Specialty Group on Foundational issues in Risk Analysis

http://www.sra.org/frasg

Terje Aven
University of Stavanger, Norway
The objectives of the group are:

• To provide leadership and play an active role in advancing on the foundational issues of risk analysis;
• to facilitate the exchange of ideas and knowledge on the subject among practitioners, researchers, scholars, teachers;
• to encourage collaborative research on the subject
• to exchange on subjects of educational programs in the field
2014

Regular activities
• Special sessions/symposia at the SRA meeting
• Special sessions/symposia at other SRA meetings (SRA- Europe for example)
• Stimulate papers on foundational issues
• Website: information about relevant workshops, literature, etc.  http://www.sra.org/frasg
• Dropbox for documents? Linkedin group? Other Communication means?

Specific activities
• Committee on Foundations of risk analysis:
  – Group: About 10 persons
  – Scope:
    i) Review the foundations of risk analysis
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• Workshop April/May/June 2014 for selected young researchers, joint ESRA-SRA
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SRA meeting in Denver
December 8-11, 2014

Four sessions (symposia) on the topic
Monday 1:30 - 3:10 PM
Plaza Court 6
M3-B Symposium:

**Foundational Issues I**

A new SRA glossary for risk terminology
Aven T

Defining emerging risk
Flage R, Aven T

Can we define a concept of ‘risk tolerance’?
Bouder F

Is the weight of evidence approach in risk assessment according to REACH an application of a general perspective on risk?
Sahlin U, Vareman N

What is the difference between risk-based, evidence-based and knowledge-based decision making?
Vareman N, Sahlin U
Tuesday 10:30 AM - Noon
Plaza Ballroom E
T2-G Symposium:

Foundational Issues II: Confronting the Unforeseen and Black Swans

Unknown (Un)Knowns: a problem formulation and approaches for risk-informed decision-making
Damnjanovic I

Are adaptive strategies feasible and useful in confronting extreme risks?
Goble R

Reflections on black swans and emerging risks
Renn O

The complexity of critical infrastructures and the risk of black swans: some foundational reflections
Bjerga T, Zio E, Aven T

Can model simulations be used to reduce the domain of black swans?
Berner CL, Flage R, Guikema S
Foundational Issues III: Uncertainties in Risk Analysis

Some reflections on uncertainty treatment in risk analysis
Aven T

Risk analysis under deep uncertainty: a methodological comparison
Shortridge JE, Aven T, Guikema SD

Model uncertainty in risk analysis
Droguett EL

Risky accounts: uncertainty as a resource for safety
Haavik TK
Foundational Issues IV

Can policy be risk-based? A reality check based in the cultural theory of risk.
Duckett DD

Methodological foundations for integrating socio-technical risk analysis with big data analytics
Pence J, Mohaghegh Z

Risk assessment report card
Shamoun DY, Calabrese EJ

Case studies of acceptable risk: paving the way for the risk-specific dose
Fox MA, Baksh S, Lam J

Multiple elicitations: the internal inconsistency of everyday decisions
Bessette DL, Arvai JL
The risk field needs concepts, principles, theories and methods that give some sort of unity to the field and provide guidance on how to think when assessing, managing and communicating risk. To this end, we need further developments of such concepts, principles, theories and methods, scrutiny/clarification of existing ones, and reflections and discussions. This entails a broad set of initiatives and measures. The Foundational Issues in Risk Analysis Specialty Group (FRASG) represents an arena for generating them. It provides a scientific and technical forum for dialogue on all these issues and will promote initiatives reaching the diverse communities of risk analysts and researchers. It will guide the organization of workshops, conferences, and committees to study and reflect on key issues. A special responsibility is fostering the involvement of talented young researchers.

Contact:

Terje Aven
Chair
Elisabeth S. Fiskå
Secretary
Roger Flage
Web Administrator

Recent News

- Special issue of Risk Analysis on foundational issues in risk analysis
- Special issue of Safety Science on the foundations of safety science
- Summary of the" Black Swans" workshop in Stavanger, Norway - 20 February 2014
- …
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SRA Council mandate December 2013: Prepare a suggestion for a new SRA glossary

The plan for the development of this glossary:

- Mandate from the SRA council: to prepare a suggestion for a new SRA glossary Dec 2013
- Establishing a Committee for the work. March 2014.
- First discuss and agree within the committee on a structure for how to proceed – agreeing on the core set of terms to cover (13 June, 2014)
- A first draft of the definitions is produced (Sept 1, 2014)
- Discussion and agreement on a draft glossary (Nov 20, 2014)
- Presentation of a draft glossary at the SRA meeting in Denver and at the SRA Council meeting there December 2014
- Sending the draft to SRA members and the Specialty Groups for comments (Feedback before 1 March 2015)
- Committee conclusions for the glossary (May 1, 2015).
- SRA Council approval June 2015.
Committee members

