[Unit 8] Seminar 4: Quantitative Risk Modelling

CVSS is in essence a qualitative assessment as it is subjective. Questions asked, for example:

- What is the impact?

- What is the severity of this vulnerability on your system?

The vulnerability score registered or assigned is across all industries, not per specific industry (there may be a high risk score for one industry but low risk score for another).

Considerations

Think about whether it is a good idea to manipulate or add numbers which came from a subjective or qualitative evaluation. Quantitative is based on historical data; objective. If historical data not available, the next best thing is to apply probability distribution – choose the appropriate probability distribution for the specific behaviours or activities.

YASAI is an easier way (more basic) to do a Monte Carlo Simulation (MCS), which picks a probability distribution and runs a simulation on it a few thousand times to get some number. MCS assumes independent probabilities.

Bayes Theorem is another way of doing probability distributions. Bayes assumes conditional probabilities.

Reading	Topic
Goerlandt et al (2017)	Validity and validation of safety-related quantitative risk analysis
Hugo et al (2018)	Usefulness of quantitative risk analysis in project management
Çelikbilek & Tüysüz (2020)	Multi-criteria decision methods (MCDMs) review of relative accuracy and validity of techniques (e.g. TOPSIS).
Olsen & Desheng (2020)	Monte Carlo Simulation (MCS)
Eckstein & Riedmuller (2002)	YASAI (can replace crystal ball)

References

Çelikbilek,Y. & Tüysüz, F. (2020) An in-depth review of theory of the TOPSIS method: An experimental analysis, *Journal of Management Analytics*, 7:2, 281-300.

Eckstein, J. and Riedmueller, S.T. (2002) YASAI: Yet Another Add-in for Teaching Elementary Monte Carlo Simulation in Excel. *INFORMS Transactions on Education*, 2(2), pp.12–26.

Goerlandt, F., Khakzad, N. and Reniers, G. (2017). Validity and validation of safety-related quantitative risk analysis: A review. *Safety Science*, 99, pp.127–139.

Hugo, F.D., Pretorius, L. & Benade, S.J. (2018) Some Aspects of the use and Usefulness of Quantitative Risk Analysis Tools in Project Management. *South African Journal of Industrial Engineering*, 29(4).

Olson, D.L. & Desheng D.W (2020) *Enterprise risk management models*. Berlin, Germany: Springer.