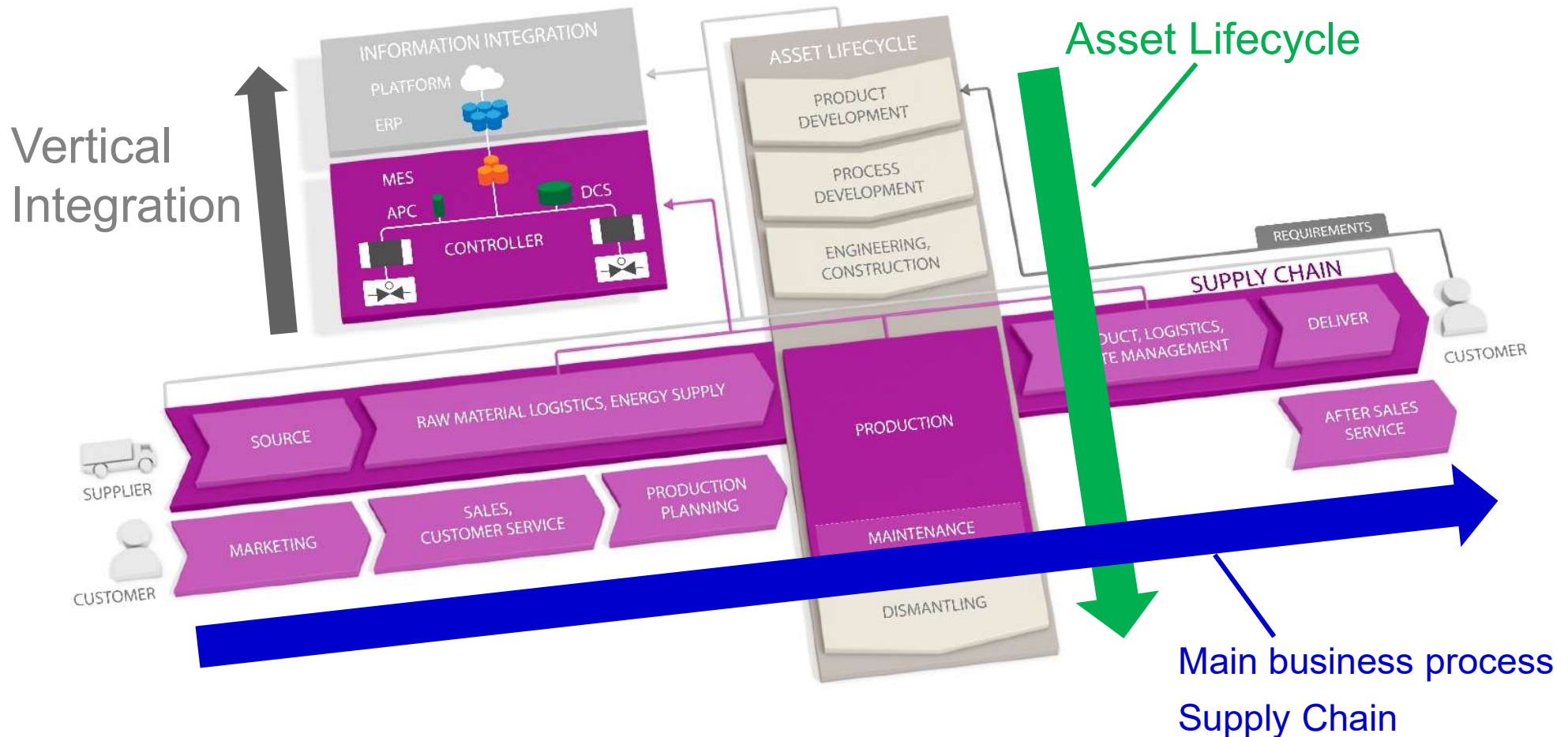# DEXPI Information Model
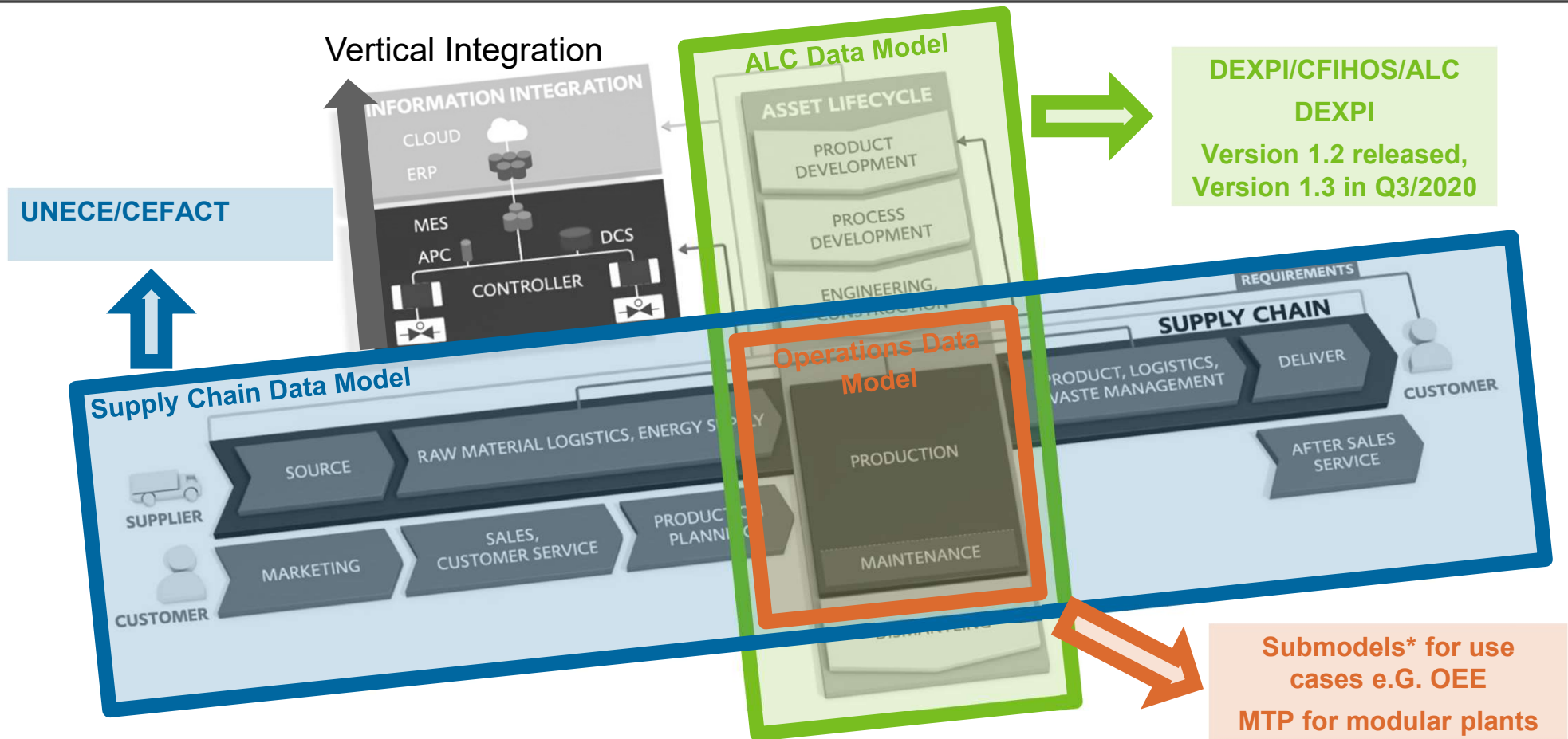# Status of "structural models" in Process Industry

