

# PSAM14 – Special Panel Session on the future of HRA data

Andreas Bye, OECD Halden Reactor Project,  
Institute for energy technology (IFE)

























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**BLADE RUNNER**



# Usefulness of data for HRA

- Yes, empirical data can be used to validate HRA methods
- Yes it is possible to adapt HRA methods to new digital systems by collecting new data on basic task probabilities and contexts
- Yes, data can support consistent use of the HRA methods





# HRA needs in the future

- Digital systems, do they need new or updated HRA methods?
- Fire PRA and flooding PRA





# Digital systems

- Potential differences between analog and digital systems
  - More data needed, can be concluded in a few years time?



# Fire and flooding PRA

- Unforeseen situations and events
- Decision making
- Will require more insights into how people handle difficult situations under high stress
- More studies needed





# Questions to the panel



# What is the role of different types of data?

- Qualitative data important to increase knowledge and to support consistent use of HRA methods
- Quantitative methods can for cases where we can generalize, almost replace HRA methods
  - What was the question when these data were created? Can the data answer other questions?
  - Decontextualized data can support probabilities on basic task types
- For context evaluation, generalization of data is difficult and requires evaluation (HRA analyst)





# What role will engineering models play?

- Exploration role, increase knowledge.
- Cannot replace application of HRA methods, but can improve them, minimize the “generalization step”
  - Propose probability given a set of assumptions, up to the HRA analyst to check and adapt?



What methods do we apply to analyze the data, to combine data from multiple sources, or to generalize beyond the context of the data collection?

- Different data valid for different situations
- HRA methods with manual judgement will be used to generalize.
- Subjective expert judgement will play a role at one level or the other. The judgement should be easy based on details of the assumptions and validity of the data
- How do we combine new data and knowledge with existing methods?
  - Making assumptions clear



# Big data, quantitative methods

- Quantitative data use
  - For rare situations, not that much data is needed (if using e.g., Bayesian methods).
    - However, these situations are really rare and small differences in the beginning of a scenario may cause the situations/context to be different almost every time
    - Strong demands on the definitions of the dimensions used. If these are well specified, it might be a good solution
  - For common situations, there will be more data (with a well standardized context)
    - However, be aware that these situations may be well trained and often successful, thus the amount of data needed to establish the number of opportunities for error is way higher





# What can (and can't) we do with these data?

- Improve knowledge of rare situations, fire, flooding
- Improve basis for base probabilities
- Can data replace HRA methods?
  - The role of HRA methods is to some extent to generalize from general knowledge to specific situations at specific plants with specific conduct of operations
  - Linked to HFE modeling and the definitions of situations for which the data is collected
  - E.g., TOE/SF/PIF in SACADA, how does this translate to HFEs? Are there assumptions made given the conduct of ops at the plant where the data is collected that are valid for the next situation?



# The biggest challenges?

- Generalization, context dependence.
  - One must take care about generalization from situation to situation (scenario to scenario, HFE to HFE), e.g., based on various conduct of operations

# What is HRA going to look like in 10 years? Beyond 10 years?

- HRA is still an important safety analysis methodology
- Data will not replace HRA methods, but complement them and make the use of the HRA methods more robust

