

Close collaboration IEC/SC 3D with eCl@ss to increase user experience on SEMANTIC master data dictionaries

Gernot ROSSI
IEC/SC 3D Secretary

2019-09-18 / V01

What can you expect during the next 35 min?

Table of content

- + SEMANTIC in general use by humans
- + What is a SEMANTIC master data dictionary?
- + Why is a SEMANTIC master data dictionary enabling DIGITALIZATION and INDUSTRIE 4.0?
- + Introduction of the two important SEMANTIC master data dictionaries: IEC CDD and eCl@ss
- + Future collaboration between IEC CDD and eCl@ss
- + **How does this collaboration increase the user experience?**
- + Take away
- + Further information

Forum II

"Close collaboration IEC SC3D with eCl@ss to increase user experience on SEMANTIC master data dictionaries"

Gernot Rossi
Technology & Innovation
Management
Siemens AG

Human interaction can be a problem...



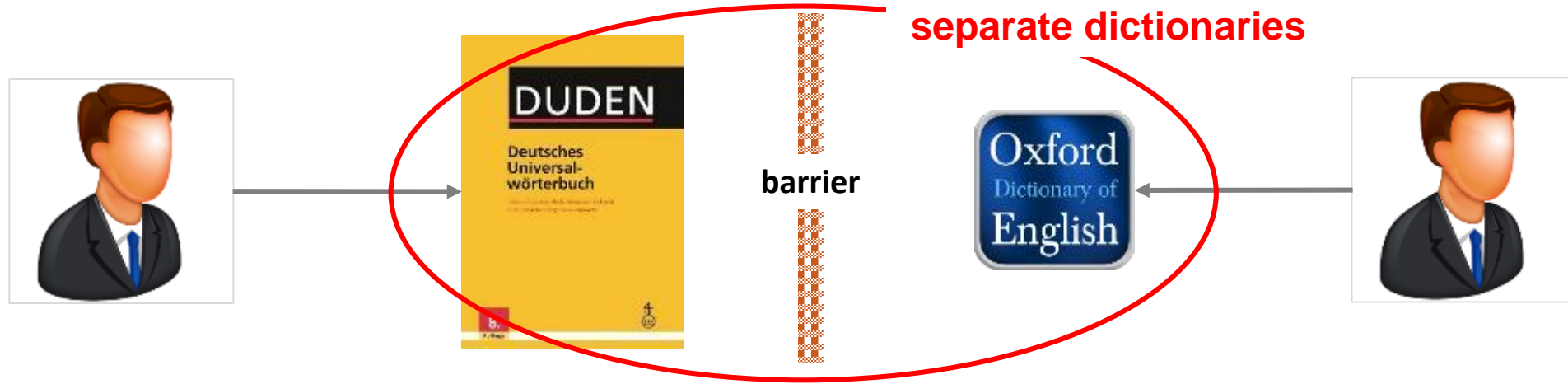
Als ich gestern nach Hause kam, lag ein Zettel - geschrieben von meiner Freundin - mit folgender Anweisung auf dem Tisch: "Komme um 20.15 Uhr nach Hause. Stell um 19.30 Uhr den großen Topf auf Stufe 4, um 19.45 Uhr den kleinen auf Stufe 5." Hab ich dann gemacht... War auch wieder nicht richtig... 😞😞😞

22:10



Meine Frau schreibt mir eine SMS: „In der Küche stehen Kartoffeln. Schäle bitte die Hälfte und stelle sie auf den Herd“

SEMANTIC in general (daily) use by humans



Wie geht es Ihnen?

??? ☹️

What did you say?

??? ☹️

SEMANTIC in general (daily) use by humans



Wie geht es Ihnen?



How are you?

Thx. How are you?

Danke gut! Und wie geht es Ihnen?

