



# Asset Administration Shell and IEC 61987

**Overview Presentation**

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Andreas Schüller – YNCORIS

Online, 15. November 2023

# Agenda

1. What is the Asset Administration Shell?
2. Why is the AAS alone insufficient?
3. IEC 61987
4. Platforms for Data Exchange

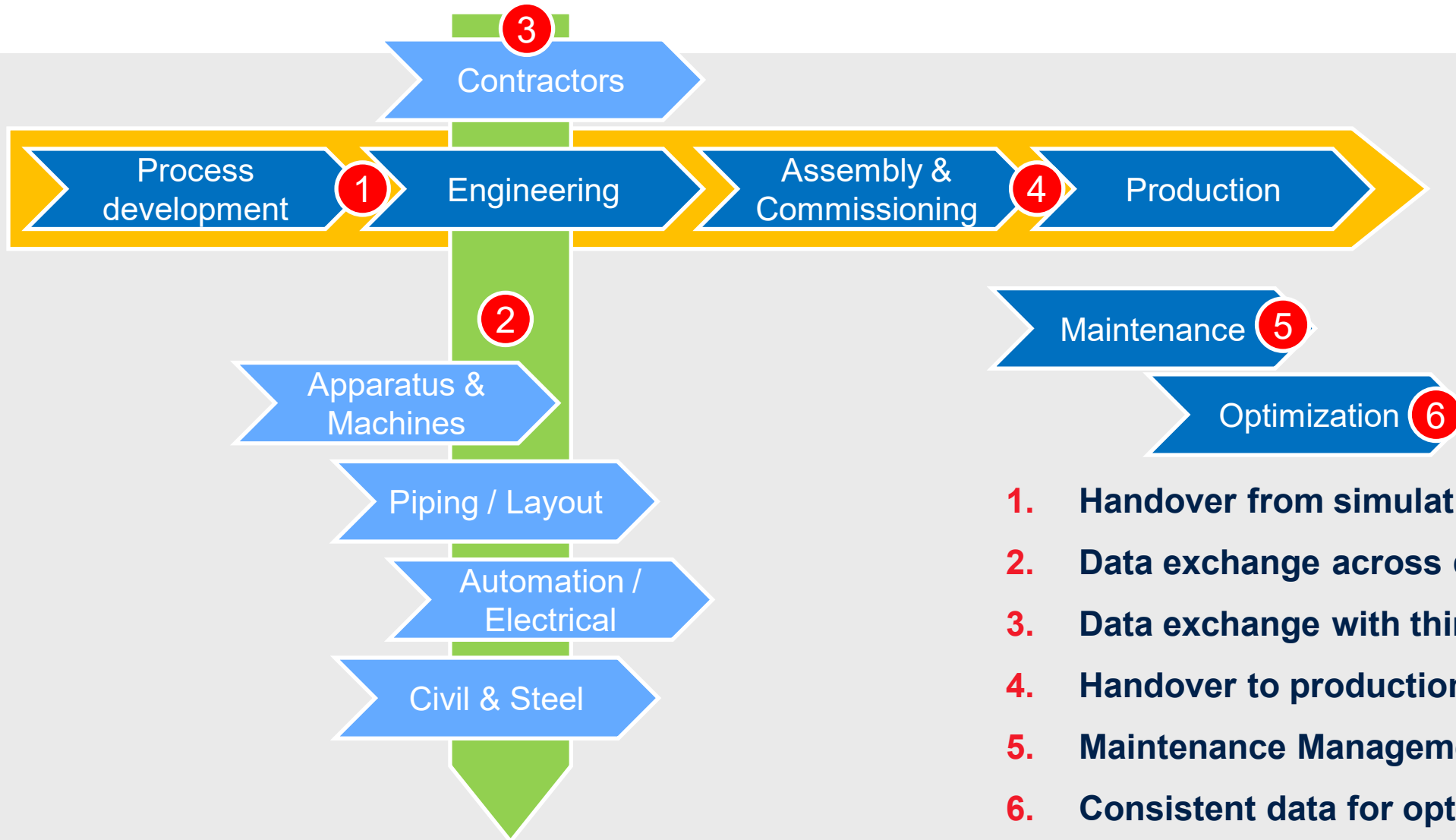




01

# What is the Asset Administration Shell (AAS)?

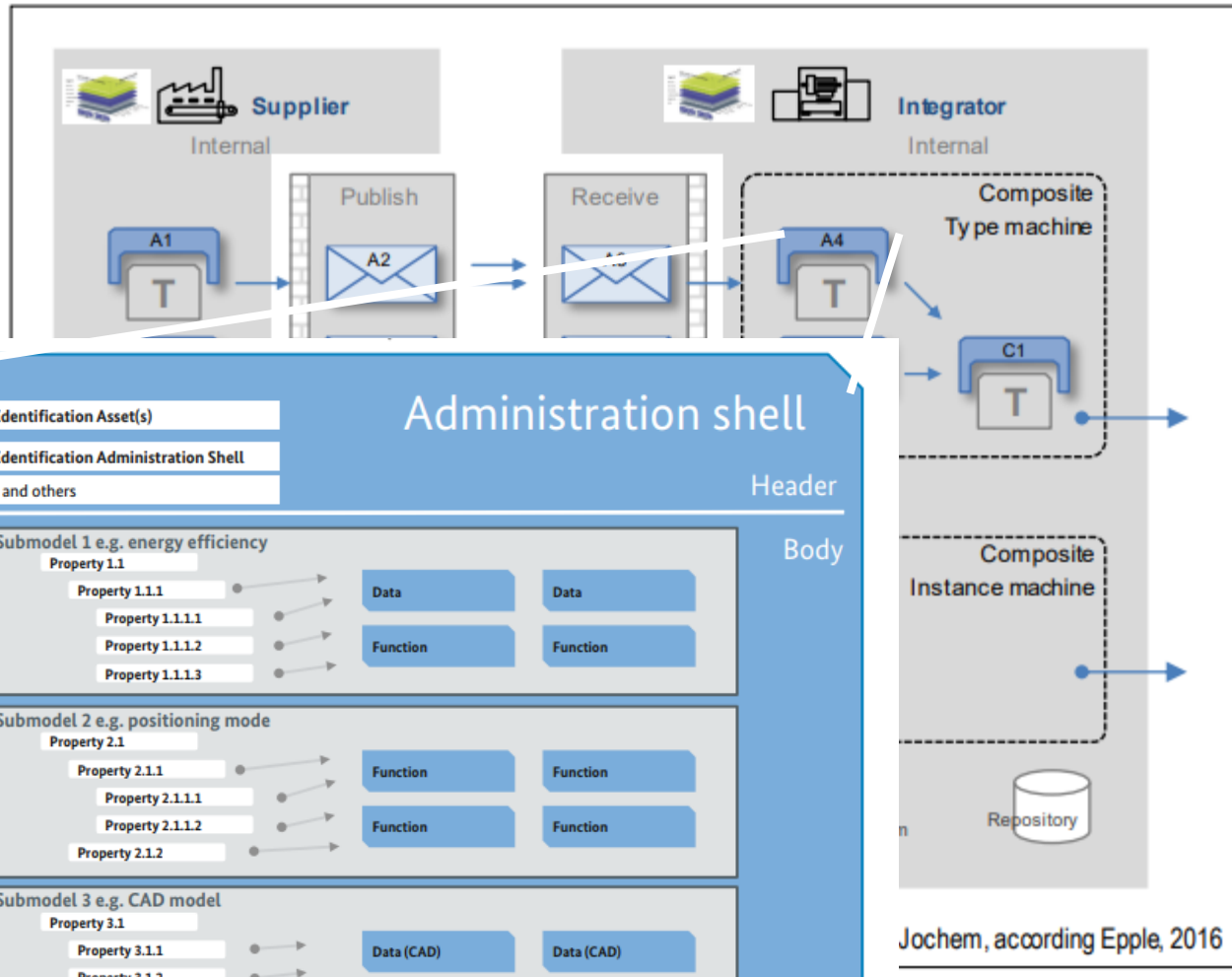
# Interfaces and handover along the Asset Lifecycle



1. Handover from simulation to CAE
2. Data exchange across disciplines
3. Data exchange with third parties
4. Handover to production
5. Maintenance Management
6. Consistent data for optimization

[acc. Otten, Grüner]