Wilhelm Otten
Head of DEXPI Networking Team
Date: 2022-02-23

Project: DEXPI as submodel of AAS

It is all about Safety, Sustainability, Efficiency and Flexibility in the main business processes "Supply Chain" & "Asset Lifecycle"
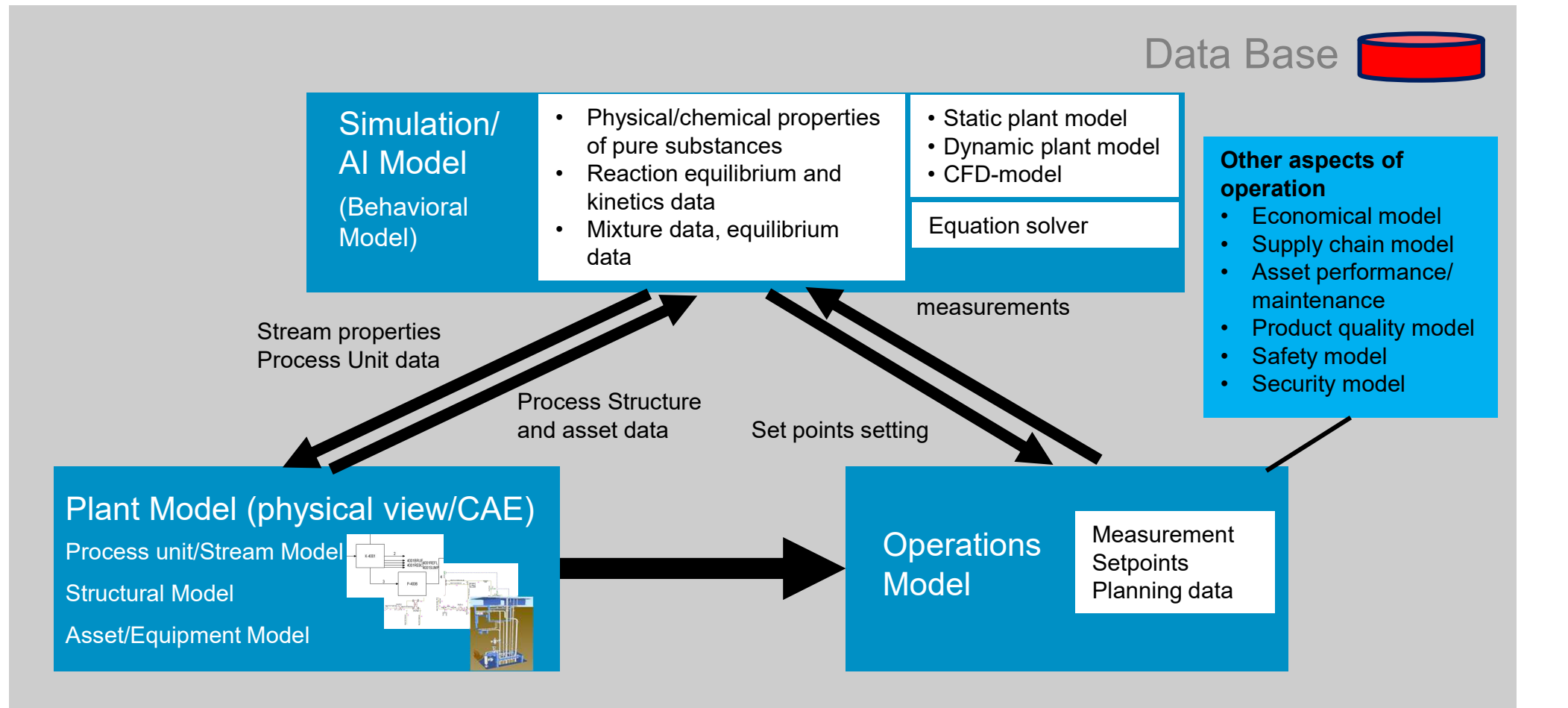
Business Processes

Vertical Integration

ALC Data Model

UNECE/CEFACT

Supply Chain Data Model

Operations Data Model

DEXPI/CFIHOS/ALC

DEXPI

Version 1.2 released, Version 1.3 in Q3/2020

Submodels* for use cases e.G. OEE

MTP for modular plants

* MTP is an operational model

What is a digital twin (information model) in process industry?

Data Base

Simulation/ AI Model
(Behavioral Model)

- Physical/chemical properties of pure substances
- Reaction equilibrium and kinetics data
- Mixture data, equilibrium data

- Static plant model
- Dynamic plant model
- CFD-model

Equation solver

measurements

Other aspects of operation
- Economical model
- Supply chain model
- Asset performance/ maintenance
- Product quality model
- Safety model
- Security model

Stream properties
Process Unit data

Process Structure and asset data

Set points setting

Plant Model (physical view/CAE)