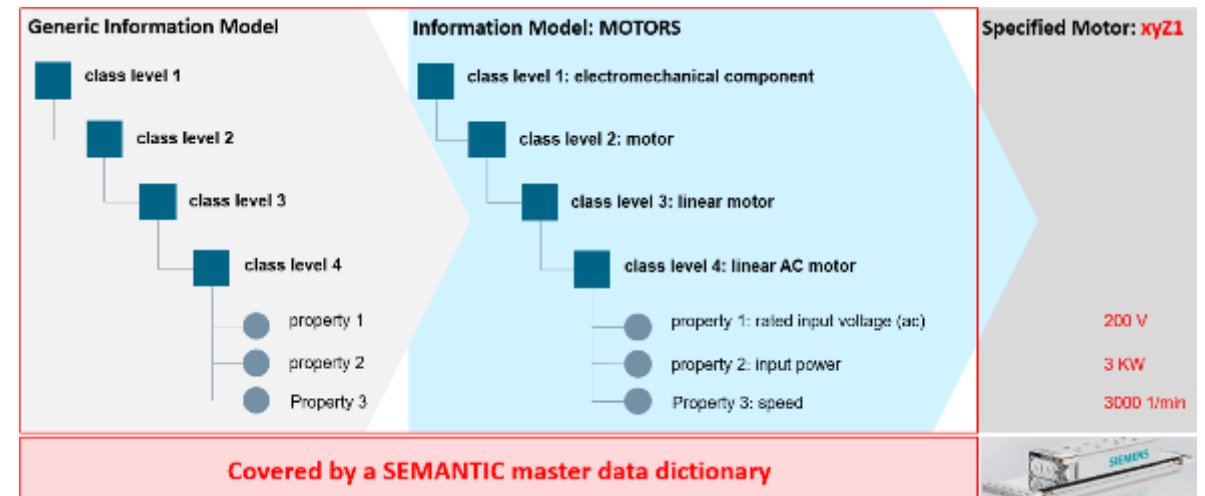
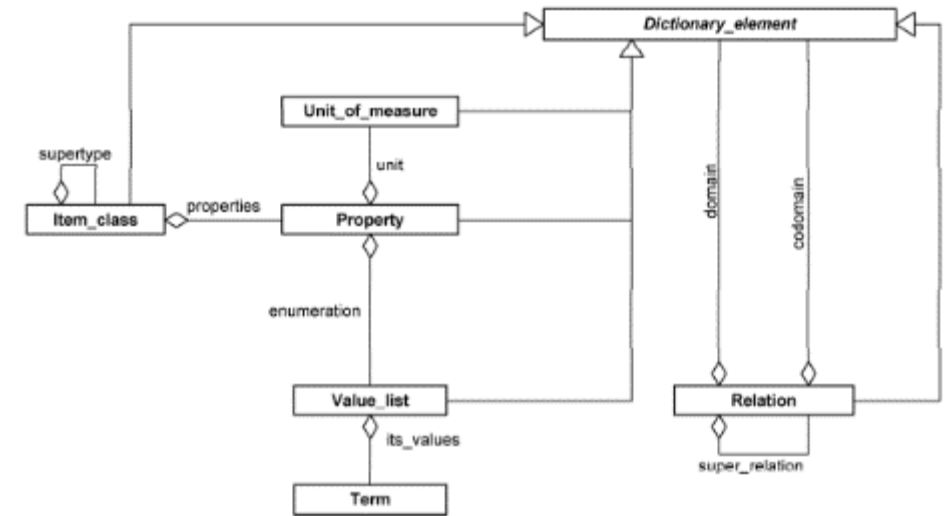


