HEALTH AND SAFETY MANAGEMENT

Principles and Best Practice

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Management

of this approach was the role that feedback and interaction played in the communication process. In the UK, the Inter-Departmental Liaison Group on Risk Assessment (1998) produced good practice guidance on risk communication for government departments, and highlighted four important aspects of the process:

- Integrate risk communication and risk regulation by engaging those stakeholders affected by risk issues.
- Listen to stakeholders' views and concerns.
- Tailor communications to the issue and the audience.
- Manage the communication process effectively.

Problems encountered with poor risk communication include the generation of unnecessary fears about hazards and their risks, a distrust of experts and government departments, and anger and resentment among those people most affected by the risks. Failure to comment on risk issues, particularly by industry and government, is often interpreted negatively by the public. In the absence of information, the public will often assume the worst-case scenario, as it would be assumed that, if the message were beneficial, the relevant parties would be quite prepared to present their viewpoints.

Concerns about risk among stakeholders often revolve around two aspects of the problem. The first is related to the *level of fear* generated by the hazard, and the second is related to the *emotive impact* raised by the level of risk. It is important to recognise that the emotive impact on stakeholders is not necessarily related to the actual level of harm that may arise from a hazard. Although both of these aspects must be addressed in a risk communication programme, it is important to identify which, if either, of the two components is the dominant issue in each case.

Level of fear

Levels of fear may arise through individuals' concerns for their own or the public's safety. For example, although one may have a genuine fear for anyone living next to a high-hazard chemical plant, the feelings of concern for oneself would be quite different. The communication programme therefore needs to address whom the risks would affect and how the risks would affect them. In these cases it might be helpful to compare the level of risk with other similar sources of risk in order to place the level of the problem into perspective.

Emotive impact

Emotive impact arises from perceptions of how risks might affect an individual rather than the actual level of injury. It is important not to trivialise stakeholders' emotive fears about risks, even when the communicator is confident that the risk levels are minimal, as this approach might harden the audience's views about the issue. The following provides a strategy for addressing the emotive impact of risks:

- Avoid making comparisons with other risks, as this could indicate that the communicator is not addressing the problem but is simply attempting to divert attention from the issue by identifying an issue with an even bigger risk.

- Discuss a full range of risk mitigation options, and explain how each of these would address the risks.
- Identify, where possible, the benefits associated with the risks and balance these against the known costs.

Risk communication strategies

The general principles of communication, which were discussed earlier, are equally valid for the issues of risk communication; however, there are three general approaches that should be considered when developing a risk communication strategy.

The *technical approach* uses the dissemination of technical information about a hazard and its associated risks as the main theme of the communication process, and technical experts such as scientists and engineers often prepare and present the information. The information should be presented in a factual way with little, if any, discussion with other stakeholders. The approach often fails because the communicators have not been trained in the necessary communication skills that are required to present information to the public and the media.

The *public relations approach* concentrates on getting the 'right message' across to stakeholders rather than a desire to present the scientific or technical justification for the message. There is little effort to educate or increase the stakeholders' understanding of the issues involved. Here the communicators might be highly trained in communication skills, but they would often lack the scientific background that would be required to answer technical questions about the hazards and risks.

The *multidisciplinary approach* aims to take the positive aspects of the technical and public relations approaches and to combine them with other relevant disciplines, such as toxicology, social science and economics, in order to present a holistic approach. The multidisciplinary approach provides a forum for public, industrial and governmental debate of risk issues, and presents a more rounded view of the risks than either of the individual approaches.

Ranking and comparing risks

A major problem associated with the risk communication process is the need to explain and communicate the probability and consequences of undesirable events in a way that would be acceptable to the recipients of the information. Early research in risk communication focused on trying to identify what the public perceived to be an acceptable level of risk in order to develop better ways of communicating the data outputs from risk assessments. However, attempts at communicating risk levels, for example as 1 in 10^6, often proved to be difficult or impossible because people experienced difficulty in understanding and interpreting statistical probabilities. Many people believe that risk is a discrete event, which either happens or does not happen. To the public, the information, for example, that the fatal accident rate in the manufacturing sector was 1 in 100 000 per year

would appear to be so small that it could be ignored at any individual plant. However, because there might be one million people working in the manufacturing industry, the actual number of fatalities per year in this sector would, statistically, be 10. Therefore some researchers have used Likert-type scales to assess and communicate risk by using measures such as: *extremely unlikely*, *unlikely*, *possible*, *likely* and *probable* for the frequency of occurrence and *very slight*, *slight*, *minor*, *significant* and *major* for the consequences of adverse events. Objections to this approach relate to the difficulties of communicating the significance of low-probability, high-consequence risks. The subjective scales also make it difficult to interpret the results, because the phrases might have different meanings to different people.

