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Template for smart manufacturing use cases

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Template for smart manufacturing use cases

FOREWORD

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The text of this Systems Reference Deliverable is based on the following documents:

Draft	Report on voting
SyCSM/127/DTS	SyCSM/136/RVDTS

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 Systems Reference Deliverable 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 ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

The collection, storage and distribution of use cases are intended to show the characteristics of smart manufacturing (SM), including but not limited to the following:

– vertical integration of networked manufacturing systems within enterprises;
– horizontal integration crossing enterprises;
– end-to-end integration of the whole value chain;
– short time-to-market of the new product;
– enhanced engineering and operational efficiency;
– openness for integration;
– self-optimization;
– new business model;
– resource optimization and cost savings;
– flexibility in production;
– sustainability.

In addition, managing a collection of use cases has the following goals:

– to organize use cases according to different aspects such as life cycle, hierarchy;
– to make access to a required use case easy;
– to assist in deepening the understanding of the use cases.

Use cases in SM are developed by many organizations, such as standardization bodies and consortia. With the wide spread of manufacturing Internet of Things (IoT), it is expected that many use cases will continue to be created.

The benefits from use case collection include the following aspects from different perspectives:

– to show how SM related technologies can be used to express business needs and to capture user requirements;
– to derive standardization requirements and improve the capability to use standards;
– to gather experts who are interested in SM;
– to support and promote SyC SM work;
– to help people to understand standards by related use cases.

The benefits for users of identified or analysed use case collections include the following:

– to easily access target use cases using keys corresponding to user concerns or interests;
– to effectively develop the application with use cases;
– establishment of a fundamental platform (repository) for expanding the usage of SM use cases.

In addition, the benefits for IEC itself are as follows:

– to draw attention to the usage of use cases related to SM;
– to provide the potential data query service.

The initial task of the previous SyC SM AHG 2 was the identification of SM use cases which were already available in the IEC and ISO technical work.

It is difficult to compare or contrast catalogues of use cases from different standards development organizations (SDOs) since they are developed from separate sources with different templates for different purposes. It will be useful if they can be tied to a unified framework within the SM landscape.

Therefore, to facilitate the collection of smart manufacturing use cases, SyC SM WG 1 was set up as a subsequent group carrying over the outcomes from the SyC SM AHG 2. It was requested to collaborate with TCs and SCs, ISO/SMCC, other SDOs and external organizations.

The SM use case template is based on SM reference architecture (refer IEC 63339:2024), taxonomy (refer ISO/IEC TR 63306-1:2020), terminology (refer IEC TR 63283-1:2022), and current use cases. The development of the SM use case template follows the V-model shown in Figure 1. The SM use case template is analysed and designed based on the requirement from SDG users, IEC SyC SM WG 3, industry users, etc. Then, it will be verified by WG 1 using use case data, and validated by related SDOs and industry users.

