PD ISO/IEC TR 63306-1:2020

BSI Standards Publication

Smart manufacturing standards map (SM2)

Part 1: Framework

Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

National foreword

This Published Document is the UK implementation of ISO/IEC TR 63306-1:2020.

The UK participation in its preparation was entrusted to Technical Committee GEL/65, Measurement and control.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2021
Published by BSI Standards Limited 2021

ISBN 978 0 539 16551 7

ICS 01.040.25; 25.040.01; 25.060.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 January 2021.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

ISO/IEC TR 63306-1

Edition 1.0 2020-12

TECHNICAL REPORT

colour inside

Smart manufacturing standards map (SM2) – Part 1: Framework

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.01; 25.060.01; 01.040.25

ISBN 978-2-8322-9199-3

Warning! Make sure that you obtained this publication from an authorized distributor.

Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

CONTENTS

FOREWORD 8
INTRODUCTION 10
1 Scope 11
2 Normative references 11
3 Terms and definitions 11
4 Principle of the Smart Manufacturing Standards Map (SM2) 11
4.1 Framework 11
4.2 SM2 Catalogue 12
4.3 Graphical representations 14
5 Overview of the SM2 Vocabulary 21
5.1 Summary of characteristics and blocks 21
5.2 Values of the characteristics 24
5.3 Qualifier 24
6 Block "Identification" 25
6.1 Composition 25
6.2 Qualifier 25
6.3 Sub-block "Reference" 26
6.3.1 Characteristic "Status" 26
6.3.2 Characteristic "Standard number" 26
6.4 Sub-block "Publication" 26
6.4.1 Characteristic "Edition" 26
6.4.2 Characteristic "Publication date" 26
6.5 Sub-block "Project" 27
6.5.1 Characteristic "Project number" 27
6.5.2 Characteristic "Forecast publication date" 27
6.6 Sub-block "Owner" 27
6.6.1 Characteristic "Organization" 27
6.6.2 Characteristic "Committee number" 27
6.6.3 Characteristic "Committee title" 28
6.7 Sub-block "ICS" 28
6.7.1 Characteristic "International Classification for Standards" 28
6.7.2 Other characteristics 29
6.8 Sub-block "Title" 29
6.8.1 Characteristic "Standard title" 29
6.8.2 Characteristic "Standard short title" 29
7 Block "Object" 30
7.1 Composition 30
7.2 Qualifier 30
7.3 Sub-block "Type of standard" 30
7.3.1 Description 30
7.3.2 Characteristics 30
7.4 Sub-block "Type of object" 32
7.4.1 Description 32
7.4.2 Characteristics 32
7.5 Sub-block "Manufacturing process type" 33
7.5.1 Description 33

AVA Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

7.5.2 Characteristics ... 34
8 Block "Hierarchy" ... 34
8.1 Composition ... 34
8.2 Qualifier ... 35
8.3 Sub-block "Equipment hierarchy" ... 35
8.3.1 Description ... 35
8.3.2 Characteristics ... 35
8.4 Sub-block "Functional hierarchy" ... 37
8.4.1 Description ... 37
8.4.2 Characteristics ... 37
9 Block "Life cycle" ... 38
9.1 Composition ... 38
9.2 Qualifier ... 39
9.3 Sub-block "Product type life cycle" ... 39
9.3.1 Description ... 39
9.3.2 Characteristics ... 40
9.4 Sub-block "Product instance life cycle" ... 41
9.4.1 Description ... 41
9.4.2 Characteristics ... 41
9.5 Sub-block "Production system life cycle" ... 41
9.5.1 Description ... 41
9.5.2 Characteristics ... 42
10 Block "Interoperability" ... 42
10.1 General ... 42
10.2 Composition ... 43
10.3 Qualifier ... 43
10.4 Sub-block "Interoperability approach" ... 43
10.4.1 Description ... 43
10.4.2 Characteristics ... 43
10.5 Sub-block "Interoperability concern" ... 45
10.5.1 Description ... 45
10.5.2 Characteristics ... 45
10.6 Sub-block "Interoperability layer" ... 46
10.6.1 Description ... 46
10.6.2 Characteristics ... 46
11 Block "System engineering process" ... 46
11.1 General ... 46
11.2 Composition ... 47
11.3 Qualifier ... 48
11.4 Sub-block "Agreement processes" ... 48
11.4.1 Description ... 48
11.4.2 Characteristics ... 48
11.5 Sub-block "Organizational project-enabling processes" ... 49
11.5.1 Description ... 49
11.5.2 Characteristics ... 49
11.6 Sub-block "Technical management processes" ... 49
11.6.1 Description ... 49
11.6.2 Characteristics ... 49

AVA Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

11.7 Sub-block "Technical processes" ... 50
11.7.1 Description ... 50
11.7.2 Characteristics ... 50
12 Block "Relevance to SM" ... 51
12.1 Composition ... 51
12.2 Qualifier ... 52
12.3 Characteristic "Relevance level" ... 52
12.4 Characteristic "Motivation" ... 52
13 Block "Validation" ... 52
13.1 Composition ... 52
13.2 Qualifier ... 53
13.3 Characteristics specification ... 53
Annex A (informative) Compilation of definitions of smart manufacturing ... 54
A.1 Objective ... 54
A.2 Definition ... 54
A.3 Complements to the definition ... 54
A.4 Vision ... 55
A.5 Difference from the manufacturing to date ... 56
A.6 New technologies for smart manufacturing ... 57
Annex B (informative) Life cycles ... 60
B.1 General ... 60
B.2 Product life cycle ... 60
B.3 Production system life cycle ... 62
B.4 Supply chain life cycle ... 64
B.5 Characteristic "RAMI4.0 Life cycle" ... 65
B.5.1 Description ... 65
B.5.2 Possible values ... 65
B.6 Characteristic "IMSA Life cycle" ... 66
B.6.1 Description ... 66
B.6.2 Possible values ... 66
Annex C (informative) Hierarchies ... 67
C.1 General ... 67
C.2 Characteristic "Equipment hierarchy" of IEC 62264-1 and IEC 61512-1 ... 67
C.2.1 Description ... 67
C.2.2 Possible values ... 67
C.3 Characteristic "Functional hierarchy" of IEC 62264-1 ... 68
C.3.1 Description ... 68
C.3.2 Possible values ... 68
C.4 Characteristic "SGAM Zones" ... 69
C.4.1 Description ... 69
C.4.2 Possible values ... 69
C.5 Characteristic "RAMI4.0 Hierarchy levels" ... 70
C.5.1 Description ... 70
C.5.2 Possible values ... 70
C.6 Characteristic "IMSA System hierarchy" ... 71
C.6.1 Description ... 71
C.6.2 Possible values ... 71
C.7 Mapping legacy hierarchies on the equipment hierarchy ... 71

