Challenges in Maritime Risk Assessment - A Focus Session

Discussant

Sonja B. Haber, Ph.D.

Human Performance Analysis, Corp.

Marine Board Fall Meeting

9 November 2016

Washington, D.C.

What challenges do you see for risk analysis and research?

- Complexity of the relationships between individuals, technology and organizations must be considered to fully understand risk.
- Understanding the behaviors and having reliable and valid tools to assess them is the most effective way to understand and assess these relationships.
- Too often organizations just look at processes or indicators which are only outcome measures and may be obtained by several different behaviors.
- Implementation of a systemic approach to safety can support comprehensive risk assessment.

How are multidisciplinary approaches being incorporated? Have they changed?

- Initial Human Reliability Analysis in Probabilistic Risk Assessment was not empirically based.
- U.S. Nuclear Regulatory Commission Research 1988 -1993
  - Quantitative assessment of management and organizational influences on safety performance.
  - Development of a systematic and objective methodology.
  - Lessons Learned – importance of organizational factors; assessment through quantitative and qualitative tools; still difficult to incorporate into risk assessment.

How are qualitative and quantitative risk assessment methods used in nuclear safety?

- Probabilistic safety assessment (PSA) is the basis for all emergency related activities such procedures, training, design basis scenarios.
- Maintenance activities are risk identified for the plant based upon the PSA. (Maintenance Rule is required by the regulator)
- Regulatory oversight activities are often identified based upon their risk to public health and safety.
- Daily plant risk (indicated by green, yellow or red light) is identified by the analysis of the risk associated with all the ongoing activities.

What other methods can be used to address challenges in risk assessment?

- Low frequency, high consequence events are often caused by human and organizational factors (e.g., Chernobyl, Fukushima).
- Methods to assess the gaps and weaknesses in human and organizational factors need to be better understood and valued for their qualitative insights into risk.
- Systematic, objective, quantitative and qualitative methods are available to more precisely identify the contribution these factors have on risk.
- Approaches from psychology, organizational theory, safety science, systemic thinking among others need to be considered in the development of more comprehensive risk assessment.

Risk assessment in the future ?

- Reliable and validated tools for assessment and analysis of human and organizational factors do exist.
- Using those factors in risk assessment to promote change will result in more sustainable performance.
- Learning from successes as well as failures will make organizations more resilient to future events and modelling more realistic.
- As the whole system is extremely complex an integrated approach is needed, which invites diversity of expertise and thinking.
- The interplay between humans, technology and organization using a systemic approach to safety is necessary.

Fukushima Nuclear Accident 2011

"Basic assumption" that plants were safe significantly contributed to the accident. Conventional thinking was unable to identify and change this "basic assumption".

- All stakeholders **shared and mutually reinforced** this belief.
- Influenced safety related decision making including **design basis and risk assessment.**
- Requires an **integrated approach** considering human, organizational and technical factors.

Individuals and organizations need to consciously and continuously **question their own basic assumptions** and their implications on actions that impact safety.

- The possibility of the **unexpected** should be considered. (IAEA 2015)