SEMANTIC in general (daily) use by humans

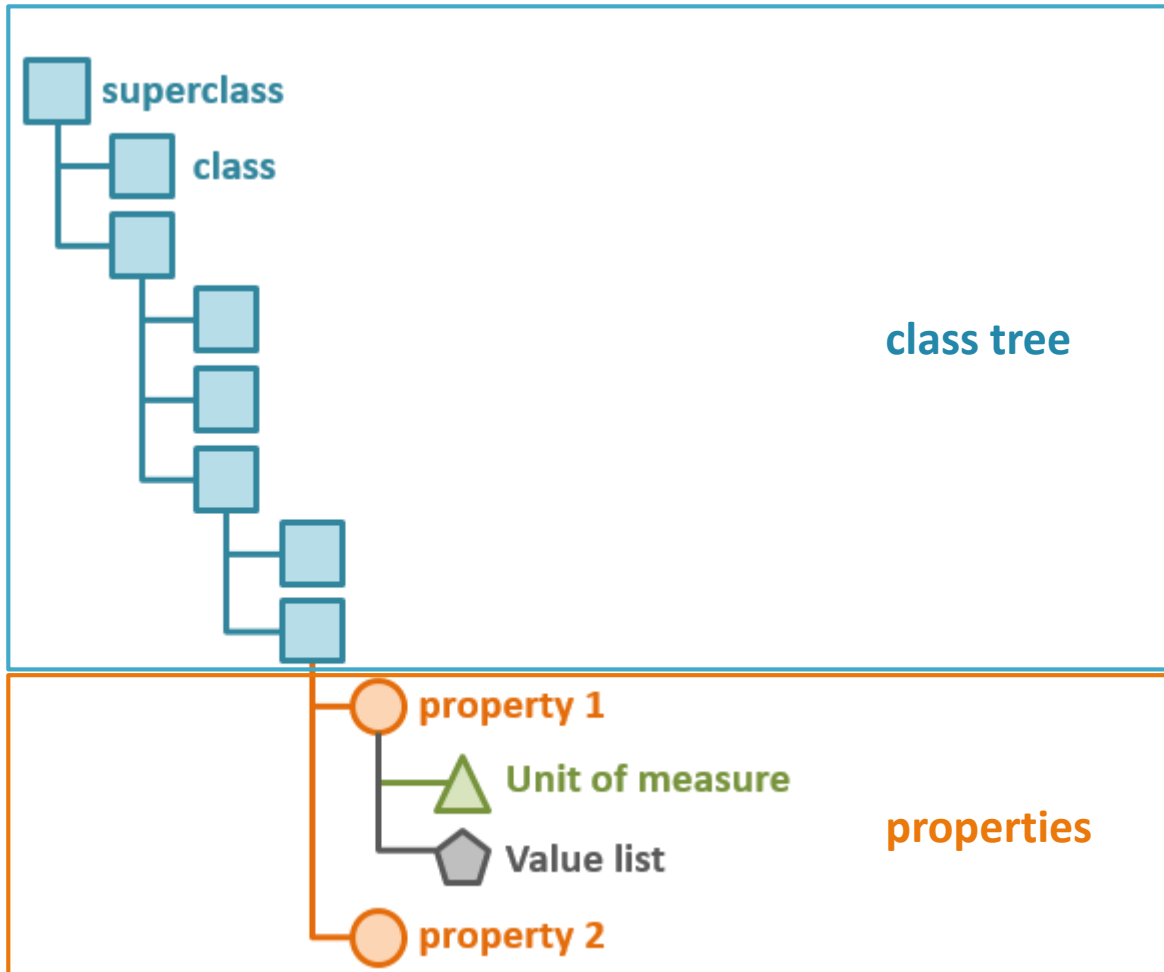


What is a SEMANTIC master data dictionary?

- A SEMANTIC master data dictionary provides data structures (based on an information model) to describe a product with its properties in a machine readable, unique form
- The two SEMANTIC master data dictionaries IEC CDD and eCI@ss are sharing the harmonized information model:
 - + IEC CDD is based on IEC 61360
 - + eCI@ss is based on ISO 13584-42
- SEMANTIC master data dictionaries are providing only data structures. Based on these data structures the SEMANTIC DATA for a specific product are created by the manufacturer or user.