AVA Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

C.8 Mapping on legacy hierarchies on the functional hierarchy ... 73
Annex D (informative) Interoperability ... 74
D.1 General ... 74
D.2 Big Picture characteristic "Interoperability barrier" ... 74
D.2.1 Description ... 74
D.2.2 Possible values ... 74
D.2.3 Comments ... 74
D.3 Characteristic "SGAM Interoperability Layers" ... 76
D.3.1 Description ... 76
D.3.2 Possible values ... 77
D.4 Characteristic "RAMI4.0 Layer" ... 78
D.4.1 Description ... 78
D.4.2 Possible values ... 78
D.5 Characteristic "IMSA Intelligent characteristics" ... 80
D.5.1 Description ... 80
D.5.2 Possible values ... 80
Annex E (informative) Big Picture history ... 82
Bibliography ... 85

Figure 1 – Principle of the SM2 Framework ... 12
Figure 2 – Example of populated SM2 Catalogue ... 13
Figure 3 – Example mapping of product catalogue data standards ... 15
Figure 4 – Example mapping structure for production system standards ... 16
Figure 5 – Example chart "Production system cube" with standard numbers ... 17
Figure 6 – Example chart "Production system cube" with short title ... 18
Figure 7 – Example 2D chart with standard numbers ... 19
Figure 8 – Example 2D chart with short title ... 20
Figure 9 – Product type life cycle ... 40
Figure 10 – GERA life cycle phases ... 42
Figure B.1 – Product type life cycle ... 60
Figure B.2 – Versions of a product type ... 61
Figure B.3 – Product type improvement ... 61
Figure B.4 – Product instance life time ... 62
Figure B.5 – Product instance and product type ... 62
Figure B.6 – Production system life cycle ... 63
Figure B.7 – The user and the external actors ... 63
Figure B.8 – From the design to maintenance ... 63
Figure B.9 – Spare component discontinued ... 64
Figure B.10 – Supply chain life cycle ... 64
Figure C.1 – RAMI4.0 Hierarchy ... 70
Figure D.1 – Grouping into interoperability layers ... 77
Figure E.1 – Standards landscape ... 82
Figure E.2 – History of the Big Picture project ... 84

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

Table 1 – Block "Identification": sub-blocks and characteristics 21
Table 2 – Block "Object": sub-blocks and characteristics 21
Table 3 – Block "Hierarchy": sub-blocks and characteristics 22
Table 4 – Block "Life cycle": sub-blocks and characteristics 22
Table 5 – Block "Interoperability": sub-blocks and characteristics 23
Table 6 – Block "System engineering process": sub-blocks and characteristics 23
Table 7 – Block "Relevance to SM": sub-blocks and characteristics 24
Table 8 – Block "Validation": sub-blocks and characteristics 24
Table 9 – Composition of the block "Identification" 25
Table 10 – Possible values of "Status" 26
Table 11 – Composition of the block "Object" 30
Table 12 – Characteristics of "Type of standard" 31
Table 13 – Characteristics of "Type of object" 32
Table 14 – Characteristics of "Manufacturing process type" 34
Table 15 – Composition of the block "Hierarchy" 35
Table 16 – Characteristics of "Equipment hierarchy" 35
Table 17 – Characteristics of "Functional hierarchy" 38
Table 18 – Composition of the block "Life cycle" 39
Table 19 – Characteristics of "Product type life cycle" 41
Table 20 – Characteristics of "Product instance life cycle" 41
Table 21 – Characteristics of "Production system life cycle" 42
Table 22 – Composition of the block "Interoperability" 43
Table 23 – Characteristics of "Interoperability approach" 44
Table 24 – Characteristics of "Interoperability concern" 45
Table 25 – Characteristics of "Interoperability layer" 46
Table 26 – Composition of the block "System engineering process" 47
Table 27 – Characteristics of "Agreement processes" 48
Table 28 – Characteristics of "Organizational project-enabling processes" 49
Table 29 – Characteristics of "Technical management processes" 50
Table 30 – Characteristics of "Technical processes" 51
Table 31 – Composition of the block "Relevance to SM" 52
Table 32 – Possible values of "Relevance level" 52
Table 33 – Composition of the block "Validation" 53
Table B.1 – Possible values of "RAMI4.0 Life cycle" 65
Table B.2 – Possible values of "IMSA Life cycle" 66
Table C.1 – Possible values of "Equipment hierarchy" 67
Table C.2 – Possible values of "Functional hierarchy" 68
Table C.3 – Possible values of "SGAM Zones" 69
Table C.4 – Possible values of "RAMI4.0 Hierarchy level" 70
Table C.5 – Possible values of "IMSA System hierarchy" 71
Table C.6 – Mapping on legacy hierarchies on the equipment hierarchy 72
Table C.7 – Mapping on legacy hierarchies on the equipment hierarchy 73
Table D.1 – Possible values of "Interoperability barrier" 74

AVA Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

Table D.2 – Interoperability categories defined by GWAC 76
Table D.3 – Possible values of "SGAM Interoperability Layers" 77
Table D.4 – Possible values of "RAMI4.0 Layer" 78
Table D.5 – Possible values of "IMSA Intelligent characteristics" 81

Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

SMART MANUFACTURING STANDARDS MAP (SM2) –

Part 1: Framework

FOREWORD

1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
2) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC and ISO National bodies.
3) IEC and ISO documents have the form of recommendations for international use and are accepted by IEC and ISO National bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC and ISO documents is accurate, IEC and ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC and ISO National bodies undertake to apply IEC and ISO documents transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC and ISO document and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC and ISO do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC and ISO marks of conformity. IEC and ISO are not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this document.
7) No liability shall attach to IEC and ISO or their directors, employees, servants or agents including individual experts and members of its technical committees and IEC and ISO National bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this ISO/IEC document or any other IEC and ISO documents.
8) Attention is drawn to the Normative references cited in this document. Use of the referenced publications is indispensable for the correct application of this document.
9) Attention is drawn to the possibility that some of the elements of this ISO/IEC document may be the subject of patent rights. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

This document has been prepared by IEC systems committee SM: Smart Manufacturing, in collaboration with ISO technical committee 184: Automation systems and integration.

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

Draft	Report on voting
SyCSM/42/DTR	SyCSM/46/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 ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs.

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

In this document, the following print types are used.

– The font colour of the committee mandatory characteristics is red.

– The font colour of the committee conditional characteristics is purple.