# Asset Administration Shell – Solution?



The Structure of the Administration Shell

The Asset Administration Shell (AAS) is a meta model

It helps to create technical implementations of information models

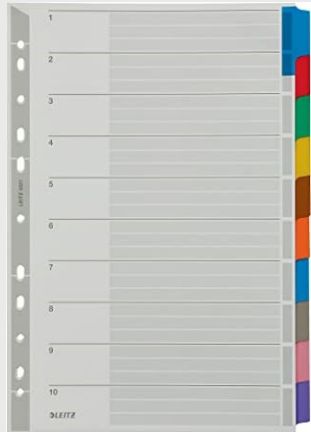
Information is stored in submodels

These submodels have to be standardized

Jochem, according Epple, 2016

Industry 4.0, 2020-11-23

# Analogies



**Asset**

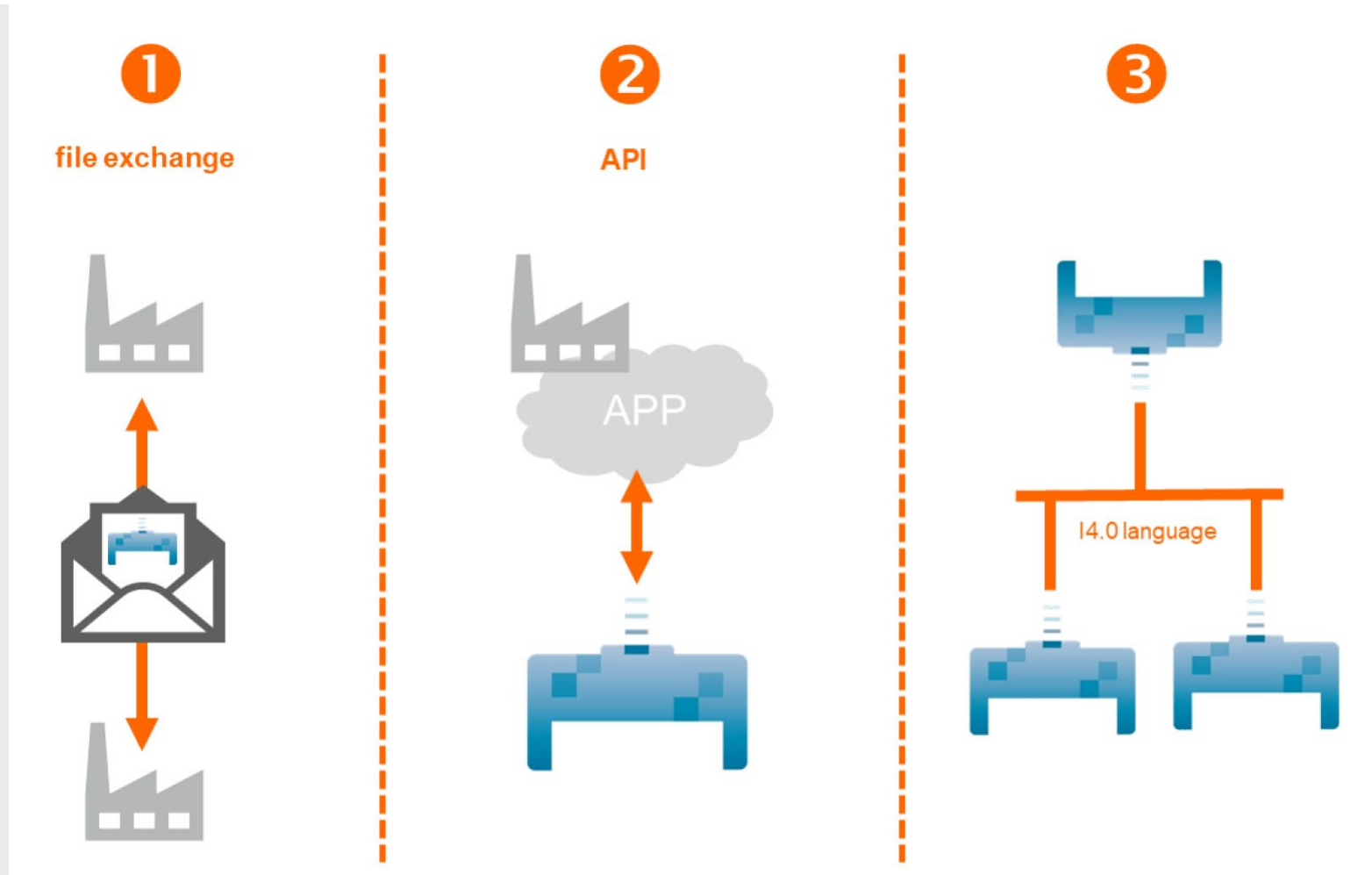
**Administration**

**Shell (AAS)**

**Attributes + Structure**

**Submodel**

# Types of AAS



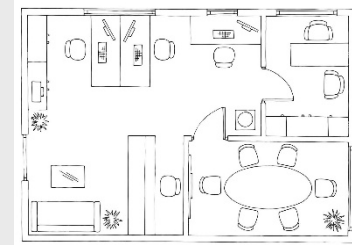
Source: Plattform Industrie 4.0 – Details of the Asset Administration Shell Part 2

02

# Why is the AAS alone insufficient?



# What Problem is solved by the AAS?



The measures of the folder are known

The carpenter is able to produce the file cabinet

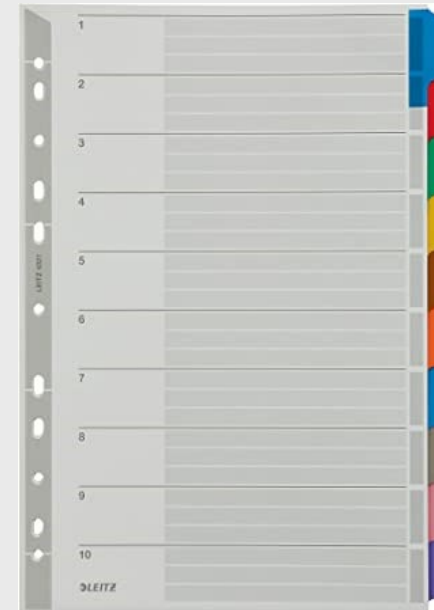
The Architect can set up the office

- **The Asset Administration Shell defines a Meta Model**
- **Using the Meta Model Software that supports the relevant interfaces can be developed**
- **The interface is reusable and there is no need to reconfigure**
- **The specification is publically available and usable**

# Which Problems remain Open?



- What are the relevant folder types?
- What is the structure of folders?
- How can folders be standardized?



# Industrial Digital Twin Association



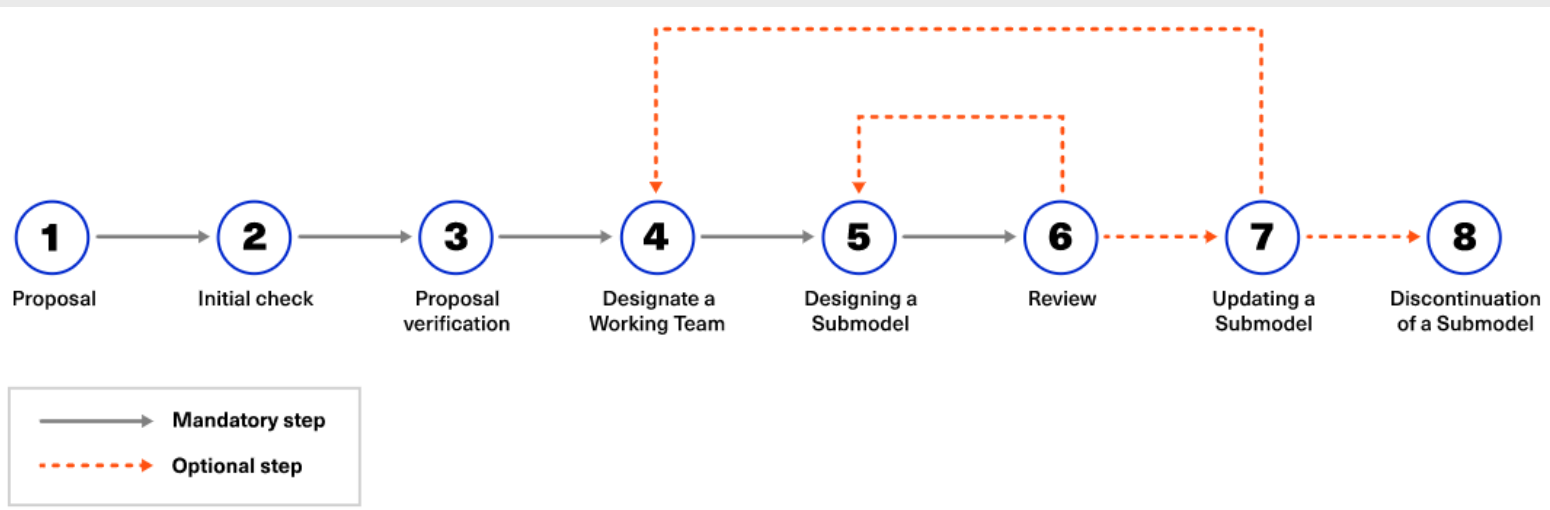
„Als IDTA fungieren wir als zentraler Anlaufpunkt für alle Interessengruppen. Wir stellen die notwendigen Spezifikationen für die Asset Administration Shell bereit und erstellen und harmonisieren die Teilmodelle für den Industriellen Digitalen Zwilling in das Big Picture.“

**As IDTA, we act as a central point of contact for all stakeholders. We provide the necessary specifications for the Asset Administration Shell and create and harmonise the sub-models for the Industrial Digital Twin into the Big Picture.**



Anzahl unserer  
Teilmodelle:

