



IEC 62559-2

Edition 1.0 2015-04

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



### Use case methodology –

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

### Méthodologie des cas d'utilisation –

#### Partie 2: Définition du formulaire type de modèle de cas d'utilisation, de la liste d'acteurs et de la liste d'exigences



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### USE CASE METHODOLOGY –

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

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International Standard IEC 62559-2 has been prepared by IEC technical committee 8: Systems aspects for electrical energy supply.

This first edition cancels and replaces IEC PAS 62559:2008 which had been published together with EPRI. Main content of the former PAS will be transferred to the new IEC 62559-4.

IEC 62559-1 to IEC 62559-3 are now more related to the application of the use case methodology in standardisation. In this document, a revised and updated template is provided.

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

FDIS	Report on voting
8/1389/FDIS	8/1395/RVD

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

This publication 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.

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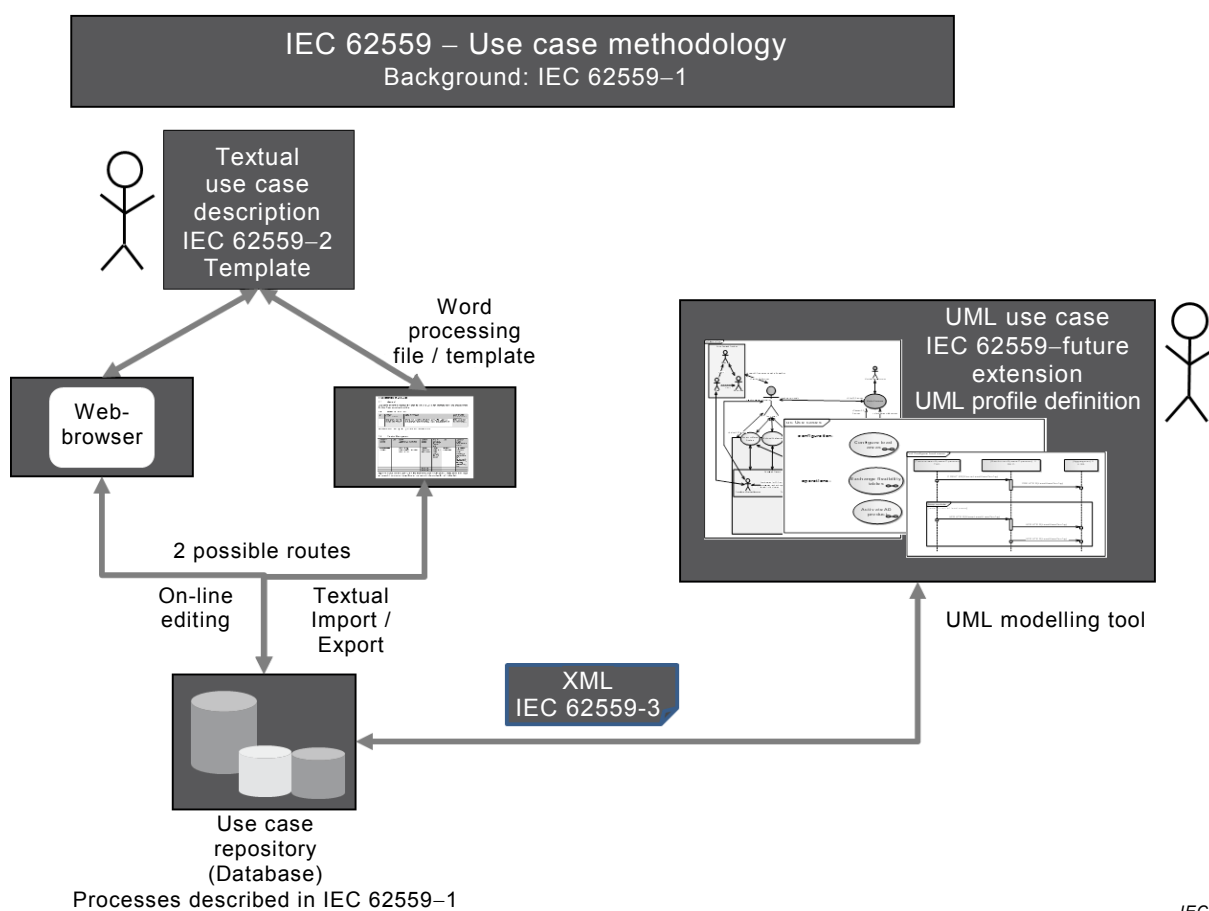
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## INTRODUCTION

For complex systems, the use case methodology supports a common understanding of functionalities, actors and processes across different technical committees or even different organizations. Developed as software engineering tool, the methodology can be used to support the development of standards as it facilitates the analysis of requirements in relation to new or existing standards. Further arguments for the use case methodology and background information are available in IEC 62559-1.