A list of all parts in the ISO/IEC 63306 series, published under the general title *Smart Manufacturing Standards Map (SM2)*, can be found on the IEC and ISO websites.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

INTRODUCTION

International and regional standards developing organizations (SDOs), as well as consortia and national initiatives, identified the need for clarifying the standards landscape of thousands of publications related to manufacturing in general and more specifically to smart manufacturing.

On this matter, the "Big Picture" project initiated by ISO/TC 184 "Automation systems and integration" in 2001 is notable. It resulted in the publication of ISO/TR 23087:2018 [1][1].

The other important contributions are:

– NISTIR 8107, Current Standards Landscape for Smart Manufacturing Systems [2], 2016;
– VDI/VDE and ZVEI, Reference Architecture Model Industrie 4.0 (RAMI4.0) [3], 2015;
– final report of ISO/TMB Strategic Advisory Group Industry 4.0/Smart manufacturing, 2016.

The Smart Manufacturing Standards Map (SM2) project was initiated by ISO and IEC in order to provide a credible, central, and neutral repository of information about standards related to smart manufacturing.

NOTE Standards is a generic term covering international and national standards, specifications, technical reports, technical specifications, white papers and other similar deliverables provided by standards developing organizations (SDO) or consortia.

The goals of this project are to provide a systematic and reliable classification method (vocabulary and catalogue), and in the future a central repository with visualization tools for sorting, classifying and comparing standards.

These tools are intended to support SDOs, their officers and experts in the following tasks:

– identify standards that apply to their own domain;
– examine the main features of selected standards;
– generate comparisons between the relative positioning of different standards in their domain or other domains.

These tools should also serve standards users in the following tasks:

– identify the relevant standards for their activity;
– evaluate their activity in terms of the standards and the standardization projects;
– build their product development roadmap in accordance with the standards landscape.

These tools and the information contained in the repository are updated frequently to reflect new standards and the need for new ways to characterize standards as technology advances.

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

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

© ISO/IEC 2020

SMART MANUFACTURING STANDARDS MAP (SM2) –

Part 1: Framework

1 Scope

This document describes the framework and the vocabulary that are used for the development of entries in the Smart Manufacturing Standards Map Catalogue. These enable the mapping and linking of standards and standard projects related to various aspects of smart manufacturing (product, production, supply chain, industrial services …).

The framework applies to international standards, de facto standards and consortium specifications; publications or projects; thereafter named "standards".

The framework part (Clauses 4) briefly describes the principle of structuring the standards catalogue and its use for analysing the standards landscape.

The vocabulary part (Clauses 5 to 13) specifies the characteristics that are used for the classification of standards.

NOTE The vocabulary is not universal but is the best effort to name the concepts used in different domains.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

4 Principle of the Smart Manufacturing Standards Map (SM2)

4.1 Framework

The framework for the Smart Manufacturing Standards Map (SM2) enables the standardization stakeholders to identify, for each concerned standard, the characteristics related to its potential role and the impact of its use in the industry. These characteristics are defined in the SM2 Vocabulary.

Figure 1 shows the principle of this framework.

Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020

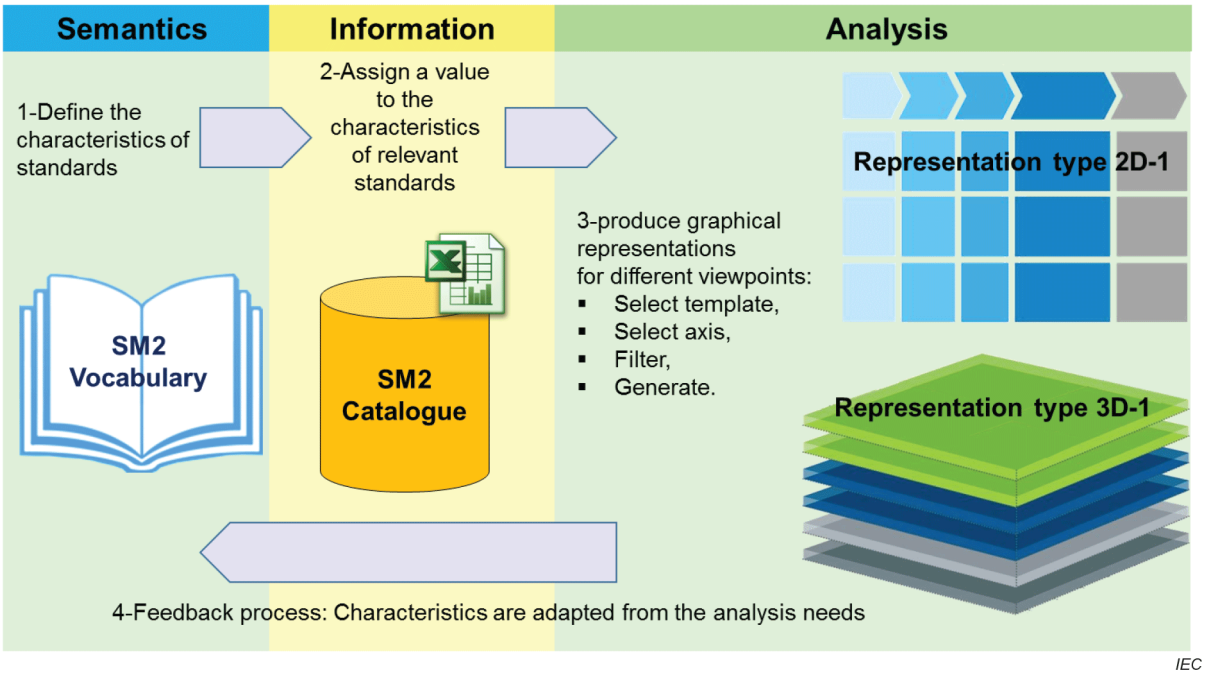

Figure 1 – Principle of the SM2 Framework

4.2 SM2 Catalogue

In the SM2 Catalogue, relevant standards and standardization projects are depicted in terms of the characteristics (properties of standards) organized in blocks and sub-blocks of characteristics as described in this document.

NOTE The reference model for the Smart Manufacturing Standards Map is based on ISO/TR 23087:2018 [1], which is intended to monitor the consistency of the published standards and the current or future standardization projects (see Annex E).

Each characteristic has a format, possible values and a qualifier.

The qualifier specifies which entity is expected to provide the value for the characteristic.

From the filtering of the SM2 Catalogue, different graphical representations can be built to facilitate understanding of the issues and decision making.

Figure 2 shows an example of a populated SM2 Catalogue.

