

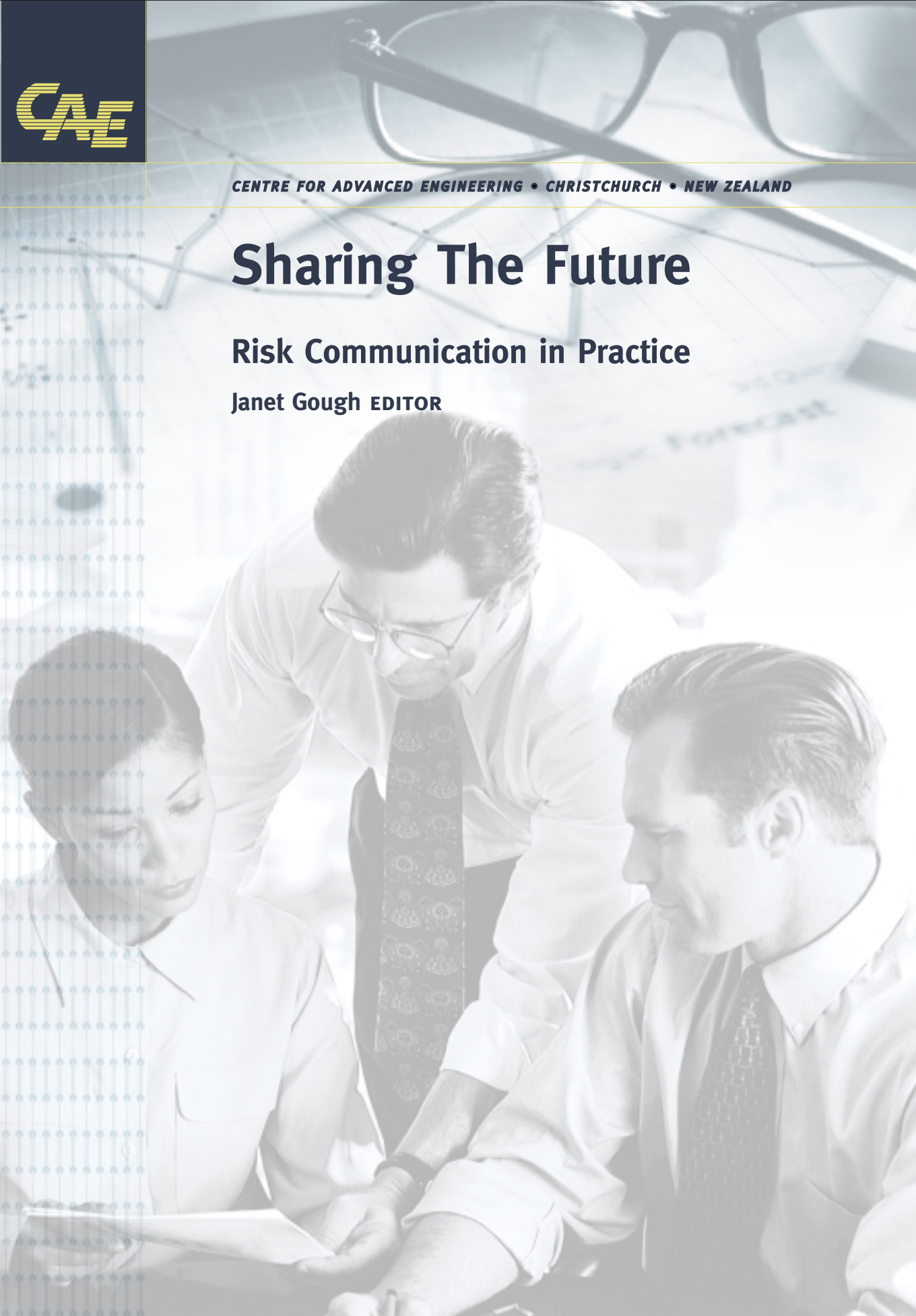


CENTRE FOR ADVANCED ENGINEERING • CHRISTCHURCH • NEW ZEALAND

Sharing The Future

Risk Communication in Practice

Janet Gough EDITOR





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Based on papers presented at the CAE Conference *The Risk Communication Challenge: Issues, Techniques and Practice*, held November 2000, and the CAE *Risk Communication Workshop*, held October 2002 as part of the New Zealand Society for Risk Management inaugural conference.

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Preface

David Elms

Risk Management has two close companions: decision and communication. The three are inseparable, and could follow Dumas' heroes in saying, "All for one and one for all". This book deals with risk communication and its many facets.

The central issues in risk communication differ according to context. Different stakeholders have different needs and backgrounds. Within an organisation, for instance, managers will need to understand their place in the firm's risk framework, which determines what has to be communicated and how. Dealing with the public needs a different approach, especially when the issue relates to public safety or the environment. Different again is the way in which risk is shared between contractor and client, and how this risk is to be communicated between the two.

The Chernobyl disaster resulted in part from poor risk communication. The Chernobyl plant had received a myriad directive from Moscow. The operators had no idea that while many were trivial, some rules were associated with enormous risk.

We can get an overview of the issues by considering the attributes and capabilities of the skilled risk communicator – the SRC, for short. The first thing the SRC will understand is that, in an organisation, it is seldom the SRC that does the risk communication. The SRC will plan, teach, mentor, advise and assess, but others will do the communication. For instance, following a bad airline accident it is not a PR expert that should be dealing with the public, but the Chief Executive.

The second attribute of the SRC must be a deep and sophisticated understanding of communication and its nature. Only a small proportion of communication between people and groups is concerned with facts. Communication takes place at many levels, some of them in unconscious. We could at times even think of some methods as using hypnosis, in broad terms. The SRC needs to be on top of the subject for two reasons: to help people in an organisation communicate effectively in a given risk context, but also sometimes to understand the communication techniques used by others. To be blunt, in the arena of public risk communication, others will often (yes, often) use sophisticated techniques to sway public opinion. It is vital that the SRC is aware of all the tricks.

Next, the SRC must have a deep understanding to risk psychology and risk perception. A great deal of research has been done on the factors controlling risk perception. To give one example, a voluntary risk is many times more likely to be accepted than an involuntary risk. However, that is what the science will tell us. The SRC has to go an important step further, and use the scientific findings as part of a strategy for communication risk. To continue the example, the SRC will

find a way to convert the perception of a risk from involuntary to voluntary. Thus it is vital to know the science, but the science is not enough.

The SRC also needs to understand the social and political context of risk communication. For example, in a public context, we have to work within the “law system”. This is not the same as the legal system, but contains it. The law system contains statute and case law. It includes lawyers, their conventions and their ways of looking at the world. It also includes the statutory authorities (such as district councils) and statutory regulations and planning documents. It is a sense the web that holds society together. But it does not always deal comfortably with risk. A lawyer, might, for instance, cite the building Act which says in effect that if there is a risk, the building must be lived in. A black and white position. We, on the other hand, might know that the risk is minimal; but the law might not see it that way at all. Risk has to be dealt with in a system not well-equipped to do so.

Finally, there is the question of ethics. The good SRC will have a great deal of power – power to change, power to persuade, power to manipulate understanding and opinion. It would be easy to misuse the power, and for that reason the SRC must have a strong personal ethic, perhaps by subscribing to the New Zealand Society for Risk Management Code of Ethics.

An understanding of risk communication is vitally important for the risk management professional. The subject is sophisticated and has many facets. It is not something learned in a day. I am therefore delighted that CAE has published this book and hope that many will read it and learn its lessons. The book promises to be a major contribution to risk management sophistication in New Zealand and beyond.

D G Elms
1 July 2003

About the Authors

Caron Chess

Dr Caron Chess is an associate professor at Rutgers University's Department of Human Ecology and director of Rutgers University's Center for Environmental Communication, which has an international reputation for experience in responding to environmental communication dilemmas with research, training, and public service. Her experience in academia, government, and environmental advocacy underpins her research interests in risk communication and public participation. She is particularly interested in ways to evaluate public participation. In addition, she focuses on organizational factors that affect outreach efforts.

Dr Chess, who is President Elect of the Society for Risk Analysis, is recognised as a leading international expert in the area of risk communication.

Karen Cronin

Karen Cronin is a Research Fellow and part time PhD student in Environmental Studies, at the School of Earth Sciences, Victoria University of Wellington. Her research is in the field of risk communication. Karen's professional career has been in environmental policy and corporate communications: she was Corporate Communications Manager for the Environmental Risk Management Authority from its establishment in 1997 to 2001, and has held senior management positions in the Wellington City Council, the Ministry for the Environment and the World Wide Fund for Nature. She was a member of New Zealand Environmental Council from 1985-1987; has been a member of the international Commission on Environmental Education and Communication, IUCN, since 1996; and a member of the OECD international working party on risk communication 1998-2001.

Karen was a founding member of the New Zealand Society for Risk Management in 2000 and a member of the Society's management committee.

Terry Day

Terry Day is currently CEO of the West Coast Regional Council, where he has been for the past four and a half years. Terry is Canadian born, but is now a New Zealander. His academic training was in British Columbia and at the University of Canterbury, where he gained a PhD in 1974. Terry then worked in the Canadian Federal Civil Service as research scientist with the Geological Survey, and in water resources management at Environment Canada, before returning to New Zealand in 1996.

Janet Gough

Janet Gough is a senior analyst for ERMA New Zealand and researcher/consultant

with Taylor Baines and Associates, in which capacity she is currently acting as the CAE risk management programme manager. She has had a long-time interest in risk perceptions and risk communication, and has published a number of papers relating to the theory and practice of risk communication in New Zealand, with particular emphasis on natural hazard risk.

Janet is Secretary of the New Zealand Society for Risk Management, and has been actively involved in the development of AS/NZS 4360 and associated Handbooks as a member of the Standards Risk Management technical committee, and Chair of the Standards Environmental Risk Management committee.

Gordon Hosking

Gordon Hosking has over 30 years experience in forest health and biosecurity research and management. From 1968 to 1997 he was a researcher and research manager with Forest Research's Forest Health Group. In 1997 he joined the Ministry of Forestry as Chief Forestry Officer and led the science team in the successful eradication of white-spotted tussock moth from Auckland. He now runs his own forest health and biosecurity consultancy, has established a joint venture technology company, Frontline Biosecurity, and delivers an indigenous forest health assessment package in partnership with Forest Research.

John Lumsden

John Lumsden is Projects Director at the Centre for Advanced Engineering. Following graduation he spent nine years in Canada as a structural engineering consultant. He returned to New Zealand in 1974 and joined an engineering consultancy specialising in coastal and ocean engineering. He was a director of that practice from 1983 until 1989 when he resigned to join CAE, and to pursue his own consulting interests.

At CAE, John has been responsible for the development and direction of projects undertaken by the Centre, which was set up in 1987 to provide facilities for groups of senior engineers, scientists and others to investigate technical matters of national importance. Through his work at CAE, John has gained a broad understanding of the many issues surrounding infrastructure, including energy, electricity supply, waste management, water quality, and lifeline engineering. Since 1997, John has developed a growing interest in the role of risk analysis in decision-making and, in particular, the essential elements of risk communication.

Jules Maher

Jules, whose academic background is in law, has been National Risk Manager for Telecom with responsibility for forming a risk management function in the Corporate office since 1993. During this time his emphasis has been on developing a strategic focus for the Risk Management function, providing appropriate policy frameworks, and expert consultancy within the Company on: managing risk; business continuity

management; compliance and business ethics; security and protection; risk financing and insurance (excluding Treasury). He manages a team of seven people called the “Risk Services Group” specialising in these different aspects of risk management.

Jules has been a member of the Management Committee of the New Zealand Society for Risk Management since its formation in early 2001.

Peter O’Hara

Peter O’Hara was Deputy Director General of MAF from 1994 to 1998, and acting Director during the period of the review of the proposal to import the rabbit haemorrhagic disease (RHD) virus as a biological control agent for rabbits. He had a special interest in biosecurity issues. Prior to 1994 he was Chief Veterinary Officer for the MAF Regulatory Authority. Peter has had a long and varied career in private practice, academia and public service. He is a member of a number of statutory bodies including the National Hydatids Council, the National Animal Ethics Advisory Committee, and the Animal Health Board.

Since his retirement from the Ministry in 1999, Peter has been active as a consultant and team member in areas ranging from border control and biosecurity, bovine tuberculosis, SPS and trade in the Pacific, food safety, and the abatement of greenhouse gases.

Bernd Rohrman

Bernd Rohrmann is an Associate Professor in the Department of Psychology at the University of Melbourne in Australia and an Adjunct Professor at the University of Mannheim in Germany. Educated in Germany, Dr Rohrmann has held positions as a social scientist and lecturer at various research institutions and universities and has been the director of a social-scientific consultancy team and visiting lecturer in Austria, Switzerland, Australia, New Zealand and Hong Kong.

Professor Rohrmann’s main areas of research are applied social research, environmental psychology and research methodology. Special interest areas include risk perception/communication/management, and attitudes towards risk-taking. He has conducted numerous hazard perception studies in Germany, Australia, Canada, China, Japan and Singapore as well as research and consultancy work in the areas of risk communication and management in Germany and Australia.

Adrian Sparrow

For the last two years Adrian Sparrow has been Management Assurance Advisor at The Treasury, where he provides assurance that the key ownership risks are understood and managed appropriately. Prior to this he worked as a risk management consultant for KPMG and Deloitte, and also ran the benefit crime programme for the Income Support Service.

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Section 1:

Risk Communication Principles and Theory

The chapter is a brief and personal introduction to risk communication. The views expressed here derive from observation over the past fifteen years.

Janet begins by describing some of the background to the book, and then examines the origins of risk communication, and the relationship between risk communication, risk perceptions and acceptable and tolerable risk. The context for this discussion is environmental risk communication, which includes consideration of risk to the natural environment and the health and safety of individuals and communities.

She outlines briefly some of the principles of risk communication, and notes the importance of internal risk communication within organisations as well as external communication between an organisation (public or private) and its stakeholders. Risk communication is an intrinsic part of risk management and this relationship is examined in the context of the Australian and New Zealand Risk Management Standard.

New Zealand's experience in the practice of risk communication has tended to focus on particular areas and Janet describes some of the programmes from personal experience. Finally, Janet refers to some of the more recent developments in terms of recognition of the importance of good risk communication, and introduces the CAE Risk Communication Project being launched in 2003.

The purpose of this chapter is to 'set the scene' and provide a context for the remainder of the book. While this chapter provides an introduction to the field of risk communication it is not intended to be an exhaustive review of a discipline that is employed in a wide range of subject areas, and by a large number of expert international practitioners (two of whom have provided chapters for this book). Nor is it intended to provide best practice guidelines – this will be the objective of a forthcoming CAE project. It is, however, intended to introduce the sound theoretical foundation of the practice of risk communication, and to make the reader want to know more about the theory and practice of risk communication. To this end a selection of recommended readings is provided.

Introduction

The papers published in this book were presented either at the CAE conference, *The Risk Communication Challenge: Issues, Techniques and Practice* held in November 2000, or the CAE Risk Communication Workshop held as part of the New Zealand Society for Risk Management inaugural conference in October 2002.

The contributors come from a wide range of backgrounds, including ecology, biology, veterinary sciences, psychology, mathematics, economics, geography, law, and engineering, thus illustrating the importance of risk communication within a range of disciplines. Many of the papers presented here reflect experience in the public sector, at a national and regional level. To some extent this reflects the public notification requirements of much of our environmental legislation, including (in New Zealand) the Resource Management Act (1991) and the Hazardous Substances and New Organisms Act (1996). However, CAE is very much aware of the importance of risk communication in private sector organisations and has initiated a project examining practice and performance in organisational risk communication, with emphasis on risk appetite, in both the public and private sectors.

The origins of risk communication

People's perceptions of risks provide a valid and required input to both formal and informal risk assessment and risk management procedures. In recent years the public has become much more aware of, and concerned about, environmental hazards. Part of this concern has arisen because of changing attitudes to the environment, reflecting changes in people's value systems, and a greater awareness of the importance of environmental health to our own well-being. This chapter concentrates on perceptions of environmental risk (unless otherwise stated). This includes risks to people and their physical and social environment (health and welfare) as well as the environment itself. The primary emphasis is on technology-induced risk, but most of the discussion also relates to natural hazard risk.

One of the drivers of risk perception research was the recognition that individuals and particular groups in the community view risk in a very different way from technical experts and scientists who use scientific models and tools to analyse and measure risk. Early researchers examined the different factors and characteristics of situations and specified risks that individuals take into account when they are making their own estimates of risk (and benefit).

Some researchers were initially motivated by the expectation that if it were possible to understand why people perceived risk in different ways to experts then it would be comparatively straightforward to 'educate' people so that they would 'understand' risk better and would therefore accept the advice being given by technical and scientific experts. However, greater understanding of both the factors affecting public perceptions and the reasons why expert predictions and lay perceptions differ has shown that this may not necessarily be the appropriate outcome. Over time, more emphasis has been given to understanding risk percep-

tions and including consideration of them in making decisions involving risk.

Perceived risk research (see Chapter 3) has provided improved understanding of how individuals think about risk, with the key outcomes being the identification of the main factors affecting people's perceptions of risk, the recognition that the technical concept of risk as a compound of probability and magnitude is inadequate in terms of the way most people think about risk, and a greater comprehension of the heuristics that people use in their efforts to estimate risk (e.g. Starr, 1969; Tversky and Kahneman, 1982; Fischhoff *et al.*, 1975; Fischhoff *et al.*, 1978; Slovic, 1987).

Risk conflicts arise when experts and the public differ in their views about risks associated with an activity, and are due to many causes. Research into perceived risk has provided considerable insight, and has highlighted a major social problem that derives from risk conflicts — the lack of confidence that the public has in the technical expert. The credibility of the expert is now a key issue of risk research reflecting on the credibility of the public-sector decision-making processes.

The concept of acceptable risk is linked to perceived risk. Acceptable risk is best seen as the result of a decision process where risks are analysed and, according to the particular decision criteria, specified as being either 'acceptable' or 'unacceptable'¹. In public decision processes, the criteria for determining acceptability or tolerability² should include consideration of public opinion or public perceptions of the risk, though how this 'consideration' is included in the decision process may vary widely, and is the subject of some of the following chapters. The concept of 'accepted' risk, referring to that which people choose to accept even if they don't like it³, is also relevant.

One important result of the early perceived risk and acceptable risk research was that people's perceptions are not simply 'irrational', and that people use a wide variety of input information including expert predictions to make their own social evaluations of risk (Fischhoff *et al.*, 1982, Kraus *et al.*, 1992). Essentially, individual and community perceptions are a valid input into decision processes, particularly the perceptions of groups likely to be affected by decisions. As a result, and also as a by-product of a certain amount of soul searching as to the purpose of research into perceived risk, the emphasis in risk research in the late 1980s switched towards designing ways of communicating risk information, as a

¹ Needless to say it isn't as simple as this, and in many cases three categories are defined, such that there is a group between 'acceptable' and 'unacceptable' that consists of those risks that require further attention.

² Tolerable risk depends primarily on the idea of the benefits outweighing the risks. The risk will never be accepted, but it will be tolerated for a particular activity or for a specified time period. Moore (1988) describes the term 'tolerable risk' as originating from the Sizewell B Inquiry in Britain. "A tolerable risk is not the same as an acceptable risk as people may tolerate a certain level of danger associated with a particular risk but that does not mean they will ever accept it." The term derives from comments by Sir Frank Layfield Q.C. (1987) that "although acceptable risk is often used in balancing risks and benefits, it does not adequately convey the reluctance with which possible substantial risks and benefits may be tolerated".

³ Accepted risk differs from tolerable risk in that people accept it voluntarily; for example, smoking.

means of (a) capturing public knowledge, and (b) avoiding costly risk conflicts that have the potential to slow or even halt some development activities. There is also a considerable body of work directed towards exploring the differences between expert and lay perceptions of risk (e.g. Lazo, *et al.* 2000; Flynn and Slovic, 1999).

An important driver for finding better ways of communicating on risk issues, and incorporating public knowledge into decision making, is that in many environmental decision processes there can be no absolute right answer because of the existence of uncertainty⁴. Therefore, the most acceptable solution to all parties must intuitively be reached by a process of trade-off between them (Renn, 1989; Renn and Levine, 1992).

For this to be successful, all parties must be prepared to negotiate and to establish a framework for this negotiation that will include the areas in which they are prepared to negotiate. Risk conflicts typically include elements of value conflicts as well as interest conflicts and risk communication seeks to clarify ways in which these can be defined and properly described.

Some principles of risk communication

The National Research Council (1989) defined risk communication by stating that the risk communication approach:

“...is an interactive process of exchange of information and opinion among individuals, groups and institutions. It involves multiple messages about the nature of risk and other messages, not strictly about risk, that express concerns, opinions or reactions to risk messages or to legal and institutional arrangements for risk management.”

There are two important concepts outlined in this definition. Firstly, risk communication is an exchange of information, or an interactive process requiring the establishment of two-way communication channels. Secondly, at times the communication channels will process messages that are not strictly related to risk. Risk concerns are often used as a surrogate for other issues in public-sector decision processes. This aspect of risk communication can be very important, as long as it is used judiciously and does not result either in ‘information overload’ or in a loss of confidence in the channel.

There are many manuals written on the ‘how to’ of risk communication. A number of consultants have taken the results from risk perception research, as well as communications research and participatory research, and have used this to specify sets of ‘principles’ or rules to be applied in communicating with the general public on risk issues. Some of these are described in Chapter 5.

⁴ Other important issues to be mentioned here include the Precautionary Approach and decision maker's approach to risk.

Some key messages can be extracted as to what should, and should not, be done. The following list is a useful set of aims for a programme.

- Start early;
- Identify stakeholders and be inclusive rather than exclusive – communicate broadly;
- Always involve the community in the decision-making process if appropriate representatives can be identified;
- Address community concerns when explaining risk (try to consider their perspective), and be very careful when making comparisons with other risks;
- Present material clearly and simply (but not condescendingly), give people time to assimilate and familiarise complex issues, and remember that there are no ‘dumb’ questions;
- Pay as much attention to the community’s intuitive perception of the risk, and to the community’s concerns, as to scientific variables (provide the information that the community wants as well as what it ‘needs’);
- Don’t avoid negative information, and admit when you simply don’t know; and
- Focus on building trust as well as generating good data, and only make promises that you know you can keep.

All of these aims are directed towards building trust and credibility which are essential elements of a good risk communication programme.

What risk communication can’t achieve

When risk communication processes were initially promoted some experts believed that it would be possible to solve all conflict simply by providing the public with ‘better’ information. This has indeed been the case in some instances, however, there have also been a number of studies of conflicts where the public is not prepared to accept that the experts’ viewpoint is ‘better’. The fundamental flaw in this approach is that risk communication is not just about ‘telling people’ or ‘educating the public’ but about exchanging information for the purpose of better informing all parties. With hindsight, most experts who have been involved in risk communication processes now have a greater understanding of the public’s attitudes and concerns.

Attitudes are based on values and beliefs. Communication is associated with flow of information (and knowledge). Therefore while risk communication can provide all parties with a better general understanding of the issue it cannot (and should not) attempt to change basic values and beliefs. However, risk communication can help by identifying points of commonality and points of difference, and also why these arise (Gerrard, 1995).

The National Research Council definition of risk communication (see above) addresses the issue of purpose obliquely, by noting that it may be used for a variety

of messages some of which may not be related to risk. The notion of purpose is important because the organisation or individual initiating the process needs to be clear about the intended purpose of the specific process so that the success or otherwise can be judged against the criteria implicit in the purpose. Risk communication is not necessarily unsuccessful because all parties cannot reach consensus. In some cases the purpose may simply be to gauge opinions or establish a communication vehicle.

Internal and external risk communication

While much of the risk communication literature concentrates on communication between an organisation and its stakeholder, it is important to remember that communication about risks within an organisation can be critical. A classic and dramatic example of where poor internal communication about risks led to a tragic outcome is the case of the Challenger Shuttle disaster. The details on how this occurred are well described in Feynman (1988). In this instance it was lack of communication between engineers (analysts) and managers that resulted in poor decisions. Another, more recent, example from the medical field relates to an instance in the United States where information from gene therapy trials was not sent to the central registry, thus resulting in incomplete information being given to patients (*New Scientist*, 2000).

Chapter 2 touches on the way in which internal communication about risks can affect the way an organisation communicates with its stakeholders, and Chapter 10 illustrates how differences in interpretation within an organisation regarding risk appetite can arise when there is no explicit policy established.

Internal risk communication ensures that those who are responsible for implementing the risk management framework understand why certain actions are required. It can be used to encourage internal staff to keep a watchful eye for activities or situations that may lead to risk. Good internal communication about risk should be part of an organisation's risk culture, and embedded into risk management profiles and programmes.

Risk communication and risk management in Australia and New Zealand

The Australian and New Zealand risk management standard *AS/NZS 4360: Risk Management* (Standards Australia and Standards New Zealand, 1995, 1999), was first published in 1995. This first version of the standard did not include explicit consideration of risk communication. However, when the revised version was republished in 1999⁵, risk communication had become a fundamental component of all steps of the process⁶.

⁵ AS/NZS 4360 is currently (2003) under revision again. In the 2004 version of the Standard the role of risk communication has been further reinforced.

⁶ The development of the Environmental Risk Management Handbook (Standards Australia and Standards New Zealand, 2000) was a positive driver in ensuring the recognition of risk communication.

The standard promotes the development of a risk communication programme as an essential part of risk management, where elements of such a programme include determining:

- **why** communication and consultation is required;
- **who** is going to be involved (who are the stakeholders);
- **when** the different parties are going to be involved;
- **what** is to be the subject of the communication and consultation; and
- **how** the process is to be undertaken throughout the risk management cycle.

One of the benefits of embedding risk communication within the risk management process is seen as being improved stakeholder relationships, allowing an organisation to explicitly identify its internal and external stakeholders, and to develop a conversation between the stakeholders and the organisation. One important element may be assigning responsibilities for internal and external communication, whilst keeping in mind that communication, as well as risk management, must be part of everyone's responsibility.

Communicating and consulting on risk issues requires knowledge and consideration of the varying factors that affect all stakeholder perceptions. Individuals and communities respond to risk according to how the risk is perceived. Such perceptions are influenced by a range of factors that go beyond the simple two-dimensional model of likelihood and magnitude of effect, should the event occur.

When designing risk communication programmes as part of risk management, the distribution of risk across the population is highly relevant since, in many cases, external stakeholders believe that they are being asked to bear the risk while the organisation garners the benefits. Chapter 2 and Chapter 12 illustrate how directly involving stakeholders and convincing them that the organisation has an interest in ensuring that stakeholders are not unnecessarily disadvantaged can help to allay these concerns. As discussed in Chapter 6, 'respect' is an important element of good communication.

Risk communication in New Zealand

New Zealand has not yet faced the sorts of major risk conflict situations that have concerned Europe and the United States over the past two decades. One reason is that these have focused largely on large-scale questions such as nuclear power generation and hazardous waste disposal. The second area is of concern to a number of groups and agencies, but it has not yet surfaced as a major focus of the general public.

In the past few years, however, there have been significant areas where differing perceptions of risks have led to conflict. These include the siting of microwave and cellular phone towers, genetic modification and biotechnology (Chapters 6 and 9), and large scale spraying of residential areas to eradicate pest species (Chapter 12).

Risk communication techniques have been applied in New Zealand to natural hazard management and flood control. While Chapter 8 provides one example, there are a number of other circumstances where councils have applied successful risk communication programmes that have used community knowledge and experience to help design appropriate systems. These include flood control (Kingsbury, 2000), and general natural hazard management (McSaveney, *et al.* 1996; Gough, *et al.* 2001).

Since the implementation of the Resource Management Act 1991 (RMA), communities have become accustomed to being consulted on the development of District and City Plans. Along with this, the notification requirements of the RMA has resulted in community groups becoming more active about engaging with planning authorities in a number of areas, many of which involve risk.

The health sector in New Zealand has also become more aware of the importance of risk communication, though in a number of recent examples the emphasis has been on informing the public, rather than consulting the public. Part of this is the result of current legislation; proposals for changes to the Health Act may result in better recognition of the benefits of properly designed risk communication programmes. At a clinical level, a great deal of emphasis has been given to improving doctors' and clinicians' communication skills in recent years.

Two areas where long-term risk communication channels have been established in New Zealand are the Ministry of Agriculture and Forestry (MAF) Farm Advisory Service, and the Civil Defence Service. The Farm Advisory Service has for many years operated as a communication channel between farmers and the scientific and technical researchers of MAF. This has proved to be an effective two-way communication channel with farm advisors acting as communicators. One of the features of the service is that the communicators have been trained primarily as farmers rather than as communicators so they have used their own professional judgement to determine what the message should be and how it should be communicated. Unfortunately, institutional change has resulted in the downgrading of the service.

The Civil Defence service has largely been a one-way communication system with Civil Defence providing the public with information on what to do in cases of emergency. The efficacy of this communication channel is hard to judge since Civil Defence situations do not occur very often. The new Civil Defence and Emergency Management Act (2002) aims to strengthen the role of risk communication in managing for emergencies, and communities and councils will be more directly involved in all aspects of planning for emergencies.

New Zealand needs to place emphasis on:

- encouraging institutions and agencies currently involved in risk assessment to recognise the validity and utility of their procedures;
- enhancing the credibility of agencies and institutions likely to be involved in risk communication exercises;

- considering ways of providing comprehensive and comprehensible technical information to the media and the public; and
- exploring imaginatively the establishment of communication channels (either as institutional arrangements or flexible processes)⁷.

Towards the future

In 1997, the United States Presidential/Congress Commission on Risk Assessment and Risk Management published a document entitled *Framework for Health Risk Management*.

The importance of this document to proponents of risk communication was that the central element of the diagram illustrating the relationship of risk assessment and risk management was ‘engage stakeholders’. It discusses the need for better communication between regulators and the public and concludes that “The practice of risk communication is moving from trying to explain risk information to citizens toward building partnerships between plant managers and nearby residents, between companies and consumers, and between agency risk managers and the public. Although our air, water, and food are measurably cleaner and therefore less risky than they were 30 years ago, the fact that many citizens believe that they are at greater risk indicates that risk communication has a long way to go.”

In November 2002, the United Kingdom Cabinet Office published a document entitled *Risk: Improving Government’s capability to handle risk and uncertainty*. In it they refer to the importance of risk communication and note the following:

“Three specific concerns were raised in our study in relation to communication with the public about risks they face:

- communication needs to start earlier in the policy development and decision process, wherever possible when framing decisions are being made. A number of NGOs⁸ told us that they were frequently approached for comments on a narrowly defined solution to risk issues, rather than being involved early on in analysing the problem and the range of options available for tackling it;
- communication with the public on risks that affect them needs to be a genuinely two-way process. NGOs have suggested that a one-way approach to risk communication is more likely to increase public anxiety about risks than to provide reassurance; and
- involvement of the public in decisions about risks, both formal and informal, needs to be as widespread and balanced as possible. Stakeholders we spoke to suggested that, by restricting formal consultation to their usual list of contacts, Departments were more vulnerable to ‘group think’ and as a result key risks were sometimes missed. Similar concerns were voiced about informal soundings such as public attitude surveys, with one politician we spoke

⁷ This statement derives from Gough, 1991. It remains appropriate today.

⁸ Non Governmental Organisations

to suggesting that Departments sometimes confuse market research with genuine involvement in the decision process.”

The importance of these conclusions is not so much their content, which will be well recognised by people familiar with risk communication literature and practice, but that they are presented in high level government documents.

In the New Zealand context, the public participation elements of our environmental legislation (Resource Management Act 1991, Hazardous Substances and New Organisms Act, 1996, Civil Defence and Emergency Management Act, 2002) provide a legislative foundation for the development of better practice in communicating about risk issues. However, while there is an imperative for public participation, this does not necessarily translate to an imperative for risk communication in the broadest sense, and there is often a perceived as well as an actual power imbalance. Changes to the Local Government Act may help to empower communities, who will need tools to assist them in participating fully. At the same time (as identified in later chapters) organisations also require tools for both internal and external risk communication.

CAE is seeking to address some of these issues in a new project on risk communication. The goal of the project is –

To develop approaches and techniques for enabling risk communication suitable for New Zealand organisations, *by means of*

- An improved understanding of the psychology of risk taking and risk perceptions at an organisational level
- The development and promotion of a process within organisations for promoting a more general awareness and understanding of expectations regarding managing risk i.e. risk attitude
- The development and promotion of a process for assisting organisations to communicate risk to external stakeholders and interested parties both on a project basis and on a more general basis

It is important to note that the use of the term ‘approaches’ here includes notions of how, why, what, when, and why, so as to assist organisations to undertake ‘better’ communication about risks.

This book provides a good base for the project. In order for New Zealand to manage risks better, there needs to be an open discussion on what risk management can and cannot do, and how and where it should be applied. An excellent start would be greater recognition of the importance and value of risk communication and stakeholder contributions to decision making.

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Useful websites

Risk Communication in Print and on the Web: A Critical Guide to Manuals and Internet Resources on Risk Communication and Issues Management, Philip CR Gray and Peter M Wiedemann — www.fz-juelich.de/mut/rc/inhalt.html

2

Managing Risk Communication: Risk Communication Inside Out

Caron Chess

Risk communication is a process aimed at improving the credibility of decisions, and at achieving effective management of risk. It is a means of transferring information between all stakeholders and provides an arena for discussing different viewpoints. Effective risk communication should be a genuine effort to involve all parties in the resolution of an issue.

Risk communication is sometimes thought of solely from the perspective of an organisation communicating with its external stakeholders. External risk communication is part of good practice and helps an organisation to fulfil its legislative responsibilities, provide due diligence and obtain necessary permits. It will improve community understanding and awareness of an organisation's environmental activities.

However, Caron points out that there are two further aspects that are critical to good risk communication: the policy and structures within the organisation that support risk communication and, closely linked to this, internal risk communication processes. From a risk management perspective, internal risk communication ensures that those who are responsible for implementing the risk management framework understand why certain actions are required.

This chapter introduces and discusses how internal aspects of risk communication affect the success of risk communication with external stakeholders and interested parties, and illustrates this by examining a set of questions relating to internal processes that need to be addressed by organisations before undertaking external risk communication.

By emphasising the organisational aspects of risk communication, as opposed to procedural aspects, Caron provides the context for the remaining chapters.

Introduction

Risk communication programmes may require effective internal systems that facilitate an organisation's ability to communicate with outside audiences. Based on two case studies, this paper raises six questions for organisations to consider:

- 1 Why are you communicating?
- 2 How do you listen?
- 3 Who communicates?
- 4 How do you communicate internally?
- 5 What is the relationship between what you say and what you do?
- 6 How do you keep risk communication efforts on track?

In the United States, risk communication was born less than a year after the tragedy in Bhopal, with an accidental airborne release in August 1985 from the Union Carbide plant in West Virginia. The release created a crisis of public confidence that sent an alarm through the chemical industry (Lueck, 1985). Companies sought to regain credibility, in part, with risk communication with communities. The subsequent passage of a federal law that required public disclosure of information provided further momentum to risk communication efforts.

While early risk communication efforts focused on translating technical information into lay terms, the trend in the United States is towards developing participatory processes that involve communities (e.g. Fischhoff, 1995). In the words of the (US.) National Research Council (1996):

"The common practice of eliciting comments only after most of the work of reaching a decision has been done is cause for resentment of risk decisions. Many decisions can be better informed and their information base can be more credible if the interested and affected parties are appropriately and effectively involved."