The information model (IEC 61360 or ISO 13584-42) with the class tree and properties in “explorer view”



Each **property** has attributes like **CODE/IRDI**, **Version/Revision**, **(Preferred) NAME**, **DEFINITION**, **UNIT OF MEASURE**, **VALUE (LIST)**, etc.

Code:	0112/2///61360_4#AAE184
Version:	001
Revision:	05
IRDI:	0112/2///61360_4#AAE184#001
Preferred name:	rated input voltage (ac)
Synonymous name:	
Symbol:	U _{ac}
Synonymous symbol:	
Short name:	U_ac
Definition:	nominal rms alternating voltage at the terminals of an ac motor
Note:	For polyphase supply, the line voltage is intended.
Remark:	
Primary unit:	V
Alternative units:	
Level:	nom
Data type:	LEVEL(NOM) OF REAL_MEASURE_TYPE
Format:	NR3..3.3ES2
Definition source:	IEC 60034-1 (9.1) (1983)

Why is a SEMANTIC master data dictionary enabling DIGITALIZATION and INDUSTRIE 4.0?

- ➕ INTEROPERABILITY is one of the key enablers for digital transformation and SEMANTIC DATA are essential to enable INTEROPERABILITY
- ➕ SEMANTIC master data dictionary provide the necessary data structures (based on an information model) for SEMANTIC DATA in machine readable, unique and understandable form



Figure 1 - Facets of IoT interoperability

Source: ISO/IEC WD 21823-1:2017

Table 1 - Summary of different facets of Internet of Things interoperability

Facets	Aim	Objects	Requirements	Examples
Transport	Technically secure data transfer	Physical connections Signals	Protocols of data transfer	HTTP/S, MQTT
Syntactic	Receiving data in an understood format	Data	Standardized data exchange formats	JSON, XML, ASN.1
Semantic data	Receive data using an understood data information model	Programmatic interface	Common interpretation of data information model	Directories, data keys, ontologies
Behavioural	Obtain expected outcomes to interface operations	Information	Behavioural model(s) of the invoked IoT entity	UML models, pre and post conditions, constraint specifications
Policy	Assurance that interoperating systems follow applicable regulatory and organizational policies	Regulatory and organizational polices and interoperation context	Conditions and control for use and access	Security policies of IoT system stakeholders, restriction on cross-border data transfer, Regulations controlling PII

How is an information model used for SEMANTIC DATA and classification?

Example: Web shop

classes

classes

The screenshot shows a web shop interface for women's shoes. At the top, there are navigation tabs for 'WOMEN', 'MEN', and 'KIDS'. Below these are categories like 'Style Notes', 'New Arrivals', 'Clothing', 'Shoes', 'Sports', 'Accessories', 'Premium', 'Brands', and 'Sale'. A search bar is labeled 'Search Zalando'. On the left, a sidebar lists shoe categories: Ankle Boots, Boots, Trainers, Heels, Flats & Lace-Ups, Ballet Pumps, Outdoor Shoes, Flip Flops & Beach Shoes, Mules & Clogs, Sandals, Slippers, and Sports Shoes. The main content area features a large banner for 'SHOES' with various shoe images. Below this are three smaller sections: 'STREET STYLE', 'CLASSIC', and 'TRENDY'. At the bottom, there is a filter section for 'Women's Shoes' with dropdown menus for Brand, Colour, Price, Size, Material, Collection, New products, Discount, Pattern, Heel height, Type of heel, Toe, and Fastener. Annotations in red and blue highlight specific parts of the interface.

