

UNIDEMI – Research Unit in Mechanical and Industrial Engineering

RISK-MEN: Risk Assessment (Mechanical & Naval Industries)

Research Team PPE / POM / MTA



R&D Unit in Mechanical and Industrial Engineering



Celeste Jacinto

(Researcher / PI)
Safety Research

- Risk Analysis (RA)
- Accident Investigation and Analysis (AIA)
- Safety Management Systems (SMS)

Focus: occupational safety and health (OSH) and/or industrial safety (operations safety).

Objectives

Aim: to develop a structured and up-to-date methodology for the analysis, assessment and control of accidents' risks.

Coverage: two types of risk; 1) “occupational” risks (individual exposure of workers), 2) “operational” risks (leading to major accidents related to activity and operations).

Study object: two main activity sectors - *the metalwork manufacturing and the naval industries* - focusing on their technologies and fabrication and/or operation processes.

Methodology

The analytical framework of the proposed methodology is based on the “bow-tie” approach. This allows to make a clear distinction between the necessary prevention and protection/mitigation barriers, which in turn facilitates risk management.

Task 1 – bow-tie analysis with **semi-quantitative evaluation** of risks (accident data)

Task 2 – in-depth analysis using **fuzzy theory for risk quantification**; consists of an in-depth study of the more significant risks, performed only by FCT-UNL team

Task 3 – in-depth analysis using **Bayesian networks** (BBNs); consists of an in-depth study of risks within more complex systems, performed only by IST-UTL team

Task 4 – recommendations for risk management (specific safety sheets); this is a “wrapping up” task. The final result is produced by **merging the recommendations** produced by both teams.

Expected Results

Expected results

A relevant output is the new methodology proposed. This “final product” comes with a user’s manual providing step-by-step guidance for H&S professionals (in Portuguese & English).

Repercussions and impact in the society

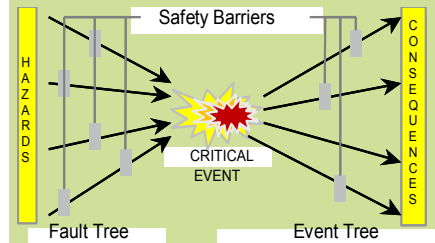
All enterprises cooperating with this developmental work will benefit directly, on a short term basis; it will also have a positive impact at national level, by making the method’s manual easily accessible to all those who need it, across a variety of activity sectors. It has the potential to be valuable for the regulatory authorities, creating a “risk inventory” to help authorities tuning their national prevention strategies. The benefits may also spread internationally.

Funding: submitted to FCT-ME, rated Excellent; no funding

Previous Projects with funding

PTDC/CS-DEM/098646/2008-FCT (CAPTAR – Learn to Prevent)

PIQS/SOC/50062/2003-FCT (Accident causation in different activity sectors)



the “bow-tie” approach

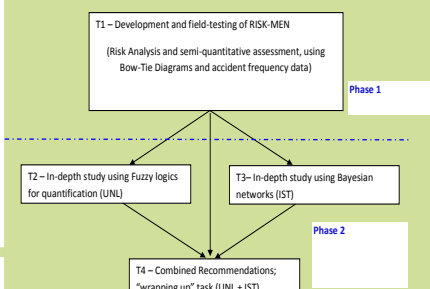
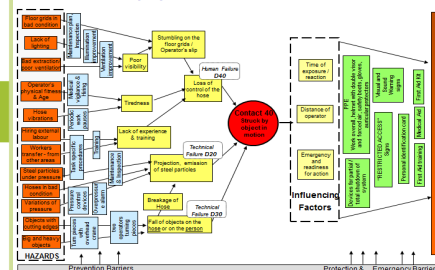
Work Context: shipbuilding yard

- Case Study (3 main processes)
- ✓ steel-blasting
 - ✓ electroplating
 - ✓ dry dock airless painting



Risk Analysis – Steel blasting

Contact 40 – Struck by object in motion



Methodology: the global reasoning and tasks of the project