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

Identification								
Reference			Title		Standard number	Status	Standard title	
Hierarchy	Equipment hierarchy	Enterprise			IEC 61158-2	Publication	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	Publication
		Facility						
		Station						
		Device						
	Functional hierarchy	Connected world			ISO 18629	Publication	Industrial automation systems and integration – Process specification language – Part 1: Overview and basic principles, Part 11: PSL core, Part 12: Outer core, Part 13: Duration and ordering theories, Part 14: Resource theories, Part 41: Definitional extension: Activity extensions, Part 42: Definitional extension: Temporal and state extensions, Part 43: Definitional extension: Activity ordering and duration extensions	Publication
		Business (L4)						
		Operations management (L3)						
		Control (L2)						
		Sensors and actuators (L1)						
		Process (L0)						
		Product						
Life cycle	Product type life cycle	Marketing			ISO/IEC 27000	Publication	Information technology – Security techniques – Information security management systems – Overview and vocabulary	Publication
		Development						
		Sales						
		Obsolescence support						
	Product instance life cycle	Manufacturing						
		Transport & stock						
		Use						
		Disposal						
	Production system life cycle	Concept						
		Design						
		Implementation						
		Use						
		Retirement						
Interoperability	Interop. approach	Integration						
		Federation						
		Unification						
	Interoperability concern	Business						
		Process						
		Service						
		Data						
	Interoperability layer	Business						
		Function						
		Information						
		Communication						
		Resources						

Standard number	Enterprise	Facility	Station	Device	Connected world	Business (L4)	Operations management (L3)	Control (L2)	Sensors and actuators (L1)	Process (L0)	Product	Marketing	Development	Sales	Obsolescence support	Manufacturing	Transport & stock	Use	Disposal	Concept	Design	Implementation	Use	Retirement	Integration	Federation	Unification	Business	Process	Service	Data	Business	Function	Information	Communication	Resources
IEC 61158-2	-	-	1	1	-	-	-	1	1	1	1	-	1	-	-	1	-	1	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	1	1
ISO 18629	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	1	1	1	-
ISO/IEC 27000	1	-	?	?	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	1

IEC

Figure 2 – Example of populated SM2 Catalogue

Documents
Document Sharing Hub

4.3 Graphical representations

The standard mapping is necessarily linked with graphical representations that are essential for a human understanding.

Different graphical representations can be generated from the SM2 Catalogue. The type of graphical representation depends on the viewpoint that is selected for the investigation of stakeholder concerns.

For example, system integrators are typically involved in the production system life cycle and therefore need to consider the various product type life cycles. A representation as shown in Figure 3 can assist system integrators in the analysis of the relevant product catalogue data standards by showing in which phases of the life cycle(s) these standards can be used.

Figure 4 shows a possible structure for the mapping of relevant production system standards, along the axes "Interoperability layers", "Production system life cycle" and "Functional hierarchy".

The generation of graphical charts may be based on templates (like "Cube" or "2D Chart") and the configuration of chart parameters.

For example, in Figure 5, a 3D template was selected, and only standard numbers of international standards are displayed while in Figure 6 short titles are displayed.

In Figure 7 and Figure 8, a 2D template option display is selected; the search options selected are process instruments ec@talogue and ISO and IEC standards. In Figure 7, the display option standard number is selected, while in Figure 8 the standard short title option is selected.

