



RISK LEXICON

1. Introduction

This Risk Lexicon has been developed by the OPSS risk group with the aim of facilitating clear dialogue and communication within OPSS on the topic of risk and risk-related matters. Because multiple definitions of 'risk' and associated terms such as 'hazard' and 'harm' exist, it is important that as an organisation OPSS is clear what is meant when such terms are used in discussion, in OPSS documents, etc. Similarly, a risk lexicon helps provide clarity to stakeholders when in dialogue with OPSS on risk-related matters, and when reading relevant OPSS publications.

The definitions used within the lexicon were initially developed via a process of consensus using the Delphi method (expert panel within OPSS) and with reference to published research. This was followed by a second round of consensus via the Delphi method, this time using an expert panel of external academics. Finally, feedback on the draft lexicon was sought from a range of OPSS staff.

2. Contents

The terms featured within the lexicon have been categorised as either core or supplementary. Core terms are those central to the topic of risk, and on which the meaning must be clear to avoid confusion and misunderstandings. Supplementary terms are relevant to the topic of risk but are likely to be significant only in certain contexts.

Under the core and supplementary headings, the terms are presented in what is felt to be a logical order.

3. Core Terms

Hazard

Definition: "A potential source of harm".

Note: This is a wide definition that includes products, substances, processes, premises, infrastructure and activities. The level of a hazard will be determined by the nature of the harm it can cause (in terms of its severity) and the anticipated extent of that harm (e.g. in terms of the number of people that could be affected). The EU Rapex guidelines give the following definition: "Hazard is the intrinsic property of the product that may cause an injury to the consumer who uses the product."¹.

¹https://ec.europa.eu/consumers/consumers_safety/safety_products/rapex/alerts/repository/content/pages/rapex/docs/Guidelines%20annex_en.pdf

Harm

Definition: "Adverse impact on individuals, the environment, infrastructure, property, animals, or businesses, and which can include human injury² and ill health, damage (including disruptions) to property, damage to the environment, or economic loss".

Note: This is a wide definition that includes physical, mental³, social and economic adverse impacts. It can also extend to the failure to deliver a benefit or preventing a benefit from being realised.

Severity of Harm

Definition: "The harm (physical, psychological, environmental, etc) that a hazard can potentially cause can have different degrees of severity. The severity of the harm thus reflects the effect the hazard has on the subject under the conditions described in the particular scenario."⁴

Note: The guidelines for the management of the European Union Rapid Information System 'RAPEX' established under Article 12 of Directive 2001/95/EC (the General Product Safety Directive) distinguishes four severity categories, depending on such factors as the reversibility of an injury, i.e. whether recovery from an injury is possible and to what extent. This categorisation is for guidance only, and a risk assessor should change the category if necessary, and report it in the risk assessment; this should be done to reflect a range from a negative effect not likely to require medical attention (i.e. can be treated with first aid) to acute, long-term adverse health impact or death.

Risk

Definition: "A function of the level of a hazard and the likelihood (or probability)^{5 6} that the hazard will cause harm".

Note: In some regulatory contexts, the likelihood of compliance / non-compliance is used as a proxy for the likelihood of a hazard causing harm⁷.

Risk is an event that can have negative impact (harm). Conversely an event that can have a positive impact (benefit) is an opportunity⁸, so any situation in which the consequences can be identified beforehand, or assessed post event, in terms of positive and negative impact will, by definition, be classified as either risks or opportunities⁹.

² Injury here can refer to that caused to a person(s) or non-human animal(s) that is psychological as well as physical.

³ Mental here can refer to psychological harm. See Persad, G. (2015). Law, science, and the injured mind. *Ala. L. Rev.*, 67, 1179.

⁴ Guidelines for the management of the European Union Rapid Information System 'RAPEX' established under Article 12 of Directive 2001/95/EC (the General Product Safety Directive) and its notification system

⁵ The term likelihood is synonymous with the term probability, given that here and throughout a likelihood estimate a probability estimate attributed to a hazard that will cause harm; where likelihood cannot be measured or estimated given the available paucity of data, then an estimate of uncertainty of the likelihood is necessary to indicate the risk as an event where the outcome is estimated with some degree of uncertainty (see Aven & Renn, 2009; Jenkins, Harris, Osman, 2020; Osman, 2016).

⁶ Aven, T., & Renn, O. (2009). On risk defined as an event where the outcome is uncertain. *Journal of risk research*, 12(1), 1-11.