WOMEN MEN KIDS

Style Notes New Arrivals Clothing Shoes Sports Accessories Premium Brands Sale Search Zalando

Women / Shoes

Shoes

- › Ankle Boots
- › Boots
- › Trainers
- › Heels
- › Flats & Lace-Ups
- › Ballet Pumps
- › Outdoor Shoes
- › Flip Flops & Beach Shoes
- › Mules & Clogs
- › Sandals
- › Slippers
- › Sports Shoes

SHOES

STREET STYLE ›

CLASSIC

SHOP NOW ›

TRENDY ›

Women's Shoes

Brand Colour Price Size Material Collection

New products Discount Pattern Heel height Type of heel Toe

Fastener

Introduction of the two important master data dictionaries: IEC CDD and eCl@ss

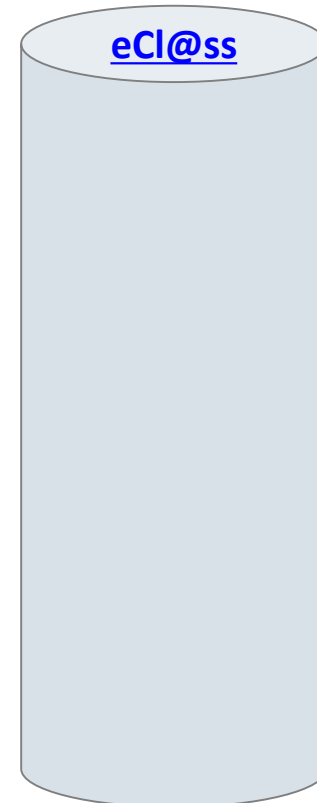


Common repository [based on intern. standards]

IEC SC3D IEC61360-4 Electric/Electronic components	
IEC SC3D IEC62720 UNITS	
IEC SC65E IEC61987 Process automation	
IEC SC121A IEC62683 Low voltage switchgear	
IEC TC65 Industrial-process measurement, control and automation	
IEC TC59 Household and similar electrical appliances	
ISO TC131 Fluidics	
ISO TC172 Optics and photonics	
ISO TC29 Cutting Tools	
IEC TC85 Measuring equipment for electrical quantities	
ISO TC184 SC4 Industrial data	
IEC TC2 Electrical machines/motors	
IEC TC22 Power converters/inverters	



Domain/Company repository [based on consortia standards]



- 27 Electric engineering, automation, process control engineering ⓘ
- 27-01 Generator
- 27-02 Electrical drive
- 27-03 Transformer, converter, coil
- 27-04 Power supply devices
- 27-05 Accumulator, battery
- 27-06 Cable, wire
- 27-07 Medium voltage switchgear, system
- 27-08 High voltage switchgear, system
- 27-09 Power quality management
- 27-10 Network control technology
- 27-11 Lighting installation, device
- 27-12 Substation automation
- 27-13 Protection installation, device (electric)
- 27-14 Electrical installation, device
- 27-15 Analysis technology, device
- 27-16 Overhead line technology
- 27-18 Electrical cabinet, housing, rack
- 27-20 Measurement technology, process measurement technology
- 27-21 Signal processing
- 27-22 Actuator (fitting)
- 27-23 Process control system (PCS)
- 27-24 Control
- 27-26 Component (electronic)
- 27-27 Binary sensor technology, safety-related sensor technology ⓘ
- 27-28 Identification
- 27-29 Pneumatics
- 27-30 Hydraulics
- 27-31 Image analysis
- 27-32 Industrial weighing technology
- 27-33 Display and control component ⓘ
- 27-37 Low-voltage switch technology ⓘ
- 27-38 Robotics, Assembly
- 27-39 Property, access monitor
- 27-40 Electrical insulation and connecting material
- 27-42 Electronic coil and filter
- 27-43 Cable, pipe, hose laying (electric installation)
- 27-44 Connector system

Comparison of fundamental structures for the two master data dictionaries IEC CDD and eCl@ss



IEC CDD (maintained by IEC/SC 3D)

- + Information-model according to IEC 61360
- + Class tree is structured by standards
- + Unlimited class levels; 1st level class is called domain
- + Classification by SDOs based on international (ISO or IEC) standards → Responsible: TCs/SCs
- + Share common aspects/features within IEC 61360-4

International Electrotechnical Commission
IEC 61360 - Common Data Dictionary (CDD)

Domain:

- Electric/electronic components (IEC 61360-4)
- Process automation (IEC 61987 series)
- Low voltage switchgear (IEC 62683 series)

eCl@ss (maintained by eCl@ss e.V.)