**30**



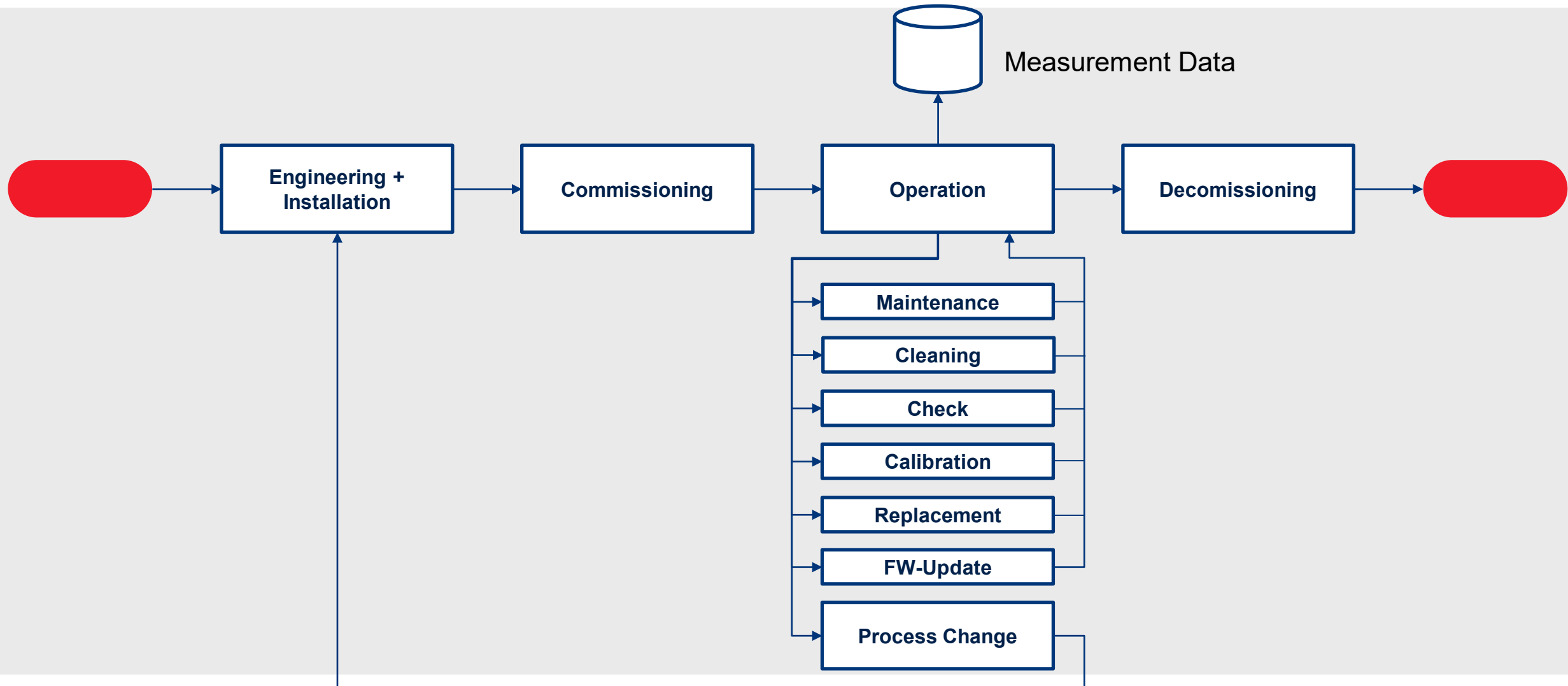
Stand: September 2022

<https://industrialdigitaltwin.org/>

<https://industrialdigitaltwin.org/content-hub/teilmodelle>

[https://industrialdigitaltwin.org/wp-content/uploads/2022/01/2021-12-01\\_IDTA\\_Process-Submodels\\_V1.0.pdf](https://industrialdigitaltwin.org/wp-content/uploads/2022/01/2021-12-01_IDTA_Process-Submodels_V1.0.pdf)