⁷ Roselius, T. Consumer rankings of risk reduction methods. *Journal of Marketing*, 1971, 35, 56-61. Roselius identified a sixth variety of risk: "Time loss: when some products fail, we waste time, convenience, and effort getting it adjusted, repaired, or replaced." (1971, p. 58)

⁸ COSO (Committee of Sponsoring Organizations of the Treadway commission, 2004). *Enterprise Risk Management: Integrated framework*, www.coho.org/publications.htm.

⁹ Fenton, N., & Neil, M. (2012). *Risk assessment and decision analysis with Bayesian networks*. Crc Press.

Probability of Harm

Definition: “The likelihood (probability estimate) of the identified hazard causing harm; this refers to a harm scenario that may indeed materialise during the expected duration of a hazard”¹⁰

Note: the probability of harm can be expressed as a point estimate (typically ranging from 0 to 1); in descriptive terms such as high, medium or low; or both, by attaching descriptions to different point estimates, e.g. >0.5 (or >50%) = very high probability.

Risk Assessment

Definition: “The process by which the level of risk associated with a particular hazard is identified and categorised”.

Note: The categorisation process normally allows comparisons to be made between different hazards.

Risk Evaluation

Definition: “The process by which the outcome of a risk assessment is combined with policy considerations to characterise the risk and inform decisions on risk management”.

Note: relevant policy considerations can include how the risk is perceived by the public, political concerns and societal concerns, and wider organisational objectives. Other considerations might include the nature of the risk, in particular whether it is created by a high level of hazard or a high likelihood of harm, and its characteristics (e.g., controllability, familiarity).

Risk Management

Definition: “The elimination, control or mitigation of risk”.

Risk Analysis

Definition: “The constituents of a process by which situations of risk are considered and involves identifying: (1) the hazardous event whose occurrence would cause the risk, (2) the consequence(s), known as harm, associated with that event, (3) the population at risk, (4) the risk per unit of exposure, (5) the level of exposure of members of the population”^{11,12}

Note: Risk analysis can be taken to refer to the formal constituent procedures required when considering situations of risk, and these include: risk assessment, risk evaluation, risk management and risk communication ^{13 14 15}.

¹⁰ Guidelines for the management of the European Union Rapid Information System ‘RAPEX’ established under Article 12 of Directive 2001/95/EC (the General Product Safety Directive) and its notification system

¹¹ Van Duijne, F. H., van Aken, D., & Schouten, E. G. (2008). Considerations in developing complete and quantified methods for risk assessment. *Safety Science*, 46(2), 245-254.

¹² Jarrett, R., & Westcott, M. (2010). Quantitative risk. *Dealing with uncertainties in policing serious crime*, 16(1), 67.

¹³ This order is not necessarily fixed.

¹⁴ Risk analysis as defined by Codex Alimentarius Commission (CAC) (World Health Organization [WHO]/Food and Agricultural Organization of the United Nations [FAO], 2015).

¹⁵ Jenkins, S., Harris, A., Osman, M. (2020). Influence of Psychological Factors in Food Risk Assessment – A Review. *Trends in Food Science & Technology*. <https://doi.org/10.1016/j.tifs.2020.07.010>

Risk-based Regulation

Definition: “Where consideration of risk is embedded in regulatory decision making at all levels, and priorities are established according to the outcomes of risk assessment.”

4. Supplementary Terms

Risk Communication

Definition: “¹⁶The interactive exchange of information and opinions throughout the risk analysis process concerning the existence, nature, form, severity or acceptability of risk, risk-related factors and risk perceptions among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions¹⁷”

Note: There is a need to acknowledge that the communication of risk is integral to the entire risk analysis process, and it is often adapted to suit the recipient (e.g. risk assessor, risk manager, policy maker, media, citizens, industry). Risk communication includes content conveyed numerically (e.g. probabilities, frequencies) and/or categories or ranks (e.g. low, moderate, high) that represents risk to audiences that are engaged with and dependent upon risk analysis.

Risk Appetite

Definition: “The amount of risk an entity (individual, organisation, regulator) is willing to accept in pursuit of value (e.g. financial, personal, societal, political) to that entity¹⁸”

¹⁶ World Health Organization/ Food and Agricultural Organization of the United Nations. (2015). *Codex Alimentarius Commission Procedural Manual - Twenty Fourth Edition* (WHO/FAO, 2015, p.120)

¹⁷ Risk communication can be a form of risk management, in and of itself. Plough & Krinsky 1987 have a nice definition that I've tried to incorporate: “any public or private communication that informs individuals about the existence, nature, form, severity or acceptability of risks”. (see, Plough, A., & Krinsky, S. (1987). The emergence of risk communication studies: social and political context. *Science, Technology, & Human Values*, 12(3/4), 4-10.