However, developing risk communication efforts that go beyond mere propaganda may require companies and government agencies to change not only how they communicate to those beyond their walls, but also how they communicate internally. In some cases, it may require these organisations to change not only what they say, but also what they do.

There is very limited research on the relationship between internal organisational systems and external risk communication. Therefore, it would be unwise to develop risk communication 'rules' for complex organisations dealing with difficult risk issues and potentially contentious communities. My goal here is to provoke some reflection by raising questions based on two case studies: 1) Sybron Chemicals developed an innovative telecommunications system so that plant neighbours could routinely communicate about concerns to the plant and 2) Rohm and Haas' Bristol, Pennsylvania plant developed one of the country's first advisory committees (Chess *et al.*, 1992; Chess *et al.*, 1995).

Motivation: Why are you communicating?

In the cases studied, companies learned the hard way. A release from Sybron Chemicals in the middle of the night led to the evacuation of 60 people and calls from the community for the plant to shut down. As a result, the plant took a crash course in community relations. Rohm and Haas' Bristol plant was hit with headlines about its landfill before the site told anyone in the community.

One of the risk communication rules of thumb is to communicate before, rather than after a crisis. There needs to be further research on the extent to which there is sufficient motivation for most companies to develop participatory risk communication efforts before such motivating events.

How do you listen to outside voices?

The successes relied on a number of different methods to hear outside voices. In this way, plants were more likely to hear of community concerns before citizens felt a need to shout for attention. For example, at Sybron calls from the community were put directly through to managers. Rohm and Haas had a sophisticated response vehicle, complete with monitoring equipment and information on toxics that went to the homes of callers concerned about odours.

Arguably Sybron had the most innovative mechanisms in place to hear outside voices. To help Sybron listen, the PINS telecommunications system, which notified neighbours in event of an emergency, also functioned as a sophisticated answering machine. Plant neighbours could call into PINS 24 hours a day to hear a recorded message about the status of the plant, or to leave a message if they had concerns. This allowed residents to report odours and gives operators information to track plant malfunctions and track odour releases quickly and promptly.

The PINS system was such a success, both in helping the plant to quickly track odour releases and in giving community people prompt access to information, that Sybron went one step further. The plant set up an odour identification team made up of volunteers from the neighbourhood who were trained to identify odours that might come from the plant. In this way they could assist the plant by reporting odours more accurately. Volunteers also had weather stations in their backyards to help determine if Sybron was the source of the offending odours. Volunteers served as resources to the plant, which could call members of the odour ID team to verify a reported odour or to go over to a neighbour who smelled something.

Sybron's approach was an innovative one for a plant where odours were the primary concern. Organisations with different problems will undoubtedly need different mechanisms.

The role of public relations: Who talks and listens?

Too often, public relations personnel serve as a buffer between the plant and

outsiders, creating a soundproof barrier that community residents may try to shout down. Contrast this with the model of the amplifier where PR managers and others listen to outsiders and carry the messages back to others in the organisation. Then outsiders do not have to scream to be heard.

In the cases studied, public relations managers were facilitators of communication, serving as amplifiers, rather than buffers. Managers at all levels were involved in dealing with outside people routinely. Plant and environmental managers played vital roles, and risk communication was part of the organisation rather than a veneer.

Public affairs staff served as advisors, trouble-shooters, liaisons, coordinators, writers, editors, coaches, and advocates for improved communication. But face-to-face communication was left to managers and other personnel with the technical backgrounds. Rather than serving as a mouthpiece, the role of public relations personnel was to make sure that other managers learned how to communicate. They found it easier to train an engineer to speak to a community meeting than to teach a public relations person an understanding of production processes.

How do you communicate within the organisation?

Rohm and Haas managers saw improvements in internal communication as critical to their efforts to communicate with outside audiences. “We make an intentional effort as soon as we know about something to inform employees so they know about it, and they don’t get a distorted message. And if [employees] do hear a distorted message on the outside they can answer it directly,” according to a manager from the Bristol plant. In addition, at Sybron and Rohm and Haas routines were in place to make sure messages from outside the facility were passed on clearly.

What is the relationship between what you say and what you do?

In these cases, responding to concerns about risk management was, to varying extents, part of the risk communication programme. Communities’ suggestions did not disappear into a black hole; companies improved environmental management, increased monitoring and changed standard operating procedures. For example, Sybron and Rohm and Haas’ pledges to reduce odours were part of larger environmental efforts. Sybron’s PINS telecommunications system and members of the odour identification team were integral to the plant’s risk communication and risk management efforts. Reports of odours alerted plant personnel to explore potential sources of problems in the plant.

How does your organisation keep risk communication on track?

For an organisation to listen and respond, more than one trained listener may be required. To avoid the model of the great communicator riding off in the sunset, organisational learning needs to take place.

In all three cases there were systems in place so that the organisation developed a shared understanding about risk communication. Not only did staff and managers change their behaviour, but records were kept and routines were developed to build institutional memory, so the organisations could do better the next time around.

Surprisingly few personnel interviewed had taken risk communication courses. Most had learned the hard way and from feedback from others who had more experience or training. While formal risk communication training is likely to enhance these skills, it is not sufficient for effective risk communication.

The bottom line may be: What is your organisation doing internally to promote effective communication externally? Risk communication is not something you do to others. Risk communication may also require you to make changes.

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The study of risk perception research is an interdisciplinary research area in which psychologists, sociologists and political scientists investigate how individuals judge and evaluate hazards related to working conditions, private activities, technological developments, residential settings, environmental hazards and global ecological changes. The main issues are the subjective concepts underlying risk judgments, the determinants of perceived risk magnitude and risk acceptance, and differences in risk perception between societal groups or countries and cultures. Most studies are based on a psychometric approach in which risk sources are scaled according to a set of substantive risk criteria.

Risk perception research has provided input into the study of risk communication processes as well. A major thread of the development of risk communication derives from research into perceived and acceptable risk and seeks to find ways (a) of avoiding the costly risk conflicts between promoters of projects and affected public groups and individuals, and (b) to inform the public about risk issues that may affect them in an appropriate manner. Risk communication thus requires education of experts and laypersons so that their common understanding of the issues, facts and values associated with risk will be increased.

Social-scientific research on risk perception has explicated the strong influence of socio-psychological factors and the cultural quality of risk evaluations. How the magnitude of risks is rated, and to what extent people are prepared to accept a risk, is dependent on the type of hazard, on personal experiences, beliefs and attitudes, and on diverse societal influences. Judgments are more negative for technology-induced than for natural hazards, and involuntary than self-chosen (controllable) risk exposure. Fear associations, unfamiliarity, catastrophic potential, and long-term health impacts are stronger influences than assumed probability to die. Clearly, 'technical' and statistical risk characteristics cannot explain risk acceptance data. While individual and, particularly, societal benefits counterbalance risk concerns for occupational and private risks, this is less true for large-scale technology risks. Regarding personal characteristics, attitudes such as environmental concern, scepticism about technology usage and 'post-material' value orientation are significant determinants while socio-demographic factors have only restricted effects. Those attitudes are embedded in a wider cultural and political context; therefore, societal sub-groups differ widely in risk acceptance.

Such findings are valuable for a better understanding of people's attitude toward risk and societal risk controversies. They can be utilised for designing comprehensive information, communication, and education about risks — which

is an indispensable component of effective risk management.

With this chapter, Bernd extends the context within which risk communication is applied by providing an overview of risk perception concepts and principles. He also helps to set the scene for Section II, which consists of examples of risk communication processes and case studies. Since people respond to risk issues according to their perceptions of the risk, an understanding of the concept of acceptable risk and under what circumstances people will 'accept' or 'tolerate' different types and levels of risk, is fundamental for shaping risk communication efforts.

The chapter has three parts: firstly, the main concepts and approaches regarding risk perception are explicated. Then selected results collected in six countries, including New Zealand) are used to illustrate main research outcomes, and a structural model integrating these findings is discussed. Finally, the relevance for risk communication is emphasised.

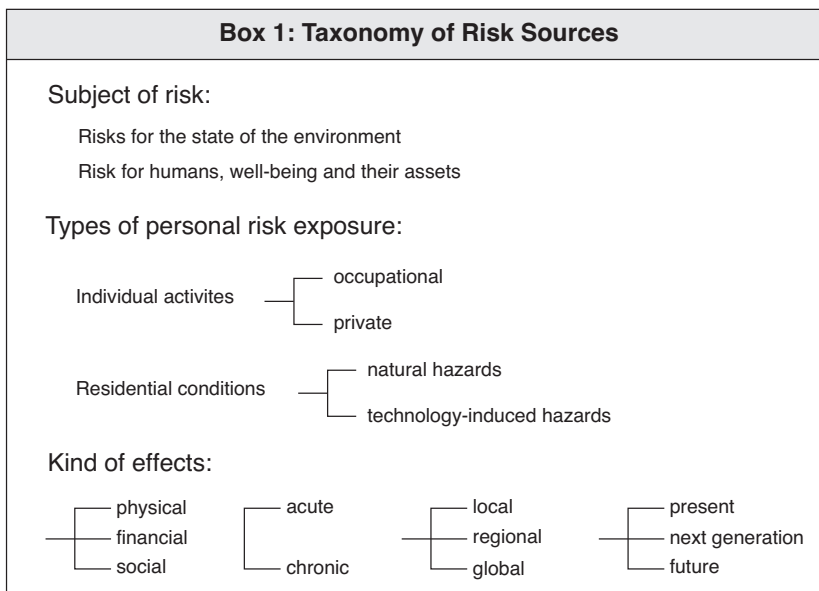
Concepts and Approaches

Risk perception has provided a fertile source of both societal debate and scientific research for two decades now. In this interdisciplinary area, psychologists, sociologists and political scientists investigate how individuals judge and evaluate hazards related to working conditions, private activities, technological developments, residential settings, environmental hazards and global ecological changes. Researchers of particular backgrounds as well as the various groups within 'the public' often differ in their understanding and use of risk-related terminology; therefore this text begins with a brief discussion of main concepts and approaches.

Hazards and risks

Without question 'risk' is a highly topical term. To illustrate this: an internet search for 'risk' in May 2001 produced an amazing number of hits, namely 10,254,835 or 8,573,640 or 5,514,845 by three search engines. However, there are many meanings of this concept, in terms of both denotations and connotations, as the literature demonstrates, e.g. Drottz-Sjoeberg, 1991; Fischhoff, Watson and Hope, 1984; Lupton, 1999; Renn, 1992a; Rohrmann, 1998; Short, 1989; Vlek, 1996; Yates and Stone, 1992. One reason for this is that hazards, the sources of risks, are very heterogeneous, as the taxonomy presented in Box 1 elucidates.

From a socio-psychological perspective, it is important to be conscious of differences between physical and psychological phenomena, and to distinguish between judgments, attitudes and behaviours in respect to risk situations. In Box 2



Note: This text is an extended version of my presentation at the CAE conference "The Risk Communication Challenge" and mainly based on the work published in Rohrmann 1994, 1995, 1998, 2000.

a set of definitions for relevant risk terms is outlined based on Rohrmann 1998.

A hazard is a physical entity while risk is not; it is an inference about the implications of a hazard (for people or nature, or assets) exposed to it. In most contexts ‘risk’ refers to a danger of unwanted negative effects; however, in some fields ‘risk’ is treated as a neutral term equating to uncertainty about the outcomes of choices and there is also a positive connotation, such as ‘desired risk’ e.g., ‘getting a thrill’ by acting in a risky manner. Clearly risk is a multi-faceted concept.

Risk perceptions are interpretations of the world, based on experiences and/or beliefs. They are embedded in the norms, value systems and cultural idiosyncrasies of societies. Every human is busy with risk perception most of the time, whether driving a car or thinking about health care or worrying about upcoming bad weather and so on. Strictly speaking, risks cannot be ‘perceived’ like a size or speed or the weather. However, risk perception has become the standard label of the respective research topic.

It is important to note that most people have views about every risk, regardless of whether they are exposed to it or not. Also, neither perceptions of nor attitudes towards risk should be taken as equivalents of actual behaviour.

Risk perceptions can be quantified by socio-psychological scaling and survey techniques, e.g. the psychometric approach, cf. Section 1.4. In other words, while

Box 2: Core Concepts in Risk Research

Hazard

A situation, event or substance that can become harmful for people, nature or human-made facilities

Risk

The possibility of physical or social or financial harm/detriment/loss when exposed to a hazard

Risk Perception

People's judgments and evaluations of hazards they (or their facilities, or the environment) are or might be exposed to

Perceived Risk Magnitude

A person's judgment (belief) about how large the risk associated with a hazard is

Risk Acceptance/Refusal

Decisions about the acceptability of risks in individual or societal terms (principal or de-facto)

Risk Propensity

An attitude towards taking a risk when deciding how to proceed in situations with uncertain outcomes

Risk Behaviour

The actual behavior of people when facing a risk situation

risk perception is subjective in nature, the data describing it are as objective as other scientific findings.

Perceived versus ‘real’ risk

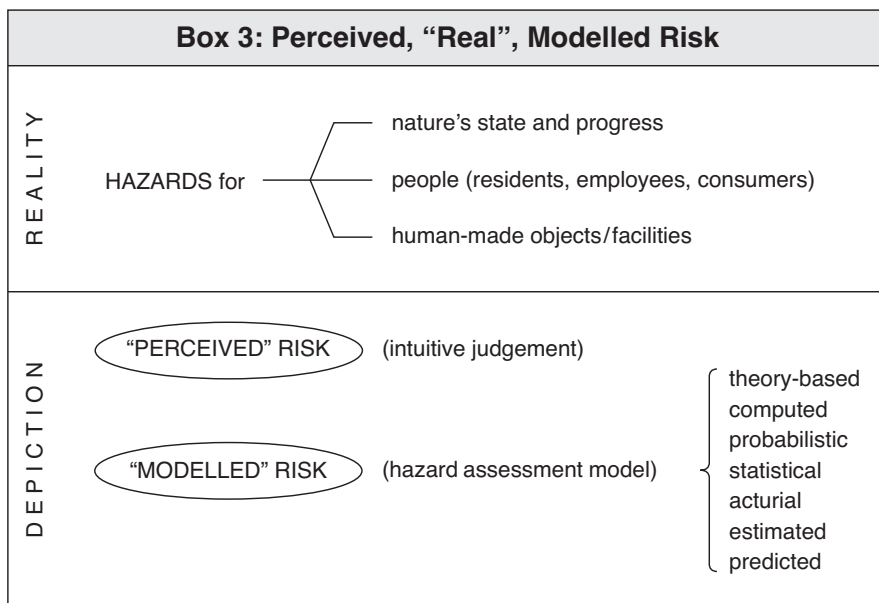
The understanding of ‘risk’ in natural and social sciences tends to clash. For example, quite often the term ‘real’ or ‘actual’ risk is used as counterpart to ‘perceived risk’. Epistemologically this does not make much sense though Hudrey, 1996; Rohrmann, 1998; Slovic, 1996. All statements about risk, whether rough guesses or highly quantitative data-based computations, are only depictions of the ‘reality’ in question cf. Box 3 for an illustration.

It appears more appropriate to label results from Quantitative Risk Assessments (which can be seen as a model-based estimate of the ‘real’ risk) as, for example, ‘statistical’ — which then may be contrasted to perceived risk.

Risk acceptance

The concept risk acceptance refers to statements about the acceptability of a risk in individual or societal terms, i.e., whether it is evaluated as being tolerable or not cf. e.g. Fischhoff et al., 1982; Fischhoff, 1994; Handmer et al., 1991; Vlek and Cvetkovich, 1989. Principal acceptability is the normative, and actual acceptance the empirical aspect.

In strict terms ‘acceptance’ would need to be based on a deliberate decision; however, if people do not choose or refuse a risk situation intentionally, defacto acceptance results.



Approaches to study human perception of hazards and risks

Both quantitative and qualitative research methods have been used extensively to study and explain risk perception, e.g. Arabie and Maschmayer, 1988; Pigeon et al., 1992; Rohrman, 1999b. In the first phase, pertinent studies were interested in general principles of risk perception. More recently, the focus is on cultural differences within and across societies.

The dominating approach, often labelled 'psychometric paradigm', is based on four intentions:

- to establish 'risk' as a subjective concept, not an objective entity;
- to include technical/physical and social/psychological aspects in risk criteria;
- to accept opinions of 'the public' (i.e., laypeople, not experts) as the matter of interest; and
- to analyse the cognitive structure of risk judgments, usually employing statistical procedures such as factor analysis, multi-dimensional scaling or multiple regression.

This approach was developed by B. Fischhoff, S. Lichtenstein and P. Slovic, the 'Oregon Group' see Fischhoff et al., 1978; Slovic et al., 1980; see also Slovic, 1992. Many researchers followed their approach, most of them in the USA and European countries. For overviews see, for example, Boholm, 1998; Fischhoff et al., 1997; Guerin, 1991; Renn, 1990; and the documentation by Rohrman, 1999.

The subjective meaning of risk concepts, evaluation of risk sources and determinants of risk acceptance have also been investigated by means of qualitative approaches, e.g. Earle and Lindell, 1984; Fischer et al., 1991; Tyszka and Goszcsynska, 1993.

Psychometric studies are based on individual or group responses to risk issues. However, the process of risk perception in society has been thoroughly analysed from a 'macro-sociological' perspective as well - see e.g. Beck 1992, Dake 1992, Douglas and Wildavsky 1982, Luhmann 1990, Wildavsky 1988. Sociologists have particularly stressed that the evaluative process of risk perception is determined by the norms, value systems, and cultural idiosyncrasies of societies. According to the 'cultural theory' approach, risk is a 'social and cultural construction' (Johnson and Covello, 1987) — not an 'objective' entity to be measured independently of the context in which hazards occur (Douglas and Wildavsky, 1982; Rayner, 1992).

Most of the research conducted so far follows the psychometric paradigm. Some researchers (e.g. Marris, Longford and O'Riordan, 1998) have attempted to bridge the gap between psychological and sociological conceptualisations of risk perception research.

Findings from Risk Perception Studies

Risk perception research is a large and flourishing area, with studies from at least two dozen countries. Only few examples of empirical results can be presented

here. For a substantive discussion of main findings see Pidgeon et al., 1992; Renn and Rohrmann, 2000; and the reader by Slovic, 2000. A comprehensive review and documentation of this body of research is provided in Rohrmann, 1999.

Main research questions

The core interest of risk perception research is to understand how people subjectively assess hazards and how the manifold aspects of risk judgments are related. This interest is linked to several further research issues, as outlined in Box 4.

Cultural differences in risk perception can be investigated from several perspectives, based on intra-national group comparisons or cross-national studies (Box 5).

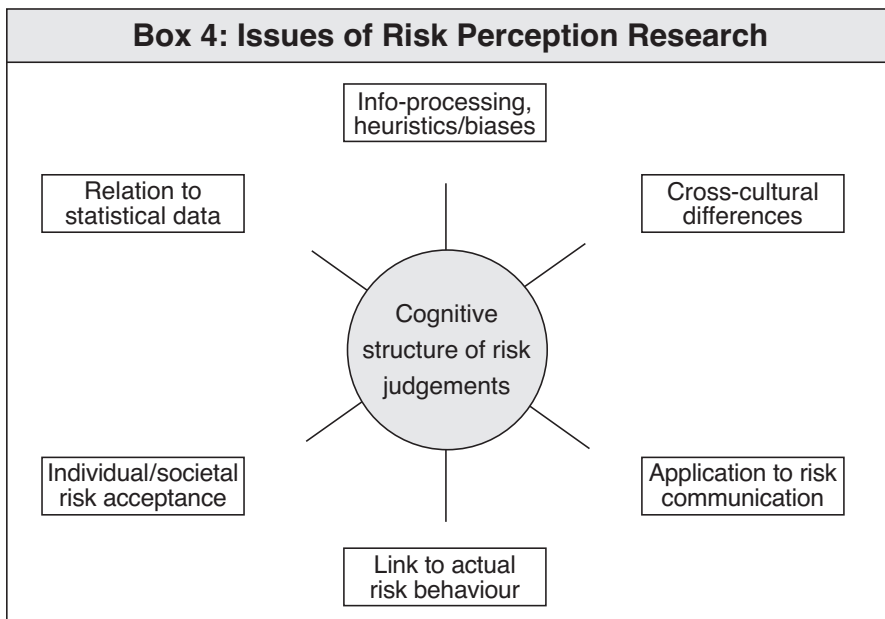
Design of a cross-cultural project

In the following paragraphs a few results from the author's Project CRC, "Comparison of risk perception in different countries and cultures" will be presented, because this is the only risk perception study with data for New Zealand and Australia for more details cf. Rohrmann 1994, 1996, 1999, 2000. The 'problem space', with the three facets: hazards, risk features, respondents, is summarised in Box 6.

The project actually consists of two sub-projects, both cross-national, with data collections in 3 and 6 countries; the respective samples are listed in Box 7.

The principal interest of CRC-1 was:

- to analyse the cognitive structure of subjective hazard evaluations; and



Box 5: Notions of “Cross-cultural” Risk Perception Research		
Level of comparison	intra-national	inter-national
Units of study	professional or ideological sub-groups of society	countries or cultures
Core variables	beliefs and attitudes towards perceived risk sources	culturally embedded values regarding safety and risk

- to identify differences between societal groups of distinctive professional background.

The main focus of CRC-2 was:

- to compare two culturally different sets of countries, ‘western’ versus ‘eastern’; and
- to look at differences between scientists and students.

The principal psychometric approach and the underlying conceptual model is the same for both sub-projects. Final comparative data analyses are currently underway.

Risk magnitude ratings for hazard types

A first interest is which hazards are rated highest on riskiness scales. As an example, in Box 8 the results for New Zealand are given (source: Rohrmann, 1996); these are mean judgments including all 8 groups for 24 risk sources.

Overall, the following risks get the most negative evaluations in terms of perceived risk magnitude <RM>, assumed probability of dying <PD> and health impacts <HI>: long-term heavy smoking, working in asbestos production, living in polluted urban areas, and living near a nuclear power plant. These risk sources also induce the most fear associations <FA>. Not surprisingly, catastrophic potential <CP> is seen as highest for nuclear power much higher than for earthquakes — which might surprise, given the enormous death toll which many earthquakes incur.

The personal risk exposure <PR> is rather low for most risk sources; the highest scores are for smoking, overeating and the earthquake hazard. Obviously smokers know as well as non-smokers about the risk: smoking clearly ranks highest in all three pertinent aspects <RM, PD, HI>.

Box 6: Project CRC: Problem Space			
FACET	Included	Conceptual basis	Example
Hazards:	24 risk sources	hazard taxonomy	earthquake
Risk features:	12 evaluation aspects	causal model of risk perception	rated magnitude
Respondents:	(A) 8 countries	‘western’ vs ‘eastern’	NZ, Singapore
	(B) 4 societal groups	professional and political affiliations	engineers

Box 7: Project CRC: Sampling — Groups of Respondents					
CRC-1		Country:	Australia	Germany	New Zealand
Sub-Group:					
<T> "Technological orientation"	65	40	65	170	
<T-e> Engineers	28	20	34		
<T-s> Students in techn. sciences	37	20	31		
<E> "Ecological orientation"	73	40	65	178+94	
<E-e> Environmentalists	32	20	26		
<E-s> Students in (env.) psychology	41+67	20	39+27		
<F> "Feminist orientation"	72	60	67	199	
<F-e> Members of fem./women groups	40	30	47		
<F-s> Students in women's studies	32	30	20		
<M> "Monetarian orientation"	62	77	54	193	
<M-e> Accountants/Finance managers	33	36	26		
<M-s> Students in economics/finance	29	41	28		
Sum: N =	272+67	217	251+27	834	
(Not included here: "Psychology-1 students" in Switzerland, N=67)					
CRC-2		"Western" countries	"Eastern" countries		
		Australia	Canada	Germany	China Singapore Japan
Students					
T-s Technology/Engineering	60	46	46	90	57 70
G-s Geography	50	45	47	52	44 42
P-s Psychology	60	50	58	74	52 84
Scientists					
X-e Technical & Social Sciences	33	--	84	54	-- --
Sum: N =	203	141	235	270	153 196 1195

Judgments of individual and societal risk acceptance

Box 8 also contains the results for benefit and acceptance ratings, both measured with regard to an individual and a societal viewpoint. Regarding the risk for oneself <IA>, again nuclear power, asbestos production, and polluted urban areas get the most negative ratings. Regarding risks for society at large <SA>, smoking, tranquillisers and nuclear power are seen as least acceptable. It should be noted that there are no nuclear power stations in New Zealand, nor in Australia.

Less adverse ratings are given to skiing, flying an emergency helicopter, coal power plants and living in electric storm areas. For sporting activities, a positive individual benefit <IB> is seen, and for public service professionals (e.g. fire fighters) both individual and societal benefits <SB> are highly valued. Commonplace technical facilities (e.g. airports, chemical industry) are accepted as fairly beneficial as well.

The set of hazards investigated in this project was based on a taxonomy of risk sources, allowing for the comparison of defined hazard types. The results (see

Box 8: Hazard Appraisal: Means for 24 Hazards & 11 Risk Aspects												
Risk Aspect:											Data: NZ	
RM = Overall risk magnitude rating												
PD = (Assumed) Probability of dying												
HI = (Danger of) Health impacts												
CP = Catastrophic potential												
FA = Feelings of anxiety about risk												
IB = Individual benefit (of activity)												
SB = Societal benefit (of activity)												
IA = Individual risk acceptance												
SA = Societal risk acceptance												
PR = Personal rel. to risk												
DM = Desire to move												
RM	PD	HI	CP	FA	IB	SB	IA	SA	PR	DM		

Hazard:												
A	6.0	3.5	2.9		6.6	7.4	2.2	7.8	6.2	3.2	Parachuting	
B	6.6	4.1	3.9		5.9	7.4	2.5	7.6	5.7	2.5	Car racing	
C	5.2	2.5	3.3		4.9	7.5	2.6	8.0	6.7	3.5	Skiing	
D	8.3	5.4	7.4		7.9	3.2	3.3	3.5	2.6	1.1	Asbestos production	
E	5.8	2.7	4.9		4.8	5.5	7.2	5.4	6.8	2.1	X-ray lab	
F	5.8	2.3	5.4		5.0	3.9	5.5	4.9	5.6	2.3	Compressor tools	
G	8.9	6.4	8.5		8.4	2.8	0.9	5.2	1.4	4.2	Smoking	
H	8.1	5.2	7.5		8.0	2.9	1.6	5.0	2.0	2.4	Tranquilizers	
I	7.6	5.0	7.2		6.4	3.2	1.6	5.7	3.0	4.6	Overeating	
K	6.3	3.7	4.7		5.8	7.1	8.6	6.7	8.5	1.9	Fire fighter	
L	6.1	3.6	4.7		5.7	4.9	5.7	5.7	5.8	1.2	Blaster	
M	5.5	3.9	3.4		5.6	8.0	8.7	7.0	8.8	1.3	Emerg. helicopter	
N	4.7	2.2	4.3	4.1	4.2		5.9	4.6	4.9	2.2	5.7	Coal power plant
O	4.9	2.2	4.3	4.3	4.4		6.5	4.6	4.8	1.6	6.1	Metal production
P	4.6	1.7	3.6	5.1	4.5		7.1	5.2	5.2	2.8	6.8	Airport
Q	6.8	3.6	3.1	5.4	5.8		5.2	3.9	1.2	6.6		Avalanche area
R	6.3	3.1	2.9	7.0	5.2		5.7	4.9	5.3	5.3		Earthquake area
S	4.8	2.5	2.6	3.9	4.0		6.0	5.5	2.2	4.4		Electric storms area
T	6.1	3.1	3.4	6.0	6.0		3.7	4.0	3.4	0.9	6.9	Explosives factory
U	7.7	4.0	5.5	9.1	8.3		3.7	3.2	2.3	1.0	8.8	Nuclear power plant
V	6.6	3.3	4.8	6.9	6.6		6.0	3.8	3.5	1.6	7.6	Chemical industry
W	7.2	3.6	6.3	6.4	6.9		3.9	3.0	3.5	8.2		Polluted urban area
X	6.5	3.2	5.8	5.5	6.2		4.6	3.8	2.8	7.6		Unhealthy climate
Y	6.9	3.5	5.6	5.9	6.4		4.3	3.4	1.4	7.2		Natural radiation

	6.4	3.5	4.8	5.8	6.0	5.3	4.6	5.3	4.7	2.4	6.8	(Mean, all hazards)

NOTES:												
N=278 respondents (N=224 for variables PR and DM). Empty cells: n/a												

Box 9, taken from the German sample) illustrates the following:

- Hazard impacts: Judgments of fatality rates are higher for risks comprising an acute danger (i.e. accidents/catastrophes); in comparison, health impacts are

judged higher for chronic risk exposure.

- **Benefits:** for both occupational and private risky behaviours, people perceive benefits for themselves (even smoking or working with dangerous tools); however, benefits for the society relate to occupational activities only.
- **Acceptance:** Individual risk acceptance tends to be higher for private activities (e.g. sport or consumption risks), societal risk acceptance clearly is higher for occupational hazards. Regarding residential environmental risks, risk acceptance is higher for natural hazards from both a societal and an individual perspective. On average, risky activities are more accepted than risks related to residential hazards — voluntariness might be the crucial factor for this difference.

Differences in risk magnitude are small and were neither expected nor even intended, given the selection rationale for the risk sources considered in this project.

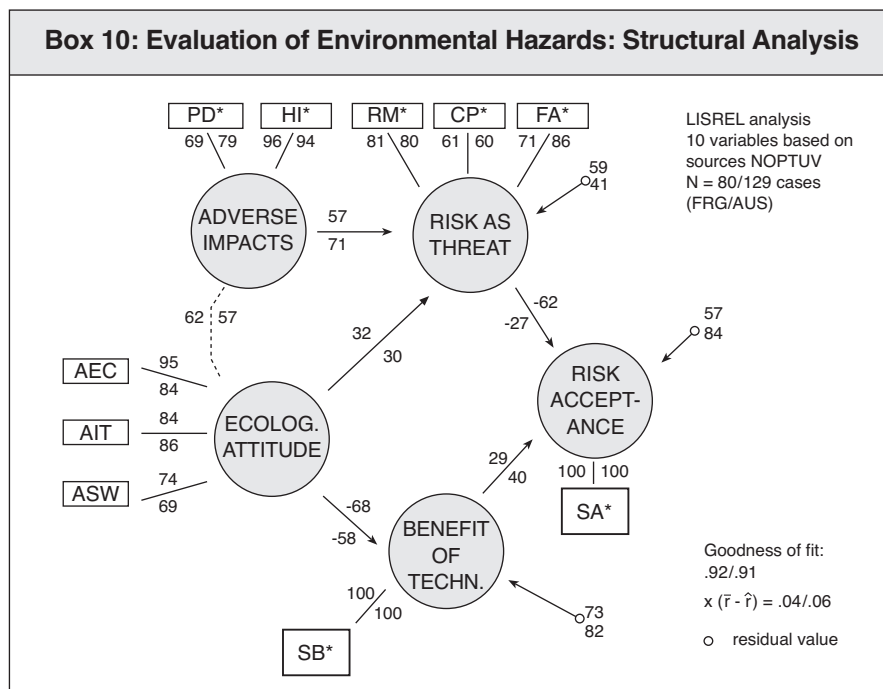
What determines whether risk sources are accepted or not? The principal model assumes that acceptance is decreased by risk magnitude and increased by benefits associated with the risk source, and that attitudes and ‘worldviews’ people held are co-determinants (‘moderators’) of this judgmental process. Conceptions like this can be analysed by multiple regression and especially structural/causal modelling, e.g. the LISREL approach (Joereskog and Soerbom, 1988). Its purpose is to identify ‘linear structural relationships’ among constructs on the basis of a hypothesised theoretical model. One such analysis is shown in Box 10 (source: Rohrmann 1994). It was computed with both Australian and German data (cf. values on the right and the left in the graph).

This model was developed by introducing overarching constructs (namely, ‘adverse impacts’ with probability of dying <PD> and concern about health impacts <HI>) as indicators, and ‘risk as threat’ (determined by risk magnitude <RM>, fear

Box 9: Mean Judgements for Different Types of Risk									
German Data	Type:	Kind of Hazard		Effect		Activities		Env. Cond.	
		Act.	Env.Cond.	Acute	Chronic	Priv.	Occup.	Nat.	Technol.
	n =	12	12	12	12	6	6	6	6

<i>Risk Aspect:</i>									
PD	Probability of Dying			2.7 *	2.4				
HI	Health Impacts			4.4 *	4.9				
IA	Indiv. Risk Acceptance	5.8 *	4.4			6.4 *	5.4	5.1 *	3.7
SA	Societal Risk Accept.	4.9 *	4.6			3.2 *	6.6	5.0 *	4.1
IB	Individual Benefit					6.1 *	5.6		
SB	Societal Benefit					1.3 *	6.7		

<i>Notes:</i>									
N=217; * indicates significant difference; "n=" number of hazards for that type;									
Hazards: "Act." = activities, "Env.Cond." = environmental conditions									



associations <FA> and catastrophic potential <CP>); these variables represent the negative evaluation of hazards. Societal risk acceptance <SA> is introduced as a final dependent variable. In terms of risk sources, six technological hazards N/O/P/T/U/V (cf. Box 8) are used and aggregated into sum variables. The result is well in line with the basic claims of the project's theoretical framework and it particularly affirms the significance of the 'threat' aspect in risk perception.

This model also demonstrates the considerable influence of ecological attitudes, here measured as a composite of environmental concern <AEC>, worry about the impacts of technology <AIT> and 'post-material' societal values <ASV>: the stronger these attitudes, the more likely technological hazards are seen as threats and the less likely are benefits associated.

Together these findings elucidate the socio-psychological factors contributing to the 'intuitive' risk concept which people use for risk evaluations and their significance for risk acceptance.

Differences between societal groups

The sampling approach of this project is based on the assumption that people with a specific professional and/or ideological background 'worldviews' or 'cultural biases' (cf. Dake, 1991; Thompson 1990) differ in their evaluation of risks. A comparison of the respective subgroups (cf. Box 7, above) confirms this expectation. The findings for the countries included in project CRC-1 (NZ, Australia, Germany) are similar and can be summarised as follows:

People with an 'ecological orientation' as well as those involved in 'feminist' issues evaluate risks much more critically than the other two groups. For example, for most risk sources, their ratings on all riskiness scales <RM, PD, HI, CP> and feelings of anxiety <FA> are higher, while benefit judgments <IB, SB> and risk acceptance <IA, SA> are lower. By comparison, those with a 'technological orientation' show the lowest risk ratings, see more benefits and are more ready to accept risks. The judgments of the 'monetarian' group fall in between the extremes.

This pattern is most obvious for technology-induced risks, as shown in Box 11. The largest group differences occur with 'living near a nuclear power plant' or 'chemical industry', which in fact are the most debated large-scale technologies anyway.

There are some interesting exceptions to the general pattern. For example, with respect to 'consumption risks' such as smoking, tranquillisers and overeating, engineers and technology students give the lowest acceptance ratings while the 'monetarian' and 'feminist' groups yield surprisingly high scores.

Group differences with respect to employees vs students were also analysed. The effects were smaller than expected and insignificant for most risk sources and risk aspects; therefore the groups were pooled.

