

Modelling 3D Legal Boundaries for Urban Infrastructure in a BIM Environment: Case Studies in Queensland, Australia

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SUMMARY

One of the five goals of the future vision for Australia and New Zealand is to provide a digital representation of the real world that is survey accurate, 3D and dynamic. The 3D element is becoming increasingly important due to the escalating development of buildings and infrastructure below and above the ground that are difficult to visualise on 2D survey plans. In Queensland, Australia, 3D objects in survey plans are represented using Building Format plans and Volumetric Format plans. To enhance the visualisation of these survey plans, legal boundaries have been incorporated into Building Information Models (BIM). Prior research has demonstrated how legal boundaries defined on building format plans can model volumetric spaces based on physical building elements such as floors, walls and ceilings. This project aimed to extend this research by investigating whether more abstract legal boundaries bound by 3-dimensionally located points as depicted on Queensland Volumetric Format plans could be modelled in a BIM and transferred to an alternative BIM program using an international geospatial standard. Industry Foundation Classes (IFC) is the most widely used open data model to facilitate the transfer of information between different proprietary BIM platforms. A BIM prototype model developed in Revit demonstrated how a volumetric lot can be created within a BIM environment together with attributes required for an interactive Land Administration system. Two case studies were conducted for this research using two volumetric survey plans, one representing a volumetric lot underground containing an underground road tunnel and another representing an aboveground lot used for leases of infrastructure above a high-rise building. The volumetric lots in the models were designated as IfcSpace entities in the IFC standardised data structure. The interoperability of the prototype models encoded in an IFC format was demonstrated by successfully importing the files into two alternative information platforms. A BIM/IFC-based approach to modelling volumetric boundaries has the potential to be a viable input into the formulation of the 3D land administration for urban infrastructure in Queensland.

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