Figure 1 provides an overview of the intended first parts of the IEC 62559, mainly describing the relation between IEC 62559-2 and IEC 62559-3.



IEC

**Figure 1 – IEC 62559 standard series**

### IEC 62559-1 – Concept and processes in standardization

IEC 62559-1 is the basis for a common use case repository in order to gather use cases within IEC on a common collaborative platform. This repository will also be used 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 methodology like terms or use case types.

### IEC 62559-2 – 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 the previous IEC PAS 62559 specification and shall be read together with IEC 62559-1.

## IEC 62559-3 – Definition of use case template artefacts into an XML serialized format

Based on IEC 62559-2, IEC 62559-3 defines the required core concepts and their serialization into an XML format of a use case template, an actor list and a list for detailed requirements. The XML format is used to transfer the content of the template to other engineering systems (e.g. UML modelling tools). These documents are developed using the energy system and Smart Grids as examples, but they are general enough to be transferred to other domains and systems. It is intended to develop a UML profile definition based on this part in the future.

### Motivation

The International Standard IEC 62559 "Use case methodology" is needed to fulfill the SG3 decision 7 made by the 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. Nevertheless, the use case methodology described in this document is intended for a broader application within standardization exceeding Smart Grid systems.

More and more complex systems such as Smart Grids or Smart Cities are raising the question of managing system level requirements, which have to be fed by many domains of expertise (in standardization related to different Technical Committees (TCs)), and which have to be broken down further and shared by many TCs in charge of specifying standards to support these system level functions.

One way to handle this transversality efficiently is to set some common methods and terms. The use case methodology is the current state of art and supports further engineering activities.

The use case methodology offers a unique way for sharing ideas and requirements of new use cases or business cases between many experts/TC's with different backgrounds: e.g. domain experts with knowledge about energy systems or business processes on one hand and system-/IT-experts defining exchanged information and communication on the other hand. In the requirement development process, domain experts are providing general ideas and functional requirements. The main goal is for system experts to detail down these use cases to a level they can be used to specify interfaces, dedicated functionality, data and service model exchange. However, safety- or EMC-experts (as examples) may also make use of the described use cases, their terminology and identified requirements.

However, the starting point is to set up a frame for consistency within IEC helping IEC members to provide use cases in a consistent manner – this standard shall serve as basis for use case repositories in order to gather, administrate, maintain, and evaluate use cases.

Within IEC, a use case repository shall be used as common collaborative platform for use case elaboration and to organize a harmonization of use cases in order to provide broadly accepted generic use cases as basis for further standardization work.

But the use case template defined in this document may serve not only for the development of standards, but also – as it was the original purpose of the previous IEC PAS 62559:2008 (refer to IEC 62559-4) – as a helpful means for the realization of projects within the area of complex systems. Also other applications, which need the benefits of a structured requirements development and formalized description of functionality, may make use of the suggested template.

The use case methodology has to be seen as a process which starts with the definition of business ideas, goals and requirements, detailing these in use case descriptions. This information can be used as a basis to identify/link reference architectures describing the types of components used, and going further down to an analysis for the further standardization process.



Further developments regarding the use case template are expected. These developments are mainly related to information, which is required in the use case description for further analysis, and which can be mapped to other information (e.g. to a reference architecture, IT security methods, standards and data models). Partly this is considered in the suggested template of this standard. Further relations will be described separately as they are still under development and they might be considered for the further development of the IEC use case repository.

## USE CASE METHODOLOGY –

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

#### 1 Scope

This part of IEC 62559 “Use case methodology” defines the structure of a use case template, template lists for actors and requirements, as well as their relation to each other. In this document, a standardized template for the description of use cases is defined for various purposes like the use in standardization organizations for standards development or within development projects for system development.