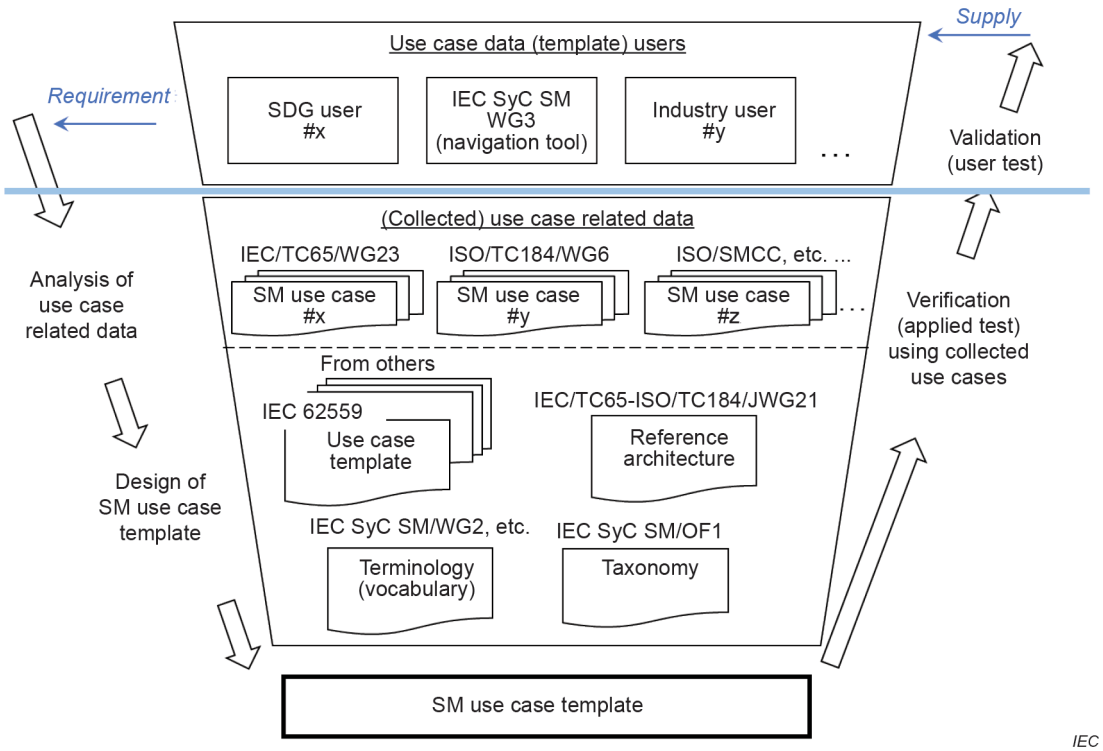


Figure 1 – Development process of SM use case template

It is important to encourage SDOs and industry users to compile the SM use case based on the SM use case template described in 7.1. A guideline for drafting the use cases is provided in 7.2. Use cases from various sources will be brought into the proposed use case management repository (UCMR) for ease of access and reference by standards developers, and industry users of SyC SM applications, shown in Figure 2.

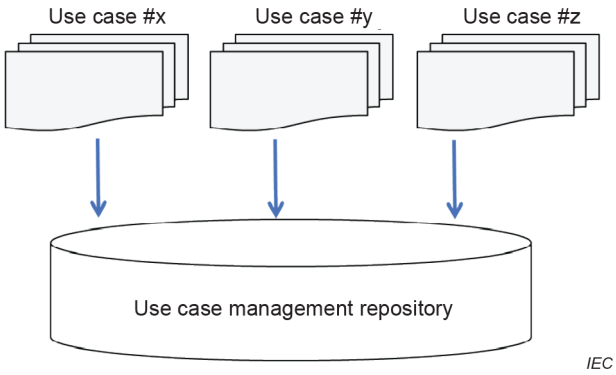


Figure 2 – Use of UCMR

IEC Guide 125 on application of the use case (UC) methodology is under development. It is based on IEC 62559-2, which gives an overview of the individual parts of the IEC 62559 series, provides the background and basics for the use case approach defined therein (like terms or use case types), and introduces processes for collaborative use case collection within IEC. IEC Guide 125 will be the basis for a common use case repository, used to gather use cases within IEC on a common collaborative platform. The SM use case template has the same structuring methodology as IEC Guide 125 and it can be one of the profiles for different domains.

1 Scope

This document specifies the template for smart manufacturing use cases. It is developed for easier storage, search, comparison, and retrieval of use cases from different SDOs and others by having a unified template of use cases.

The storage of SM use cases in IEC UCMR follows the template requirements in this document.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 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:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
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]

3.1.2
use case template
form which allows the structured description of a use case in predefined fields

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

3.1.3
user
entity which makes use of the use case template or the services and/or facilities of a database based on the use case template

EXAMPLE SM system developer, SM standard developer and SM application developer.

3.1.4
repository
place where information like use cases can be stored

Note 1 to entry: The information is usually stored as a database (refer to use case repository).

[SOURCE: SG-CG/M490/E:2012-12; 3.12, modified – Supplementary information has been moved to a note to entry.]