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Building information models - Information delivery manual - Part 2: Interaction framework (ISO/DIS 29481-2:2024)

Bauwerksinformationsmodelle - Handbuch der Informationslieferungen - Teil 2: Interaktionsframework (ISO/DIS 29481-2:2024)

Modèles des informations de la construction - Protocole d'échange d'informations - Partie 2: Cadre d'interaction (ISO/DIS 29481-2:2024)

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ISO/DIS 29481-2

Building information models — Information delivery manual —

Part 2: Interaction framework

Modèles des informations de la construction — Protocole d'échange d'informations —

Partie 2: Cadre d'interaction

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Foreword

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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 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).*

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

— *Part 1: Methodology and format*

— *Part 2: Interaction framework*

— *Part 3: Data Schema*

This second edition cancels and replaces the first edition (ISO 29481-2:2012) and introduces updates that better integrate the interaction framework within the concept of digital IDM communication. It also aligns terminology and practices with the latest in the IDM series and other related standards

Introduction

Collaboration between the participants involved during the lifecycle of built assets is pivotal to the efficient delivery and operation of assets. Organizations collaborate within specific use cases to achieve higher levels of quality and greater re-use of existing knowledge, information experience and resources. A significant condition of collaboration is the opportunity to communicate, re-use and share information efficiently, and to reduce the risk of loss, contradiction or misinterpretation.

The information delivery manual (IDM) series provides significant assistance in making the most of information management. If the necessary information is available at the right time, the quality of the information is satisfactory and the right person is involved at the right time, the collaboration and outcome itself is greatly improved. Management and coordination of the parties involved depend on communication, therefore it shall be well structured, unambiguous, explicit and prompt. For this to happen, there must be a common understanding of the purpose, the processes, the actors involved and the required information.

This document focuses on the foundations for and execution of digital communication in accordance with the processes and information requirements of a use case. With a sharp focus on communication, this part of ISO 29481 offers a natural complement to standards that focus on information management such as ISO 19650, information containers such as ISO 21597 and information modeling, such as ISO 16739 and ISO 10303-239.

This document describes how to use various components of an Information Delivery Manual (IDM) for verifiable and traceable execution of digital communication. The resulting interaction framework enables standardization of digital communication in construction processes within any collaboration, both within and between organizations. It is applicable during the complete lifecycle of built assets and construction projects of all sizes and all levels of complexity. It provides a standard format that IT solutions may use. Supporting this standard in various ICT solutions means that various information management systems are connected. By doing so, it provides a basis for reliable information exchange and sharing for users, so that they can be confident that the information they send or receive is accurate and sufficient for the coordination activities they need to perform. This provides a basis for using Common Data Environment (CDE) solutions and workflows.

Building information models — Information delivery manual —

Part 2: Interaction framework

1 Scope

Document specifies a methodology for describing and managing interactions and a format for digital communication between actors in any use case associated with the management of an asset during all life cycle stages.

It therefore specifies

— a methodology that describes an interaction framework for a use case;

— an appropriate way to map responsibilities and interactions that provides a process context for information flow;

— a format in which the interaction framework should be specified and executed.

This document is intended to promote secure, verifiable, traceable and high-quality digital IDM communication between actors during all phases of the lifecycle of built assets, facilitate interoperability between software applications used, and to provide a basis for data- and process driven information exchange and traceability of communication.

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

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

ISO 10303-11, *Industrial automation systems and integration — Product data representation and exchange — Part 11: Description methods: The EXPRESS language reference manual*

ISO 40210, *Information technology — W3C SOAP Version 1.2 Part 1: Messaging Framework (Second Edition)*

3 Terms and definitions

3.1 Terms defined in ISO 29481-1

For the purposes of this document, the following terms defined in ISO 29481-1 apply.

3.1.1
asset
item, thing or entity that has potential or actual value to an organization

[SOURCE: ISO 55000:2024, 3.1.1, modified - The notes to entry have been removed.]

3.1.2
use case
description of a process by defining a sequence of actions performed by one or more roles to realize a purpose

Note 1 to entry: a use case specifies the scope of the business context.

[SOURCE: ISO 24014-1:2021, 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
business context
environment in which actors undertake processes

Note 1 to entry: Such an environment includes all the roles, activities, and interactions, products and services under the actor's control.

Note 2 to entry: the business context always contains one or more business processes

3.1.4
business 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 business process always contains one or more transactions.

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

3.1.5
information delivery manual
IDM
specification of a use case using business context maps and exchange requirements

Note 1 to entry: Use case, business context maps, and exchange requirements may be collectively referred to as IDM components.

