INVESTIGATING SEMANTIC FUNCTIONALITY OF 3D GEOMETRY FOR LAND ADMINISTRATION

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Abstract Significance of semantic data during the recent years is growing. This trend, combined with facilitation of new 3D object modeling has led to semantically enriched 3D models, serving various applications where relations between objects' components and their environment need to be stored and presented. In the field of Land Administration, semantics can greatly contribute to optimize land management and land policies. Integration of semantics to 3D building models is currently achieved through two differently structured models: semantic-oriented CityGML and structural-oriented BIM/IFC. Integration of the semantic information of each model is still an object of intense research worldwide. In this pa-per, a 3D building model designed in SketchUp Pro software was transformed using FME software to a CityGML file; land use features were assigned to the model and attribute queries were executed in order to check the exported models' functionality in terms of semantics.

Keywords: 3D modelling, Land Use, Sketchup Pro, CityGML, attribute query

MANAGING VERSIONS AND HISTORY WITHIN SEMANTIC 3D CITY MODELS FOR THE NEXT GENERATION OF CITYGML

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Abstract Semantic 3D city models describe city entities by objects with thematic and spatial attributes and their interrelationships. Today, more and more cities worldwide are representing their 3D city models according to the CityGML standard issued by the Open Geospatial Consortium (OGC). Various application areas of 3D city models such as urban planning or architecture require that authorities or stakeholders manage parallel alternative versions of city models and their evolution over time, which is currently not supported by the CityGML standard 2.0.

In this paper, we propose a concept and a data model extending CityGML by denoting versions of models or model elements as planning alternatives. We support transitions between these versions to manage history or evolution of the city models over time. This approach facilitates the interoperable integration and exchange of different versions of a 3D city model within one dataset, including a possibly complex history of a repository. Such an integrated dataset can be used by different software systems to visualize and work with all the versions. The versions and version transitions in our proposed data model are bi-temporal in nature. They are defined as separate feature types, which allow the users to manage versioning and to perform queries about versions using an OGC Web Feature Service. We apply this data model to a use case of planning concurrent versions and demonstrate it with example instance data. The concept is general in the sense that it can be directly applied to other GML-based application schemas including the European INSPIRE data themes and national standards for topography and cadasters like the British Ordnance Survey Mastermap or the German cadaster standard ALKIS.

Keywords: Semantic 3D city models, CityGML, Planning versions, History, City model lifecycle