Many people do not understand the concept of annualised risk, but there has also been concern because they do not understand the issue of *cumulative risk*. This issue can be illustrated by comparing two types of temperature control that may be used on a chemical plant to prevent overheating of a reactor vessel. On an annualised basis, one type of control is 99% reliable whereas a second type is only 95% reliable but cheaper. As there appears to be only a small difference in the performance, a decision might be taken to install the cheaper control system operating at 95% reliability. However, the cumulative performance difference between the two control systems would increase from 4% in the first year to over 30% by the tenth year.

It is generally accepted that risk comparisons are more meaningful to the public than the use of absolute values of risk, especially where the risks are very small. In addition, if fatality rates do not take exposure levels into account they may not indicate that some risks are related to certain risk factors, such as age. For example, fatality rates during pregnancy are higher for young women simply because women are generally under 40 years of age when they conceive. Fatality rates for lung cancer, on the other hand, are higher later in life because of the latency period involved with this type of disease. Various ways of presenting risks have been devised in order to overcome these and other problems. Wilson (1979) used the idea of listing activities that would increase one's chance of death in any one year by a factor of one in a million, for example:

- smoking 1.4 cigarettes;
- receiving one chest X-ray;
- living 150 years within 20 miles of a nuclear power station; and
- working one hour in a coal mine.

Cohen and Lee (1979) used the concept of loss of life expectancy from a lifetime of exposure to specified risks; for example:

- cigarette smoking: –2250 days;
- medical X-rays: –6 days;
- radiation from the nuclear industry: –0.02 days;
- coal mining: –1100 days.

Other approaches have compared risk levels with activities that the stakeholders may be more familiar with, for example stating that the risk of a fatality from working in a particular environment is more or less than the risk of a fatality

from painting the outside of one's house. The incidence of risks can also be presented as the frequency of injury per thousand or million hours of exposure. For example, Hawkins and Fuller (1999) reported that the risk of injury in football was 4 per 1000 hours during training but 28 per 1000 hours during competition.

Differences in risk perception inevitably lead to differences in views of the acceptability or unacceptability of risks. Therefore risk perception is an important indicator of how an individual or a group might respond to a set of data that was presented to them. A problem with measuring risk perception is that people's ability to judge absolute levels of risk accurately is poor (Daamen *et al.*, 1986). Different people have different perspectives on risks: therefore one disadvantage claimed for using specific risk-rating scales is that they do not allow respondents to rate risks by the issues that are important to them (Slovic, 1992). One way of measuring the validity of an individual's judgement of risk, however, is to measure the way in which they perceive the level of risk of one activity compared with that of another activity and then to compare these views with statistical data for the same risks. Whereas the validity of some measures of risk comparison is subject to debate, the rank ordering of these risk judgements has been shown to be relatively consistent, and in line with the available statistical information (Daamen *et al.*, 1986). Fuller and Myerscough (2001) compared how race team members, officials and spectators together with safety managers compared the risks of motor racing with those of other sporting activities (Table 5.1). Although significant differences were observed between stakeholders for the relative risk perception scores across the five sports, their rank ordering of the scores was similar, and consistent with the published fatal accident rates for these sports.

Table 5.1 Average relative risk perception scores and fatal accident rates for sport activities compared with motor racing

Activity	**FAR**[a]	**Average relative risk perception scores**[b]				
		All	*Race teams*	*Race officials*	*Race spectators*	*Safety managers*
Climbing	237	+0.59	+0.60	+0.58	+0.45	+0.91
Motor racing	161	0	0	0	0	0
Horse riding	46	–0.16	+0.21	–0.19	–0.49	+0.09
Rugby	14	–0.39	–0.03	–0.23	–0.75	–0.41
Swimming	10	–0.74	–0.59	–0.77	–0.86	–0.68
Work	8	–	[c]	[c]	[c]	–0.77

[a] Fatal accident rate per 100 million days' participation.
[b] +1: higher risk; 0: equal risk; –1: lower risk (compared with motor racing).
[c] Information not requested.
Source: Fuller and Myerscough, 2001

Judgements and decisions about the acceptability of risks must include a consideration of the decision process as well as a consideration of the hazards and risks, because risk comparisons form only one part of the overall process. However, where risk comparisons are made, they should include a consideration of the following points:

- Comparisons should be made between similar types of risk.
- Data sources should be valid and credible.
- Strengths and weaknesses of the data and information should be provided.
- Data and information should be provided in order to present the audience with a full perspective of the problem.