3.1.6
interaction map
business context map of the interactions related to a use case

3.1.7
information exchange
act of satisfying an information requirement or part thereof

[SOURCE: ISO 19650-1:2018, 3.3.7]

3.1.8
interaction
communicative action between two roles

3.1.9
transaction
sequence of interactions involving the exchange of information using messages

EXAMPLE processing of a request by one role on behalf of another

Note 1 to entry: a transaction is a message between the initiator and the executor.

3.1.10
role
functions being performed by an actor at a point in time

Note 1 to entry: The role of an actor is determined by action and outcome and not necessarily by the profession or trade followed by the actor.

3.1.11
message
information prepared for communication purposes

[SOURCE: ISO 5127:2017, 3.1.8.02]

3.2 Other terms and definitions

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

3.2.1
digital IDM communication
exchange of messages within the confines of a use case enabled by an interaction framework and project specific message

3.2.2
interaction framework
XML file for the elements of an interaction

Note 1 to entry: Elements of an interaction include roles, transactions, messages, and information units

3.2.3
interaction framework schema
XML schema definition file that the interaction framework shall comply with

3.2.4
project specific message
PSM
message placing the interaction framework in the context of a project and links people to organizations and roles

3.2.5
interaction message schema
XML schema definition file that the messages shall comply with

3.2.6
promotor
algorithm that generates an interaction framework schema from an interaction framework, with the support of a template definition used as input

3.2.7
templates definition
file containing a number of templates, independent of the specific interaction framework, for generating an interaction framework schema and an interaction message schema

4 Interaction Framework

4.1 General

This Clause explains the core concepts and principles for the development and use of an Interaction Framework for digital IDM communication. By following the methodology presented in this document users of software tools are able to model (in a machine interpretable XML file) the business context and exchange requirements of a specified use case and subsequently start to digitally communicate with each other based on that interaction framework.

4.2 Information Management and the interaction framework

Information management involves defining, producing, checking, and delivering information. Every team member in any business activity interacts with information management to some extent. The importance of documented responsibility and accountability in information management is crucial, because focusing on good information management leads to better project outcomes. To be effective, there shall be a shared understanding of the processes and the necessary information in each step for their execution.

An IDM captures the business context associated with a use case and defines a detailed specification of the information that a user fulfilling a particular role would need to provide at a particular stage within a business process in order to create a product or deliver a service.

Generally speaking, a use case involves delivering goods or providing services to people or institutions. These people and institutions are called the use case customers or clients. As soon as a customer or client requests the delivery of a batch of goods or the provision of a service, a chain of activities is set in motion to fulfil that request. Such a chain of activities is called a business context.

This leads to the basic framework of an IDM as illustrated in Figure 1. Each use case has an associated business context and information requirements.