This document was developed for general application in various domains and systems. The energy system/smart grid is used as example in this document as it was one of the first usage areas for this use case template, but this general template can be applied in other usage areas different from energy systems as well (e.g. smart home or electro-mobility).

The motivation, background information on use cases, recommendations for the handling of use cases and the processes for the description of use cases inside standardization and in relation to a central use case repository is described in IEC 62559-1.

#### 2 Normative references

Void.

#### 3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions given in IEC 62559-1 and the following apply.

##### 3.1

##### **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]

##### 3.2

##### **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: Based on IEC PAS 62559:2008]

##### 3.3

##### **role**

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

Note 1 to entry: Alternative: A role represents the external intended behavior 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]

### 3.4

#### **use case template**

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

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

### 3.5

#### **repository**

here used for a place where information like use cases can be stored, usually as a database (refer to use case repository)

[SOURCE: based on SG-CG/M490/E:2012-12, definition 3.12]

### 3.6

#### **use case repository**

##### **UCR**

database, based on a given use case 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: based on SG-CG/M490/E:2012-12, definition 3.13]

### 3.7

#### **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]

### 3.8

#### **area**

major usage area for use cases supporting of grouping, filtering and administration of use cases within a common use cases database

**EXAMPLE** Energy Systems/Smart Grid, Smart Home.

Note 1 to entry: Might be used in combination with domain which further divides an area.

### 3.9

#### **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 organisational background, for the energy system some domains are suggested in this document as examples throughout this document.

[SOURCE: ISO/IEC 19501:2005: Unified Modeling Language Specification]

### 3.10

#### **group/grouping**

group of actors in order to organize an actor list

EXAMPLE Smart metering actors like meter operator (role), smart meter gateway (devices).

Note 1 to entry: Might be used in combination with domain and area.

### 3.11

#### **zones**

automation levels, classified in combination with a reference architecture

EXAMPLE SGAM.

### 3.12

#### **smart grid architecture model**

##### **SGAM**

suggested reference architecture for the smart grid area

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

### 3.13

#### **semantic model**

structured description of the semantics of a set of information, e.g. using some information modeling language like UML

Note 1 to entry: Many different semantic models are expressions of the same semantics. Even with one language, like UML, there are lots of ways to represent the structure of the same kind of information.

Note 2 to entry: Semantic modeling only represents information content – it does not include formatting/encoding (syntactical) specifications. There are typically many formatting/encoding options for a given semantic model.

[SOURCE: based on SGAC Semantic Framework, draft version]

### 3.14

#### **canonical data model**

##### **CDM**

semantic model chosen as the single unifying model that will govern the semantic definition of a collection of data specifications, such as the specifications for message payload content for a collection of interfaces

[SOURCE: based on SGAC Semantic Framework, draft version]

### 3.15

#### **namespace**

(standardized) space of names qualifying pieces of information, including information about their name detailed semantic, and usually their attached model (e.g. canonical data model)

### 3.16

#### **name of information**

unique ID which identifies the selected information to be exchanged in the context of the use case and its step-by-step analysis and which should be related to the namespace

### 3.17

#### **by-default namespace**

namespace where “name of information” is by default originated from

### 3.18

#### **scenario**

a possible sequence of interactions

[SOURCE: SG-CG/M490/E:2012-12, definition 3.10]

### 3.19

#### **activity step**

elementary step within a scenario representing the finest-grained description level of interactions in the use case

[SOURCE: SG-CG/M490/E:2012-12, definition 3.11]

### 3.20

#### **conceptual description**

cluster of use cases which can be described in an overall description providing an introduction and summarizing the main ideas and the relations between different high level use cases of the cluster

EXAMPLE Flexibility concept in the Smart Grid area, smart charging in the electro-mobility/Smart Grid area.

### 3.21

#### **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]

### 3.22

#### **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]

### 3.23

#### **primary use case**

use case which describes in detail the functionality of (a part of) a business process

Note 1 to entry: Primary use cases can be related to a primary goal or function which can be mapped to one architectural solution.

