INTERNATIONAL STANDARD

ISO
29481-1

Building information modelling — Information delivery manual —

Part 1:
Methodology and format

Modèles des informations de la construction — Contrat d'interchange —
Partie 1: Méthodologie et format

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 29481-1 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 13, *Organization of information about construction works*.

ISO 29481 consists of the following parts, under the general title *Building information modelling — Information delivery manual*:

— *Part 1: Methodology and format*

The following part is planned:

— *Part 2: Management communication*

Introduction

Building information modelling provides a concept for describing and displaying information required in the design, construction and operation of constructed facilities. It can bring together the diverse sets of information used in construction into a common information environment - reducing, and often eliminating, the need for the many types of paper documentation currently in use.

An information delivery manual (IDM) provides significant help in getting the full benefit from a building construction information model (BIM). If the information required is available when it is needed and the quality of information is satisfactory, the construction process itself will be greatly improved.

For this to happen, there should be a common understanding of the building processes and of the information that is needed for and results from their execution.

This part of ISO 29481 sets out a methodology and format for the provision of an integrated reference for the processes and data required by a BIM. It describes how to identify and describe the processes undertaken within construction, and the information required for their execution and the results. This part of ISO 29481 also describes how this information can be further detailed to support solutions provided by building-information-system providers in a form that enables its reuse and how it can be configured to meet national, local and project needs.

In doing so, this part of ISO 29481 provides a basis for reliable information exchange/sharing for users so that they can be confident that the information they are receiving is accurate and sufficient for the activities they need to perform. The development of this part of ISO 29481 has been driven by the need of users for reliability in information exchange.

Examples and guidelines related to the development of IDMs will be published at: <http://www.standard.no/IDM>. The site will developed and maintained by the ISO/TC 59/SC 13 secretariat.

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Building information modelling — Information delivery manual —

Part 1:
Methodology and format

1 Scope

This part of ISO 29481 specifies a methodology and format for the development of an information delivery manual (IDM).

This part of ISO 29481 specifies

— a methodology that unites the flow of construction processes with the specification of the information required by this flow,

— a form in which the information should be specified, and

— an appropriate way to map and describe the information processes within a construction life cycle.

This part of ISO 29481 is intended to facilitate interoperability between software applications used in the construction process, to promote digital collaboration between actors in the construction process and to provide a basis for accurate, reliable, repeatable and high-quality information exchange.

2 Terms and definitions

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

2.1
actor
person, organization or organizational unit (such as a department, team, etc.) involved in a construction process

2.2
building construction information model
BIM
shared digital representation of physical and functional characteristics of any built object (including buildings, bridges, roads, etc.) which forms a reliable basis for decisions

NOTE   "Building information model" is frequently used as a synonym for BIM.

2.3
building information system
system used to create, maintain, disclose or expire elements of a building information model

NOTE   The components of the system can include actors, hardware (servers, clients, peers) and software solutions.

2.4
business process modelling notation
BPMN
notation for use in the development of business process diagrams that is designed to be readily understandable by all business users

2.5
business requirement
requirement that describes in business terms what needs to be delivered or accomplished

2.6
business rule
statement that formally defines or constrains some aspect of the business, a rule under which an organization operates or a policy or decision that influences a process

2.7
exchange requirement
ER
set of information that needs to be exchanged to support a particular business requirement at a particular process phase (or phases) / stage (or stages)

NOTE   Information delivery requirement can be used as a synonym for exchange requirement.

2.8
exchange requirement model
ERM
technical expression of an exchange requirement expressed as a schema

NOTE   An exchange requirement model describes the binding of an exchange requirement to a particular standard information schema and version.

2.9
functional part
FP
unit of information within an exchange requirement that may be fully specified in its own right

2.10
interaction map
representation of the roles and transactions relevant for a defined purpose

2.11
management communication
sharing information for a management purpose

2.12
model
representation of a system that allows for investigation of the properties of the system

NOTE   "Representation" is defined in http://www.businessdictionary.com/definition/representation.html.

2.13
process map
PM
representation of the relevant characteristics of a process for a defined purpose

2.14
role
functions being performed by an actor at a point in time

NOTE   The role of an actor is determined by action and outcome and not by the profession or trade followed by the actor.

