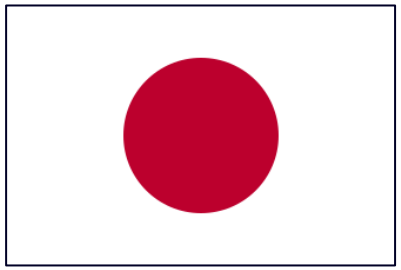
「日本巡回 ISO IEC 81346 セミナー」



STATUS AND EXAMPLES

ISO/IEC 81346 STANDARD SERIES

The Common Language in Engineering.

Wednesday 2026-06-24

by Henrik Balslev (hb@syseng.dk)

AGENDA

Open meeting 2026-06-24

1. Welcome and presentation of participants.
2. The common language for engineers
3. ISO/IEC 81346 in brief: History, elements and how it works today
4. Two case examples: Wastewater Energy Plant & Coffee Machine (by SEC-Hub® tool)
5. 81346 in IT tools: The landscape so far.
6. Useful links
7. Debate
8. Closure

SYSTEMS ENGINEERING A/S

システムズ・エンジニアリング A/S (株式会社)

HV Electrical Engineer B.Sc. 1988

ISO and IEC standards since 1996

Prefers to be **practical and daily-life** orientated.

Henrik Balslev
Founder

ヘンリック・バルスレフ
創業者（そうぎょうしゃ）

SYSTEMS ENGINEERING A/S

A selection from our portfolio

MOLIO viden, du bygger på · READI · GRUNDFOS · nel · Vestas · FLSmidth · Renewables Norway · LKAB

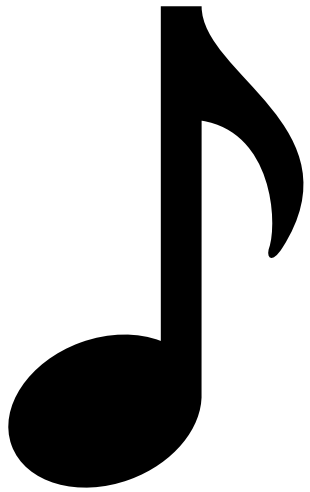
novo nordisk® · Tetra Pak® · TransAlta™ · SYNTEGON · Ørsted · Chevron · Pågen

WHY ISO/IEC 81346

The mission…

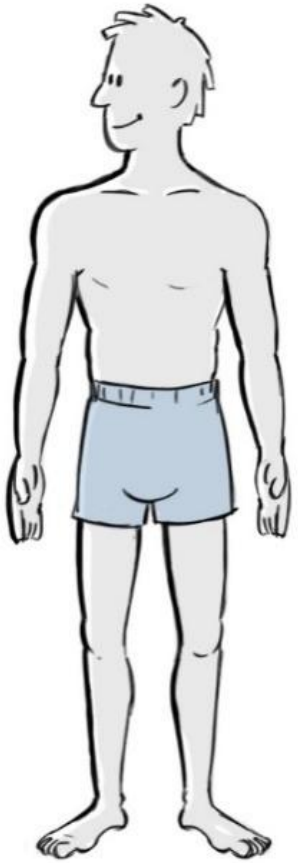
THE MISSION

a common language



THE PREMISE: SYSTEMS THINKING

RV-2FR-D-S25 | Robotsystem | Robot | Catalogue | Mitsubishi...