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

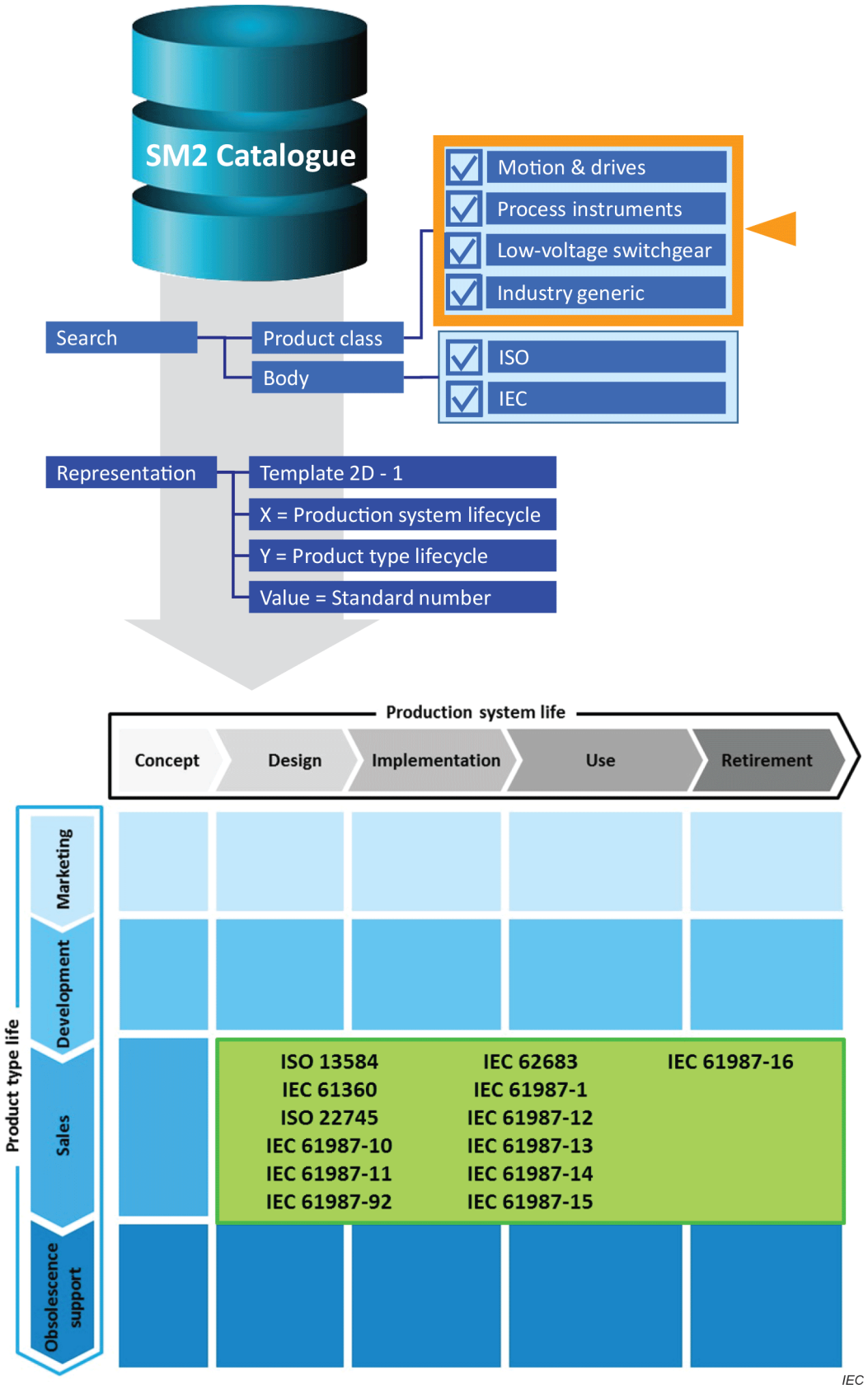

Figure 3 – Example mapping of product catalogue data standards

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

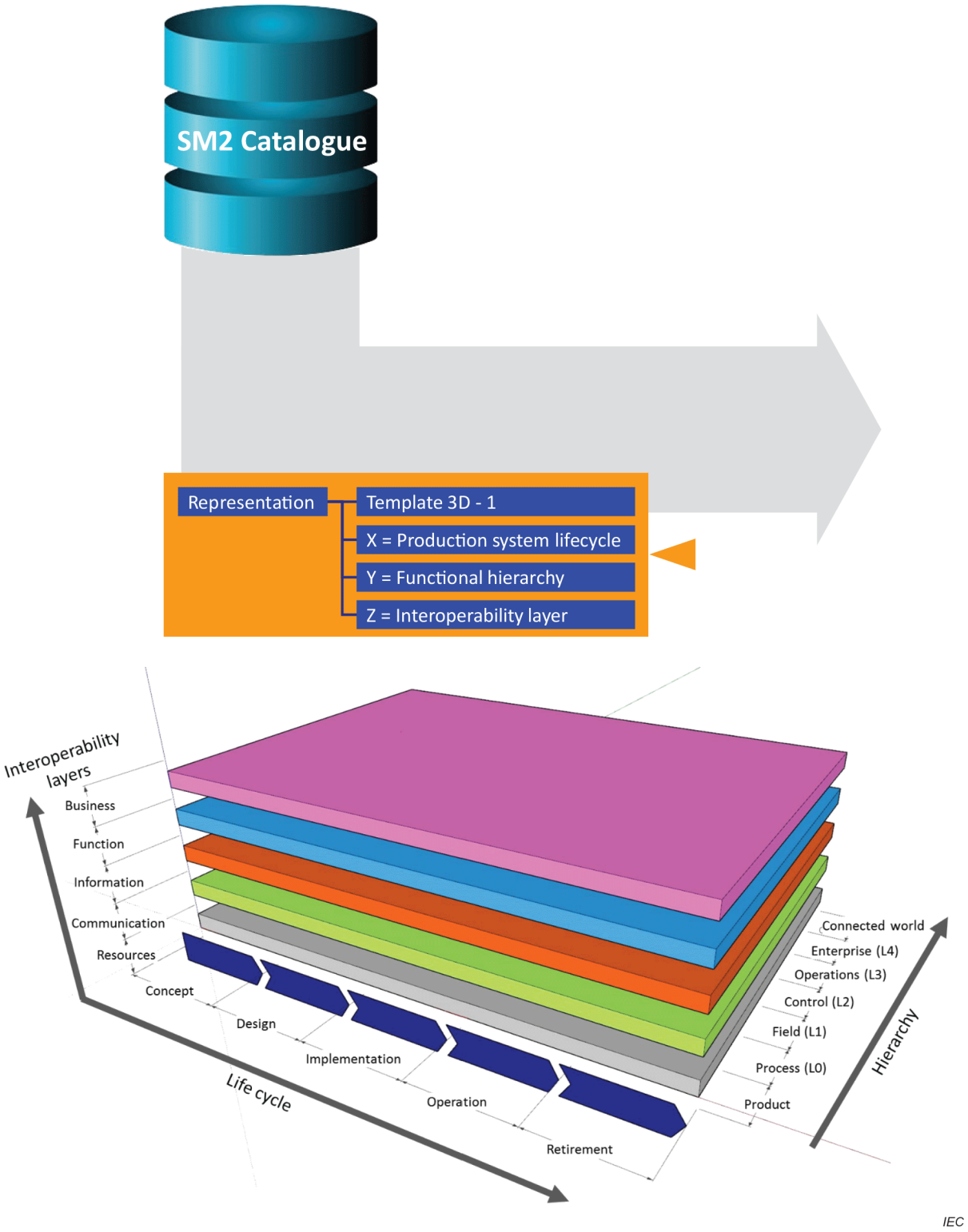

Figure 4 – Example mapping structure for production system standards

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

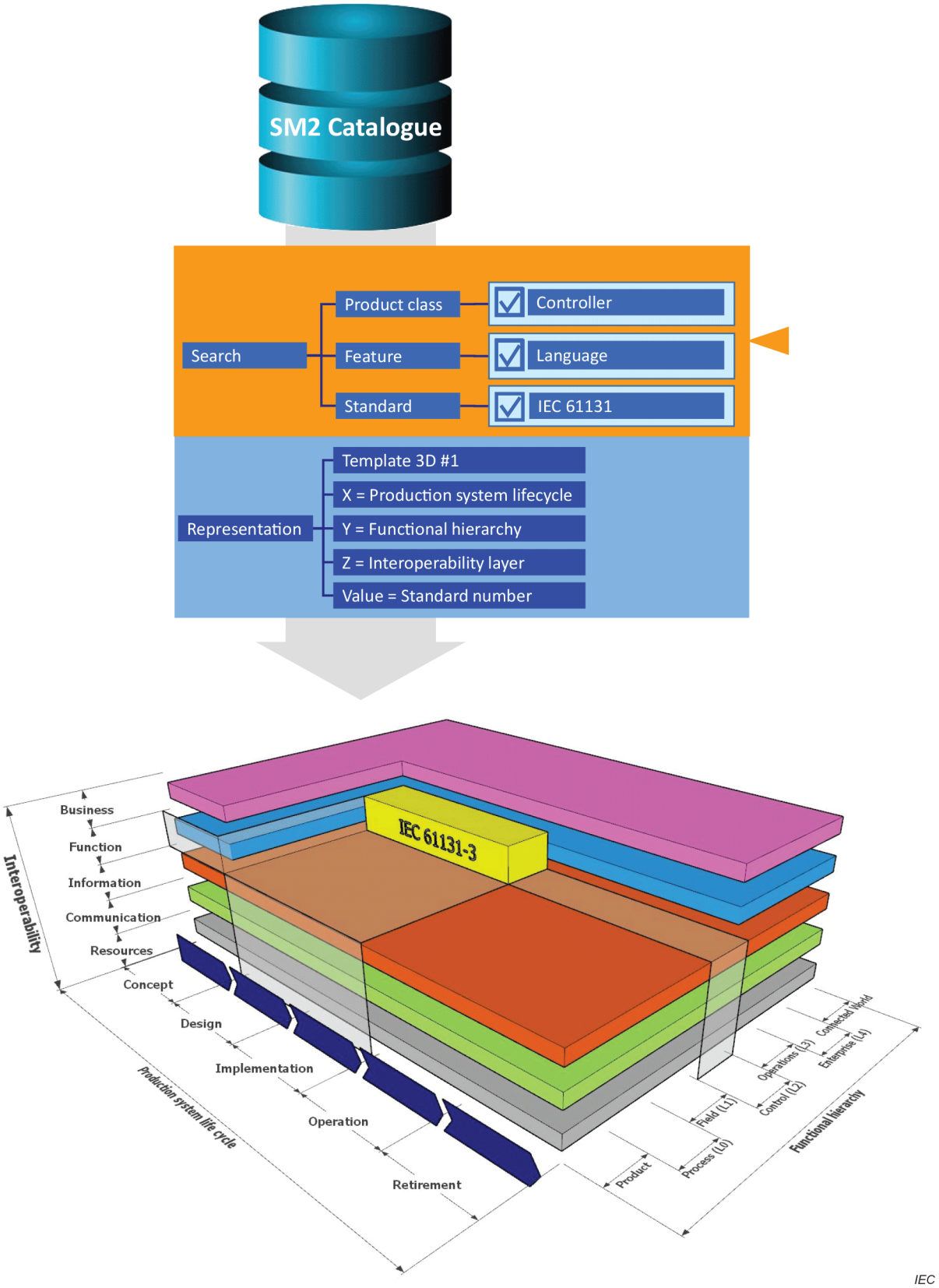