# Life-Cycle of Measurement Device / Function

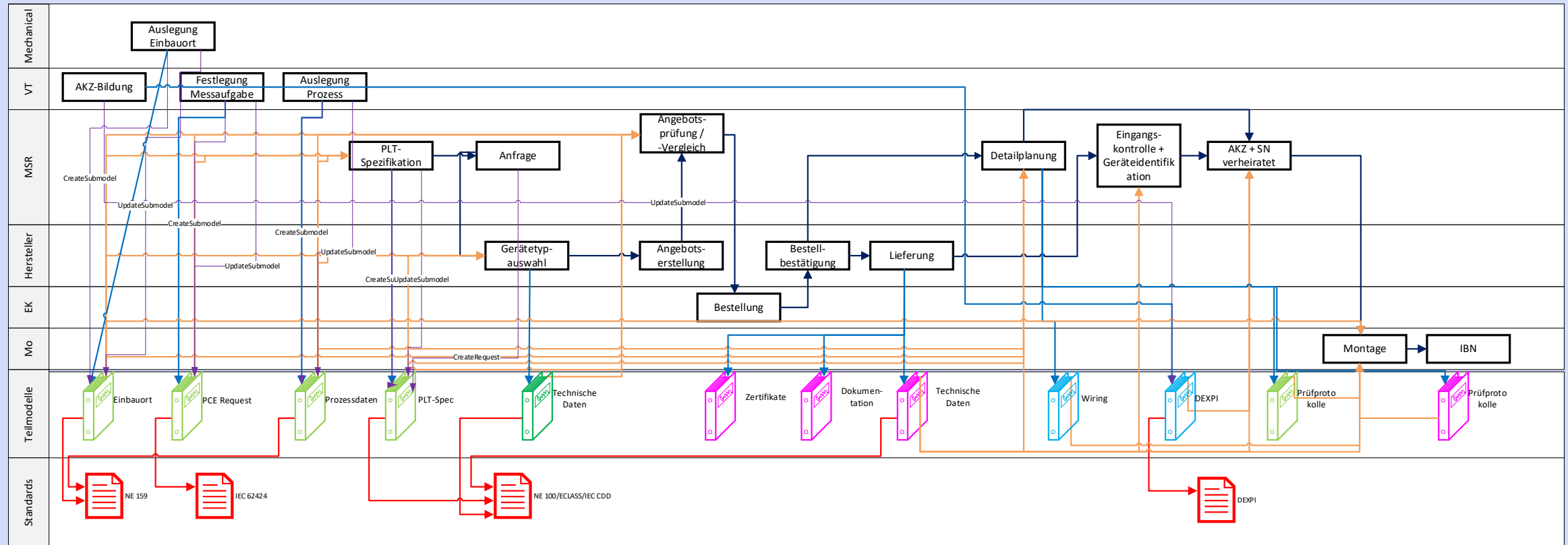




# Use Case 1 – Engineering of a new Pressure Measurement



Neuplanung Druckmessung Wasserkessel



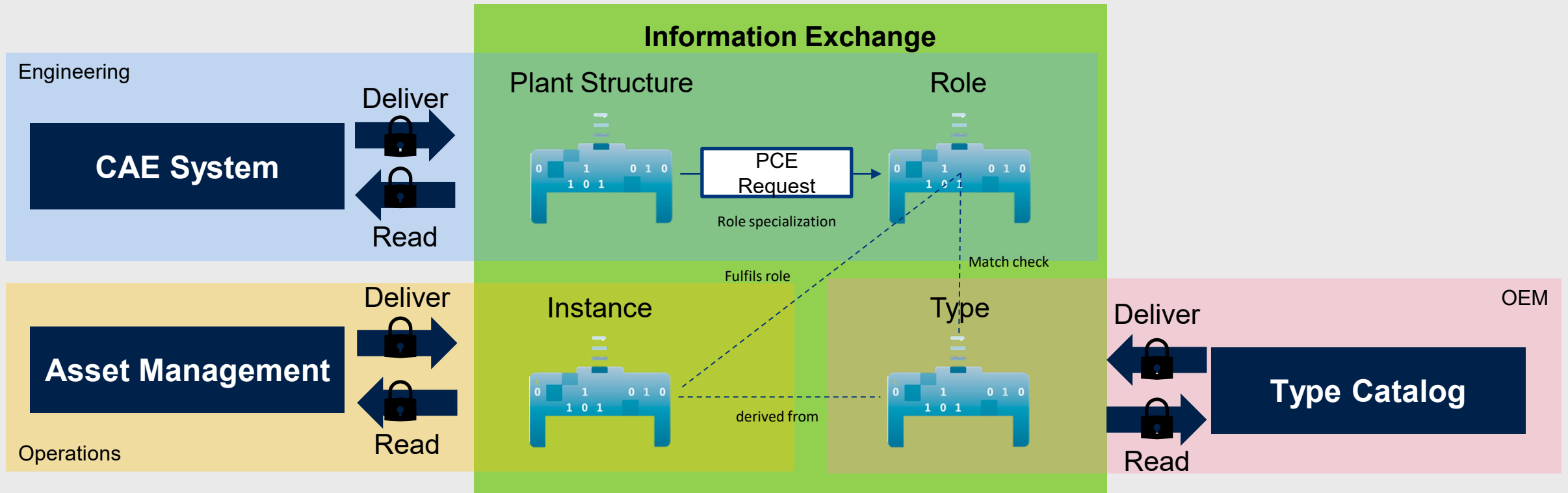
Reminder-Dienst für fehlende Attribute

Freigabe

Nutzerverwaltung

Elektronische Signatur

# Possible Structure for Information Exchange



# DEXPI Submodel for Asset Administration Shell

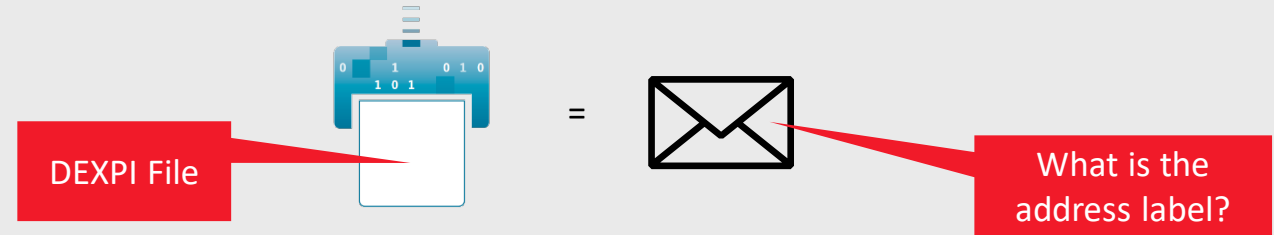
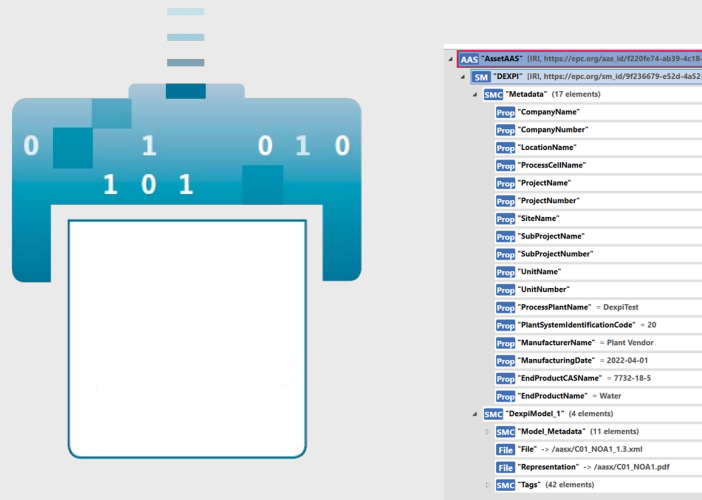


Next step in Industry 4.0 for process industry

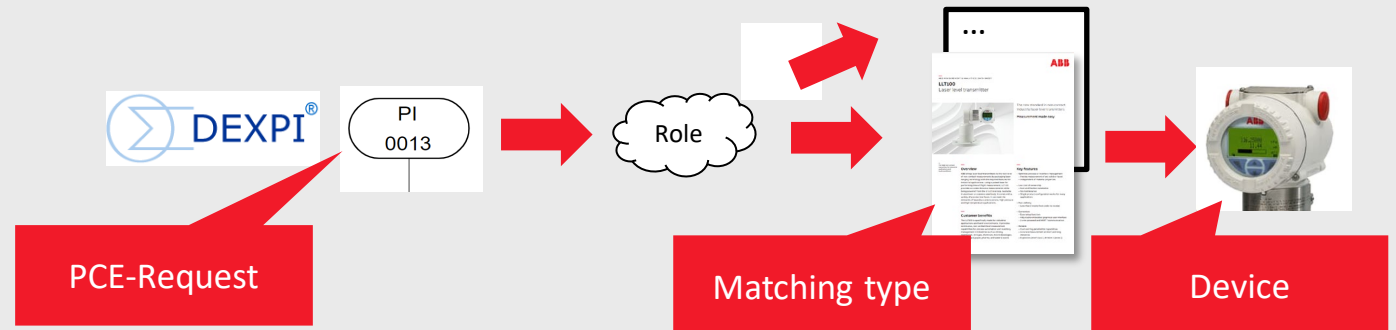
## IDTA Submodel Working Group

### Two initial use cases:

- Handover of DEXPI P&I Diagrams. Challenge: how to specify “P&ID” Identity



- Using P&I Diagrams for specifying Roles and Requirements in Asset Lifecycle

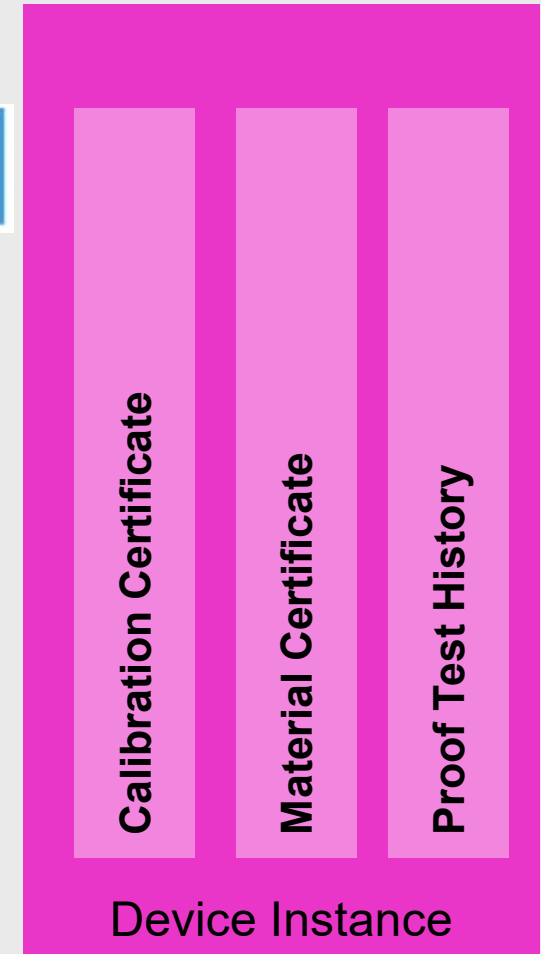
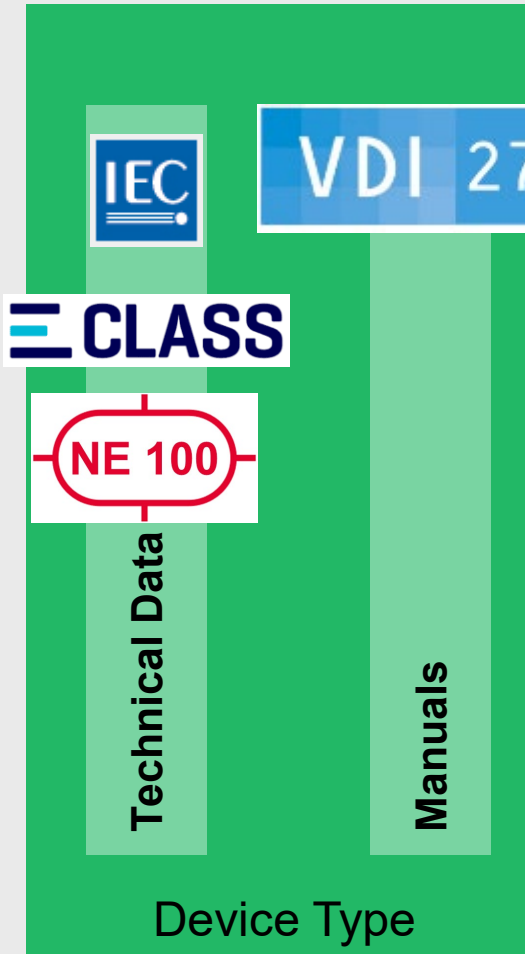
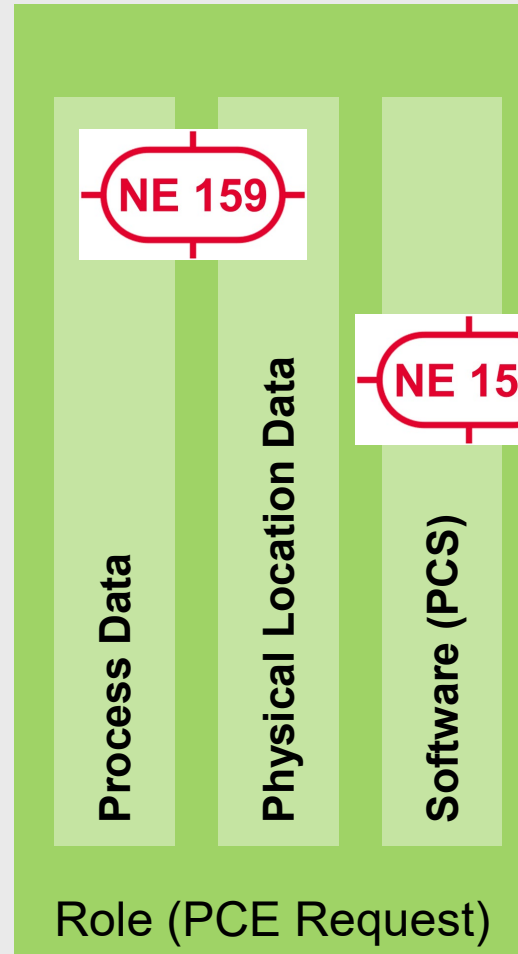


- Kick-off: 3.3.2022

- Connection to DEXPI WGs: Wilhelm Otten

- Group members: ABB, Equinor, Aibel, Oslo University, Magdeburg University, FESTO

# Content of the different types of AAS





# Migration of Existing Data



	A	B	C	D	E
1	Hersteller	HerstellerTyp	eClass_Geraetetyp	HerstellerSpez	SerienNr
2	ATB	CD 160	27-02-21-02	160 L2 Y3	563457001H
3	Hermetic	Spaltrohrmotor	27-02-27-05	65YA36562	559907003H
4	Siemens	1MJ6097	27-02-21-02	4CA36	409141001H

## Cooperation between RWTH IAT+YNCORIS for extension of the AAS Managers

- Supports Mapping of Tables to Submodels and Attributes of Asset Administration Shells
- Automatic Generation of Asset Administration Shells (AAS)

