Special Session "Balancing Complexity and Efficiency: Optimal Model Resolution and Network Granularity in Risk Analysis"

This mini-symposium focuses on the critical examination of model resolution and granularity in risk analysis. Accurate risk analysis requires representative models that strike a trade-off between computational feasibility/efficiency and accuracy. Such a trade-off requires determining the appropriate level of model resolution. Additionally, risk analysis increasingly relies on the modeling of systems with extensive spatial footprints. Therefore, determining the optimal granularity of networks is crucial for achieving the desired level of accuracy, managing computational resources, and ensuring the relevance of the insights.

This session seeks contributions that discuss considerations about model resolution and network granularity, explore methods and criteria for selecting the optimal model resolution and network granularity, and practical case studies demonstrating how different levels of resolution and granularity impact the outcomes of risk analysis. We welcome theoretical advancements, empirical analyses, and applications across domains in engineering, environmental science, finance, and safety management. Discussions will also focus on iterative approaches to refining models, aiming to select the optimal resolution and granularity that provide an effective trade-off between accuracy, simplicity, and efficiency, while highlighting global metrics that measure overall model performance and local metrics to indicate areas requiring greater detail.

The session aims to bridge the gap between overly simplified models that typically underrepresent critical aspects and high resolution or highly granular models that may introduce unnecessary complexity. By fostering a better understanding of how model resolution and network granularity affect risk analysis, perception, and decision quality, this session will contribute to enhancing the value of risk analysis across various industries.

Proposers:

Prof. Alessandro Contento, Fuzhou University
Prof. Paolo Gardoni, University of Illinois Urbana-Champaing