Figure 5 – Example chart "Production system cube" with standard numbers

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

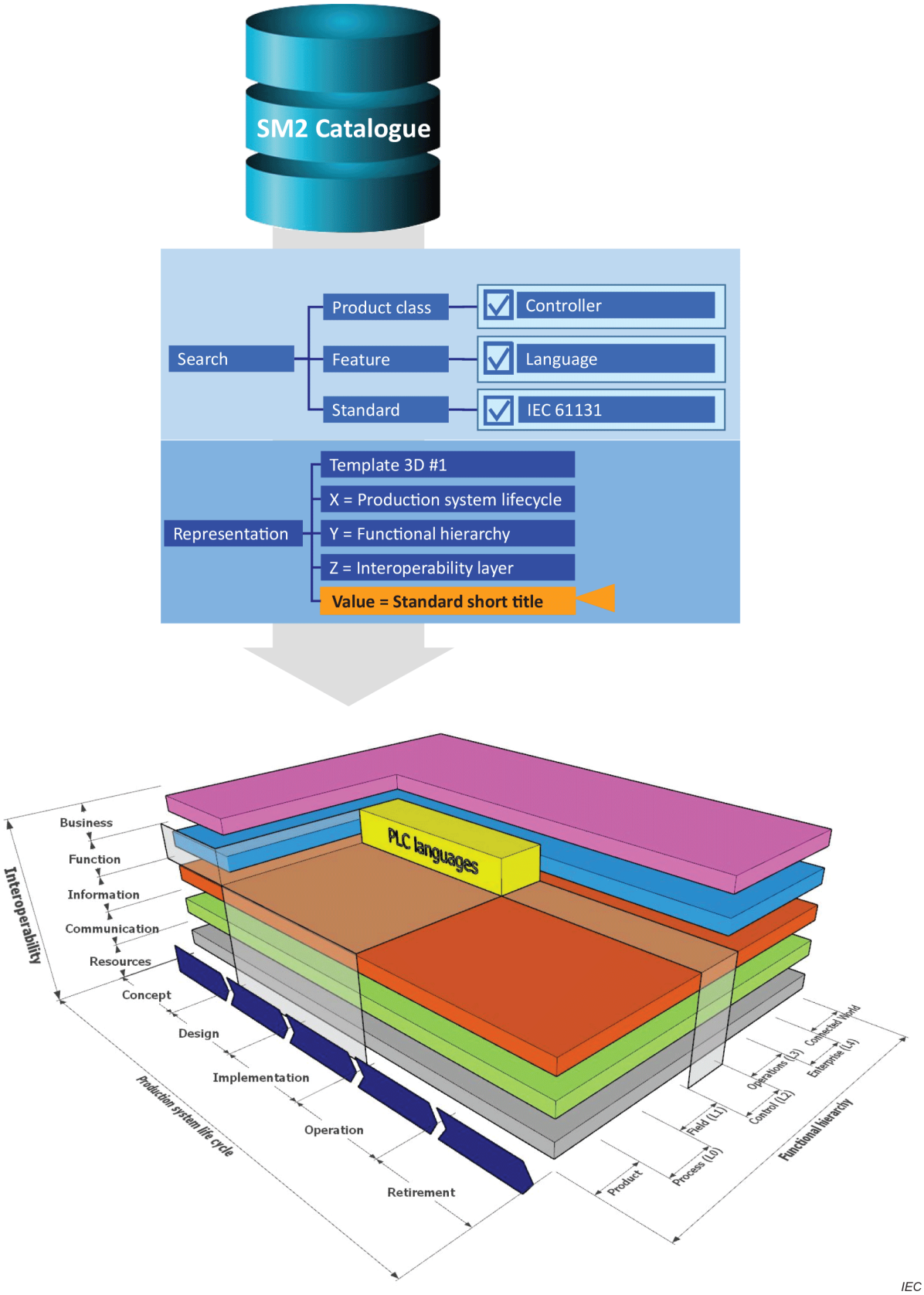

Figure 6 – Example chart "Production system cube" with short title

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

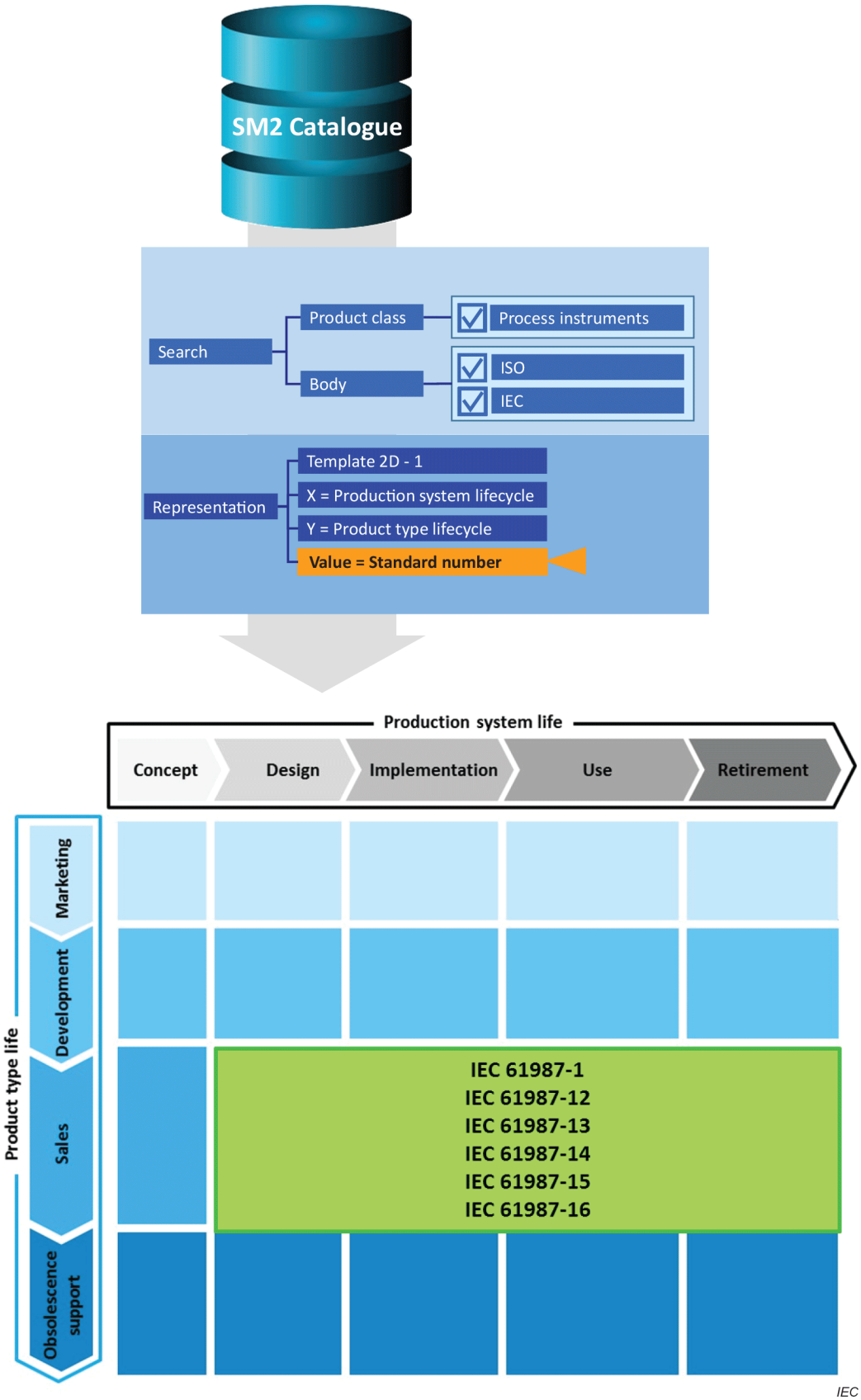

Figure 7 – Example 2D chart with standard numbers

