



Embedding event sequence diagrams within the format

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Outline

Introduction

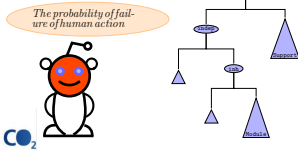
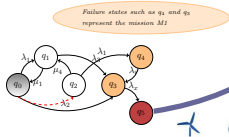
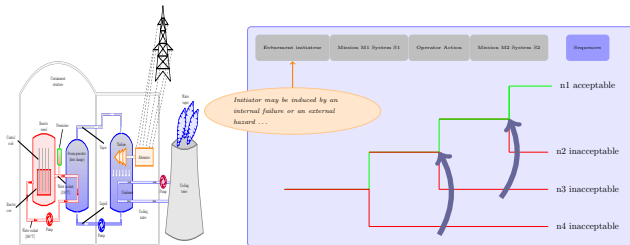
PSA and event sequence diagrams

Clarity and transparency of event trees

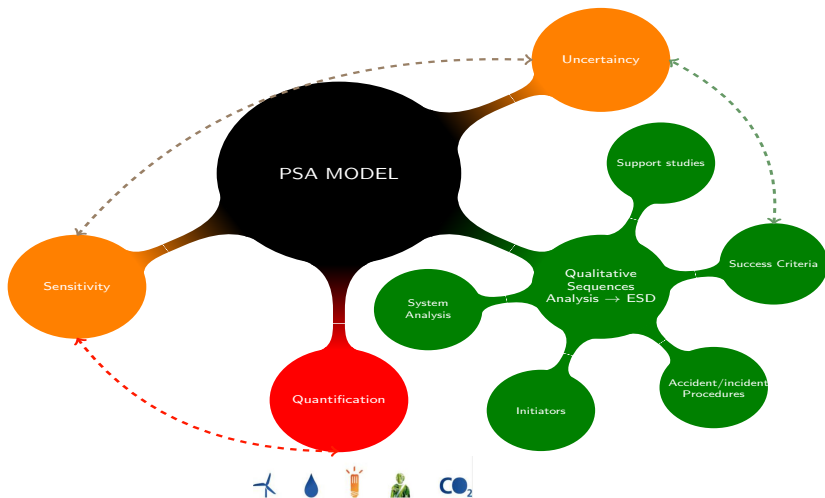
Conclusions and perspectives



Evaluate the frequency of an undesired event and identify the scenarios that lead to

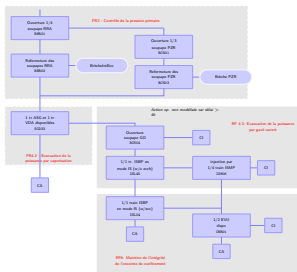


The general methodology scheme of a PSA model



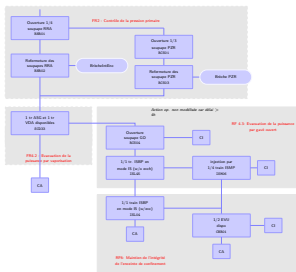
The practice of PSA and model construction

- Simplified ESD an output of sequence analysis



The practice of PSA and model construction

- ▶ Simplified ESD an output of sequence analysis

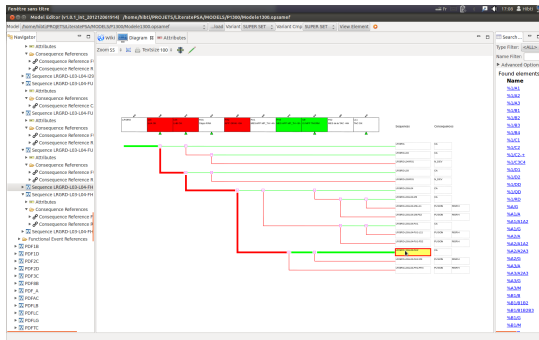


- ▶ In practice PSA users update their models on the basis of event tree structures
- ▶ More complex to **review and modify event trees** than **event sequence diagrams**
- ▶ May be not coherent with the **main sequence assumptions**
- ▶ May be confusing for other applications of the models (dynamic ...)



Make event trees easy to understand

- ▶ A good/optimized event tree is

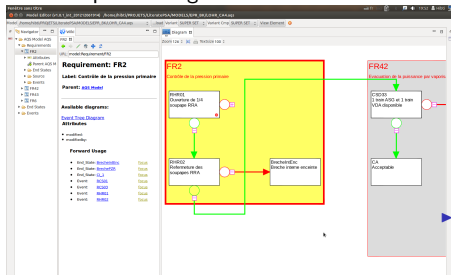


- ▶ Easy to read
compact, informative and clear
- ▶ Suitable for quantification purposes
- ▶ Suitable for overall risk assessment **but also** for applications
- ▶ Coherent with the **original** event sequence diagram



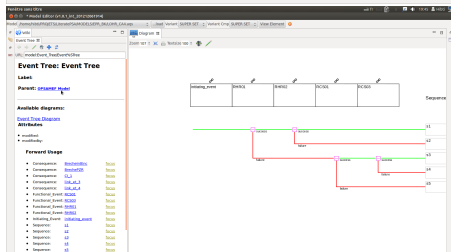
Consistency, completeness and clarity

► Event sequence diagram to Event tree



► Clear semantics for ESD and ET for consistency and completeness

- Verify that **all** the sequences of the ETS are relevant
- Verify that **all** the scenarios of the ESD are represented in the ET



Introduce dynamic results in event tree sequences

- ▶ Use other formalisms as an alternative to event sequence diagrams
 - ▶ Boolean logic Driven Markov Processes
 - ▶ Monte-Carlo simulation ...
- ▶ May solve issues regarding
 - ▶ Recoveries
 - ▶ System recoveries
 - ▶ Initiators
 - ▶ Time dependency conditional events



Conclusion and perspectives

- ▶ Event sequence diagrams as source code for event trees for comfortable visualisation and review
- ▶ Make the model clearer
- ▶ Make possible **(semi)-automated** generation
 - ▶ With the suitable level of granularity (ET per safety function, or global ET, ...)
 - ▶ Appropriate with **algorithmic considerations**
- ▶ Allow integration of input from dynamic models

