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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

Organisation et numérisation des informations relatives aux bâtiments et ouvrages de génie civil, y compris modélisation des informations de la construction (BIM) — Gestion de l'information par la modélisation des informations de la construction —

Partie 4: Échange d'informations

Reference number
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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).

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).

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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)*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 442, *Building Information Modelling (BIM),* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 19650 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.

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Introduction

ISO 19650-1 to ISO 19650-3 require the sharing of project and asset information as part of collaborative and convergent processes. These provide the governance and strategy around the execution of information management during both the delivery phase and operational phase of the whole life cycle. ISO 19650-4 supplements ISO 19650-1 to ISO 19650-3 and ISO 19650-5 by providing the explicit process and criteria for each individual information exchange. The intention is to secure the benefits arising from collaborative and interoperable building information modelling (BIM) by choosing 'open' schemas, data formats and conventions whilst specifying when alternatives may be appropriate.

Information exchange occurs within the information production and consumption process at every level between project teams and asset/facility management and operation teams (see ISO 19650-2:2018, Figure 2 and ISO 19650-3:2020, Figure 3). It is critical that appropriate criteria are applied to ensure the reliability of the information and the repeatability of the processes. The requirements around information exchange (identified in this document) are distinct from any specific "exchange information requirements (EIR)" as used in ISO 19650-1, ISO 19650-2 and ISO 19650-3.

The information exchange process is based on the choice of how information containers (see ISO 19650-1:2018, 3.3.12) are specified to ensure that information can be managed.

In this context, an information container:

— is given a persistent identifier and other metadata;

— can be retrieved, using a common data environment (CDE) and appropriate status metadata;

— is made persistent, using revisioning and systematic archiving.

The use of appropriate quality assurance and quality control measures supports the fulfilment of a specific exchange information requirement related to an individual information exchange by enumerating criteria relating to completeness, compliance to formal exchange schemas, the continuity of concepts between exchanges and the elimination of spatial and specification conflicts.

It promotes a proportional and sustainable approach to information exchange where the immediate delivery of information does not limit its future use.

The concepts and principles relating to the application of the requirements within this document are provided in ISO 19650-1, and in the information exchanges specified in ISO 19650-2 and ISO 19650-3. EN 17412-1[1] describes a methodology for qualifying an exchange with criteria relating to relating to level of information need.

NOTE Asset delivery and operation have a role in achieving the UN Sustainable Development Goals[2].

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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

1 Scope

This document specifies the detailed process and criteria for decision makings when executing an information exchange as specified by the ISO 19650 series to ensure the quality of the resulting project information model or asset information model. It details the implementation of the concepts in ISO 19650-1 and is applicable to any information exchange within the delivery stages covered by ISO 19650-2 and operational trigger events covered by ISO 19650-3.

This document is applicable to assets of all sizes and all levels of complexity. This includes portfolios of buildings, campuses, infrastructure networks, individual buildings and pieces of infrastructure. The requirements in this document should be applied in a way that is appropriate to the scale and complexity of the asset. This document makes use of the phrase "shall consider". This phrase is used to introduce a list of items that the person in question is required to think about carefully in connection with the primary requirement described in the subclause. The amount of thought involved, the time taken to complete it, and the need for supporting evidence depend on the complexity of the asset, the experience of the person(s) involved, and the requirements of any national policy on introducing building information modelling. On a relatively small or straightforward asset, it can be possible to complete, or dismiss as not relevant, some of these "shall consider" items very quickly. One way to help identify which of the "shall consider" statements are relevant can be to review each statement and create templates for assets of different sizes and 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 6707-2, *Buildings and civil engineering works — Vocabulary — Part 2: Contract terms*

ISO 19650-1:2018, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 1: Concepts and principles*

ISO 19650-2:2018, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 2: Delivery phase of the assets*

ISO 19650-3:2020, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 3: Operational phase of the assets*

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ISO 19650-5, *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 5: Security-minded approach to information management*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1, ISO 6707-2, ISO 19650-1 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 relating to phases

3.1.1
stage
distinct period in a project used as a management tool

Note 1 to entry: A stage generally terminates at a key decision point (ISO 19650-1:2018, 3.2.14).

Note 2 to entry: Handover can be viewed as a delivery stage and as an operational trigger event.

Note 3 to entry: Trigger event is defined in ISO 19650-1:2018, 3.2.13.

