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Information exchange between BIM and GIS - Part 1: Core principles and specifications (ISO/DIS 23143-1:2026)

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Information exchange between BIM and GIS —

Part 1: Core principles and specifications

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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 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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by the Joint Working Group 14 *GIS-BIM interoperability*, a joint working group between Technical Committee ISO/TC 59 *Buildings and civil engineering works*, Subcommittee SC 13 O*rganization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)* and ISO/TC 211 *Geographic information/Geomatics*.

A list of all parts in the ISO 23143 series can be found on the ISO website.

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

The integration of Building Information Modelling (BIM) and Geographic Information Systems (GIS) represents a critical evolution in how the built environment is planned, delivered, and managed. As digital transformation reshapes the architecture, engineering, construction, and operations (AECO) sector, the need for seamless information exchange across scales and the knowledge domains that support them is becoming essential.

BIM and GIS were developed independently to address different industry needs. BIM emerged to support the detailed design, construction, and operation of individual built assets through multidimensional digital representations and collaborative workflows. Initially focused on buildings, BIM has expanded to encompass infrastructure including roads, bridges, railways, and other civil engineering works. GIS, conversely, was developed to define phenomena in the real world as geographical features under a unified spatial reference system, and then to abstract these geographical features into points, lines, areas, and volumes at different scales. While GIS excels at processing, visualising and managing all types of geographical features within different spatial scopes, BIM provides micro-scale precision for asset-specific information.

Both domains are converging and therefore call for more structured workflows and specific strategies to overcome current incompatibilities in how they individually structure, store, process, and visualize information. These differences extend across coordinate systems, semantic representations, geometric paradigms, levels of granularity, and data access methods.

This international standard addresses these challenges by establishing core principles and specifications for structured, semantically consistent information exchange between BIM and GIS. It recognizes that interoperability between these domains is essential for the AECO sector to meet contemporary demands for sustainable development, resilient infrastructure, and efficient asset management.

The standard adopts a perspective-based approach, recognizing that different stakeholders view BIM-GIS information exchange through distinct lenses shaped by their roles, responsibilities, and objectives. Eight fundamental perspectives are identified: life cycle, process, product, data, exchange, actor, geospatial, and standards. Understanding which perspective drives a particular information exchange ensures it fulfils its intended purpose.

This document establishes the foundational framework. It defines key concepts, describes technical requirements, and identifies critical elements including requirements, services, functions, resources, and repositories. Subsequent parts address metadata exchange (Part 2), geometric representation concepts, semantic alignment, and process quality.

The approach presented herein builds upon existing international standards in both domains while providing practical guidance for their coordinated application. By enabling seamless data flow between BIM and GIS systems, this standard supports informed decision-making throughout the entire life cycle of built assets within their geographic setting, facilitating multi-scale analysis from building component to regional infrastructure network, collaborative workflows across traditionally separate disciplines, and compliance with regulatory requirements spanning both building and geographic domains.

This document is intended for:

— Project owners and asset managers defining information requirements

— Design consultants and BIM managers implementing information exchanges

— GIS specialists and geospatial engineers establishing coordinate systems

— Software developers creating interoperability solutions

— Standards bodies and policy makers establishing BIM-GIS integration requirements

— Educators and researchers advancing BIM-GIS integration practices

This document applies to:

— All phases of the built asset life cycle from strategic planning through decommissioning

— Projects of any scale from individual buildings to regional infrastructure networks

— All built asset types including buildings, bridges, roads, railways, utilities, and other civil engineering works

— Both new construction and renovation/retrofit projects

— Public and private sector projects requiring BIM-GIS integration

Information exchange between BIM and GIS —

Part 1: Core principles and specifications

1 Scope

This document establishes the core principles and specifications for enabling structured and semantically consistent information exchange between BIM and GIS. It provides a comprehensive framework for understanding, planning, and implementing information exchanges that span both the BIM domain and the GIS domain.

This document provides a conceptual framework, built around eight perspectives on BIM-GIS information exchange: life cycle, process, product, data, exchange, actor, geospatial, and standards perspectives, how they shape, dictate, or constrain the structuring and execution of information exchanges, and the relationships between them and their application to specific use cases.

