

ISO/DTS 19166

ISO/TC 211

ISO/CD TS 19166(en)

Secretariat: SIS

Date: 2025-07-17

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

~~Information géographique — Cartographie conceptuelle de BIM à GIS (B2GM)~~

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## ISO/DTS 19166:2025(en)

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Published in Switzerland

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## Contents

Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references .....	2
3 Terms and definitions.....	2
4 Abbreviated terms and notation .....	4
4.1 Abbreviated terms .....	4
4.2 UML notation.....	5
5 Conformance .....	5
6 Conceptual framework for BIM to GIS mapping .....	5
6.1 General.....	5
6.2 Conceptual overview.....	5
6.3 Mechanisms.....	6
7 BIM to GIS perspective definition.....	11
7.1 General.....	11
7.2 Mechanisms.....	12
8 BIM to GIS element mapping.....	14
8.1 General.....	14
8.2 Mechanism.....	14
9 BIM to GIS LOD Mapping.....	17
9.1 General.....	17
9.2 Mechanism.....	17
Annex A (normative) Abstract test suite.....	20
Annex B (informative) B2G EM and LM example .....	22
Annex C (informative) Instance example using B2G PD .....	24
Annex D (informative) CityGML LOD model and mapping.....	25
Annex E (informative) LOD mapping rule description example.....	27
Bibliography .....	28

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO ~~documents~~document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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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](http://www.iso.org/members.html).

## Introduction

Building ~~Information Modelling~~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 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~~indoor service implementation such as emergency management (routing, evacuation path finding under fire situation);
- b) ~~Outdoor-outdoor~~indoor linkage service, such as seamless navigation;
- c) ~~Effective~~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 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 ~~needs to 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~~perspective definition (B2G PD): ~~supports~~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~~data view to extract the data required and transform the information from the various data sources.
- BIM to GIS ~~Element Mapping~~element mapping (B2G EM): ~~supports~~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)~~ mapping (B2G LM): ~~supports~~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 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 ~~urban facility management~~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<sup>[1]</sup>) and Industry Foundation Classes (IFC) (ISO 16739-1<sup>[2]</sup>). The Open Geospatial Consortium (OGC)'s *Land and Infrastructure Conceptual Model Standard (LandInfra)*