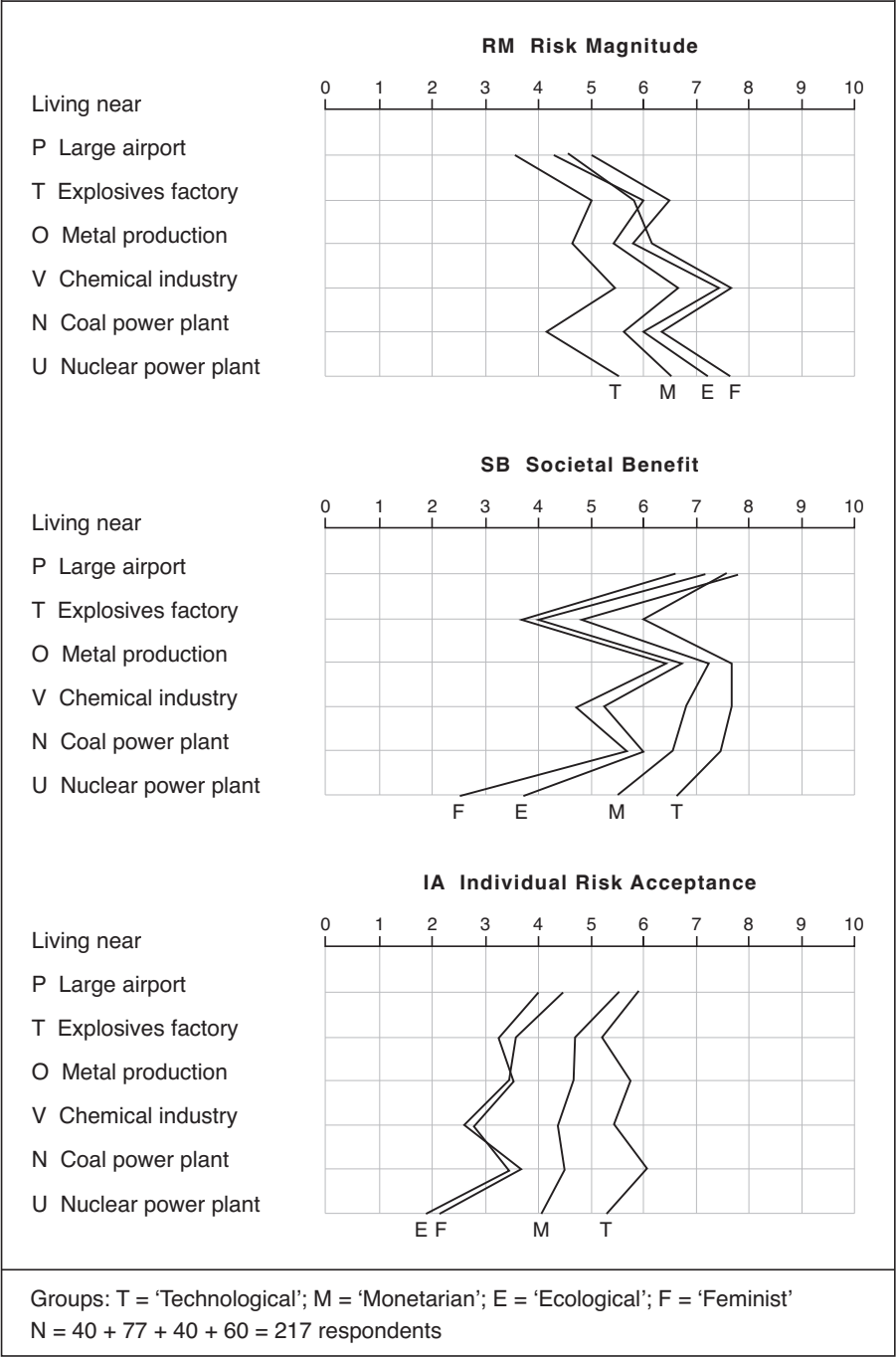
In sub-project CRC-2, significant group differences were found too, but they are less clear-cut. It appears that 'geography' students are the most and 'technology' students the least concerned about environmental hazards. Individual risk acceptance is lower for the 'scientists' group than for students; this is strongest for 'lifestyle' risks.

Altogether the societal groups looked at in this research differ considerably and systematically in their risk perception. Interestingly, at least for the three countries looked at in project CRC-1, disparities between societal groups tend to be stronger than cross-national differences, particularly regarding technology-induced risks. This is in line with the strong influence of environmental and societal attitudes on risk acceptance shown above (Box 10).

Cross-national differences

A cross-national comparison for the three countries from project CRC-1 is given in Box 12, containing mean judgments for risk aspects. Significant differences include: NZ and Australian respondents reveal more acceptance <IA, SA> for sport-related risks (e.g. car racing or skiing) and unhealthy private behaviours (e.g. smoking, overeating) and they give lower risk ratings <RM, PD, HI, CP> for 'conventional' technologies (e.g. airports, coal power plants). In contrast, risk-exposed occupations even those of high social benefit <SB>, (e.g. fire fighting, environmental pollution and large-scale technology such as nuclear energy) get more negative evaluations than from the German respondents. However, given the highly critical views on nuclear power in Australia and especially NZ, the latter

Box 11: Ratings for Technological Hazards by Different Groups – German Data



difference is not as large as expected.

The results from NZ and AUS are much the same, apart from some disparities regarding earthquakes, a hazard more familiar to New Zealanders.

For results from sub-project CRC-2, a comparison of risk perception in 'Western' and 'Eastern' countries (see Rohrmann, 1999); as expected, differences are considerably larger than those among the three countries included in Box 12.

A further issue for cross-national studies is to analyse whether the described disparities between societal groups are valid across countries. Respective com-

Box 12: Hazard Appraisal: Cross-national Comparison for 3 Risk Aspects												
	RM			SB			IA					
	Overall Risk			Societal			Individual Risk					
	Magnitude			Benefit			Acceptance					
	GER	AUS	NZL	GER	AUS	NZL	GER	AUS	NZL			

Hazard:												
A	5.5	6.5	6.0	1.2	2.2	2.2	7.2	7.5	7.7	Parachuting		
B	7.5	6.9	6.6	1.4	2.7	2.4	6.3	7.4	7.6	Car racing		
C	5.4	5.4	5.1	1.7	3.0	2.6	7.2	7.8	8.0	Skiing		
D	8.2	8.6	8.3	3.6	3.0	3.3	3.3	3.1	3.5	Asbestos production		
E	6.3	6.1	5.7	7.2	7.2	7.3	5.3	5.0	5.4	X-ray lab work		
F	6.7	5.9	5.9	5.4	6.0	5.6	4.1	4.9	4.9	Compressor tools		
G	8.4	9.0	8.9	1.0	0.9	0.7	4.3	5.2	5.2	Smoking		
H	8.2	8.0	8.0	1.1	1.6	1.6	4.0	4.9	5.0	Tranquilizers		
I	7.6	7.4	7.6	1.3	1.4	1.5	4.5	5.6	5.6	Overeating		
K	4.8	6.1	6.3	8.9	8.7	8.7	7.9	6.6	6.7	Fire fighter		
L	4.8	6.0	6.0	6.0	6.0	5.8	6.8	5.6	5.7	Blaster		
M	4.1	5.2	5.6	9.0	8.7	8.7	8.2	6.9	7.0	Emerg. helicopter		
N	5.9	5.6	4.7	6.6	6.3	6.0	4.0	4.3	4.5	Coal power plant		
O	5.9	5.6	4.9	7.2	6.8	6.5	4.0	4.2	4.5	Metal production		
P	5.8	4.3	4.7	6.6	7.1	7.0	3.7	4.9	5.0	Airport		
Q	5.8	7.0	6.7				4.8	5.1	5.2	Avalanche area		
R	6.3	6.8	6.1				4.8	5.1	5.7	Earthquake area		
S	3.1	4.5	4.7				7.1	6.1	6.0	Electr. storms area		
T	5.3	5.8	6.1	4.0	4.4	3.7	4.0	4.0	3.9	Explosive factory		
U	6.8	7.6	7.6	5.0	4.3	3.8	3.3	3.2	3.1	Nuclear power plant		
V	6.7	6.8	6.6	6.4	5.9	6.1	3.4	3.6	3.8	Chemical industry		
W	6.8	6.6	7.3				3.6	4.5	3.8	Polluted urban area		
X	5.4	5.8	6.6				5.1	5.1	4.6	Unhealthy climate		
Y	5.3	6.7	6.8				5.2	4.6	4.3	Natural radiation		

	6.1	6.4	6.4	4.6	4.8	4.6	5.1	5.2	5.3	(Mean, 24 hazards)		

Notes:												
GER=Germany, AUS=Australia, NZL=New Zealand; N=217/272/224. Data based on overall samples (i.e., sub-groups merged). For results of significance tests for countries cf. Rohrmann 1994.												

parative tables cannot be included here, but the findings indicate this:

- the ‘pattern’ of disparities between groups with a ‘technological’ or ‘monetarian’ versus ‘ecological’ or ‘feminist’ orientation’ is quite similar;
- inter-group differences are stronger for the German data, while group polarisation is lower for the Australian and NZ groups.

Altogether the cross-cultural differences found in this project form a rather complex pattern, reflecting interplay of group attitudes, national idiosyncrasies and cultural factors in general.

Integration and Application

After twenty years of intensive research, risk perception can be seen as a ‘mature’ field (Fischhoff, 1995; Renn, 1998; Rohrmann, 1999). The rich body of findings has many implications for other areas as well, especially for risk information and management.

A structural model of the subjective evaluation of risks

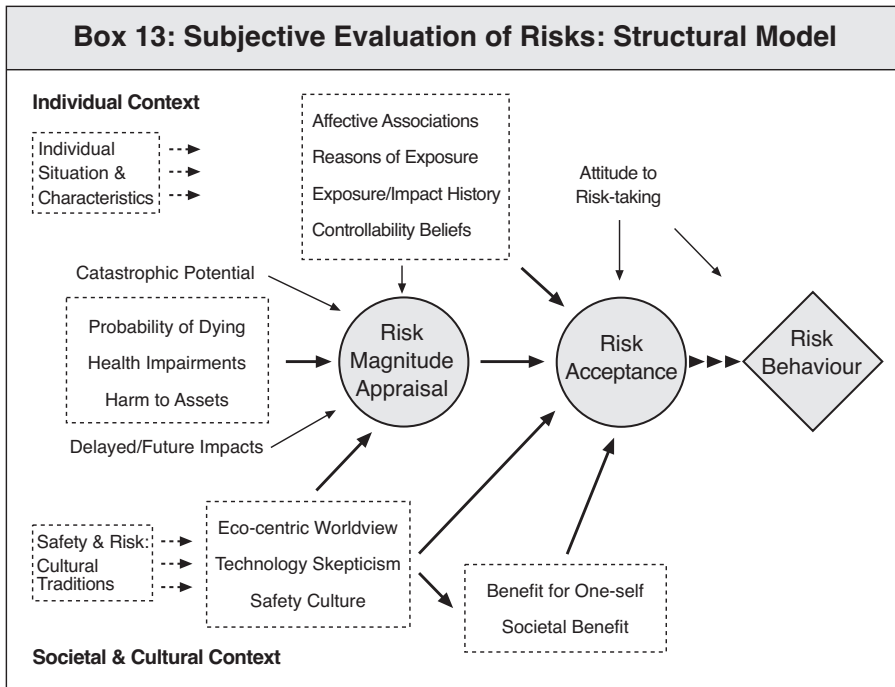
Numerous psychological and sociological studies on the factors underlying risk perception have clarified that a multitude of factors influence how humans perceive, evaluate and handle risks. In Box 13 the relevant findings — particularly those from structural/causal modelling — are ‘condensed’ into an influence diagram adapted from Rohrmann 1995.

The structure shown in this model is gained from analyses using a variety of risk sources and populations. The principal message of this model is that neither perceived risk magnitude nor acceptance of risks — the two core issues of risk perception — can be sufficiently explained by quantitative features such as event probabilities or expected damage.

However, for specific risks and social groups the result could be quite different. For example, a variable such as ‘catastrophic potential’ seems to be relevant mainly for risks beyond individual control while ‘probability of dying’ might be considered for personal voluntary activities, general value orientations, particularly influence judgments of technology-induced hazards, while risk-taking propensity is most pertinent in financial risks contexts, and so on. Indeed, each individual may have a personal influence pattern for the relevance of variables in this model. This begins with the intuitive risk definition a person employs and ends with the importance of societal attitudes not specific to the risk source.

The meaning of risk perception findings

The studies presented here have explicated the socio-psychological and culture-bound quality of risk evaluations. How the magnitude of risks is rated, and to what extent people are prepared to accept a risk, are dependent on the type of hazard, on personal experiences, beliefs and attitudes, and on diverse societal



influences. Judgments are more negative for technology-induced hazards than for natural ones, and for involuntary rather than self-chosen (controllable) risk exposure. While individual, and particularly societal benefits, counterbalance risk concerns for occupational and private risks, this is less true for large-scale technology risks. Fear associations, unfamiliarity, catastrophic potential and worry about long-term health impacts are stronger influences than fatality statistics. Scepticism about complex mega-technologies (such as nuclear power) can become part of a country's cultural identity.

Clearly, statistical risk characteristics cannot explain risk acceptance data. As has been discussed by various psychologists, sociologists and some engineers as well (e.g. Jungermann and Slovic, 1993; Lopes, 1992; Morgan, 1993; Renn, 1998; Rohrmann, 1995; Tweeddale, 1994) the 'technical'/'quantitative' approach of risk analysis is inadequate to reflect the complex pattern of individual risk evaluations. The way humans think about the magnitude and the acceptability of risks, and the way in which they make their respective judgments and decisions is influenced by a variety of 'qualitative' consequences of risky activities or living conditions that are not reflected in hazard scenarios, accident probabilities, death rates and so on. As people's attitudes towards risks are embedded in a wider cultural and political context, societal sub-groups differ widely in their risk evaluation. Also, acceptance or defiance of risks is not determined by knowledge (or lack thereof) — value disparities are the key factor (cf. also Dake, 1991; Peters and Slovic, 1996; Stern and Dietz, 1994).

How did such a situation evolve, and why have so many people strong views on risks even if they never personally encountered the respective hazards? To understand the complex picture of risk perception, both psychological and social processes need to be considered. In a theoretical framework developed by Kasperson et al., 1988, the “social amplification of risks” is seen as a core phenomenon. They particularly stress the influence of factors such as political/environmental movements or media coverage, which either intensify or attenuate the perception and interpretation of risk-related events. The enormous, but quite selective, public attention paid to some risks over the last decade is indeed salient. As all individuals are part of social ‘arenas’ (Renn, 1992b) they will inevitably be influenced by current societal debates (Beck, 1992).

Furthermore, individual styles in judgment and decision making need to be seen as culture-bound as well (Sjoeberg, 1999; Trimpop, 1994; Weber and Hsee, 2000). The significance of personal characteristics such as risk-taking versus avoidance, ‘rationality’, and group adherence differs considerably across the cultures included in risk perception studies so far — in this respect risk perception research is rather at its beginning.

The relevance of risk perception for risk communication

Risk perception research is not just an academic enterprise — its findings are of substantial value for many tasks of risk communication — a social process by which people become informed about hazards, are influenced towards behavioural change and can participate in decision-making about risk issues. In Box 14, main reasons for utilising knowledge about risk perception are summarised.

Socio-psychological expertise on risk judgments and acceptance of risks is particularly relevant for a better understanding of conflicts about risk evaluation and can be applied to improving communication among the various parties involved in risk issues (Covello et al., 1989; Fischhoff et al., 1997; Kasperson and Stallen, 1990; Lundgren and McMakin, 1998). Interactive communication and co-operative conflict resolution must be based on mutual knowledge and acceptance of the

Box 14: Utility of Perception Research

Findings about socio-psychological risk perception processes are relevant for:

- > analysing discrepancies between statistical risk data and subjective judgments
- > understanding the influence of professional and societal orientations ('worldviews')
- > clarifying the roots of controversies about risky technologies
- > identifying core needs for risk communication and disaster preparedness programs
- > designing risk information in line with people's thinking about hazards
- > recognising reasons for shortcomings of safety campaigns
- > considering cultural differences in conceptualising and conducting risk communication

actor's way of thinking about risk (Renn, 1992b) Rohrmann, 1991; Sjöberg, 1998).

Finally, the increasingly cross-cultural nature of risk perception research — providing knowledge about universal and culture-specific factors of subjective risk evaluation — can help to better adapt risk communication efforts to the needs of specific communities within their cultural context.

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4

Risk Communication and the Australian and New Zealand Risk Management Standard

Janet Gough

This chapter discusses the development of the Australian and New Zealand Risk Management Standard (AS/NZS 4360: Risk Management), and notes the change in attitude to risk communication of many of the stakeholders in the standards development process between the mid- and late-1990s. This reflects a growing understanding of the importance of recognising and improving risk communication practice.

Between the publication of the original Standard in 1995 and the revised version in 1999, the committee reviewed the growing recognition of the importance of risk communication in all forms of risk management. As a result, communication and consultation were incorporated as an intrinsic part of each step of the process.

Janet notes that techniques for the identification of, and communication with, stakeholders vary according to the application and decisions about whether to consult and who to consult must be made at an early stage, and an important aspect of establishing the context for risk management involves the development of a communication and consultation plan that includes principles for communication. Thus, risk communication is firmly embedded as an intrinsic component of good risk management, both for internal organisational risk management, and processes involving external stakeholders and interested parties.

Because risk communication is a fundamental element of risk management, this chapter again extends the context for the examples and case studies in Section II.

Introduction

In 1992, in recognition of the growing prominence of risk management in the early 1990s and an increasing number of organisations seeking to develop and apply integrated risk management systems within their organisations, Standards Australia formed a technical committee to develop a risk management standard.

Historically risk management had been compartmentalised. Organisations were comfortable with managing financial risk, business risk, and operational risk (varying according to their structure and purpose). However, new occupational health and safety and environmental legislation was introducing new risks that needed different skills and new techniques. Developing ways of managing these new risk areas highlighted the difficulties of fragmentation and the potential benefits to be gained by integrating risk management.

The integration of risk management requires all people involved in managing risk within an organisation to have a common understanding of terminology, and of the concepts underpinning risk management. These issues were apparent to the newly formed standards risk management technical committee (OB/7), whose members came from a range of backgrounds including the insurance industry, business risk management, the IT sector, Australian Customs (one of the main sponsors), process engineering and safety science.

An additional complication was that the term ‘risk management’ was interpreted in different ways. In the United States risk assessment and risk management were often separated deliberately into two sequential but separate processes, ostensibly to preserve the independence of the risk analysts from the decision makers. As a result there was limited interaction between analysts and decision makers and that at times led to incorrectly informed decisions being made, with serious adverse consequences.

The protagonists for the American terminology argued strongly for a clear distinction between risk assessment, as the part of the process carried out by experts, and risk management, as the part carried out by decision makers who are responsible for implementing their decisions and bear responsibility for the risk. Identification of hazards and risks is seen as part of risk assessment process.

In Australia and New Zealand a more holistic approach was being adopted involving greater interaction between analysts and decision makers throughout the combined risk management process of assessing (estimating) risk and establishing procedures for controlling risks.

The development of AS/NZS 4360: Risk management¹

Given the problem of addressing established preconceptions about what risk management was, the committee decided to start from the beginning and exam-

¹ This section relies heavily on assistance from Professor Jean Cross, Chair of the Standards Australia and Standards New Zealand Risk Management Committee.

ine the potential building blocks that could be used to develop a process framework.

Three elements were agreed as shown in Figure 1:

- identify risks;
- assess risks; and
- control risks.

Once agreement had been reached as to the initial framework, each of these steps was defined and expanded out. At this point it became apparent that the word ‘control’ meant different things to different people. To safety experts, control meant reduce risk, financial specialists included insurance as a means of risk control, and health and environment practitioners preferred to use the word ‘manage’ instead of ‘control’.

The committee did not want to perpetuate the use of the word risk management to mean both the whole process and the subset of the process carried out by decision makers and wished to have a universal terminology which could be applied to all risk. Therefore it was decided to introduce a new word ‘treat’ that had not previously been used in this context. Thus the process became identify, assess, and treat risks².

The rationale behind the separation between risk assessment and risk management in the United States approach was recognised as a perceived need to separate an objective analytical phase from a subjective decision process where additional factors might be introduced. This was achieved within the Standard process by separating risk assessment into two steps — risk analysis and risk evaluation. Risk analysis provides estimates for the two elements of risk, likelihood, and magnitude of consequence, and allows risks to be ordered. Risk evaluation is where risks are compared against the predetermined criteria to determine whether they are deemed acceptable or whether they require ‘treatment’.

Figure 2 shows the next evolution in the development.

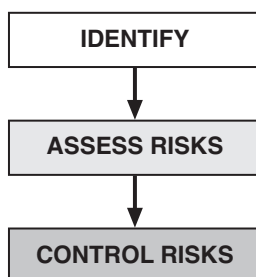


Figure 1: Basic building blocks

² Use of the term ‘treat’ has caused some problems with health risk managers, but the British National Health Service has since adopted the standard, and accepted the terminology.

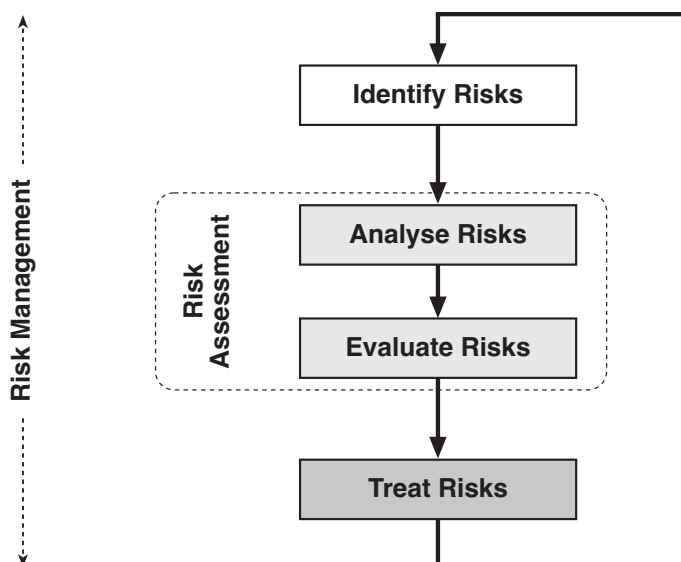


Figure 2: Risk management as overarching concept

All members of the committee agreed that monitoring and feedback was seen as an intrinsic part of each step of the process, as well as being used as part of the iterative process, and this was introduced as a ‘sidebar’ with interactive links to each step.

An essential element of any systems process involves scoping the issues to be addressed, defining the problem, setting the boundaries for analysis, and establishing a basis for decisions. Before starting to identify risks a considerable amount of background work is required. This includes gathering information about the activity or the organisation and the relevant stakeholders and interest parties. Risks may be affected by outside influences, for example legislation, government policy and natural events. Basic criteria for determining whether risks are going to be acceptable or not should be developed at this stage, although subsequently they may be modified. This is necessary so that the identification and assessment produces information of a type and in a form that is consistent with the criteria. To emphasise the importance of this implicit step, a new explicit step entitled ‘establish the context’ was included.

By the time New Zealand members attended committee meetings in early 1994 (some New Zealand members had corresponded prior to this time), the formal process had been agreed. Early contribution from the New Zealand members therefore concentrated on ensuring that the terminology of the standard was reasonably consistent with, or at least able to be reconciled with, our particular interests. After the normal Standards review processes, AS/NZS4360: risk management, was published in November 1995 (see Figure 3).

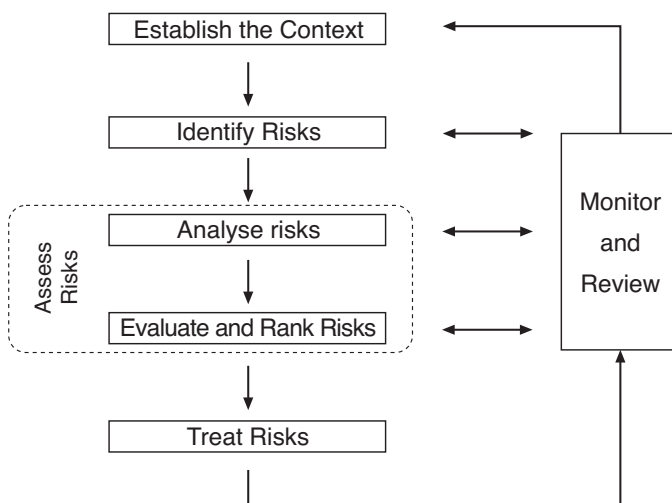


Figure 3: AS/NZS 4360 Risk Management (1995)

Supplementary guidance

Prior to the publication of the Standard in 1995 it had been recognised that while the standard was a useful generic guide, people working in specific technical areas were going to need additional guidance to assist them in implementing the standard.

A number of working parties or subcommittees of the risk management technical committee were established and tasked with preparing sector specific guidelines or handbooks. The core members of these committees were members of the risk management committee, but in addition new experts were invited to join the working groups.

At February 2003, nine guides based on AS/NZS 4360 have been published:

- A basic introduction to managing risk (SAA HB 142: 1999);
- Guidelines for managing risk in the Australian and New Zealand Public Sector (SAA/NZS HB 143: 1999);
- Risk Financing (SAA HB 141: 1999);
- Environmental risk management: principles and processes (SAA HB 203: 2000);
- Information security risk management guidelines (HB 231: 2000);
- Guidelines for managing risk in outsourcing (HB 240: 2000);
- Organisational experiences in implementing risk management practices (HB 250: 2000);
- Guidelines for managing risk in the healthcare sector (SAA/SNZ HB 228:2001); and
- Guidelines for managing risk in sport and recreation (SAA HB 246:2002).

One more is in press:

- Business Continuity Management.

While a further two are still with committees:

- Occupational safety and health; and
- Assurance and Governance.

Two further publications that are related to 4360 are:

- Risk Management for Local Government (SNZ 2000) — published by Standards New Zealand but without reference to the Standards committee, and not endorsed by it.
- Emergency risk management: applications guide — reviewed and endorsed by the risk management standard committee, and published by Emergency Management Australia.

Environmental risk management: principles and process

As part of the process of developing sector specific guidelines, in 1996 Standards Australia established a separate environmental risk management committee to provide a link between risk management and environmental management systems (EMS). This committee was tasked with preparing a guide or handbook on environmental risk management that was consistent with the EMS procedures currently in place under the ISO14000 series of standards.

A first full draft of the handbook was presented to a workshop in Melbourne in July 1998. This workshop, which was sponsored by Standards Australia, the Environment Institute of Australia, the CSIRO, the Australian Mineral and Energy Environment Foundation, the Minerals Council of Australia and the Australian Chamber of Manufacturers, was attended by over 200 people who provided valuable feedback on the expectations of the intended audience. Additional changes were required as a result of the revision of AS/NZS 4360 in 1999, and the guide was published in mid 2000 as AS HB 203 *Environmental Risk Management: Principles and Process*.

The stated purpose of the guide is to inform individuals and organisations about environmental risk management, and to provide them with a process for managing the risk to the environment. Specifically, it can be used to assist in implementing an environmental risk management programme based on AS/NZS 4360.

Some of the particular activities it can support are the development of a framework for strategic planning and decision-making, and the implementation of environmental risk management at operational and strategic levels. It also provides tools to help organisations improve their environmental management by identifying areas of environmental risk within an organisation and evaluating the potential environmental effects of proposed or existing projects, programmes, and

policies. In this way it can be used as a formal tool within an organisation's environmental management system.

Communication and consultation

While the handbooks were being developed the technical committee continued to meet regularly to discuss further developments to the standard in light of the experience rapidly being gained by organisations as the standard was adopted and implemented.

There were three main areas where modification of the standard was deemed necessary³. First of all it had quickly become apparent that the diagram of the risk management process was not complete. All handbooks needed to stress the importance of communication and consultation⁴, which had not been addressed adequately in the 1995 version of the Standard.

Secondly, while risk management was readily accepted as a process, the committee recognised that for integrated risk management to be effective, risk management should also be viewed as a 'culture' within an organisation. Thirdly, discussion with users and feedback from interested parties demonstrated that the committee needed to review some of the terminology and techniques described.

Of concern also as the fact that while the committee had been careful to include examples of techniques and tools in the Appendices of the standard, rather than in the body of the standard, thus implying that there is not necessarily one 'right way', many organisations had simply used elements such as the risk register and the tables illustrating qualitative risk applications without modifying them to suit their own specific requirements.

In 1999 the revised version of the standard was published. Aside from reasonably minor terminology modifications, and some areas of elaboration, the two main changes were:

- the definition of risk management was restated as "the culture, processes and structures that are directed to the effective management of potential opportunities and adverse effects", and the original definition of risk management as "the systematic application of management policies, procedures and practices to the tasks of establishing the context, identifying, analysing, evaluating, treating, monitoring [and communicating⁵] risk" was used as a definition for the risk management process; and
- communication and consultation were included as integral components of the process.

The essential element remains that risk management is both a formal process

³ Some minor changes in terminology had been adopted in 1996 and published as 'amendments'.

⁴ The inclusion of communication and consultation as a formal step in the process was initially proposed and promoted by the Environmental Risk management Committee.

⁵ Added during the 1999 revision.

and a culture of thinking *what if* and being attuned to potential risks and opportunities.

While the impetus for explicit inclusion of communication and consultation as part of the risk management process came initially from the environmental risk management group, and was reflected in the environmental guide, the members of the technical committee had also recognised that was a significant gap in the standards process. Thus the framework diagram was modified to include a new sidebar to the process, equivalent to the ‘monitor and review’ step, as shown in Figure 4.

In the early stages of consideration of communication of risk a number of concerns had been raised about the implications of formal and explicit consideration of communication and consultation. These could be summarised as:

- organisations will not always want to communicate with the public;
- legal implications;
- definition of interested parties and stakeholders; and
- communication and consultation is expensive and may not provide value.

It was agreed that organisations may not always want to communicate with the public for a variety of reasons including commercial secrecy. In addition, there may be other situations where full disclosure may not be appropriate for legal reasons. These two issues are valid reasons for organisations not to want to consult and communicate. It can be difficult to define interested parties and stakeholders, and it may also be expensive to undertake consultation.

However, before an organisation implements an environmental risk management

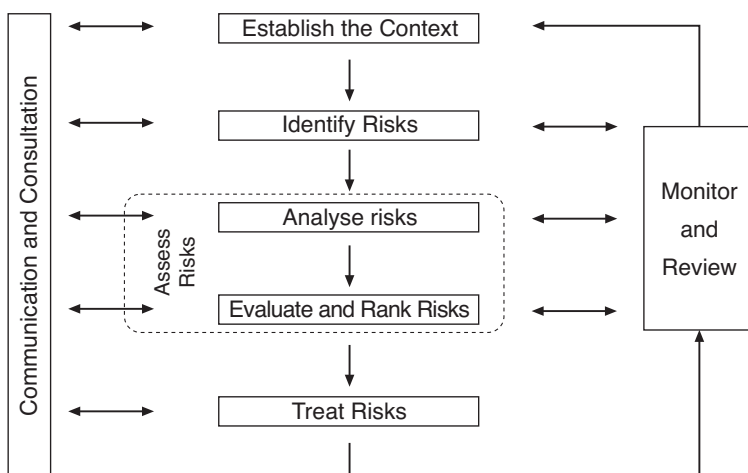


Figure 4: Risk Management (AS/NZS 4360: 1999)

programme it should consider the purpose of the risk management process being undertaken, the stakeholders and their likely interests, whether non-disclosure is likely to have adverse effects on the organisation, and whether value might be added by a targeted process of communication and consultation. In other words, the organisation should prepare a communication plan

Specifically the communication plan should include:

- why communication and consultation are required (set objectives at organisational and project level);
- whether communication and consultation are to be internal, external or both;
- who is going to be involved;
- when the different parties are going to be involved;
- what is to be the subject of the communication and consultation; and
- how the process is to be undertaken throughout the risk management cycle.

Some of the common objectives of risk communication are to:

- improve the efficiency of risk decisions — what this really means to help ensure that risk decisions ‘stick’ or that the control or treatment procedures that are put in place are adhered to;
- provide risk managers with a means of involving affected (interested) parties;
- promote channels of communication between parties to minimise conflict;
- help establish and convey a richer of risk characteristics; and
- identify and facilitate compromises.

For example, the specific objectives of communication and consultation within the environmental risk management process are to:

- ensure that appropriate internal and external communication and consultation systems are considered and developed;
- assist in identifying stakeholders and interested parties, and to provide the organisation with information about their expectations;
- identify clearly the roles and responsibilities of the organisation and its staff for communication and consultation; and
- avoid business risk.

Good internal communication is part of good management and can enhance productivity and minimise errors through ensuring that key staff understand the purpose of guidelines and assignments.

External risk communication can improve community understanding and awareness of an organisation’s environmental activities. It is part of good practice and helps an organisation to fulfil its legislative responsibilities, provide due diligence and obtain necessary permits.

Implementing communication and consultation within a risk management framework

Effective internal and external communication is important to ensure that those responsible for implementing risk management, and those with a vested interest understand the basis on which decisions are made and why particular actions are required. While external communication may not always be required, it is important to at least consider whether it is relevant, and to make a conscious decision as to whether to communicate or not.

Perceptions of risk can vary due to differences in assumptions and concepts and the needs, issues and concerns of stakeholders as they relate to the risk or the issues under discussion. Stakeholders are likely to make judgements of the acceptability of a risk based on their perception of risk. Since stakeholders can have a significant impact on the decisions made it is important that their perceptions of risk, as well as their perceptions of benefits, be identified and documented and the underlying reasons for them understood and addressed.

The inclusion of communication and consultation requires consideration and identification of interested parties and stakeholders as part of establishing the context for risk management. Initially it may be useful to undertake a scoping exercise that looks at interested parties in broad sense, before refining the set of stakeholders at a later stage. Stakeholders may include user interests, as well as community groups and individuals. In environmental risk management groups such as future generations, native flora and fauna, and ecosystems may be included as interested parties or stakeholders. The term 'interested parties' is often considered to encompass a wider group than stakeholders. Differentiation between interested parties and stakeholders may be used to define different levels for communication and consultation.

A common technique used for risk identification is brainstorming, often with a wide range of participants. In some cases the inclusion of representatives from stakeholder groups may enhance the risk identification process.

It can be difficult to communicate the results of quantitative analysis to stakeholders. If people are involved throughout the process it can help them understand the outcomes of complex analyses. Where appropriate, stakeholder assistance can be sought in designing plans for communication and consultation to ensure that information is relevant, appropriately presented, and timely.

Proposals for future developments

The SA/SNZ technical committee on risk management is continuing to meet on a regular basis and to use its collective experience to identify areas of improvement to the standard. In this way the standard itself is subject to a rigorous process of risk management.

At present the standard is being implemented by a wide range of groups from

different disciplines, and is being applied in many different circumstances. Over time more guidance documents will be developed. A key area noted as requiring attention is the preparation of a set of best practice case studies with commentary and evaluation. The emphasis for these case studies will be on demonstrating the advantages and limitations of particular approaches applied in different circumstances. The intention will be not to provide a cookbook, but to illustrate ways of evaluating risk management to assist in continuous improvement of processes and practices.

