Model Transformation Verification by Design for Information Interoperability

Mutation Testing + MT verifiability
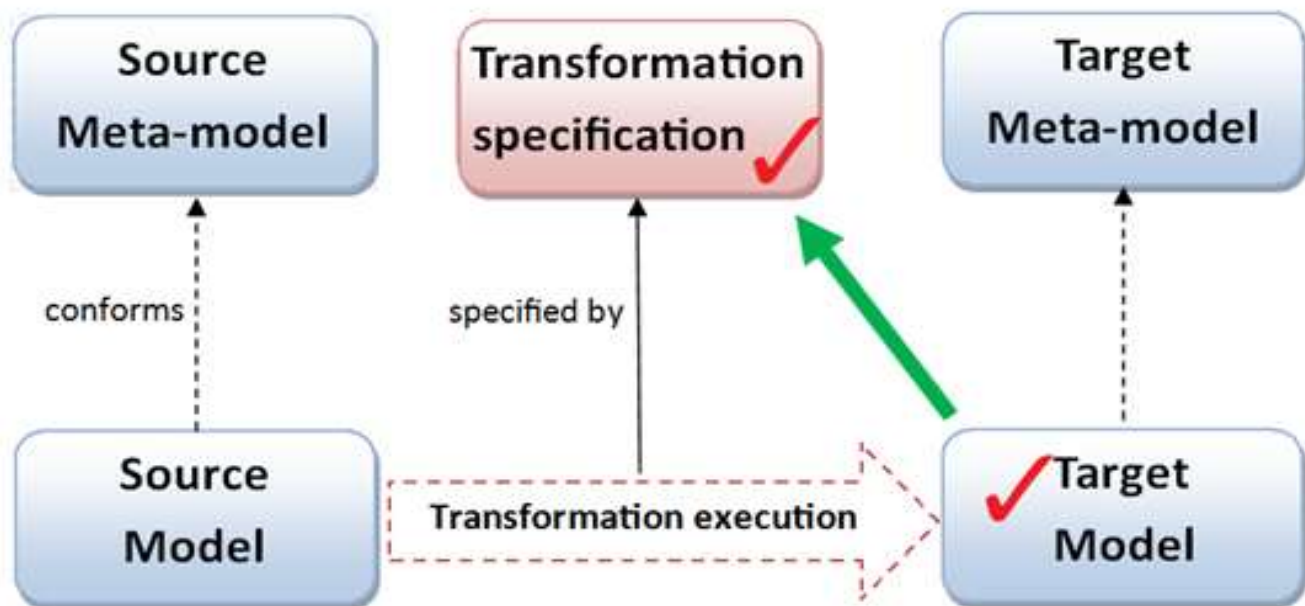
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Summary: MT verification by Design

