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TECHNICAL REPORT

Internet of things (IoT) and digital twin – Best practices for use case projects

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INTERNET OF THINGS (IoT) AND DIGITAL TWIN – BEST PRACTICES FOR USE CASE PROJECTS

FOREWORD

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ISO/IEC TR 30194 has been prepared by subcommittee 41: Internet of Things and Digital Twin, of ISO/IEC joint technical committee 1: Information technology. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
JTC1-SC41/457/DTR	JTC1-SC41/465/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, and the ISO/IEC Directives, JTC 1 Supplement available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

INTRODUCTION

The concept of use cases was introduced in the 1980s in system engineering by Ivar Jacobson [1][1] to enable the capture and specification of the requirements of a system, using textual, structural, and visual modelling techniques. The practice of providing use cases has been widely used at research level [2]. It has been nearly systematically used at standardization level as shown in the following examples:

– methodology for use cases from IEC 62559 [3], [4], [5];
– use cases in the ambient assisted living (AAL) domain [6];
– use cases in the big data domain [7], including three iterations from NIST [8], [9], [10];
– use cases in the IoT domain [11];
– use cases in the AI domain [12], including a companion standard on security and privacy [13];
– use cases in the digital twin domain [14];
– use cases in the blockchain domain [15];
– use cases on privacy-by-design in the consumer domain [16];

This document describes best practices for use case projects. It is structured as follows:

– Clause 5 provides an introduction on existing definitions (5.1), and specifies a conceptual model of use cases.
– Clause 6 explains the purpose of use case projects (6.1), and provides examples of use case projects (6.2).
– Clause 7 explains the purpose of use case templates (7.1), providing a conceptual model of a use case template (7.2), and describing the content of a template: description blocks, predefined fields, instructions, and samples (7.3).
– Clause 8 explains the purpose of use case project plans (8.1), covering the use case initiative governance process (8.2), the template development process (8.3), the template maintenance process (8.4), the use case development process (8.5), and the use case maintenance process (8.6).
– Annex A provides examples of use case projects on IoT (Clause A.2), digital twins (Clause A.3), artificial intelligence (Clause A.4), and privacy for consumer goods and services (Clause A.5).

Figure 1 to Figure 9 use the Unified Modelling Language (UML) diagrams notation.

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[1] Numbers in square brackets refer to the Bibliography.

INTERNET OF THINGS (IoT) AND DIGITAL TWIN – BEST PRACTICES FOR USE CASE PROJECTS

1 Scope

This document describes best practices for use case projects in terms of projects, templates and plans, with the objective to improve the consistency of content across different use case projects and enable sharing of knowledge between projects. A long-term goal is to foster interoperability between tools supporting the collection and maintenance of use cases.

This document is intended for developers of use case projects, including in the context of standardization.

The document can be used to complement existing methodology standards such as IEC 62559 [3], [4], [5].

2 Normative references

There are no normative references in this document.

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3 Terms and definitions

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

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

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

3.1
actor
stakeholder involved in a *use case* (3.4)

3.2
role
function assumed or part played by an external *actor* (3.1) or party, in interaction with the system under focus

Note 1 to entry: Parties include functions, systems, organizations, devices.

3.3
stakeholder
individual, team, organization, or classes thereof, affected by or affecting the *use case* (3.4) directly or indirectly

3.4
use case
specification of a set of actions performed by a system, which yields an observable result that is, typically, of value for one or more roles or other *stakeholders* (3.3) of the system

Note 1 to entry: Based on ISO/IEC 19505–2:2012, 16.3.6.

3.5
use case template
structured description of a *use case* (3.4) based on a set of *predefined fields* (3.7)

3.6
use case project
project involving the collection of *use cases* (3.4)

3.7
predefined field
agreed set of fields in relation to a domain

3.8
description block
group of *predefined fields* (3.7)

3.9
vocabulary
terminological dictionary that contains designations and definitions from one or more domains or subjects

Note 1 to entry: A vocabulary favours re-use.

[SOURCE ISO 1087:2019, 3.7.5, modified – Note 1 to entry has been replaced.]