Standards are reviewed and revised on a five yearly cycle, and at February 2003, the process of revising the base document AS/NZS 4360: risk management itself has commenced. A revised draft will be circulated to stakeholders for comment from March 2003, with a new version to be voted in later in the year.

In this chapter, John presents material from work undertaken by three of the major consultants in the United States working in the risk communication area in the late 80s and early 90s. Each of these three original presenters developed a particular set of rules, pointers or precepts that provide founding guidelines for risk communication practitioners. There are obvious synergies among these different strategies, not least because they are for the most part derived from risk perception research, or the theoretical and analytical work of academics, introduced in Chapter 3.

The basic premise is that risk communication is the process of communicating responsibly and effectively about risk factors associated with industrial technologies, natural hazards, and human activities. These communication responsibilities arise for all those who are developers and managers of industry and technological change, as well as those who oversee health and environmental management. Risk communication is about bridging the gap between experts and laypeople. In fact, everyone in society faces a vast array of risks every day and, often subconsciously, makes trade-offs regarding the acceptability of each risk. People, understandably, have an aversion to admitting that they do indeed tolerate various levels of risk for themselves and their children. To the public it matters greatly whether or not one is exposed voluntarily or involuntarily to risks. Good risk communication practice seeks to address the division between experts and the public. The three specialists, whose work is featured in this paper, each provide guidelines for facilitating this process.

Business needs to spend more time and resources on developing sound risk communication practices. Not to do so represents a business risk. In essence, this requires the promotion of a reasoned dialogue among stakeholders on the nature of relevant risk factors and acceptable risk management strategies.

John emphasises that risk communication should become an integral part of the risk management process. Informed public understanding of risk factors is the key to achieving board support for and trust in risk management strategies, and this in turn requires good risk communication practice.

This Chapter helps to demonstrate the links between theoretical developments and practical applications by expounding the principles that the three consultants have derived from the research undertaken by different specialists, and which they are promoting in the development of guidelines to be applied by organisations seeking to undertake risk communication.

Introduction

Whereas risk assessment has become an integral part of modern decision-making, both in the public as well as in the private sector, risk communication on the other hand has tended to either be ignored or, at best, treated as an afterthought by many managers. Thus, while guidelines and methods on risk assessment have flourished since the 1960s, risk communication has really only begun to receive the attention it deserves in the past decade.

Traditionally, risk communication has been seen as the end result of the decision-making process — the point where media, stakeholders, and the public were informed of the outcome of an action or, perhaps, a regulatory decision.

Risk communication, thus, was often an exercise in public relations, generally accomplished through well-crafted press releases and selected briefings to news media, community groups and other interested parties. In most cases there was often little involvement of scientific and technical staff and others responsible for conducting the risk assessment.

It is probably fair to say that these past efforts were often quite successful in informing the public and others about the general nature of problems of a less controversial nature. But, it also seems that in the past people, outwardly at least, more readily accepted decisions by those perceived to be respectable such as state-owned organisations or local government. People also took much less interest in their environment, and sustainable management hardly rated a mention. In a way too, life was arguably simpler and the pace of technological change was certainly slower. However, as the public came to question decisions on matters of interest to them and gradually became empowered, traditional communication efforts became much less effective, particularly where problems concerning the environment, public health, or other matters of a politically-divisive or emotionally-charged nature were concerned.

Risk communication is, thus, a relatively recent discipline that has developed out of a growing need to bridge the gap between what may be a scientific and technically-based assessment and an often uninformed public. Complicating this is the fact that members of the public, community groups, etc., tend to perceive risks quite differently from those conducting the risk assessments or those who commission them. If this disparity did not exist, risk communication would be a relatively straight-forward business.

The task for the risk communicator is to disseminate the various outcomes to an audience that may include those with a range of agendas, abilities to understand the information, ideologies, and sympathies.

Just as the audience can vary, so can the occasion. It might be instructing workers about how to use equipment safely, teaching low-income families about the need for proper nutrition or explaining the importance of water quality. In other instances, there may be the need to tell people that a perceived hazard is not as

serious as they think. Issues such as siting of cell-phone towers and landfills have an ability to inflame public opinion even when the risk assessors declare that the risk is very low. Another objective may be to inform people so that they will be prepared in event of a natural disaster.

Opportunities for proper communication are thus many and varied and, in recent years, various strategies and techniques have been developed to improve the effectiveness by which technical and sometimes complex issues can be explained to lay people and non-technical audiences.

Risk Communication Strategies

There are many ways in which the communication of public health, environmental, safety and hazard information can be improved. Much of the developmental work on risk communication strategies has taken place in the USA.

This paper presents the work of three risk communication specialists who have gained a reputation in the USA for their work in this field. The first two, Vincent Covello and John Paling, have both developed sets of rules or guidelines for risk communication.

Dr Covello is an internationally recognised expert in the field of risk communication and is currently serving as Director of the Center for Risk Communication in New York City. Over the past 25 years, Dr Covello has served in numerous positions in academia and government, including Associate Professor of Environmental Sciences and Clinical Medicine at Columbia University. Prior to his joining the Faculty at Columbia, Dr Covello was a senior scientist on detail to the White House Council on Environmental Quality in Washington, DC; a Study Director at the National Academy of Sciences in Washington, DC; Director of Risk Assessment Programs at the National Science Foundation; and a professor at Brown University. He received his doctorate from Columbia University in 1976 and his MA and BA with Honours from Cambridge University in Great Britain.

John Paling is Founder and President of The Environmental Institute and has championed the benefits of co-operative, non-adversarial solutions to our environmental challenges. He was a full professor, first at Oxford University, and then at the Universities of California and Florida, and has numerous award winning films to his credit including specials for the National Geographic Society and the BBC. His films and wildlife documentaries have won four Emmy Awards. Now working as a risk analyst in the States, he has formulated a Richter Scale For Risks as a way of putting anxieties into perspective. "In order for the public to understand the relative levels of risk, there must be some way of comparing new levels of risk in daily life and those we are already familiar with."

The work of Paul Sandman, the third specialist, adds a further dimension that brings people's perception of risk into the equation. A Rutgers University professor since 1977, Dr Sandman founded the Environmental Communication Research

Programme at Rutgers in 1986, and was its Director until 1992. Now a full-time consultant, Dr Sandman retains his academic affiliations as Professor of Human Ecology at Rutgers. He received his PhD in Communication from Stanford University in 1971. His work is widely known and is commonly referred to in the literature.

Vincent Covello

Covello presents Seven Cardinal rules of Risk Communication. He notes that there are no easy prescriptions for successful risk communication. His rules, which are presented in an abbreviated form below, have been developed from the views of those who have studied and participated in debates on the topic.

Rule 1 — Accept and Involve the Public as a Legitimate Partner

A basic tenet of risk communication in a democracy is that people and communities have a right to participate in decisions that affect their lives, their property, and the things they value.

It is essential to demonstrate your respect for the public and underscore the sincerity of your effort by involving the community early, before important decisions are made. Involve all parties that have an interest or a stake in the issue under consideration.

Rule 2 — Plan Carefully and Evaluate Your Efforts

Risk communication will be successful only if carefully planned.

Begin with clear, explicit risk communication objectives, such as providing information to the public, motivating individuals to act, stimulating response to emergencies, or contributing to the resolution of conflict. Evaluate the information you have about the risks and know its strengths and weaknesses. Classify and segment the various groups in your audience. Aim your communications at specific subgroups in your audience.

Remember that there is no such entity as ‘the public’; instead, there are many publics, each with its own interests, needs, concerns, priorities, references and organisations. Different risk communication goals, audience, and media may require different risk communication strategies.

Rule 3 — Listen to the Public’s Specific Concerns

If you do not listen to people, you cannot expect them to listen to you. Communication is a two-way activity.

Do not make assumptions about what people know, think, or want done about risks. Take the time to find out what people are thinking: use techniques such as interviews, focus groups, and surveys. Let all parties that have an interest or a stake in the issue be heard. Identify with your audience and try to put yourself in

their place. Recognise people's emotions. Let people know that you understand what they said, addressing their concerns as well as yours. Recognise the 'hidden agendas', symbolic meanings, and broader economic or political considerations that often underlie and complicate the task of risk communication.

Rule 4 — Be Honest, Frank, and Open

In communicating risk information, trust and credibility are your most precious assets.

State your credential, but do not ask or expect to be trusted by the public, at least not at the outset. If you do not know an answer or are uncertain, say so. Get back to people with answers. Admit mistakes. Disclose risk information honestly and as soon as possible (emphasising any reservations about reliability). Do not minimise or exaggerate the level of risk. If in doubt, lean toward sharing more information, not less, or people may think you are hiding something. Discuss data uncertainties, strengths and weaknesses, including the ones identified by other credible sources. Identify worst-case estimates as such, and cite ranges of risk estimates when appropriate.

Rule 5 — Co-ordinate and Collaborate with Other Credible Sources

Allies can be effective in helping you communicate risk information.

Take time to co-ordinate all inter-organisational and intra-organisational communications. Devote effort and resources to the slow, hard work of building bridges with other organisations. Use credible and authoritative intermediaries. Consult with others to determine if you or someone else are best able to answer questions about risk. Try to issue communications jointly with other trustworthy sources (for example, credible university scientists, physicians, or trusted local officials).

Rule 6 — Meet the Needs of the Media

The media are a prime transmitter of information on risks; they play a critical role in setting agendas and in determining outcomes.

Be open with and accessible to reporters. Respect their deadlines. Provide risk information tailored to the needs of each type of media (for example, graphics and other visual aids for television). Prepare in advance and provide background material on complex risk issues. Do not hesitate to follow up on stories with praise or criticism, as warranted. Try to establish long-term relationships of trust with specific editors and reporters.

Remember that the media are frequently more interested in politics than in risk, more interested in simplicity than in complexity, more interested in danger than in safety.

Rule 7 — Speak Clearly and with Compassion

Technical language and jargon are useful as professional shorthand. But they are

barriers to successful communication with the public.

It is preferable to use simple, non-technical language. Be sensitive to local norms, such as speech and dress. Use vivid, concrete images that communicate on a personal level. Use examples and anecdotes that make technical risk data come alive. Avoid distant, abstract, unfeeling language about deaths, injuries, and illnesses. Acknowledge and respond (both in words and with actions) to emotions that people express, such as anxiety, fear, anger, outrage, and helplessness. Acknowledge and respond to the distinctions that the public views as important in evaluating risks, e.g., voluntariness, controllability, familiarity, dread, origin (natural or man-made), benefits, fairness, and catastrophic potential. Always try to include a discussion of actions that are under way or can be taken. Promise only what you can do, and be sure to do what you promise.

Regardless of how well you communicate risk information, some people will not be satisfied. Never let your efforts to inform people about risks prevent you from acknowledging, and saying, that any illness, injury or death is a tragedy. If people are sufficiently motivated, they are quite capable of understanding complex risk information even if they may not agree with you.

John Paling

Dr Paling provides ten ‘Pointers’ for communicating environmental, health and safety risks to the public and the media. Although the words are different, in essence he is really presenting much the same message as Covello, albeit in a different manner.

1 Understand where your critics are coming from

Start by recognising that your critics are most likely energised by emotions rather than facts. When the public believes there is a serious risk, expect that initially the strength of their feelings will make them deaf to any discussion of figures or statistics from business.

2 Listen

Be prepared to “Seek first to understand ... then to be understood” (Stephen Covey). You should aim to be able to relay your understanding of your critics’ positions back to them such that they agree it correctly reflects their position. (This does not mean you need to agree with them.)

Make a note of the specific risks and circumstances that are their main concerns so that later you might offer to work together on getting more information from all sides of the debate.

3 Empathise

Begin by believing that you are discussing the issues with fair-minded people who have genuine concerns. Consider how you might feel if your child was unwell

and you feared some business operation was causing the illness.

Be aware that there have been other businesses who have claimed that their processes and products were safe, that there was no need to worry — and yet events proved them wrong.

Move forward by offering to recheck and report back on all facts or concerns they may have.

For mutual empathy to develop, both sides must be speaking the same ‘language’.

4 Don't tell them everything is safe

You could very well be wrong, for example, new chemicals may be interacting in our environment to produce new poisons.

Strategically, you need to deal with your adversaries’ ‘outrage’ by offering simple truths. Honesty and wisdom dictate that you should acknowledge that you are aware that all industrial processes present risks to some degree and that you are taking your responsibilities in this regard very seriously.

5 Facilitate working together to research their concerns

Build on your offer to look over the information that was at the root of the concerns and arrange a follow up meeting to report back. Offer to show them the safety procedures you have in place and how safety is monitored. Extend the offer indefinitely in case they are not ready for that immediately.

Make available extra resources for additional input if necessary.

6 Offer them a way to sort out their concerns for themselves

Citizens need not feel at the mercy of businesses, politicians or environmental activists. They can draw their own conclusions. If they wish, let them invite others of their choosing to work with you “to establish a better understanding of the facts.”

7 Work together to establish the ‘Home Base Zone’

As well as taking the figures in the book, work together at putting your own figures for “risks which we are all at home with” on a blank scale. Fill in the ‘Home Base Zone’ using figures from official sources (e.g. accident statistics) Invite your new ‘partners’ to get independent figures from any source they choose to place on the chart for comparison.

8 Compare the critics’ concerns with the ‘Home Base Zone’

Once citizens ‘get’ the concept of a Home Base Zone on the chart, they are immediately interested in seeing where you believe the risks from your busi-

nesses fall on the chart. Invite your new partners to get figures from others — perhaps your old antagonists — and put them on the chart too. Then ask them to discuss their findings with you so you have a fair chance to be kept in the loop.

This unusual openness has many benefits. First, it greatly diffuses suspicious feeling towards your business since it demonstrates that you are not trying to hide anything. Also, it allows the discussion to be focused on real issues and not be side-tracked by emotional claims as would otherwise certainly take place.

9 Consider pro-active risk communication an investment

Recognising that good risk communication is an ongoing project which should not be abandoned when things are going right. Plant managers wouldn't remove safety valves just because the equipment has not blown up over the past five years! Take the same approach to your investment in risk communication.

Be aware that however well you present your data, your company's credibility will rest more on a good long-term performance record, than on any figures. Good community relations are crucial.

10 How to handle hostile activists

In these special cases, we must recognise that when seasoned activists challenge business, it is not always because they seek to put risks into perspective but often it is to get a forum for their rhetoric and to recruit others to their cause. Such people will not be 'reasonable' or respond to empathy, therefore a different approach must be used.

Businesses, of course, must accept their responsibilities for how they manage risks and must address all reasonable concerns. But now, as well as justifying your company's position in the traditional ways, you should challenge the activists to state what level of risk they believe they are dealing with.

Peter Sandman

Dr Sandman points out that risk communication differs from risk assessment in that risk assessment deals with the physics and chemistry and probability of something happening. Risk assessment defines risk as magnitude (how bad the problem could be) times the probability (how likely it is to happen). Experts tend to focus on this definition (let's call it hazard), and so underestimate actual risk, because they ignore outrage. The public tends to focus instead on outrage and pay less attention to risk (hazard). Dr Sandman offers a new dimension to risk communication. His thesis is that risk communication comprises two facets: 'scaring people' and 'calming people down', or alerting and reassuring people.

He refers to The Four Levels of Risk Communication:

- 1 Stonewall Stage: No communication — ignore the public.
- 2 Missionary Stage: One-way communication — show the public why you are

right and they are wrong.

- 3 Dialogue Stage: Two-way communication — learn from the public the ways in which they are right and you are wrong.
- 4 Organisational Stage: — Internal communication — become the sort of organisation that finds dialogue possible, even natural.

There are moderate hazards that people are apathetic about and minor hazards that people are outraged about. Dr Sandman's contention, for which he has become well-known, is that:

$$\text{Risk} = \text{Hazard} + \text{Outrage}$$

It thus becomes important in risk communication to create a level of 'outrage' appropriate to the level of hazard. Public acceptability of certain risks depend largely on the degree of their outrage. When public outrage about a perceived risk, such as the use of certain pesticides, is very high and the actual risk, according to experts, is low, the effectiveness of education efforts may be limited because of the defensive posture held by both parties. In this situation, educators and scientists must acknowledge the public outrage as a component of the risk equation. Simply acknowledging the outrage may not eliminate the concern, but failure to validate the values and feelings of the public can lead to mistrust and alienation.

Although Sandman's model is simple, it is useful in gaining understanding about why some traditional methods of educating and communicating about risks can fail. He says "If people are outraged because they DO NOT understand the hazard, educate them about the hazard. If they are outraged and DO understand the hazard, you must address the outrage. 'Educating the public' is not necessarily sufficient to deal with public outrage.

In other words, to decrease public concern about small hazards, risk managers must work to diminish the outrage.

Components of Outrage

There are 12 principal components of outrage in relation to risk that Dr Sandman tells us need to be dealt with. These are the perceptions that should be addressed to lower community outrage.

1 Voluntary vs coerced

Voluntary risk is as much as three orders-of-magnitude more acceptable. The 'right to say no' makes the risk seem smaller. Make the risk more voluntary even if you can't make it completely voluntary.

2 Natural vs industrial

Natural is perceived as less risky (even when it isn't). Don't try to compare the

risks you impose on people to natural risks. Natural and industrial risks are measured on different scales. There's a quite high radon risk in northern New Jersey from the breakdown of uranium in the granite substrate. People there are generally apathetic, it's 'natural' radon. However, there's a nearby township where the houses are built on an old landfill that contains (thorium) tailings from a paint factory. The same levels of radon in their basements, but people are upset about it — it's not 'natural' radon.

3 Familiar vs not familiar

Familiar is less risky: employees get so familiar with risk that their outrage goes down (and sometimes so does their safety). If you can get the public familiar with the hazard, their outrage may also go down. Use plant tours, mall displays and so on to increase familiarity.

4 Not memorable vs memorable

Not memorable is better. How easy is it to visualise something going wrong? The media creates memories. There are signals of risk: odours, guards, alarms, plumes, warning signs. Signals increase memorability. So do symbols: the 55-gallon drum is a symbol of the chemical industry, the cooling tower symbolises the nuclear industry. The outrage is independent of the hazard (cooling towers aren't dangerous) but such symbols create an emotional response (outrage) in the viewer.

5 Not dreaded vs dreaded

Not dreaded lessens outrage. HIV and cancer are the most dreaded diseases in the United States whereas high-blood pressure is a MUCH more common risk, yet it is difficult to arouse people's interest in addressing that disease; versus the much less common HIV and cancer, which present a much lower risk, but are attended by tremendous 'outrage' and so get the funding, the activists, and the interest and concern of 'regular' people.

It is important to acknowledge the dread. If there's an oil spill, don't keep talking about how low the toxic effect will be. If people are saying "it's disgusting", you must confirm their perception and agree "it's disgusting, but the hazard is low." If you're busy disagreeing with their perception, they will mistrust whatever you tell them about the hazard. By agreeing that it's disgusting, you change the focus from the disgust to the hazard.

6 Chronic vs catastrophic

Chronic is perceived as less dangerous. This is why car-related deaths are considered less newsworthy than aircraft-related deaths. The car deaths are spread out over time and location. Companies too often focus on making the probability of occurrence lower, and not on reducing the hazard. A low probability times a high hazard will equal high outrage. You must focus on reducing the severity to lower the perceived risk. People want the probability to be lowered, but especially the

severity (magnitude) of the hazard reduced.

Companies must talk honestly about the worst-case scenario. This goes against all company desires. They want to downplay the worst case because its (one hopes) least likely. To gain the trust of the public you must address worst case.

A chemical company fought against meeting with the public and talking about the true worst-case. Against their desires, they did it: they told the public what the worst, worst, worst case could be, how many thousands of people would be killed and injured and all the likely damage. The public and the activists agreed it was the worst case, but since it was so very unlikely, they wanted to talk about the more likely, less severe cases. Instead of mistrust and accusations of covering up the worst possibility, the company and the public were about to work together on the more possible cases.

7 Knowable vs unknowable

Knowable is better. The public is much less tolerant of uncertainty than are engineers or scientists. The public prefers a lower 'highest possible damage' with a higher likelihood of occurring to a higher 'highest possible damage' with a lower likelihood of occurring. You must recognise that rationality doesn't matter — how the public perceives the risk is what you must address (outrage, not hazard).

Part of the 'knowable' component is detectability. It would be so much easier if radioactivity was purple. At Three Mile Island (TMI), it was the first time anyone had seen reporters hurrying a press briefing. When asked why, when the reporters had been in wars and earthquakes and riots, they were in such a rush to get away from TMI, a reporter said "At least in a war, you know you haven't been hit yet."

To address this outrage component, make the risk more detectable (if you dare). An example is the siting of a chemical incinerator. In working with the public to get them to accept the incinerator, the public asked the plant to put a 7-ft neon sign on the plant roof, attached to the thermostat in the stack. As long as the temperature stays above a certain level, the toxins would be burned and not released. This detectability reduces outrage, and therefore reduces opposition.

8 Individually controlled vs controlled by others

Individually controlled makes people feel a sense of being safer, even if they're not. Consider: who implements the voluntary choice. Imagine you're carving a beef roast, but you've got no fork. You put your hand on top of the roast and start carving. How close to the knife do you put your hand? Now, imagine it's a two-person job. How close do you put your hand to the knife someone else is wielding?

The public is holding the meat, the company the knife. It's really hard to both disempower people and reassure at the same time. The solution? Share the knife. Share control with the public, through advisory committees, public representation

on the board, and so on. Companies may dislike this, but they will do it because they need to make a profit and so they need to mollify the public.

9 Fair vs unfair

The distribution of risk and benefits must be fair (or mitigated). Unfair risk is a big risk: That is, if the people who are in jeopardy from the hazard are NOT receiving a benefit from being near the hazard, then the outrage will be much higher (and high outrage equals high risk).

You must find ways to make the benefit proportional to the hazard. If you cannot make the benefit proportional, go for mitigation. Don't just build a park for the people affected by the hazard — ask them what they want: you'll probably end up building the same park, but the people will see it as mitigation (and as company responsiveness), and not random (and unconnected) largesse. This allows the company to connect fairness to individual control: if the company feels a little blackmailed into doing something for mitigation, then they are probably sharing control, and thus creating fairness.

10 Morally irrelevant vs morally relevant

Pollution used to be unimportant. Now, pollution is morally wrong, and polluters are reprehensible. Once the public decides something is 'wrong' (morally), then the language of trade-offs becomes insufficient. Now it's not acceptable to pollute only a little, you must be trying to avoid polluting at all. You may not reach zero, but your goal must be zero. You can be right on the data (low hazard) but the moral value prohibits acceptance.

11 Trustworthy sources vs untrustworthy sources

You need to build trust. Anytime you acknowledge a problem, you build trust. If you deny problems, you destroy trust. While working to build trust, you must NOT ask for it. If you ask for trust, you create mistrust.

The replacement for trust is accountability. Find ways to be accountable to regulators, neighbours and activists. To increase the value of regulators, publicise enforcement actions. Negotiate binding agreements with traditional opponents.

12 Responsive process vs unresponsive process

Responsive process has four facets:

- 1 Secrecy vs openness: Almost all the risk communication crises Dr Sandman deals with are based in secrecy.
- 2 Acknowledging vs stonewalling on wrongdoing. A two-year-old spills juice and says "It was an accident!" An adult spills juice and says "Oh dear, I'm so sorry!" and the HOST says "It was an accident." An oil company spills "juice" and says "It was an accident!" What do you think the public says? About six months after the Exxon Valdez (Alaska) spill, a ship carrying BP Oil ran aground

and spilled oil at Huntington Beach (rich enclave), California. The BP CEO flew to the spill, and had obviously planned his risk communication carefully. When he was asked, “Whose fault was this spill?” you could see he wanted to say “Look, it was a contract ship, with a contract crew. They spilled our oil!” But instead he said, “My lawyers say this was not our fault, but I feel as if it were our fault, and we will deal with it as if it were our fault.” Six months after the spill, they polled the residents, and BP had a HIGHER approval rating than before the spill.

- 3 Courtesy vs discourtesy. Even though your public may be angry and impolite, you must never return discourtesy or you will create more outrage.
- 4 Compassion vs dispassion. When dealing with a situation, there comes a point where you must stop dealing with the hazard and work with outrage. There’s a common misperception that engineers and scientists and technologists can’t do it — they retreat further into the tech specs, rather than deal with the emotionalism. But if an engineer’s 18-yr-old daughter comes home in tears from college because her relationship broke up, the engineer realises there is little point in saying “You must realise that the median teenager has an average of 3.7 break-ups over the 4 years of college attendance.”

Seven Conclusions about Hazard and Outrage

- 1 The public responds more to outrage than hazard.
- 2 Activists and the media amplify outrage, but they don’t create it.
3. Outraged people don’t pay much attention to hazard data.
- 4 Outrage isn’t just a distraction from hazard. Both are legitimate and important.
- 5 When the hazard is high, risk communicators try to nurture the outrage.
- 6 When the hazard is low, risk communicators try to reduce the outrage.
- 7 Companies and agencies usually can’t reduce outrage much until they change their own organisations.

Final Points

It will be clear that risk communication is the process of communicating responsibly and effectively about risk factors associated with industrial technologies, natural hazards and human activities. These communication responsibilities arise for all those who are developers and managers of industry and technological change, as well as those who oversee health and environmental management. Risk communication is about bridging the gap between experts and lay-people. In fact, everyone in society faces a vast array of risks every day and, often subconsciously, makes trade-offs regarding the acceptability of each risk. People, understandably, have an aversion to admitting that they do indeed tolerate various levels of risk for themselves and their children. To the public it matters greatly whether or not one is exposed voluntarily or involuntarily to risks. Good risk communication practice seeks to address the division between experts and the public. The three specialists, whose work has been featured in this paper, each

provide guidelines for facilitating this process.

Business needs to spend more time and resources on developing sound risk communication practices. To not do so represents a business risk. In essence this requires the promotion of a reasoned dialogue among stakeholders on the nature of relevant risk factors and acceptable risk management strategies.

Risk communication should become an integral part of the risk management process. Informed public understanding of risk factors is the key to achieving board support for and trust in risk management strategies, and this in turn requires good risk communication practice.

Further Information

Most of the material in this chapter that has been attributed to Peter Sandman was included in notes provided at a course on Risk Communication, presented by Dr Sandman at Harvard University, Boston Ma., attended by the author in October 2000. Vincent Covello, John Paling and Peter Sandman are all widely published and a substantial amount of further information is available from internet-based sources.

This paper reflects on some issues around applied communication that illustrate fundamental principles in developing a risk communication programme.

Ethical issues arise both when risk communication is internal to an organisation and between an organisation and its stakeholders. In this paper, Karen draws on her experience at ERMA New Zealand to demonstrate the ethical issues faced every day by government managers.

She bases her discussion on a presentation by Professor Donald Evans of the Centre for Bioethics at Otago University, which concluded that applying ethical considerations is essentially about ‘showing respect’ for the principles of:

- *Autonomy;*
- *Beneficence;*
- *Truthfulness;*
- *Dignity;*
- *Non-maleficence; and*
- *Justice.*

Ethical issues need to be addressed at a very early stage of developing a risk communication programme, and considered throughout the project or activity.

Karen also discusses the difference between communication and consultation, and the need to deal with community expectations as to the degree of influence people will have on the decisions of public authorities. A lack of clarity in the early stages of a project can cause significant problems in the later stages.

¹ This is a personal presentation and does not represent the views or policy of the Environmental Risk Management Authority.

Imagine this...

You are the Communications Manager for a large New Zealand city council. The council has had problems in the past over its handling of major development projects but in recent times its public profile has been improving.

The Chief Engineer advises the management team that an old council landfill, constructed in the 1960s, is now causing serious environmental problems. The landfill was covered over and has been used as a park and sportsground for many years. It is surrounded by middle-income housing and is next to a private Christian primary school. Gas from the landfill is leaking out and in some places at such levels that it could ignite or explode from a dropped cigarette.

What are the risk communication issues in this situation — and how should they be dealt with ethically?

This is an hypothetical example, although based in part on actual events. The management of this situation required good professional communications ‘techniques’ — but also raised a number of ethical considerations. The risk management response included:

- immediately establishing the history of the landfill and the nature of the waste involved;
- measuring and testing the gas emissions and establishing their potential hazardous effects;
- setting up a close relationship with the neighbouring residents, on a personal basis with a trusted senior council officer;
- also establishing a relationship with the school Principal and Board and the wider church authorities;
- keeping these immediate stakeholders informed with all the information available from the start and new information as it came to hand;
- informing councillors in the ward about the issue and what was being done;
- fencing off those parts of the park where the hazard was greatest;
- closing the park to general public access;
- implementing a management plan to reduce or eliminate the gas leaks;
- conducting a city wide investigation to check if any other landfills built at the same time were causing similar problems — and setting up further plans to manage or eliminate any problems found; and
- establishing the potential legal and financial liability the council might face.

There were some important communications dimensions in this response.

The situation first came to the attention of the council from some of the local residents because they noticed the smell of the gas. But not all of them knew and so the first thing was to ensure that all the immediate affected households were informed — and kept fully updated at each step along the way. For the school, it

was important that the Principal, the Board of Trustees and the parents were informed.

Potentially in this situation the residents might have demanded financial compensation from the council. This could have come to a significant amount, especially if claims arose from other hazardous landfill sites around the city. The general response of those affected was to accept that there was some risk but that it was being managed and eliminated. Their overriding concern was that if information got out, their property values would be seriously affected. They explicitly asked the council not to tell the news media about the situation.

From an issues management point of view however, it was highly unlikely that the media would not get to hear about this. Local word of mouth would have been enough. The notices on the park would have soon attracted attention. Residents usually talk to their councillors and — as in many local authorities — the temptation for politicians to run with this story would have been hard to resist. And if the media found out, one of their main angles would have been to accuse the council of covering up another ‘major bungle’.

As it turned out, the story did find its way to journalists. The council responded with detailed information including the history of the landfill and, more importantly, explained what was being done to respect the wishes of residents — and to manage the risk at this site and potentially other sites. The residents were immediately informed, before the story began to surface in the media. The council confirmed its policy of not initiating the story but explained that it had to respond when questions started to be asked. Some residents, but not all, chose to speak to the media themselves. Generally this comment was supportive of the council’s approach.

What are the ethical issues that arise from this example?

First of all, it might be useful to establish what we mean by ‘ethics’. Entire university programmes and a vast literature are devoted to this subject and it wouldn’t pay to start down that track in a single chapter of this book. Ethical issues are important generally to good communication practice, but take on a greater significance when you are dealing with potential harm to public health and the environment.

The Environmental Risk Management Authority have given some thought to how it should incorporate ethical issues into risk decision-making. There is no easy answer.

But as part of our thinking we sought advice from ethical specialists, including Professor Donald Evans of the Centre for Bioethics at Otago University. He gave a very useful overview of the issues from his knowledge of the field. In the end, he said, “It is a matter of showing respect”. This meant showing respect for:

- Autonomy: in that people have a right to determine their own lives and to

have a say about activities that may affect them.

- Beneficence: will the proposal do good? What are the benefits and to whom?
- Truthfulness: are people honestly being told the whole story?
- Dignity: are their situation and their needs being taken into account and respected?
- Non-maleficence: making sure that a proposal, or the management of a risk, does no harm.
- Justice: does the risk management decision reflect the principles of justice?

This provides a useful framework for those of us working in risk communication: to show respect for the well being of individual people and communities. Interestingly, these principles could also provide a basis for showing respect for nature, including the well being of other species and the healthy functioning of natural ecosystems. Those concepts have been developed more fully in the literature on environmental ethics.

In the case of the landfill story, some of the ethical considerations included:

- Respecting the rights of the residents and the school to know what was going on and to have a say in how the issue was managed. This also extended to the ward councillors who wanted to be seen to be taking a responsible role in the situation.
- Doing whatever was necessary straight away to reduce any danger to human health at the site, especially given that children could be affected.
- Telling the complete truth to the residents and the media about the landfill, what was in it, what the gas was and how harmful it might be — and what was being done about it.
- Respecting the dignity of those most affected by keeping them informed from an early stage — and being open to the possibility that some might choose to seek compensation.
- Recognising that people themselves can articulate their own interests if allowed to do so, for example the potential health harm from the gas versus likely the financial harm from a reduction in their property values.

Another dimension of this was to trust that people would not over-react to the true picture. There can be a bureaucratic inclination to ‘protect’ people from information like this on the assumption that they will respond ‘hysterically’. (The issue of so-called ‘public hysteria’ in the face of a risk might be an interesting topic for another seminar).

- Making sure that no one else living near other landfills was in any danger.
- Recognising and communicating the actual potential harm of the gas leak — and communicating the benefits of the management plan.
- Taking responsibility for the liability if compensation was sought; i.e. the council was accountable for its past actions and was not evading the issue.

Turning to the ethics of risk communication generally, I wanted to explore some

ideas that might apply to other kinds of environmental risk.

Environmental risks are becoming increasingly significant in our lives — and are often major issues for communities or even countries to resolve. For example, as well as landfill issues, local authorities in many parts of the country have had to deal with the issue of cell phone tower installations, which have generated strong community interest and concern. (This is a classic case study of risk communication, including all the dimensions of expert and community risk perception.)

Risk management is now a growing professional field, in which risk communication is recognised as a crucial dimension. A very useful model recently developed by the Australia/ New Zealand Standards Committee, emphasises that communication needs to happen throughout the process: from the identification of risks and their evaluation, through to risk decision making and any management regime that is then established (Standards Australia/Standards New Zealand, 2000).

For those of us involved in risk communication, there are a number of ethical issues that we can consider as part of our professional practice.

But first a brief comment on terminology.

The words ‘risk’ and ‘communication’ can generate multiple interpretations when they are used, let alone when they are used together. There are also the related concepts of ‘consultation’ and ‘public education or raising ‘public awareness’. I think it is useful to make the following distinctions:

Strictly speaking, ‘communication’, or ‘public relations’, involves giving people targeted information and highlighting key messages from an organisation to position it effectively with key audiences.

‘Consultation’ requires two-way communication: information is provided and there is an opportunity for information to be fed back. It is a process that allows for input into decision-making.

Public awareness programmes are aimed educating the public or specific groups about a particular issue or proposal to increase their levels of awareness and understanding.

‘Risk communication’ programmes can involve one or more of these components.

Risk communication might be needed in a reactive situation, like the landfill example, or in a proactive situation when a proposal with potential risks is put forward for consideration and a final decision is going to be made by a company or a public authority.

One of the first ethical issues in designing a risk communication programme is to be clear about the level of influence that external parties might have on the decision.

Looking at the experience of public agencies, and a number of models for

consultation, we can see that broadly the approaches are:

- No influence: the public authority makes the decision without any external comments, and announces the final result.
- Limited influence: the public authority makes the final decision, but in the process other information is sought and taken into account. The decision is communicated to all parties to show how their comments were considered and the outcome was reached.
- Shared decision-making: the public authority may not have all the information to make the decision itself. The decision-making role is shared with other parties. The final decision is one that all the parties reach together.
- Delegation: the public authority decides it does not need to take the decision itself at all and the power to decide is given to another group.

It is important to define who is making the decision and to what extent external parties will be able to influence the outcome. People quickly become disillusioned if they think that their submissions are not going to have any effect. The ethical issues here arise out of respect for autonomy, dignity, and justice. It is important to clarify expectations and the scope of influence by laying down the ‘ground rules’ at the start of the process. It is also important to let people know how their views were taken into account in the final decision.