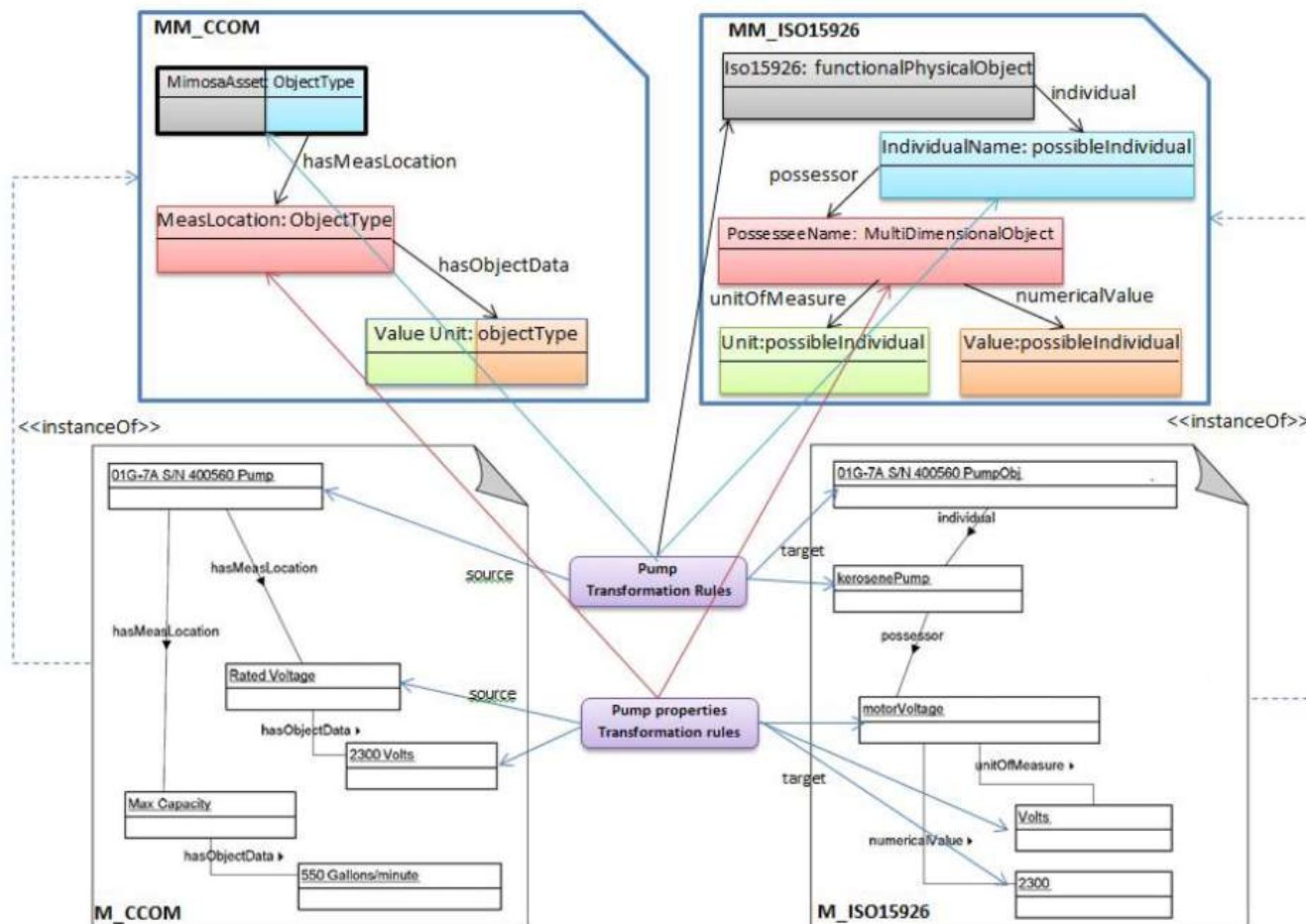○ Verification of MT properties before transformation execution

MT verification properties

- **Termination**
- **Determinism/Confluence**
- **Typing**
- **Conformance**
- **Multi-model properties**
- **Model Syntax Relations**
- **Model Semantics Relations**
- **Functional behaviour**
- **Metamodel coverage**
- **Source model properties**
- **Transformation rule order and location**
- **Tracing property**
- **Quality properties**

Source Meta-model

Transformation specification ✔

Target Meta-model

conforms

specified by

Transformation execution

Source Model

Target Model ✔

Interoperability in Oil & Gas Industry

Oil & Gas Interoperability (OGI) Pilot is a joint academic-industry project

- **Digital handover of engineering design documents from the design to operation & maintenance phase**
- **ISO 15926 <=> MIMOSA CCOM (Common Conceptual Object Model)**

- **Kerosene pump asset**
- **Meta-model coverage(MMC)/syntactic completeness MT property**
- **Should cover all meta-model elements**
- **Pre-transformation verification of MMC instead of post-transformation**
- **Transformation rules are analysed for including all target meta-model elements in their target part.**

MY INTEREST IN MT^2

- **How to apply Mutation Testing into Model Transformation verification**
- **Meta-model coverage, tracing and quality properties verification/testing with Mutation Analysis**
- **Identify operations that constitutes particular MT property verification -> fault injection**
- **Mutation operators to detect inadequacies in MT property verifications/tests**
- **Usage of Mutation Testing for MT verification evaluation**

I LOOK FORWARD TO . . .

- Gain insight in adapting MT to MT

- understand how to efficiently evaluate the quality of MT verification/test [by MT]

- Taxonomy of faults for MT verification

- Design and implementation of mutant generator for MT verification

- Evaluate the effectiveness of the mutation operators

- Feasibility of the implementation of mutation operators

- How to automate mutation analysis in the context of Model Transformation Verification/Testing