Bachelor Thesis/Master Thesis

Automatic information validation for factory planning in BIM

Initial situation
The aim of the thesis is to develop an operational concept for a research project. The problem within factory planning is that the planning results of the production planner cannot be checked for consistency with those of the MEP planner (Mechanical, Electrical Plumbing, e.g. planning of the cooling water design) in a time-efficient way. A current design validation is nearly always limited to purely geometrical checks (“Does the pipe run through the machine?”). A check of non-geometric information (“Does the flow rate in the pipe match the hourly machine demand for water?”) is currently not possible. For this purpose, the overall research project is intended to represent the knowledge required for checking the described interface by means of ontology models and to implement checking rules in this ontology model. This generally valid knowledge model, which is initially independent of the concrete planning project, will be used to validate concrete planning data from BIM software. This thesis is intended to conceptualize the operational implementation of the research project. The concrete question of the thesis: In which (uniform) data format can planning information be extracted from different BIM software (e.g. database formats) and how can the exported data be mapped to concepts and instances of an ontology model in order to validate the planning data using the generally valid ontology model?

The following subtasks have to be considered:

1. Familiarization with ontologies, BIM and rule checking
2. Investigation on export possibilities of planning models from proprietary BIM software (e.g. Autodesk Revit) by means of expert interviews (experts organized by WZL).
3. Investigation on storage possibilities of ontologies and implemented rules (SWRL)
4. Development of a concept for checking data models from BIM software (see 2.) using concepts and rules from ontology models (see 3.); through literature research and interviews with experts organized by WZL
5. Possibly, short validation of the concept

Requirements
• Good studies in Mechanical Engineering, Industrial Engineering, PSE or others
• High motivation, commitment and personal initiative proactive way of working
• Programming/Coding knowledge (Java/Python)
• Knowledge and/or interest in database systems (e.g. SQL)

We offer
• Very extensive guidance through WZL
• Clear task
• Self-reliant execution
• Friendly working environment

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