It also addresses the following key elements:

— Requirements definition and hierarchy for BIM-GIS information exchanges

— Services enabling exchange and integration, transformation, query and analysis, and visualization and communication

— Functions supporting spatial registration and georeferencing, data harmonization, linking, analytical operations, and workflow management

— Resources including data and information types, formats, and their characteristics

— Repositories for centralized data management, translation and integration, and specialized storage

It provides guidance on:

— Use case definition, services, and functions specification

— Application schema considerations addressing fundamental differences between BIM and GIS data structures

— Data resources management including objects, entities, and features

— Position and location management including georeferencing levels, metadata requirements, and implementation tasks

— Coordinate reference system selection and transformation parameters

— Georeferencing, including levels of georeferencing, metadata requirements and georeferencing tasks

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC Guide 14:2018, *Products and related services — Information for consumers*

ISO 7817-1:2024, *Building information modelling — Level of information need — Part 1: Concepts and principles*

ISO 8000-8:2015, *Data quality — Part 8: Information and data quality: Concepts and measuring*

ISO 12006-2:2015, *Building construction — Organization of information about construction works — Part 2: Framework for classification*

ISO 19101-1:2014, *Geographic information — Reference model — Part 1: Fundamentals*

ISO 19111:2019, *Geographic information — Referencing by coordinates*

ISO 19115-1:2014, *Geographic information — Metadata — Part 1: Fundamentals*

ISO 19156:2023, *Geographic information — Observations, measurements and samples*

ISO 19162:2015, *Geographic information — Well-known text representation of coordinate reference systems*

ISO/TS 19166:2025, *Geographic information — Building information modelling (BIM) to geographic information systems (GIS) conceptual mapping (B2GM)*

ISO 19650-4:2022, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 4: Information exchange*

ISO 23387:2025, *Building information modelling (BIM) — Data templates for objects used in the life cycle of assets*

ISO 29481-1:2025, *Building information models — Information delivery manual — Part 1: Methodology and format*

ISO 55013:2024, *Asset management — Guidance on the management of data assets*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1 BIM domain

3.1.1
building information modeling
BIM
use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions

Note 1 to entry: Built assets include, but are not limited to, buildings, bridges, roads, process plants.

[SOURCE: ISO 19650-1:2018 [1], 3.3.14]

3.1.2
use case
description of a *process* (3.3.3) by defining a sequence of actions performed by one or more roles to realize a *purpose* (3.1.6)

Note 1 to entry: A *use case* (3.1.2) specifies the scope of the context.

[SOURCE: ISO 24014-1:2021 [2], 3.36, modified - the word "actor" has been replaced with "role". The words "and by the system itself" has been replaced with "to realize a purpose". The note to entry has been added.]

3.1.3
life cycle
⟨asset⟩ life of the *asset* (3.3.4) from the definition of its requirements to the termination of its use, covering its conception, development, operation, maintenance support and disposal

[SOURCE: ISO 19650-1:2018 [1], 3.2.10]

3.1.4
life cycle
⟨product⟩ consecutive and interlinked stages of a *product* (3.1.7) (or *service* (3.3.12)) *system* (3.1.10) , from raw material acquisition or generation from natural resources to final disposal

Note 1 to entry: The life cycle stages include acquisition of raw materials, design, production, transportation/delivery, use, end-of- life treatment and final disposal.

[SOURCE: ISO/IEC Guide 14:2018, 3.11]

3.1.5
actor
person or organizational unit involved in a *process* (3.3.3) or *project*

[SOURCE: ISO 6707-2:2017 [3], 3.8.1]

3.1.6
purpose
intention or objective for which something is done or created or for which something exists

[SOURCE: ISO 6707-4:2021 [4], 3.6.7]

3.1.7
product
tangible outcome of a *process* (3.3.3)

[SOURCE: ISO 6707-3:2017 [5], 3.3.1]

3.1.8
object
related to any part of the perceivable or conceivable world

Note 1 to entry: An object is something abstract or physical toward which thought, feeling, or action is directed.

