FINAL WORKSHOP
IRIS – Improving Risk matrices using multiple criteria decision analysis

Team
Mónica D. Oliveira¹, Carlos A. Bana e Costa¹, Diana F. Lopes¹,
João C¹. Lourenço, Ângelo Teixeira², Gil Luís¹

¹Centre for Management Studies of Instituto Superior Técnico, Universidade de Lisboa, Portugal
²Centre for Marine Technology and Engineering of Instituto Superior Técnico, Universidade de Lisboa, Portugal


Context

Top external pressures...

Need to:
✓ determine the relative significance of different sources of risk.
✓ need for a cost effective management of risks.

...are causing firms to give more emphasis to risk management.

Risk matrix in use by the Health Service Executive

Context  Scope and objectives  Workshop agenda

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<thead>
<tr>
<th>Appearance</th>
<th>Impact levels</th>
<th>Probability x Impact</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Negligible (1)</td>
<td>Minor (2)</td>
</tr>
<tr>
<td>Almost Certain (5)</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Likely (4)</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Possible (3)</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Unlikely (2)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Rare/remote (1)</td>
<td>1</td>
<td>2</td>
</tr>
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Similar systems are endorsed by the Project Management Institute and have been used by multiple public and private organizations...

...prioritise risks of power plant projects (Figueiredo and Oliveira, 2009)

...prioritise financial, operation and clinical risks (NPSA, 2008)

...prioritise risks that threaten the health system, organisations, business units and team and/or patients (OSQHC, 2005)

...prioritise risks encountered in the development, test, production, use, and disposal of defense systems (US DoD, 2012)
Why are risk matrices widely used?

- Allow for intuitive use, demanding for limited expertise (Cox, 2009)
- Imposed by International Standards (ISO, IEC/FDIS 31010) and recommended by guidelines in many contexts (e.g. health and safety)
- Are included in several packages:
  - SAP (SAP AG, 2012)
  - Active Risk Manager (Microsoft Pinpoint, 2012)
  - MITRE’s risk matrix tool (The MITRE corporation, 1999)
- Provide a clear framework for systematic review of risks, enabling organizations to prepare convenient documentation
- Allow for stakeholders participating in the process of building risk matrices (Cox, 2008)
## Key problems with risk matrices

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## Why Multiple Criteria and Portfolio Decision Analysis?

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- MCDA theoretical foundations (Keeney and Raiffa, 1976) (Von Winterfeldt and Edwards, 1986) (Belton and Stewart, 2002)

- Can be used to evaluate and order risks, allowing:
  - A transparent evaluation
  - To account for the multidimensional nature of risk impacts (e.g., quality, delivery time and budget)
  - To account for various levels of quantitative and qualitative information of risk sources & for subjective preferences of DMs
  - To overcome the problem of suboptimal resource allocation
  - To build methods within a socio-technical approach, involving key stakeholders in risk management
## Project scope and objectives

### Context

- Develop MCDA methods to improve the design and deployment of risk matrices

### Scope and objectives

- Identify and address different types of challenges:
  - Improve risk matrices (respecting theoretical principles)
  - Develop methods to model interdependencies between risk impacts:
    - MACBETH-Choquet approach
    - Multicriteria Cognitive Map
  - Develop methods to assist:
    - The construction of probabilities
    - The allocation of resources to risk mitigation actions

## ACKNOWLEDGEMENTS

- **Funding:**
  - Portuguese public budget through FCT – *Fundação para a Ciência e a Tecnologia*, within project PTDC/EGE-GES/119230/2010

- **Collaboration:**
  - Occupational Health and Safety Unit of the Regional Health Administration of Lisbon and Tagus Valley:
    - Cândida Pité Madeira (Engineer), Teresa Galhardo (doctor), Pedro Pardal (nurse), Fátima Vaz (nurse), Ana Dias (tec.), Ana Vicente (tec.), Daia Monteiro (tec.), Susana Salvador (tec.), Anabela Santos (tec.)
  - Bana Consulting
Workshop agenda

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**PART I: METHODOLOGICAL DEVELOPMENTS**

- **9:10-9:40:** "The IRIS approach: Designing and exploring risk matrices with MACBETH" (Carlos Bana e Costa)
- **9:40-10:10:** "A MACBETH-Choquet approach for modelling interdependencies in decision aid contexts" (Diana Lopes)
- **10:10-10:40:** "Multicriteria Cognitive Map: A tool for problem-structuring and multicriteria evaluation" (Mónica Oliveira)

**PART II: APPLICATION OF METHODS**

- **11:00-11:30:** "Occupational health and safety: Designing and building with MACBETH a value risk-matrix for evaluating health and safety risks" (Mónica Oliveira)
- **11:30-11:40:** "A Decision Support System to evaluate health and safety risks" (Gil Luis)
- **11:40-12:10:** "Resource allocation to projects with uncertain benefits: The EDPD case study" (João Lourenço)
- **12:10-12:40:** "Evaluating ship collision risks" (Ângelo Teixeira)
- **12:40-13:00:** Final discussion and future research.

10:40-11:00: COFFEE BREAK

Workshop of the IRIS project, 17th November 2014