Framing effects

Research within the area of risk communication and decision-making identified an important factor that is referred to as the *framing effect*. Framing effects, which relate to the context in which information is presented or 'framed', can lead to bias in the recipients' views of the risks. For example, Slovic (1993) commented on the anomaly created by the public's acceptance of the use of X-rays and chemicals in the medical domain, where they were perceived as high-benefit and low-risk hazards, compared with their non-acceptance in the industrial domain, where they were perceived as high-risk and low-benefit. Although, in theory, decision-making should not be affected by the way in which information is presented, this is not generally the case in practice.

The most common framing effect is that of the *domain effect*, which involves changing the description of a risk from a negative to a positive description by, for example, identifying the benefits associated with a risk rather than the losses. Where a choice must be made between two undesirable options, both options can be framed in terms of their relative gains rather than the losses, so that those people affected by the decision would be left with a positive feeling that they had made a real gain whichever decision was made. Similarly, decisions could be significantly influenced by whether the options available were phrased in terms of lives lost or lives saved. For example, if a new surgical procedure had been developed in order to cure a disease, the results could be framed in a number of ways, such as:

- 95% of operations were successful;
- 5% of operations were unsuccessful;
- 5 out of every 100 people undergoing the operation died; or
- 95 out of every 100 people undergoing the operation were cured.

Each of these statements communicates the same information, but the interpretation and conclusion reached by each individual about the surgical procedure would depend, for example, on whether the recipients were optimists or pessimists.

An important application of the framing effect is where communicators claim that the general public would receive substantial benefits from an activity, and that only a small group of people would be adversely affected. This could have the effect of minimising the perceived risk to the general public at the expense of the identified minority group, who would become isolated and exposed. The use of framing effects has wide implications, as it allows some individuals or groups to manipulate other people's decisions simply by choosing the format in which data are presented. This approach is routinely used in the advertising industry in

order to present products and services in the best possible light. In a similar way, it has become common practice for politicians to use *spin-doctors* to frame communications so that they provide a positive image to what might otherwise be unpopular political communications.

Social amplification of risk

The hypothesis behind the *social amplification of risk* is that risk events interact with psychological, social, cultural, institutional and governmental processes, and this either increases or decreases perceptions of risk. The concept of risk amplification applies both to intensifying and to attenuating consequences of an event, but it relates mainly to the intensification of the risk perception process. In risk amplification, the impact of adverse events extends from the direct or primary costs of accidents and incidents, such as lost time, lost production and damaged equipment, to the indirect or secondary costs of the event, such as loss of sales and investor confidence. Secondary effects also include calls from the public for higher standards and legislation. A framework describing the risk amplification process, which is based on the proposals made by Kasperson *et al*. (1988), is presented in Figure 5.4.

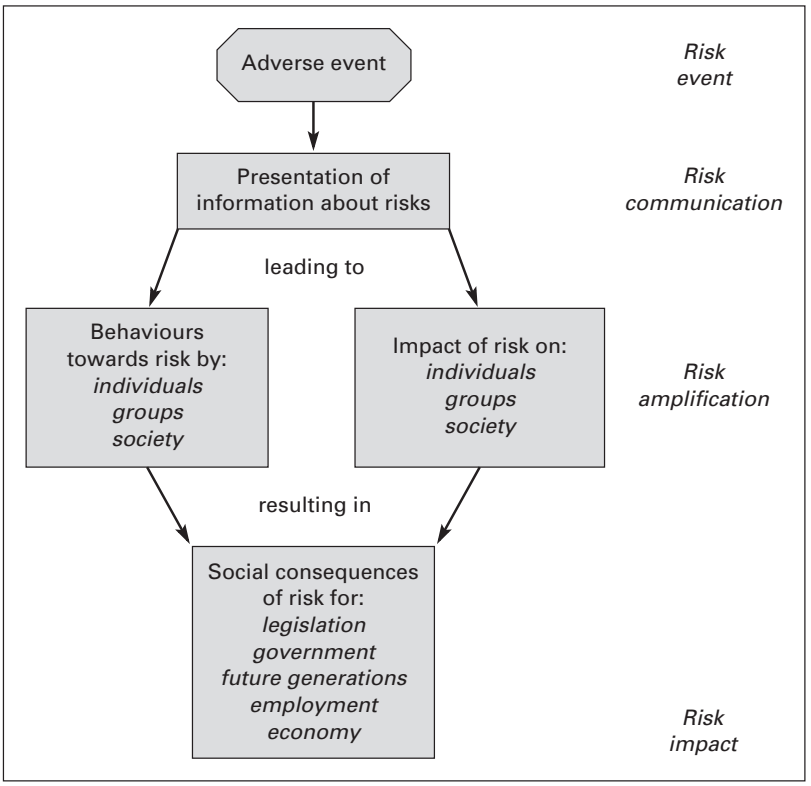

Figure 5.4 Processes involved in the social amplification of risk