Apply Functional Modeling to Consequence Analysis in Supervision Systems

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APPLY FUNCTIONAL MODELING TO CONSEQUENCE ANALYSIS IN SUPERVISION SYSTEMS

Present by

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AGENDA

- Introduction
- Consequence analysis and functional modeling
- Multilevel Flow Modeling (MFM)
- Rule-based tool development
- Implementation challenges
- Conclusion

INTRODUCTION

- PHD project

  Funded together by DTU and IFE

- Period

  March 2012 to March 2015

- Subject

  Consequence Reasoning in MFM and Its Application in Operation Supportive Systems

CONSEQUENCE ANALYSIS

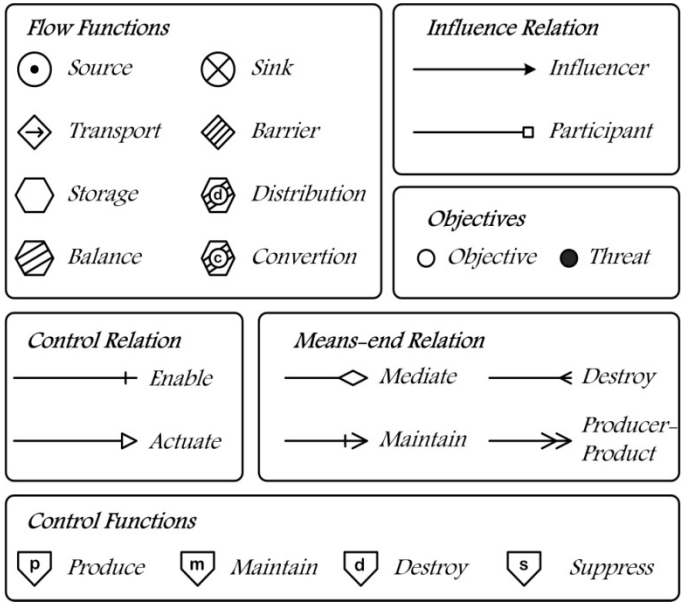
- Scope:

FUNCTIONAL MODELLING

- What – Definition
- Why – Justification
  - Means-end concept
  - Goal-function representation of the process
- How – Methodology

MULTILEVEL FLOW MODELING

- MFM Concepts and MFM models



- Means-end and whole-part decomposition
- State dependency relations are generic
- Means-end relations
- Means-end patterns
- MFM patterns
- Potential path of event propagation, temporal information

- Domain: NPP, etc. [refs]

MFM REASONING

RULE-BASED SYSTEM

- Components of a typical rule-base system:
  - A user interface or other connection to the outside world through which the knowledge of the system is collected and the input and output signal can be sent.
  - A knowledge base that stores the system information and conditions.
  - A rule base contains a set of rules, which is a specific type of knowledge base.
  - An inference engine or semantic reasoner, which infers information or takes action based on the interaction of knowledge base and the rule base.