Process unit/Stream Model

Structural Model

Asset/Equipment Model

Operations Model

Measurement
Setpoints
Planning data

Information Models / W
© NAMUR - Interessengemeinschaft Automatisierungstechnik der Prozessindustrie e.V.
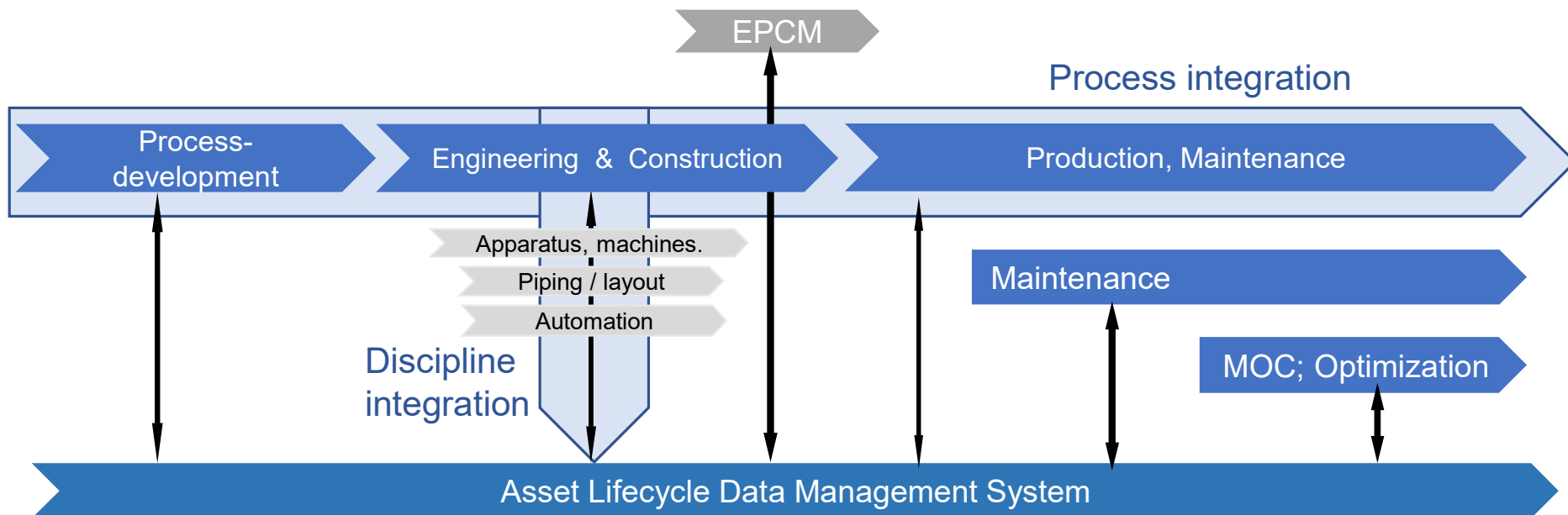Sitz des Vereins: Leverkusen   Eintragung: Amtsgericht Köln, VR 18371

V2 optimiert

Being faster and more efficient in investment projects as well as plant engineering and maintenance
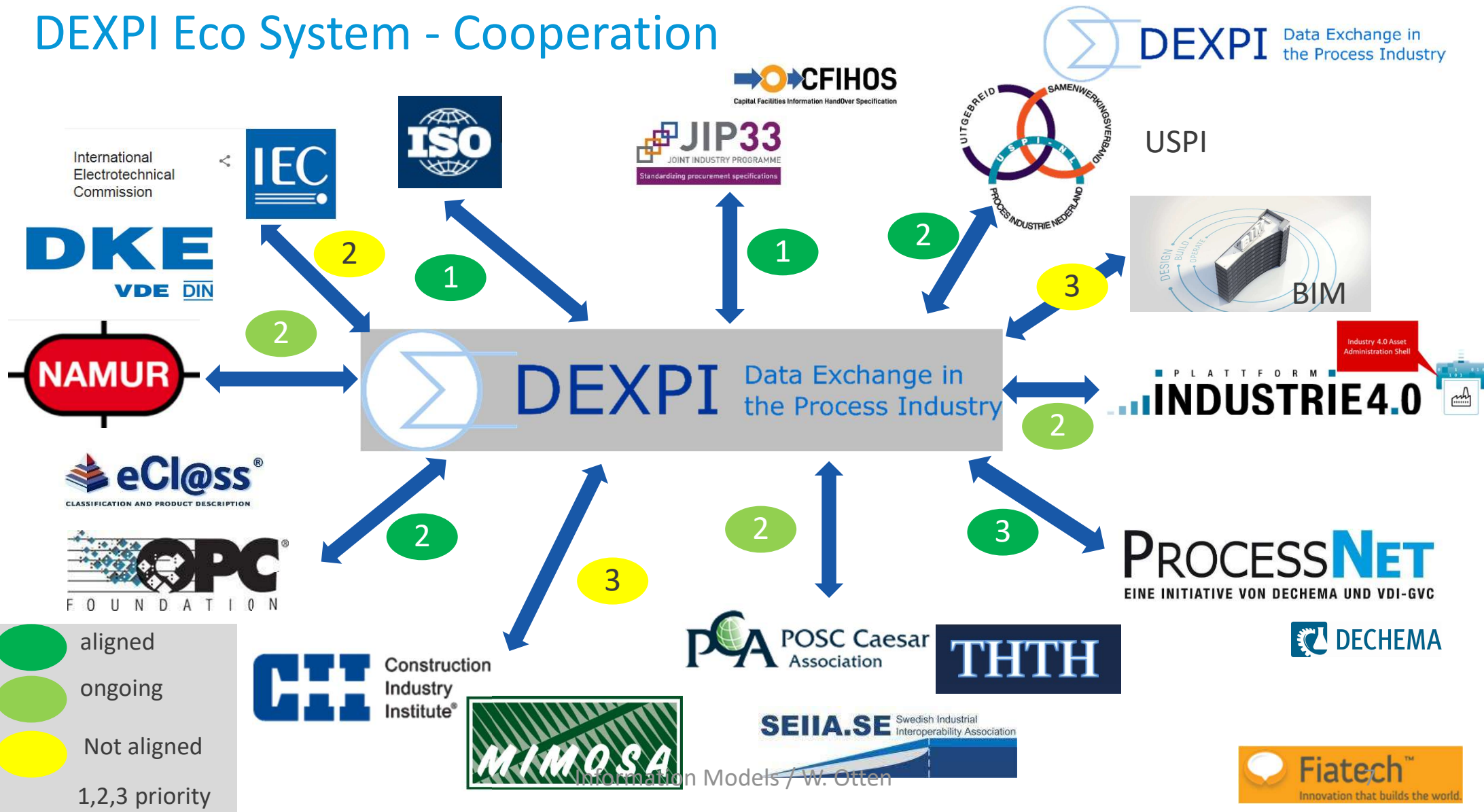
Integration along the process and across the disciplines by using one single Asset Lifecycle Data Management System
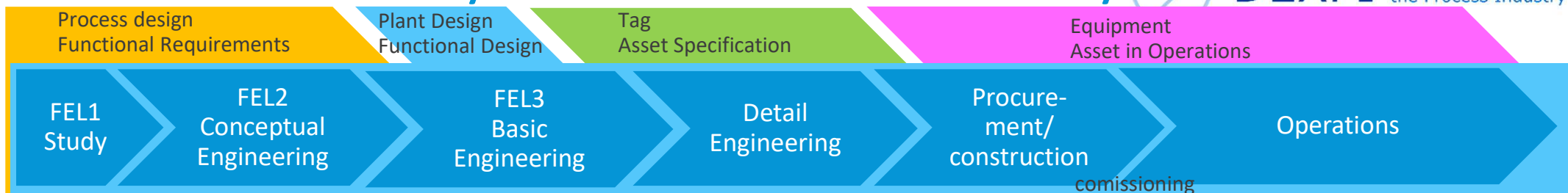
Asset-Lifecycle

DEXPI Eco System - Cooperation

Data Model Eco System in Process Industry

DEXPI — Data Exchange in the Process Industry

Process design Functional Requirements	Plant Design Functional Design	Tag Asset Specification		Equipment Asset in Operations

