Technical Specification

ISO/TS 19166

Geographic information — Building information modelling (BIM) to geographic information systems (GIS) conceptual mapping (B2GM)

Information géographique — Cartographie conceptuelle de la modélisation des informations de la construction (BIM) aux systèmes d'information géographique (GIS) (B2GM)

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Foreword

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This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, Geographic Information, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO/TS 19166:2021), which has been technically revised.

The main changes are as follows:

— definitions 3.3, 3.9, 3.10 and 3.13 have been revised;

— Figure 4, Figure 5, Figure 7, Figure 9 and Figure 10 have been revised.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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 can include information about other features than buildings which are relevant to geographic information systems (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 should 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 should 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 is as 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 the BIM model, and transformed to represent in the 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 a GIS model element.

— BIM to GIS level of detail (LOD) mapping (B2G LM): Supports the LOD mapping from BIM model to GIS model. LOD 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 should 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 UFM 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 [1]) and Industry Foundation Classes (IFC) (ISO 16739-1 [2]). The Open Geospatial Consortium (OGC)’s *Land and Infrastructure Conceptual Model Standard (LandInfra)* (OGC 15-111r1 [3]) 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 is usually reasonably straightforward. This document, therefore, concentrates on mapping from BIM models not based on LandInfra.