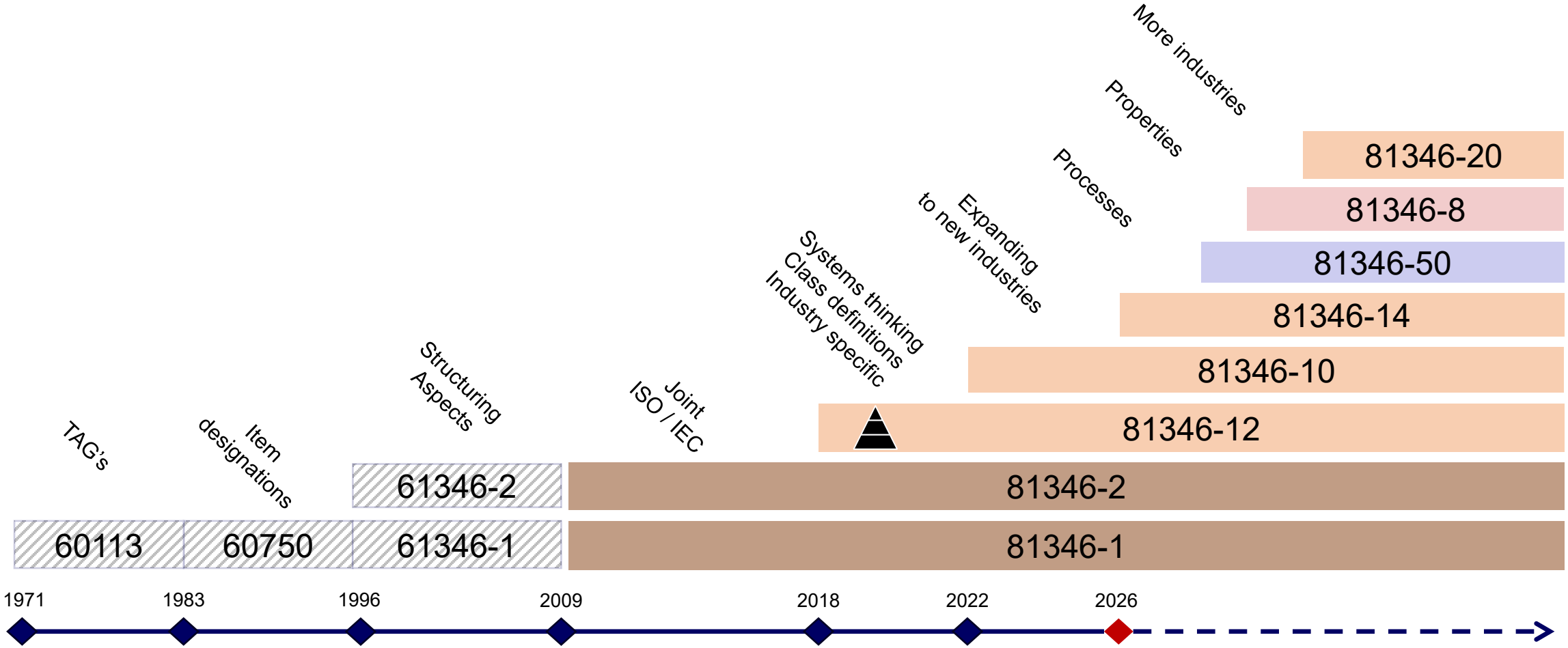
The Common Language for Engineers

ISO/IEC 81346

Standard Series

Since 1971

ISO/IEC 81346 MILESTONES SO FAR



Disclaimer: ISO TS (Technical Specification) publications are not included. Redrawn ISO publications are not included. Each valid part of 81346 is under regularly maintenance. Timeline is not linear and indicative only. Please refer to www.iso.org and www.iec.ch for full reference.

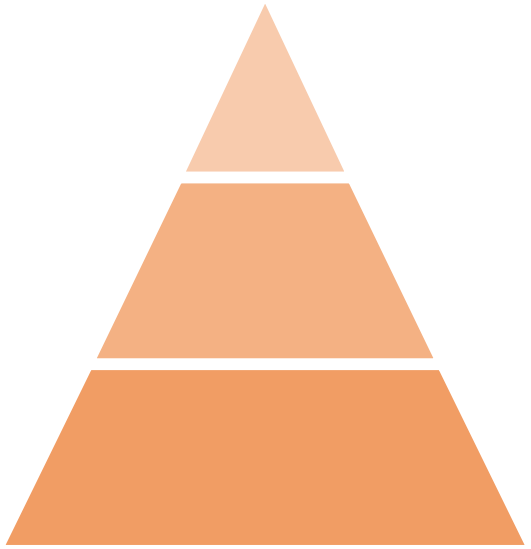
THE 81346 LIBRARIES TRIANGLES

Classes with distinct definitions

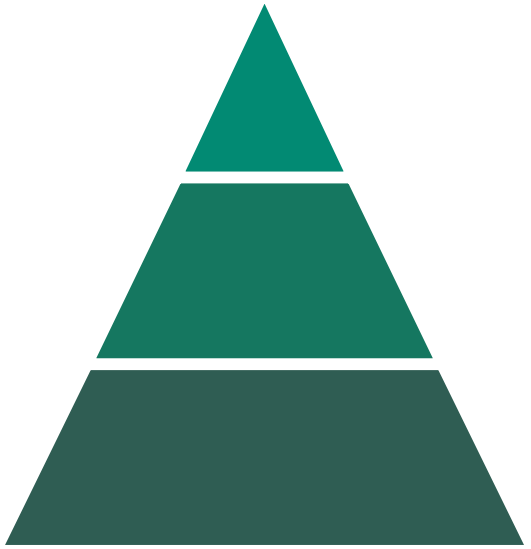
ONE
letter

TWO
letter

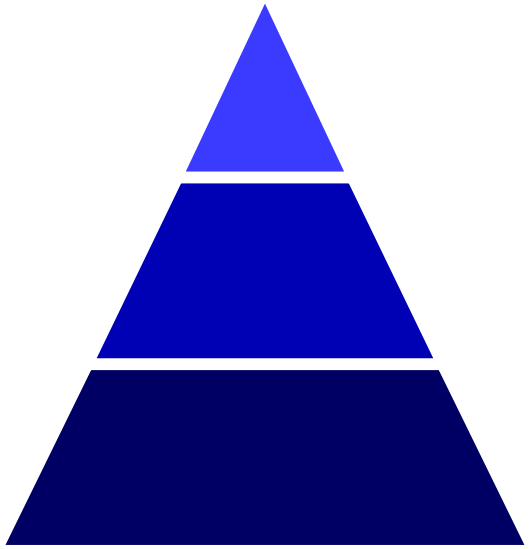
THREE
letter



Systems
81346-2 &
81346-10 / 12 / 14 / 20



Spaces
81346-2



Processes
81346-50

SAME PRINCIPLE FOR ALL CLASSES

If you know one, you know them all…

ONE letter	Prime systems	Construction complexes	Prime processes
TWO letter	Technical systems	Construction entities	Activity processes
THREE letter	Component systems	Spaces	Task processes

