

Contents

<i>Preface</i>	<i>page</i> vii
<i>Acknowledgments</i>	xi
1 Introduction to risk management and risk assessments. Challenges	1
1.1 General features of risk management and risk assessments	1
1.2 Challenges	13
2 Concepts and perspectives on risk	16
2.1 Risk equals expected value	16
2.2 Risk is defined through probabilities	17
2.3 Risk is defined through uncertainties	20
2.4 Other definitions of risk	20
2.5 Comparison of some common risk definitions and the (A,C,U) perspective	21
2.6 The ontological status of the various risk concepts	22
2.7 A risk assessment perspective based on the (A,C,P _f) definition	23
2.8 A risk assessment perspective based on the (A,C,U) definition	27
2.9 Example: Offshore diving activities	29
2.10 Summary of concepts and perspectives	31
3 Science and scientific requirements	32
3.1 Reflections on risk assessment being a scientific method	32
3.2 Review of some traditional sciences important for risk assessment and risk management	35
3.3 Risk assessment as a scientific method. The reliability and validity requirements	38

vi	<i>Contents</i>	
4	Introduction to case studies	41
4.1	Working accidents	41
4.2	An LNG plant in an urban area	44
4.3	The design of a safety system	49
5	Risk assessment when the objective is accurate risk estimation	51
5.1	Scientific basis	51
5.2	Case 1: Statistical inference of accident data	52
5.3	Case 2: QRA of the LNG plant	61
5.4	Case 3: Design of a safety system	67
5.5	Discussion	68
6	Risk assessment when the objective is uncertainty descriptions	76
6.1	Scientific basis	76
6.2	Case 1: Statistical inference of accident data	77
6.3	Case 2: QRA of LNG plant	85
6.4	Case 3: Design of a safety system	94
6.5	Discussion	94
7	Risk management and communication issues	103
7.1	The use of predefined risk criteria	103
7.2	The use of the ALARP principle and cost–benefit type of analyses	107
7.3	The role of the cautionary and precautionary principles	115
7.4	Risk communication	124
7.5	The content and purpose of managerial review and judgement	129
8	Towards a holistic scientific approach to risk assessment	138
8.1	What is risk? A structure for conceptualising and describing risk	139
8.2	A model-based framework for risk assessments	144
8.3	Probability and alternative approaches for representing (expressing) epistemic uncertainties	154
9	Conclusions	174
<i>Appendix A</i>	Introduction to probability theory and statistical analysis	178
<i>Appendix B</i>	Terminology	197
	<i>References</i>	200
	<i>Index</i>	210