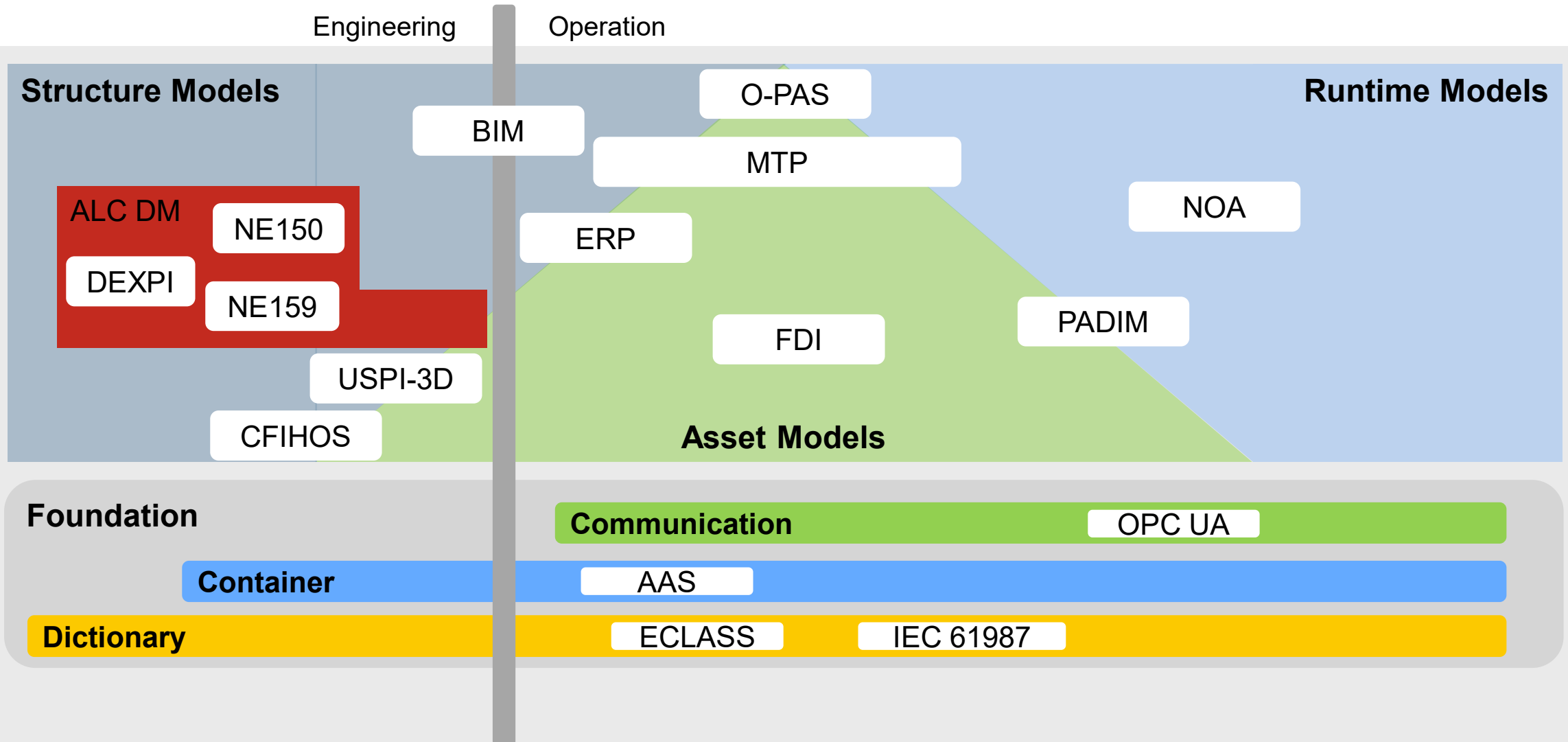
The screenshot shows the AAS Manager interface. The main window displays a tree view of the 'TestPackage1.aasx' structure, including submodels like 'shells', 'assets', and 'submodels'. The 'ExampleProperty2' object is selected, and its details are shown in the 'Edit/Create object' dialog box. The dialog box contains the following fields:

- id\_short\*: ExampleProperty2
- value\_type\*: String
- value\*: String (exampleValue2)
- kind\*: INSTANCE
- value\_id: Create (optional)
- category: CONSTANT
- description: Create (optional)
- semantic\_id: Reference
- key\*: Key 1 (GLOBAL REFERENCE, local: , value: http://acplt.org/Properties/ExampleProperty, id\_type: IRI)
- qualifier: Create (optional)

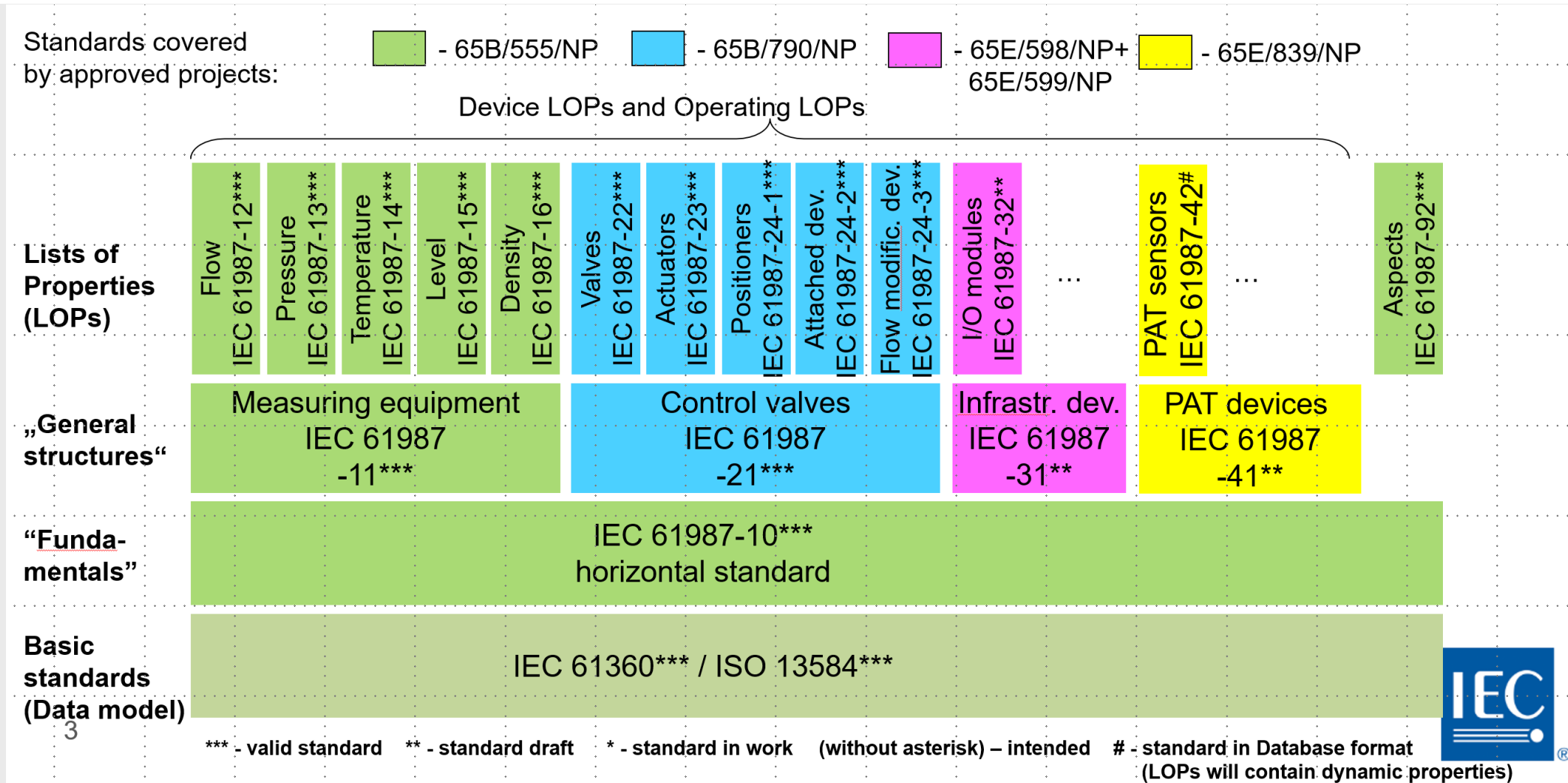
03

# IEC 61987

# Map “information models”



# Current Landscape of the IEC61987 standard series (October 2021)





# Interactive Online Catalog



Domain:

< > Print Export

English French German Japanese Chinese

Open all | Close all

Process automation (IEC 61987 series)

- 0112/2///61987#ABA000 - Equipment for industrial-process automation
  - ABV000 - Characterization
    - ABA001 - Measuring instrument
      - ABA643 - Gauge
      - ABA684 - Measuring assembly
      - ABA689 - Sight indicator
      - ABA697 - Switch
      - ABA751 - Transmitter
    - ABA845 - Measuring instrument component
      - ABA846 - Analog signal switch
      - ABA847 - Connection head
      - ABA849 - Converter
      - ABA856 - Fitting
      - ABA861 - Remote seal
      - ABA866 - Relay
      - ABA870 - Sensing element
      - ABA880 - Transmitter
      - ABA884 - Primary element
      - ABD337 - Manifold for pressure measurement
      - ABE362 - Insert/element
    - ABD340 - Final control element
      - ABD341 - Control valve or automated on/off-valve
      - ABD385 - Process regulator
    - ABN977 - Infrastructure device
      - ABN985 - Calculator
      - ABN988 - Controller
      - ABO001 - Communication adapter
      - ABO002 - Converter
      - ABO021 - Indicating device
      - ABO025 - I/O assembly
      - ABO028 - I/O module
      - ABO045 - Network component
      - ABO062 - Power supply
      - ABO066 - Protection device
      - ABO077 - Recorder
    - ABV001 - Libraries
      - ABJ604 - LOQ
      - ABJ725 - LOPD
      - ABV500 - LOP
      - ABV501 - Block

