

Contents

Preface — V

1 Introduction to risk management (RM) — 1

- 1.1 The RM process — 3
- 1.2 RM and resources/financial aspects — 5
- 1.3 RM and safety culture — 6
- 1.4 The role of education — 9
- 1.5 Safety management education — 11
- 1.6 Conclusion — 12
- References — 13

2 The need for engineering risk management (ERM) education — 15

- 2.1 Is ERM only a matter of professionals and professional training? — 15
 - 2.1.1 The third safety revolution: CHES — 15
 - 2.1.2 Teaching engineering risk management (ERM) — 17
 - 2.1.3 Digitalization and education — 18
- 2.2 Could we make an optimal prevention without education? — 18
 - 2.2.1 Educational approaches — 18
 - 2.2.2 Person- and behavior-based safety — 19
 - 2.2.3 Improved KPABC model — 20
 - 2.2.4 Safety as a separate education subject – and not — 21
- 2.3 Standards and education — 22
 - 2.3.1 Standards in the education of engineering risk managers (ERManagers) — 22
 - 2.3.2 Competence required by the application of standards in ERM — 24
- 2.4 Conclusion — 26
- References — 26

3 Education profiles for ERM — 29

- 3.1 Different education profiles for ERManagers — 29
- 3.2 Elements for education of the “classic risk manager profile” — 32
 - 3.2.1 The process industries as an example — 33
 - 3.2.2 The classic risk manager profile — 37
- 3.3 Elements of education of a continuing education profile — 38
- 3.4 Different forms of safety education — 41
- 3.5 Conclusion — 49
- References — 49

4 Learning characteristics and outcomes — 51

- 4.1 Safety teaching and training — 51
- 4.2 Process safety education (as an example) — 53
 - 4.2.1 Introduction — 53
 - 4.2.2 Process safety accreditation — 55
 - 4.2.3 Process safety curricula — 56
 - 4.2.4 Teaching strategies for process safety — 56
 - 4.2.5 Process safety research fields — 57
 - 4.2.6 Process safety collaboration strategies — 58
 - 4.2.7 Process safety competence — 60
 - 4.2.8 Process safety training — 61
 - 4.2.9 Process safety education: a discussion — 62
- 4.3 Conclusion — 63
- References — 64

5 Example of safety or ERM education programs, courses and contents — 69

- 5.1 University programs — 69
 - 5.1.1 Skills required in the educational background of ERManagers — 69
 - 5.1.2 Competence providers — 69
 - 5.1.3 General framework of university programs for ERM education — 71
- 5.2 Different examples from different countries — 73
 - 5.2.1 Industrial risk management — 74
 - 5.2.2 Reliability and safety management — 77
 - 5.2.3 Process safety management — 78
 - 5.2.4 Disaster risk management — 80
 - 5.2.5 Environmental risk management — 81
- 5.3 Illustrative courses — 84
- 5.4 Conclusions — 84
- References — 88

6 Conclusions and perspectives — 89

- 6.1 Perspectives on risk management education — 89
- 6.2 New technologies and new delivery formats for education and networking — 90
- 6.3 Competences and resources for education — 95
- References — 99

Acronyms — 101

Index — 103