Human Reliability for Design Applications at a Swedish Nuclear Power Plant

Preliminary Findings and Principles from a User-Needs Analysis

A study conducted by
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Ringhals - a part of Vattenfall

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Vattenfall in brief

- Europe's fifth largest generator of electricity and the largest generator of heat
- Vision: To be a leading European energy company
- Operations in Sweden, Finland, Denmark, Germany and Poland
- Electricity generation, transmission, distribution, sales and trading
- Heat generation, distribution and sales
- More than 32,000 employees
- Vattenfall AB is wholly owned by the Swedish State

Number One for the Customer

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Ringhals – the largest power plant in Sweden

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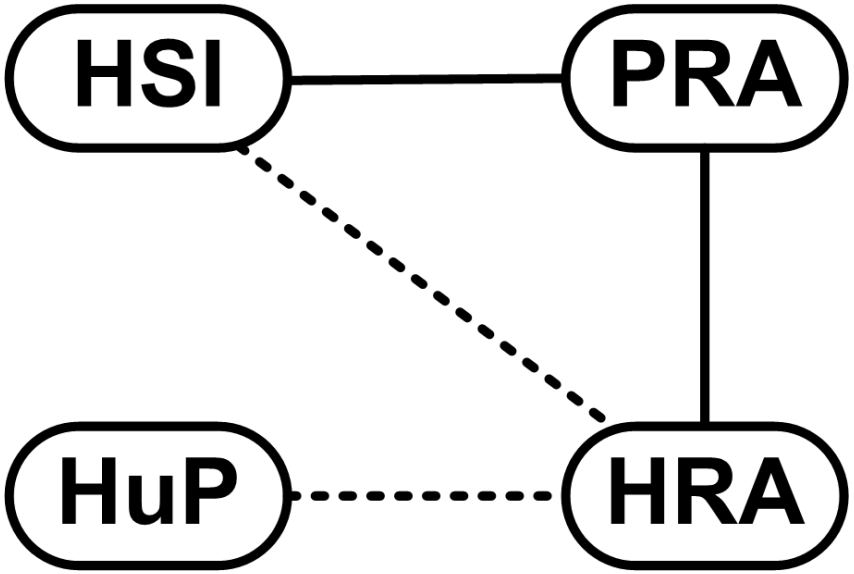
Background

- The interaction between different human factors and risk groups at Ringhals



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Purpose of Study

- How to address human factors in control room modernizations?
- Can HRA support different parts in the organization?

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Study outline

- Interviews
  - 23 nuclear power plant specialists
  - HRA, PRA, HSI, and HuP
- Data analysis
  - Cataloged by common themes
  - Reviewed by two analysts
  - Findings aggregated
- Principles
  - Six principles were derived

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The most important questions

- What are the barriers to HRA being used more?
- What is the main strength of HRA in your view?
- What is the main weakness of HRA in your view?
- How could HRA support your job?
- How could you support HRA in your job function?

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Principles

1. Early implementation rather than late verification
   - Impact on design
   - Ranking of design concepts
2. Tailored HRA methods for design
   - Not one-size-fits-all
   - Suite the purpose
   - Harmonization
3. Scalable HRA

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Principles

4. Better use of quantitative HRA
   - Tracing root causes
   - Determination of performance contributors
5. HRA design acceptance criteria
   - Risk-informed decision making
   - Identify consequences of errors
6. HRA sensitivity to human-machine interface issues
   - New issues adequately addressed
   - New methods or tools

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Summary

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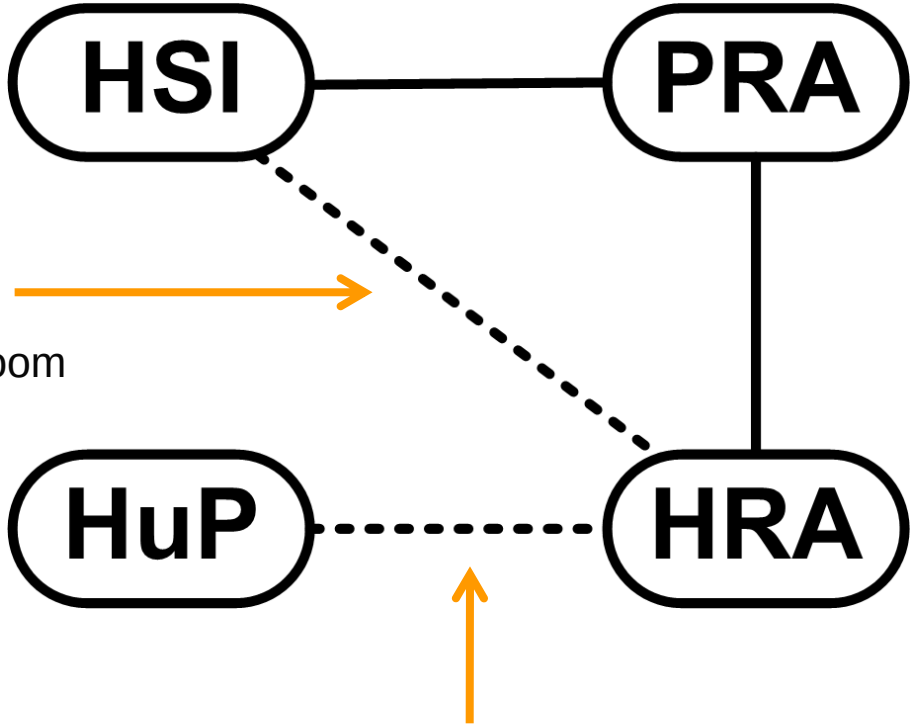
Summary

Prevent Errors Early
Determine Testing Scenarios
Design Acceptance Criteria
Prioritizing Design Concepts
HRA for Advanced Control Room



HRA as a Bridge Between Psychological and Engineering work

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Questions?

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