FEL1 Study	FEL2 Conceptual Engineering	FEL3 Basic Engineering	Detail Engineering	Procurement/ construction	Operations

comissioning

OPC FOUNDATION — Industry data exchange framework — PLATTFORM INDUSTRIE4.0 — Industry 4.0 Asset Administration Shell

International standardization

ISO — International Electrotechnical Commission — IEC

P&ID	Hand over EPC	Procurement specification

DEXPI — Data Exchange in the Process Industry — CFIHOS Capital Facilities Information HandOver Specification — JIP33 JOINT INDUSTRY PROGRAMME Standardizing procurement specifications

		Detail/ Procurement	automation

USPI 3D — eCl@ss CLASSIFICATION AND PRODUCT DESCRIPTION — POSC Caesar Association — MIMOSA — NAMUR

BIM   building

Dechema — CII Construction Industry Institute — Asset life cycle — THTH — SEIIA.SE Swedish Industrial Interoperability Association
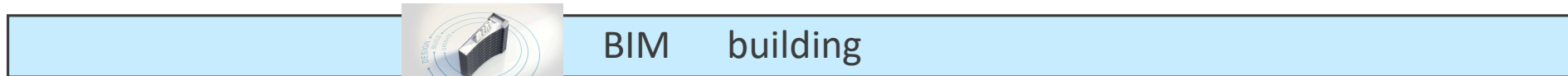
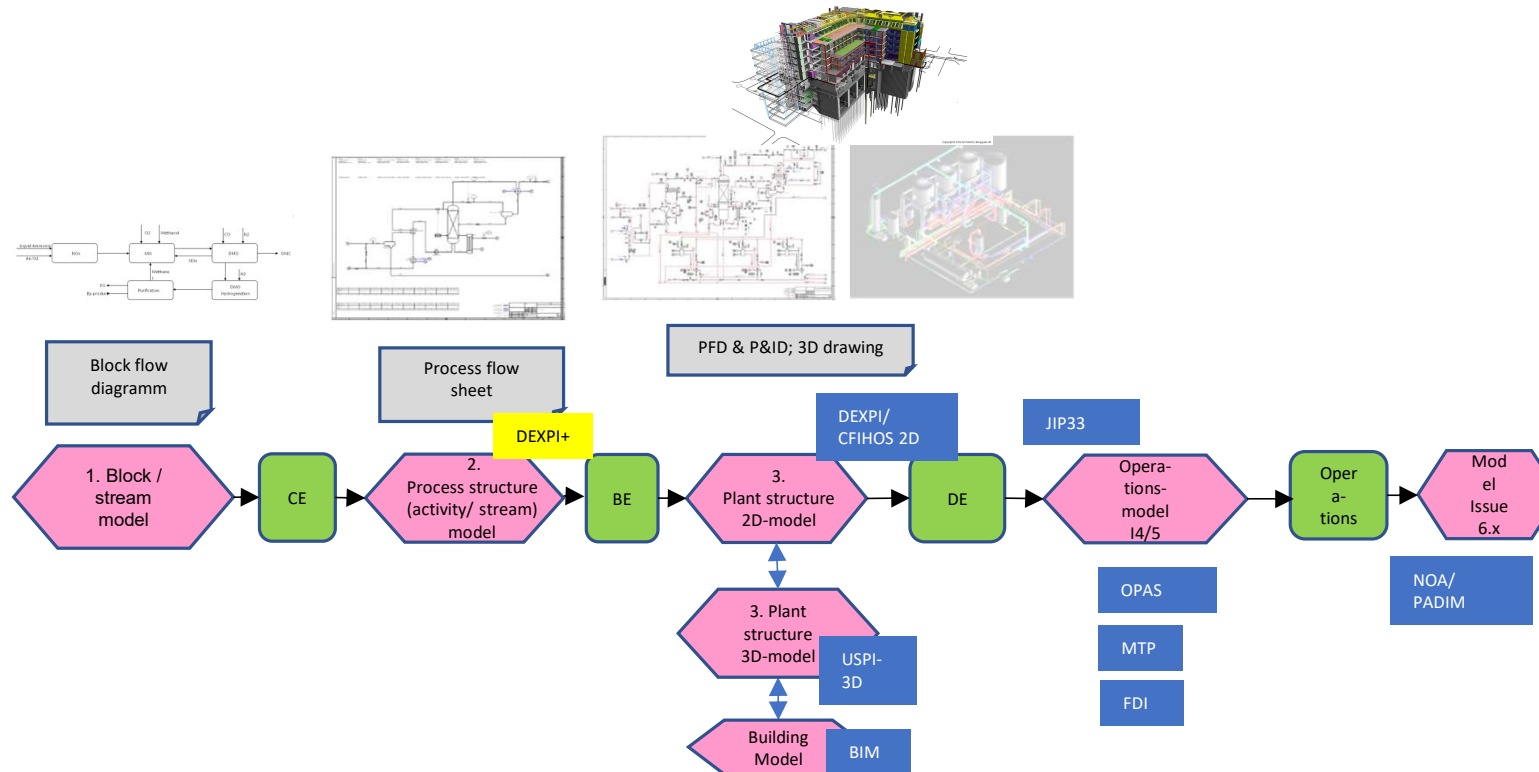| Integrating and Extending standards |
|---|
| Applying and integration of standards |

Asset Life Cycle

Block flow diagramm

Process flow sheet

PFD & P&ID; 3D drawing

DEXPI/ CFIHOS 2D

JIP33

DEXPI+

| 1. Block / stream model | CE | 2. Process structure (activity/ stream) model | BE | 3. Plant structure 2D-model | DE | Opera-tions-model I4/5 | Oper-a-tions | Model Issue 6.x |

3. Plant structure 3D-model

USPI-3D

OPAS

MTP

FDI

NOA/ PADIM

Building Model

BIM

One integrated data model/base and CAE-landscape using this common data model/base

Asset Lifecycle Data Model based on DEXPI enables efficient integrated engineering along the asset life cycle