Code:	0112/2///61987#ABA000
Version:	002
Revision:	04
IRDI:	0112/2///61987#ABA000#002
Preferred name:	Equipment for industrial-process automation
Synonymous name:	
Coded name:	
Short name:	
Definition:	equipment that supports partial or fully automated operation of industrial processes
Note:	
Remark:	
Definition source:	
Drawing:	
Class type:	ITEM_CLASS
Applicable documents:	
Class value assignment:	
Requisity of properties:	
Superclass:	
Higher level classes:	
Classifying DET:	
Properties:	
Properties tree:	0112/2///61987#ABA000 - Equipment for industrial-process automation
Open all Close all	
Inherited properties:	
SuperBlocks:	
Is case of:	
Imported properties:	
Instance sharable:	
Status level:	Standard

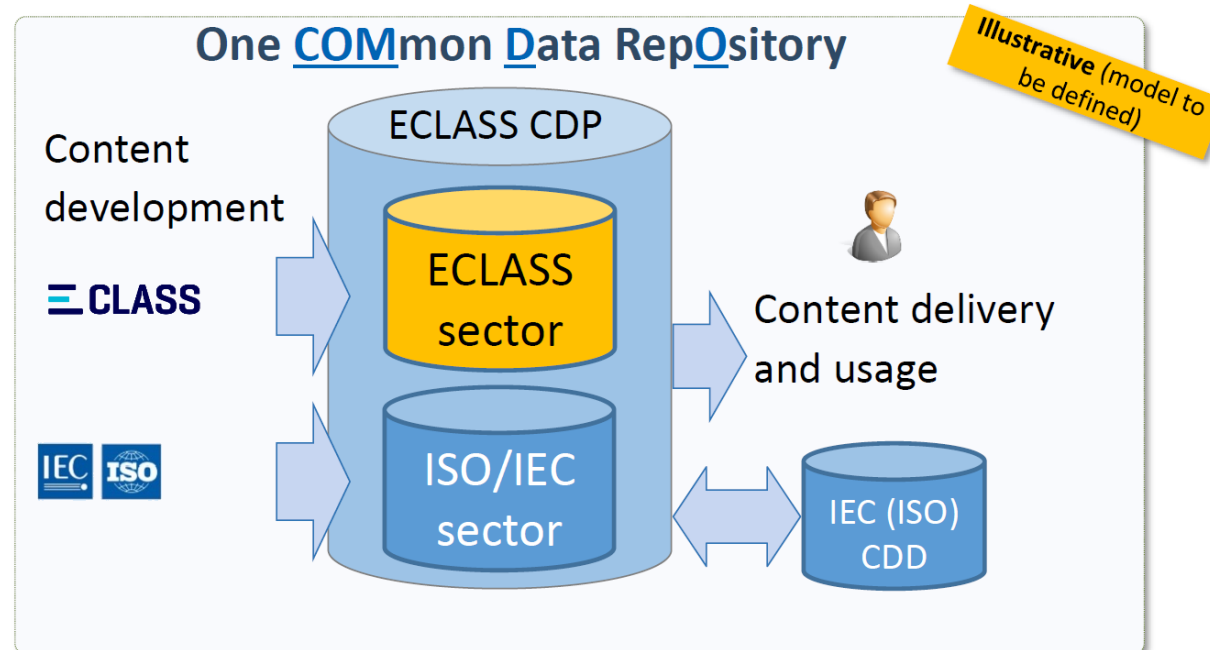
<https://cdd.iec.ch/>

# Harmonization of ECLASS and IEC CDD



## Projekt COMDO

“To meet user requirements, a single common data repository is strongly required”



“Joining the best of two worlds”