At ERMA New Zealand we developed a policy to explain our approach to public involvement in applications for hazardous substances and new organisms under Part V of the HSNO Act (ERMA New Zealand, 2000). Given the statutory processes involved, the Authority decided that it was working with the second model, i.e. ‘limited influence’. The Authority calls for submissions and holds hearing for notified applications for GM field tests and releases. At the end of its consideration, it issues a comprehensive decision and this is widely publicised on our website and in the media.

A second ethical issue might be the choice of the communication or consultation technique we chose to employ in any given situation.

Communicating about environmental risks can involve various elements and approaches including: baseline awareness studies, stakeholder analysis, opinion surveys, focus groups, sector or interest group briefings and consultation, and community participation programmes (in various forms, from informal networking to formal statutory processes).

And it also includes all the standard communication techniques such as written material, road shows, seminars, advertising, websites, special events, etc. — and not least of all media relations.

The choice of technique depends on the purpose of the risk communication programme.

Again, there are some choices facing the risk communication professional. It is

important to be clear about what you are trying to achieve. For example your approach could be aimed at different points on the following scale:

- Providing information — presenting basic facts and figures about the proposal or the risk (usually done with a brochure or a display). But this is only ‘one way’ communication. It is passive: the information may not be picked up or used and does not allow for interaction or feedback.
- Raising awareness — information is provided in a way that the target audience becomes aware of what is going on. This can be measured with before and after surveys.
- Increasing understanding — as well as being aware, the audience is able to develop an understanding of the proposal and make some judgements on it; and is empowered to take part meaningfully in any consultation process.
- Changing behaviour — the programme is deliberately aimed at producing a different behavioural response in the target audience.

In my current work, we are trying to apply this concept to a communication programme about the risks of bringing new organisms into New Zealand, particularly plants.

Publishing brochures or posters about the dangers of unwanted plants would probably be useful but it is a minimalist approach. It would obviously provide information and perhaps change awareness. But it would not be sufficient to generate a wider change of attitudes and behaviour where people have learnt to consciously consider the harm they might cause to New Zealand’s agriculture or natural environment from the import of a new organism — and chose not to create the risk.

To achieve those wider objectives, a more comprehensive campaign would be needed, for example using television and well known public figures to ‘champion’ the cause — and to create a positive public commitment to idea of protecting the ‘treasures’ in our natural environment.

But running a campaign at that end of the scale raises some interesting questions about ‘means and ends’ in the design of risk communication programmes.

Communication techniques, including sophisticated marketing and PR devices, can be used to identify the current awareness or behaviour of an audience, but also to try to change that understanding or behaviour. Communication strategies can — and do — have a powerful influence on public opinion and social outcomes.

Obviously, when we want to communicate about the dangers of importing invasive pests and weeds — about alcohol abuse or fire safety — we are consciously trying to change public awareness and behaviour to achieve an agreed social good.

However, when the net social outcome is in dispute — for example with some forms of technology — those of us involved in risk communication may want to

ask “What is the real purpose of this programme” and “is it ethical to proceed?”

All risks — and their avoidance or management — occur within a social context. The existence and significance of a risk inherently depend on your point of view, including your professional worldview, your cultural worldview, your personal opinions and attitudes, and your fundamental values and beliefs.

It also depends on how you might be affected. Depending on their ‘stake’ in the situation, people will identify a variety of risks including ecological, health, social, cultural, and possibly political risks. They will also evaluate and seek remedy for risks in different ways.

It comes down to how you look at the risk — and who is doing the looking. But whose definition of the risk is the most valid or should have the most influence? For example is it the policy maker, the technical expert, the regulator, the scientist, the iwi, the lawyer, the neighbourhood group, or the wider public?

How can we take an ethical approach to risk communication in a situation where there are diverse and sometimes deeply divided views about the risks involved? Should risk communication programmes be developed to ‘educate’ some people to perceive the risks in a different way and alter their judgements — and hence the level of ‘social tolerance’ of an activity or proposal?

As a minimum, an ethical approach would require that all the risks in the situation are identified, brought into the process and shown respect, including those that might be seen as less valid by other stakeholder groups.

Another approach to consider is altering the direction of the communication programme. Conventional practice would see the risk manager developing a programme aimed at the ‘public’ to get feedback into the decision making process.

Thinking laterally, a communications programme could also be developed to support the members of the community in a discussion amongst themselves about the issues involved.

This might be particularly useful for the Maori community using hui or wananga.

Another approach would be to support a process where the different stakeholders discuss — and potentially resolve — the issues with each other rather than with the formal decision maker, (for example members of the public engaging in dialogue with scientists).

All of this takes us into the wider territory of innovative processes for public decision-making on major issues. (And that is definitely the topic for another seminar).

The final issue I want to talk about is trust.

Social scientists such as Lynn Frewer and Paul Slovic have established that the

credibility — and effectiveness — of any risk communication programme is determined by how well the communicator is trusted.

The recent backlash in the UK against a public awareness campaign on genetic engineering by Monsanto is a case in point. Briefly, the company decided to take a proactive stance and spent millions on a communication campaign to ‘educate’ the public about GM crops. It did this in response to a groundswell of public reaction to GMO issues both in the UK and Europe, which was being actively highlighted by the popular press. The campaign was innovative in that it sought to tackle the technical issues head on and provide general information on GE. It included newspaper advertising that recommended people contact Greenpeace for further information. However the campaign backfired: despite the considerable investment in this communication strategy, the company’s favourability rating was lower than before it started (Frewer, 2000; Allen, 2000).

A similar exercise here in New Zealand, involving a pamphlet on GE food ‘facts’ distributed and promoted through supermarkets, also produced an adverse reaction including a ‘counter’ pamphlet and supermarket protests around the country.

The issue is just as important for environmental groups. For example, Greenpeace in the UK suffered a blow to its credibility when it used inaccurate figures related to the oil spill from the *Brent Spar*. While it subsequently admitted a mistake and corrected the figures, the incident was harmful to its reputation at that time (Frewer, 2000).

Industry, environmental groups and public agencies that are trusted are more likely to have their message heard and acted upon than those who are not. The issue is especially important for government agencies that may be spending taxpayer money on communication programmes — and in particular for agencies like ours that also have a semi-judicial role and have to maintain a strictly neutral stance.

At ERMA New Zealand, one way we have dealt with the potential conflict between our educational role and our judicial role is to produce education material and run events which enable the various issues and stakeholders to come together and talk to each other, but without inserting an ERMA New Zealand point of view.

The community education kit on genetic engineering, which we produced earlier this year, is an example. It includes a video that outlines the science of GE and how it is actually done in the lab in a simple way for people to understand. And it has a list of questions to act as a ‘discussion starter’ for groups to use themselves to explore the issues involved.

So rather than running risk communication programmes that can be seen as either ‘for or against’ an issue, a more appropriate approach for public agencies may be to design programmes that will actively increase the level of awareness and understanding in the target audience — and which then make it possible for those groups to facilitate their own learning.

The aim is to inform and educate but not to persuade. A desirable end point would be to support stakeholders so they are confident enough to take part meaningfully in the debate and therefore make a positive contribution to social policy.

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Section 2:

Risk Communication in Practice

The Role of Risk Communication Processes in Disaster Preparedness

Bernd Rohrmann

People exposed to hazards — natural ones such as earthquakes, hurricanes, wildfires or floods, or technological ones, such as explosions, chemical spills, train crashes and so on — want and need to be optimally informed about risk characteristics, preventative measures, and appropriate behaviours during emergencies. To meet these expectations, authorities have to compose pertinent planning, prepare coping strategies, and communicate the relevant information effectively to residents, people in the workplace and communities as a whole.

The more disaster management requires active involvement of residents, the more vital risk information/communication/education become. Furthermore, in the case of controversial risk sources (e.g. the siting of an airport or a waste incineration facility), public discussion, participation of stakeholders and possibly joint conflict resolution are required.

The author notes that all of these situations involve social processes which are usually subsumed under the (umbrella) term ‘risk communication’, and the exchange of risk information between interested parties (individuals, groups, institutions) is at the core of it. Risk communication is the link between risk perception (i.e. people’s observations, judgments and evaluations of hazards they are or might be exposed to) and risk management (i.e. activities of individuals or authorities to eliminate or mitigate the causes and/or impacts of hazardous events).

Given the high relevance of effective disaster preparedness, risk communication programmes need to be based on a sound understanding of the underlying socio-psychological processes and preconditions for successful communication.

This chapter firstly presents a theoretical model for the risk communication process. Secondly, two case studies are used to illustrate practical experiences, one about informing residents about chemical emergency warnings, and one addressing community-based bushfire preparedness programmes. Thirdly, recommendations for comprehensive risk communication will be outlined.

The following suggestions for good practice are based on relevant research.

- *Reflect risk perception mechanisms when deciding about message content and context.*
- *Identify existing knowledge and pertinent ‘mental models’ of the hazard.*
- *Check materials/advice for comprehensibility, plausibility, feasibility, capacity to motivate.*

- *Acknowledge apathy/inertia and information overload when requesting activities.*
- *Adapt programmes to core characteristics of specified target groups (including ethnicity).*
- *Incorporate community groups and induce community-based activities.*
- *Provide interactive communication and pathways for information requests and confirmation.*
- *Strengthen personal involvement and responsibility.*
- *Take credibility issues very seriously.*

The author recommends strongly that empirical outcome evaluations be incorporated into risk communication campaigns, and finally notes the importance of interdisciplinary collaboration in enriching both the design and the assessment of disaster preparedness campaigns.

This Chapter serves as an introduction to the case studies and examples that make up Part II of the book.

Core Concepts

Risk information, education, communication, dialogue

Humankind has made many inventions to prevent or at least reduce harm from hazards, and safety has become a core value in our professional and private lives. Nevertheless, very many residents, as well as people in the workplace or travellers, are exposed to a wide range of hazards. Once humans face the risk of environmental disasters — natural ones such as earthquakes, hurricanes, wildfires, or floods; or technological ones, such as explosions, chemical spills, train crashes and so on — hazard management and especially disaster preparedness becomes a very important task. People exposed to hazards want and need to be optimally informed about risk characteristics, preventative measures, and appropriate behaviours during emergencies, and they must understand their own responsibility. Authorities have to compose pertinent planning, prepare coping strategies, and communicate the relevant information to residents and communities as a whole effectively. The more disaster management requires active involvement of residents, the more vital risk information/communication/education become. Furthermore, in the case of controversial risk sources (e.g. the siting of an airport or a waste incineration facility), public dialogue, participation of stakeholders and possibly joint conflict resolution are required.

All these situations involve social processes that are usually subsumed under the (umbrella) term ‘risk communication’, and the provision and exchange of risk information between interested parties (individuals, groups, institutions) is at the core of it. Depending on the nature of the hazard and the objectives of a risk communication programme, different tasks evolve; in Box 1, primary aims are listed. Usually risk awareness and preparedness are to be increased; however, sometimes the aim is to reduce concern about risks.

Executing these tasks requires a variety of communication means and channels, which need to be chosen carefully. Distribution of print material is (still) the most frequent procedure; others, e.g., warning sirens, are restricted to specific purposes (cf. Box 1).

For a systematic treatise of this very active field of research and application see, for example, Bennet and Kalman, 1999; Covello et al., 1989; Hance et al., 1990; Kasperson and Stallen, 1990; Lundgren and McMakin, 1998; NRC, 1990; Renn, 1992; Sadar and Shull, 1999; and The Royal Society, 1992. For overviews see Fischhoff, 1995; Fischhoff et al., 1997; Leiss, 1996; Morgan et al., 1992; Plough and Krinsky, 1987; Renn, 1998; and Rohrmann, 1995b.

Communicating about hazards and the involved risks for humans and their assets is a commonplace activity which occurs in a multitude of situations (‘arenas’), ranging from systematic campaigns planned by authorities to informal exchanges in occupational or private contexts (see Box 2).

Note: This text is an extended version of my Keynote Address at the CAE conference *The Risk Communication Challenge*, and is based on the work published in Rohrmann 1998, 1999 and 2000.

Box 1: Risk Communication: Aims, Tasks, Means

Principal aim:

The provision and exchange of information about the characteristics, impacts and mitigation of risks for humans or the environment among individuals and/or groups

Primary types of risk communication tasks

- Identifying unknown/difficult/controversial risk aspects (inducing RC problems)
- Advancing/changing knowledge and attitudes regarding hazards & risk-taking
- Modifying risk-related behaviour of people exposed to hazards
- Promoting community participation in hazard mitigation
- Facilitating cooperation and joint conflict resolution regarding controversial risks
- Developing disaster preparedness and emergency management

Communication means & channels

- Print material (e.g., fliers & brochures), distributed by institutions/agencies
- Product information, machine operating instructions, etc
- Public information services, 'hot lines', etc
- Educational video/film/computer products
- Info presented via broadcasting, television, newspapers, journals and the internet
- Expert presentations (at meetings, public hearings, trainings, drills etc)
- Warning sirens (or messages through mobile loudspeakers)

These processes involve a variety of ‘actors’ which may be senders, audience, or both. In addition to various risk-exposed people (employees, residents, consumers) and public authorities, further actors in the RC ‘arena’ are to be considered (see bottom of Box 2), such as industry, scientific institutions, and various types of media; this alone makes RC a complex process (Covello et al., 1989; Rohrmann, 1991; Slovic, 1996). Mutual trust — or rather lack thereof — between actors is a crucial issue (Peters et al., 1997; Renn and Levine, 1991).

Informing and communicating about risks is more likely to succeed when treated as a two-way process, when participants are seen as legitimate partners (“experts must respect and include citizens in decisions on risk”, Slovic. 1996, p7), and when people’s

Box 2: Arenas And Actors Of The Risk Communication Process

Situations in which RC occurs

- | | |
|---|--|
| • Information campaigns by authorities | • Counselling contacts, medical advice |
| • Safety training courses, tests, exercises | • Advice for handling disaster impacts |
| • Emergency information and warnings | • Evacuation |
| • Public hearings, conferences etc | • Judicial proceedings |

Target audiences and actors

- | | |
|------------------------------------|---|
| • Risk-exposed people | • The general public |
| • Industry/manufacturers/companies | • Administrative/regulatory authorities |
| • Scientific institutions | • Journalists/media |

attitudes and ‘worldviews’ regarding environment and technology are respected. This is particularly true in the case of risk controversies. Acceptance of risks is not an information/education issue; it results from a societal discourse (Cvetkovich and Lofstedt, 1999; Susskind and Field, 1996; Wiedemann and Schuetz, 2000).

A theoretical model for the risk communication process

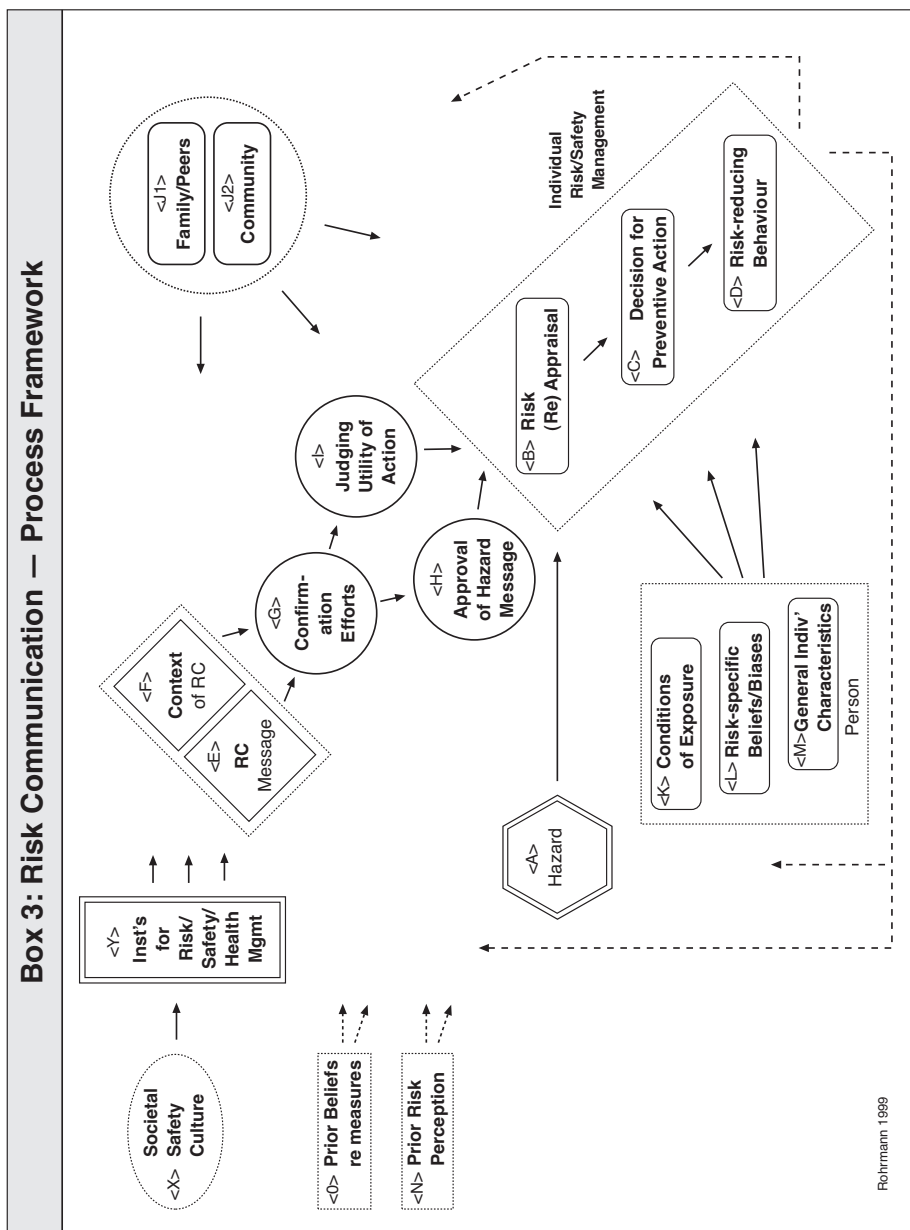
Designing valid and effective risk communication is a challenging task. Practical experience may not be sufficient to ensure satisfactory results. Rather, a comprehensive theoretical framework is needed to guide such efforts.

In spite of the immense literature on risk communication, systematic modelling of the risk communication process is relatively rare (e.g. Earle et al., 1990; Mileti and Fitzpatrick, 1991; Paton et al., 1999; Renn, 1992; Rohrmann, 1992; Powell and Leiss, 1998; Zimmermann, 1987) and often restricted in scope — comprehensive approaches are scarce. The need for a sound framework becomes especially evident when risk communication outcomes are to be assessed (Rohrmann, 1998). Thus concepts and findings from relevant research fields (social psychology, risk research, verbal communication) were integrated to develop a model of risk communication (Rohrmann 1992, 1995a, 2000).

The structural model identifies the main components of risk communication processes and specifies the factors which determine the results of risk communication efforts, referring to characteristics of the distributed messages, the conveying authority, the receiving audiences and the context in which the communication process occurs. Three processes overlap and need to be linked: how people deal with hazards, how risk information is processed and evaluated, and how accepted information effects risk perception, evaluation, and behaviour. The full model (from Rohrmann 2000b) is presented as a graph in Box 3.

The focus is on an individual rather than collective (community) level of activities. The proposed causal links between the variables are indicated on a global level only, that is, for sets of related aspects of the risk communication process. (Note that ‘feedback loops’ are assumed as well but not fully outlined here.)

In short, the model expresses that the final outcome variable, risk-reducing behaviour <D> regarding a hazard <A>, is determined not just by the communicated messages of the information/education programme <E> but the result of a complex evaluation process <B-C and G-H-I>, including prior attitudes <N, O>, and influenced by personal characteristics <K, L, M> and manifold context factors, e.g. attributes of the information source and channel features <F> utilised by the respective authority/agency <Y>, as well as family/peers/friends and the community one belongs to <J>; the whole process is embedded into a culture’s health and safety orientation <X>. As the feedback-loops in the figure indicate, risk-reducing behaviour <D> is intended to mitigate the impacts of the hazard <A>; moreover, often people will link their activities to their social network <J> or approach relevant authorities <Y>.



This risk communication model can be elaborated and/or made specific to the problem type, the target audience, and the relevant attitudes and behaviours to be dealt with.

Such a framework is essential for designing evaluations and developing pertinent instruments, as well as recognising reasons for lack of success with risk communication campaigns.

Links between risk perception, risk communication and risk management

As outlined above, the aims of risk communication involve information, communication, education, and management tasks. Risk communication is the link between risk perception (i.e., people's observations, judgments and evaluations of hazards they are or might be exposed to) and risk management (i.e., activities of individuals or authorities to eliminate or mitigate the causes and/or impacts of hazardous events).

Given the high relevance of human safety, pro-active accident prevention, and effective disaster preparedness, risk communication programmes need to be based on a sound understanding of the underlying socio-psychological processes and preconditions for successful communication (Powell and Leiss, 1998; Renn, 1998).

Regarding risk management — very few measures are purely technical while most activities include at least some communication with risk-exposed people; in most cases risk information/communication/education is an indispensable prerequisite of successful risk management.

Case Studies

In the following, risk communication experiences from two case studies are reported, one related to a technological (and human-made), one to a natural hazard. In both cases, enhancing the disaster preparedness of residents was the aim.

Informing residents about chemical emergency warnings

In industrialised countries, many residential areas are exposed to technological hazards, especially industrial facilities such as airports or chemical production and storage. These have the potential of accidents and can cause disasters. Thus elaborated information procedures are usually in place, and considerable resources are necessary to meet the requirements of risk control (e.g. Covello, 1990; Hance et al., 1990; Lee, 1986; Muller-Vogt and Sorensen, 1994; Powell and Leiss, 1998; Willis et al., 1997).

An example is the CAER (Community Awareness and Emergency Response) programme run in many cities, including one around a complex of major chemical facilities in Melbourne, Australia. In 1992 the local council informed residents about emergency preparedness issues, linked to a new warning siren. In defined areas each household received an information brochure (plus a condensed version on a magnetic card), referring to the siren and containing behavioural guidelines for emergencies. Translations of the main messages into other languages were provided as well. Information distribution was repeated after about 12 months.

A year later, the author initiated a small field study (Project ICE, *Informing about Chemical Emergency Warnings*) to assess the results of that hazard information programme (Jaensch, 1995; see also Rohrmann, 1998). The study design represents receivers as well as non-receivers (sampled in a control area) and ethnicity (Anglo

versus Italian). Eighty-two residents were interviewed, based on a standardised questionnaire. Selected results are summarised in Box 4.

Notably, only half of the respondents in the information distribution area actually recalled receiving the emergency preparedness information, and only a small proportion had the material at hand. While the knowledge about the nature of the warning siren signal was limited (in fact the siren itself was not explained in the brochure), the overall response to the information provided was positive; the material was rated as understandable and intended compliance with the guidelines was rather high. However, perceived credibility of information sources seems to be restricted (highest for a non-local governmental agency, lowest for the media).

When asked about likely behaviours in the case of a chemical emergency (based on two scenarios, being at home or in a shopping centre when the warning sirens go off), the group of receivers revealed a superior knowledge of emergency issues — yet wrong answers were still quite frequent. Regarding ethnicity, no significant

Box 4: Perception Of A Chemical Hazard Information Campaign (Project Ice)		
Selected results from the case study in Altona/Melbourne (N=82, 1995)		
Acknowledging receipt of the hazard information material:		
• in distribution area	48 %	
• in comparison area	4 %	
Material stored (% of those acknowledging the campaign = Group A):		
• information leaflet	4 %	
• magnetic info card	52 %	
Effects for respondents <u>a</u> ware vs <u>n</u> ot aware of campaign	A	Non-A
• Assumed source of emergency warnings correct (%)	88	25
• Likely compliance with guideline (5-point scale)	3.9	4.2
• Intended behaviour corresponds to guideline		
— if at home when emergency occurs (%)	60	23
— if shopping during emergency (%)	28	5
Perceived credibility of information sources		
• Local government (Council)	3.3	
• Chemical industry in Altona	2.8	
• Environmental Protection Agency	3.7	
• Media	2.6	
(Source: Jaensch 1995, Rohrmann 1998)		

differences were found between the two included groups; however, a majority of the interviewed Italians (all bilingual) would prefer emergency information in their first language.

This case study demonstrated that information distribution cannot be equated with information receipt, that well-designed hazard information improves emergency preparedness if actually reaching the target group, and that a 'one-shot' campaign based on printed information is not sufficient to ensure a full acceptance of behaviour directives for risk mitigation.

Community-based bushfire preparedness programmes

Fires are a constant threat to communities, especially in Australia where wildfires/ bushfires are common and have the potential for disasters (Pyne, 1991; Webster, 2000). Whenever people are exposed to the risk of fires, hazard prevention becomes an obligation. Risk communication about fire hazards in the workplace or in residential settings is an indispensable part of this task. Such an understanding extends the 'classic' firefighting missions of fire authorities. In fact, a shift in the general orientation of fire risk management seems obvious (see, for example, Smith et al., 1996; Rhodes and Reinholdt, 1998).

A remarkable example is a novel approach to fire safety, the 'Community Fireguard' (C/F) programme introduced by the Country Fire Authority of Victoria/Australia. It is based on community involvement (cf. Jones 1987) and aims to enhance individual responsibility for fire safety and survival strategies (CFA, 1995; Beckinsale, 1994). Interactive risk communication between residents and fire authority officers is a core element.

In order to assess the process and outcomes of this programme, a detailed investigation (Project EBP, *Evaluation of community-based approaches to bushfire preparedness*) was conducted in Melbourne and regional Victoria (Rohrmann, 1998, 1999).

The sampling of this project is shown in Box 5. Of interest here is sub-study <X>, which was used to create a 'before/after' design with an 'experimental' group <N> = members of new C/F groups exposed to the programme and a comparison group <C>.

Selected data for these groups are listed in Box 6. The results demonstrate:

- Judgments of risk awareness, knowledge re bushfires, own responsibilities, technical fire preparedness as well as actions taken (A1, B1, B4, G2, H1, O1) slightly increased for new C/F participants from phase 1 to phase 2, while reading activities and perceived information need (E1) decreased.
- However, similar effects occurred within the comparison group (see columns C1/C2), and some differences were actually higher (see C2-C1 vs N2-N1).
- While the absolute level of awareness, reading, knowledge, and action taken was still somewhat lower in the 'Non-C/F' group (cf. C2/N2), subjective

Box 5: Survey Design: Target Groups & Samples		
<Project EBP>		
<E>	Residents participating in existing C/F program	N=110
<X>	Bushfire-prone areas; no C/F; future CFG's likely out of <X> - interviewed again in Phase II:	N=126
<N>	residents participating in new C/F group	N=21
<C>	comparison group not exposed to C/F, same areas	N=36
<F>	Residents exposed to fires in 1997	N=30
<P>	CFA personnel: officers dealing with the C/F program	N=20

understanding, preparedness and acceptance of own responsibilities (cf. B1, G2, H2) was actually about the same or slightly higher than for C/F participants.

To understand these somewhat surprising results it needs to be considered that unfortunately the methodologically crucial data collection in phase II was severely confounded by two 'external' events: serious fires occurred in the Sydney region in November 1997 (larger and earlier than usual), inducing wide-spread media activities; and the Victorian CFA had to modify its community education approach (including the programme under study) in response to predictions of a high bushfire risk for 1998. These events created considerable 'risk communication' too, obviously increasing problem awareness and consequently bushfire preparedness in all investigation areas and thus blurring the specific effects of the C/F programme.

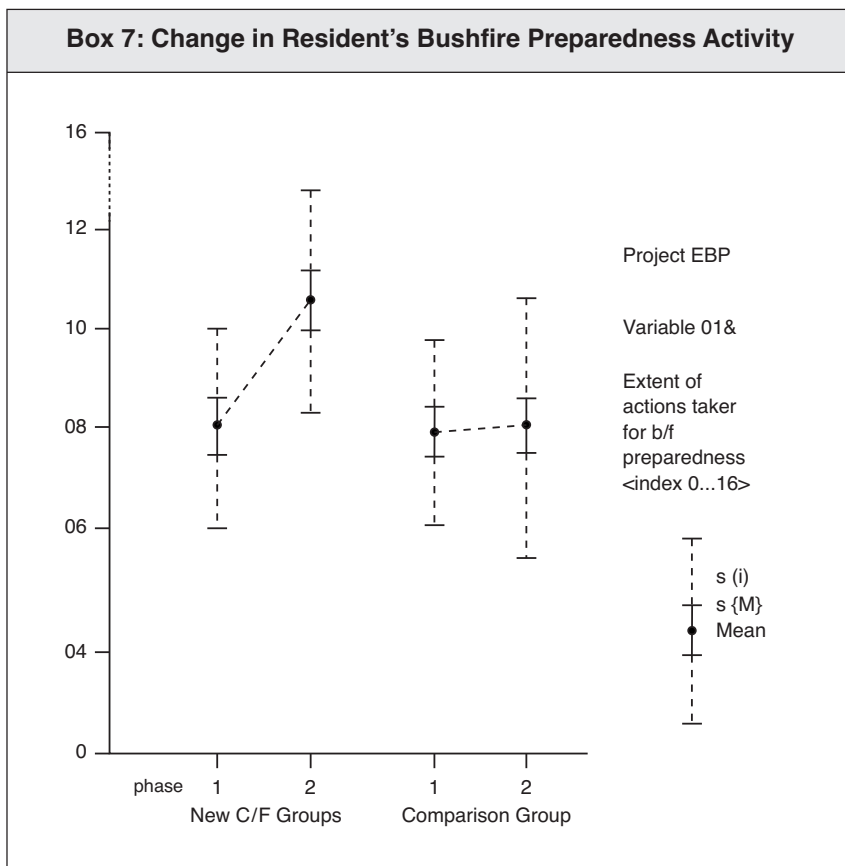
The findings suggest that the C/F risk communication process achieved at least three important aims: improved knowledge about bushfire preparedness; better

Box 6: Resident's Views on Bushfire Issues — Comparison Phase 1										
<Project EBP>										
#	Topic/Variable	Phase:	New C/F Groups				Comparison Group			
			N1		N2		C1		C2	
			Mean	s[M]	Mean	s[M]	Mean	s[M]	Mean	s[M]
A1	Rating of area's bushfire risk (0..100)		81.2	3.0	84.0	3.1	74.0	4.0	82.6	3.5
B1	Understanding bushfire issues (self-rating 0..100)		63.8	3.3	68.1	2.7	62.0	3.2	72.1	2.4
B4	Knowledge index re bushfire issues (0..24)		16.1	0.4	17.6	0.5	13.6	0.5	13.8	0.7
C5	Brochures/pamphlets re bushfires read (%)		93.8		75.0		60.0		45.8	
E1	Need for information re bushfire issues (%)		62.5		37.5		48.0		28.0	
G2	Responsibility attitude regarding the bushfire risk									
	Accepted as own responsibility (2..10)		7.8	0.5	8.0	0.4	8.1	0.3	8.4	0.3
	Seen as CFA's responsibility (3..15)		8.2	0.7	6.8	0.5	8.8	0.5	7.9	0.6
H1	Overall bushfire preparedness (self-rating) (0..100)		56.3	4.2	67.8	3.8	60.0	4.0	65.2	3.5
O1	Overall extent of actions taken (0..16)		8.1	0.5	10.6	0.6	8.0	0.4	8.2	0.5

understanding that the fire risk is not solely the authority's (CFA's) responsibility; and higher levels of taking action. Box 7 demonstrates the changes in preparatory activities. (This graph also indicates the considerable variance in the residents' responses; the dotted lines depict the standard deviation for a variable; the solid bar represents the standard error of the mean.)

Altogether the evidence from these and the other sub-studies (cf. Box 5 above) clearly indicates that the community-based 'Fireguard' approach is beneficial on the whole to the bushfire preparedness of residents in fire risk areas and provides an effective context for interactive risk communication with high involvement of citizens. Thus the project confirmed the advantages of risk communication based on direct collaboration with residents and group activities. Yet an additional study focusing on brochures about fire preparedness (Rohrmann, 2000a) showed that carefully designed print material is also very useful and still indispensable.

Both case studies presented here are valuable for a better understanding of successes and shortcomings of risk communication programmes. They also point at several unresolved issues, such as: what is the optimal combination of info material and group work? How best to overcome socio-psychological barriers to



involvement and implementation? To which degree are procedures effective for 'ethnic' (non-'Anglo') residents? And what is the long-term stability of programme effects and behavioural change?

Conclusions

Recommendations for comprehensive risk communication

The two case studies demonstrate (once more) that designing effective risk communication programmes is a complex undertaking — and something like the 'seven cardinal rules' (Covello and Allen, 1988) is not likely to solve the problem, particularly as different risk communication tasks and target audiences (see Boxes 1 and 2) require different approaches. From a management viewpoint, careful planning is the first task. Box 8 gives an example for the steps involved.

In the beginning, two steps are important: any programme should be based on clear-cut decisions about the goals to be achieved; and a risk communicator must understand what people to be addressed know already, don't know, believe to know but don't, or might know inaccurately (Kahneman et al., 1982; Morgan et al., 1992). To take terminology matters seriously is important as well (Rohrmann, 1998), for both internal and external communication. The list of steps in Box 8 refers to an approach in which monitoring the risk communication process and empirical outcome evaluation after implementing/conducting the campaign is integrated into the overall programme.

In substantive terms, the socio-psychological literature on risk communication provides ample advice and guidance; this relates to the conceptualisation and content as well as to the implementation and execution of campaigns (e.g. Covello et al., 1989; Hance et al., 1990; Lundgren and McMakin, 1998; Powell and Leiss, 1998; Sadar and Shull, 1999). Main considerations are briefly listed in Box 9.

Even though establishing the information-behaviour chain is often the core task, successful risk communication most likely needs to be treated as an interactive process (Leiss, 1996; Renn, 1992; Slovic, 1996; Wiedemann and Schuetz, 2000). Consequently, accessibility of institutions, feedback opportunities, and interactive procedures are very important. Also, social trust is a fundamental factor which, once missing or lost, is not easily (re-)established; therefore, credibility issues should be taken very seriously. In the case of highly controversial problems, the use of mediators (Brown et al., 1998; Carnevale and Pruitt, 1992) can be beneficial.

Programmes aiming at enhancing risk awareness, reducing unsafe behaviours and improving disaster preparedness face many obstacles and barriers. It is instructive to look at the essential steps of the persuasion and attitude change process, as studied in social psychology (e.g. Eagley and Chaiken, 1993; McGuire, 1985; Oskamp and Schultz, 1998):

attention → comprehension → interpretation → confirmation → acceptance → retention (→ behaviour change).

