IEC TR 62559-1

Edition 1.0 2019-01

TECHNICAL REPORT

RAPPORT TECHNIQUE

colour inside

Use case methodology – Part 1: Concept and processes in standardization

Méthodologie des cas d'utilisation – Partie 1: Concept et processus de normalisation

IEC TR 62559-1:2019-01(en-fr)

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INTERNATIONAL
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FOREWORD

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IEC TR 62559-1, which is a Technical Report, has been prepared by IEC systems committee Smart Energy. This first edition, together with the other parts of the IEC TR 62559 series as described in the Introduction, cancels and replaces IEC PAS 62559 published in 2008. This edition constitutes a technical revision.

The text of this document is based on the following documents:

Enquiry draft	Report on voting
SyCSmartEnergy/56/DTR	SyCSmartEnergy/60/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62559 series, published under the general title *Use case methodology*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

Complex systems of systems such as Smart Grids, Smart Cities, Smart homes/buildings, Active Assisted Living (AAL) systems, etc. call for cooperation between experts from several different domains (home automation, health, energy, telematics, IT, etc.). In the specificiation and design of such systems, standards play an essential role to obtain interoperable, safe, secure and cost effective solutions. Thus, a common cooperation platform, including a collaboration framework (terminology, quality guidelines, workflows, etc.), for involved stakeholders is needed both in project development as well as in standardization work.

The work on the IEC 62559 series used IEC PAS 62559:2008 as a starting point. IEC PAS 62559 defined a methodology for power system domain experts to determine and describe their user requirements for automation systems, based on their utility business needs. Since its publication in January 2008, the IEC PAS 62559 use case methodology has been increasingly used within standardization and the need for a framework was recognized, e.g. for IEC experts to provide use cases in a consistent manner. The IEC SMB SG3 recommendation 7, approved by the Standardization Management Board (SMB) at its February 2010 meeting (SMB/4204/DL, Decision 137/10) requesting the urgent delivery of a generic use case repository for all Smart Grid applications introduced a need to transform IEC PAS 62559 to an IEC 62559 standard to support the development of an IEC use case repository and to provide support for the use case methodolgy in general.

IEC PAS 62559:2008, as well as experiences from the many activities which have already used it, provide central input to a full IEC 62559 standard series. This series will among other be the basis for a common use case management repository in order to gather use cases within IEC on a common collaborative platform and to organize a harmonization of use cases in order to develop and provide broadly accepted generic use cases as basis for the further standardization work. The new IEC 62559 series of standards is intended to support the standardization bodies needs to create and manage a common use case repository (Parts 1 to 3). In contrast to the original scope of IEC PAS 62559:2008, the IEC 62559 series of standards intends to be widely applicable for the development of different kinds of technical systems also outside the Smart Grid domain. But, as the development of the series was based on IEC PAS 62559, most examples come so far from the electrical energy supply domain of Smart Grids.

Figure 1 provides an overview of the intended first parts of the IEC 62559 series mainly describing the relation between Part 2 (the use case template), Part 3 (the XML import/export format) and the common use case repository.

– Part 1: Concept and processes in standardization

  IEC 62559-1 (this document) provides the basis for a common use case management repository in order to gather use cases within IEC on a common collaborative platform and to organize a harmonization of use cases in order to provide broadly accepted generic use cases as basis for the further standardization work. It describes processes and provides basics for the use case approach.

– Part 2: Definition of the templates for use cases, actor list and requirements list

  IEC 62559-2 defines the structure of a use case template, an actor list and a list for requirements. The document is mainly based on IEC PAS 62559:2008.

– Part 3: Definition of use case template artefacts into an XML serialized format

  Based on IEC 62559-2 template, IEC 62559-3 defines the required core concepts and their serialization into XML syntactic format of a use case template, an actor list and list for detailed requirements. The XML format is used to transfer the content of the template to other engineering systems (e.g. based on UML). It is intended to develop a UML profile definition based on this part in future.

