

Preface

Today's society seems to be preoccupied with the notion of risk. The examples of the devastating flood in Pakistan in 2010, the hurricane Katrina in 2005, the so called "Mad Cow Disease" (BSE) in Great Britain, the terrorist attack on the World Trade Center in New York, and the major accident of a nuclear power plant in Chernobyl to name just a few, have gained much public attention and have given rise to a growing discontent between the public's desire to see risks reduced and the actual performance of risk management institutions. There is confusion about the potential of risk assessment and risk management. What can society do to reduce risks? What does the term "risk" imply and how is this term understood among engineers and statisticians, natural and social scientists, regulators, social groups and the public at large? What is so special about risk that makes it such an important issue in contemporary politics?

There are more questions than answers when people talk about risks (Short 1984; Aven 2003; Renn 2008). The career of the term "risk" is a rather recent phenomenon, however (Fischhoff et al. 1984). Of course, risk has always been part of human existence and the field of risk research started as early as human beings started to reflect on the possibility of their own death and contemplated actions to avoid dangerous situations. The fundamental mathematical tool for risk assessment, probability theory, was developed centuries before actual risk analyses were performed on technical systems. A systematic scientific attempt to study risks in society and to professionalize risk management agencies is a rather recent addition, however. Several authors claim that systematic studies of risk began with Chauncy Starr's seminal article on risk and voluntariness in 1968 (Starr 1969; Kates and Kaspersen 1983; Covello and Mumpower 1985). Others date the beginning in the early 1950s when space exploration programs were designed and probabilistic tools of safety analysis were developed and implemented (Kolluru 1995). Others again associate the first risk assessment studies of chemical or nuclear power plants with the beginning of risk research (Royal Society 1992). Whatever date one chooses, the preoccupation with risk is a rather recent phenomenon in contemporary society and, thus, still an emerging topic in the long tradition of scientific analysis.

The emergence of this topic and its fascinating scope has attracted the two of us to this subject. Why is this topic so fascinating? First of all, risk is paramount to our understanding of human agency. We presume that human beings have agency and that they can choose from a variety of behavioral options (Renn 2008). Agency presupposes that human beings are capable of acting in a strategic fashion by linking decisions with potential outcomes. Humans are goal oriented; they have options for action available and select options that they consider appropriate to reach their goals. Selecting options implies that humans consider and weigh the opportunities and risks that are linked with each option. Thinking about “what could happen” is one of the major distinctions between instinctive and deliberate actions. Hence, in this book we will specifically explore the connections between risk and decision making.

Second, risk plays a major role in most contemporary theories about modern or post-modern societies. Not by chance did Ulrich Beck call his famous book on reflexive modernity *The Risk Society* (Beck 1986, 1992b). Risk has become an essential part of modern society which has been adopted by many scholars and has inspired many analyses about the foundation of modernization and the evolution of governance structures relating to managing uncertainties in a world full of contingencies. This is the reason why we have chosen the concept of governance to describe the societal handling of risk.

Third, risk is not just a fascinating academic subject; it has a direct impact upon our life. People die, suffer, get ill or experience serious losses because they have ignored or misjudged risks, miscalculated the uncertainties or had too much confidence in their ability to master dangerous situations. The institutional means of societies to deal with risks have direct and often painful, consequences for each individual affected by collective actions and arrangements. Risks cannot be confined to the ivory tower of scholarly deliberations. It clearly affects the lives and livelihoods of humans all over the world. Therefore, it is so important that our concept of risk covers both the best technical estimate of the harm as well as an understanding of the social and cultural context in which risks occur. In this book we have tried to give justice to these two sides of risk – the analytical as well as the practical aspects.

Fourth, risk is a truly interdisciplinary, if not transdisciplinary, phenomenon. Risk is a popular topic in many sciences: aspects of risk are studied in the natural, medical, statistical, engineering, social, cultural, economic and legal disciplines. Yet, none of these disciplines can grasp the entire substance of this issue; only if they combine forces can one expect an adequate approach to understanding and managing risks. Investigating risks necessitates a multidisciplinary approach. Risk is like a polished gem with different facets: each facet reflects the light in different colors; but the whole gem can be appreciated only if the images of all the facets are being absorbed. This is the reason why this book has been written jointly by a researcher based on the engineering and statistical tradition and a social scientist. Combining the two major domains of science, the technical/natural and cultural parts of our world, this book should also be seen as an example of the synergies one can accomplish when the two camps meet and cooperate.

Given these four reasons, the main purpose of this book is to illuminate as many of the facets of our polished gem as the two of us were able to detect. In particular, our emphasis is on integration: we attempt to provide an in-depth-understanding of the mathematical and analytical rigor of risk analysis and its outcomes without falling into the usual jargon that may be discomfiting to those unfamiliar with mathematical algorithms and formulas. At the same time, we intend to familiarize the more analytically inclined reader with the richness and subtle insights of social science research into risk issues. Our goal is to build bridges between the two science camps. This is not only a desirable goal for its own sake, but, more importantly crucial for improving our performance in risk assessment and risk management. As a physician may be able to understand a mysterious disease only, if he or she investigates all the relevant medical and behavioral facets, so thinking about risk in an integrated fashion helps society to gain more knowledge and expertise in detecting, assessing, evaluating and managing complex risks. There are many textbooks on risk – but usually either seen from a natural science or engineering angle or from a typical social or cultural science perspective. There is a lack of truly integrated approaches to grasp risk from a holistic perspective. This book is meant to meet this challenge.

This first chapter sets the stage for integrated analysis of risk. It provides a description of our understanding of risk, its crucial components and the context in which risk plays a major role. The second chapter is devoted to an overview of risk concepts in different disciplines and traditions. The following chapters introduce the risk governance cycle that we have taken from the model proposed by the International Risk Governance Council (IRGC 2005). The framework builds upon the logical structure of four consecutive phases called reassessment, appraisal, characterization/evaluation and management. In addition, risk *communication* accompanies all four phases. Within each of the boxes, specific activities are listed that are deemed essential for meeting the requirements of good governance. These five phases serve as the main guidance for structuring Chaps. 3–8. Since the term risk communication also includes the important issue of stakeholder involvement and participation, we decided to devote a chapter on its own for this subject (Chap. 9) and another one for stakeholder and public involvement (Chap. 10). Chapters 11–13 illustrate these more abstract steps of risk governance through three distinct case studies. These cases illustrate the need for improvements in risk assessment as well as in risk management. The last Chap. 14 summarizes the main results of our analysis and provides some major lessons for decision and policy makers in economy, politics, and society.

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