Box 8: Steps Of A Risk Communication Program

- Hazard identification/specification
- Clarification of responsibilities within the organization
- Identification of exposed people, areas etc (according to various scenarios)
- Identification of relevant parties/'actors' (institutions or individuals) to be involved
- Analysis of information necessities/needs
- Explication and statement of the objectives of the RC program
- Critical assessment of available resources
- Selection of the target audience(s)
- Determination of the content of the RC
- Selection of communication means & channels
- Designing message format & layout
- Expert check of substantive correctness of information to be disseminated
- Pre-examination of comprehensibility and credibility
- Principal decision about conducting empirical evaluation research
- Survey and documentation of "before" situation

Implementing/conducting the RC campaign

- Monitoring the RC process and pertinent context factors
- Evaluation of effectiveness with respect to stated RC objectives
- Identification of implications for future risk management
- Revision of the RC program

Difficulties can be technical or socio-psychological in nature, ranging from information distribution and storage problems to lack of involvement and inertia. Many people's overconfidence in safety matters, unrealistic optimism and cognitive biases (Kahneman et al., 1982; McClure and Williams, 1996; Weinstein, 1989; Weinstein and Klein, 1996) add to the problem. In terms of the sender, proficient management of the risk communication process is essential. In Box 9, a conceptual framework for preconditions of and barriers to an effective information-behaviour link are outlined (taken from Rohrmann, 2000a). For each step of the core process (from receiving information to implementing an advised action or behaviour change) both internal and external preconditions must be favourable and barriers overcome to accomplish the respective communication objectives. (This model depicts an idealised process — however, it is not assumed that each step takes place in a linear fashion; rather, some steps might not occur at all, e.g. confirmation; or the message receiver might go back to previous steps, e.g. from retention to attention.) In the light of this complex process, assuming a straight 'conversion' of information into behaviour would be 'unrealistic optimism' on a meta level!

Such a model (as well as the one presented in Box 3) can be utilised to anticipate problems and counterbalance them by creating a favourable risk communication context.

Box 9: Core Suggestions For Designing Risk Information/Communication

Reflecting risk perception in RC design

- Ensure valid understanding of how people process and evaluate risk information
- Identify existing knowledge and pertinent 'mental models' of the hazard

Developing RC procedures & materials

- Define and explicate a program's objectives before designing campaigns and materials
- Focus risk communication on behaviour change (not just knowledge advancement)
- Check materials/advice for comprehensibility, credibility, feasibility, capacity to motivate
- Acknowledge apathy/inertia and information overload when suggesting activities
- Adapt materials to core characteristics of specified target groups (including ethnicity)

Implementing RC as interactive process

- Incorporate community groups and induce community-based activities
- Provide interactive communication and pathways for information requests & confirmation
- Strengthen personal involvement and responsibility

Strive to provide an optimal context for risk communication programs

- Take credibility problems very seriously
- Respect differing viewpoints and do not discredit opinions as 'unscientific' or 'emotional'
- Use neutral mediators/facilitators in case of serious conflicts

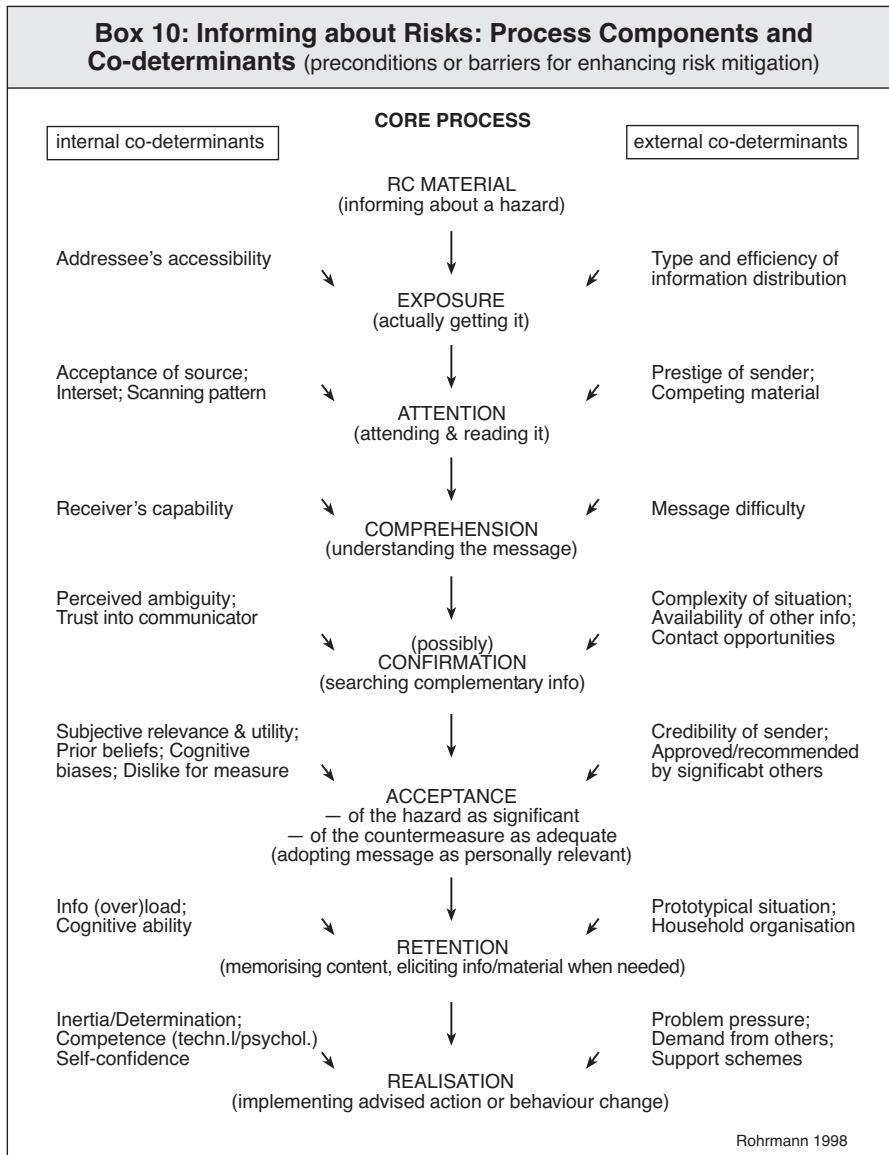
Finally, how risks are communicated has obvious implications for the health and well-being (and possibly even life) of risk-exposed people, and in some cases also has the potential to be harmful — thus ethical considerations (Johnson, 1999; Jungermann, 1996; Willis et al., 1997) may also be an issue in designing risk communication programmes.

The need for empirical evaluation of risk communication campaigns

Risk information/communication/education campaigns are dealing with important aims: human safety, health, and sometimes even survival may be at stake, as well as social relations in a community in case of disagreements about hazard evaluation and risk management. Consequently it is crucial that pertinent risk communication activities actually achieve their goals.

To provide evidence for this, empirical evaluation research is necessary. 'Evaluation' means the scientific assessment of the content, process and outcomes of an intervention and their appraisal according to defined criteria (Fink, 1995; Patton, 1997. See Rohrmann, 1992, 1998 or Weinstein et al., 1992 with respect to risk communication). Systematic empirical investigations are required in order to prove the effectiveness of risk communication — simple experience is not sufficient (in fact even theoretically sound risk communication efforts might not work in practice); see Box 11 for further considerations. In fact, evaluation research should be included in a campaign in advance.

To conclude — clearly effective risk communication is essential for best-possible risk mitigation and disaster preparedness, and two means seem to be especially



important to achieve this: using a sound conceptual framework, and incorporating empirical evaluation into a programme.

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**Box 11: Substantive and Methodological Reasons
for Evaluation Studies**

- It is a matter of responsibility to check whether risk information and hazard preparedness efforts are successful and sufficient.
- Evaluation results can demonstrate not only whether but also why a program works (or not) and thus guide the improvement of risk communication.
- Intuitive assessments of the program's effectiveness can easily fail because of wrong cause-effect attributions (spurious causality).
- Evaluation provides an empirical basis for a decision between alternate risk communication programs.
- As campaigns are laborious and usually rather expensive (in terms of costs, personnel and time), evaluation can help to justify the efforts.

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8

Practical Steps in Ensuring Good Risk Communication in a Regional Council

Terry J Day

On the West Coast of New Zealand, the community of Franz Josef is facing the reality of a rapidly aggrading river and the threat of a dam burst, which together are marginalising existing protection works, exposing residents and visitors to considerable risk, and for which a long-term solution is well beyond the financial resources of the community. Terry notes that theories of integrated risk management and methodologies for effective risk communications are useful tools for addressing these types of situation, but additional practical ingredients for success in dealing with real community situations are patience, persistence and personal commitment.

As a first step, any agency undertaking communication with a defined community must recognise the complex internal relationships, and the fact that these will evolve under hazard threats. In this case, the governmental framework is a similarly complex reality for the community with two local authorities owning aspects of the hazard issues and with several central government departments seeking involvement.

Terry describes the ‘hazard history’ of the community, and how local government has sought to manage the issues, using a range of tools including aspects of risk management and risk communication. He notes that the main communication issue now is keeping the community aware of the hazard threat, as civil defence procedures are improved, and as local government seeks funds for a long-term solution, and comments on the importance of personal relationships with communities when trying to reconcile different objectives and expectations. With the present lengthy negotiations to secure central government funding, keeping the community focussed, and local government efforts credible in their eyes, is a significant challenge.

An important aspect of the case-study reported in this chapter is that the purpose of communication is not at this stage to provide input into a decision process (since none of the primary stakeholders is in a position to make a decision), but to ensure information sharing, and to maintain awareness of the hazard and associated risks.

Introduction

A Local Government Perspective

Managing risks is daily business for local government. Certainly for small councils rarely do we have time or make time to think back through an issue to evaluate what we have done. Hence an opportunity to reflect upon and evaluate our risk communications efforts on one of our more significant issues relating to the hazards is welcomed.

The West Coast of New Zealand is a sparsely populated area of spectacular and dynamic landscapes. From a local government perspective rating bases are small and the issues as significant as elsewhere. Councils are marginally staffed and everyone has a range of tasks to perform. The reality that emerges is both good and bad. On one hand staff can be overworked and spread too thinly, and on the other hand we are compelled to work with and through others to a large degree, and as well, staff are more able to hand complex situations.

Franz Josef Community

The hazard situation used as an example is occurring at Franz Josef in South Westland. Franz Josef is one of the jewels in New Zealand's tourism crown. Each year hundreds of thousands of tourists pass through this community to enjoy its scenery. The community numbers are small with just a few hundred permanent residents.

Franz Josef has been built near the Alpine fault line that has formed a dramatic mountain scarp along the western edges of the Southern Alps. The township is located at the apex of the alluvial fan that the Waiho River is building as it exits the mountains.

Risk Assessment

Active river processes and flooding are a fact of life on the West Coast where rainfalls can be intense and where waterways are generally short and steep with large quantities of gravels to move. Some extraordinary events have occurred under these conditions.

The Regional Council works with the West Coast community to provide protection works. The Council manages this responsibility through rating district schemes that see those who benefit pay for their protection on either a differential or uniform basis. Approximately 20 such schemes are currently being managed. Being a small entity with a small rating base the Council is unable to provide general rates for these schemes. In fact the protected community, whether a group of farmers or a community such as Greymouth, must pay all of its direct costs of protection (capital construction, maintenance, insurance and administration).

Many of these protection schemes were developed in the days of central govern-

ment subsidies and now with only local monies to continue these schemes, some have had to be disestablished while others are maintained on a very limited basis. As the costs of scheme maintenance increase other regions of New Zealand are beginning to experience the realities long present on the West Coast.

The Waiho River is very active. The Franz Josef town site is to the north of where the Waiho River exits the mountains. Further developments are on the south side. Upstream of the town site is the Franz Josef Glacier, a very popular tourist site. During the height of the tourist season as many as one thousand visitors are present each day. For most New Zealanders the glacier and its environs are recognised as a national tourist icon.

At first we considered that the situation at Franz Josef was no different from other areas on the West Coast. Over the years various protection works had been constructed either for the community or by Transit New Zealand to protect State Highway 6, the vital transportation artery for the West Coast.

However, after the Council had to deliver a public hazard warning to the parties on the south side (due to the river aggrading its bed and hence marginalising the flood protection of the existing banks) a study was commissioned to:

- Provide the community with an overview of the behaviour of the Waiho River, first as a natural system and then as one influenced by human intervention.
- Identify, quantify and rank the natural hazards within the village and peripheral areas.
- Identify the standard of protection (structural and non-structural) from natural hazards (principally flood-induced) appropriate for the community.
- Assess the adequacy of existing protection and management to meet these standards.
- Identify some course of action that the community could choose from that would enable them to avoid or mitigate the identified hazards.
- Identify the possible consequences of taking any (or none) of these actions.

The resulting report was available in September 1998 (McSaveney and Davies, 1998). While the report also considered earthquake and dam-break risks, its conclusions for the Waiho River were startling in that they identified that the increasing aggradation near the Franz Josef Township was due to the existing river protection works. As the community sought to protect its assets on the Waiho alluvial fan the stopbanks constrained the river, and as it could no longer deposit its sediment load over the width of its natural fan, it did so in its active riverbed. This was a contentious view as it challenged conventional engineering thought and indicated that future protection could not come from simply more stopbanking (even if the community could afford to do so).

A cooperative river-surveying programme has been established between Transit New Zealand and the Regional Council. This programme provides information on

(1) the temporal variations of the riverbed and (2) the distribution and amounts of sediment moving onto the Waiho fan surface. These studies show that an enormous amount of sediment has yet to enter the Waiho riverbed near the township. Hence the threat is increasing.

Further opportunities for discussing this risk assessment have been taken. A particularly significant one was during an international gravel river conference in August 2000, where many of the top experts spent a day discussing the situation and commenting critically on the McSaveney and Davies report.

Risk Management

As the Councils seek a lasting solution to the river hazard at Franz Josef we are taking a number of practical steps to manage risk and to demonstrate to the community our resolve to protect them.

Managing Continued Economic Development

As our process continues the councils are faced with a community that has to continue to exist and we have to manage the resulting pressures within the context of a yet undefined long-term solution.

The Westland District Council has varied its District Plan to accommodate the flooding threat. The proposed Westland District Plan now has objectives, policies and rules relating to the hazard area. Anyone requesting a Land Information Memorandum is advised that the riverbed is aggrading and that a serious potential for flooding exists. Applicants are also given a copy of the McSaveney and Davies report.

The Westland District Council is continually reminding owners who wish to expand their businesses of the hazard implications.

The Regional Council's response to resource consents for river protection works on the Waiho River is consistent with our views on communicating the hazard. We pass each application to one of the authors of our report to ensure the request is situated within the appropriate context. We are tending to give short duration consents with appropriate monitoring and removal conditions.

Monitoring

The survey monitoring information provides an immediate context for decisions on hazard level and possible community activities, and as well providing a database for the modelling and engineering work we consider will be part of any lasting solution.

Civil Defence

The Westland District Council, with assistance from the Ministry for Emergency Management, has upgraded its civil defence capabilities at Franz Josef. As the

Waiho is a short, steep system, floods arise very quickly and there is little time to warn and evacuate residents and tourists. A well-experienced civil defence team is absolutely critical to prevent a tragedy.

In support the Regional Council has installed a flood warning system to supplement (not supersede) the existing human-based civil defence processes.

Risk Communications Methodology

Our Council understood the importance of the need to inform and to engage the community in finding the best solution. This is our role as local government managers and as technical professionals.

We were also driven by the realisation that a lasting solution was beyond the financial resources of either the Franz Josef community or the two councils (representing all ratepayers on the West Coast) and hence any approach to central government for financial assistance would require a consensus in the local community.

Risk Communications: Practical Realities and Solutions

Our first major risk communications challenge was to translate a highly complex report to the community that was busy managing their significant investments, while having regard to the differing roles of the two Councils, and having to integrate the interests of Transit New Zealand, the Ministry of Emergency Management and the Ministry for the Environment.

For our Council, risk communications means ensuring that the right information exists and is effectively transferred (that we have the most effective processes in place to do so), and that we are managing the expectations and concerns that arise in the community.

Translating the Report's Findings

The first stage in managing the content of the McSaveney and Davies report was to have it reviewed by staff of the two Councils and Transit New Zealand. This was done on a confidential basis to ensure that we ironed out concerns before the report was released. We wanted to prevent the disruptive impact of organisations squabbling over the report in public. The community has a right to expect that professionals can collectively and constructively work through their differences. As the report's findings on the cause of the aggradation were so contrary to the standard river engineering philosophy of West Coast engineers, it took an external peer review to settle discussions and to have the report's findings accepted.

Even in spite of this concerted effort we continue to have to address dissenting views. We have always shown extreme patience with these dissenting views and when these are expressed in public we respectfully listen then patiently rebuild our case.

The next stage was to release the report to a selected number of residents, picking those who were prominent in the rating districts that manage the existing river works. This was done first on a confidential basis, and then as we began to hear back from them, we allowed them to increase the circulation of the report.

In the various formal and informal meetings held with the community over the contents of the report we have been patient to listen to and consider their views of the hazard and how it should be managed. On several occasions we have brought our consultants back into the community to re-discuss issues. The cost of doing so has been significant, but as we might lose the support of the community if this is not done, then the cost is considered acceptable. We found it very important to have these sessions in public as it is easy for a dissenter to disrupt our work in the community because we are not there on any continuing basis.

The report was made available to the public and certainly any prospective property buyer who contacted either Council received the report (but staff were directed not to talk about how the report might impact on property under sale). Interestingly enough several properties and leases on the south side changed hands after the report was released.

Managing the Inter-Council Relationship with the Community

We had to carefully manage the relationship between our Regional Council and the Westland District Council. We have split our respective roles with the Regional Council being responsible for hazard identification and warning, and the Westland District Council being responsible for hazard management.

Both Councils realised the importance of a combined and sustained approach. Consequently we formed a Joint Committee under the Local Government Act to ensure that the issue obtained critical political support and that it worked with the community through a public process. The subsequent Waiho Hazard Management Committee was composed of two councillors from each council and several residents elected in a public meeting. A Westland District Councillor chaired it as the Committee's focus is on hazard management. Staff from both councils provide support to the committee. The Department of Conservation was also involved due to its significant investment and responsibilities in the area. Our Council used the Committee as its primary communications vehicle with the community.

As a risk communications vehicle this approach has certain strengths and weaknesses. Certainly one of its strengths is that it is an open process where meetings have to be advertised, proper procedures followed and minutes kept. It also engages local politicians whose support is necessary in any search for funding. On the down side our expectations that the local representatives would interact with others in the community was not fully realised. Everyone is seen to have a vested interest and it is difficult for him or her to be separated from any recommendation made by the Joint Committee. Also the local representatives are not as conditioned as staff and councillors in handling diverse and sometimes extreme

views. Even engaging councillors is challenging due to the complex nature of the hazard and of the very public way we sought to manage communications. However one of our Regional Councillors who was committed actually went through the community on an individual basis to gain input.

In communicating its efforts the Committee had to be conscious of the 'structure' of the Franz Josef community. There are a number of ways to stratify this small community, for example: there are those who live and work there and those who own from outside; there are long-term and others who are short-term residents (a high transient workforce exists to service the tourist trade); and there are those who live on the north side of the Waiho River and those who live on the south side. As discussions about the best option to solve the river threat developed, negative feelings between the north and south sides increased. We attempted to deal with this diversity through public presentations on the report and through the Committee that represented the range of views in the community.

Whenever we discussed the issue we were certain to remain consistent with the report's findings and to listen carefully to comments received. We, along with our consultants, also had to deal with some very individual agendas.

Managing Relationships with Central Government Departments

Transit New Zealand has a prominent position on the West Coast because we are so dependent upon their transportation decisions. At Franz Josef, Transit New Zealand is recognised as a good citizen who has come to the aid of the community during flood events.

Transit New Zealand is obviously committed to maintaining State Highway 6 with stopbanks along the south side of the Waiho River. It wants to maintain this protection. Even a few days of closure of this main transportation route have been shown to have a significant impact on regional economic activities.

Keeping Transit New Zealand involved is of utmost importance to our process for managing the Waiho hazard. Having them alongside the councils and the community is very much part of our communications strategy.

Transit New Zealand has been engaged in our process from the initial report review stage. They attend the public meetings and have participated in a subsequent study costing the options for managing the river threat. They have indicated a willingness to contribute to a 'final' option but only as far as their responsibilities take them. They will not be a cash cow to help the community out of its dilemma and this is a perfectly reasonable decision. Hence one of the risk communications objectives is to ensure that the community is aware of Transit's responsibilities and commitments.

As we promoted this community's issue to central government (done primarily through our local Member of Parliament) both the Ministry for the Environment

(through their past involvements in river schemes) and the Ministry for Emergency Management (for their risk management responsibilities) sought to become involved. Such involvements presented certain challenges to our efforts to manage the risk communications process. On one hand we had to ensure they were fully aware of the background and status of our efforts, and not inadvertently comprise our efforts, and on the other we had a community that could have adverse reactions to a flying visit of 'Wellington suits'.

Overall they handled their involvement professionally, making certain they were properly briefed and that they knew who to talk to in the community. Their findings were dutifully reported back to the Councils and helped in particular to spur on planning actions by the Westland District Council. Both departments are still engaged with our Councils in finding a solution. The continuing commitment of the staff of these two organisations has proved extremely helpful.

Managing Expectations on Central Government Discussions

Small communities hear and know everything. As we worked through our Member of Parliament to gain support from central government the community's concerns and expectations became acute.

Our Council was invited by the Ministry for the Environment to approach the community to determine their ability to contribute to a solution (that was identified in the \$14-22 million range). This discussion took place around the concept of a single-rating district for Franz Josef and its environs. The appropriate public meetings took place; however the process became stuck on the reality that without knowing exactly what they were to contribute to, the community declined to commit. Also, even though the river-related threats exist (in somewhat different forms) for both north and south side residents, many on the north side sought to distance themselves from any solution. A petition was made to our Council to this effect. Hence as the reality of costs struck home we have to deal with a further partitioning in the community.

These meetings occurred in the spring of 2000 and now two years later, we still are without a commitment from central government to assist the community. As the current government deals with the changes to the civil defence and emergency management legislation, the associated organisational changes, and the yet-to-be made decisions on their Disaster Recovery Plan, our inquiries are continuing to be unsuccessful.

We have remained committed to this quest, however, and are now renewing our approaches to central government with the Ministry for the Environment's critical support. In the meantime we have to deal with the community's expectations that central government relief is possible, an expectation that we raised in the community. All we can do is continually tell the community that while central government has not said yes, they have not said no. We can only continue to try while ensuring the community maintains its awareness of the river hazard.

Managing Community 'Continuing-Use' Interests

As our process continues, the Councils are faced with a range of interests that have to be managed within the context of a yet undefined long-term solution. How we react to continual economic development pressures is very much part of the messaging we have to make to and on behalf of the community.

The last thing we seek is to allow any action that undoes the progress we have made. Decisions Councils must now make with regards to further river protection and building have to either lessen, or at least not aggravate, the present threats. Certainly they cannot prevent a further option.

The practical steps we are taking to manage this aspect are outlined in the section on Risk Management.

Managing the Media

We never had an explicit communication plan, but we ensured that the local media were informed of our Committee meetings, that all reports were copied to them, and that Councillors were available for interviews.

Evaluation

Against Methodology

If we consider an integrated risk management framework (management, assessment and communications are continually linked and modified) then the Councils have, and are continuing to assess the risk, to place management actions in place and to consult with the community. With the various elements of integrated risk management distributed amongst local and central governments, then overall it is believed we have kept it together well.

Whatever success we are having is directly attributable to individuals in the Franz Josef community, in our Councils (staff and councillors), in the Ministry for the Environment (in particular) and the Ministry of Emergency Management, most of whom have made a personal commitment to protecting the community and working towards a lasting solution. There is a similar level of commitment from staff at the Institute of Geological and Nuclear Sciences and from Lincoln University. Their professional commitment has been exemplary.

We have been at this issue for three years now. If there was criticism of our efforts, it would be on timeframes. Some of the steps taken have been slow in coming, and this is mostly due to the reality of small Councils with very limited resources.

External Assessment

We are fortunate that two 'community response' studies have been undertaken. The first one was sponsored by the Institute of Geological & Nuclear Sciences and

took place in 1999 after the hazard report was released (Gough, Johnston and McSaveney, 1999). The second report followed the establishment of the local hazards committee and public consultations on the possible options for managing the river (Gough, 2001). Our Council sponsored the second report.

The key communications observations in the first report were:

- There was a general awareness of the likelihood of a flood and an understanding of the consequences (although this was not so true on the south side);
- Sense of complacency on evacuation procedures;
- General concern for the tourists exposed in the south side accommodations;
- Community wanted a task group formed;
- Recognition that this was a national issue;
- Expectation that the community would be consulted on future options; and
- Concern that the community would opt for a cheap short term option (as many business owners are there for a relatively short time to make money and leave).

The key communications observations in the second report, remembering that this report was commissioned after the Waiho Committee was active, were as follows.

Improvements

- Increased awareness of the hazard reports and the implications of these risks;
- Residents taking precautions in case of an emergency (supplementary power, staff training, food reserves); and
- Considerable support for the Regional Council and a reasonable understanding of the relative roles of the two councils.

Concerns

- Continued concerns for information flow for those businesses that are leased and to residents who rent;
- General need for more information through the mail;
- Council prepared information targeted for employees is required;
- A split between the north and south side residents;
- Increased economic activity has led to a concern that people will ignore the warnings; and
- General uncertainty about the current status of Civil Defence.

These reports show that while improvements in understanding the risks have occurred, certain areas require more careful attention, and most importantly the

Councils need to keep their risk communications active.

Summary

Effective risk communication requires good process and commitment. The efforts of science organisations and local and central governments to address the significant hazards at Franz Josef on the West Coast are generally consistent with good practice for integrated risk management and for risk communications. But the key to our success has been the commitment of individuals in these organisations and in the community itself.

The critical task of keeping track of and integrating the various organisational inputs has been relatively easy due to the professionalism of all concerned.

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Communication and Consultation — Some Observations on the ERMA New Zealand Experience

Karen Cronin

This chapter addresses the issue of communicating about issues and activities that have a risk component, within a regulatory framework.

In this second paper, Karen describes how the Environmental Risk Management Authority has sought to meet its obligations to communicate and interact with stakeholders, within the statutory provisions set down in the Hazardous Substances and New Organisms (HSNO) Act 1996. The Authority manages the introduction of new organisms, including genetically modified organisms, and of hazardous substances to New Zealand.

A report published in 2000 by the Centre for Impact Assessment, Research and Training at Otago University reviewed and analysed ERMA's approach. While the CIART report was positive about some aspects, it also criticised other areas and suggested ways that ERMA might improve its approach. Karen notes that options for consultation are limited by the requirements of the HSNO Act but that ERMA had gone beyond the statutory requirements in several respects.

Responding to the report, and reflecting the experience gained in its first years of operation, ERMA has since made a number of changes in the way public opinion is sought and incorporated in the decision process. Karen concludes by raising a series of fundamental questions for public agencies when developing communication programmes, including the need for proactive approaches to engaging stakeholders, the incorporation of social responses into decision-making and the role of risk communication in the risk management process.

The Environmental Risk Management Authority

The Environmental Risk Management Authority was established under the Hazardous Substances and New Organisms (HSNO) Act 1996. ERMA controls the introduction of new plants and animals, including genetically modified organisms (GMOs), and new and existing hazardous substances to New Zealand.

The Authority is a semi-judicial decision-making body with up to 8 members appointed by the Minister for the Environment (currently the Hon. Marian Hobbs). It is supported by a professional staff of around 50, known as ERMA New Zealand.

Nga Kaihautu Tikanga Taiao is an advisory committee appointed by the Authority under the HSNO Act. Nga Kaihautu helps the Authority with information on:

- taking account of the principles of the Treaty of Waitangi;
- how Maori approach risk and risk aversion;
- specific risks of concern to Maori;
- appropriate consultation with Maori where risks are identified;
- the extent to which applications satisfactorily address Maori perspectives; and
- other advice on tikanga Maori as required.

Nga Kaihautu has a direct relationship with the Authority rather than applicants. The chairperson takes part in governance meetings of the Authority. It may have up to 6 members and can co-opt more people with specific expertise if needed for particular issues. The committee does not represent specific iwi or hapu.

The purpose of the Authority is to protect the environment and the health and safety of people and communities by preventing or managing the adverse effects of hazardous substances and new organisms. The functions of the Authority include:

- Making decisions on applications under Part V of the Hazardous Substances and New Organisms (HSNO) Act, by evaluating risks, costs and benefits and placing conditions on approvals; and making decisions on transitional licenses and other approvals;
- Transferring existing approvals to the HSNO Act;
- Monitoring and coordinating compliance with the Act and Authority decisions;
- Promoting public awareness of the risks of hazardous substances and new organisms;
- Advising the Minister for the Environment on the effectiveness of the Act and other matters; and
- Inquiring into accidents or emergencies.

The Authority's main role is to make decisions on applications to import, develop, or field test new organisms; or to import or manufacture hazardous substances. These applications are made under Part V of the Act. Decisions by the Authority are final and cannot be appealed – unlike under other environmental legislation.

However, a decision by the Authority can be challenged on a point of law. To date there has only been one appeal on an Authority decision.

There is provision for the Minister for the Environment to 'call in' an application but, having done so, he or she must consider it under the same criteria applying to the Authority.

Hazardous substance and new organism applications

A hazardous substance is any substance that may be explosive, flammable, able to oxidise, corrosive, toxic or eco-toxic. Anyone who uses or is involved with hazardous substances needs good information on their potential risks and how to use them safely. The HSNO Act provides a platform for completely assessing a hazardous substance so that it can be managed appropriately throughout its lifecycle. The Act commenced for hazardous substances on 2 July 2001. Every new hazardous substance imported or manufactured in New Zealand after that date requires an approval from the Authority.

A 'new organism' is a new species coming into New Zealand for the first time. If it was not here before the Act came into effect on 29 July 1998, it has to be approved by the Authority. A new organism could be a breed of fish for marine farming, a zoo animal, a packet of seeds, a flower plant, a new micro-organism, or a genetically modified organism.

A GMO is any organism in which the genes have been modified by using in vitro (recombinant DNA) techniques, for example GM potatoes or pine trees modified to resist disease or improve their growth rate.

Since commencement in 1998, the Authority has received 267 applications, of which 5 have been declined, 189 approved with controls, and 24 approved without controls (the remainder were withdrawn).

Communication and consultation

To 'consult' means: "to have deliberations with someone, to seek information or advice from a person or to take their feelings and interests into consideration" (Concise Oxford Dictionary). Consultation is a two-way process which provides information and an opportunity to comment. It provides for external contributions to decision-making, from a range of sources.

A distinction can be made between 'consultation' and 'communication' or 'public awareness' programmes. Communication, including public relations, involves giving targeted information to selected audiences, to highlight key messages from an organisation with the aim of positioning it effectively with external publics. Public awareness programmes are aimed at educating the public or specified groups about certain issues or practices, to increase knowledge, understanding or to alter attitudes and behaviour.

‘Risk Communication’ uses a full range of approaches from information to communication, awareness raising, and consultation.

General communication activities

As a small agency, ERMA NZ has only limited resources for communications work and undertakes the following:

- ERMA NZ official website;
- an educational website on Hazardous Substances and New Organisms developed with the Ministry for the Environment;
- quarterly newsletter *Perspective*;
- Annual conference;
- seminars and workshops on current policy issues;
- an industry consultative group meeting 3-4 times a year for industry/scientists involved with HS or NO;
- an NGO consultative group meeting 3-4 times a year and/or written update;
- a public speaking programme – giving talks on request and to specified sectors on key topics;
- targeted educational material for key groups e.g. small and medium enterprises using HS, and Maori;
- regional meetings/site visits to industry or community groups;
- a wide range of publications including: policy documents, protocols for guiding decision-making, quick guides to ERMA NZ operations, information sheets on key issues;
- displays;
- videos/community education kits;
- participation in wider government education programmes, e.g. on biosecurity awareness or on GM issues; and
- media liaison – general news, feature stories, etc.

Communication and consultation requirements under the HSNO Act

Under the Act, the Authority has a range of functions that will require communication and consultation at some point. Some of these functions, particularly making decisions under Part V, have specified processes for public input. Other functions, such as developing policy to provide advice to the Minister, may benefit from consultation, but this is done as a matter of general practice, rather than through specified provisions.

The Authority has therefore developed two consultation policies:

- ERMA New Zealand Policy on Consultation (November 1998); and

- Policy on Consultation and Interaction under Part V of the HSNO Act 1996, published in April 1999 (recently updated but not yet republished).

The first policy covers general consultation by ERMA NZ on matters other than those under Part V of the HSNO Act.

Consultation has been an important part of the work of the Authority since its establishment in 1996. For example, under the Act the Authority was required to develop a methodology – a set of guidelines to be used when considering new organism or hazardous substance applications. Interestingly – and perhaps uniquely in New Zealand law – the methodology itself was then formalised into statute by way of an Order in Council. The Act required the Authority to prepare a draft methodology, consult with the public about it, and report public submissions to the government which then approved the final document and drafted it into law. This provided an interesting political ‘balance’: the government had delegated decision power to an independent Authority, but ensured that the way the issues were weighed up and judged was constrained by a decision-making methodology it approved.

Consultation on the methodology took place in a tight time frame over two months in late 1997. The Authority had been in place less than a year and the new managers and staff were only just being appointed. This programme involved seven public meetings and seven hui in regions around New Zealand and a call for written submissions. The regional visits served to put ERMA on the map and provided the basis for later consultation with local communities.

ERMA also sought input on other policy, notably the development of a set of ‘Protocols’ that elaborated on the Authority’s thinking and approach to decision-making. These documents provided more detail than could be written into the formal Methodology Order in Council (1998) but did not have the same legal standing.

The Authority has also consulted on the design of the application process (the administrative and operational apparatus for making decisions on applications); on its proposed fees and charges; a proposed enforcement and compliance regime; and on how it might deal with issues of significance to Maori.

The general consultation policy (1998) set out how the Authority intended to run such consultation programmes. It recognized two objectives:

- To enable accurate, quality information to be provided to the Authority for achieving its functions under the HSNO Act; and
- To ensure that all organizations and individuals with an interest or a stake in the work of ERMA NZ have an opportunity to interact, present their views and be informed.

The aim was to conduct consultation in a way that enhanced ERMA New Zealand’s “operation and its reputation”. A number of standards for good performance were

set out: who might be consulted, how information would be made public, how submissions might be made, and feedback on the final result. It also outlined approaches to Maori consultation, requiring input from Nga Kaihautu Tikanga Taiao on specific consultation programmes.

When it came to public participation on new organism and hazardous substance applications, a different approach was seen as necessary. ERMA NZ argued that this was not consultation in the general sense, or even in the sense set by precedent under other law. The HSNO Act itself set out specific procedures and these were seen as primary.

The policy on Part V applications uses the term ‘interaction’ to limit any generic expectations on consultation, and makes it clear how far public views will be allowed to influence the decision-making power of the Authority:

“In the context of Part V decision-making, the basic reason for consulting and interacting with stakeholders is to contribute to high quality information and informed decision-making” (Policy on Consultation and Interaction under Part V of the HSNO Act 1996, April 1999 p.5)

Referring to a model of different levels of influence on public agency decision makers, the Authority made it clear that it would operate under an approach of ‘limited influence’:

“...in the process other information is sought or received. While external views are taken into account, the final decision is still made by the public authority. It is communicated to all parties, showing how their comments were considered and how the outcome was reached.” (op cit p.5)

Citing its formal decision-making role under HSNO, the Authority described itself as:

“a quasi-judicial body, with powers similar to those of court judges. The opportunities for external comment are formally set down in the Act, including procedures for notified and non-notified applications. The Authority follows a prescribed statutory process of publicly notifying relevant applications, receiving submissions, and holding hearings. Decisions are made on the basis of the Act and the Methodology.” (op cit p.7)

This strictly legal approach was seen as important to limit the extent to which ‘public opinion’ would have an effect on HSNO decisions. The Authority was committed to rational decision-making, seeking submissions that provided ‘accurate’ and ‘quality’ information, with a strong reliance on scientific fact rather than values or opinion.

