



**Master's
Thesis**

**Consistency in
Modeling Language
Evolution**

Background

Modeling languages are everywhere, including automotive, architecture, avionics, biology, chemistry, city planning, manufacturing, medicine, and more. Their models facilitate communication, documentation, analysis, and synthesis of systems. Yet, the engineering of modeling languages is challenging as their parts to realize their syntax (e.g., metamodels, grammars, OCL) and semantics (e.g., model transformations, code generators, interpreters) often are defined using various language workbenches and in terms of specialized (meta)modelling languages themselves.

Challenge

The evolution of modeling language parts, therefore, needs to consider and relate changes across artifacts conforming to different metamodeling languages. For instance, removing a concept from a metamodel can lead to issues as related processes may expect the deleted concept while executing.. In this thesis, together with experts from the Software Engineering and Technology group of Eindhoven University of Technology (TU/e), a novel consistency management method for modeling languages shall be developed. To this end, important properties of selected metamodeling languages and their relations shall be encoded into graph-based knowledge representation and augmented with inconsistency patterns to automatically detect problems in modeling language evolution.

Task

- Analyze the metamodeling languages used for language definition in selected language workbenches
- Identification of consistency requirements between these metamodeling languages

- Conception of a framework to translate models of these languages into knowledge graphs
- Specification and automated application of inconsistency pattern to this graph

Requirements

- Curiosity for modeling languages
- Experience in object-oriented programming
- Motivation to learn and perform challenging tasks
- Ability to work independently and in collaboration with TU/e's Software Engineering and Technology group
- Creativity and problem solving

Knowledge gained

- Software language engineering
- Knowledge engineering
- Language workbenches
- Independent scientific work