¹⁸ Though note the following variants – of which this is not an exhaustive list:

ISO- Amount and type of risk that an organization is prepared to pursue or retain

COSO- The amount of risk an entity is willing to accept in pursuit of value (it also refers to the degree of risk, on a broad-based level, that a company or other entity is willing to accept in pursuit of its goals)

HM Treasury's Orange Book-The amount of risk that is judged to be tolerable and justifiable

Institute of Internal Auditors, from its glossary- The level of risk that an organization is willing to accept

Dupoy-The investor's willingness to buy risky assets

Office Government Commerce U.K.- The amount of risk the organization, or a subset of it, is willing to accept

Towers Watson - The total risk that an organization is willing to take to achieve its strategic objectives and meet its obligations to stakeholders

IRMI -The degree to which an organization's management is willing to accept the uncertainty of loss for a given risk when it has the option to pay a fixed sum to transfer that risk to an insurer

BS- Total amount of risk that an organization is prepared to accept, tolerate, or be exposed to at any point in time

BCI- Willingness of an organization to accept a defined level of risk

KPMG -The amount of risk, on a broad level, that an organization is willing to take on, in pursuit of value (or in other words: the total impact of risk an organization is prepared to accept in pursuit of its strategic objectives)

PWC- The quantum of risk that the firm is willing to accept within its overall capacity

Fxtimes- The willingness to take certain risks for a potential gain

Risk Perception

Definition: “attributions of, and/or a recognition of the presence of, risk.

Note: This can be informed by the probability of an occurrence together with psychological factors that include risk origin, severity, controllability, familiarity.”^{19 20}

Risk Preference

Definition: “a tendency reflected in a context(s) where choices are made (that are more or less risky according to a utility function) and where those choices can be classed along a continuum from risk avoiding to risk seeking”²¹

Risk Exposure

Definition: “The vulnerabilities faced by an individual (or population) as an estimated likelihood of a single hazard or a combination of hazards occurring as a direct (or indirect) consequence of activities and their frequency”.

Risk Quantification

Definition: “A means of articulating the size of a risk”

Note: Articulating the size of a risk can be in the form of an estimate, such as the likelihood²² of a hazard (this can be quantified [e.g., 0.001 to 0.01]) causing harm. Where risk cannot be quantified, such that there are cases for which there is limited or no data from which to determine a likelihood estimate, then expert judgment is required to determine a likelihood estimate. Under these conditions, it is appropriate to assert a qualification of the estimate, which involves a rationale for the estimate along with an estimate of uncertainty of the likelihood estimate.

Risk Tolerability

Definition: “The acceptability of a perceived risk based upon the current values of society²³”

Note: The degree to which a risk is tolerable will usually be influenced by the associated benefits derived and the degree to which it is seen as being effectively controlled and managed.

Threat

Definition: “Any situation or circumstances that has the potential to create or increase risk”.

Uncertainty

Definition: “A function of the lack of information and differences in certainty between individuals that reflect differences in personal experience and beliefs”^{24,25}

¹⁹ Jenkins, S., Harris, A., Osman, M. (2020). Influence of Psychological Factors in Food Risk Assessment – A Review. *Trends in Food Science & Technology*. <https://doi.org/10.1016/j.tifs.2020.07.010>

²⁰ Slovic, P. (1999). Trust, emotion, sex, politics, and science: Surveying the risk-assessment battlefield. *Risk analysis*, 19(4), 689-701.

²¹ Weber, E. U., & Milliman, R. A. (1997). Perceived risk attitudes: Relating risk perception to risky choice. *Management science*, 43(2), 123-144.

²² Though more broadly risk quantification is also uncertainty about and severity of the consequences of an activity with respect to something that humans value (INSERT AVEN&RENN 2009 REF)

²³ Though more specifically this can be considered as the trade-off an individual is willing to make between the perceived risk and expected return of pursuing a particular choice of action

²⁴ Fenton, N., & Neil, M. (2012). *Risk assessment and decision analysis with Bayesian networks*. Crc Press.

²⁵ Meder, B., Le Lec, F., & Osman, M. (2013). Decision making in uncertain times: what can cognitive and decision sciences say about or learn from economic crises?. *Trends in Cognitive Sciences*, 17(6), 257-260.

Note: Uncertainty includes the state of belief with respect to the knowledge of a given event, whereby that knowledge can be limited in reliability, is imprecise, can conflict with other information that could have a bearing on the event, or incomplete.

