
**Organization and digitization of
information about buildings and civil
engineering works, including building
information modelling (BIM) —
Framework for specification of BIM
implementation**

iTeh STANDARD PREVIEW
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*Organisation et numérisation des informations relatives aux
bâtiments et ouvrages de génie civil, y compris modélisation des
informations de la construction (BIM) — Cadre pour la spécification
de la mise en œuvre du BIM*

[ISO 12911:2023](https://standards.iso.org/standards/catalog/standards/sist/4c9f2ec7-406b-463e-a617-0d8d642725ea/iso-12911-2023)

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 Terms related to knowledge resources.....	2
3.2 Terms related to requirements management.....	2
4 Purpose and background	3
4.1 Role of the framework.....	3
4.2 Intention of BIM implementation specifications.....	4
4.3 Overview of framework sections.....	4
4.4 Implementation.....	4
4.5 Conformity.....	5
4.6 Implications of nonconformity.....	5
5 Relationship to other standards	5
5.1 Review.....	5
5.2 Use.....	6
5.3 Development of new outcomes.....	6
5.4 Specialized application areas.....	6
5.5 Classification structures and language usage.....	7
5.6 Automation.....	7
6 Framework	7
6.1 Overview.....	7
6.2 Framework sections.....	7
6.2.1 Framework Section 1: Outcomes.....	7
6.2.2 Framework Section 2: Controls.....	8
6.2.3 Framework Section 3: Input.....	8
6.3 Extensions.....	8
6.4 Clause structure.....	9
6.4.1 Overall.....	9
6.4.2 Title.....	9
6.4.3 Applicability.....	10
6.4.4 Selection.....	10
6.4.5 Exception.....	10
6.4.6 Requirement.....	10
6.4.7 Complex metrics.....	10
6.4.8 Notes.....	10
Annex A (informative) Clause ordering	11
Annex B (informative) BIM implementation specification examples	14
Bibliography	22

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 13, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM)*.

This first edition cancels and replaces the Technical Specification ISO/TS 12911:2012, which has been technically revised.

The main changes are as follows:

- formalization of requirements;
- references updated.

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

Information management processes for the built environment sector have been defined through several international standards (e.g. the ISO 19650 series and the ISO 29481 series). These standards can be supported by creating structured and checkable technical specifications for the inputs to, controls on and outputs from those processes.

Structured and checkable technical specifications cover a wide range of situations. They can be used to define:

- the structure of an information planning document (e.g. a BIM execution plan);
- an information management control (e.g. the convention for a file name);
- the contents of an information container (e.g. the specified level of information need in a particular type of design model, drawing or schedule).

Some of these applications are already subject to standardized definitions but these definitions are usually in the form of textual descriptions which means they cannot be used by rule-based software to check for the expected outcomes.

This document defines a systematic approach through which a structured specification for any type of BIM implementation document can be created. Once created, these BIM implementation specifications can be shared amongst those providing and receiving information to enable deliverables to be checked, ideally through automated processes. The BIM implementation specifications are designed so that they can be both human-readable and machine-readable. This is done through the clear definition of the requirements that the deliverable has to meet, the applicable situation(s) that each specification is for, any selection of subsets, and any exceptions that need to be stated. This structured process is referred to as "RASE" (requirement, application, selection, exception).

Use of this document is expected to help organizations and individuals at all points during information management processes to explain their own expectations and to understand the expectations of others.

Authors of BIM implementation specifications, including international and national institutions as well as individual organizations, can use this framework to document their expectations in a way that is clear, concise and checkable. Those supporting specific software application usage can also conform to the framework.

Implementers of information management processes will benefit from the clear structure and the ability to compare and merge BIM implementation specifications, potentially from multiple sources, to mobilize, execute and check their internal BIM implementations.

BIM implementation specifications can be used:

- internally within an organization, to standardize the production of planning documents or to encode the rules to be used during the production of information containers;
- in appointment documentation to convey requirements from one organization to another;
- by discipline or sector-wide organizations to capture consensus on specific aspects of information management and production (e.g. the expected contents of detailed design drawings for structural steelwork or architectural floor plans).

Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Framework for specification of BIM implementation

1 Scope

This document establishes a framework for providing specifications for the internal commissioning and implementation of building information modelling (BIM) during both delivery and operational phases. It identifies a structured approach so as to encourage clarity during development, management and checking processes for use by organizations that develop and apply these specifications.

This document does not provide specific content but it does provide examples.

It is applicable to buildings, infrastructure, facilities and managed landscapes, of any size or complexity.

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 6707-1, *Buildings and civil engineering works — Vocabulary — Part 1: General terms*

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

ISO 12006-3, *Building construction — Organization of information about construction works — Part 3: Framework for object-oriented information*

ISO 19650 (all parts), *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling*

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

ISO 29481-3, *Building information models — Information delivery manual — Part 3: Data schema and code*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1 and the following apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 Terms related to knowledge resources

3.1.1

framework

structure of processes and specifications designed to support the accomplishment of a specific task

Note 1 to entry: A framework for a specification is analogous to a schema for an information container.

[SOURCE: ISO/IEEE 11073-10201:2020, modified — Note 1 to entry added.]

3.1.2

building information modelling implementation specification

BIM implementation specification

technical specification that aids authors and implementers in achieving their intended results through the use of *BIM* (3.1.5)

EXAMPLE Guide, guideline, manual, handbook.

Note 1 to entry: BIM implementation specifications are instantiations of a *framework* (3.1.1) schema.

Note 2 to entry: BIM implementation specifications can include BIM execution plans, definitions of style and content of deliverables such as types of drawing or schedule, and rules for preparing deliverables such as information container naming conventions.

3.1.3

information delivery manual

IDM

documentation which captures the business process and gives detailed specifications of the information that a user fulfilling a particular role would need to provide at a particular point within a project

Note 1 to entry: This can be referred to as an "information delivery specification (IDS)".

[SOURCE: ISO 29481-1:2016, 3.10]

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3.1.4

information model

set of structured and unstructured information containers

[SOURCE: ISO 19650-1:2018, 3.3.8]

3.1.5

building information modelling

BIM

use of a shared digital representation of an asset to facilitate design, construction and operation processes to form a reliable basis for decisions

Note 1 to entry: The acronym BIM also stands for "building information model" as a shared digital representation of the physical and functional characteristics of any construction works.

[SOURCE: ISO 29481-1:2016, 3.2, modified — "asset" has replaced "built object", and "(including buildings, bridges, roads, process plants, etc.)" has been deleted from the definition. "building information model" as a' has replaced "the" in Note 1 to entry.]

3.2 Terms related to requirements management

3.2.1

constraint

objective (3.2.4) or *metric* (3.2.2) that can be evaluated to true, false or unknown

Note 1 to entry: Based on specification of IfcConstraint in ISO 16739-1.

3.2.2 metric

limiting value or boundary condition that can be applied to or tested against a descriptive resource

Note 1 to entry: Based on specification of IfcMetric in ISO 16739-1.

Note 2 to entry: A building information model is an example of a descriptive resource.

3.2.3 clause

part of a specification document which contains one or more *objectives* (3.2.4)

Note 1 to entry: See 6.1.

3.2.4 objective

constraint (3.2.1) that is decidable by examination of its constituent *objectives* (3.2.4) and *metrics* (3.2.2)

Note 1 to entry: Based on specification of IfcObjective in ISO 16739-1.

3.2.5 requirement, application, selection, exception RASE

method for structuring knowledge by distinguishing requirements, applicability, selections and exceptions

Note 1 to entry: See 6.4 and Reference [16].

4 Purpose and background

4.1 Role of the framework

The objectives of the framework are as follows:

- a) Create a common approach for BIM implementation specifications by:
 - 1) aiding the development of clear and repeatable processes;
 - 2) allowing international, national, institutional and project/enterprise BIM implementation specifications to be prepared according to a common framework.
- b) Make BIM implementation specifications manageable by:
 - 1) encouraging completeness of BIM implementation specifications by providing a common structure for outcomes, controls and inputs;
 - 2) encouraging the provision of reasoned explanations for demanded performance;
 - 3) enabling extensibility of BIM implementation specifications;
 - 4) supporting the comparing and merging of BIM implementation specifications.
- c) Make BIM implementation specifications able to be tested by:
 - 1) encouraging the testing of BIM implementation specifications against this document;
 - 2) supporting the testing of outcomes against BIM implementation specifications;
 - 3) encouraging the use of formal arrangements which refer to BIM implementation specifications.