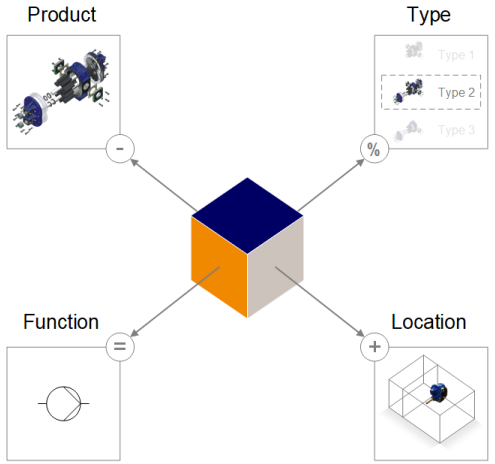
HOW 81346 WORKS

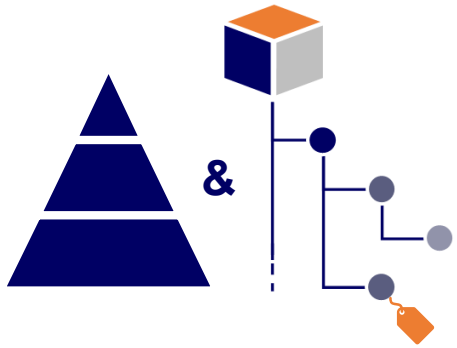
The reference model

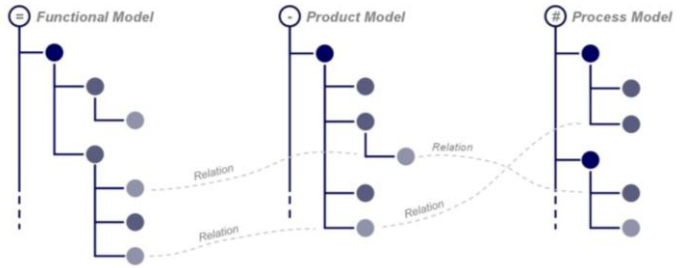
ISO/IEC 81346
Standard Series

THE ISO/IEC 81346 STANDARD SERIES

The common language







Aspects | ***Classes & Structure*** | ***Relations***

System Reference Model

RDS 81346 CLASSIFICATION SYSTEM

A door is a door!

1

… with many properties!

RDS 81346 CLASSIFICATION SYSTEM

ISO/IEC 81346-2

Q__	object for controlling access or flow	controlling object
QQ_	controlling object to a space	space access object
QQC	space access object for upright passage by persons	door

RDS 81346 CLASSIFICATION SYSTEM

ISO/IEC 81346-2 (in Japanese by AI)

Q__	アクセスまたは流れを制御するためのオブジェクト	「制御オブジェクト」
QQ_	「空間に対する制御オブジェクト」	「空間アクセスオブジェクト」
QQC	「人が直立して通行するための空間アクセスオブジェクト」	「ドア」

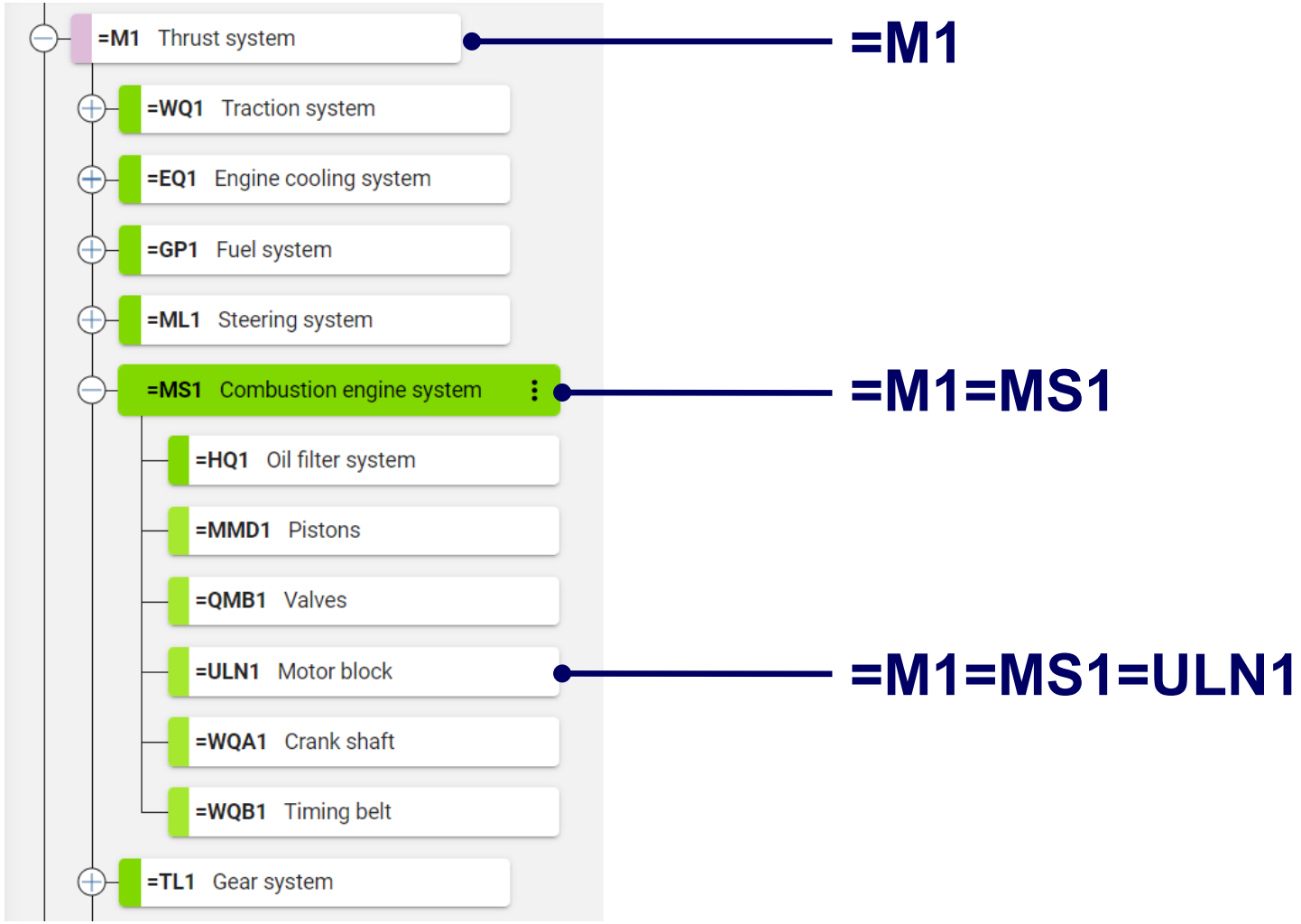
Disclaimer: Text translated to Japanese by AI. Not validated. For illustration purposes only.

