Development of Framework for justification of Overall Safety (OSAFE)

Lessons learnt from semantic modelling

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OSAFE 2020 highlights

SMRs from the perspective of Design is available at:
https://lutpub.lut.fi/handle/10024/161945

Semantic modelling in the context of non-baseload operation

Non-baseload operation (flexible operation)

- Baseload operation ~ operation at steady full rated electrical output
- **Non-baseload operation** ~ any change from baseload operation in interfacing with the grid (to meet the requirements of the electricity system in balancing generation and demand).

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Semantic modelling

- In semantic modelling it is a question of creation of knowledge model(s) in order to obtain a deep understanding of a chosen phenomenon.

- Different knowledge models can be added in the semantic model to complement each other.

- Benefits:
  - Obtaining multidisciplinary and holistic understanding of a chosen phenomenon
  - New links can be found that would be difficult to realise otherwise (due to large amount of data)

Impacts of non-baseload operation on safety of NPP	Possible impacts on NPP organisation	Impacts on regulatory body
Maintenance ❑ Risk of equipment degradation or failures, additional maintenance and replacement of components ❑ additional monitoring and surveillance needed ❑ Increasing need of calibration of measuring equipements	**Maintenance** ❑ Resources are needed more, and experts in calibration	❑ The relevant role of regulatory body in decisions regarding nonbaseload operation
Operation ❑ Reactivity management (non-baseload operation has effects on reactivity, neutronflux changes and it becomes more difficult to guide ❑ Grid-driven operation	**Operation** ❑ Review and revision of procedures ❑ Interface with grid operator	
Safety ❑ Non-baseload operation can affect e.g., ageing	Safety ❑ Attention to non-baseload operation in PRA and safety analysis in general	
❑ Understanding the possible effects of non-baseload operation is needed	❑ Training regarding non-baseload operation is needed	
❑ Communication	❑ How the organization supports nonbaseload operation? ❑ Safety culture implications	

Lessons learnt: benefits and limitations of semantic modelling

- Multidisciplinary and holistic understanding of a chosen topic
- Enables modelling the topic from several viewpoints
- Enables detection of new relationships between elements within and between the different knowledge models
- Easy to learn
- But hard to master
- Making information from different sources commensurable can be challenging
- A too application specific viewpoint can reduce the usability of the model in other similar contexts

THANK YOU FOR YOUR ATTENTION!