– Part 4: Best practices in use case development for IEC processes and company projects

  IEC 62559-4 maintains the application of the use case methodology in IEC PAS 62559:2008 relating to company projects. Part 4 gathers recommendations

around the application of the use case approach for project specific developments in a broader sense, whereas Parts 1 to 3 concentrate on the application within standardization, the use case template and the management of an IEC use case repository.

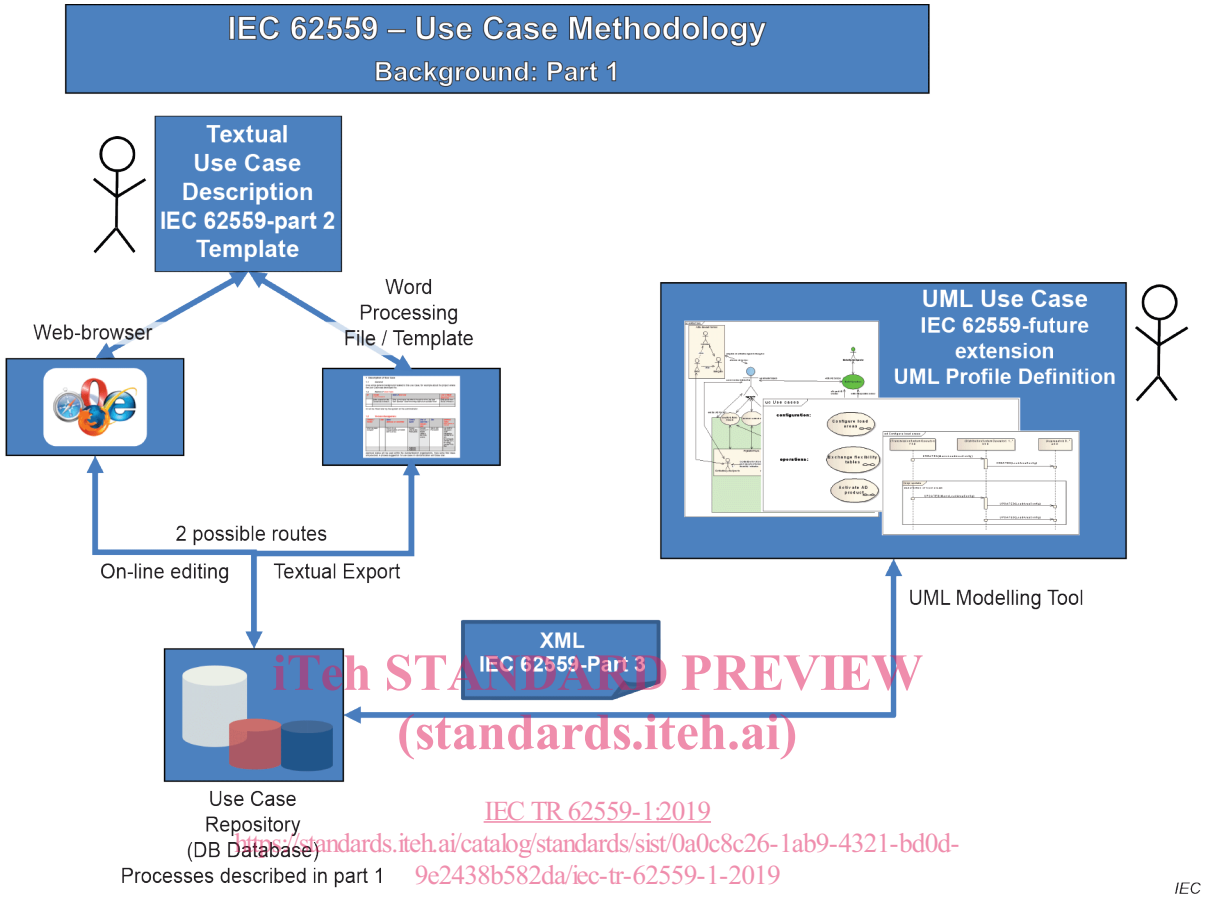


Figure 1 – IEC 62559 standard series

USE CASE METHODOLOGY –

Part 1: Concept and processes in standardization

1 Scope

This part of IEC 62559, which is a Technical Report, is the basis for a common use case repository, used to gather use cases within IEC on a common collaborative platform. The repository is used to organize and harmonize use cases in order to provide broadly accepted generic use cases as basis for the further standardization work.