[SOURCE: SG-CG/M490/E:2012-12, definition 3.5]

### 3.24

#### **secondary use case**

elementary use case which may be used by several other primary use cases

EXAMPLE Communication functions.

[SOURCE: SG-CG/M490/E:2012-12, definition 3.6]

### 3.25

#### **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 technology-specific solution

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

### **3.26**

#### **specialized use case**

use case which is using specific technological solutions/implementations

EXAMPLE Use case with a specific interface protocol.

[SOURCE: SG-CG/M490/E:2012-12, definition 3.8]

### **3.27**

#### **individual use case**

use case which is used specific for a project or within a company/organization

[SOURCE: SG-CG/M490/E:2012-12, definition 3.9]

### **3.28**

#### **identification number**

##### **ID**

string of characters representing the value of the identifier

EXAMPLE Each use case and each requirement have an ID.

[SOURCE: IEC 62507-1:2010, definition 3.5]

### **3.29**

#### **identifier**

attribute associated with an object to unambiguously identify it in a specified domain

[SOURCE: IEC 62507-1:2010, definition 3.8]

### **3.30**

#### **requirement ID**

##### **R-ID**

ID for the requirements in template section 4 in order to identify requirements in the general requirements list

### **3.31**

#### **unified modeling language**

##### **UML**

graphical modeling language for the specification, construction, and documentation of parts of software and other systems.

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

Note 2 to entry: This note only applies to the French language.

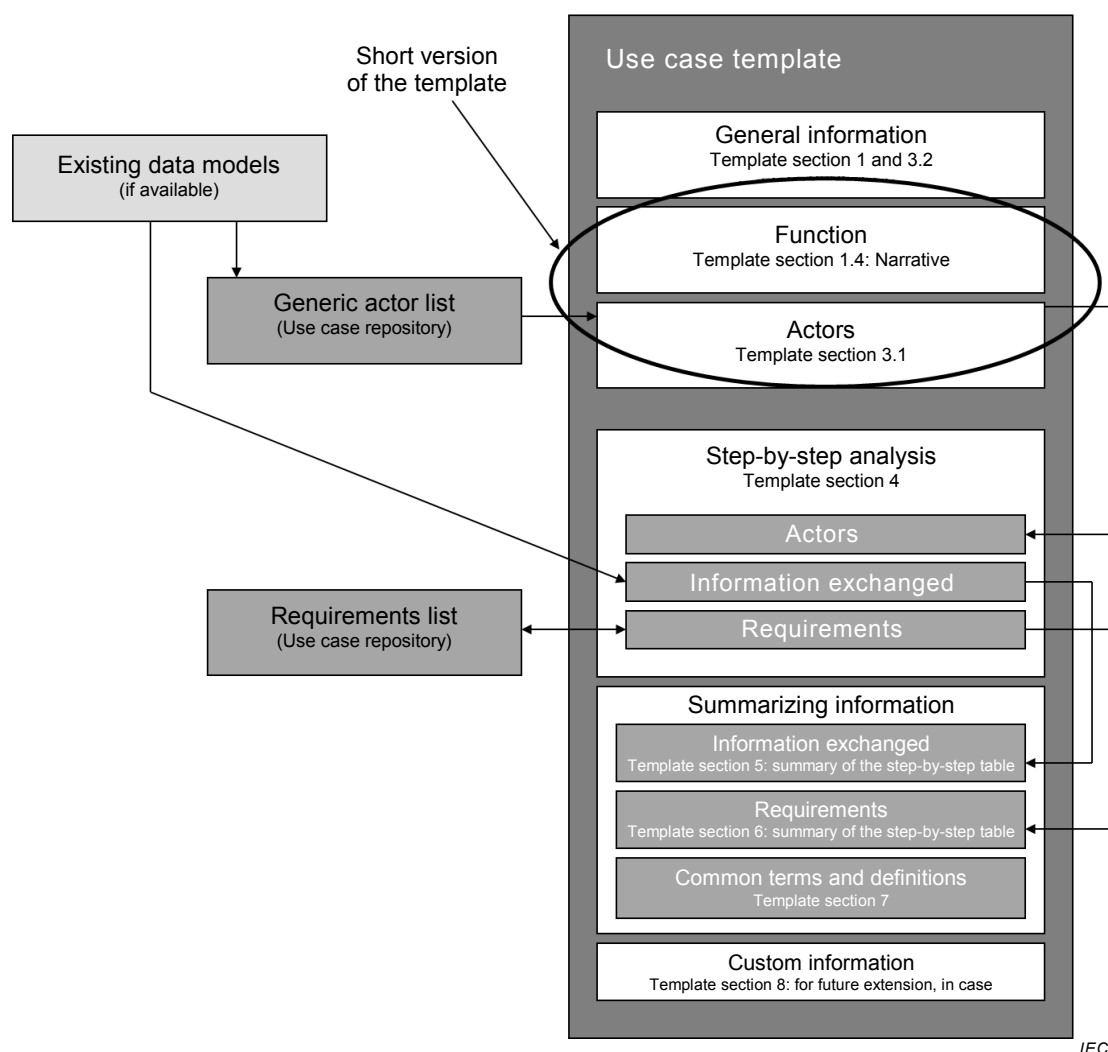
[SOURCE: Based on UML Infrastructure Specification, v2.4.1]

