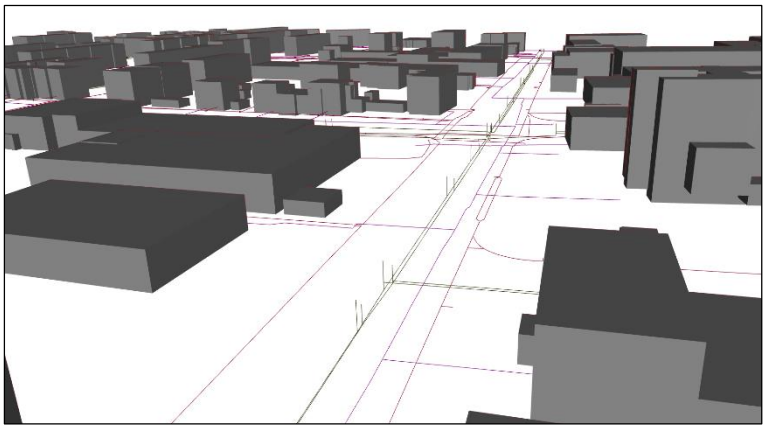
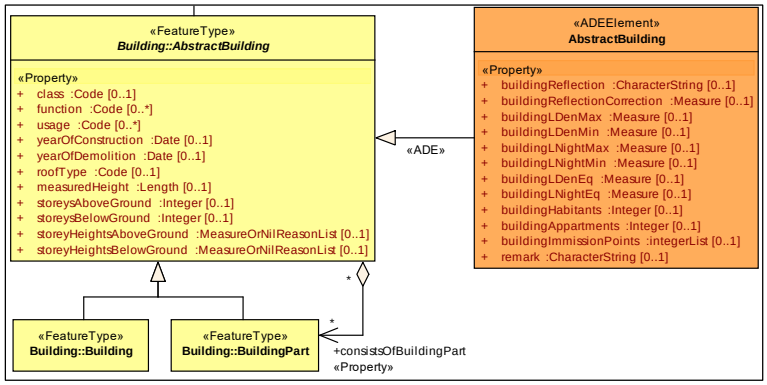
Geodäsie & Geoinformation

Master's Thesis Proposal

Verification of the Correctness of CityGML Application Domain Extensions

CityGML is an international standard issued by the Open Geospatial Consortium (OGC) for modelling, storing, and exchanging semantic 3D city models. CityGML contains a built-in mechanism for systematically extending the standard with so-called Application Domain Extensions (ADEs). In this way, CityGML can be adapted to various areas of application. Examples are the Noise ADE for noise mapping, the Utility Network ADE for representing supply infrastructures, or the Energy ADE for urban energy analyses.





The preferred way of defining ADEs is by using the Unified Modeling Language (UML) and creating UML data models. Afterwards, GML application schemas can be derived automatically from these UML models. Several rules need to be followed when defining ADEs using UML. The goal of this thesis is to develop a tool that verifies whether the ADE conforms to these rules.

This involves specifying a) the rules that make ADEs compliant to CityGML and relevant ISO standards, the rules also need to take into account that the ADE-mechanism defined in CityGML version 2.0 differs from the upcoming version CityGML 3.0; and b) rules to check whether the UML models are compliant to the GML encoding rules defined in the standard ISO 19136.

These rules are then to be implemented. Since ADEs are commonly defined using the software Enterprise Architect, the rules are to be implemented as a script that can be run directly within Enterprise Architect.

The tool is then to be applied to various currently existing ADEs listed in [Biljecki et al. 2018 CityGML Application Domain Extension (ADE): overview of developments] and it is to be evaluated how many of the ADEs comply to the rules and what are the common pitfalls. In addition, a manual evaluation is to be conducted for ADEs that have not been defined using Enterprise Architect.

Knowledge in UML modelling using Enterprise Architect is required. Programming knowledge is required as well; the tool is to be implemented by using either JavaScript or VBScript.

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