[SOURCE: ISO 6707-2:2017, 3.3.4, modified — The original note 1 to entry has been removed; new notes 1 to 3 to entry have been added; the preferred term "phase" has been removed.]

3.2 Terms relating to activities

3.2.1
information provider
actor who provides information in an information container

EXAMPLE 1 A structural engineer acts as an information provider in preparing a detailed proposal during a detailed design *stage* (3.1.1).

EXAMPLE 2 A maintenance team acts as an information provider in preparing an inspection report on an asset during an operational trigger event.

Note 1 to entry: Information providers include both the authors of requirements and the providers delivering information according to the requirements.

3.2.2
information receiver
actor who receives information in an information container

Note 1 to entry: An information receiver can be the appointing party or a lead appointed party with responsibility for the authorization and acceptance of information into the published state. See ISO 19650-1:2018, Figure 6.

Note 2 to entry: For appointing party, lead appointed party and appointed party see ISO 19650-1:2018, 3.2.3 and 3.2.4.

3.2.3
information reviewer
actor who reviews information and its information container

EXAMPLE An *information provider* (3.2.1) such as a structural engineer or maintenance team, acts as a reviewer before approval from the work in progress (WIP) state.

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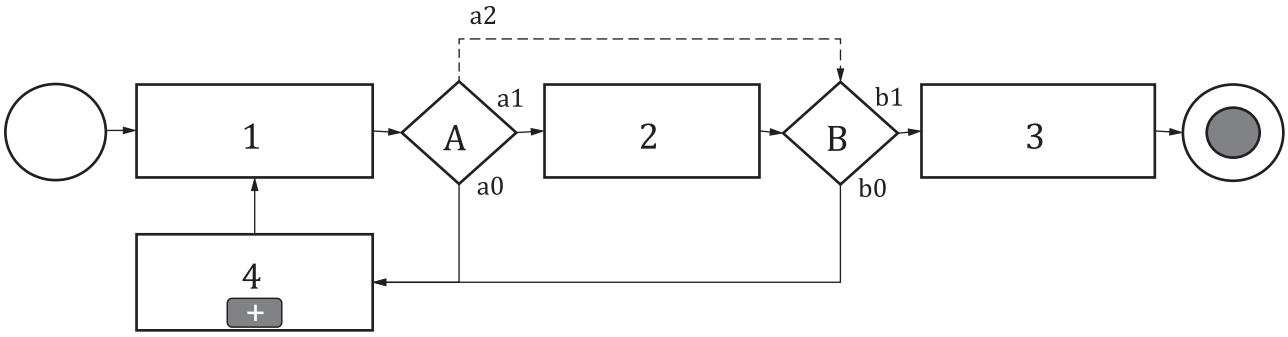
Note 1 to entry: The task team leader acts as reviewer before approval out of work in progress (WIP) state.

Note 2 to entry: The delivery or operational team including the lead appointed party, act as reviewers before the authorization into the published state and its possible acceptance by the appointing party.

Note 3 to entry: An information reviewer can be an artificial intelligence agent or an automated rules-based process.

4 Process overview

Each information exchange, whether executed during or at the end of a stage or trigger event, shall be executed as specified in ISO 19650-2:2018, 5.6 and 5.7 or ISO 19650-3:2020, 5.6 and the associated governance arrangements, as summarized in Figure 1. Each process is detailed in Clause 5, each decision in Clause 6 and the criteria in Clause 7.



Key

1 generate work in progress (see 5.1)

2 use shared state (see 5.2)

3 use published state (see 5.3)

4 develop change actions (see 5.4)

A decision A: approve for sharing (a1, see 6.1) or change action (a0, see 5.4) or omission from the shared state (a2, see 6.4)

B decision B: authorize and accept for publication (b1, see 6.2) or change action (b0, see 5.4)

Figure 1 — Information exchange process

NOTE 6.4 provides the criteria and examples of information exchanges that can omit the shared state given other controls, shown dotted.

5 Process steps

5.1 Mobilization and information production

5.1.1 General

During delivery stages and operational trigger events information providers shall produce information and develop information containers using other shared and/or published resources and reference information as background information, and as work in progress (see Figure 1, key 1).

NOTE Implementation (5.1.3) can be dependent on steps taken during mobilization (5.1.2).

5.1.2 Mobilization and testing prior to information exchange

The methods and procedures of undertaking an information exchange shall be tested to ensure flow of information, prior to finalizing requirements and exchanging deliverables.

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