- + Information-model according to ISO 13584-42
- + Class tree is structured by technical areas
- + 4 class levels: 3 classification classes + application class
- + Classification by EG (Expert Groups) based on consortia standards → Responsible: EGs
- + eCl@ss BASIC not appropriate for reference repository

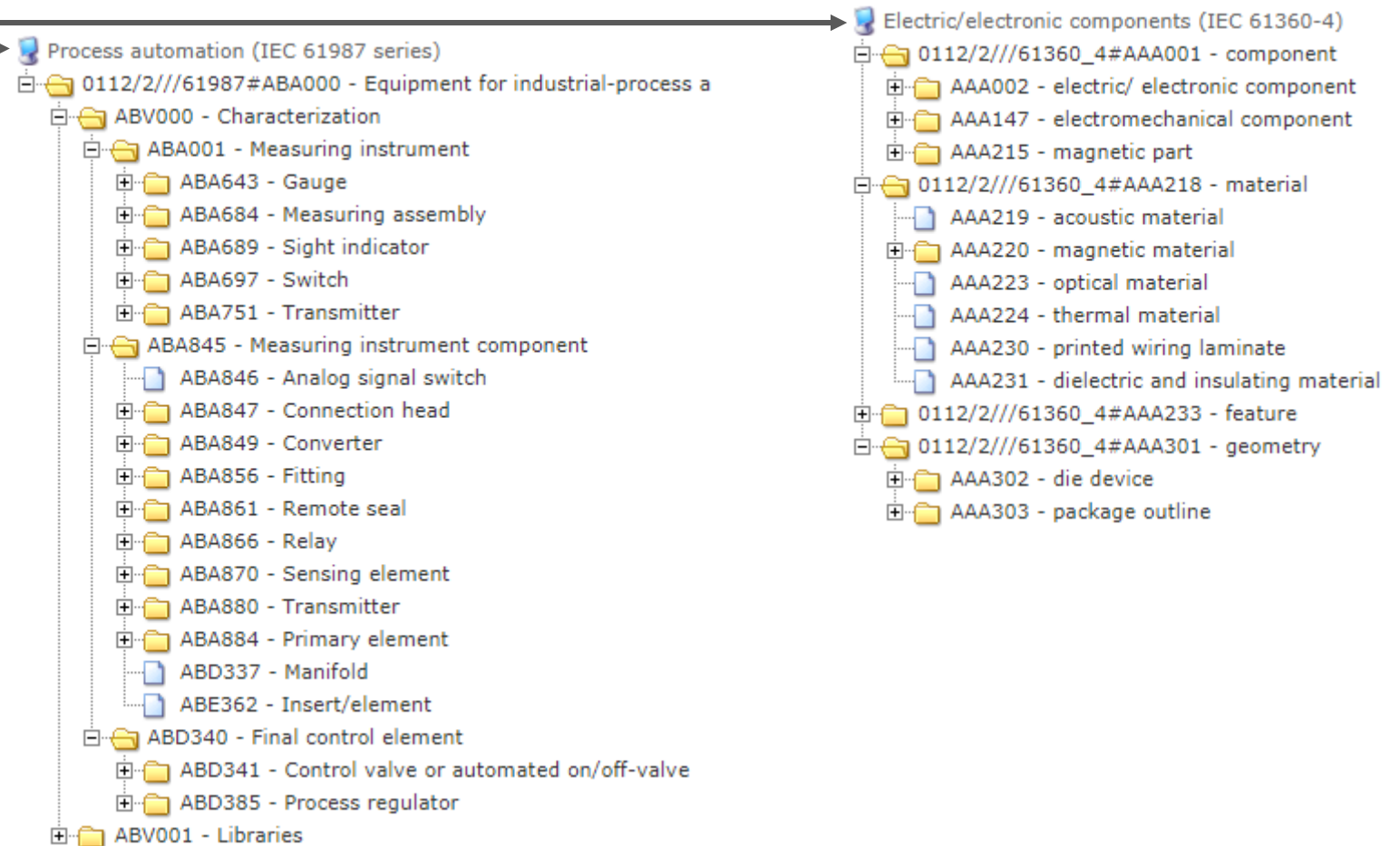
eCl@ss Version 10.1 (en)

