Towards 3D Cadastral Level of Detail

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SUMMARY

The cadastre has given rise of increasing interests within the last decade under transition from 2D to 3D with the help of 3D spatial technologies 3D GIS and BIM. Traditionally, legal information including textual documents and index maps that is recorded in cadastral dossiers is the fundament in the cadastral system. From a point view of geometry, 3D cadastre is based on the integration of legal information with physical models from 3D GIS and/or BIM models to represent 3D property units and 3D property boundaries. However, 3D GIS and BIM domains represent and model geometric and semantic building information with their own hierarchical data structure - Level of Detail (LOD) and Level of Development (LOD) respectively. When generating 3D cadastral models and converting between BIM and 3D GIS, it will create problems with defining and representing legal information in 3D models accurately, maturely and reliably due to the fact that current 3D cadastre has no data hierarchy structure and data details.

To address those issues, a conceptual definition Cadastral Level of Details (CLODs) is proposed as a hierarchical data structure to represent both legal information, rights, restrictions and responsibilities (RRRs) and geometric information for 3D cadastral models. The purpose is to describe and reflect specific application requirements including property boundaries, property units and property rights. In other words, the CLODs are the link to combine legal and spatial cadastral information, as well as to represent and visualize hierarchically in 2D cadastral maps and 3D cadastral models. The classification of CLODs corresponds to both the levels of details of physical models (such as BIM/IFC and 3D GIS models) and legal information/models (for example LADM models) from CLOD0 to CLOD3. A case study of Multihuset, Malmö, Sweden will be developed to explain the classification of CLODs. A well-defined hierarchical data structure enables to provide cadastral data specifications clearly, where the risk of spatial representation with legal information being misunderstood will be reduced. It will satisfy the cadastral geometry and legal requirements,

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save time and cost for further development of efficient and effective information retrieval, address the gap for harmonizing the cadastre, BIM and GIS database in order to facilitate the transformations efficiently from the hybrid stage towards the full 3D cadastre stage. It will be beneficial for different actors in a uniform way to digitalize and standardize 3D cadastral management, as further to strategically support making decisions, detailed plans, and digital twins.