4.2 Intention of BIM implementation specifications

BIM implementation specifications may be used for a variety of purposes, including to:

- a) establish the desired outcomes and define appropriate quality;
- b) identify appropriate management effort and tools;
- c) identify necessary effort and resourcing;
- d) achieve and maintain a common understanding within national and project/programme contexts.

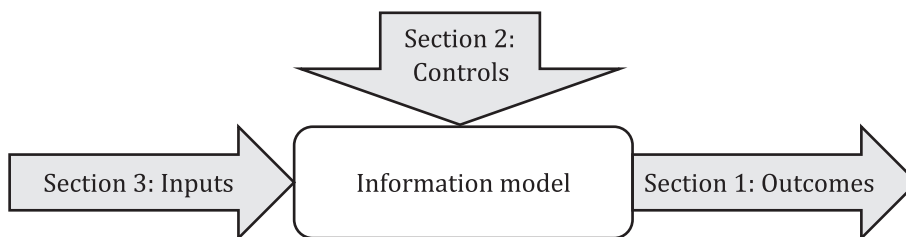
BIM implementation specifications may additionally cover the presentational conventions for application in the generation of outputs such as drawings and documents. This content may be carried forward from national and project drawing and document production standards.

4.3 Overview of framework sections

Authors and implementers should be able to easily navigate and understand any BIM implementation specification that results from implementation of this document. The enterprise is supported when the objectives for applying BIM (Framework Section 1: Outcomes, see 6.2.1) are reviewed and approved at the executive level. Information management (Framework Section 2: Controls, see 6.2.2) is supported by reviewing and implementing the management policies needed. Since these policies are keyed into the overall objectives, the dialogue between the manager and the executive is supported. Delivery teams can review and implement the input requirements (Framework Section 3: Inputs, see 6.2.3) as this defines what they shall do. These requirements are keyed into the management policies so that the dialogue between the delivery teams and management is supported. The three sections are illustrated in Figure 1.

The style and content are intended to ensure that the requirements within the BIM implementation specification are directly measurable either by human inspection or by automated checking.

A BIM implementation specification may be provided at an overall facility project or programme level, but may also be provided more specifically for individual sub-processes within those overall objectives. These individual sub-processes may be arranged in series and in parallel. The IDM methodology (see ISO 29481-1) shall be used to document, review and specify new processes. The outcomes of the review of new processes should then be documented in a BIM implementation specification, adhering to this document.



NOTE Based on the ISO/IEC/IEEE 31320-1:2012 IDEF0.

Figure 1 — Interaction of framework sections

4.4 Implementation

International, regional and national standards bodies, as well as other sponsored standardization authors and other project and consortia organizations responsible for facility projects or programmes may mandate the framework and BIM implementation specifications produced according to it. They may also author their requirements using this document. Requirement documents authored by those organizations may be converted to this document for use by organizations.

BIM implementation specifications are used internally within an organization as corporate technical specifications to manage information management within the delivery or operational phase.

The hierarchy of requirement sources authoring to this document affecting the execution and checking of its specifications is illustrated in [Figure 2](#).

NOTE In some contexts national or regional standards can take precedence over international standards.

