



DESIGN AND EVALUATION OF AN INTELLIGENT DECISION SUPPORT SYSTEM FOR NUCLEAR EMERGENCIES

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In the field of nuclear emergencies, it is important to have all the tools **to prevent and lower the risks of contamination**, allowing the operator to know what to do; even under hard pressure.

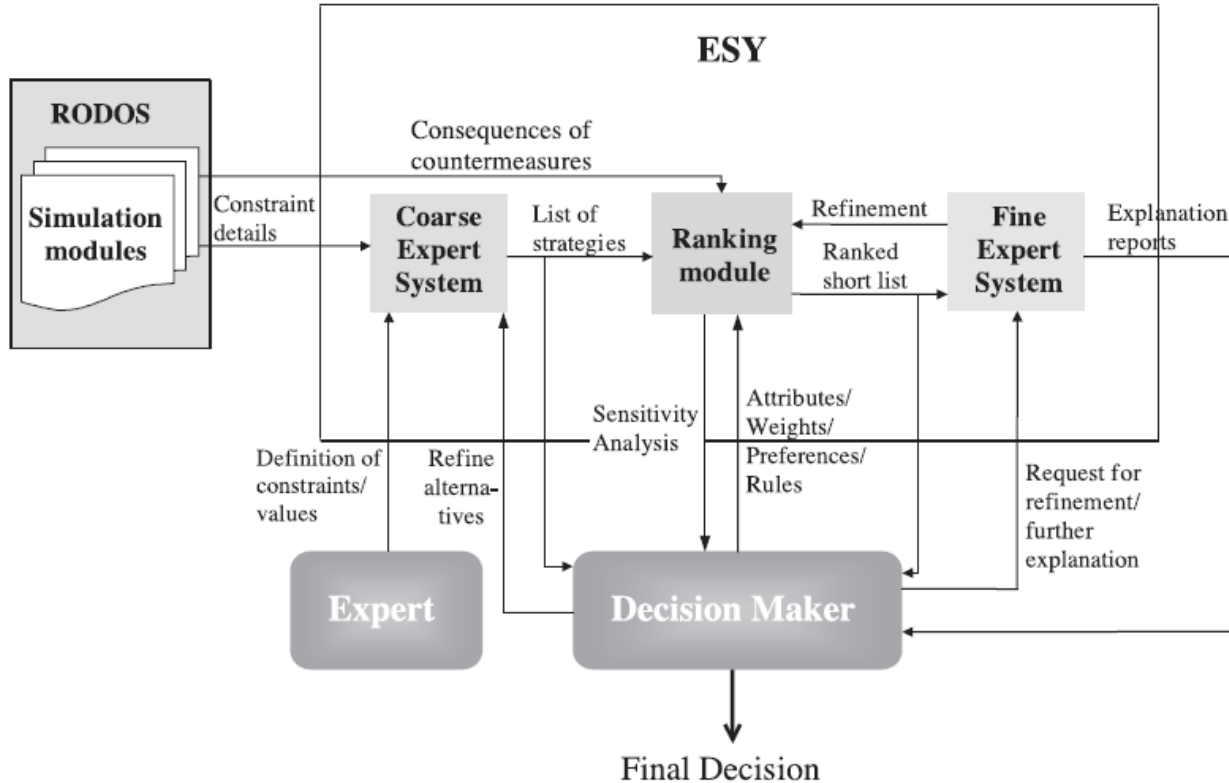
Building an IDSS to help decision makers to create emergency plan during a nuclear failure is really important.

The goal of our DSS called **ESY**, is to output the best strategy to apply using parameters given by the user in a nuclear emergency.

The user can then adjust parameters and see how it **impact the different strategies**, and have access to a **Sensitivity analysis**.

The users of **ESY** are scientists, nuclear plant operators, planning officers and advisors in emergencies.

Strategies will be ranked and outputted **in English Text** for an easy use of the operator.



1. The **IDSS** has 3 modules :
 1. CES : Generates the different alternatives
 2. RM : Ranking strategies
 3. FES : Generates Natural Text output
2. **Strategies are simulated** in the **RODOS modules** in a deterministic way
 - Constraint processing based on the parameters and minimizing the output damages
3. **Multi-attribute Value Theory** in the ranking module (MCA)
 - Replace a complex decision problem with simple ones
 - Already used in nuclear applications
 - Strength: Provides a structured approach for dealing with the problem
 - Weakness: Bad performances with bad parameters
4. Optimization : **Sensitive analysis**
 - Users can adjust the parameters on the strategies and see long-term outcomes

1. **Examination of appropriateness of the methods**
 - Constraint satisfaction techniques to identify feasible alternatives
 - Multi Attribute value Theory to evaluate alternatives
 - Natural Language Generation to explain the system recommendations
2. **Software verification**
 - Static testing methods (Quality assurance facilities & static analysers)
 - Dynamic testing methods
3. **Evaluation of knowledge base**
 - Consulting Experts to verify accuracy, consistency and reasoning of the system
4. **Comparison to other DSSs**
 - MOIRA, CMDSS, Spreadsheets-based DSS
 - ESY Support decision-making throughout all phases of a radiation accident
5. **Questionnaire**
 - Measuring utility of the DSS
 - Evaluation by users (relevance, understanding, completeness, ease of use ...)