THE REFERENCE MODEL

What 81346 offers to you.

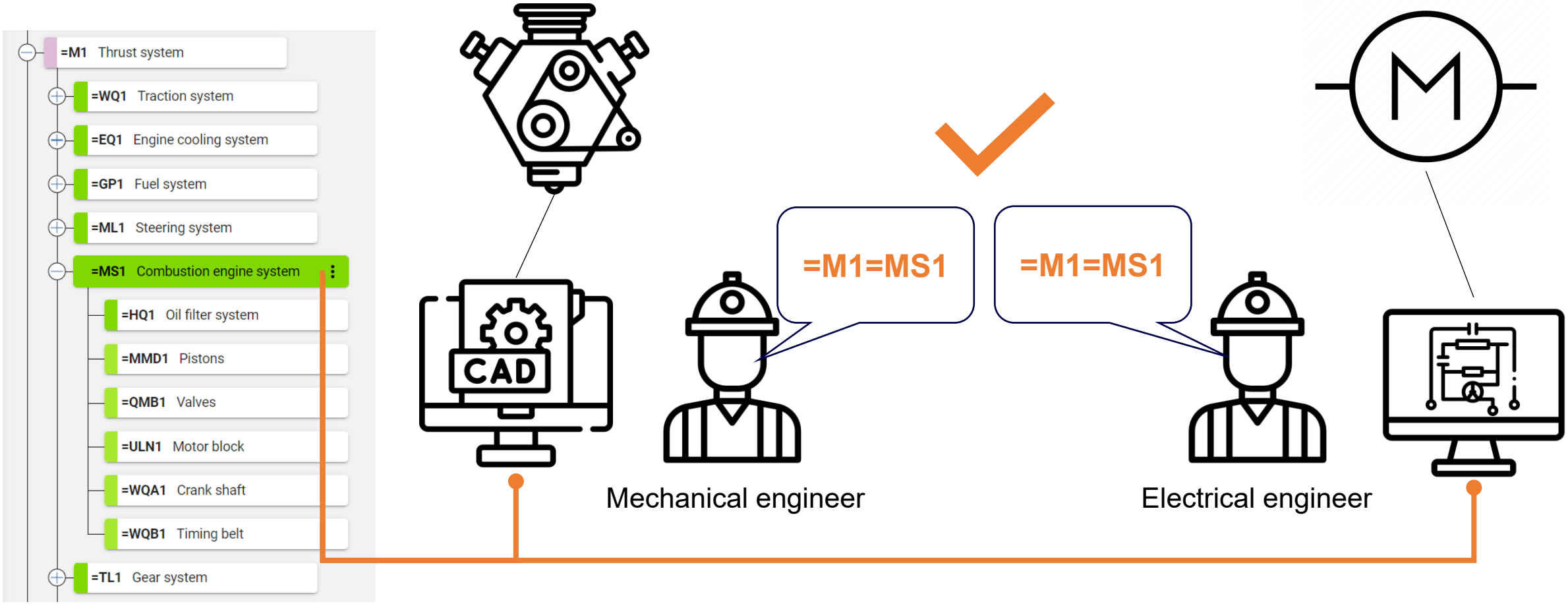
SYSTEM REFERENCE MODEL

Using the ISO/IEC 81346 common language for systems



SYSTEM REFERENCE MODEL

Common language for systems engineering

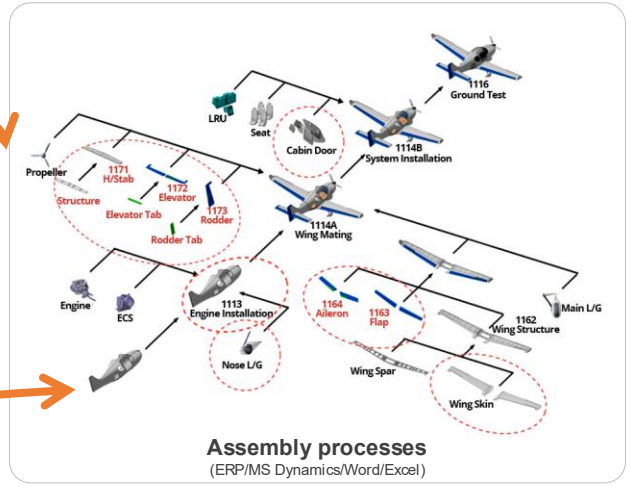


CURRENT LANDSCAPE

Linking silos

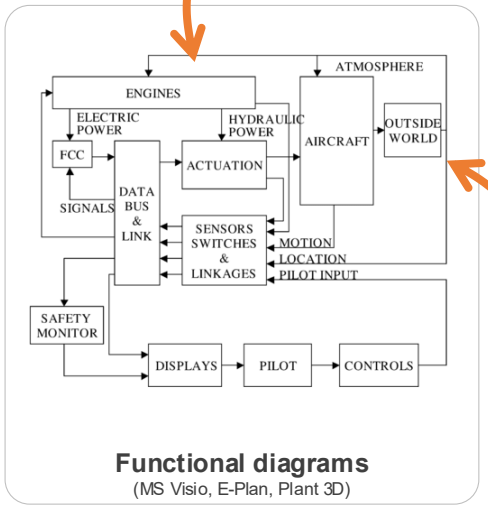
3D CAD model
(ProE/SolidWorks/Catia)

creo SolidWorks CATIA



Assembly processes
(ERP/MS Dynamics/Word/Excel)

SAP ERP



Functional diagrams
(MS Visio, E-Plan, Plant 3D)