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

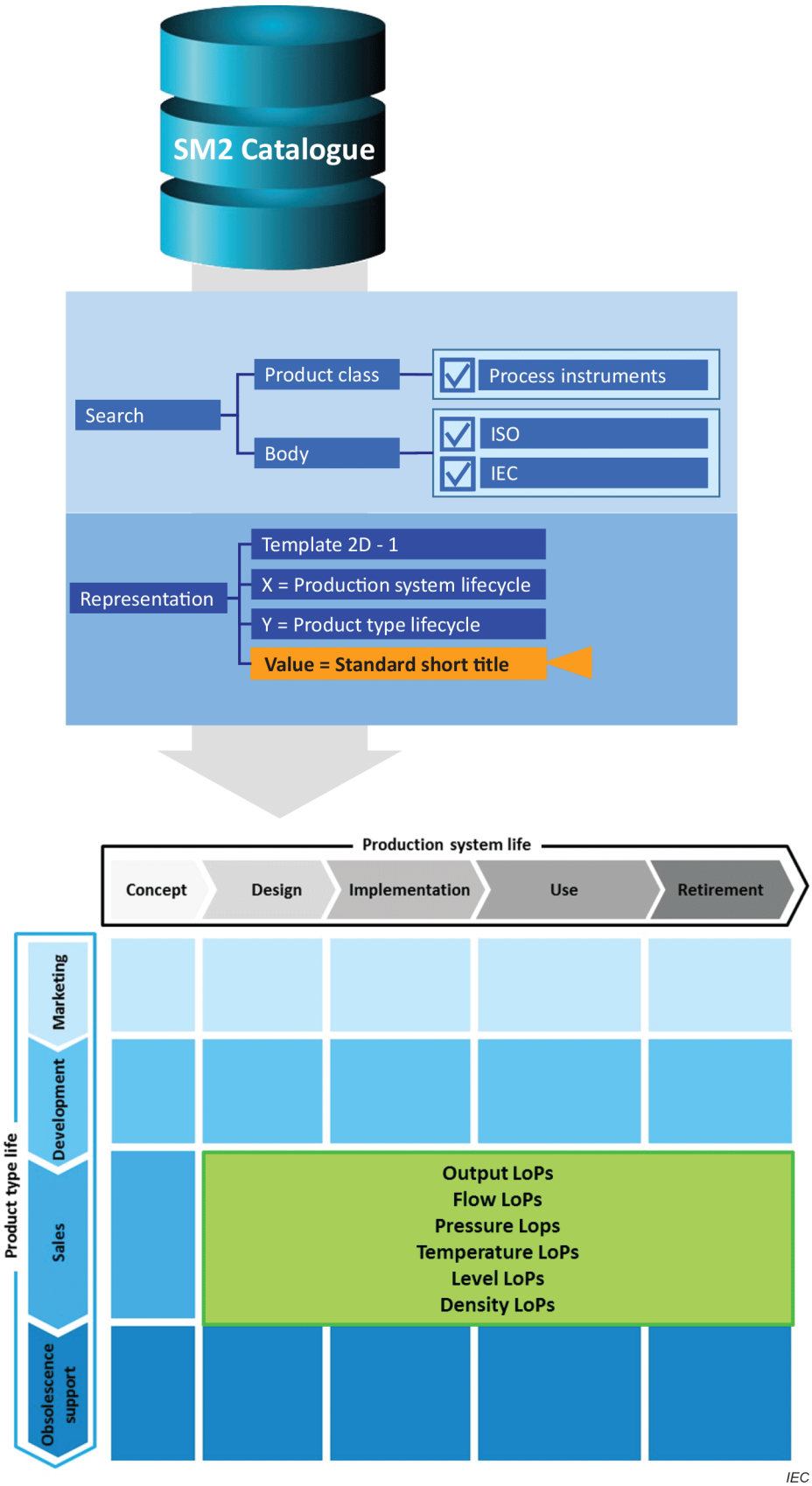

Figure 8 – Example 2D chart with short title

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

5 Overview of the SM2 Vocabulary

5.1 Summary of characteristics and blocks

The classification scheme uses the term "block" to indicate a top-level classifier and "sub-block" as a second level classifier for characteristics.