RULE-BASED SYSTEM

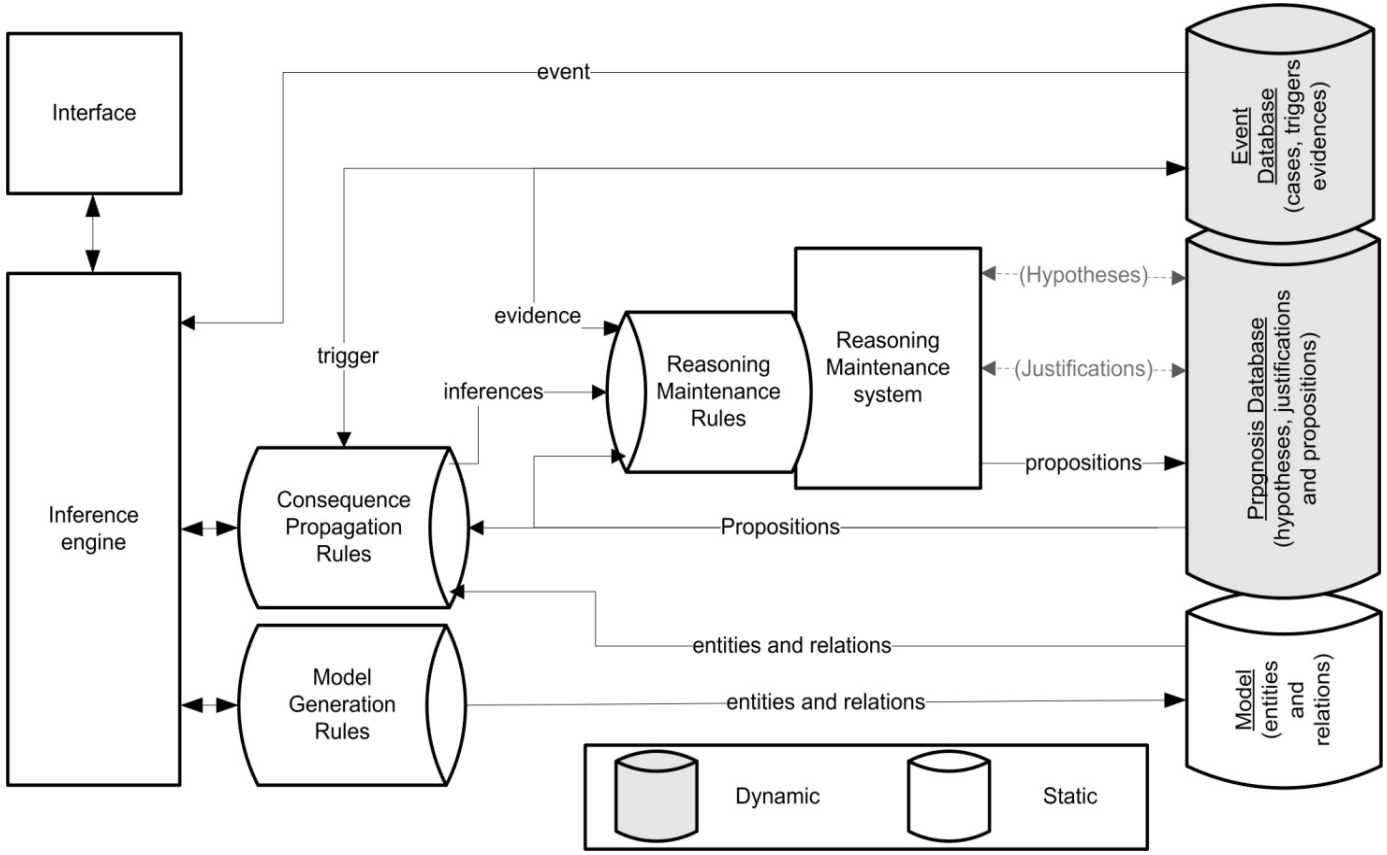
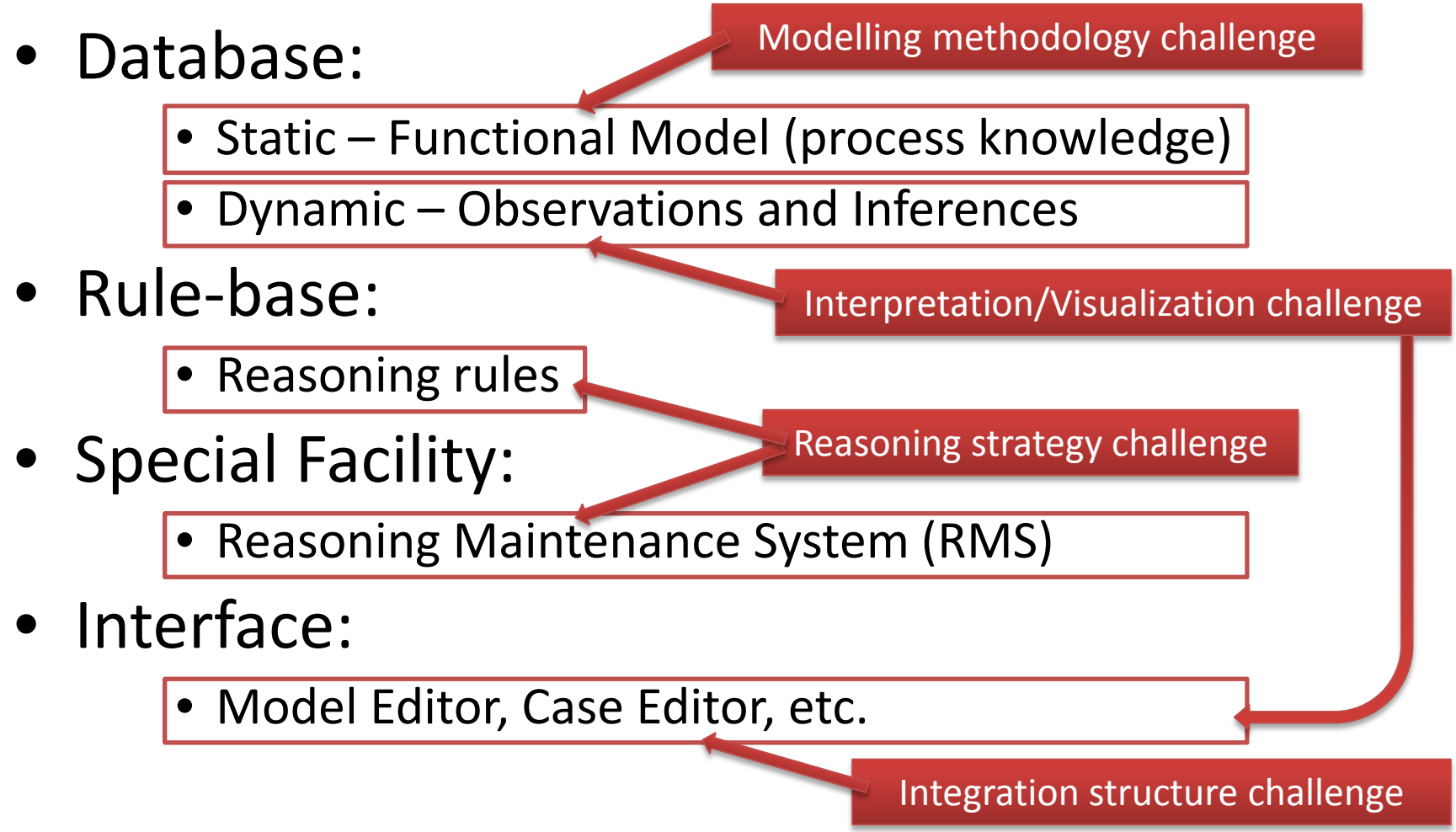


Fig2. Reasoning System Architecture for Consequence Analysis

RULE-BASED SYSTEM



CHALLENGES

- Modelling challenge:
  - Represent operation modes, barriers, control structures, etc.
  - [Refs]
- Reasoning strategy challenge
  - Inference propagation and validation
- Integration challenge
  - Interface design with other operation support systems
- Data interpretation challenge
  - Structure-role-function mapping
- Visualization challenge
  - Knowledge representation and display

INFERENCE PROPAGATION

- Identify propagation loops

MULTIAGETN ARCHITECTURE

CONCLUSION

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THANK YOU FOR YOUR ATTENTION!