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4 Abbreviated terms

UML Universal Modelling Language

5 Use cases

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5.1 General

Table 1 shows a number of definitions which have been provided for the concept of use case in standards

Table 1 – Examples of definitions of the concept of use case in standards

Committee	Standard	Definition
ISO/IEC JTC 1/SC 7 (Software and system engineering)	ISO/IEC/IEEE 26513:2017, 3.46	description of the behavioural requirements of a system and its interaction with a user
ISO/TC 215 (Health informatics)	ISO/TR 28380-1:2014, 2.13	textual and graphical depiction of the actors and operations that address information exchange in the context of a set of specific tasks for a workflow performed by different systems or devices
ISO/TC 10 (Technical product documentation)	ISO 10209:2022, 3.14.46	description of behavioural requirements of a system and its interaction with a user
ISO/IEC JTC 1/SC 41 (IoT and digital twin)	ISO/IEC TR 22417:2017, 3.2	specification of a sequence of actions, including variants, that a system (or other entity) can perform, interacting with actors of the system
	ISO/IEC TR 22417:2017, 3.3	IoT use case description of a hypothetically possible situation where IoT concepts, products and services may be specified as a set of actions associated with actors in an IoT system, which yields an observable result that is, typically, of value for one or more actors or other stakeholders of the system Note 1 to entry: The aim is to pictorially describe a field of problems in a way that the artificial situation makes IoT approaches to solutions evident in their temporal, spatial as well as technical dimension.

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5.2 Conceptual model of a use case

The conceptual model of a use case is shown in Figure 1:

– a use case can include several interaction scenarios,
– a scenario involves actors with specific roles,
– a scenario is about a system of interest, and
– a scenario describes how a goal is attained.

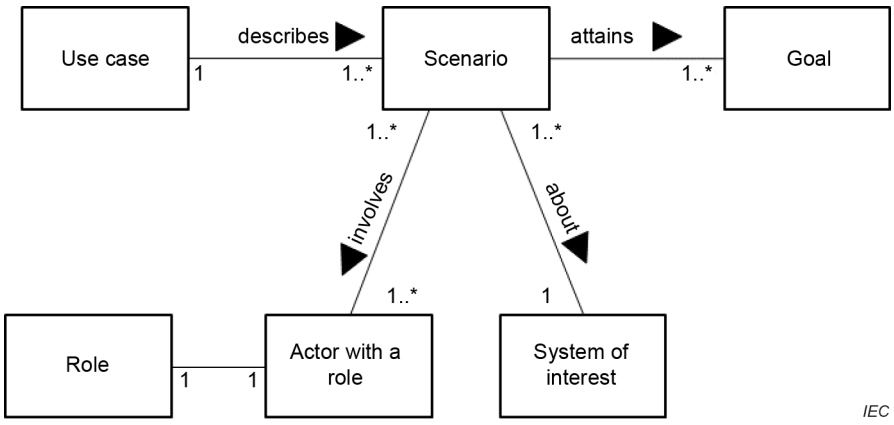

Figure 1 – Conceptual model of use case

6 Use case projects

6.1 Purpose

Use case projects collect use cases in order to serve different goals:

a) study;

b) guidance;

c) expectation;

d) business;

e) system;

f) a use case project providing both justifications on expectations, arguments on business goals, and arguments on a solution.

Use case projects are often followed by other projects.

g) ISO/IEC TR 30172:2023 [14] collects use cases on digital twin. ISO/IEC TR 30172:2023 has been followed by ISO/IEC 30173:2023 [17], which focuses on terms and concepts. A future project, ISO/IEC 30188, focuses on reference architecture.

6.2 Examples of use case projects

6.2.1 Study project

In a study project, use cases describe real implementations. The purpose of a study use case is to provide insight on important building blocks (Figure 2).

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EXAMPLE 1 ISO/IEC TR 22417:2017 [11] provides insight on IoT.

EXAMPLE 2 ISO/IEC TR 30172:2023 [14] provides insight on digital twins.

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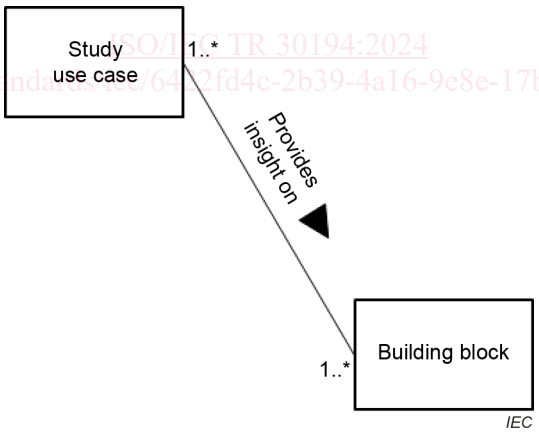

Figure 2 – Purpose of study use case

6.2.2 Guidance project

In a guidance project, use cases are examples, real or invented. The purpose of a guidance use case is to provide guidance on the use of requirements (Figure 3).

EXAMPLE ISO/TR 31700-2:2023 [16] provides examples on the use of ISO 31700-1:2023 [18].