ALC processes
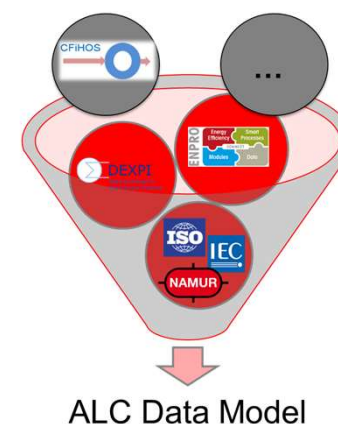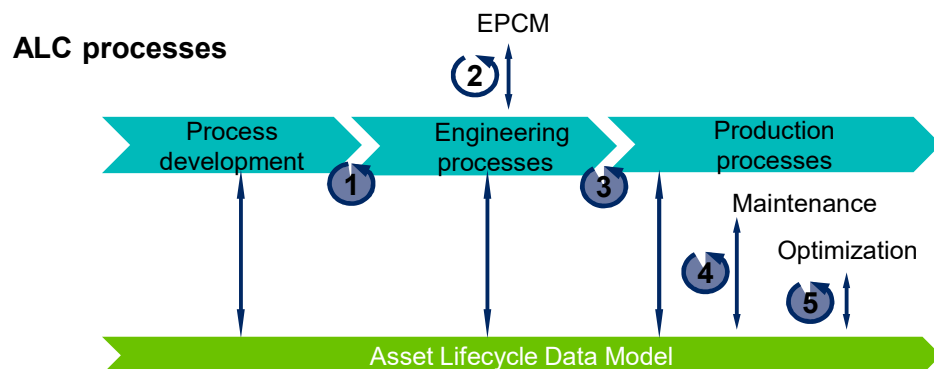
DEXPI General exchange standard for the process industry based on ISO 15926
Extended to an open, international information model for the entire plant life cycle
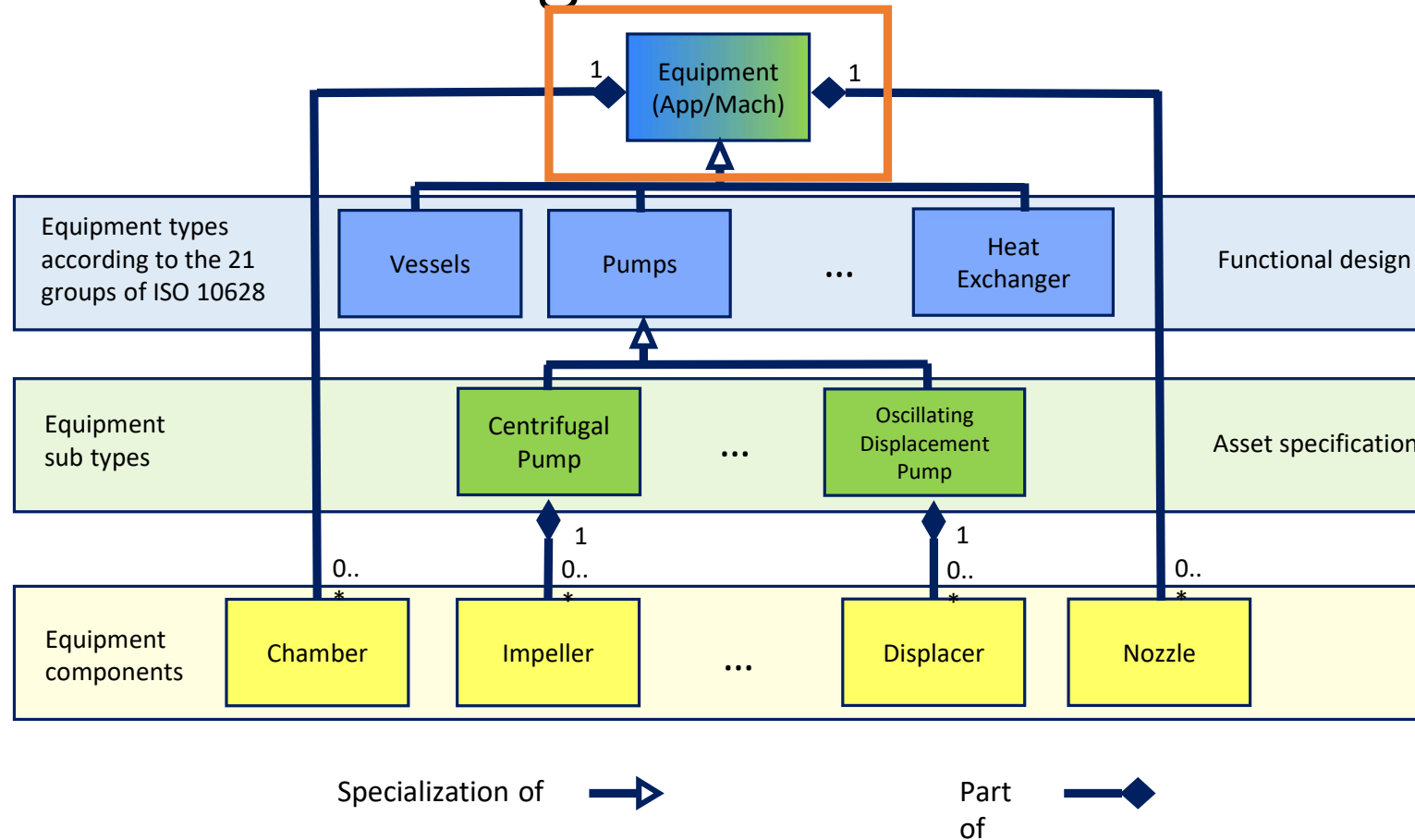

ALC Data Model
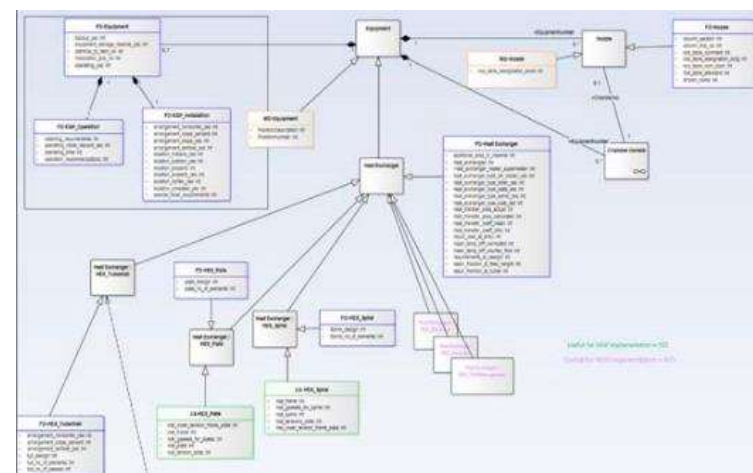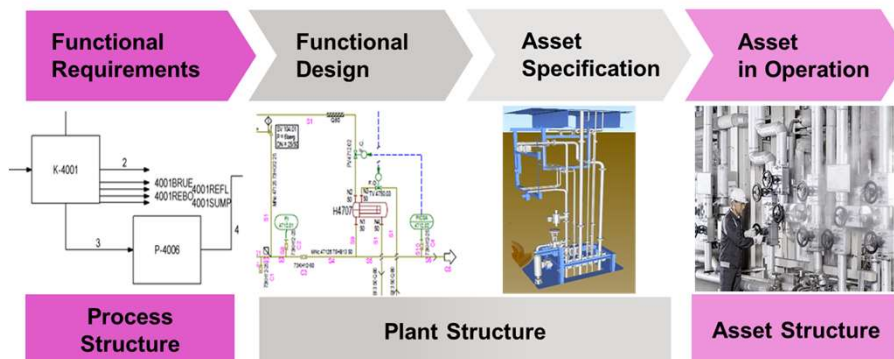
Data Exchange challenges for P&IDs
General exchange standard for the process industry based on ISO 15926