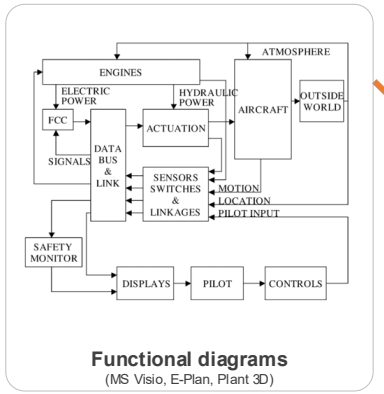
AUTOCAD PLANT 3D

Assembly & service fixtures
(ProE/SolidWorks/Catia/Fusion 360)

creo SolidWorks CATIA

ONE COMMON REFERENCE MODEL

Common foundation in the RDS model



Functional diagrams
(MS Visio, E-Plan, Plant 3D)

AUTOCAD PLANT 3D

Assembly & service fixtures
(ProE/SolidWorks/Catia/Fusion 360)

Digital Twin: A complete **Reference Model** of a System-of-Interest

*(Creates the **Common Language** for Model Based Systems Engineering)*

A *Functional view*
How does the system work?
= Functional systems

B *Modular view*
How is the system constructed?
- Physical systems

C *Process view*
How is the system assembled?
Processes

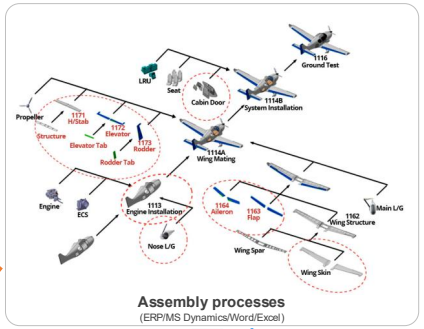
Reference model A *Reference model B* *Reference model C*

Reference model D

Reference model E (Complete model)

The digital twin is Model Based Systems Engineering (MBSE)

3D CAD model
(ProE/SolidWorks/Catia)



Assembly processes
(ERP/MS Dynamics/Word/Excel)

SAP ERP

ONE COMMON REFERENCE MODEL

Common foundation in the RDS model

Digital Twin: A complete **Reference Model** of a System-of-Interest

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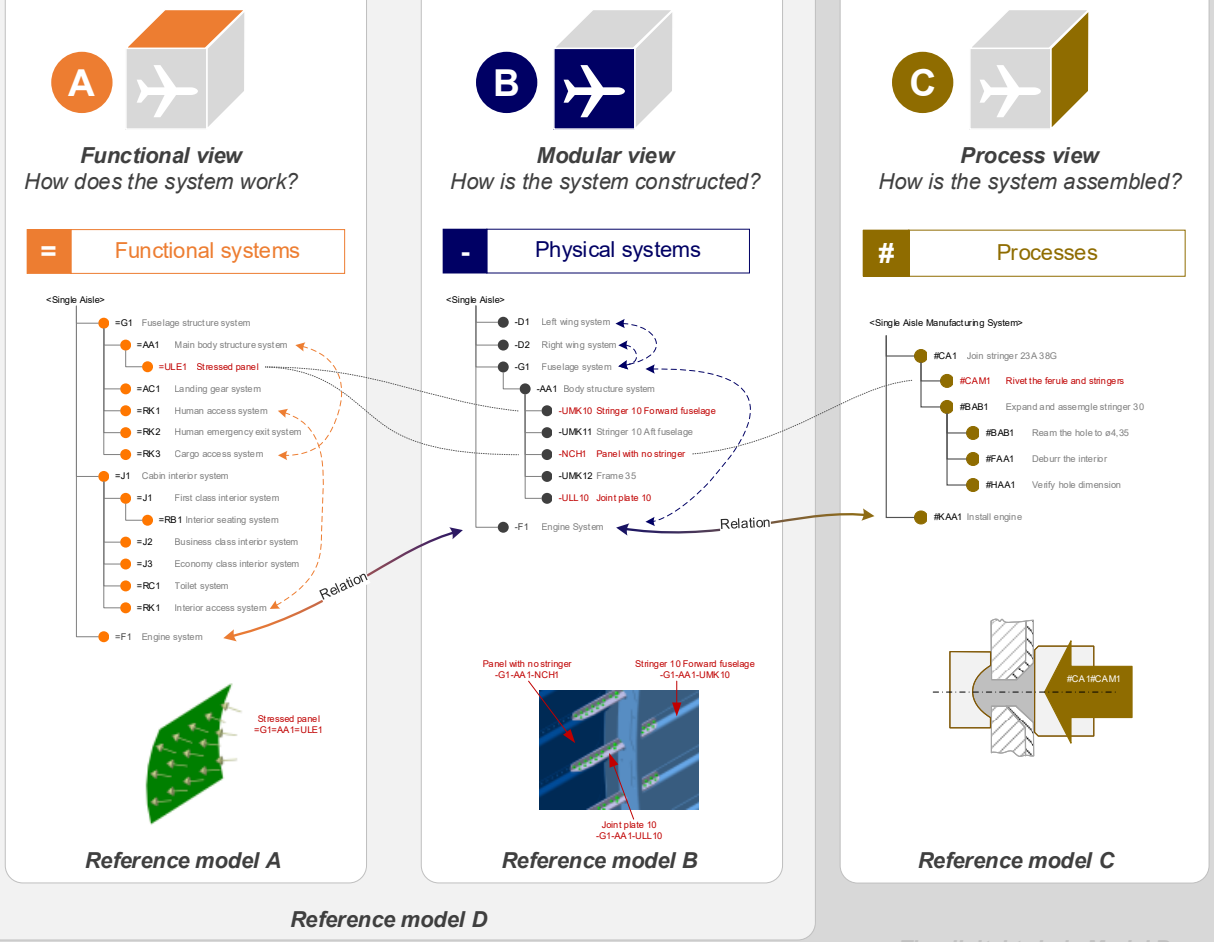


81346 USE CASE #1

Aarhus Water – The ReWater Project

New Wastewater Energy Plant in Denmark

Aarhus ReWater

The world's most resource-efficient wastewater treatment plant will be located in Aarhus.