This document gives an overview about the individual parts of the IEC 62559 series, provides the background/basics for the use case approach defined therein (like terms or use case types), and introduces processes for collaborative use case collection within IEC.

Operational documents like user manuals for software tools like the use case repository are not described in detail as they will be available online and might as well be frequently updated.

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.

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1
actor
entity that communicates and interacts

Note 1 to entry: These actors can include people, software applications, systems, databases, and even the power system itself.

[SOURCE: IEC 62559-2:2015, 3.2]

3.2
role
role played by an actor in interaction with the system under discussion

Note 1 to entry: Alternative: A role represents the external intended behaviour of a party. A party cannot share a role.

EXAMPLES A legally defined market participant (e.g. grid operator, customer), a generic role which represents a bundle of possible roles (e.g. flexibility operator) or an artificially defined body needed for generic process and use case descriptions.

Note 2 to entry: Legally or generically defined external actors may be named and identified by their roles.

[SOURCE: SG-CG/M490/E:2012-12, definition 3.17]

3.3
cluster
group of use cases with a similar background or belonging to one system or one conceptual description

[SOURCE: SG-CG/M490/E:2012-12, definition 3.3]

3.4
domain
area of knowledge or activity characterized by a set of concepts and terminology understood by the practitioners in that area

EXAMPLE Taken from Smart Grid/energy system area: generation, transmission, distribution, customer.

Note 1 to entry: Major area of similar technologies and organizational background, for the energy system some domains are suggested in this document as examples throughout this document.

[SOURCE: ISO/IEC 19501:2005, Glossary]

3.5
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 actors or other stakeholders of the system

[SOURCE: ISO/IEC 19505-2:2012, 16.3.6]

3.6
generic use case
use case which is broadly accepted for standardization, usually collecting and harmonizing different individual use cases without being based on a project or technological specific solution

[SOURCE: SG-CG/M490/E:2012-12; definition 3.7]

3.7
high level use case
use case which describes a general requirement, idea or concept independently from a specific technical realization like an architectural solution

[SOURCE: SG-CG/M490/E:2012-12, definition 3.4]

3.8
business use case
use case that describes how business roles interact to execute a business process

Note 1 to entry: The business processes are derived from services, i.e. business transactions, which are needed to achive different strategic goals for an organization; e.g. for the purpose of achieving specified and measurable results/products for internal or external customers.

3.9
system use case
use case that describes how system and/or business roles of a given system interact to perform a function required to enable or facilitate the business processes described in business use cases

3.10
use case template
form which allows the structured description of a use case in predefined fields

[SOURCE: SG-CG/M490/E:2012-12; definition 3.2]

3.11
use case repository
UCR
database, based on a given use cases template, for editing, maintenance and administration of use cases, actors and requirements including their interrelations

Note 1 to entry: The UCR is designed as collaborative platform for standardization bodies, inter alia equipped with export functionalities as UML model or text template.

[SOURCE: SG-CG/M490/E:2012-12; definition 3.13]

3.12
requirement
provision that conveys criteria to be fulfilled

[SOURCE: ISO/IEC Guide 2:2004, 7.5]

3.13
functional requirement
requirement that describes what the system must do

Note 1 to entry: They are actions in response to events, or actions performed autonomously. They represent operations and features provided.

[SOURCE: IEC PAS 62559:2008, 7.2.6.2]

3.14
non-functional requirement
requirement that describes what qualities the system must contain from an execution and performance perspective

Note 1 to entry: These are also known as “constraints”, “behaviour”, “criteria”, “performance targets”, etc. They set limits or controls on how well the system performs the functional requirements.

