be simply associated with a restriction on the quantity and type of information made available to the public. This approach, although partially resolving the possible conflict between risk communication and security, does not promote effective risk communication. More efforts should be paid in elaborating risk communication strategies that do not jeopardise public security.

Issue n.2: 'Public Information vs. Public Involvement'

According to the general principle of democratic governance, public involvement in decision-making has recently been a major objective in the EU environmental policy. This has been expressed in several initiatives, based on the principle that policies and projects should involve the communities and individuals affecting and affected by those policies, throughout the whole process of design and decision. However, the current practice in environmental decision-making has demonstrated that the public is hardly ever involved in playing an active role in this process. One of the main questions is whether the public is actually willing to participate or not. Current experience acquired during the last few years, and in particular in the implementation of Seveso Article 13, indicates that active participation from the public (typically in open hearing sessions) has often been quite limited and ineffective. This is especially the case when the discussion concerns existing and well established activities. One of the main reasons could be associated with the way that risk communication campaigns are often perceived more as a bureaucratic requirement than an opportunity to get 'real' feedback from the public community. On the other hand, the public when realising that the result of their participation is not always translated into practical implementation for decisions, is less prone to actively participate.

Some positive experience of public involvement related activities is given by the 'Comités d'Intérêt de Quartier' (CIQ), and the 'Comité de liaison des Comités d'Intérêt de Quartier' (CLIQ), developed in France. These are public awareness groups consisting of public representatives, meeting regularly with operators and regulators to discuss potential effects of the industrial installation on local society. They constitute a force of proposition and opinion on general questions arising from the industrial installation, with the aim of improving the quality of life for citizens.

Issue n.3: 'Reliability of risk analysis and uncertainty'

Good risk communication practice implies the communication of risks, potential benefits and uncertainties. Communicating risk information alone only gives a partial picture of the risk issue.

In any decision-making process that makes use of the results of risk analysis, it is of fundamental importance to understand the role played by uncertainty. Unfortunately, not all decision–makers are aware of this aspect. In this respect, it seems that it would be very appropriate that risk communicators explore this matter further.

Finally, an important question to answer is whether any input from the public could be used in the risk analysis process in order to address the issue of uncertainty.

Issue n. 4: 'Factors and contexts which give rise to public distrust of risk management authorities and risk management practices'

Several barriers to trust and credibility arise when certain factors are present, these factors include the following:

- Inability of parties to acknowledge opposing points of view,
- Disagreement amongst risk experts,
- Aversion to acknowledge risk,
- Insensitivity of those responsible for managing the risk to public participation,
- Reluctance to disclose or share information.

In some Member States there are examples of successful campaigns to improve trust in their regulatory bodies. It is important to assess which are cultural differences in the different Member States on the public views of their regulators, in order to generalize the successful experience developed in some countries to other cultural contexts.

Issue n. 5: 'Risks do not stop at administrative borders. However, laws and practice tend to be dictated by administrative borders, thus cooperation between neighboring areas can be very challenging'

Cross-border training of civil protection authorities is already taking place in many countries. However, it is very important to understand how this experience can be translated into concrete measures in the risk communication field, and how this could be implemented by involving the public.

Issue n. 6: 'The role played by media for risk communication'

The media are by definition a powerful instrument for risk communication and, therefore, play a significant role in this contest. However, they are never independent instruments being them potentially influenced by internal values and pressures. In addition there is a very complex multidirectional influence amongst the media, policy, social movements and public response.