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## Chapter 1 **Risk Communication: What Problems Are We Facing?**

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The term “risk communication” refers assessing and responding to the risks faced by individuals and their communities. Although risk communication is not intended to be technique for resolving social conflicts through persuasion, the public and other stakeholders often expect that it is. This expectation is just one of the many challenges faced by those performing risk communication but is particularly difficult to eliminate because one motivation for individuals and organizations participating in communication is to make their own opinions accepted by others. Which is to say, with the intent to persuade. Also, the direction taken by policymakers regarding risk communication will change depending on whether the policymakers perceive the public as being emotionally involved and therefore unable to escape common judgment biases or being rational and capable of tackling problems calmly. It is necessary to understand that risk communication is neither a silver bullet for conflict resolution nor a technique that is independent of the values and implicit biases of those taking part in it.

## Chapter 2 **Visualizing and Bridging Gaps Between Science and Policy as well as Between Technology and Society**

KISHIMOTO Atsuo
(Professor, Institute for Datability Science, Osaka University
Director, Research Center on Ethical, Legal and Social Issues, Osaka University)

Policies on science issues are often characterized as being guided by science. Not only companies but also universities are strongly expected to go beyond basic research and develop technologies that can be implemented in society. Basic research is often conducted under the assumption that the advancement of science will automatically lead to good policy-making, and new technologies are often developed with the assumption that good technologies will naturally be accepted by society. The reality is, however, that policies are not determined by science alone, and there are various hurdles to be overcome in implementing new technologies in society. In other words, there are large gaps between science and policy as well as between technology and society. We must visualize and bridge these gaps by developing tools and approaches based on knowledge from the humanities and social sciences as well as address these gaps centrally in science and technology communication. Communication with stakeholders from an early stage is also effective in identifying ELSI (ethical, legal and social issues) at an early stage.

## Chapter 3 **New Paradigm in Disaster Risk Communication**

YAMORI Katsuya
(Professor, Disaster Prevention Research Institute, Kyoto University)

In disaster risk communication, it is necessary to foster the capacity to respond to unprecedented and unexpected disaster events, such as the Great Hanshin-Awaji Earthquake in 1995 and the Great East Japan Earthquake in 2011, that may occur beyond human understanding and control. If this is the case, then the paradox is that risk communication that provides people with a sense of the "unexpected" or "surprise" is actually more important than communication that accurately describes disaster events as expected. In other words, we need a new communication style that is oriented toward making people encounter the unexpected, rather than the old style of thoroughly trying to eliminate the unexpected. In this chapter, the significance of this new style is explained through two risk communication tools that we have developed and implemented in society: "Nige Tore," a smartphone application for tsunami evacuation drill, and "Crossroads," an education game for active discussion about disaster damage reduction.

## Chapter 4 **The Basics of Risk Communication**

MIKAMI Naoyuki
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This chapter outlines the basic concepts and terminology of risk and risk communication. Risk refers to the likelihood that a cause or event will lead to an adverse effect on a subject to be protected and is expressed as a combination of two elements: the probability/frequency of an adverse effect occurring and the magnitude of the adverse effect. The main components of risk are the 'hazard,' which is the causative agent or event of the adverse effect, the 'exposure' of the protected object to the hazard, and the 'vulnerability,' the degree to which the protected object will ultimately be adversely affected. It is important to make a clear distinction between 'risk assessment,' which evaluates potential risk, and 'risk management,' which considers and implements measures to reduce risk. Risk communication is an interactive process of exchanging various information and opinions about risks between individuals, groups and institutions, and involves both risk assessment and risk management. In the context of uncertain and ambiguous risks where the extent and content of adverse effects are difficult to predict, it is particularly important to build trust among stakeholders, and it is essential to conduct participatory risk communication with the participation of a wide range of stakeholders, including the public.

## Chapter 5 **Risk Communication and Governance of Science and Technology**

SHINEHA Ryuma
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Osaka University)

In considering governance of science and technology, it is necessary to examine various impacts of new knowledge. There are common perspectives with those required in risk communication. In particular, there are several important common perspectives such as: (1) understanding the diversity of framing on science and technology, (2) paying attention to issues surrounding the distribution of benefits and risks, and (3) recognizing the importance of social vulnerability. The importance of similar perspectives has been repeatedly pointed out worldwide in the challenges surrounding COVID-19 and its risk communication. Current science and technology policies on the pandemic have tried to take up those perspectives actively.