Note 2 to entry: Non-functional requirements include: reliability, security, usability, upgradeability, expandability, scalability, compatibility, safety, performance, and conformance.

[SOURCE: IEC PAS 62559:2008, 7.2.6.2]

3.15
repository
place where information like use cases can be stored, usually as a database

Note 1 to entry: Refer to use case repository.

[SOURCE: SG-CG/M490/E:2012-12; definition 3.12]

3.16
system
set of interrelated elements considered in a defined context as a whole and separated from their environment

Note 1 to entry: A system is generally defined with the view of achieving a given objective, for example by performing a definite function.

[SOURCE: IEC 60050-351:2013, 351-42-08]

3.17
unified modelling language
UML
graphical modelling language for the specification, construction, and documentation of parts of software and other systems

Note 1 to entry: UML has a very broad scope that covers a large and diverse set of application domains.

[SOURCE: Based on UML Infrastructure Specification, v2.4.1]

3.18
Smart Grid architecture model
SGAM
suggested reference architecture for the Smart Grid area

[SOURCE: SG-CG/M490/C:2012-12]

4 The use case development methodology

The concept of use cases originates from software engineering where it is used to identify functional requirements. A use case is simply a "story" about how a system will be used, ideally developed by the people who will actually be using it. Use cases permit "users" too clearly and comprehensively express their information needs in a manner that can be used by information specialists and design engineers to develop the ICT/automation systems that will exactly meet their requirements.

Thus its main focus is on the description of general functionalities of systems under design and their environment. In general the description of use cases is independent of design specifics and allows the identification of requirements. They provide links to artefacts from different development viewpoints and due to that, they support a common understanding between experts from different domains and technical/IT experts who have to implement these functions.

The application of the use case methodology in power systems emerged from the need for a methodology to interactively design the traditional power system infrastructure together with its information and automation infrastructure to pursue the vision of a future highly reliable, highly efficient, self-healing power system – the Smart Grid. Thus, the use case methodology from software engineering was adapted to the use in energy systems in a research project – the IntelliGrid project initiated by the Electric Power Research Institute (EPRI) – and the project results were the basis for IEC PAS 62559:2008.

The process of developing use cases in general was described as shown in Figure 2 in IEC PAS 62559:2008. It consists of the following types of people and project steps.

