Nataliia Vasyliv

Ivano-Frankivsk national technical university of oil and gas, Ivano-Frankivsk

ORCID: 0000-0002-1561-1141

**RE-EVALUATING THE RELATION OF RISK TO RISK MANAGEMENT IN THE FIELD OF SCIENTIFIC RESEARCH**

Formally, a “risk” is a product of the probability of an undesired outcome multiplied by the severity of that outcome, summed over the range of possible undesired outcomes. This is the standard definition of risk in decision theory. Under this definition, the “probability of outcomes” is a probability distribution. The spread of the distribution represents the uncertainty as to which outcome actually will occur. Since the probabilities from this distribution are multiplied by measures of severity of outcome, and then summed to calculate the total risk, the uncertainty is part of the risk. If the outcomes were not uncertain, we would not call it risk, we would just call the analysis a prediction. The total uncertainty reflected in the spread of the probability distribution arises from two sources: inherent randomness in future processes and imprecision in our knowledge of how to model those processes. Both sources of uncertainty affect the risk in exactly the same way, so there is no point to separating the two when calculating the risk, and there is nothing to be gained from attempting to remove them from the risk characterization [1].

In decision making there is ideally a set tolerance for risk. This tolerance applies regardless of how much of the risk is due to uncertainty from incomplete data, uncertain model parameters, or uncertain outcomes of future random processes. If the risk is too high, the decision maker is committed to select some action to address it. If the risk is low enough, the decision maker may proceed without specifically taking action to address the risk.

When the calculated risk is too high, then the subsequent decision of what to do about it will require knowing the magnitudes of the contributions of various sorts of uncertainty to the total risk. The decision may seek to reduce the risk through management actions to control the feared outcomes, through collecting additional data and then recalculating the risk on the basis of new data and determining whether the risk is still too high, or through some combination of more data collection and control of outcomes.

The tradeoff between the management action to control outcomes and choosing instead to collect more data (“to reduce uncertainty”) is essentially a matter of cost-benefit analysis, not a policy call: sometimes the cost of data is so high relative to its information content that it is more rational to accept the uncertainty and by default select the management action even though there is some probability that it is not actually necessary; in other circumstances the cost of new data is so low, and the value of new data is so high, that the choice definitely is to collect more data. Either way, what is being controlled is risk, and uncertainty appears in the equation only as a contributing factor in the risk [2].

A risk calculation is not just a model prediction, and so a real risk assessment will behave rather differently from a simple predictive model as its information input is reduced. Indeed, a simple predictive model may well predict a more favorable outcome when it is given less detailed or less precise input information. That is because the model prediction is a single scenario: the best estimate of the outcome. Furthermore, these kinds of models have “out of sight, out of mind” behavior. With less detailed input information, the model will default to assumptions of intermediate input values and will therefore deliver an intermediate output prediction.

The way risk assessment takes account of our uncertainty about input values is to represent every uncertain input as a probability distribution. The greater our uncertainty about the input, the broader that distribution. Now, the uncertainty about inputs gets propagated through the prediction component of the risk assessment. The output of the risk assessment is also a probability distribution, showing the distribution of outcomes. The greater the uncertainty about inputs, the greater the uncertainty about outcomes. The uncertainty about outcomes is reflected in the spread of the probability distribution that describes the result. If there is little uncertainty, the probability distribution is concentrated over a narrow range of outcomes, and then the acceptability of the risk depends merely on whether the outcomes in that narrow range are themselves in a range that we consider acceptable [3].

Risk management includes the principles, framework, and processes for managing risks effectively. Risk events are characterized as a combination of both the probability and consequences of undesired events. Therefore, risk management efforts are focused on a combination of the following: eliminating or reducing the probability of an undesired event; and reducing or mitigating the consequences of the undesired event should it occur.

**REFERENCES**

1. Василів Н. Системний аналіз небезпеки та оцінки ризику як інструмент для вирішення задач з підвищення рівня техногенно-екологічної безпеки об&apos;єктів нафтогазової галузі / Екологія, неоекологія, охорона навколишнього середовища та збалансоване природокористування: матеріали IХ Міжнародної наукової конференції молодих вчених // Х.:ХНУ імені В. Н. Каразіна, 2021. – С. 158.

<https://ecology.karazin.ua/wp-content/uploads/2021/12/stud_konf_2021.pdf>

1. Nataliia Vasyliv. Management systems approach to occupational safety and health hazards and risks / Матеріали Всеукраїнської науково-практичної конференції курсантів, студентів, ад’юнктів (аспірантів) «НАУКА ПРО ЦИВІЛЬНИЙ ЗАХИСТ ЯК ШЛЯХ СТАНОВЛЕННЯ МОЛОДИХ ВЧЕНИХ», 26 травня 2022. – Черкаси: Черкаський інститут пожежної безпеки імені Героїв Чорнобиля НУЦЗ України, 2022. – р. 277-278.

<https://sci.ldubgd.edu.ua/bitstream/123456789/10730/1/%D0%B7%D0%B1%D1%96%D1%80%D0%BD%D0%B8%D0%BA%20%D0%9D%D0%B0%D1%83%D0%BA%D0%B0%20%D0%BF%D1%80%D0%BE%20%D1%86%D0%B8%D0%B2%D1%96%D0%BB%D1%8C%D0%BD%D0%B8%D0%B9%20%D0%B7%D0%B0%D1%85%D0%B8%D1%81%D1%82%202022.pdf>

1. Vasyliv N. An Analysis of Occupational Accidents and Diseases. Матеріали міжнародної науково-практичної інтернет-конференції на тему: «Інформаційне суспільство: технологічні, економічні та технічні аспекти становлення (випуск 78)», 8-9 червня 2023р. // м.Тернопіль, Україна – м. Переворськ, Польща: 2023. – с.157-159.

<http://www.konferenciaonline.org.ua/data/downloads/file_1693298685.pdf>