2.15
schema
schema is a description of the formal structure of a defined set of information

2.16
transaction
communication event that fulfils a relationship between two roles

3   IDM (Information delivery manual)

3.1   Complete schema

A complete information schema that covers all of the information required for all actors throughout the construction process will be large and comprehensive. Such a schema is relevant in defining all of the project information needs for all business requirements at all life-cycle stages (see Figure 1), but it is not the way that project information is usually delivered.
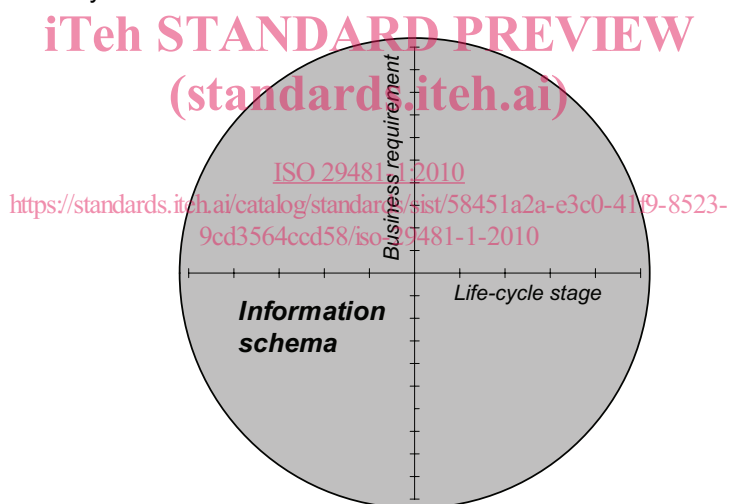
Figure 1 — The information schema supports all business requirements at all life-cycle stages

3.2   Breaking a complete schema to support requirements

It is more usual for information to be exchanged about a particular topic and the level of detail provided to be driven by the life-cycle stage. The need is (generally) to support one business requirement over one or more life-cycle stages (see Figure 2). This is a matter of deciding which components of the information schema should be used to meet requirements.
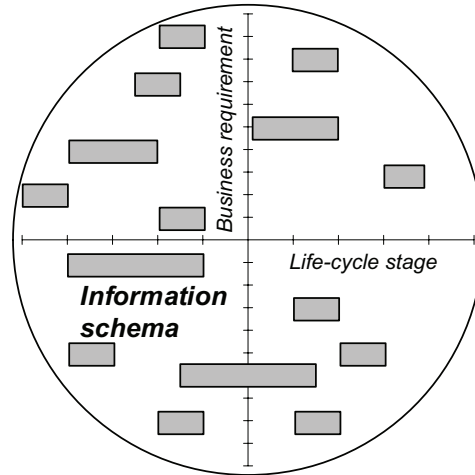
Figure 2 — Need to support a business requirement at a life-cycle stage

3.3 Supporting the building information modelling

Elements of the overall information schema are used in a building construction information model (BIM) (see Figure 3). For a particular business requirement, only certain classes of information are required. Multiple objects are derived from each class, each object having an identity (determined by a unique identifier) and a state (determined by the values given to each attribute of the object). The classes that support the business requirement form a unique and identifiable schema.