## Chapter 6 **Risk Communication and Media**

TANAKA Mikihito
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and
YOSHIMATSU Fumi
(Researcher, National Institute of Infectious Diseases)

Contemporary media is changing into a “hybrid media system” in which mass media and social media are intricately intertwined. Amid this change, the modus operandi of risk communication in media must also be reconstructed. The purpose of risk communication is to encourage diverse stakeholders to form a consensus on appropriate risk management as a society. Mass media is expected to share risk information and set the social agenda, while social media nourishes social acceptance or refusal of risk based on interactive dialogue. However, sharing risk information in a highly uncertain situation is difficult, and there are concerns that hybrid media would amplify societal polarization about risk and make risk communication difficult. The challenge is taming such a hybrid media environment and making it possible for each layer of society to engage in dialogue, mutual consideration, and co-production regarding risks.

## Chapter 7 **Food**
## **: With a Central Focus on Foods That Use Genetic Technology**

TANAKA Yutaka
(Professor, Faculty of Informatics, Osaka Gakuin University)

In this paper, foods that use genetic technology, such as genetically modified foods and genome-edited foods, were mainly focused on. The paper showed that it is useful to know the psychological characteristics of consumers' risk perception and the psychological factors that influence their acceptance of risk, and to utilize psychological models in risk communication. The importance of providing consumers with scientific and easy-to-understand explanations about biotechnology and genetic technology was also discussed. Then, as examples of risk communication in a broader sense, the "Bio-Station" website on genome editing and the free distribution of genome-edited tomato seedlings with high GABA accumulation (cultivation monitoring) were introduced. It was explained that risk literacy is one of the literacies necessary for people today, and that consumers' mastery of risk literacy is a prerequisite for risk communication. Finally, it was also touched on what the government and researchers should learn through risk communication with consumers.

## Chapter 8 **Nuclear Energy**

YAGI Ekou
(Professor, Center for the Study of Co Design, Osaka University)

This chapter outlines risk communication regarding nuclear power in Japan, divided into four categories: 1) from the 1960s to the 1980s, when nuclear power plants were finding locations and being constructed in Japan; 2) from the 1990s to the 2000s, when many accidents and scandals attracted public attention; 3) the period immediately after the Fukushima Daiichi Nuclear Power Station accident in 2011; and 4) recent years of social transformation toward a decarbonized society.

Risk communication issues surrounding nuclear power are not limited to nuclear power generation. There are many issues; for example, the disposal of high-level radioactive waste, and interim storage of spent nuclear fuel. There are also many issues surrounding the Fukushima Daiichi nuclear accident.

This chapter provides an overview of nuclear risk communication with a focus on finding locations for, constructing, and restarting nuclear power plants, but it should also be noted that the perspective of risk communication surrounding nuclear energy is more expansive.

## Chapter 9 **Climate Change**

EMORI Seita
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and
ASAYAMA Shinichiro
(Senior Researcher, Social Systems Division, National Institute for Environmental Studies)

Climate change risks are characterized by being global scale and long term, and having complexities and uncertainties in causal relationships. There are two types of responses to climate change: adaptation measures that address individual impacts given that climate change is already underway, and mitigation measures mainly through the reduction of greenhouse gas emissions to curb global warming over the long term. With respect to risk communication regarding adaptation, event attribution, which evaluates the contribution of global warming to actual extreme weather events, has been attracting attention in recent years. On the other hand, in risk communication regarding mitigation, a major issue is how people in society should perceive and discuss climate information disseminated under the influence of skepticism and alarmism. In Japan, Citizens' Climate Assemblies, in which randomly selected members of the public discuss climate change actions, have been attempted. The provision of information on climate change risks by experts in such forums possibly offers an opportunity for interactive communication.

## Chapter 10 **Information and Communication Technology**

KUDO Mitsuru
(Associate Professor, Center for Meta-Learning, School of Systems Information Science, Future University Hakodate)

Risk communication on information and communication technology (ICT) has constantly paid close attention to security-related risks and measures expected to be taken at personal and/or organisational levels. Although such risk communication will remain crucial to our heavily ICT-dependent society, risks around advanced and emerging ICTs and associated social phenomena, including cyber security issues on supra-national and global scales, actual/expected transformation of social activities such as employment, and the duality of real-virtual societies, require us to expand our scope of risk communication. By drawing on recent arguments in studies of risk communication and their growing emphasis on collaboration and participation in conceptualising risks, this chapter presents an overview regarding how risks about ICT can and/or should be communicated in a way to promote societal discussion attended by wider groups of people in our society. The chapter identifies and outlines three important forms of risk communication about ICT depending on their primary purposes: 1) to raise awareness of ICT users about risks related directly to their use of ICT; 2) to draw social attention to actual and potential impacts of advanced and emerging ICTs on many different parts of our society; and 3) to promote participation of people from different social, cultural and professional/non-professional backgrounds in collaboratively conceptualising risks and designing responses