Close to the city, the sea, and everyday life, the new facility – Aarhus ReWater – will receive our wastewater, ensure high water quality in streams, lakes, and the bay, and transform wastewater into new materials, new products, and new energy.

APPLICATIONS IN THE REWATER PROJECT

Using systems engineering, IOS/IEC 81346 offers this support:

Reference Designations
Syntax for identifiers for systems, components, and assets (i.e., a "TAG")

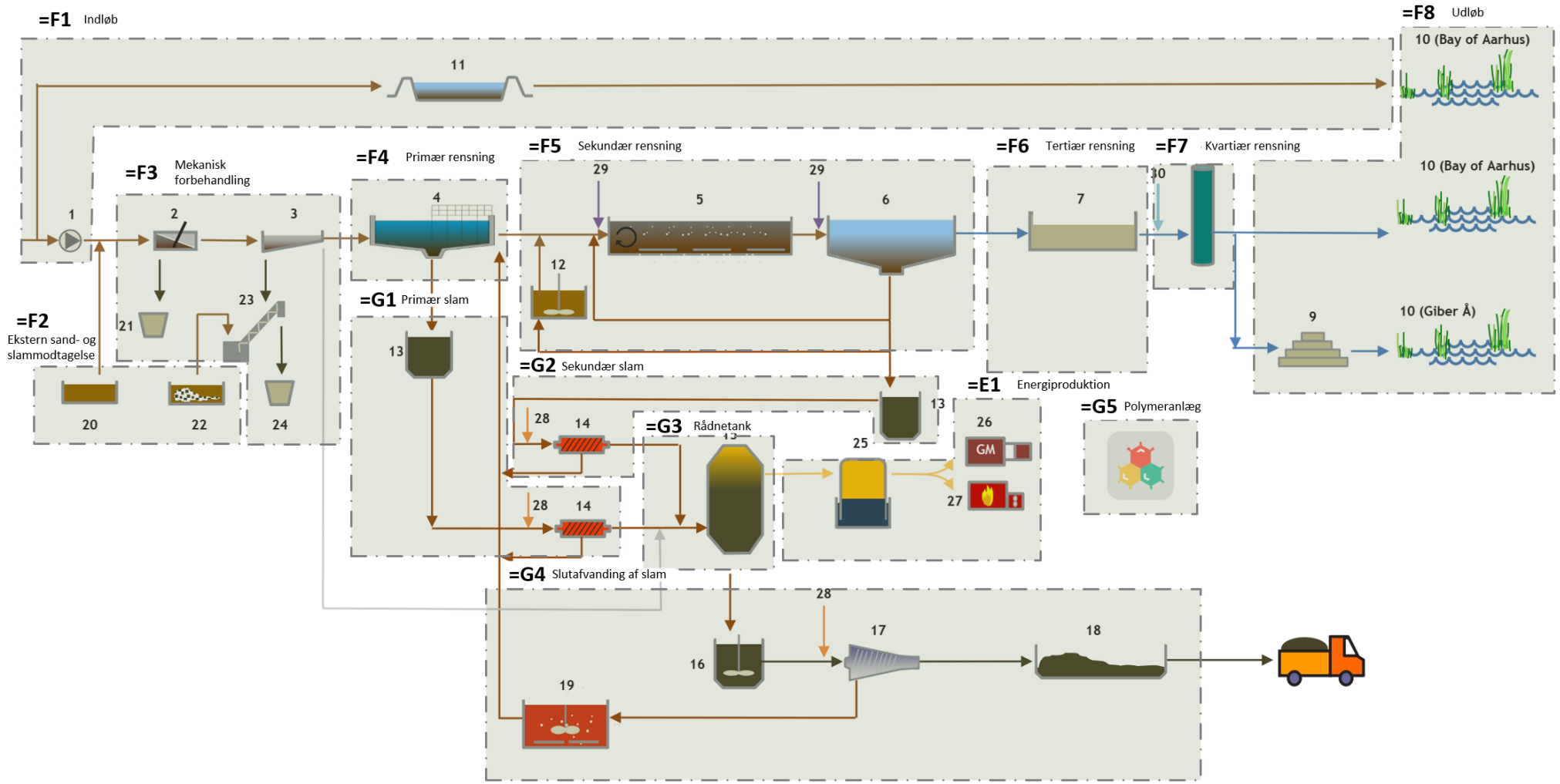
System Architecture Models
Clear, hierarchical representations of complex systems (i.e., MBSE).

