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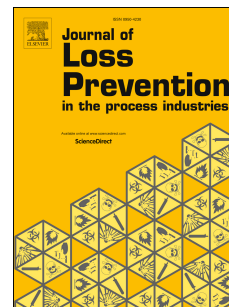
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How trustworthy are risk assessment results, and what can be done about the uncertainties they are plagued with?

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Abstract

The purpose of a risk assessment is to make a decision whether the risk of a given situation is within an acceptable range, and, if not, how we can reduce it to a tolerable level. For many cases, this can be done in a semi-quantitative fashion. For more complex or problematic cases a quantitative approach is required. Anybody who has been involved in such a study is aware of the difficulties and pitfalls. Despite proven software, many choices of parameters must be made and many uncertainties remain. The thoroughness of the study can make quite a difference in the result. Independently, analysts of the same project can arrive at results that differ by orders of magnitude, especially if uncertainties are not included. Because for important decisions on capital projects there are always proponents and opponents, there is often a tense situation in which conflict is looming. Therefore, to strengthen trust in an assessment, knowledge about uncertainties, ways to handle those, and further methods to verify and intrinsically validate risk assessments are critically important.

The paper will first briefly review a standard procedure introduced for safety cases on products that must provide more or less a guarantee that the risk of use is below a certain value. Next will be the various approaches of how to deal with uncertainties in a quantitative risk assessment and the follow-on decision process. Because expert estimates are often in high need to obtain some solution, various ways of expert elicitation and its limitations are considered. Special attention will be paid to the highly uncertain aspect of human reliability influenced by organizational factors and conditions. Over the last few years several new developments have been made to achieve, to a certain extent, a hold on so-called deep uncertainty. The paper will be concluded with some practical recommendations of how to judge the validity of risk assessments and how to reduce bias in the decision-making process.

Keywords: Risk assessment, uncertainty, trustworthiness, decision making

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