Henning Boje Andersen, Technical University of Denmark, DTU
Terje Aven, University of Stavanger, Norway
Yakov Ben-Haim, Israel Institute of Technology Haifa, Israel
Tony Cox, Cox Associates, USA
Enrique López Droguett, Federal University of Pernambuco, Brazil
Michael Greenberg, Rutgers University, USA

Seth Guikema, John Hopkins University, USA
Wolfgang Kröger, ETH Zurich, Switzerland
Ortwin Renn, University of Stuttgart, Germany
Kimberly M. Thompson, University of Central Florida, USA
Enrico Zio, Politecnico di Milano, Italy, ECP, France
Rationale


- Allow for different perspectives on fundamental concepts and make a distinction between overall qualitative definitions and their associated measurements

- Pass a scrutiny test: being logical, well-defined, understandable, precise, etc
Overall qualitative definitions

- Risk is the possibility of an unfortunate occurrence (Riegel and Miller 1966).
- Risk is the potential for realization of unwanted, negative consequences of an event (Rowe 1977).
- Risk = Uncertainty + damage (Kaplan and Garrick 1981)
- Risk is uncertainty about and severity of the consequences of an activity with respect to something that humans value (Aven and Renn 2009).
Risk metrics/descriptions (examples)

1) The combination of probability and magnitude/severity of consequences

2) The triplet \((s_i, p_i, c_i)\), where \(s_i\) is the \(i\)th scenario, \(p_i\) is the probability of that scenario, and \(c_i\) is the consequence of the \(i\)th scenario, \(i = 1, 2, \ldots, N\).

3) The triplet \((C', Q, K)\), where \(C'\) is some specified consequences, \(Q\) a measure of uncertainty associated with \(C'\), and \(K\) the background knowledge that supports \(C'\) and \(Q\), for example expressed as \((C', P, SK, K)\), where \(Q\) is taken equal to probability \(P\) and \(SK\) is introduced as a judgment of the strength of the knowledge \(K\).

4) Expected consequences (damage, loss)
   a) For example computed by the Expected number of fatalities in a period of one year (Potential Loss of Life, PLL) or the expected number of fatalities per 100 million hours of exposure (Fatal Accident Rate, FAR)
   b) \(P(\text{hazard occurring}) \times P(\text{exposure of object| hazard occurring}) \times E[\text{damage | hazard and exposure}]\) i.e. the product of the probability of the hazard occurring and the probability that the relevant object is exposed given the hazard, and the expected damage given that the hazard occur and the object is exposed (the last term is a vulnerability metric, see Section 1.15)
   c) Expected disutility

5) A possibility distribution for the damage
General insights linked to risk

Concepts, theories, frameworks, approaches, principles and methods for understanding, assessing, managing and communicating risk
Glossary structure

1. Terminology on basic concepts (risk, probability, uncertainty, vulnerability, etc.)

2. Terminology on related concepts, methods, procedures, … (risk analysis, risk appetite, risk aversion, model uncertainty, …)

3. Terminology on risk management actions (risk treatment, risk regulation, risk handling, …)
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Welcome

Young Researcher Workshop - The Future of Reliability and Risk Analysis

Donnafugata, Sicily, Italy, 26-27 May 2014
Where is the new generation of reliability and risk researchers who are committed to and willing to take responsibility for the development of the reliability and risk analysis fields?
The idea of the workshop

- A personal network of young researchers
- To obtain increased awareness and understanding of the importance of being committed to and take responsibility for the development of the reliability and risk analysis fields by discussing the current situation and how to best proceed to obtain a development of these fields in the direction needed.
- A key issue is the foundations on which reliability and risk analysis stand as scientific fields

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Other issues from 2013 Dec

• Brandon Johnson and Felicia Wu pointed to the need for comparing the way we do risk assessment for different applications. By such comparisons we will be better able to see what are really the key fundamental issues of interest, and the different areas can learn from each other.

• Awards

• Workshops
2015

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Committee

• Prepare a suggestion for a new SRA glossary
• Prepare a white paper on foundational issues in risk analysis covering
  – Review of the foundations of risk analysis
  – Identification of the key challenges
  – Recommendations for directions to address these challenges
Subcommittees producing some reflections with a first delivery target the December SRA meeting

- The Future of Risk Analysis: Meeting the Challenges. Emerging trends
- Risk analysis and science
- Uncertainty in Risk analysis
- Confronting deep uncertainties
- Confronting the unforeseen
- How to take into account early signals and precursors in risk management
- Are risk analysis results trustworthy? Why or why not? What can we do to make them more trustworthy?
- ...
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Interested in becoming a member of this specialty group

- Send me an email

- terje.aven@uis.no

- See website
  http://www.sra.org/frasg