Multiple Model Connections
Structure for interoperable digital representations. (i.e., reference points)

Interface Management
Traceability of all interfaces among systems (i.e., dependencies)

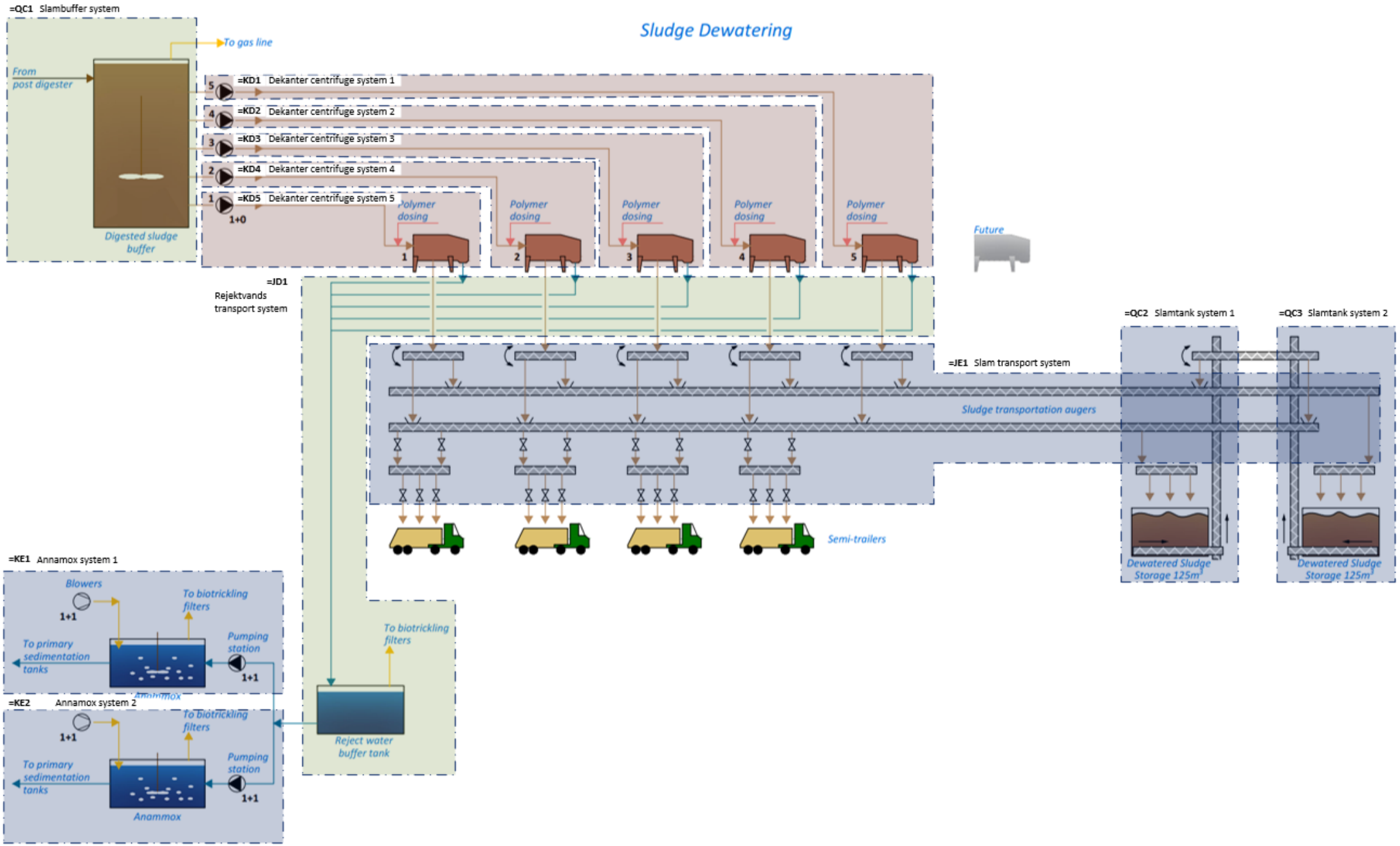
Link to Requirements
Linking requirements to the solutions (i.e., the systems)