Information Models / W. Otten

[public]
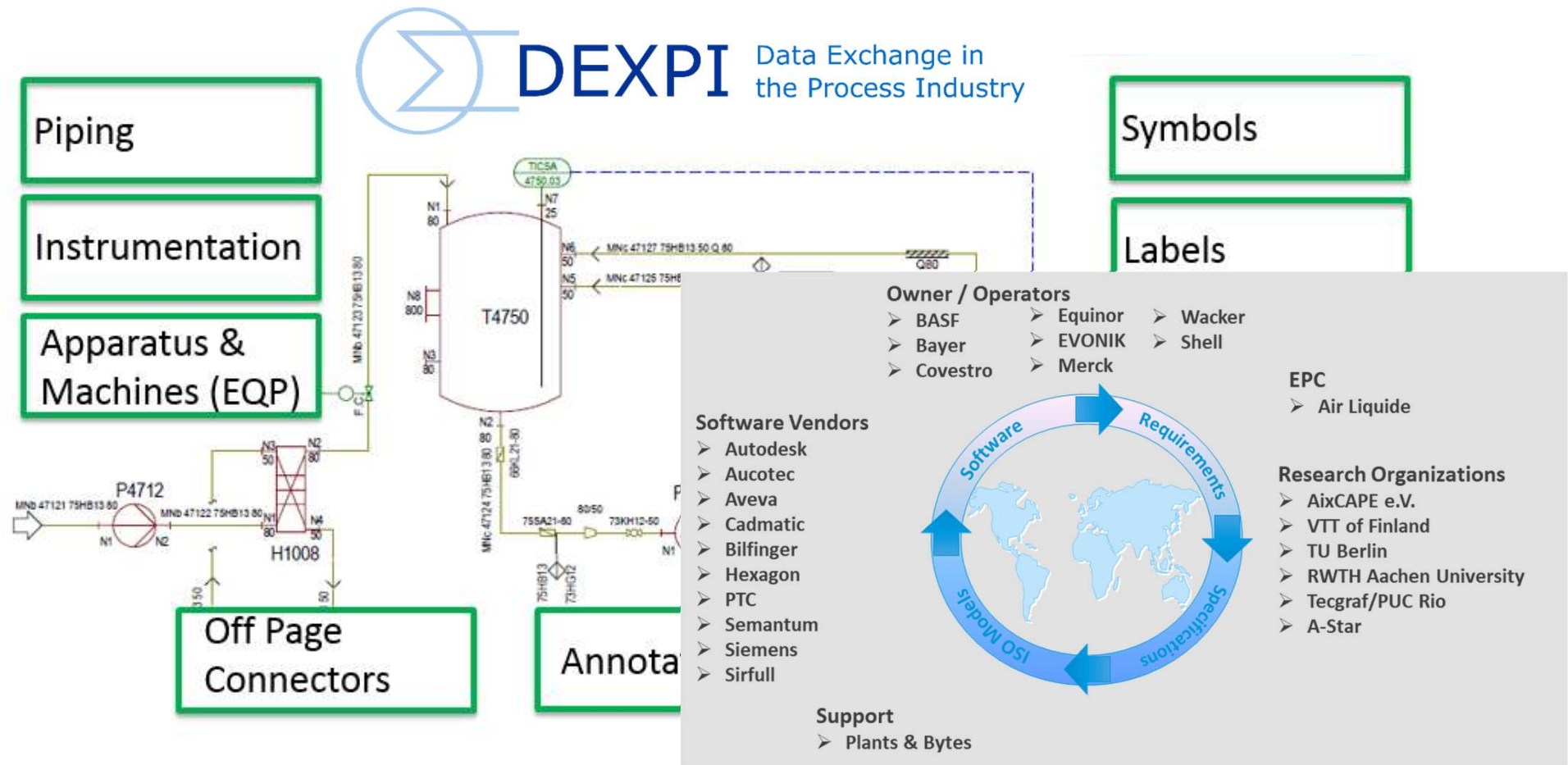
Visueller Einstieg – DEXPI
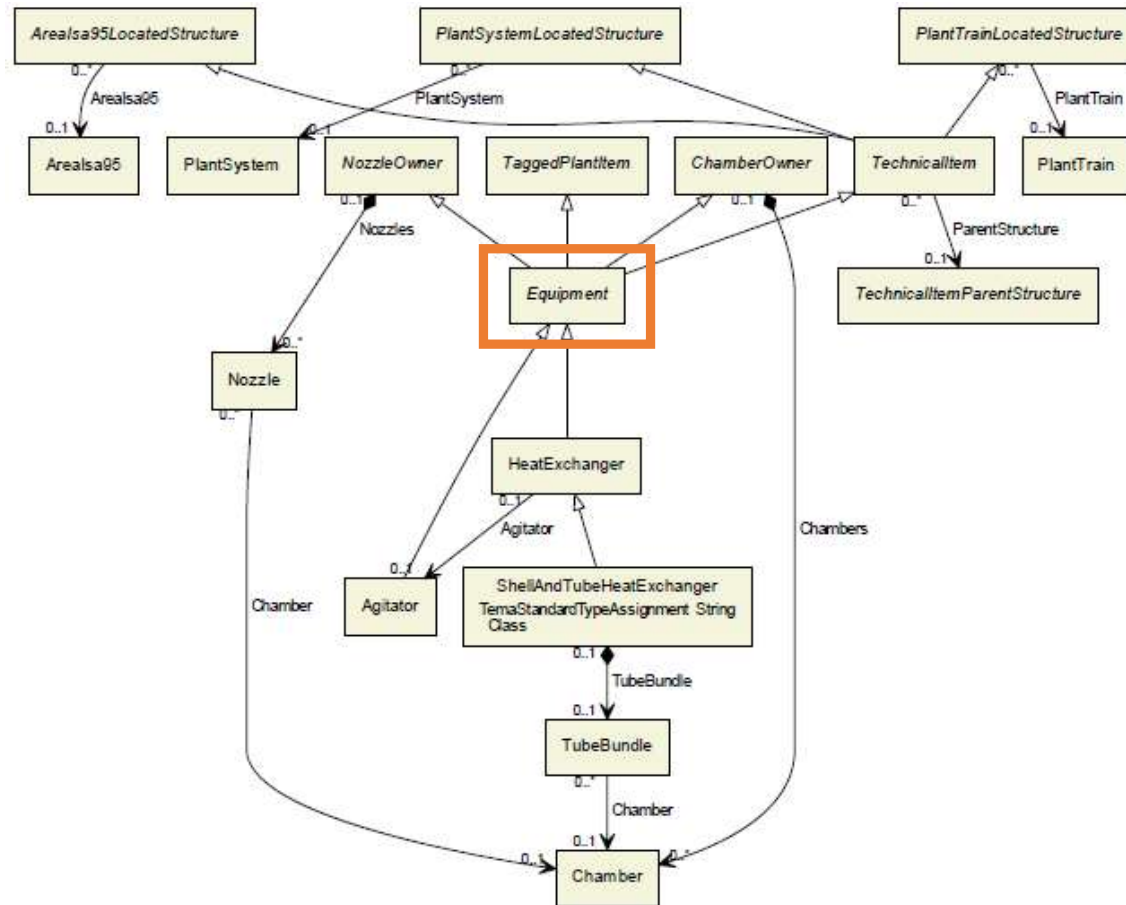
Visueller Einstieg – DEXPI
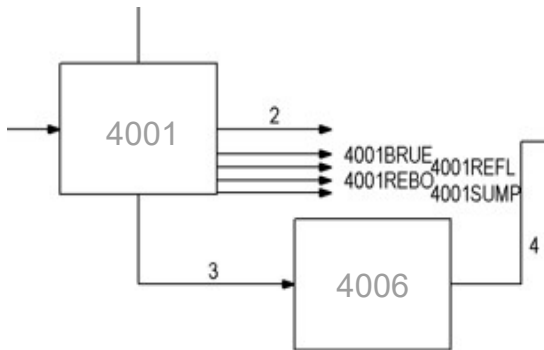
Back- up

