

Limitations of Risk Assessment

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Many of you here remember that when our Society for Risk Analysis was brand new, one of the first things it did was to establish a committee to define the word 'risk'. This committee labored for 4 years and then gave up, saying in its final report, that maybe it's better not to define risk. Let each author define it in his own way, only please each should explain clearly what that way is (Kaplan, 1997).

Definitions of risk:

- Effect of uncertainty on objectives (ISO 31000)
- (Exposure to) the possibility of loss, injury, or other adverse or unwelcome circumstance; a chance or situation involving such a possibility (Oxford English Dictionary)
- The product of the probability of a hazard resulting in an adverse event, times the severity of the event (Occupational Health & Safety Advisory Services)

Risk assessment:

Computation and communication of:

- Risk
- Uncertainty

Common language

Probability theory

- Comprehensiveness
- Mutual
exclusiveness

Alternative system

Risk	Definition
Score 1	low analytical detection and standard not exceeded; very low prevalence
Score 2	standard is exceeded a few times or else regular analytical detections but no exceeding of standard; standard value in case of insufficient information (low probability of prevalence)
Score 3	regular exceeding of standard or else frequent analytical detections and standard exceeded a few times (average probability of prevalence)
Score 4	frequent analytical detections and exceeding of standard (high probability of prevalence)

No mutual exclusiveness

Label	Type
Nil	Qualifier
Nil to negligible	Interval
Negligible	Qualifier
Negligible to low	Interval
Low	Qualifier
Low to moderate	Interval
Moderate	Qualifier
Moderate to high	Interval
High	Qualifier

No mutual exclusiveness

Qualifier	Lower limit	Median	Upper limit
Nil	0	0	0
Nearly nil	>0	1/390625	1/78125
Minute	1/390625	1/78125	1/15625
Extremely low	1/78125	1/15625	1/3125
Very low	1/15625	1/3125	1/625
Low	1/3125	1/625	1/125
Not very high	1/625	1/125	1/25
Quite high	1/125	1/25	1/5
High	1/25	1/5	1
Very high	1/5	1	1

Too accurate:

Risk	Range
Negligible	0.01 – 0.10
Extremely low	0.11 – 0.20
Very low	0.21 – 0.30
Low	0.31 – 0.40
Below average	0.41 – 0.50
Above average	0.51 – 0.60
High	0.61 – 0.70
Very high	0.71 – 0.80
Extremely high	0.81 – 0.90
Almost certain	0.91 – 0.99

→ 550/1000

		knowledge about outcomes		
		perfect knowledge	outcomes defined	outcomes poorly defined or unknown
knowledge about likelihoods	perfect knowledge	certitude		
	no basis for probabilities shaky basis for probabilities firm basis for probabilities	incertitude <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 10px; width: 45%;"> <p style="text-align: center;">risk</p> <div style="border: 1px solid black; padding: 5px; margin: 5px; text-align: center;">frequentist risk evaluation</div> <div style="border: 1px solid black; padding: 5px; margin: 5px; text-align: center;">Bayesian risk evaluation</div> </div> <div style="border: 1px solid black; padding: 10px; width: 45%;"> <p style="text-align: center;">ambiguity</p> <p style="text-align: center;">fuzzy logic sensitivity analysis</p> <p style="text-align: center;"><i>precautionary principle</i></p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="border: 1px solid black; padding: 10px; width: 45%;"> <p style="text-align: center;">uncertainty</p> <p style="text-align: center;">scenario analysis sensitivity analysis <i>precautionary principle</i></p> </div> <div style="border: 1px solid black; padding: 10px; width: 45%;"> <p style="text-align: center;">ignorance</p> <p style="text-align: center;"><i>precautionary principle</i></p> </div> </div>		