- 20 Packing material
- 21 Manufacturing facility, workshop equipment, tool
- 22 Construction technology
- 23 Machine element, fixing, mounting **i**
- 24 Office product, facility and technic, papeterie
- 25 General service
- 26 Energy, extraction product, secondary raw material and residue
- 27 Electric engineering, automation, process control engineering **i**
- 28 Automotive technology
- 29 Home economics, Home technology

IEC CDD: Data structures (so-called **CONTENT**) available

Electric/electronic components (IEC 61360-4)
 Process automation (IEC 61987 series)
 Low voltage switchgear (IEC 62683 series)
 Units of measurement (IEC 62720)

Stand: 09.2019

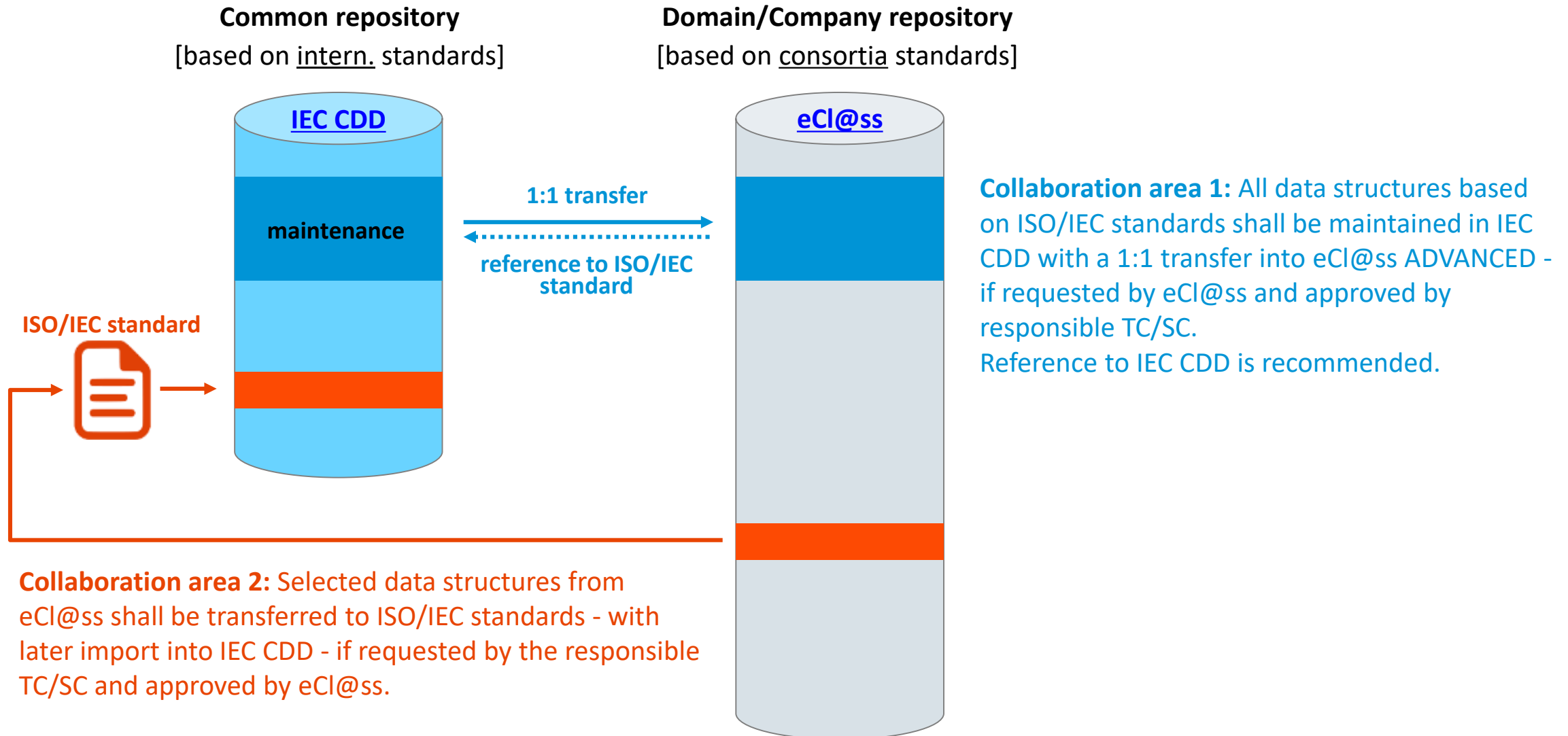


CONTENT derives from

- ⊕ IEC side (based on IEC standards) → processed by IEC/SC 3D
- ⊕ ISO side (based on ISO standards) → processed by ISO/IEC JWG24 (JWG between IEC/SC 3D and ISO/TC 184/SC 4)

Future collaboration between IEC CDD and eCl@ss

(based on liaison IEC/SC 3D with eCl@ss)



How does the future collaboration between IEC CDD and eCl@ss increase the user experience?



Benefits for the users

- ⊕ High quality DATA STRUCTURES created and maintained by ISO/IEC TCs (with support by IEC/SC 3D) based on international consensus with the broad community of ISO/IEC experts
→ Reliable DATA STRUCTURES
- ⊕ Accelerated closing of gaps for DATA STRUCTURES in IEC CDD and eCl@ss to support the urgent needs of users in INDUSTRIE 4.0 applications
→ Fully support of DATA STRUCTURES for all products and services in INDUSTRIE 4.0