DEXPI and the ENPRO lifecycle model

The asset lifecycle is separated into four aspects with three underlying data structures

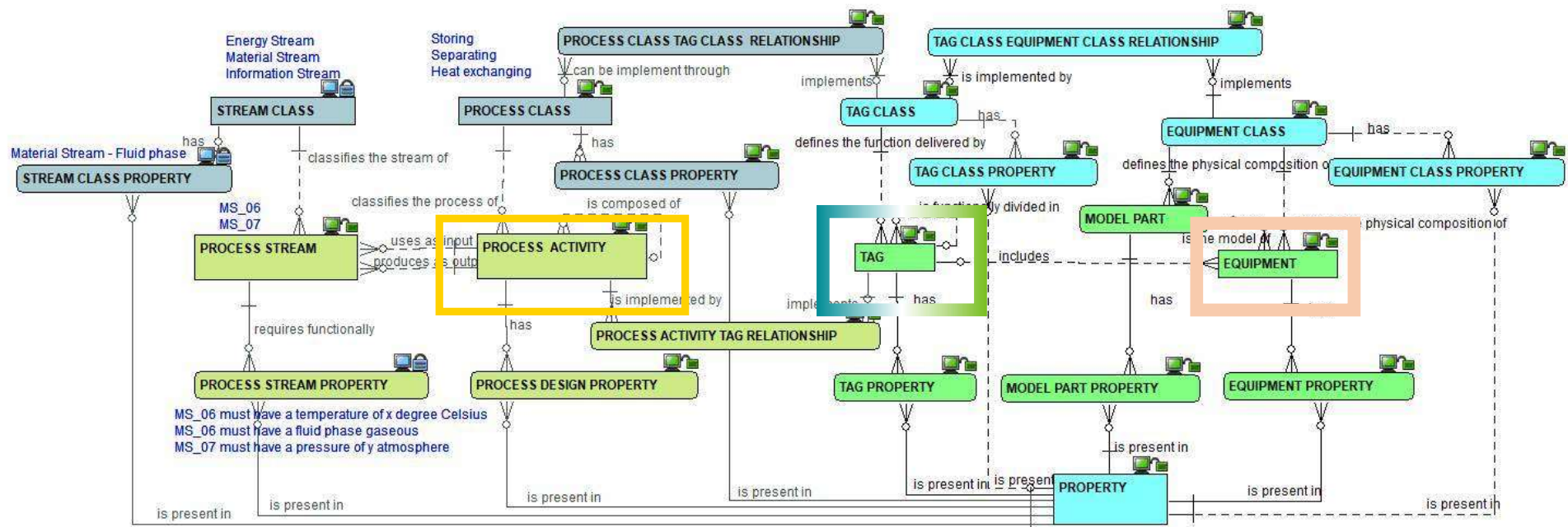| Functional Requirements	Functional Design	Asset Specification	Asset in Operation
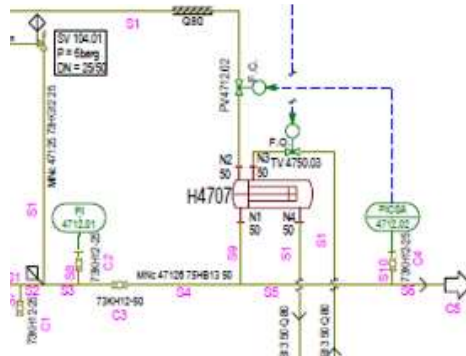
Process Structure	Plant Structure		Asset Structure

„Lifecycle" in CFIHOS (Entwurf)

Digital TWIN in Process Industry
Asset Life Cycle Data Models

DEXPI® Data Exchange in the Process Industry

		Plant Structure (DEXPI)		Type/Instance
AAS/Ind4.0	not in scope?	**Functional Design**	**Asset Spec. / Role**	Type/Instance
SAP/PM	not in scope	**Functional Location**		Equipment
CFIHOS/JIP36	will be added	**Tag** Functional Design	Asset Specification	Equipment
DEXPI concept **Evonik ALCDM**	**Process structure**	**Plant Structure** Functional Design	Asset Specification	**Asset structure** (in operation)
DEXPI P&ID	not in scope	**Plant Structure** Functional Design	Asset Specification	not in scope
ISO 15926	**Functional**			**InanimatePhysical**
materialized?	no			yes