[SOURCE: ISO 12006-2:2015, 3.1.1]

3.1.9
object type
representation of *object* (3.1.8) that share common characteristics

Note 1 to entry: The role of the object type is to classify the *data template* (3.3.5) .

[SOURCE: ISO 23387:2025, 3.5]

3.1.10
system
arrangement of parts or elements that together exhibit a stated behaviour or meaning that the individual constituents do not

EXAMPLE The object “wall” which is composed of parts is a system.

[SOURCE: ISO 23387:2025, 3.11]

3.1.11
digital product passport
DPP
digital identity card for products, components and materials, which is officially registered with a government authority, that stores relevant *information* (3.3.2) to support a *product* (3.1.7)'s sustainability, promote their circularity characteristics, and strengthen legal compliance

[SOURCE: CWA 18186:2025 [6], 3.2]

3.1.12
project information model
PIM
information (3.3.2) *model* (3.3.1) relating to the delivery phase

Note 1 to entry: During the project, the project information model can be used to convey the design intent (sometimes called the design intent model) or the virtual representation of the asset to be constructed (sometimes called the virtual construction model).

[SOURCE: ISO 19650-1:2018 [1], 3.3.10]

3.1.13
asset information model
AIM
information (3.3.2) *model* (3.3.1) relating to the operational phase

[SOURCE: ISO 19650-1:2018 [1], 3.3.9]

3.1.14
common data environement
CDE
agreed source of *information* (3.3.2) for any given project or *asset*, for collecting, managing and disseminating each *information container* (3.3.6) through a managed *process* (3.3.3)

Note 1 to entry: A CDE workflow describes the processes to be used and a CDE solution can provide the technology to support those processes.

[SOURCE: ISO 19650-1:2018 [1], 3.3.15]

3.1.15
trigger event
planned or unplanned event that changes an *asset* or its status during its *life cycle* (3.1.3), which results in an *information* (3.3.2) exchange

Note 1 to entry: During the delivery phase, trigger events normally reflect the ends of project stages.

[SOURCE: ISO 19650-1:2018 [1], 3.2.13]

3.1.16
model coordinate system
MCS
local coordinates transformed by any transforms specified as attributes at or above the node

[SOURCE: ISO 14306:2017 [7], 3.1.14]

3.2 GIS domain

3.2.1
geographical information system
GIS
information system (4.1.23) dealing with *information* (3.3.2) concerning phenomena associated with location relative to the Earth

[SOURCE: ISO 19101-1:2014, 4.1.20]

3.2.2
coordinate reference system
CRS
coordinate *system* (3.1.10) that is related to an *object* (3.1.8) by a datum

Note 1 to entry: Geodetic and vertical datums are referred to as reference frames.

Note 2 to entry: For geodetic and vertical reference frames, the object will be the Earth. In planetary applications, geodetic and vertical reference frames may be applied to other celestial bodies.

[SOURCE: ISO 19111:2019 , 3.1.9]

3.3 Joint domains

3.3.1
model
abstraction of some aspects of reality

[SOURCE: ISO 19115-1:2014 [8] , 4.14]

3.3.2
information
meaningful data

[SOURCE: ISO 9000:2015 [9], 3.8.2]

3.3.3
process
set of interrelated or interacting activities that use inputs to deliver an intended result

EXAMPLE Examples results include: agreements, systems, services, or products.

Note 1 to entry: A process always contains one or more transactions.

[SOURCE: ISO 9000:2015 [9], 3.4.1, modified - The notes to entry have been replaced with a note to entry. An example has been added.]

3.3.4
asset
item, thing or entity that has potential or actual value to an organization

[SOURCE: [SOURCE: ISO 55000:2014 [10], 3.2.1, modified — Note 1, 2 and 3 to entry have been removed]]

3.3.5
data template
DT
data structure used to describe the characteristics of an *object* (3.1.8)

EXAMPLE 1 A data template offers a view tailored to a specific information requirement. For example, a heating, ventilation and air conditioning (HVAC) *system* (3.1.10) designer may require descriptions of HVAC products that can be imported into the design system.