Experience since that document was first published raises a number of issues,

about the approach taken to decision-making by public agencies generally, and also about the basis of rational risk assessment.

Public input to the application process

The ERMA consultation policy provides for a mix of statutory (*) and non statutory steps, and (for notified applications) follows an operational time line, as follows:

Pre Application

- General information on ERMA, news and issues — ‘Perspective’ newsletter;
- General updates on applications in progress — consultative group meetings;
- Local Maori and other community consultation by applicant;
- Formal lodging of application*; and
- Verification of application by ERMA NZ staff.

Consultation

- Advice to Minister (opportunity to call in)*;
- Statutory notification to key agencies, e.g. DoC, regional councils*;
- Entry in formal Public Register*;
- Information on ERMA NZ website;
- Public notice in major daily papers and opening of submission period*;
- Media release for significant applications/ongoing media liaison;
- Bulletin (gazette of applications and decisions issued 9-10 times per year);
- Letter to those on application interest list;
- Statutory consultation with specified government agencies*;
- Distribution of executive summary/full application documents;
- Close of submissions (Note: any person can make a submission)*;
- Submissions analysis and report;
- Additional expert evaluation if required by ERMA;
- Nga Kaihautu evaluation and independent report; and
- ERMA NZ staff evaluation and review report.

Pre Hearing

- Pre-hearing meetings (with applicant/submitters on technical issues); and
- Announcement of hearing (Note: any submitter can call for a hearing)*.

Hearing

- Presentation of oral submissions to a committee of the Authority*.

Post Hearing

- Formal consideration period and writing of Decision;
- Public issue of Decision — formal notification to parties and to general public*; and
- Register/website information and media release.

Criticisms of the ERMA approach

In June 2000, researchers at the Centre for Impact Assessment, Research and Training, University of Otago, published an evaluation of the ERMA approval process, titled *Public Involvement, Risk and Genetically Modified Organisms* (Morgan, R K and Archibald, B, 2000).

The report looked at the kinds of risks and effects being taken into account by ERMA and the way the Authority was going about public participation. It focused on GMO applications, which were the main business of the Authority at that date. Biotechnology had begun to attract increasing social comment and concern, internationally and in New Zealand:

“vigorous discussion of genetic engineering in the popular media, rallies and protests opposing genetic engineering, heated public meetings and lectures, and even the destruction of GMO sites [were all] symptoms of a broadly based concern about the technology and its implications for society.” (op cit page.1)

The researchers felt that given the level of public anxiety and the degree of polarisation it was important that any regulatory processes should involve the public and that, after two years of operation, it was timely to evaluate the ERMA process. This was seen as important to:

“minimise the danger of longer term damage to public trust and confidence in the approval process” (ibid).

Commenting on the difficulties of involving the public in consultation generally, the authors noted that this is exacerbated when dealing with complex scientific or technological activities, especially those with “potentially severe but vaguely defined risks”. They noted that:

“regulatory authorities dealing with the approval of potentially high risk activities have to deal with these challenges and involve the public in an effective way, if concerns are to be allayed and proposed activities are to receive the sanction of local communities.” (page 2).

This is quite an important comment, in that it reflects a view that public sanction is a pre-requisite when dealing with highly risky technologies. It also throws into relief the underlying tensions in the ERMA situation – the relationship between

scientific information as advocated by ERMA itself, and the expectations of others for a wider and more socially responsive process.

The researchers commented that ERMA New Zealand was taking public involvement “very seriously” and were positive about a number of aspects of the current approach:

- The HSNO Act (1996) provides considerable opportunity for public input in the decision-making process. When the Act was passed the then Minister for the Environment, Hon. Simon Upton, commented that it provided a process to assess and control new organisms “in as transparent and publicly accessible way as can be practicably achieved.” (cited at page 1). ERMA NZ facilitates public input through opportunities to make written submissions and the right to call for and attend public hearings (page 11).
- The Authority had publicly outlined its approach to consultation in the 1999 policy document.
- ERMA New Zealand encouraged applicants to consult stakeholder groups and at an early stage in the process before formal applications were made. And specific consideration was given to Maori concerns, including guidelines prepared for applicants (page 11).
- In addition to the statutory provisions, ERMA New Zealand had developed other mechanisms such as providing an executive summary of applications, posting information on the website, through publications, and public awareness activities such as seminars on GM issues. (page.12).

However, they also raised a number of criticisms (pp.12-16):

- There was no requirement on applicants to consult with interested parties before public submissions were called for. Applicants were required to identify all possible effects on the ‘environment’, but this was not being extended to the community as part of the definition of the environment (see page 23). The public was therefore not being told about proposals or used as a source of information on social effects.
- The focus on early consultation, where it was required, was mainly for the purpose of generating information for the applicant to put in the application and thereafter for the decision makers, i.e. consultation was undertaken for that end use only.
- ERMA NZ itself did not consult with the general public in the risk identification or assessment phase.
- There was a focus on specific technical issues related to the application at hand, rather than dealing with general concerns. In this context, peoples’ cultural and spiritual beliefs were not being taken into account, although there was provision for this under the objectives of the Act.
- Spiritual concerns of Maori were given consideration, but non-Maori spiritual and cultural views appeared to have received less attention.
- Even so, the effectiveness of consultation by applicants with local Maori was questioned (including by the Authority’s own Maori advisory committee). And

the quality of responses by local Maori might be limited by the lack of a national philosophical framework, based on tikanga, and developed by Maori generally.

- The process of notification, relying on public notices in newspapers, was seen as inadequate. Other methods (e.g. advertising on local radio, community flyers, local meetings and displays) should also be considered.
- Within the operational process, submitters found it hard to prepare submissions as the lay public were not generally aware of what information would be seen as relevant. People (at that time) were generally not aware of the HSNO Act and the ERMA approval process.
- Hearings (at that time) had all been held in Wellington, making it difficult for some people to attend.
- The process of the hearings was seen as too formal and legalistic, inhibiting an exchange between submitters and the Authority, and between submitters and the applicant. More informal opportunities should be created for stakeholders to negotiate or receive feedback from others.
- There was a major problem with the type of information regarded by ERMA as relevant i.e. “unless submitters’ arguments have a valid scientific basis they might not be considered”. Under those circumstances, the biophysical aspects of the proposal might be given more attention than the health and well-being of people and communities.
- Even within the technical information, there was an expectation that empirical support for arguments was required before theoretical or hypothetical processes might be given any weight.
- The approach taken to effects (technical/biophysical) limited the ability of the Authority to identify the full range of social and community effects of a proposal. This meant that the views of communities living near a field test, for example, might be overlooked in the assessment process.
- The focus, by ERMA, on issues related only to the application at hand, left submitters with no place to air their concerns about wider aspects of biotechnology and the kind of social and economic options that the community preferred for the future.

The researchers set out a set of general principles for effective public participation (see pp 5-6):

- Early involvement of the public, so that concerns can be addressed before they lead to antagonism.
- Development of an atmosphere of mutual trust and respect.
- A decision-making process that recognises the contribution of local people, involves them in a meaningful way; and that is not technocratic and elitist.
- Recognising different groups in the community and involving them in an appropriate way.
- Recognising social and cultural concerns and giving them due consideration along with technical, ecological and economic variables.

- Participation procedures that allow the public to know how they might be affected and how they can take part.
- Effective communication of information about the risks involved to lay people, using a range of media, so that people can understand and take part.

They were critical of ERMA's view that the purpose of consultation was primarily to provide information to decision-makers; and that this information was being focused on scientific and technical variables, rather than other contributions:

"This view ignores the wider benefits of public involvement, such as legitimizing the activity in the eyes of the local community, promoting accountability in the decision-making process, and simply informing local people." (page 23).

Moreover, the framing of the risks – and how significant they might be – was left to applicants and the Authority. There was no opportunity for the public to have a say at the early stages of risk identification by the applicant, in helping to decide if a risk existed or was significant. At the point when ERMA New Zealand staff evaluated the application, there was no evidence that the involvement of the public by the applicant was reviewed. There was also no opportunity for public input in the decision-making phase to decide if the proposal constituted a low or high risk.

The researchers went on to suggest that decision-making might be opened up to the public, for example through the use of citizen juries and other methods. Given that ERMA practised 'limited influence' decision-making, and was not representative of the public, the authors argued for alternative models which would:

"allow for a community perspective to be brought into the heart of the decision-making." (pp. 25-26).

They concluded that the approach ERMA was using, particularly as laid out under the Methodology, was 'technocratic', and more so than other regimes (e.g. as used by local authorities under the Resource Management Act):

"ERMA has adopted an explicit risk assessment/risk management approach to its operations despite the fact that the HSNO Act lacks any formal requirement for such an approach".

This is quite a provocative conclusion since it begs the question of whether risk management is inherently technocratic or if it is simply being interpreted in a narrow technical fashion.

Recent changes

ERMA New Zealand and the Authority have made a number of changes to its procedures since the publication of the CIART report, two years ago. The Authority examined the report in detail and noted the ideas about what more could be

done in the Part V process. However, it restated that the process is a semi-judicial one, set down under a set of statutory criteria and that several of the suggestions made by the authors were therefore not appropriate under its statutory role. The Authority nevertheless went on to approve a range of additional measures for public input, at different points in the process, including:

Notification period:

- Actively identify and notify all key local stakeholders, e.g. neighbours;
- Local public meetings/seminar to explain proposal;
- Greater local media exposure and advertising;
- Displays and information in local libraries, council offices;
- Providing simply worded explanations of the proposal (not just relying on the Executive Summary provided by the applicant); and
- Giving submitters help to write submissions (e.g. in a workshop).

Evaluation and review period:

- Hold pre-hearing technical information meetings;
- Hold pre-hearing facilitation/negotiation;
- Conduct research to measure perceptions of risk;
- Provide other external input to the risk evaluation, e.g. citizens panel or experts group;
- Evaluate how well the applicant has involved the public; and
- Site visits for the media.

Hearing:

- Site visit prior to or during the hearing for all parties and the media; and
- Less formal procedures, e.g. more interaction between applicant and submitters.

Post Decision:

- Notify all key stakeholders (not just the formal parties to the submission); and
- If approved, consult locally as part of ongoing monitoring.

This policy was approved as a “menu of possible options that can be considered where appropriate” (ERMA New Zealand , 2001). In addition, ERMA New Zealand has commissioned two operational reviews: one on the process used for generating, analysing and reporting on public submissions; and another on the process used for publicly notifying applications and decisions. These reports have led to further innovations and improvements in the operational process. Finally, the Authority has issued two guidance documents that provide further direction for public involvement in risk management under the Act.

About the same time as the Otago researchers were doing their work, ERMA New

Zealand prepared and published a technical guide to identifying risks for applications under the HSNO Act. This guide sets out a recommended approach to identifying risk which includes socio-economic sources of risk and social/cultural areas of risk effect.

Following the approach defined in the Australia/New Zealand Standard for Risk Management (AS/NZS: 4360 Risk management), it emphasised the social dimension in scoping out the context of the risks, and in the identification and assessment phases. In suggesting techniques for risk identification, the guide makes note of options such as brainstorming and the Delphi technique although it does not refer to any specific mechanisms for public consultation or community input.

A further technical guide, *Taking Account of Cultural, Ethical and Community Issues*, was developed in consultation with the Royal Society, MAF and the Health Research Council, and published in August 2000. It was aimed at researchers who might be involved with GMO applications that raised ethical concerns e.g. using human genes. It leaned heavily on process matters, with reference to existing guidelines (e.g. the Animal Welfare Act). It covered issues such as informed consent, disclosure of the source of human genetic material, and the use of Maori experts in decision-making when cultural issues were significant. It noted that community concerns might also arise about the end use of a GMO, and genetic modifications involving transgenes or native flora and fauna:

“If work is to be carried out in these areas, then this should be made clear to the community and opportunities provided for the public to ask questions and have concerns addressed” (page 10).

However it provided no specific methods or requirements for public input.

Some observations

The HSNO Act was passed in 1996 at a time when no one could have predicted the speed and complexity of technical change that society would face in future years. The developments in biotechnology have been significant, with the emergence of new methods of genetic modification and the convergence of technologies (such as nutraceuticals) which have surpassed even the most vivid imagination of a legislator in the mid 1990s.

Genetic engineering is a multinational business which has raised substantial public debate in countries all around the world. While the New Zealand legislation was innovative in its time, to some extent the technology itself has outstripped the capacity of our regulatory and political processes to deal with it.

Criticisms have been made of ERMA New Zealand — by researchers such as Richard Morgan and Bronwyn Archibald — and indeed by participants in the process including the applicants and the submitters.

The ERMA New Zealand experience illustrates a number of issues for public agencies,

and for those of us who are interested in best practice in risk management and risk communication.

A series of questions relating to communication and consultation arise from this background.

On communication and consultation:

- What place should communication play in the risk management process?
- To what extent should it be one-way communication or a two-way process designed to facilitate external input?
- How far should we go with consultation? How much influence should various stakeholders have in risk identification and assessment – and in risk decision making?
- To what extent can risk communication help us to identify social and community risks, which may not be picked up by other methods?
- Is public concern about technology simply a perception or is it also a social effect?

On risk identification and assessment:

- How can we evaluate social, cultural and ethical concerns, alongside other technical or biophysical risk information?
- Is consultation simply a method of supplying information and risk data – or is it meant to be part of the risk management process itself?
- Can regulatory decision-making about risk operate alongside other methods of assessment and evaluation?

On risk decision making:

- To what extent should risk decision-makers be responding to public opinion?
- For some forms of technological risk, should regulatory decision making be replaced with other models of evaluation and decision making?
- Is risk management inherently a technical process or does it provide the basis for us to work within a social context and deal with issues that are thrown up through communication and consultation with the public?

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The concept of ‘risk appetite’, or willingness to accept risk, is intrinsic to all decision-making, but is seldom expressed explicitly. This can lead to different parts of organisations having different attitudes towards risk, leading to inconsistent decisions. Good internal risk communication processes, as part of an organisation’s risk management programme, can provide a mechanism to enhance transparency and consistency.

In this chapter, Adrian describes a project that analysed the risk appetite of different managers within Treasury. The process assessed the risk appetite of a selected group of individual managers at different levels in the organisation, by asking them to rate their perception of the organisation’s preferred risk appetite (based on a balancing of risk and reward) against a number of dimensions relating to core activities of the organisation. The result of this exercise demonstrated the differences between expectations of different levels of management, and of different groups within Treasury.

While the project stopped short of implementing a risk communication programme, it clearly highlighted the importance of ensuring that all levels and groups within an organisation have the same understanding of the policies and attitudes relating to risk (which may vary according to different activities undertaken). This often requires that these policies be established at the top level and communicated down through the organisation.

Adrian concludes by describing the benefits gained by undertaking the exercise, including a greater awareness of issues relating to risk appetite and risk management in general, and an understanding of the importance of balancing risk and opportunity.

This chapter is important to the context of the book for two reasons: firstly because it addresses the issue of communicating risk internally within an organisation, and secondly because it highlights the importance of decision-maker and stakeholder attitudes towards risk, or risk appetite.

Introduction

This project originated when the Secretary to the Treasury wanted to compare risks that people believe they are encouraged to take, with how much risk Treasury actually takes. A short internal exercise was commissioned, that involved all managers as respondents. All members of the Treasury were given unrestricted access to the results.

This paper outlines the process by which Treasury's risk appetite was laid open for debate: how dimensions against which to gauge risk appetite were developed, the rationale underlying the process, the results, and some lessons learnt.

Background

A risk assessment programme updated the Treasury risk profile. To give the assessment some context, it was important to compare senior management risk appetite on key dimensions with (a) perceptions of senior management risk appetite and (b) the actual exposure for each dimension. A simple, visual comparison offered the best way to get a better understanding of the trade-off between risk and reward, and a better alignment of expectations with practice.

The process steps were very simple:

- Design a questionnaire.
- Verify the questionnaire by the senior management group.
- Have selected respondents complete the questionnaire anonymously.
- Compile aggregated results.
- Facilitate a discussion within respondent groups to compare senior management ratings with the ratings of other individuals or groups to highlight any large gaps.
- Highlight gaps, discovering why each gap occurred.
- Use established planning processes to better align expectations, perceptions and actual exposures.

Indicators and Performance measures

Figure 1 is a simple flow chart that shows how Treasury works. This chart was used to identify the fourteen most important dimensions of risk to Treasury, and to locate those dimensions in four groups relative to the model:

Input/Infrastructure (some dimensions occur in both groups)

- Information management
- Technology
- Intellectual capital
- Human capital

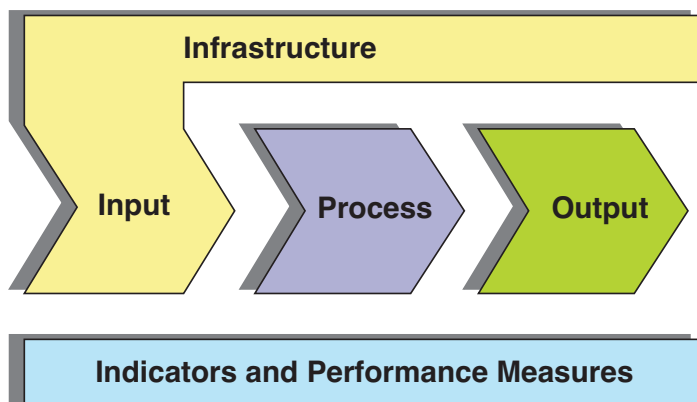


Figure 1: A simple model of Treasury

Process

- Process

Output

- Debt management
- Expenditure analysis
- Forecasting
- Second Opinion
- Policy advice
- Special projects
- Statutory reporting

Performance measure/Indicator

- Credibility with Treasury Ministers
- Stakeholder relationships

Definitions

Risk appetite: “The inclination to depart from custom and practice, or the inclination to accept the chance of a mishap.”

Risk dimensions: “A particular aspect of risk, which is significant to the achievement of a world-class Treasury working for higher living standards for New Zealanders.”

Three criteria determined selection of each dimension:

- It is required by law or by a service agreement;
- It was specifically highlighted as such by the Secretary to the Treasury; and

- It was inferred from the Strategic Plan, Annual Report and other documents to be critical to the organisational vision of becoming a world-class Treasury.

Input/Infrastructure “Risk dimensions which either contain the raw material Treasury needs to provide a service or product; or mechanisms necessary to support the efficient functioning of Treasury.”

Process “The set of actions that use resources to produce outputs.”


Output “Principal risks relating to the delivery of the most important contracted service or products.”

Performance measure/Indicator “Risk dimensions relating to the way that Treasury performance is gauged.”

Rating

The following scale gave an explicit indication of risk appetite, to help make comparisons between different peoples’ perceptions:

0	Variable or uncertain	
1	Lowest exposure possible or legally mandated	low appetite
2		
3		
4	Equal weighting of reward to risk	
5		
6		
7	Active encouragement to weight reward of risk	high appetite



Questionnaire

The questionnaire shown in Table 10.1 was designed to take no longer than five minutes to complete.

Development

In a short workshop, the Treasury senior management group agreed on the process. The group accepted that an easy, convenient questionnaire was the best way to gather the data necessary for later discussion. However, for a public sector organisation in New Zealand, it made most sense to use the eleven output classes for external dimensions. The eight ownership (internal) dimensions were retained, and then the revised questionnaire was sent out for anonymous completion by selected respondents:

Group	Dimension	Definition	Rating
Input/ Infrastructure	Information management	Data collection, collation, sorting, indexing, storing, retrieval and presentation	
	Technology	Tools to speed up processes	
	Intellectual capital	The discovery of new facts or the collation of known facts to lead debate on Government spending and revenue	
	Human capital	The wealth of human skill, experience and talent available to Treasury	
Process	Process	Courses of action, which use resources to produce outputs	
Output	Debt and financial management	Management of Crown debt and financial assets	
	Expenditure analysis	Professional opinion about the value for money Ministers get for the services they purchase	
	Forecasting	The modelling of economic and fiscal factors to help set policy	
	2nd Opinion	Professional opinion about the economic and fiscal implications of a given policy, provided secondary to the agency advocating that policy	
	Policy advice	Recommendations to help the Government achieve optimal economic and fiscal outcomes	
	Special projects	The management of one-off projects which have extraordinary fiscal or political ramifications	
	Statutory reporting	The publication of reports required by statute, principally under the Public Finance and Fiscal Responsibility Acts	
Performance measure / Indicator	Credibility with Treasury Ministers	Standing in the eyes of those Ministers accountable for the performance of the Treasury	
	Stakeholder relationships	The quality of connections with stakeholders in terms of trust, respect and understanding	

Table 10.1: Questionnaire

- Information management;
- Technology;
- Intellectual capital;
- Human capital;
- Process;
- Treasury finances;
- Budget management;

- Crown companies;
- Commercial liabilities and claims;
- Crown financial management;
- Crown financial reporting;
- Debt management;
- Intervention analysis;
- Appropriation analysis;
- Forecasting;
- Policy advice (to go outside Treasury);
- Policy advice (to stay inside Treasury);
- Credibility with Treasury ministers;
- Relationships (external stakeholders); and
- Relationships (internal stakeholders).

Results

Although they are not actual examples, the following charts give a flavour of the type of charts produced from the questionnaire data.

During the exercise at Treasury, the differences between the expectations of the second tier managers (SMG – senior management group) and the third tier managers become very clear. Similarly, the difference between intended and assessed tolerance for risk by each group also raised interesting questions. As examples, some of the actual observations to come out of the exercise include the following:

- Individual members of SMG assess risk appetite consistently with the SMG team as a whole, although the Secretary's assessment indicated exposure in some areas, which were not shared with the rest of SMG.
- SMG sees Treasury operating to a margin within 25% of tolerance.
- SMG's preference is for the pursuit of opportunity in ownership areas and low exposure in outputs: 'one size of risk' does not fit all.
- Managers perceive SMG as having a lower appetite for risk than SMG is in fact willing to tolerate.
- There is perceived to be more tolerance for pursuing opportunities in the ownership areas, but this was not seen to be exploited very much.

Breaking the respondents into different groups allowed further analysis such as comparing one business unit with the whole of Treasury; one set of managers with another; the leaders of each business unit with the Secretary to the Treasury (Chief Executive), etc.

Some of the most interesting results occurred because the Secretary allowed his views to be isolated and compared with others, and because each individual

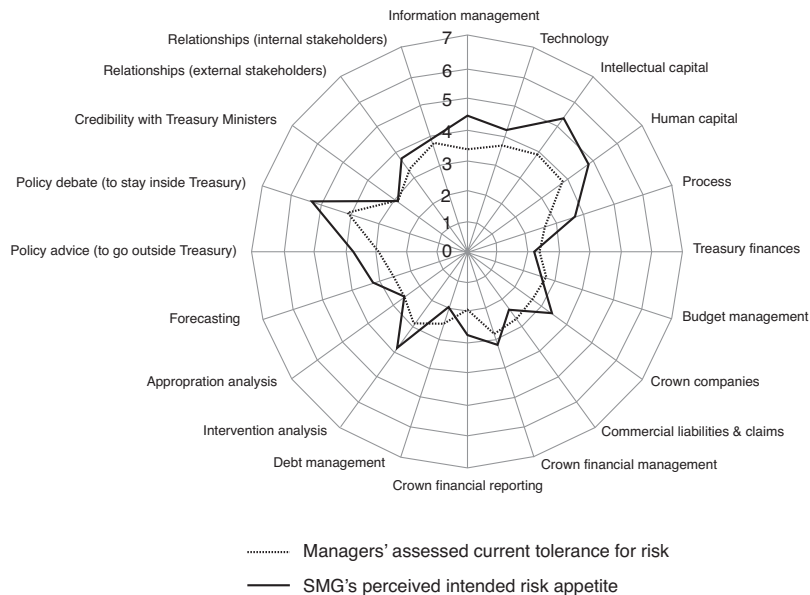


Figure 2: Aggregate managers' perceptions of SMG's intended risk appetite and Treasury's current tolerance for risk

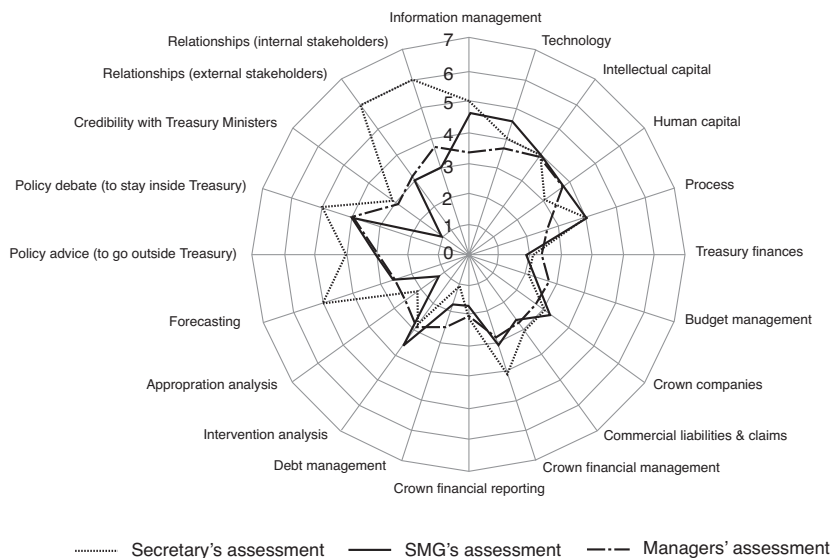


Figure 3: Current tolerance for risk in Treasury

business unit manager allowed his or her views to be identified and compared with others. All staff members were given access to all results. This transparency allowed for many open and honest discussions, and hence better alignment of expectations and tolerance for risk.

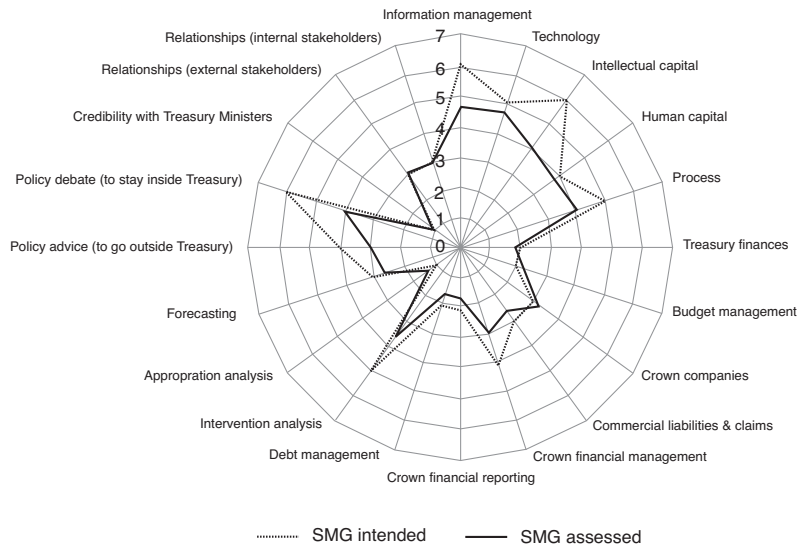


Figure 4: SMG's intended risk appetite and SMG's assessment of Treasury's current appetite for risk

Lessons learnt

The simple method developed here came about as a response to a series of casual observations about the way risk was managed in the Treasury. On the face of it, these are typical for many private and other public sector organisations:

- Perception and organisational myth replace reality.
- In-built buffers reduce the appetite for taking risks.
- Risk appetite is rarely specified or discussed explicitly.
- Overt and covert disincentives matter.
- There is little guidance readily available for a quick, convenient way to determine organisational appetite for risk.

As it evolved, the more convenient, intuitive and visual the tool became, the better it worked. Being open about the lack of precision meant that the exercise was not dismissed as pseudo-scientific sophistry, and allowance was made to see if the results had anything useful to add.

This willingness to take the results for what they were — curious observations — meant that there was no distraction from the purpose of stripping away assumptions to allow for better informed debate.

For optimum results, similar exercises would work best if run as part of, or before, planning sessions. There is no reason why risk appetite could not be reviewed using this tool for finite projects as well as continuing organisational business. Similarly, with minor adjustments, it offers the same potential in other organisations.

Summary

Five benefits accrued from this exercise:

- Expectations and perceptions became explicit.
- Investigative, dispassionate debate began over some controls used for managing risk.
- Useful material from a fresh perspective entered the traditional business planning process.
- Everyone became more aware of risk management.
- There was more discussion about pursuing opportunities.

The method used here is quick, imprecise, and subjective. While it is by no means a performance metric, it showed a lot of promise as a convenient and versatile diagnostic tool. Within Treasury it proved valuable for informing discussions about tolerance for taking risks and expectations for taking risks.

Rabbit Haemorrhagic (Calicivirus) Disease: A Case Study

Peter O'Hara

In this chapter, Peter outlines the history of the introduction of rabbit haemorrhagic disease (RHD) into New Zealand, describes the process that was used to evaluate the risks associated with the application to introduce the disease as a biocontrol agent, and considers some of the risk communication issues that arose in this particular circumstance, and which might be common to other, similar, situations.

The application to import RHD into New Zealand predated the implementation of the HSNO Act. It was clear from an early stage that there would be significant public interest in this issue and since the existing legislation (the Animals Act) did not have any procedures for public consultation, a specific process was developed for the decision process.

The applicant was required to provide a detailed application including an assessment of the risks and benefits associated with the introduction of RHD. This material was circulated for public comment, and considerable public debate followed. The decision process subsequently applied was based on a balancing of the risks and the benefits of the introduction.

Views as to whether or not RHD should be introduced were highly polarised with different sectors of the community having strongly entrenched views about the risks and benefits. Farmers discounted all uncertainty and risk, and concentrated on benefits, while other interest groups concentrated on the risks and ignored the benefits. Within the scientific community, there was dissension, leading to greater uncertainty in the uncommitted public.

This case study provides a good example of the problems that arise in communicating risk issues when there is strong conflict of interest, a perceived inequality of the distribution of risks and benefits, and high uncertainty both in the risks and the benefits. It also illustrates the difficulty in communicating complex scientific information when positions have already become entrenched.

The particular types of risk involved in this case, i.e. the irreversible release of a virus into the environment, meant that the public attitude was more likely to be risk averse than risk neutral.

Peter concludes that while it is often difficult to engage the public early in this type of decision process, it is very important that this should occur, and therefore every effort should be made to inform before positions become entrenched. He notes that in addition to providing technical and other information about the proposal, the proponents of this type of activity must recognise the legitimate concerns of the public and make every effort to listen and to deal with these concerns.

Introduction

This chapter draws on experience with a proposal to import the rabbit haemorrhagic disease (RHD) virus as a biological control agent for the rabbit, to illustrate and discuss how people respond to and deal with a complex set of risks and competing objectives. It offers some insights on how the risk communication process was managed, and how it might have been managed differently.

A brief history of the introduction of the virus and of rabbit control in New Zealand is provided so that the context in which the proposal was considered can be better understood.

History of the Introduction of Rabbit Haemorrhagic Disease into New Zealand

In August 1996, a group representing four regional councils, a district council, the Commissioner of Crown Lands and the New Zealand Federated Farmers Incorporated applied to the Director General of the Ministry of Agriculture for permission to import the rabbit haemorrhagic disease (RHD) virus from Australia for use as a biological control agent for the wild rabbit (*Oryctolagus cuniculus*) (Ministry of Agriculture, 1996).

Because the Hazardous Substances and New Organisms Act, the intended decision-making vehicle had not come into effect, the application was considered in accordance with the provisions of the Animals Act 1967. As the Animals Act provided no guidance as to how such a decision should be made, criteria and a process for decision making were developed in consultation with the public and the Government and were published prior to the application being made.

The applicants were required to prepare a detailed proposal for using the virus as a biological control agent and an assessment of the benefits and risks that the release of the virus into the New Zealand environment might convey. The detailed proposal and supporting documentation was delivered to the Director General in June 1996. The proposal was then released for public discussion and the documentation provided by the applicant group was made publicly available.

After a year of very public, polarised and, at times, acrimonious debate, the application was declined by the Director General primarily on the grounds that while the risks were assessed to be relatively low, achievement of the purported benefits was too uncertain to warrant the risks being acceptable to the public of New Zealand (Ministry of Agriculture, 1997). The decision was greeted with both applause and condemnation.

Within three months of the decision, an outbreak of fatal disease among wild rabbits near Cromwell was confirmed as RHD. In the ensuing few weeks, RHD was found at many different sites in the South Island and farmers confessed to operating a covert campaign of deliberately spreading the virus. Although no one has been found responsible for its introduction, the importation of the virus was probably deliberate and therefore illegal and probably occurred before the decision to

decline the legal importation of the virus was made. It is very likely that it was even being spread before the decision was made. The covert operation to spread the virus was carried on for three months before the existence of the disease was suspected.

A Brief History of the Rabbit and its Control in New Zealand

From the time of its introduction by the early colonists, the rabbit multiplied and spread to almost all parts of New Zealand. Its depredations were such that for more than one hundred years (1887-1995), the Crown subsidised rabbit control measures.

Ferrets, stoats and weasels were introduced last century as biological control agents but their release into the wild has been a mixed blessing. Ferrets prefer the rabbit as prey and continue to be important in regulating rabbit numbers in many environments in New Zealand. However, their impact on indigenous species is significant. Stoats have much more catholic prey preferences and probably have little influence on rabbit numbers, but their impacts on native birds are well known and documented.

Rabbit numbers in most parts of New Zealand have declined to manageable proportions largely due to climate, habitat modification and the impact of predators such as ferrets, cats and dogs. However, in the drier areas of New Zealand, high survival rates of young rabbits allow the rabbit population to outstrip these modifying influences and population densities that have a severe impact on the comparatively fragile environments ensue. Rabbits in pest proportions occur over approximately 9% of New Zealand's land area and are a severe problem over 3.7% of the land area. There are those that argue that the sheep is also damaging those environments and that the competition between the sheep and the rabbit is the real problem.

Attempts to introduce the myxomatosis virus as a biological control agent in the 1950s failed through lack of effective spreading agents (vectors) and subsequent applications to re-introduce the virus along with rabbit fleas that are known to be effective vectors in Australia have been declined. At the time that the most recent application to introduce myxomatosis was declined, the then Minister of Agriculture noted that the RHD virus had potential as a biological control agent and stated that the Government would investigate its potential use in New Zealand.

Following the recognition of RHD as an epidemic disease of rabbits in many Northern Hemisphere countries, research was started in Australia on the potential value of the RHD virus as a control agent. The New Zealand Government decided to participate in the Australian research programme so that information relevant to its possible use in New Zealand could be obtained.

At the same time, a programme of information dissemination and education was begun to ensure that the public was well informed on the issues of using the

virus in the intended way. The public's distaste of myxomatosis as a biological control was still fresh in the minds of politicians and officials.

The orderly progress of the research and the public information programme was brought to a sudden halt by the escape of the virus from an island research facility on to the mainland of Australia where it spread rapidly over a wide area, aided and abetted by gleeful graziers. The fact that the escape was from a facility managed by scientists was significant in conditioning some public attitudes to the scientific reports prepared by those scientists.

Significantly for the Ministry of Agriculture, the time line for consideration of a proposal to introduce the virus was foreshortened. Its Director General became the decision maker because the expected decision maker, the Environmental Risk Management Authority, was not ready.