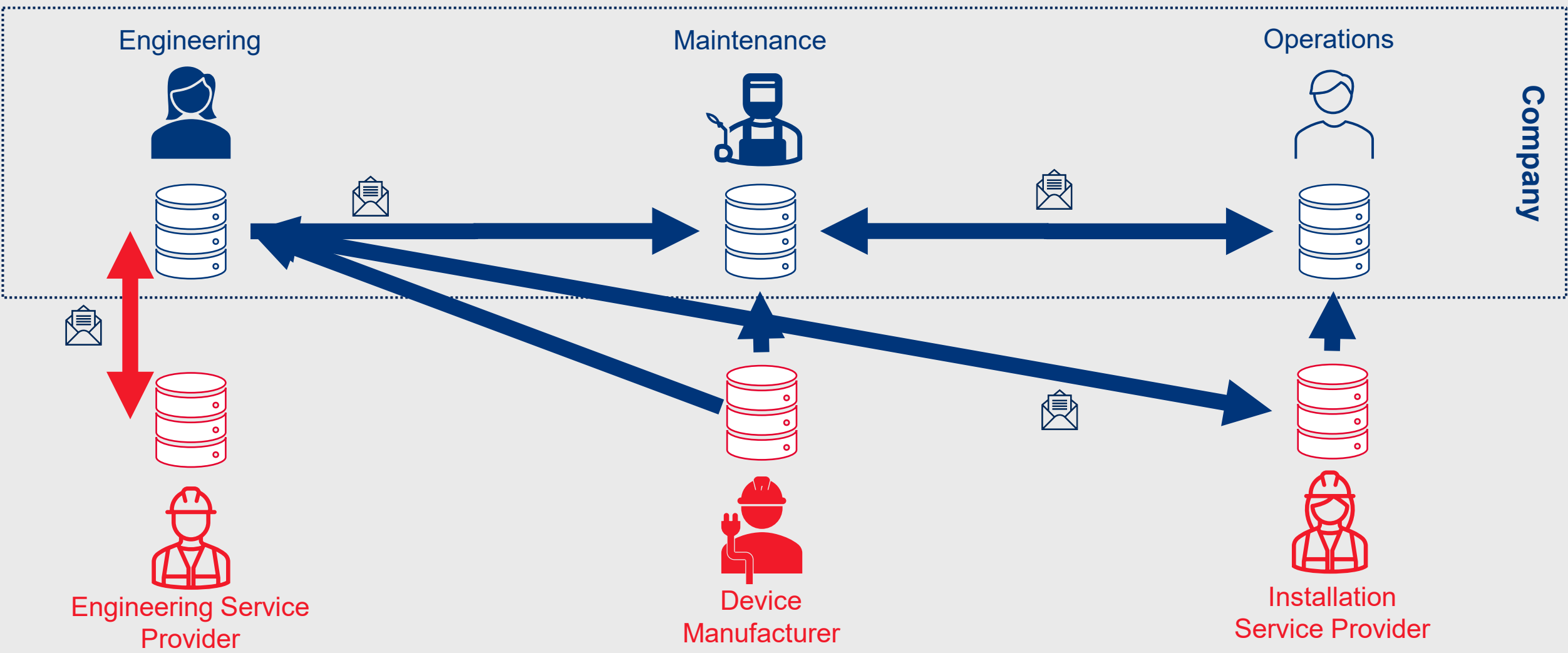
Source: IEC



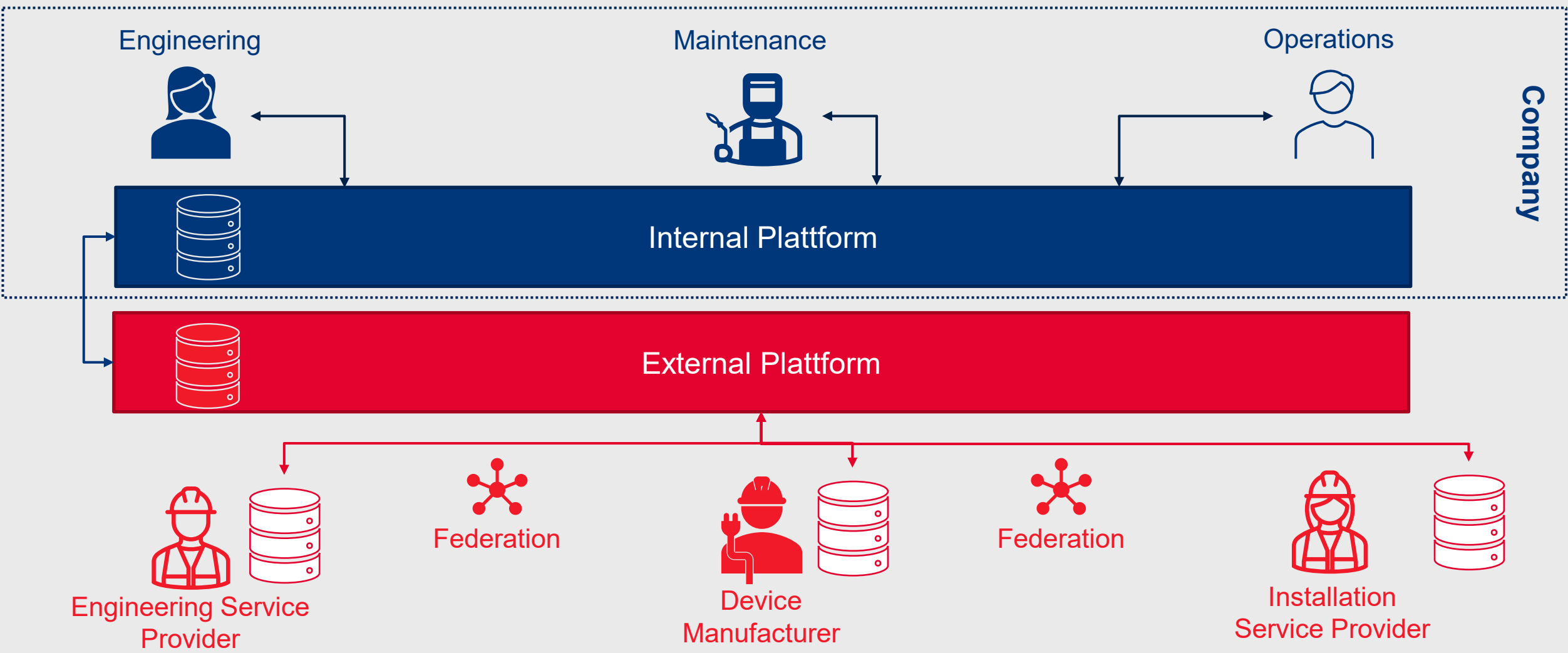
04

# Platforms for Data Exchange

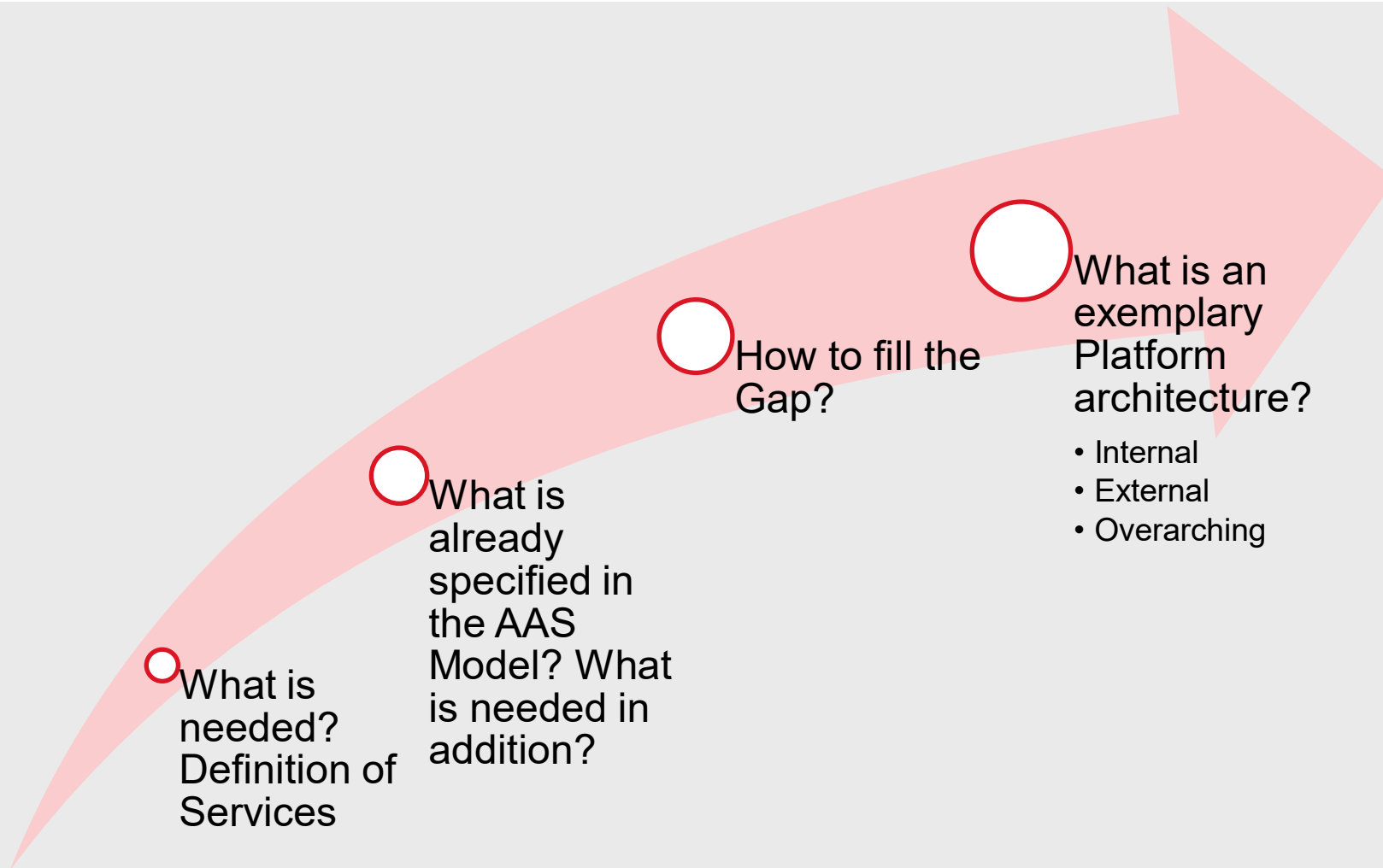
# Why Platforms?