## Chapter 11 **Disaster**

SADAIKE Yuki
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Tohoku University)

This chapter deals with risk communication related to natural disasters. A natural phenomenon such as an earthquake, tsunami, or volcanic eruption becomes a disaster when it damages society, and disaster risk depends on "choice" and vulnerability to the hazard. Since the phases of disasters need to be divided more finely than the phases of general risk communication, this paper attempts to organize them with reference to the phases of disaster information. Unlike ordinary risk communication, disaster education, one type of disaster risk communication, requires imparting knowledge and sharing knowledge in order to take actions to protect lives, and has the aspect of encouraging behavior change through education. While all approaches to disaster education can be applied to people who have never experienced a disaster, disaster education for disaster survivors must be combined with psychological care. In addition, risk communication, science communication, and outreach activities are interrelated areas; when communicating with people in practice, we need to listen to what they have to say and be attentive to their feelings.

## Chapter 12 **New Challenges Revealed by Experience with COVID-19**

NARA Yumiko
(Professor, Faculty of Liberal Arts, Open University of Japan)

The COVID-19 pandemic that began in 2020 has been a spiraling disaster, with waves repeating until they converge. It has affected not only medical health, but also the economy, education, and many other sectors. Scientific knowledge related to pandemics is "science in action," and the process of overcoming disasters has always been shrouded in great uncertainty. Various stakeholders, including politicians, experts, and citizens, have attempted risk communication in this process.

This report provides an overview of research, practice, and evaluation of risk communication related to COVID-19 in Japan and abroad, and presents issues to be addressed in the future, including information dissemination, the relationship between scientific knowledge and policy-making, trust building, dialogue, co-consideration, collaboration, and human resource development for risk communication and its positioning in organizations.

## Chapter 13 **Lessons of a Cross-National Comparative Study on the Responses to the Pandemic: Perspectives of Science and Technology Studies**

JURAKU Kohta
(Professor, Department of Humanities, Social and Health Sciences, School of Engineering, Tokyo Denki University)

The measures taken by Japan's national government to combat the COVID-19 pandemic, particularly during the early stages, have not been widely positively accepted by Japanese society despite the country experiencing relatively low infection and death rates. Some people believe that advancements in risk communication could potentially resolve this issue. However, the primary and fundamental objective of risk communication is to foster dialogue and collaboration among stakeholders in order to address various risks in contemporary society, not just to persuade the general public. This chapter will present a path for enhancing risk communication in that context by providing a summary of an international comparative study from the field of science and technology studies on responses across different countries. It wills discuss the importance of a *social compact*, a concept of "the way people imagine proper relations between the state and the citizen" (Jasanoff et al. 2021). How should expertise be utilized for public interests, and by who? Where is the boundary of the authority between experts and other actors in society? This chapter will argue for the benefits of risk communication that is deliberately aware of the specific social compact within Japanese society.

## Chapter 14 **Risk Communication in the Context of Public Law**

KIRA Takayuki
(Associate Professor, Faculty of Law, Aichi University)

This chapter outlines the tasks of risk communication from the perspective of the public law system. "Public law" refers to the field of law relating to governmental power, of which constitutions and administrative law are the most typical examples. This chapter examines the transformation into an "administrative state", in which administrative activities in response to various specific risks are diversified and expanded, as a situation common to developed countries. The risk of this becoming dysfunctional is seen as a second-order risk. One of the key functions of public law is to allocate powers to the departments responsible for responding to risks. However, the risk of mismatch arises when the nature of the risk and the capacity of each department are misjudged. This can undermine the adequacy of the administrative process or its legitimacy in terms of public confidence. The question is what role the legislature and the judiciary can play in complementing this. This chapter presents two arguments: the ideationalization project, which embodies the ideals that govern administrative activity, and the proceduralization project, which controls the process of administrative activity. In both cases, it is important to keep in mind the multi-layered nature of the legal system and its internal interactions.

# Chapter 15 **Science and Technology Risks and Communication Human Resource Development**

TANEMURA Takeshi
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The purpose of this chapter is to provide an overview of risk communication human resource development and to present future challenges. In Section 1, the capabilities required of risk communicators are summarized. Section 2 introduces human resource development initiatives being implemented in each area, along with examples from overseas. Section 3 summarizes the challenges of human resource development. The column at the end of the chapter introduces the contents of interviews with researchers involved in the implementation of human resource development programs.