Hazards and Risks

The terms 'hazard' and 'risk' are often used interchangeably in the public arena even though in modern usage in the literature on risk management the terms have distinct meanings. It is very important in any risk communication process to help the public understand the difference so that they can evaluate hazards using their own frame of reference for risk assessment.

The hazards that had to be considered were the rabbit and the RHD virus. These hazards were and are seen differently by different groups of people.

Farmers on the rabbit-prone land saw the rabbit as the principal threat to their livelihood and indeed to their survival as farmers. The costs of controlling rabbits for which they are now entirely responsible diverted expenditure from other important farm inputs and, in some cases, were funded by borrowing, reducing the farmer's equity in his land. Further, many of these farmers felt abandoned by central and local government because of the cessation of subsidies and the implementation of 'user pays' pest control. They resented being told by bureaucrats and environmentalists what their land should look like and how it should be farmed, especially when they were expected to foot the bill.

They were frequently accused by environmentalists that they were exploiters of the land and they were mining its resources.

For many of them, it seemed inevitable that the rabbit would drive them out of farming and leave the land a desert if they had to depend on currently available control measures such as poisoning, trapping and shooting. The consequence of loss of their farms and, for many, their heritage, justified extreme counter-measures. They considered the risks associated with the virus to be of a low order and the probability of successful control using the virus to be high. They were scornful of those who rated the risks to be higher.

The risks of releasing the RHD virus into the New Zealand environment knowing

that there was little hope of retrieval or eradication if adverse effects were found fell into four categories:

- the risk of human infection;
- the risk of infection in non-target species;
- the potential of the virus to mutate and initiate an unexpected adverse event; and
- the potential of predator deprived of rabbits as their prey to switch their attentions to other prey species, notably native fauna.

Many members of the public were concerned by the health hazards attributed to the virus and the threat of mutation of the virus that would enhance its virulence and/or extend its range to other host species. Most were ill-equipped to weigh up the claims and counter-claims, especially those made by scientists. The 'dread factor' and uncertainty were significant in formulating their opinions. In the absence of any perceivable benefits to them personally, most opted for a precautionary stance. Unlike the farmers, they assigned a relatively low value to potential benefits. This should not be taken to mean that they were indifferent to the damage that the rabbit was doing. They were not prepared to accept the proposed solution.

The environmental hazards and risks were of concern to a narrower range of people and tended to be debated in a more objective way. Nevertheless, uncertainty about the scale of the impact of the virus on the rabbit and the consequential impact on predator species led to calls for precaution. The immediate risks to endangered species from prey switching by predators deprived of the rabbit as their prey were ranked higher than the broad-scale risks of the rabbit to the fragile semi-arid environments.

For the decision-maker, the risks of the introduction of the virus had to be balanced against the benefits of controlling rabbits by this means and the estimated effectiveness of the virus to achieve control. A feature of the risk assessment process for each one of these risks was the degree of uncertainty surrounding estimates of the probability of occurrence of each risk and the consequences of harmful effects. When coupled with uncertainty that the virus would be effective as a biological control based on Australian experience, a decision based on the precautionary principle may have seemed inevitable. However, it was a more finely- balanced decision if one took a reasoned assessment of the risks and the likelihood of a successful control outcome in an environmental degradation scenario that demanded a solution.

Had it been known then what is now known about the performance of the virus as a control agent, a decision to allow importation would have been made. In other words, real benefits have been achieved and a better understanding of the magnitude of some of the risks has been obtained.

Nevertheless, there are those that continue to argue that we do not yet know what the long-term effects might be. That is, we do not know what we do not

know. Is this a criterion for decision making?

Real and Perceived Risks

The proposal to import the RHD virus and the subsequent decision seem to fit well with the statement:

“ the problem situations that involve post-normal science are ones where, typically, facts are uncertain, values in dispute, stakes high and decisions are urgent” (Funtowicz and Ravetz, 1992).

Howden-Chapman and Chapman (1998) have carried out a detailed review of the policy implications of risk, uncertainty and post-normal science. Their conclusion that in policy development, uncertainty is often underestimated or misunderstood leading to mis-communication between scientists, policy advisers and the public about the complex nature of health and environmental issues are borne out by the experience of this case study. The public is often expected to adjudicate on the conflicting views and opinions of the ‘experts’ in order to form their own views. There is no evidence that experts are less biased in making subjective judgements in areas of uncertainty than non-experts (Morgan and Henrion, 1990).

While it is possible to describe risks in objective terms as functions of probability estimates and estimates of the adverse impacts that hazards can cause, it is often not possible to obtain a consensus that risks described in those terms are the ‘real’ risks. Implicit in agreeing with that description of a risk is acceptance of the estimates and the analysis including assumptions that underpin them. Acceptance is a personal decision involving subjective as well as objective considerations. For example, it involves weighing up personal benefits and costs and making personal assessments of uncertainty and its consequences. It may involve emotions such as fear, dread and outrage. For these reasons, it is questionable whether the term ‘real risk’ has any validity and it is potentially inflammatory because it invites the response “says who?”.

For the farmers, the decision to import RHD virus was a ‘no brainer’. The devastation caused by rabbits was real and was destroying not only their livelihoods, but the land they loved. It is not too strong to describe their emotional attachment to the land in that way. The available control methods were not only unaffordable, but were failing. Their perception of the risks of importing of RHD virus was that they were acceptable in the face of the benefits that the virus would confer. Further, they believed that their representatives had produced a compelling body of scientific analysis that demonstrated objectively that the risks were of a low order. They discounted as emotional the uncertainty in the risk assessments claimed by the opponents of the importation.

The opponents of the introduction of the virus leaned on uncertainty as the reason why a cautious approach should be adopted. This was fuelled in part by an argument among scientists over the interpretation of laboratory results relating

to the testing of the virus for effect in non-target species. One group of scientists that claimed particular expertise with caliciviruses chose to interpret the results of one test in a way that had limited scientific justification and to use this flawed interpretation in the absence of any other evidence to claim that infection in some non-target species had occurred. This was then extrapolated to suggest a high probability of infection in a wide range of species, including man. The group also chose to go very public on their findings and their disagreements with other scientists. In doing so, they acquired a high degree of credibility among those opposed to the importation.

This dispute among scientists had two important effects:

- diametrically opposed views of the ‘real’ risk developed; and
- uncertainty and dread became big factors in the minds of many members of the public because even the ‘experts’ could not agree.

The impact of time on risk assessment

For the reasons explained above, the consideration of RHD virus as a biological control agent proceeded in two phases. The first phase was during the research on the virus in containment facilities in Australia and ended abruptly with escape of the virus from one of those facilities. The second phase began at this point and was characterised by a degree of urgency that the decision on whether or not to permit the importation of the virus into New Zealand should precede what some regarded as the inevitable arrival of the virus by accidental or illegal means.

During the first phase it was considered important that the public be well informed about biological control technologies in general, and about the RHD virus in particular. In an effort to provide a source of information that could be seen to be neutral and lacking bias, a Rabbit Biocontrol Advisory Group (RBAG) was established. Its membership was drawn from a range of organisations that had, or could have, an interest in the matter and the individual members were selected on the basis of their knowledge and personal standing in the community. RBAG was funded by a number of government departments acting in concert. RBAG provided written material in newsletter form on a regular basis, provided speakers to the media and interested organisations and was expected to be seen as the source of sound information and advice on these topics.

The first phase was characterised by a relatively low-key interest, generally orderly and objective discussions of the issues and an absence of emotion. No decisions were required at the time or were imminent. Given subsequent events, it is reasonable to infer that the public was not engaged with the issue at this time and was not being asked to make up its mind. There was a good degree of awareness of the subject of biocontrol and the virus but not any particular grasp of what was to come in the second phase. It would be fair to say that people seemed to be intellectually attuned to concept and some of the hazards and appeared relaxed about the risks. In reality, they had not been challenged as

individuals to make a judgement. That was something to be done in the future.

The second phase was quite different. The decision was imminent. It was being made before the planned research had been completed. It had the air of being rushed. It involved debates between the proponents and the opponents with lines being drawn on issues that were more wide-ranging than the immediate issues. The socio-economic context for the debates was complex and involved matters such as the long-held distrust of farmers, particularly high-country farmers, by the urban community. The decision was being forced on the public because scientists had failed to keep the virus contained. This loss of trust of the scientists that had done most of the research in Australia was crucial and much greater faith was placed in other scientists who had dubious claims to expertise. Argument and counter-argument were as much about scoring points as informing. The background threat was that the virus was coming anyway and, if it got in, it would never be eradicated.

The effect of the changed environment of the second phase was to polarise the discussion so that having a rational debate was nearly impossible. Positions were taken by parties on both sides of the debate and each would resort to using such scientific information and commentary as suited their cause. Having produced an impressively documented proposal, the proponent group responded to some criticism by producing more as if to succeed by sheer weight of argument. 'Talking at' became the norm, rather than 'talking to'.

The Ministry of Agriculture's role came under severe criticism. Its role in supporting the research programme was alleged to have compromised its neutrality as the decision maker. The decision process that had been agreed previously by Government after public consultation was alleged to be deficient and further consultation was demanded.

It is interesting to speculate whether, if the original programme and timetable of considering the introduction of the virus at the completion of the planned research could have been followed, the polarisation and acrimony of the debate that occurred in the second phase could have been avoided. Better information may have been available to the decision-maker, but whether a more informed debate would have followed is questionable.

It is probable that the same issues around which the debate revolved would have come to the fore and the answers to many of the questions that concerned the public would have been no more satisfying. It seems likely that when people are faced with having to make up their mind about a risk, the whole range of personal beliefs and subjective considerations come into play. It is difficult to avoid the tensions that surround a contentious issue and they can not be overcome just by logical argument.

Zero risk – attaining the impossible

When people are able to make personal risk management decisions after weighing

up the benefits of a certain action versus the assessed risks to them as individuals, there will be a spectrum of 'acceptable' or 'tolerable' risks. For example, some will drink and take the risk of driving, while others will obey the law and/or exercise common sense.

When faced with risks over which they have no personal control and they have to depend on the decisions of other risk managers, people demand that a high degree of caution be exercised. Such risk management decisions are expected to meet at least two criteria:

- the risk should produce 'no harm'; and
- the 'no harm' consequence should be proved, not just inferred.

Most people will concede that there is no such thing as 'zero' risk but nonetheless, will expect that they will not be harmed, especially if they perceive no benefits accrue to them. Producing evidence that no harmful effects have been observed is often not accepted; proof that no harm occurs is required. Expectations of proof are often higher than is scientifically achievable.

In the tests of RHD virus on a range of non-target species, no concrete evidence was found that the test subjects became infected with the virus — that is, that it multiplied in their tissues. For icon species such as the kiwi, this evidence did not satisfy some critics.

Similarly, the critics did not accept the evidence that thousands, perhaps millions, of people who raised rabbits for food and who were exposed to high levels of virus when their rabbits became infected in the epidemic that swept Europe suffered no known ill effects. They were more concerned by the single case of an attendant who slept in the rabbit house with infected rabbits and developed low levels of antibody to the virus.

The decision to decline a permit to import the virus was based on the lack of evidence that virus would be effective against the risks of releasing the virus. The risks were not of a magnitude that ruled out using the virus in any circumstances. That the expected benefits of biocontrol would not be achieved meant that acceptance of the risks could not be justified. The clear inference was that if and when evidence of effectiveness could be found, the decision could be reversed. After the decision was announced, a number of opponents of the importation expressed happiness with the 'no' decision even though it was clearly a qualified 'no'. They did not take issue that the decision-maker did not accept their views about the magnitude of the risks. Was winning was more important to them than the quality of the argument?

Message given and message received

The complexity of the technical matters made it very difficult for the lay person to understand the technical debate and reach their own conclusions. They were forced to select a champion and follow that person's views in a rather non-

questioning way. In these circumstances, it was natural to select champions who preached caution and who presented a 'black and white' argument, even though that argument was technically flawed or over-simplified the issue's complexity.

The proponents of the importation of the RHD virus produced a public discussion document and supporting documentation that was exemplary in its thoroughness. To the extent that they were advocating a particular proposal, the authors showed some bias in favour of their proposal, but it could not be said that their paper was misleading or failed to present all sides of the issues. The first draft was peer reviewed prior to release to ensure that the paper was complete and balanced. The authors took account of the reviewers' comments in the final draft.

The sheer volume of the material presented made it very difficult for readers to even access the material, let alone read it. Thus, in their efforts to canvass and document all relevant matters, the proponents may have unwittingly failed to deal with needs of many people who wished to be informed and alienated them in the process.

More importantly, the proponents' response to criticism during the public consultation was to ignore it, counter it with even more documentary evidence, or deride it. Discussion tended to be polarised and adversarial. The views of the proponents were dismissed by many opponents simply because they were proponents and therefore biased. The proponents got little credit for the quality of their proposal and the documentation that it provided. It was markedly better than most other material presented.

There was an alliance in opposition to the proposal between some scientists who claimed expertise in the calicivirus family and lay people concerned about the risks as they perceived them. Some members of this group were determined to prevail at all costs.

Seven hundred and fifty submissions on the proposal were received, presenting all shades of opinion, but the views of the majority of New Zealanders were unknown and, indeed, unknowable. In this case, at least, a great deal of effort was expended in meeting the needs and demands of a relatively small number of people, but whether doing so contributed to a greater understanding of the issues by the public at large is debatable.

The media had difficulty in presenting a concise balanced view of an issue as complex as this proposal was. Complex arguments were often over-simplified, argument that contained qualifications was sometimes presented as equivocation and sweeping generalisations were presented as fact. Black and white statements may seem to have authority and a ring of truth, but often gloss over crucial qualifications.

Conclusions

When issues such as the irreversible release of a virus into the environment are

involved, it is doubtful whether a risk communication process can ever overcome the personal subjective reactions, such as dread and fear, that come into play when a decision is imminent. Every effort must be made to make the public as well informed as possible in the lead up to the decision, but it has to be accepted that the public may not become truly engaged with the issue until the decision is at hand. The communication process has to accommodate and deal with the terminal period of tension and turbulence.

One of the most important elements of the risk communication process, especially when the tensions begin to rise, is listening and responding to the needs that are being expressed, however illogical or irrational they may seem. In the case of this proposal, the failure of the proponents to deal sympathetically with the legitimate concerns being expressed led to a view that they were arrogant and opened the door to other champions to capture the moral high ground. Taking sides followed and resolution was left to the decision-maker, a role that he or she should never be expected to fill. In that circumstance, the decision inevitably makes winners and losers.

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White Spotted Tussock Moth: A Case Study

Gordon P Hosking

The communication of risks associated with biological events is complicated by the high degree of uncertainty in predicting the behaviour of disrupted biological systems. These difficulties are particularly acute in the case of newly-established pests and diseases, where uncertainty is often accompanied by obscure technical argument and analysis.

Gordon describes the process surrounding the discovery of white-spotted tussock moth in the eastern suburbs of Auckland, and the subsequent eradication programme. Risk communication was essential for securing the buy-in of the stakeholders and interested parties.

The chapter begins by discussing the relationship between the stakeholders and interested parties, the language used, and the importance of ensuring the credibility of the team involved in the communication process. He goes on to look at the different areas where communication was required (e.g. political, biological, financial), and concludes that the exercise was a success because of the general commitment by all parties.

This paper has parallels with the previous paper on RHD in that it relates to the communication of risks where there is the potential for high uncertainty, some ignorance, and polarisation of the community. One significant difference between the two is that in this instance there was general agreement as to the acceptability of the proposed control mechanism. The reason for this was that the agent had been used for a significant length of time and has high specificity. Thus, uncertainty was reduced by information. At the same time, this chapter illustrates well the formal application of risk communication, and describes the particular processes used.

Introduction

The communication of risks associated with biological events is complicated by the high degree of uncertainty in predicting the behaviour of disrupted biological systems. These difficulties are particularly acute in the case of newly-established pests and diseases, where uncertainty is often accompanied by obscure technical argument and analysis (Hosking and Holden 1998).

The arrival of white-spotted tussock moth (*Orgy hyaline*) in Auckland's eastern suburbs, and the resulting eradication programme, known as Operation Evergreen (Hosking 1998, Hosking et al 2002), illustrates the multi-faceted nature of biological risk communication, addressing a range of risks of varying relevance to a range of stakeholders. In hindsight, effective risk communication was clearly pivotal to a successful outcome of the programme. However, at the time, individual risk communication components ranged from a carefully planned approach (Anon 1997), to pure luck. This chapter first considers some generic issues central to biological risk communication, and then examines the risk elements which had to be considered in Operation Evergreen.

Generic Issues

The experience with white spotted tussock moth showed certain generic issues underpinned effective risk communication. These issues are likely to be common to other biological events, and were:

- recognising the relationship between individual risk elements and stakeholder groups involved in decision-making;
- tailoring the characteristics of the language used in communicating with specific stakeholder groups; and
- ensuring the credibility and experience of the team providing technical support to risk communication.

Risk element/stakeholder relationship

Most biological events involving risk are made up of several risk elements, e.g. financial risk, political risk, etc. Understanding the relationship between these risks elements and the groups involved in decision-making, is critical to effective risk communication. Risk communication with specific stakeholder groups needs to be focused on those elements of primary interest to that specific group.

The relationship between five risk elements and three stakeholder groups for Operation Evergreen are shown in Figure 1. The Government has the widest interest because of its national governance responsibilities, while the community has the narrowest. However, it would be a mistake to suggest the importance of Government ranked ahead of that of the community in risk communication, since loss of support from either could compromise the programme. What it does make clear is the need to focus communication efforts on only the relevant risk elements when in dialogue with a specific group.

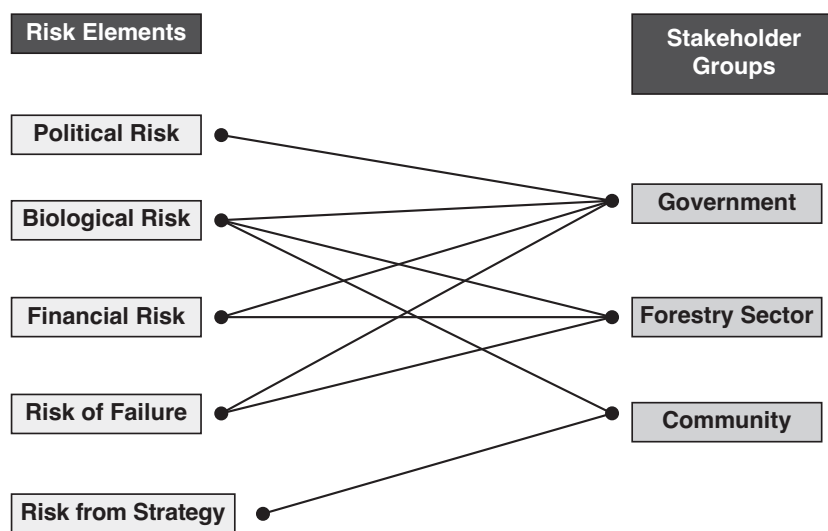


Figure 1: The relationship between risk elements and stakeholder groups for Operation Evergreen

Language of Communication

Different groups of society legitimately have different views of reality, and the language of one reality is not always the same as another. Le Shan and Morgenau (1982,) for example, describe four models of reality, each reflected in its language as:

- sensory, preferred by scientists, where they are detached observers of the larger whole;
- clairvoyant, as in music and dance, as if they are an extension of the whole;
- transpsychic, as in prayer, as if they are reciprocals of the whole; and
- mythic, as in dreaming and play as if they are identical to the whole.

While we can argue as to the validity of these particular models, there is no doubt the language of technologists and science is not the language of most of the rest of the community. Complex technical argument hedged by provisos and qualifications, while appropriate to debate within a response team, is quite inappropriate in communicating with the wider community.

Risk communication and dialogue with non-science stakeholders should be clear, concise and focused on the key issues. It should acknowledge uncertainty, but confidently describe the situation and options, based on current knowledge. Operation Evergreen was fortunate in having a number of well-qualified technical staff capable of translating science into plain language.

Credibility of the Team

It is not possible to communicate risk on any issue without credibility. In

communicating biological risk, credibility is derived from knowledge, expertise and the advocacy of defensible strategies.

All stakeholders expect the technical specialists to understand what has occurred, how, and with what implications, before they initiate the risk communication process. There is little point in undertaking risk communication until a robust preliminary evaluation of the biological event has been completed. In the case of Operation Evergreen, this involved acquiring knowledge of the insect's biology, completing a survey of its distribution, and evaluating its likely impact on the urban environment in which it had been found. This activity was completed in less than two weeks.

The assembly of a demonstrably strong scientific and technical team, with expertise in all key areas of the response, greatly enhances credibility. A willingness to welcome such expertise from whatever organization it can be drawn, builds stakeholder confidence that the needs of the programme are being placed ahead of self interest. Operation Evergreen relied on the core operational and scientific expertise of the Ministry of Forestry and Forest Research Institute, but also included specialist expertise from seven Government departments, seven different research organizations, two communications consultancies, and six community and special interest groups. This broad involvement reinforced an atmosphere of openness and receptivity, as well as competence, by the project team.

Credibility is further enhanced if the strategies being proposed can be articulated with confidence and defended with vigour and commitment. Credibility is rapidly compromised by pusillanimous and bureaucratic proposals that lack commitment and transparency. Most response strategies can be communicated in simple language which reflects clear vision and objectives by the project team. Operation Evergreen stated its goal as eradication of white-spotted tussock moth, to be undertaken by the aerial application of a biological pesticide, combined with intensive monitoring. It would aim for success in one season, but recognized it might take two, providing its own commitment was reflected by that of the community. This easily articulated strategy was taken to the community through local meetings, the media, and newsletters, and established a strong foundation of stakeholder support.

The White Spotted Tussock Moth Experience

Background

On the 17 April 1996, the white spotted tussock moth, *Orgyia thyellina* (Lepidoptera: Lymantriidae) was found to be established in Auckland's eastern suburbs. The insect, native to Japan, Korea, China and Taiwan, was known to attack oak, elm, willow, larch, apple, cherry, pear, plum, chestnut, walnut and mulberry. The resulting eradication operation involved the aerial application of the biological pesticide Btk (*Bacillus thuringiensis* var. *kurstaki*) over 40 sq kms of suburban Auckland and about 80,000 people. It took two years to complete, cost NZ\$12 million and

was the first successful eradication of a forest insect in an urban area anywhere in the world (Hosking et al 2002).

The potential risks from the permanent establishment and spread of the insect fell into five broad areas:

- environmental impacts — such a polyphagous defoliator could be expected to affect some component of New Zealand's indigenous flora;
- productivity losses — due to direct damage to horticultural crops and potential damage to some commercial forestry species;
- trade restrictions — from new requirements to prevent the insect's spread to trading partners;
- increased chemical use — for control of the insect in crops and home gardens; and
- health impacts — from allergic reactions to the urticating hairs of the larvae.

The stakeholders, and therefore the decision makers, for Operation Evergreen were:

- the government, which ultimately had responsibility for the decision to act or not;
- the forestry sector because the insect was a pest of trees, albeit mainly in an urban environment; and
- the affected community who would bear the impact of the control strategy.

Technical credibility and risk communication

A primary asset of the Operation Evergreen team in risk communication was its high technical credibility, a credibility that was clearly visible at all levels in the organization in both leadership and capability.

Independent science panel. An independent science panel was established early in the programme by the Chief Scientist of the Ministry for Research Science and Technology. It was valuable in generating political confidence in the strategy evaluation process, and providing greater credibility to the recommended course of action. Its role was largely taken over by a dedicated science advisory group once the strategy was agreed.

Operation leadership. A lead organization with strong sector responsibilities, in the form of the Ministry of Forestry, provided a clear focus for stakeholder dialogue. Within the Ministry, explicit delegation of responsibility for policy, operations and science, showed a commitment to ensuring the highest quality of advice in all key areas.

Operational capability. Sector confidence in operational capability was never questioned, given that the forestry sector regularly undertook large-scale spray operations, and pest and disease survey was a core responsibility of the Ministry. This operational experience was underpinned by specialist research capability at

Forest Research.

Science Support. The forestry sector's primary research provider Forest Research, an organization with an international reputation in forest protection, was the focus of science support. However, specialist science input was also contributed by three other research institutes as well as university and private sector research organizations.

International collaboration. A strong existing relationship between Forest Research and the US Department of Agriculture allowed access to American experience in gypsy moth control, insect rearing, and the North American research network. The world authority on lymantriid moths, Dr Paul Schaefer of the US Department of Agriculture, already a close colleague of Forest Research entomologists, provided definitive identification and all known background material. It was difficult to imagine a project team that could give greater credibility to this major eradication initiative. Experts were made freely available to stakeholder groups whenever specific issues were discussed. The team was never challenged on its level of expertise, nor on the decisions it made, by any stakeholder group.

Because of its depth of technical expertise, risk communication by the project team was confident, comprehensive and open.

Political Risk Communication

The political establishment remains the key to major incursion responses such as that undertaken by Operation Evergreen. The necessary funding only becomes available if the politicians and their supporting bureaucracies are persuaded the risks of doing nothing are greater than the risks of a proposed strategy. This persuasion involves a formal communication process quite different from that used with other stakeholders.

Language. Formal communication between officials and Government Ministers, proposing new initiatives such as the response to white spotted tussock moth, is in the form of a cabinet paper. Such papers have their own structure and require a departmental consultative process, and ministerial approval, to progress. Both the structure and process are quite foreign to those outside departmental policy groups, but are essential in establishing Government support for new initiatives. Operation Evergreen was shepherded through this process by the Ministry of Forestry's policy team, members of which become fully involved in the programme. Cabinet papers were drafted and managed by policy specialists with technical review by the wider project team.

Detail. Politicians are time poor. They do not welcome the detailed argument, evaluation, and documentation, which must underpin a well-developed strategy at an operational level. Risk communication involves building political confidence in the response team, and providing clear, concise summaries of the situation and proposed response. Operation Evergreen undertook this task through direct briefings and the production of position papers developed by policy specialists

from the Ministry of Forestry.

Funding. Response strategies for biological events are driven by biological imperatives, not the timetables of politicians and bureaucrats. Part of the risk communication exercise is to ensure funding availability does not restrict strategy implementation. Operation Evergreen was fortunate in having the winter dormancy period of the tussock moth egg stage, within which to work through the funding issues. Well developed and realistic cost estimates for a clearly-articulated strategy ensured political support and funding availability.

Champion. A political champion, preferably with real power within the political establishment, can be a critical asset to effective response. Operation Evergreen had such a champion in John Falloon, Minister for Forestry, who understood the risks and gave full support to the proposed strategy. He became personally involved in risk communication, both within the political establishment and the community. Such a champion represents a key asset in garnering political support and providing visible political commitment to the affected community.

Biological Risk Communication

The risks generating a response to a biological event, such as a new incursion, are either directly or indirectly biological in nature. They usually revolve around impact on some component of the biosphere, be it a crop, an ecosystem or a human population. Biological information is therefore pivotal to strategy development and will underpin any proposed response. It is the biological risks and impacts which will justify any proposed course of action, and decision-making groups will be looking for as much certainty as possible as the basis for their position. In the case of new incursions, biological information will almost certainly be incomplete, particularly as it relates to the organism's new environment.

Operation Evergreen was dealing with an organism relatively unknown in its home range, and relied on field data from its establishment site, and dedicated studies, to complement the scientific literature and the knowledge of international colleagues. The acquisition of biological information was given high priority, particularly in relation to likely impact and host range, and efficacy of pesticides against different life stages. Risk communication is difficult in the absence of clear and comprehensive information. The affected community, in particular, had a strong interest in why action must be taken, and what the likely effect of that action would be, both on the insect and the human population.

Close collaboration between science writers and technical experts delivered a series of readable, but technically accurate, leaflets on all aspects of the programme, which were made widely available throughout the affected community. A freephone calling centre was established, through which further information could be accessed, and community meetings were held to provide information and allow the public to directly question members of the project team. Briefings of specialist groups such as politicians and forest owners allowed a two-way dialogue on the likely

biological impacts and the proposed response strategy.

As the programme progressed, Operation Evergreen continually refined its knowledge of biological risk, largely by identifying knowledge gaps and undertaking specific studies to address them. A major insect rearing programme in Forest Research's quarantine facilities was the key to this work, providing all stages of insect material to a wide range of studies from host plant testing, to pheromone production, to pesticide efficacy trials.

Because the proposed response inevitably flows from unacceptable biological risk, the biological information on which it rests must be as complete as possible and of the highest scientific quality.

Financial Risk Communication

Any response to a biological event involves money, and in the case of new incursions usually a lot of money, with no guarantee of success. The money almost always comes from government in the first instance. Government officials need to be convinced that the financial cost of doing nothing is unacceptable, and that if they spend what is requested there will be a reasonable chance of success. Unfortunately, defining the costs and returns for biological events is extremely difficult and can vary from the wildly optimistic to almost total pessimism. It is legitimate to ask the question, however: is the cost of response justified given the likely impact and probability of success? Such questions lead directly to cost-benefit analysis. There is no doubt financial risk communication with both government and the forestry sector is most effective through cost-benefit analysis. The difficulty of this approach for biologists is the number of unquantifiable variables which must be excluded from such an analysis, or given quite arbitrary values.

Operation Evergreen undertook two cost benefit analyses, one by forestry researchers, which included best estimates of as many variables as possible and reflected the biologist's view, and one by an economic research group which took a more purist approach and excluded many variables that could not be quantified. The former delivered a benefit: cost ratio of 8.6 and the latter 1.3.

The project team used these analyses to argue the benefit-cost ratio lay somewhere in between, and given the level of uncertainty, a response was fully justified. However, uncertainty proved to be two-edged sword when the initial cost estimate of under \$6 million doubled, due to asynchronous larval development leading to many more aerial sprays than originally proposed.

In communicating financial risk it is wise to assume Treasury officials and economic analysts have little, if any, understanding of the subtleties of biological systems, and will be unsympathetic to the qualifications imposed by biologists. In the case of Operation Evergreen the project team developed a realistic cost of eradication and defended it vigorously. When the insect's biology overtook these costs they simply admitted their fallibility, recalculated, and continued to defend.

Risk of Failure

All stakeholders need to recognise and understand the risk of failure of response strategies, an unusually high risk in the unpredictable world of incursion response. The greatest threat to an eradication attempt is lack of knowledge, particularly if this lack of knowledge is not recognised. For example, if the proposed response is based on a defined infested area, and the organism exists outside this area, the strategy will be seriously compromised from its inception. Defining the extent and distribution of the eradication target is fundamental to reducing the risk of failure. However, fear of failure must not lead to risk aversion, i.e. let's do nothing so we cannot fail, nor must it sap confidence and commitment from the project team.

Operation Evergreen probably underplayed the possibility of failure in communicating with its stakeholders, at no cost because of its ultimate success. The danger of such an approach is the creation of high expectations, which if unfulfilled can reduce support for similar activities in the future. It can erode both political and public support for future initiatives, making a political champion more difficult to find, and communities less accepting of disruption.

Stakeholder ignorance of the risk of failure can have both individual and institutional costs when projects go wrong, through loss of confidence in lead organizations and the search for scapegoats. Such outcomes can destroy aggression and confidence so necessary for the risky business of pest eradication.

Risk from Strategy

Eradication programmes, such as Operation Evergreen, often involve the aggressive application of pesticides, restrictions on the movement of potentially infected material, and the invasion of private property. The question has to be asked, is the cure worse than the disease? Risk from the response strategy, particularly the application of pesticide, is invariably a major concern to the affected community. Such communities are often asked to bear costs and accept risks for the greater good. Risk communication must recognize and acknowledge costs to the affected community and ensure recognition of those costs by the wider community.

Operation Evergreen used only Btk in both aerial and ground spraying because of its high acceptability. A natural organic product, it has high specificity to caterpillars, a 30-year history of use, and is approved for use in organic production systems. The choice of Btk undoubtedly avoided significant community resistance to the spray operation. It is doubtful any other pesticide would have proved acceptable for aerial application over an urban area. Despite the large amount of information already available on Btk, Operation Evergreen commissioned a health risk assessment which not only examined the pesticide, but also the population which would be exposed, and the method of delivery. The risk assessment was made widely available to the community and was discussed by public health specialists at community meetings.

General public health advice was made available with specialist medical advice

available on request by concerned individuals. Specific precautions were recommended for asthmatics, those suffering from skin conditions, and in the area of food hygiene. In addition, a voluntary register was compiled, of all residents and operational staff exposed to Btk, and formally archived against any future need.

The project team undertook the communication of risk from the proposed strategy by being open and responsive to community concerns. This philosophy was reinforced by a highly visible presence in the affected area through daily activity, and through staff residing within the spray zone.

The elements of success

Dialogue

Dialogue would seem to be an obvious requirement of communicating risk to stakeholders in an eradication attempt such as undertaken by Operation Evergreen. However, dialogue is more than simply providing information, it involves listening, responding, and if necessary changing a proposed course of action. It looks beyond self interest and considers alternative view points. Dialogue involves a partnership based on mutual respect and honesty leading to a strategy acceptable to all participants. The Operation Evergreen team worked hard to build community trust and support through the active involvement of stakeholders in strategy development.

Confidence

The Operation Evergreen team projected confidence through its scientific and operational expertise, and a belief success was achievable. This confidence was a key asset in risk communication and in building similar confidence with stakeholders. The team was acutely aware of the fine line between confidence and arrogance, and sought to avoid the latter at all cost.

Openness

Stakeholders often requested additional information, but there was never any suggestion of the project team withholding information. It was the policy of Operation Evergreen to release all new information and data as soon as it came to hand, both good and bad. Such a policy made it easy for team members to respond to questions from both the media and the public. It also ensured an equality of dialogue between stakeholders and the project team. The Minister's assurance to the community that "what I know you will know" became the guiding principle for the project.

Accessibility

The team members were always accessible, to the public, the media, stakeholder groups and the scientific community. They travelled extensively, they provided statements and interviews, and they met personally with groups and individuals

in the community. Their operational meetings were open and often attended by sector representatives, overseas specialists, and politicians. But most of all, they were on the ground in the operational area, monitoring, supervising, managing and evaluating.

Operation Evergreen was successful because its contributors believed success was important and achievable. Outstanding technical expertise was combined with specialist communication skills to ensure the support of all stakeholder groups, and the commitment of the wider community.

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Sharing The Future

Janet Gough EDITOR

According to a report recently released by the UK Lords select committee on science and technology, scientists need to open a dialogue with the public that is "direct, open and timely". Lord Jenkin, the committee's chairman, said it was a paradox that the present crisis of trust should come at a time when the public was finding science, engineering and technology more interesting and exciting than ever.

"But the evidence of mistrust is undeniable, and must be of deep concern"

Risk communication is a critical component of risk management, aimed at improving the credibility and acceptability of decisions. It is a means of transferring information between all stakeholders and provides an arena for discussing different viewpoints. Effective risk communication should be a genuine effort to involve all parties in the resolution of an issue.

While risk communication is sometimes thought of solely from the perspective of an organisation communicating with its external stakeholders, external risk communication is part of good practice and helps an organisation to fulfil its legislative responsibilities, provide due diligence and obtain necessary permits. It will improve community understanding and awareness of an organisation's environmental activities.

This book addresses the theoretical foundations of risk communication, and includes a number of New Zealand and international examples of its application.

It will provide you with an understanding how risk communication can practically be applied to improve your chances of meeting your organisation's risk management objectives.

