Risk Management of Technical Systems

Alessandro BIROLINI

ETH Zürich, Firenze birolini@emeritus.ethz.ch

Abstract

Besides natural accident/disasters, like earthquakes or floods, to which humankind is often inevitably and dramatically exposed, questions on risk and risk management practically arise in all human activities, at different degree and in a more or less objective form. After a short introduction to the concepts of safety, risk, risk acceptance, and risk management, this contribution focuses on risk management related to repairable equipment & systems for which external influences (human or other) are important, with particular attention to new models for risk analysis, and by introducing the concept of mean time to accident /disaster (MTTA). Not considered is risk & risk management in climate, health and financial fields, as well as in relation to project management, security, sociological & ethical aspects; for all these one can refer to [21, 24, 8], as well as [13, 14, 10, 16, 17, 19, 20, 22]. This contribution is an invited paper at CCF-2016, based on [5].

Keywords: Risk, Safety, Security, System, Management, Risk Acceptance, Technical System, CCF 2016

References:

[1] Apostolakis G.E., "How useful is quantitative risk assessment?", Risk Anal., 24(2004), pp. 515-20.

[2] Aven T., Foundations of Risk Analysis, 2003, Wiley, NY; -, "Selective critique of risk assessment with recommendations for improving methodology & practice", Rel. Eng. & Syst. Safety, 2011, pp. 509-14; -, "Risk analysis", pp. 125-49 in [18]

[3] Bedford T. et al., Probabilistic Risk Analysis: Foundations & Methods, 2001, Cambridge. Univ. Press, UK.

[4] Birnbaum L.W., "On the importance of different components in a multi-component system", in Multivariate Analysis Vol 2, 1969, Academic Press, NY.

[5] Birolini A., Reliability Engineering: Theory & Practice, 8th Ed. 2017, Springer, Berlin.

[6] Digman J.M., "Personality structure: Emerg. 5-factor model", An. Rev. of Psychology, 4(1990), pp. 417-40.

[7] ESA ECSS-M-00-03A: 2004: Risk Management.

[8] Frenkel M. et al. (Eds.), Risk Management, 2nd ed. 2005, Springer, Berlin (also in [1.9]).

[9] Gilovich T. et al. (Eds.), Intuitive Judgment: Heuristics and Biases, 2002, Cambridge Univ. Press, UK.

[10] Habegger B. (Ed.), Int. HDBK of Risk Analysis & Management, 2008, Center for Security Studies, ETH Zurich.

[11] Hillson D. et al., Understanding & Manag. Risk Attitudes, 2007, Gower, Burlington, Vermont.

[12] Hubbard D., The Failure of Risk Management - Why it's broken and how to fix it, 2009, Wiley, NY.

[13] IEC 61508: 2010: Functional Safety; 62198: 2013: Managing Risk in Projects.

Asigurarea Calitatii - Quality Assurance, ISSN 1224-5410 Vol. XXII, Issue 87, July-September 2016 Pages 7-14

[14] ISO 73: 2009: Risk Manag. - Vocabulary; 31000: 2009: Risk Manag. - Principles & Guidelines (14971: 2007: Medical; 27005: 2011: Security Tech.); ISO/IEC: 31010: 2009: Risk Manag. Assessment Techn.; 16085: 2006: System & Software Eng. - Life Cycle Process -Risk Manag.; 98-3:2008: Uncertainty of Measurements.

[15] Liu B., Uncertainty Theory, 2015, Springer, Berlin.

[16] MacLean D., "Ethics and risk" pp. 791-804 in [6.108].

[17] Nicholson N. et al. "Personality & domain spec. risk taking" J. of Risk Research., 8(2005)2, pp. 157-76.

[18] Pham H. (Ed.), Safety and Risk Modeling and its Applications, 2011, Springer, Berlin.

[19] Roeser S. et al., (Eds.), Handbook of Risk Theory, Vol. 1 & 2, 2012, Springer, Berlin.

[20] Roeser S. et al., (Eds.), The Ethics of Technological Risk, 2009, Earthscan, London.

[21] US Gov. Ac. Office, Climate Eng., 2011, http://psych.cf.ac.uk/understandingrisk/docs/spice.pdf.

[22] Umiker B. et al., "Wie lassen sich grosse Industriekatastrophen verhüten?", Manag. Zeitschrift, 1(1987), pp. 15-22; "Innovation and resistance to it", 7th Building Congress, Zurich, Nov. 13, 2008; Umiker B. (www.wuco.ch), "The modern art of a discourse on risk", 4th Europ. Conf. on Safety Anal. & Risk Manag., Rome, Oct. 19, 1993; "Risk management: Concept and implementation", ASCOM Tech. Mag., 3(1994), pp. 33-36; "The coconut effect", Amer. Soc. for Ind. Security Meeting, Zurich ETH, June 4, 1997; "Krisenbewältigungdurch Innovation", 2009, Bau & Architecktur 4(2009), pp. 2-4.

[23] Wang J.X. et al., Risk Engineering and Management, 2000, Dekker, NY.

[24] World Health Organization, Global Health Risks, 2009, WHO, Geneva.