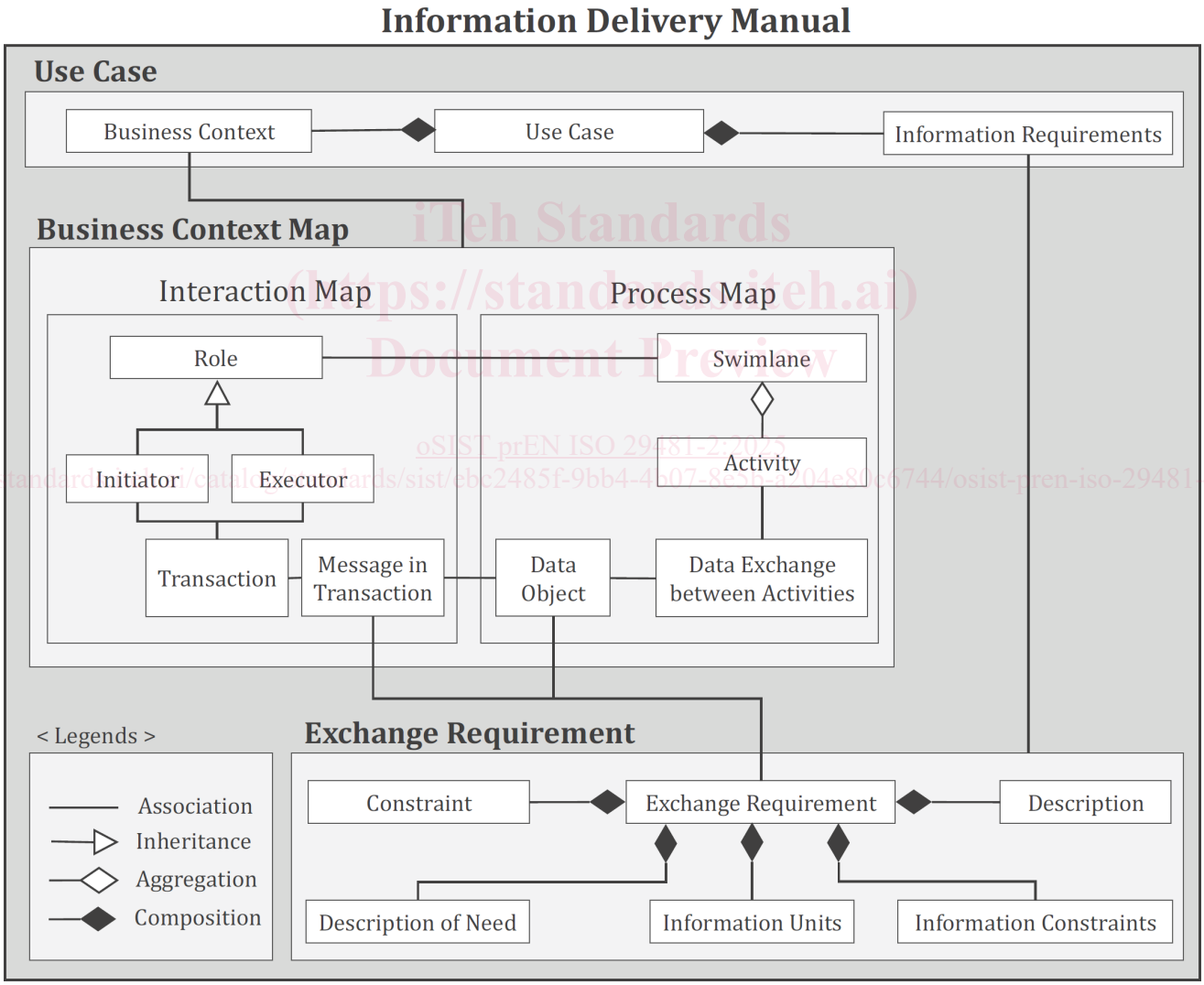

Figure 1 — IDM Basic framework

The business context is usually represented in an IDM by any combination of interaction maps and process maps, supported by textual representations. The analysis of the business context may be thought of as

a discovery process using those two mapping approaches since their purpose is to clearly show how the information exchange requirements for the use case have been derived.

An exchange requirement provides a description of the information to be exchanged between roles in plain language terms to support a particular business process in the relevant life cycle stage (within a business context). An exchange requirement may support either (or both) the communication of information essential to the design, construction, operation and deconstruction of an asset or it may support the communication of management information with messages that control project execution in relation to the life cycle management of the asset.

To deliver a service or produce a product within a use case, people perform various activities. Taken in their entirety, these form the business context. Often, within the business context there are chains of activities that provide sub products or services, these are called business processes. At certain points in time, information is needed by an actor to fulfil their task, or it is part of their responsibility to deliver specific information. When this information is transferred from one actor to another, an interaction occurs. The receiving actor determines if the information is complete and correct.

An information exchange therefore is never a single activity, it is a (digital) conversation between two actors in order to satisfy a specific information requirement.

This document focuses on formally structuring, recording and supporting these interactions and their requirements to achieve an outcome. This is known as performative communication.

4.3 Purpose of an Interaction Framework

The interaction framework is the core of digital IDM communication. It is a formal technical XML description that includes all elements necessary for interactions within use cases, such as roles, transactions, messages in transactions, and data elements in messages. The scope of an interaction framework aligns with the scope of a use case in an Information Delivery Manual (IDM).

Creating an interaction framework not only allows the identification of detailed information exchange requirements, but also facilitates (through compatible software) verifiable and traceable digital IDM communication between participants during all phases of the lifecycle of built assets. When properly set up, an interaction framework forms the foundation for software tools to enable users to communicate digitally and purposefully through messages based on the processes, roles, exchange requirements, and information defined by the IDM. Digital IDM communication through an interaction framework enables better process control, improved data management, increased transparency, enhanced verifiability of agreements, and a higher quality of the final product. A software tool utilizing an interaction framework structures, monitors, and stores communication by providing a shared digital communication archive. It clarifies responsibilities and decisions promptly, keeps project archives up-to-date and complete, facilitates faster and more flexible partnerships, and prevents miscommunication.

Since the process and content resides in the machine-readable interaction framework rather than being embedded in a software tool, a software solution implementing this method can support and improve collaboration of any use case without specialised software.

It also ensures interoperability between software tools that support this document, facilitating seamless messaging between applications. Every organization may freely choose their software tools that implements the interaction framework, ensuring secure messaging between them. This guarantees each party complete access to mutual communication through their own chosen software while shielding internal communication from the collaborating partners.