## **4 Definition of a use case template**

### **4.1 Overview**

#### **4.1.1 General**

Figure 2 provides an overview of the use case template and its internal relations as well as the relation to the actor list and the requirements list, which are common for all use cases.



**Figure 2 – Overview of the use case template**

Some fields require inputs which are/should be predefined for easier harmonization and analysis of use cases (it is recommended to use standardized lists). These recommended answers are described in the explanation of the use case template. In a tool-supported repository, the selection of predefined answers can support the author.

Existing use case descriptions are mainly based on a similar template design and can be migrated into the defined version of this standard, if required. In this case, an individual mapping table for the fields is required.

In the following, the template is defined being first provided as empty version in 4.2 below. The template and its fields are explained in Clause 5.

#### 4.1.2 Short template version and use case overview table

Only the following fields are mandatory covering the minimum short version of a use case which is mainly used for a first version of a new use case:

- name of use case,
- author,
- date,
- narrative,

– actors.

The short version is the basis for the complete use case and can simply be extended with the addition of further information, i.e. without rewriting the use case. Being self-explaining, the short version is seen as an easy starting point for domain experts without going into every detail of the use case methodology and its complete use case template.

Use cases can be displayed in a brief overview table (single row per use case). It can be used to scope the full list of possible use cases as tabular summary. Then, for instance, the most important use cases can be identified and expanded using either the short or long template.

<b>Name of use case</b>	<b>Short description</b>	<b>Actors</b>	<b>General remarks</b>
First use case			
Next use case			
...			

For examples, refer to Annex B. Further versions may be defined on individual demand, but it is recommended to use the provided fields and their definitions described in this document in order to be compatible with other use cases descriptions, tools, and repositories.

#### 4.1.3 Actor list and requirements list

Following the explanation of the template, an actor list and a requirements list are pre-defining answers for the respective fields in order to harmonize information in various use cases from different sources. In standardization, the lists are virtually made available in the IEC use case repository. A process for validating new information is described in IEC 62559-1.

#### 4.1.4 Use case repository

The template may be used in a word processing software, but using a repository provides several advantages: maintenance, overview of/interrelation between use cases, common basis for working groups or communities, support of the use case experts providing already relevant information like actors, requirements, etc. In addition to that, a repository can provide selection boxes with predefined answers, allow an easier start using the short version, easier migration to new versions of the template/consistent use of different versions (e.g. short and more detailed), mapping of information, design of special reports/views, etc.

In general, all information related to the use case can be integrated into the existing template and its defined fields. Nevertheless, section 8 of the template provides options for future individual extension. It is strongly recommended to use existing fields in order to be interoperable with general use case tools like the UCR.

For the official IEC template (and repository) fields of template section 8 can be used for future adaptations until a new version of this standard is issued. IEC 62559-1 provides a process for the request and validation of new fields. New fields for the use inside the IEC shall be announced to the responsible committee and shall be acknowledged according to the procedure described in IEC 62559-1, prior to use.

## 4.2 Use case template

The following overview provides the empty template. The template is explained in Clause 5.