Meta Model of Plant Life-cycle Information Placeholders
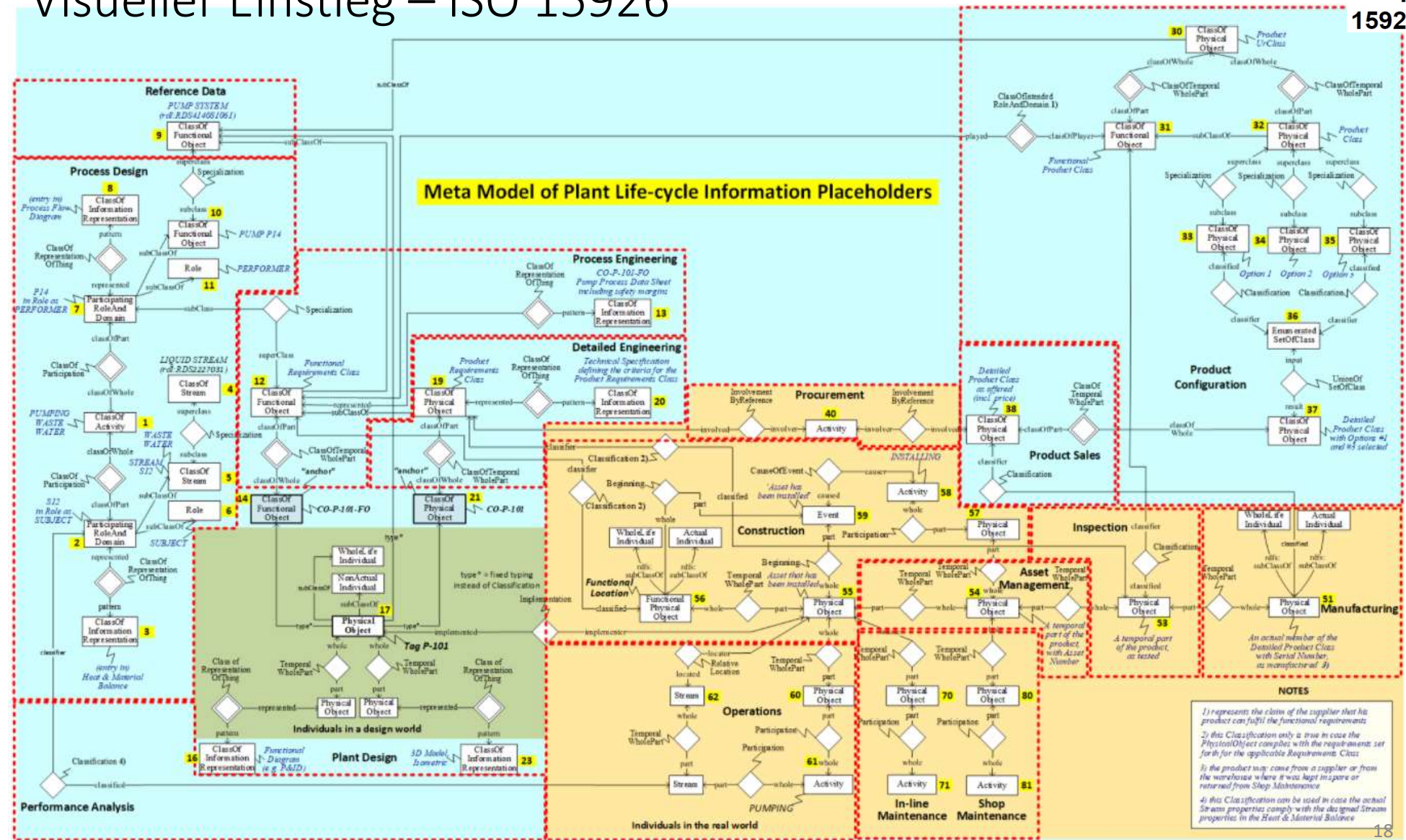
OPC Unified Architecture
for
DEXPI 1.2
Companion Specification
Release Candidate 1.00.0
September 2020

ISO 15926 Reference Data Library - Das Wörterbuch für die Prozessindustrie

Entwicklungsumgebung

-

Offizielles Portal

- http://data.posccaesar.org/rdl/

Disziplinstandards und Feedback-Prinzip
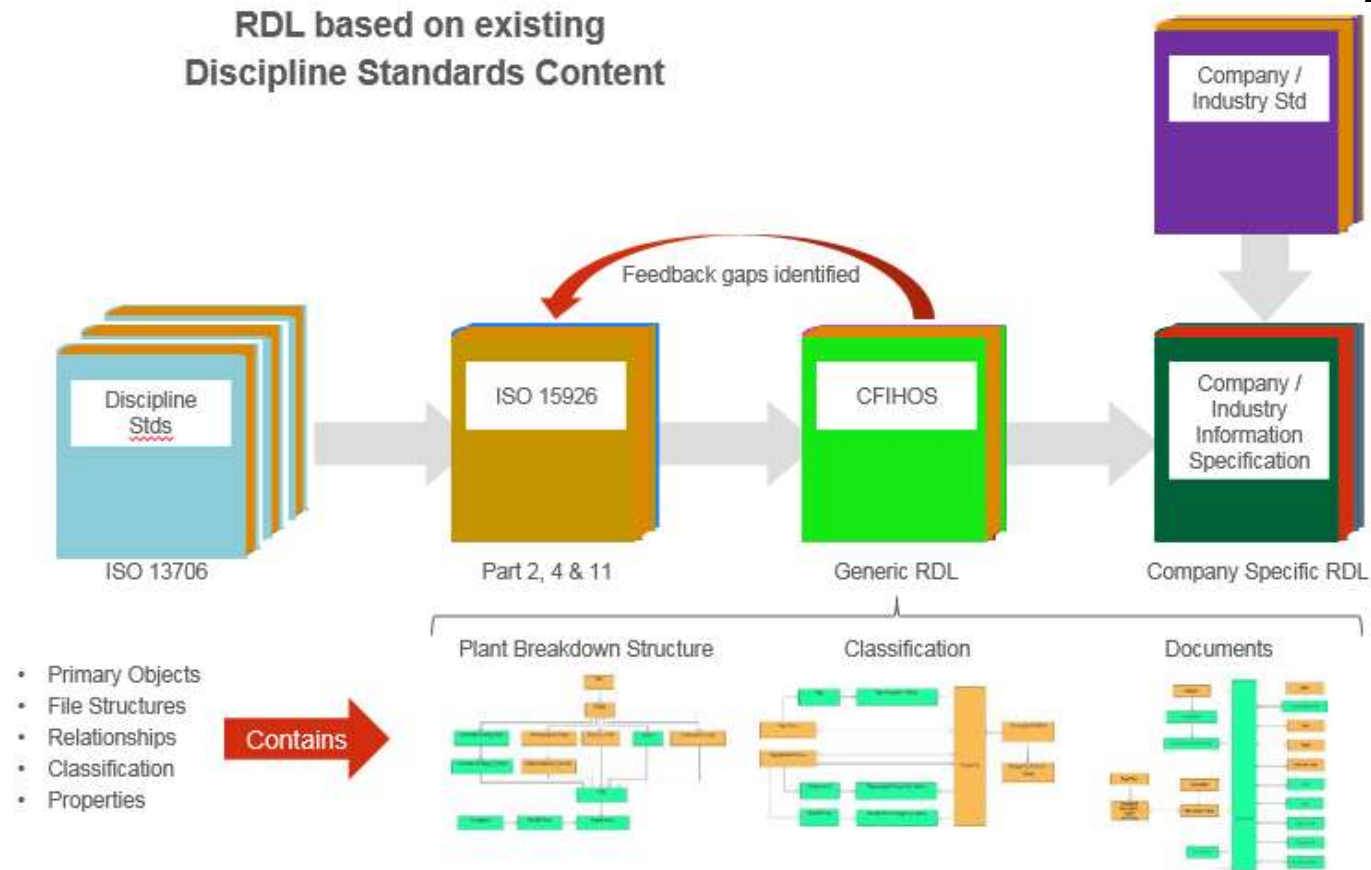
Gemeinsame Bibliothek für DEXPI und CFIHOS

Die gemeinsame Bibliothek (RDL) umfasst mehr, als die einzelnen Initiativen für sich genommen in ihren Datenmodellen verwenden.

Use of the common RDL

CFIHOS only

CFIHOS & DEXPI common use

DEXPI only

for future use