Figure 3 — Supporting the building information modelling

3.4 Supporting the business requirement

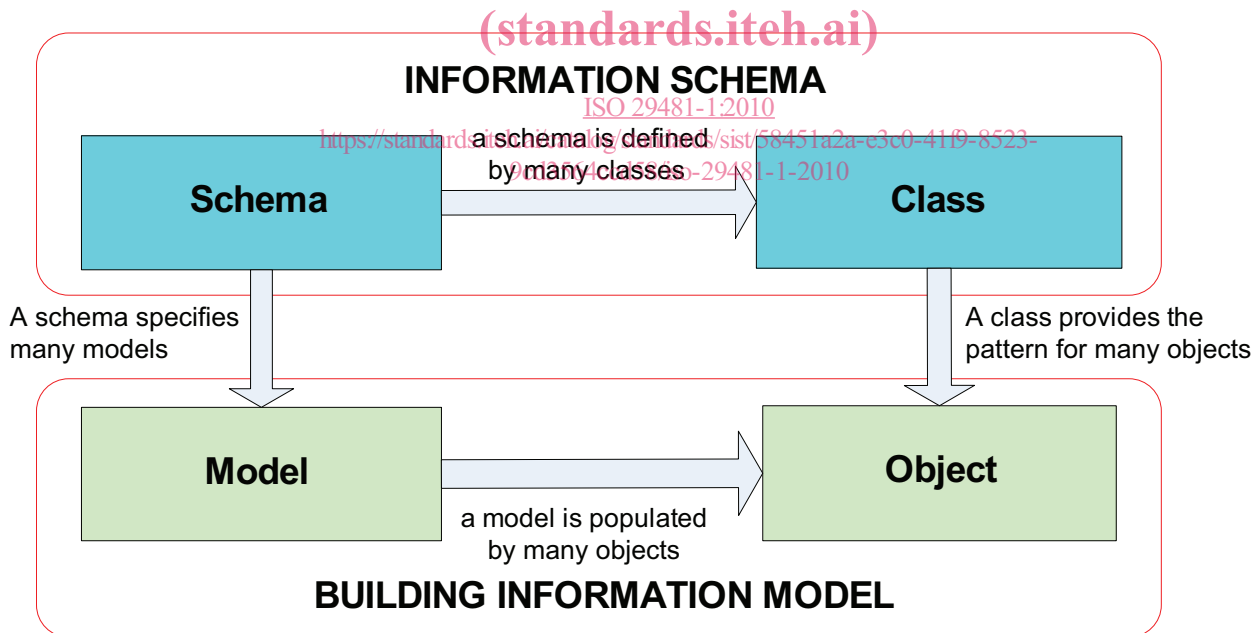To do this means that the set of information that needs to be exchanged to support a particular business requirement in the relevant life-cycle stages must be established. This is termed an exchange requirement.

An exchange requirement provides a description of the information to be exchanged in non technical terms. An exchange requirement may support the communication of object information enabling the construction and operation of a project or it may support the communication of management information that controls the project execution.

3.5 Supporting the software solution

The technical content required by solution providers to support an exchange requirement is provided as a series of units of information. A unit of information is termed a functional part.

A functional part provides the technical expression of information content as a subset of the complete information schema.

3.6 Supporting the construction process

Software solutions typically support users across several exchange requirements. Exchange requirements are used to support an overall construction process. The connection between exchange requirements and a construction process is captured within a process map.

A process map typically deals with the development of information within the boundary of a particular topic or software view. It shows the roles of actors engaged in the process and references the transactions between them.

3.7 Defining the connection between IDM components

Functional parts are used together to create exchange requirement models. An exchange requirement model provides a version of the exchange requirement that can be understood by a computer. It includes business rules which are computer interpretable versions of the business propositions described in an exchange requirement.

3.8 Content in the specific IDM

The content in a specific IDM will

— describe the need for information exchange between processes,

— specify how to capture the information needing to be exchanged between these processes,

— identify the actors sending and receiving information,

— define, specify and describe the information being exchanged to satisfy the requirements at each point of the business process,

— ensure that definitions, specifications and descriptions are provided in a form that is useful and easily understood,

— create detailed specifications of the information captured within exchange requirements to facilitate the development of software building information systems,

— ensure that the information specifications can be made relevant to local working practices.

3.9   Users of this part of ISO 29481

The main purpose of this part of ISO 29481 is to provide guidance for those who develop specific IDMs. Thus, the main users are expected to be the IDM developers who create process maps, exchange requirements, functional parts, exchange requirement models and business rules using knowledge elicited from end users and solution providers.

Other actors will mainly be using the specific IDMs which are developed by using this part of ISO 29481. In addition, some users of specific IDMs might identify needs for new IDMs and thus become users of this part of ISO 29481. These users include

— professional IDM-developers and solution providers — according to very technical specifications,

— information users, i.e. executive users and end users concerned with producing the content of the IDMs and benefiting from the result.