**1 Description of the use case****1.1 Name of use case**

<i>Use case identification</i>		
<i>ID</i>	<i>Area/ Domain(s)/ Zone(s)</i>	<i>Name of use case</i>

**1.2 Version management**

<i>Version management</i>				
<i>Version No.</i>	<i>Date</i>	<i>Name of author(s)</i>	<i>Changes</i>	<i>Approval status</i>

**1.3 Scope and objectives of use case**

<i>Scope and objectives of use case</i>	
<i>Scope</i>	
<i>Objective(s)</i>	
<i>Related business case(s)</i>	

**1.4 Narrative of use case**

<i>Narrative of use case</i>	
<i>Short description</i>	
<i>Complete description</i>	

**1.5 Key performance indicators (KPI)**

<i>Key performance indicators</i>			
<i>ID</i>	<i>Name</i>	<i>Description</i>	<i>Reference to mentioned use case objectives</i>

**1.6 Use case conditions**

<i>Use case conditions</i>	
<i>Assumptions</i>	
<i>Prerequisites</i>	

**1.7 Further information to the use case for classification/mapping**

<i>Classification information</i>	
<i>Relation to other use cases</i>	
<i>Level of depth</i>	
<i>Prioritisation</i>	
<i>Generic, regional or national relation</i>	
<i>Nature of the use case</i>	

**Further keywords for classification****1.8 General remarks****General remarks****2 Diagrams of use case****Diagram(s) of use case****3 Technical details****3.1 Actors**

<b>Actors</b>			
<b>Grouping</b>		<b>Group description</b>	
<b>Actor name</b>	<b>Actor type</b>	<b>Actor description</b>	<b>Further information specific to this use case</b>

**3.2 References**

<b>References</b>						
<b>No.</b>	<b>References type</b>	<b>Reference</b>	<b>Status</b>	<b>Impact on use case</b>	<b>Originator/organisation</b>	<b>Link</b>

**4 Step by step analysis of use case****4.1 Overview of scenarios**

<b>Scenario conditions</b>						
<b>No.</b>	<b>Scenario name</b>	<b>Scenario description</b>	<b>Primary actor</b>	<b>Triggering event</b>	<b>Pre-condition</b>	<b>Post-condition</b>

**4.2 Steps – Scenarios**

<b>Scenario</b>								
<b>Scenario name:</b>		<b>No. 1 – ...</b>						
<b>Step No.</b>	<b>Event</b>	<b>Name of process/activity</b>	<b>Description of process/activity</b>	<b>Service</b>	<b>Information producer (actor)</b>	<b>Information receiver (actor)</b>	<b>Information exchanged (IDs)</b>	<b>Requirement, R-IDs</b>

**5 Information exchanged**

<b>Information exchanged</b>			
<b>Information exchanged, ID</b>	<b>Name of information</b>	<b>Description of information exchanged</b>	<b>Requirement, R-IDs</b>

**6 Requirements (optional)**

Requirements (optional)		
Categories ID	Category name for requirements	Category description
Requirement R-ID	Requirement name	Requirement description

**7 Common terms and definitions**

Common terms and definitions	
Term	Definition

**8 Custom information (optional)**

Custom information (optional)		
Key	Value	Refers to section

**5 Explanation of fields of the use case template**

In Clause 5, each table of the use case template is presented with descriptions of the content of the table cells. Some additional information about this content is presented where helpful. Different sections of the template are marked with grey background in order to differentiate from clauses of this document.

**Template section: 1 Description of the use case****Template section: 1.1 Name of use case**

Use case identification		
ID	Area/ Domain(s)/ Zone(s)	Name of use case

**ID:** The identification number (ID) of a use case is unique within a repository or project and serves for organization/administration of use cases.

**Area /Domain(s)/Zone(s):** Use cases can be used in various areas (e.g. energy system). Within these areas, different domains are used to define/determine a more specific subgrouping. Zones might describe additionally zones within an automation system or a reference architecture. Experts in a particular field can suggest their set of domains (and zones) in order to provide a common understanding how to group use cases within an complex area. These predefined domains (and zones) can be chosen by the author of a use case (preselection). The author can select one or more domains and zones, comma separated, as it is usual that use cases are crossing different domains and zones.

**EXAMPLE** For the energy system according to the smart grid architecture model (SGAM), the following domains and zones are suggested:

Area: Energy systems

Domains:

- Generation
- Transmission system