Uncertainty Analysis

Definition: “The recognition and assessment of uncertainties in all the activities concerning the scientific process that is implemented when conducting a risk assessment”²⁶

Note: Uncertainty analysis can be formal (explicit quantification of uncertainties) or informal (explicit qualitative ascription of uncertainties) concerning assertions, claims, conclusions made from a risk assessment that has been conducted, for which causal analysis is a critical factor for ensuring that the analysis is robust, coherent, and accurate^{27, 28}. Agencies such as the European Food Standards Authority outline possible procedures that can be carried out to support uncertainty analyses, which include (1) identifying uncertainties; (2) describing uncertainties; (3) assessing individual sources of uncertainty; (4) assessing the overall impact of all identified uncertainties on the assessment output, taking account of dependencies; (5) assessing the relative contribution of individual uncertainties to overall uncertainty; (6) documenting and reporting the uncertainty analysis²⁹.

Precautionary Principle

Definition: “The principle under which protective action(s) is taken for the purpose of avoiding harm from an identified hazard, in circumstances where there is limited or no reliable evidence on the extent of the risk posed by that hazard, on the basis that taking no action could allow significant harm to occur.”^{30, 31, 32, 33}

Risk Mitigation

Definition: “Actions taken that can potentially limit (but not usually eliminate) the harm that occurs when a risk is realised”.

Causal Analysis of Risk

Definition: “The characterisation of risk in the context of causality”

²⁶ Osman, M. (2016). Making a meal out of uncertainty. *Journal of Risk Research*, 1-4.

²⁷ EFSA Scientific Committee, Hardy, A., D. Benford, T. Halldorsson, M. J. Jeger, H. K. Knutsen, S. More, H. Naegeli, et al. 2018a. “Guidance on Uncertainty Analysis in Scientific Assessments.” *EFSA Journal* 16 (1): e05123.

²⁸ Neil, M., Fenton, N., Osman, M., & Lagnado, D. (2019). Causality, the critical but often ignored component guiding us through a world of uncertainties in risk assessment. *Journal of Risk Research*, 1-5.

²⁹ Osman, M. (2016). Making a meal out of uncertainty. *Journal of Risk Research*, 1-4.

³⁰ Bourguignon, D. (2016). The precautionary principle. Definitions, applications and governance in-depth analysis. *European Parliamentary Research Service*.

³¹ Commission of the European Communities. (2000). Communication from the Commission on the precautionary principle.

³² Christiansen, A. (2019). Rationality, Expected Utility Theory and the Precautionary Principle. *Ethics, Policy & Environment*, 22(1), 3-20.

³³ Gee, D., MacGarvin, M., Stirling, A., Keys, J., Wynne, B., & Vaz, S. G. (2001). *Late lessons from early warnings: the precautionary principle 1896-2000*. P. Harremoës (Ed.). Luxembourg: Office for Official Publications of the European Communities.

Note: The characterisation process can be formal (involving quantification of the likelihood of events based on the causal structure of the context of interest) or informal (any representation of identified causes and effects within the context of interest). These characterisations involve identifying: trigger event (initiating event), risk event (the estimation of a negative event occurring), opportunity event (the estimation of a positive event occurring), controls (events that are likely to prevent the trigger event(s) from causing the risk event), mitigating event (events that can potentially prevent the negative consequence of the negative event occurring), impediment event (events that can potentially prevent the positive consequence of the positive event occurring)³⁴.

Product

Definition: “An item offered in a competitive market that is represented as serving a consumer need”

Note: The GPSR 2005 definition states: ““product” means a product which is intended for consumers or likely, under reasonably foreseeable conditions, to be used by consumers even if not intended for them and which is supplied or made available, whether for consideration or not, in the course of a commercial activity...”.

Product Liability

Definition: refers to the liability of manufacturers, processors, distributors, and sellers of products for personal harm, injury, or damage (including negligence, strict liability, and breach of warranty).³⁵

Note: 'liability' here can include the responsibility of one party for harm or damage caused to another party, which may be a cause for compensation, financially or otherwise, by the former to the latter. The details for product liability also extend to products that include artificial intelligence, or else smart functionalities; (EU commission paper liability SWD (2018) 137 final).

Utilities

Definition: “The associated costs and opportunities associated with the outcomes identified, in situations for which a risk analysis is applied”.

³⁴ Fenton, N., & Neil, M. (2012). *Risk assessment and decision analysis with Bayesian networks*. Crc Press.

³⁵ Rustad, M. L., & Koenig, T. H. (2005). The tort of negligent enablement of cybercrime. *Berkeley Tech. LJ*, 20, 1553.