4   IDM framework

4.1   Overview

Figure 4 provides a generalized view of the main components used in an IDM and how they relate to each other. The organization of the components within the framework is based on two ideas:

a) the components at the top layer of the framework relate to processes, progress through data specifications in the middle layers and include application software elements at the bottom layer;

b) similarly, the components relate to industry practitioners at the top layer of the framework and to ICT analysts and programmers at the bottom layers.
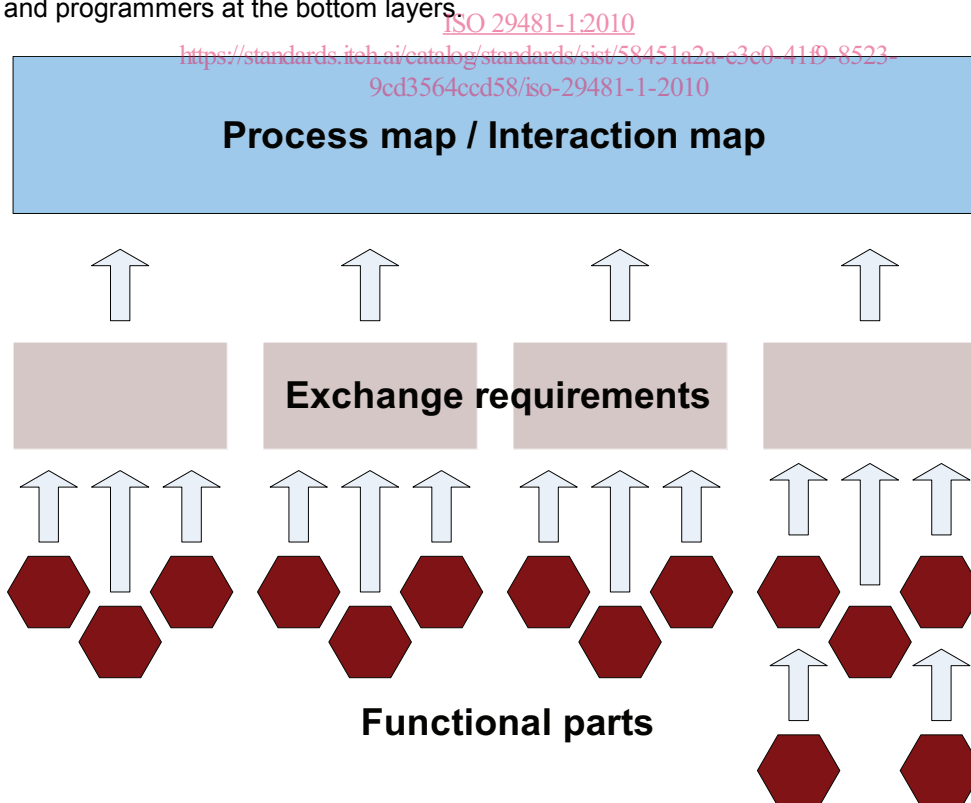

Figure 4 — IDM basic framework

4.2   IDM component header information

Each IDM component described below includes a set of administrative information that enables it, its current author and its change history to be captured. Administrative information includes

— a name or title conforming to the naming rules given in this International Standard,

— a unique identifier,

— a change log that identifies creation or change made together with the author and date.

4.3   Description of the use case

Each IDM component shall start with a short plain language description of the use case the IDM is intended to solve or about which particular topic or business requirement information shall be exchanged.

4.4   Interaction maps

The purpose of an interaction map is to identify the relevant roles and transactions for a specific purpose. IDM draws a distinction between the role "initiator" (makes a request) and the role "executor" (effectuates that request). If there is such a relationship between two roles, it is termed a "transaction".

An interaction map identifies the relevant roles, transactions and initiator – executor relations.

A transaction contains a set of exchange requirements that are exchanged for a particular purpose. The transaction also stipulates the participating roles, point in the life cycle and the sequence in which exchange requirements should be delivered (if appropriate). A message is a populated information model and contains data. Attachments may be linked to messages.

In an interaction map, all transactions needed for the handling of required contributions of relevant roles to the BIM shall be included. All transactions within the interaction map have a unique identity and name.

Using transactions, the business cooperation and communication requirements are defined. Use of exchange requirements (ER) is optional in transactions.

Using transactions, the contributions of relevant roles to the BIM can be controlled. For that purpose, in specific transactions, the following components can be added as attachments to specific messages

— exchange requirement,

— exchange requirement model,

— window of authorization: in the context of a transaction an executive role (executor) can access the building information system. The window of authorization describes what information in this transaction by the role may be read or changed.

4.5   Process maps

4.5.1   General information

The purpose of a process map is to describe the flow of activities within the boundary of a particular topic, the roles played by the actors involved, together with the information required, consumed and produced.

For representing process maps, the approach recommended is the BPMN. (Further information on BPMN is given in A.4.)