- ⊕ Identical DATA STRUCTURES in IEC CDD and eCl@ss, if based on ISO/IEC standards
→ Internationally accepted
- ⊕ Download and re-use of DATA STRUCTURES from IEC CDD and eCl@ss
→ No need for users to decide where to download the DATA STRUCTURES
- ⊕ Flexible/Accelerated new DATA STRUCTURES can be developed and downloaded via eCl@ss
→ eCl@ss is the preferred master data dictionary for accelerated DATA STRUCTURES

Take away

- ⊕ Is IEC CDD or eCl@ss offering **DATA STRUCTURES** for your products and services?
→ If not, please contact the eCl@ss office or IEC/SC 3D
- ⊕ Is your company already offering **SEMANTIC DATA** for your products and services?
→ If not, please be aware that these **SEMANTIC DATA** are required to enable **INDUSTRIE 4.0**
- ⊕ Do you need further information?
→ See a selection of further information on the next slide

Further information

A selection of further information on SEMANTIC master data dictionaries, SEMANTIC DATA, SEMANTIC interoperability and classification

- ⊕ For the management and decision makers in SMEs:
VDMA-Leitfaden “Interoperabilität durch standardisierte Merkmale” (Deutsch; English under preparation)
- ⊕ For managements, experts and developers:
IEC White Paper “Semantic interoperability - Challenges in the digital transformation age” (English)
- ⊕ For INDUSTRIE 4.0 experts:
“Details of the Asset Administration Shell (AAS) / Part 1 - The exchange of information between partners in the value chain of Industrie 4.0” (Deutsch; English)
- ⊕ LINK to IEC CDD: <https://cdd.iec.ch>
- ⊕ LINK to eCl@ss: <https://eclass.eu>