

A Conceptual Model Supporting a Range of 3D Parcel Representations Through all Stages: Data Capture, Transfer and Storage

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SUMMARY

Although some volumetric spatial units are highly complex and difficult to encode and visualise, in practice the vast majority of actual cadastral parcels are quite simple, or composed of simple components. It may be noted that even where the spatial units are apparently complex, most boundary faces are either vertical or horizontal, and that a significant majority of spatial units are composed of a simple polyhedral slice - a prism resulting from the vertical extrusion of a 2D polygon.

From the opposite perspective, the Land Administration Domain Model recognises that even conventional 2D spatial units are, in the real world, prismatic columns of space defined by vertical faces, with no explicitly stated upper or lower boundary faces. These are known as “Face Strings” (LA_BoundaryFaceString).

This paper explores a hybrid method of defining 3D spatial units, whereby the “footprint” of the spatial unit is represented as a face string, associated with a set of more general faces, (each stored as a LA_BoundaryFace). In a majority of cases, the faces can be separated to define an upper and/or lower surface (often a simple plane, usually horizontal). It is shown that this provides a complete encoding scheme - from simple 2D land parcels, to the most complex volumes. It is further shown that this scheme is more parsimonious in storage than the conventional polyhedron (stored as a collection of faces) for the vast majority of real cases (using real world examples). The paper further explores the expression of the approach as a topological encoding, in terms of the 2D coverage, and the complete 3D fabric.

The approach is discussed from three perspectives: as a scheme for the storage of mixed 2D and 3D cadastral information; as an encoding for the transport of such information (for example in

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LandXML or InfraGML); and as a technique for data capture and validation of such information.

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