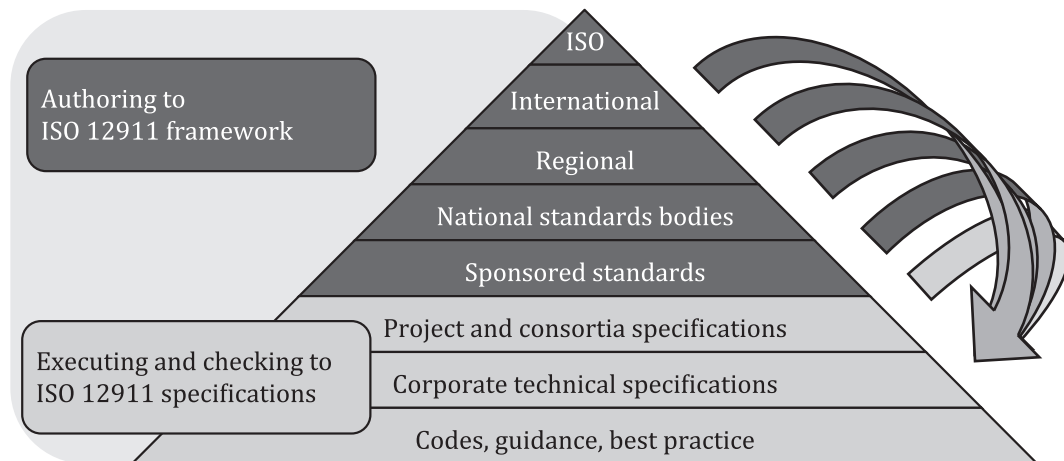


Figure 2 — Sources of and target for BIM implementation specifications

4.5 Conformity

Conformity testing to the BIM implementation specification shall be achieved by inspection or by the application of automatic compliance checking of information models and other information containers.

All units of information shall satisfy all objectives, by showing that each is either not applicable, is not selected, is excepted or is as required. [Clause 6](#) and [Table 2](#) give more detail on the logical implementation.

NOTE Units of information include objects, properties and relations.

4.6 Implications of nonconformity

Failing to conform to this document can impact on usability and coordination of BIM implementation specifications, leading to contractual and practical ambiguities.

Nonconformity with a BIM implementation specification can hinder testing and so impact the quality and efficiency of project/facility outcomes.

5 Relationship to other standards

5.1 Review

BIM implementation specifications shall be authored to support the internal commissioning and implementation of information management. It can be used in combination with other standards (refer to [Table 1](#)). New processes shall be analysed using ISO 29481-1 (IDM) and shall be incorporated within the ISO 19650 series process or other processes described in [5.2](#). Individual use cases or the overall delivery shall be defined and implemented using this document so as to support systematic checking using ISO 29481-3.

Table 1 — Approximate alignment of this document with other International Standards

Level of responsibility	Process development	Information management process	Use-case planning	Checking
	ISO 29481-1 Information delivery manual	The ISO 19650 series Information management	This document Implementation specifications	ISO 29481-3 IDS/mvdXML
Executive	Scope	Detailed responsibility matrix	Section 1: Outcomes	Package
Management	Business rules	Asset or project information standard, production methods and procedures (internal)	Section 2: Controls	Classification and naming policies
Implementation	Functional parts	Level of information need (internal) (see ISO 7817 ¹)	Section 3: Inputs	Entities, relationships, shape and properties
		See 5.2 a) for non-BIM and 5.2 b) for standalone BIM projects		

5.2 Use

BIM implementation specifications shall be applied to the internal implementation of information management. In addition:

- a) Projects and operational programmes that are not using BIM shall conform to this document with appropriate quality assurance (QA) and quality control (QC) measures.
- b) Standalone projects and operational programmes, where only documentation is shared or published, should conform to ISO 9001 for QA and QC and ISO 21500 and ISO 55000 for its purposes.
- c) Collaborative projects and operational programmes shall additionally follow the ISO 19650 series where BIM implementation specifications serve as the internal implementation plan or project or asset methods and procedures. ISO 19650-4 provides the information quality criteria for information exchanges.

NOTE Modelling and data technology can follow ISO 29481-1, ISO 23387, ISO 23386 and the ISO 21597 series.

5.3 Development of new outcomes

Where new outcomes are envisaged, ISO 29481-1 should be applied, and the outcome mapped to a BIM implementation specification. Refer to [Table 1](#).

NOTE The inputs into the IDM process include a detailed process map for the desired outcome, highlighting the interfaces between parties and documenting the information requirements, generating a new Framework Section 1: Outcomes. Business rules that constrain the expected data can be documented, generating new clauses in Framework Section 2: Controls. Functional parts document the specific inputs, generating new clauses in Framework Section 3: Inputs.

5.4 Specialized application areas

The implications of International Standards from specialized application areas, where applicable, shall be inserted into the developed BIM implementation specification by domain experts.

EXAMPLE ISO 15686-4.

1) Under preparation. Stage at the time of publication: ISO/DIS 7817:2022.