# Why Platforms?

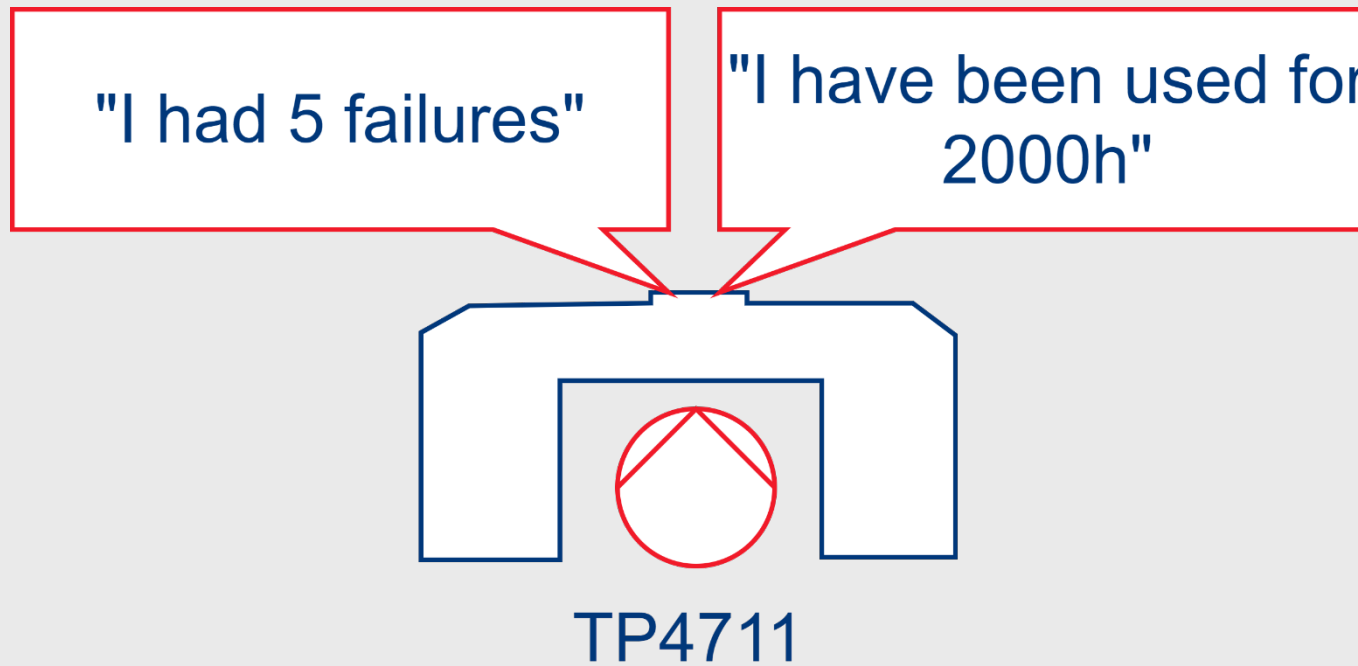


# Vorgehen im Arbeitskreis

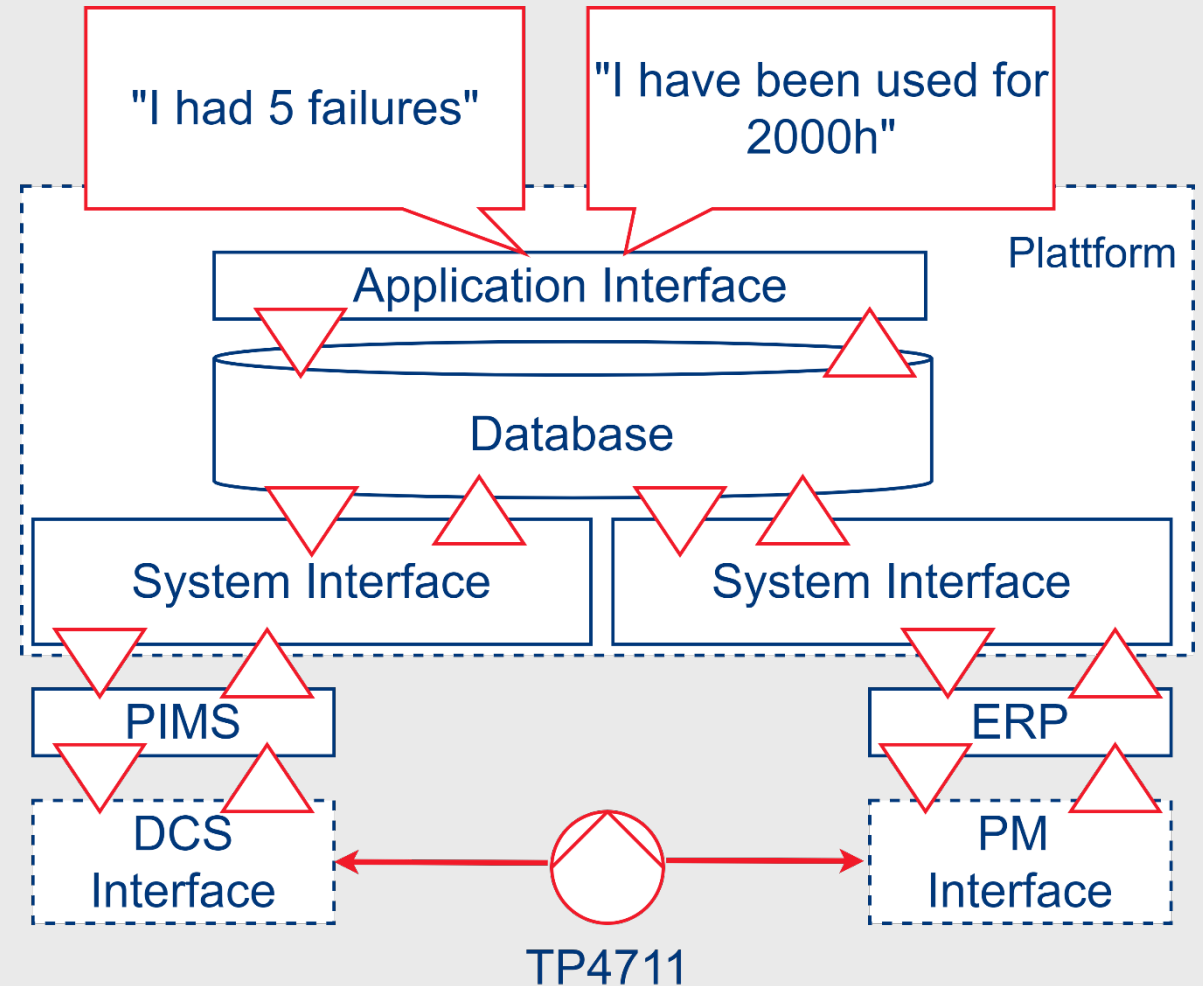
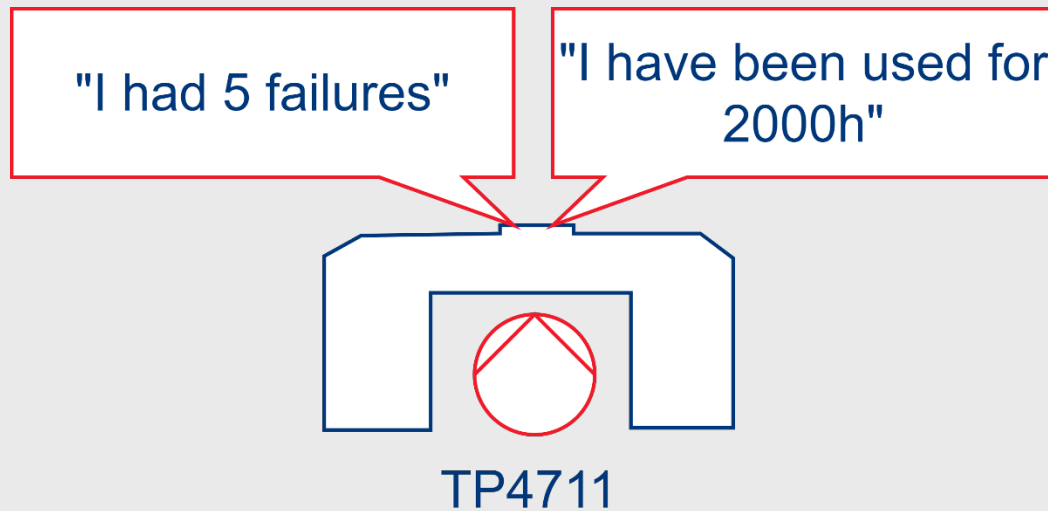




# Abstraction of System Interfaces

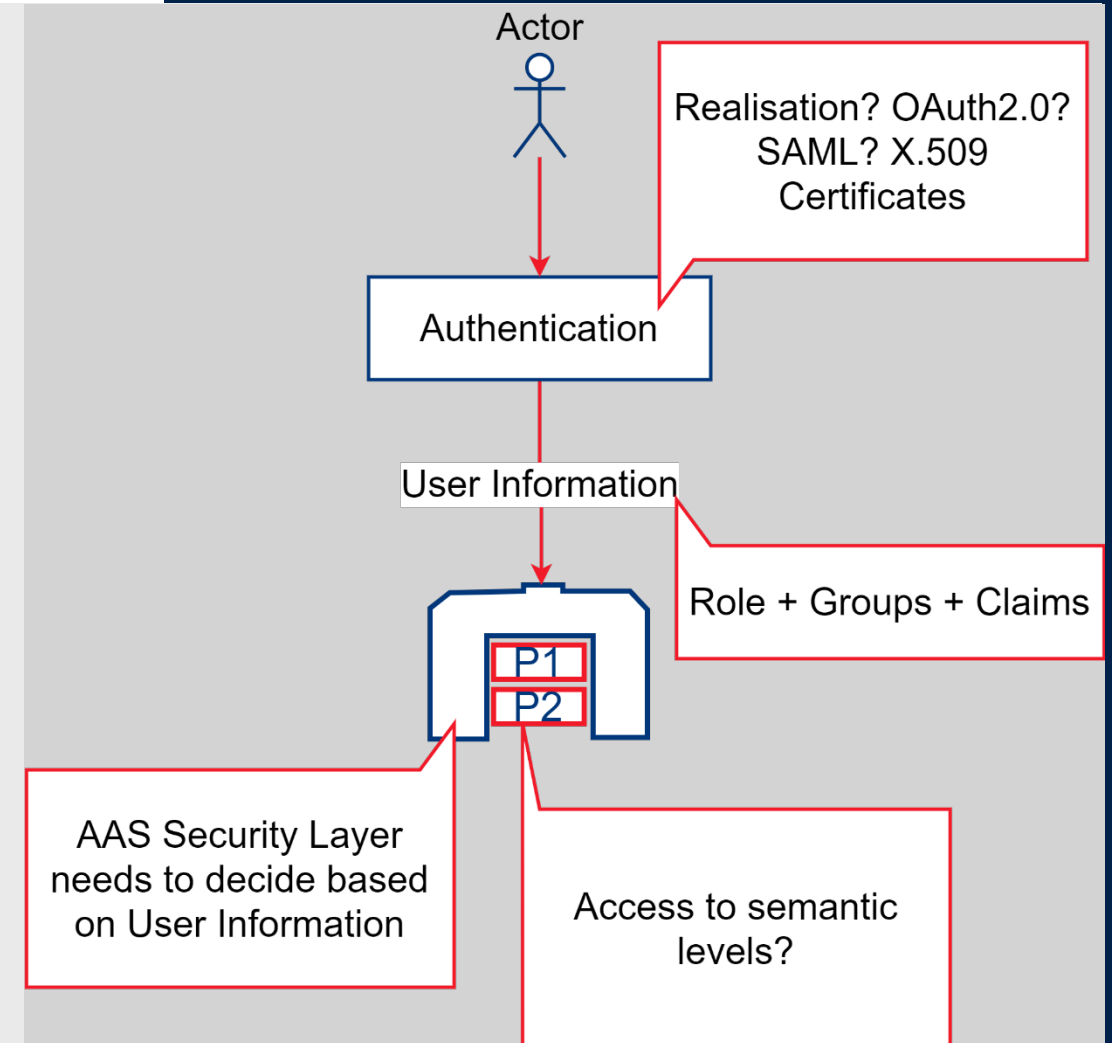


# Abstraction of System Interfaces



# Security and User Management

- We handle thousands of Assets in the platforms
- Managing Access Rights on the Level of independent Attributes and Asset Administration Shells is not possible
- Fluctuation of personell in the company and between different companies amplify the problem
- A platform must include intelligent mechanisms to manage the access to informations contained in it



## **Parallel to DEXPI a structure for the wiring is required**

- Done by the NAMUR WG1.3 as NE191

## **Existing Standards need to be evolved to a submodel template in the IDTA**

- DEXPI WIP, NE 150 und NE 159 pending

## **A large amount of submodel templates are pending standardization**

- Tasks must be placed in Expert Working Groups

## **The work between different disciplines in the life cycle of plants must be coordinated**

- Overarching negotiations between different disciplines necessary

## **For the platform based information exchange in the process industry additional abstractions are needed**

- NAMUR wants to play a role in defining the requirements

# Thank You!



NAMUR Homepage



NAMUR@LinkedIn



Asset Administration Shell  
and IEC 61987

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November 2023