TECHNICAL SPECIFICATION

ISO/TS 19166

Geographic information — BIM to GIS conceptual mapping (B2GM)

Information géographique — Cartographique conceptuelle de BIM à GIS (B2GM)

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This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

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Introduction

Building Information Modelling (BIM) contains rich information related to building elements such as doors, walls, windows, MEP (mechanical, electrical, and plumbing) and others. In addition, BIM models may include information about other features than buildings, which are relevant to GIS. From the viewpoint of GIS, there are many benefits related to using BIM information in GIS applications. Some examples are:

a) Indoor service implementation such as emergency management (routing, evacuation path finding under fire situation).

b) Outdoor - indoor linkage service, such as seamless navigation.

c) Effective facility/energy/environment management considering objects related BIM based on GIS.

Although there have been some attempts to harvest the rich information contained in BIM models and use it in GIS, there is no established way to map the information elements between the two modelling worlds. A proper mapping method is clearly required. Before the implementation of the information mapping, however, mapping mechanisms for linking appropriate information elements from BIM to GIS need to be clearly defined. In addition, for the mapping mechanisms to work together, a conceptual framework for the mapping process based on open standards between BIM and GIS needs to be established.

This document provides the conceptual framework for BIM to GIS information mapping and required mapping mechanisms.

A brief explanation of each mapping mechanism follows:

— BIM to GIS Perspective Definition (B2G PD): supports perspective information representation depending on the specific requirement such as the urban facility management (UFM). "Perspective" depends on the use-case. For example, to manage the urban facilities, the required data should be collected from the various data sources, including BIM model, and transformed to represent in user-specific perspective. PD defines a Data View to extract the data required and transform the information from the various data sources.

— BIM to GIS Element Mapping (B2G EM): supports the element mapping from BIM model to GIS model. As the BIM and GIS model schemas are different, B2G EM requires a mapping rule specifying how to transform from a BIM model to GIS model element.

— BIM to GIS LOD Mapping (B2G LM): supports the LOD mapping from BIM model to GIS model. LOD (levels of detail) in GIS is a deliberate choice of data included/excluded from a model to satisfy certain use cases including visualization. The relevant geometric and other information for the LODs required in the target GIS model need to be extracted/or queried from the BIM model. This can be defined by the LOD mapping ruleset.

This document is applicable to information query services such as urban facility management operation. BIM object visualization in GIS and other application services that require query processing depending on the relationship between BIM and GIS objects, either in the real or virtual world, will be able to use the mechanisms defined in this document for mapping the required information elements between the two systems. Although this document describes mapping information elements from BIM to GIS in general, the primary concern of this document is mapping BIM models to GIS models for visualization.

The conceptual mapping mechanism defined in this document uses existing international standards such as Geography Markup Language (GML) (ISO 19136-1) and Industry Foundation Classes (IFC) (ISO 16739-1). The Open Geospatial Consortium (OGC)'s Land and Infrastructure Conceptual Model Standard (LandInfra) (OGC 15-111r1) defines the information model of infrastructure such as roads. As LandInfra has been designed with a common conceptual model between the BIM and GIS communities, transferring information from LandInfra BIM models to LandInfra GIS models should be reasonably straight forward. This document, therefore, concentrates on mapping from BIM models not based on LandInfra.