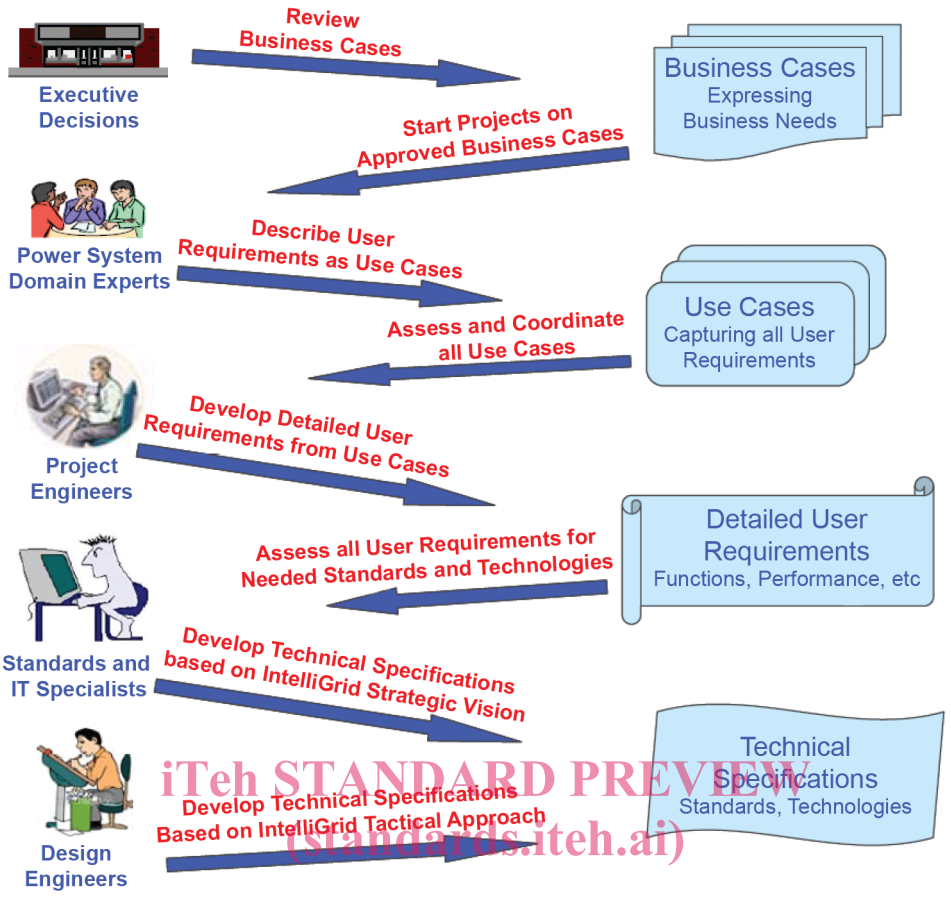
- Executives or other utility managers review business cases which describe and justify a perceived business need. They then approve specific projects.
- Domain experts and project engineers are tasked to develop a project team to undertake the project. As one of the first undertakings of the project team, all power system experts

and other stakeholders (users) that could impact or be impacted by the project should be identified.

- Domain experts review the existing IntelliGrid use cases for applicability and ideas[1].
- Domain experts develop a list of use cases (functional descriptions), covering not only the specific business need but other user needs and future possibilities that could impact or might be impacted by the project.
- Domain experts, with possible assistance by project engineers who understand the use case process, draft the key use cases, capturing all of the necessary user requirements.
- Domain experts review and update these use cases to ensure their needs are captured correctly and to assess possible misunderstandings, overlaps, holes, and other inconsistencies.
- Project engineers assess and coordinate the use cases from which they develop a comprehensive and detailed user requirements document. This detailed user requirements document contains only user requirements.
- Information specialists apply the appropriate standards and technologies, based on the user requirements document. The strategic vision of the IntelliGrid Architecture should be used to determine the key standards and technologies.
- Design engineers develop the technical specifications, which combine the user requirements from the domain experts, the strategic standards and technologies from the information specialists, and the tactical approach to system development recommended by the IntelliGrid Architecture.

1 IntelliGrid use cases can be found at http://intelligrid.info/IntelliGrid_Architecture/Use_Cases/IECSA_use_cases_overview.htm

Others are available. IEC repository is used for use cases supporting standards development.



[SOURCE: IEC PAS 62559:2008]

Figure 2 – IntelliGrid methodology for project definition

The user requirements as elicited by the use case process and ultimately described in the detailed user requirements document cover:

- functions from the user perspective, including functional description of processes, user choices, types of input data, types of results, and possibly display appearance;
- configuration issues, such as access to field data, electrically noisy substation environment, control centre LAN, or cross-organizational interactions;
- performance requirements, such as availability, response times, latency, precision, frequency of updated results, and other user parameters;
- security requirements, such as confidentiality, access restrictions, detection of failures and/or intrusions, failure management, and other safety, security, and failure issues;
- data management requirements, such as sizes, numbers of devices, amounts of data, expected growth over time, data access methods, data maintenance, and other data management considerations;
- constraints, such as contractual, legal, regulatory, safety rules, or other issues that could impact the requirements.

Additionally to the description of functions and requirements a use case identifies actors which are interacting with the system under design to achieve particular goals. These actors can for instance be other systems or human actors which are playing a role within a use case. A role represents the external intended behaviour of a party in a use case while an actor is a composition of one or more roles.