

Keynote Lecture

On Becoming Risk-Informed: Lessons Learned from the Past, Present, and (Hopeful) Future of Risk-Informed Applications

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Several decades have passed since the initial development and implementation of the embryonic elements that today form the basic structure of risk assessment for nuclear applications. Multiple references cover the history of probabilistic risk assessment (PRA) which, along with probabilistic safety assessment (PSA), is the most common title used for risk assessment techniques applied to nuclear reactors [e.g., 1-5]. The implementation of PRA/PSA techniques has long left the exclusivity of its use in advanced research applications, gaining a prominent role in supporting critical decision-making activities involving nuclear safety. Under the general term of “risk-informed applications”, PRA/PSA have become an intrinsic element of structured decision-making processes that often is confused as synonymous with PRA/PSA itself, as well as “risk-informed decision-making” (RIDM), and other terms used in various technical and regulatory environments.

As the methodological maturity of PRA/PSA consolidated, some listing and discussion of such activities has been undertaken [e.g., 6]. One aspect that is sometimes overlooked, however, is a more pressing question that arises from considering the wider use and applicability of risk-informed applications in the last two decades: what are the lessons learned from the successes (and sometimes, failures) in terms of practical implementation? What has made such applications flourish and what has inhibited it? What are the “softer” elements that have supported its expansion, such as workforce development, support for technical cooperation/coordination, and organization-cultural aspects?

This keynote lecture will explore these questions with examples from specific global applications. The intent is to have a transparent and open discussion on the methods as well as the infrastructure of RIDM, and what it can provide in terms of insights for the future. While a tremendous evolution has been achieved, RIDM still has a long journey in areas where it has been more uniformly implemented, as well as those where it has not (or those it has yet to be considered for). Setbacks can still occur, and growing pains are inevitable. Hence, a look at the recent experience with insights/questions will be presented.

Acknowledgements

This keynote lecture is dedicated to David Vose [7], a long-standing pioneer in the risk assessment community, who passed away in 2024. I was lucky enough to have several discussions on risk assessment with him in recent years (becoming enthralled with his knowledge while developing a kinship). Experts with deep, practical understanding of risk are a rare commodity in this world, Mr. Vose was one of them.

References

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