The basic principles, terms and concepts of the modelling of interactions that this document uses are based on DEMO[1)] (Design and Engineering Methodology for Organizations). DEMO is a method for analysing

1) DEMO originated from science (Maastricht University, Delft University of Technology) and builds on various theories including systems theory (Simon, 1962), philosophy of language (Austin, 1962 and Searle, 1968), communicative action (Habermas, 1986), data modeling (Nijsen and Halpin, 1989) and ontologies (Guizzardi, 2005). In collaboration with universities in Antwerp (Belgium), Duisburg (Germany), Bolzano (Italy), Luxembourg, Vienna (Austria), Lisbon and Madeira (Portugal), Prague (Czech Republic), St. Gallen (Switzerland), San Jose (USA) and Tokyo (Japan), DEMO-4 was released in 2020. DEMO is managed by the Enterprise Engineering Institute.

and (re)designing organizations, in which human action is central. DEMO describes the structure of an organization, abstracted from the implementation. It describes what happens or should happen rather than how it happens. The focus is on the essence of an organization: WHAT the organization does, not HOW it does it. A DEMO model describes a partnership, either within an organization and across organizations. A DEMO model forms a consistent set of products, responsibilities, processes, information and business rules and gives an overview of, and insight into, organizations. It

4.4 Hierarchical structure of an interaction framework

An interaction framework incorporates all necessary digital interactions and roles to realize the purpose of a use case. Figure 2 illustrates the hierarchy of definitions within this document. Each transaction defines a sequence of messages exchanged between two roles. A message is a digital form, including possible attachments, comprising data elements, which are categorized as complex and simple elements. The behaviour of simple elements is determined by its' user defined type and element conditions.

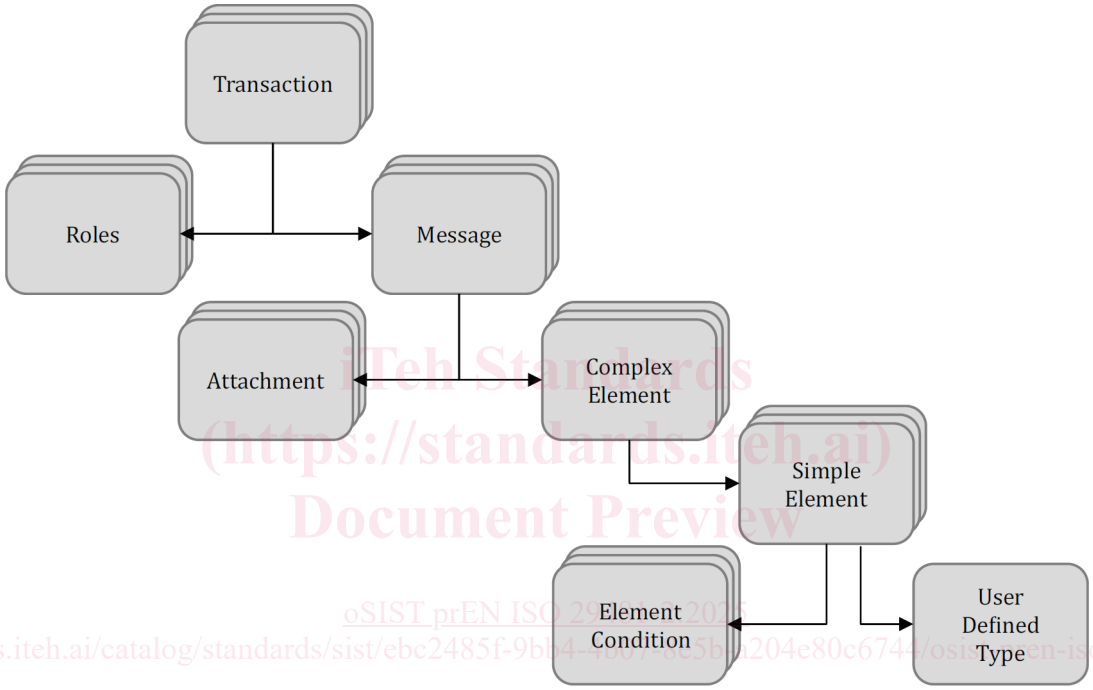

Figure 2 — Interaction framework with the hierarchy of its components

4.4.1 Roles

When defining a use case, roles are assigned to responsibilities and tasks, not specific functions or positions within an organisation. This is because the same roles consistently appear in business contexts, but individuals in different functions or positions may fulfil multiple roles or switch between them. For example, actors may fulfil roles such as 'initiator', 'client', 'builder', or 'designer'. The name of the role is derived from its primary activity, emphasizing the role's contribution within transactions.

A key principle is that people with roles act and negotiate with authority and responsibility. Only people can make agreements, take decisions, pass judgments, and enter into contracts. Roles therefor have to fulfil certain qualifications.

There is not always a one-to-one relationship between actors and roles. In some business processes, one actor may assume multiple roles, while in others, several actors may share the same role. For instance, a municipality could be both the initiator and the client, or a contractor for earthworks and an installation company might both take on the role of builder. An actor may also fulfil different roles across different business processes.