NOTE The term "block" is adopted from IEC 61360:2017 [4].

Table 1 to Table 8 depict this classification. This structure is used for the SM2 Catalogue. The following clauses (Clause 6 to Clause 13) specify the block, sub-block, characteristics and their attributes (data type, possible values and qualifier).

Table 1 – Block "Identification": sub-blocks and characteristics

Block	Sub-block	Characteristic
Identification	Reference	Status
		Standard number
	Publication	Edition
		Publication date
	Project	Project number
		Forecast publication date
	Owner	Organization
		Committee number
		Committee title
	ICS	International Classification for Standards
	Title	Standard title
		Standard short title

Table 2 – Block "Object": sub-blocks and characteristics

Block	Sub-block	Characteristic
Object	Type of standard	Basic standard
		Terminology standard
		Testing standard
		Product standard
		Process standard
		Service standard
		Interface standard
		Data standard
	Type of object	Product
		Production system
		Enterprise
		Personnel
	Manufacturing process type	Batch
		Discrete
		Continuous

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

Table 3 – Block "Hierarchy": sub-blocks and characteristics

Block	Sub-block	Characteristic
Hierarchy	Equipment hierarchy	Enterprise
		Facility
		Station
		Device
	Functional hierarchy	Connected world
		Business (L4)
		Operations management (L3)
		Control (L2)
		Sensors and actuators (L1)
		Process (L0)
		Product

Table 4 – Block "Life cycle": sub-blocks and characteristics

Block	Sub-block	Characteristic
Life cycle	Product type life cycle	Marketing
		Development
		Sales
		Obsolescence support
	Product instance life cycle	Manufacturing
		Transport and stock
		Use
		Retirement
	Production system life cycle	Concept
		Design
		Implementation
		Use
		Retirement

Documents
Document Sharing Hub
Full document details: PD ISO/IEC TR 63306-1:2020

Table 5 – Block "Interoperability": sub-blocks and characteristics

Block	Sub-block	Characteristic
Interoperability	Interoperability approach	Integration
		Federation
		Unification
	Interoperability concern	Business
		Process
		Service
		Data
	Interoperability layer	Business
		Function
		Information
		Communication
		Resources

Table 6 – Block "System engineering process": sub-blocks and characteristics

Block	Sub-block	Characteristic
System engineering process	Agreement processes	Acquisition process
		Supply process
	Organizational project-enabling processes	Life cycle model management process
		Infrastructure management process
		Portfolio management process
		Project management process
		Human resource management process
		Quality management process
		Knowledge management process
	Technical management processes	Project planning process
		Project assessment and control process
		Decision management process
		Risk management process
		Configuration management process
		Information management process
		Measurement process
		Quality assurance process
	Technical processes	Business or mission analysis process
		Stakeholder needs and requirements definition process
		System requirements definition process
		Architecture definition process
		Design definition process
		System analysis process
		Implementation process
		Integration process
		Verification process
		Transition process

AVA Documents
Document Sharing Hub

Block	Sub-block	Characteristic
		Validation process
		Operation process
		Maintenance process
		Disposal process

Table 7 – Block "Relevance to SM": sub-blocks and characteristics

Block	Sub-block	Characteristic
Relevance to SM		Relevance level
		Motivation

Table 8 – Block "Validation": sub-blocks and characteristics

Block	Sub-block	Characteristic
Validation		Responsible person
		Checked
		Check date
		Warning
		Comment

5.2 Values of the characteristics

The data type of a characteristic value can be:

– Boolean,
– string (sequence of alphanumeric characters expressing meaningful text),
– enumeration (selection of a value from a fixed list of options),
– date (yyyy-mm or yyyy-mm-dd).

In the catalogue, the Boolean type is displayed:

– "1" for value 1,
– "-" for value 0.

Any value can be additionally displayed:

– blank (empty) if the value of the characteristic was not evaluated by the owner,
– "?" if the owner could not evaluate the characteristic.

All the characteristics of the blocks Object, Hierarchy, Life cycle, Interoperability and System engineering process have a Boolean data type.

5.3 Qualifier

The qualifier specifies which entity is expected to provide the value for the characteristic.

The qualifier can be:

– committee mandatory characteristic: The characteristic value is provided by the project/publication owner technical committee (TC, SC, ...);

AVA Documents
Document Sharing Hub

– committee conditional characteristic: The characteristic value is provided by the project/publication owner technical committee (TC, SC, ...) only for certain values of another characteristic;
– committee optional characteristic: The characteristic value is provided by the project/publication owner technical committee (TC, SC, ...);
– SDO characteristic: The characteristic value is provided by the project/publication owner SDO;
– administrative characteristic: The characteristic value is used for the management of the catalogue by the standards map organization.

NOTE The font colour of the committee mandatory characteristics is red. The font colour of the committee conditional characteristics is purple.

6 Block "Identification"

6.1 Composition

Table 9 describes the composition of the block "Identification".

Table 9 – Composition of the block "Identification"

Block	Sub-block	Characteristic	Characteristic data type, possible values and example	Qualifier
Identification	Reference	Status	Enumeration: publication, project, both	SDO characteristic
		Standard number	String EXAMPLE IEC 62264-1	
	Publication	Edition	String EXAMPLE 2.0	
		Publication date	Date (yyyy-mm) EXAMPLE 2015-05	
	Project	Project number	String EXAMPLE IEC 62264-1 Ed. 3.0	
		Forecast publication date	Date (yyyy-mm) EXAMPLE 2017-05	
	Owner	Organization	String EXAMPLE ISO	
		Committee number	String EXAMPLE ISO/TC 184/SC 4	
		Committee title	String EXAMPLE Industrial data	
	ICS	International Classification for Standards	String EXAMPLE 25.040.40-35.240.50	
	Title	Standard title	String EXAMPLE Enterprise-control system integration	
		Standard short title	String EXAMPLE 1 IEC CDD EXAMPLE 2 FDT	Committee optional characteristic

6.2 Qualifier

All characteristics of the block "Identification" except the "Standard short title" are SDO characteristics.

The characteristic "Standard short title" is committee optional.

AVA Documents
Document Sharing Hub

Full document details: PD ISO/IEC TR 63306-1:2020