Bachelor Thesis/Master Thesis

Automatic information validation for factory planning in BIM

Initial situation
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. This thesis is intended to build up the individual steps of planning information validation, i.e. to combine concrete existing approaches and develop own approaches so that a uniform workflow results.

Concrete questions for the thesis:
- In which, if possible, uniform format can planning information be extracted from different BIM software (e.g. Excel or SQL)?
- How can the extracted data be mapped to an existing knowledge model (ontology model)?
- How can the planning information be checked using the knowledge model and a rule model and how can a report from the check be generated?

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 data base systems (e.g. SQL)

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