AAV REWATER SYSTEMS

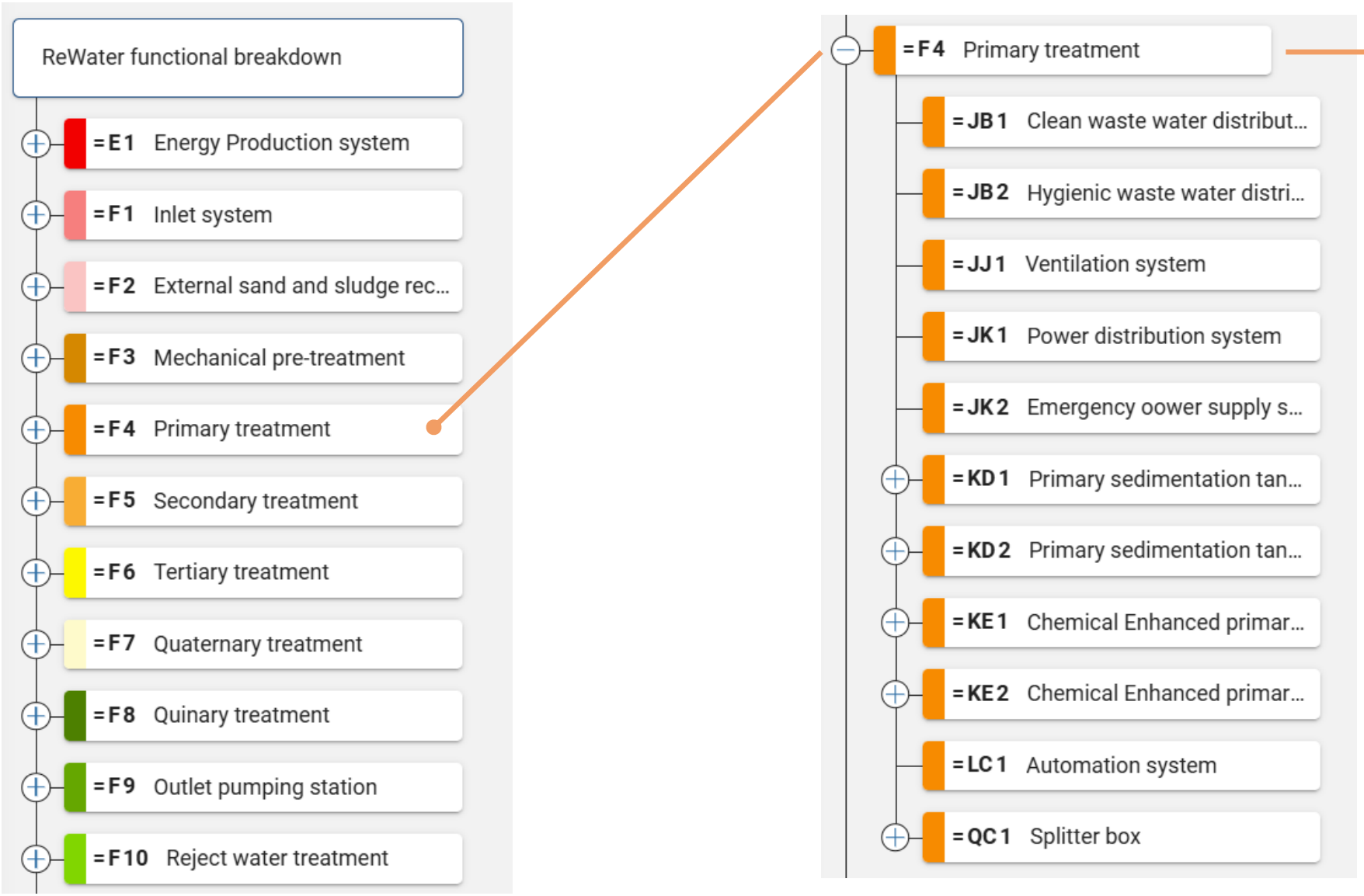


=G4

Sludge Dewatering



REWATER REFERENCE MODEL (M1)



System Owner

Example from SEC-Hub®

39 x 39	=F1 Inlet system	=F2 External sand and sludge... reception	=F3 Mechanical pre-treatment... system	=F4 Primary treatment system	=F5 Secondary treatment system	=F6 Tertiary treatment system	=F7 Quaternary treatment system
=F1 Inlet system	**=F1** Inlet system	–	DB	–	–	–	–
=F2 External sand and sludge... reception	–	**=F2** External sand and sludge... reception	DB DC	–	–	–	–
=F3 Mechanical pre-treatment... system	–	DC	**=F3** Mechanical pre-treatment... system	DB DC	DB	–	–
=F4 Primary treatment system	–	–	DC	**=F4** Primary treatment system	DB	–	–
=F5 Secondary treatment system	–	–	–	–	**=F5** Secondary treatment system	DB	–
=F6 Tertiary treatment system	–	–	–	–	–	**=F6** Tertiary treatment system	DB DD

SEC
M2c

REQ MAN WITHOUT SE

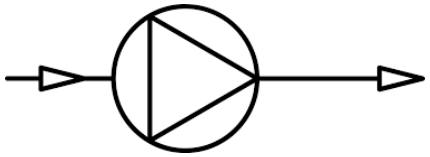
1. REQ

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Maecenas porttitor congue massa. Fusce posuere, magna sed pulvinar ultricies, purus lectus malesuada libero, sit amet commodo magna eros quis urna.

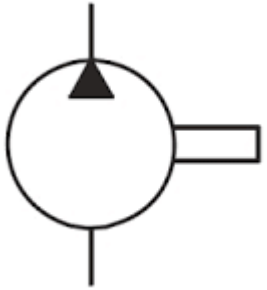
Nunc viverra imperdiet enim. Fusce est. Vivamus a tellus.

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Proin pharetra nonummy pede. Mauris et orci.

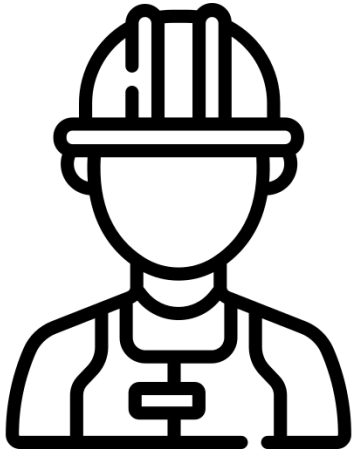
2. DESIGN



2A. Alternative



3. CONSTRUCTION



REQ MAN WITH SE

Scope M2a

1. REQ

001. Lorem ipsum dolor sit amet, consectetuer adipiscing elit.

002. Maecenas porttitor congue massa.

003. Fusce posuere, magna sed pulvinar ultricies.

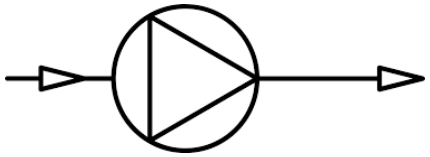
004. Nunc viverra imperdiet enim. Fusce est. Vivamus a tellus.

005. Pellentesque habitant morbi tristique senectus

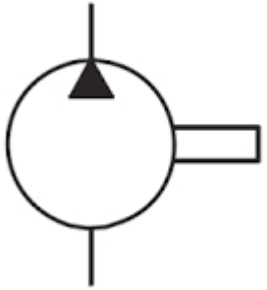
006.Proin pharetra nonummy pede. Mauris et orci.

&

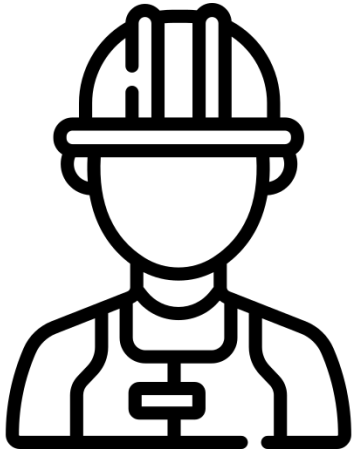
2. DESIGN



2A. Alternative

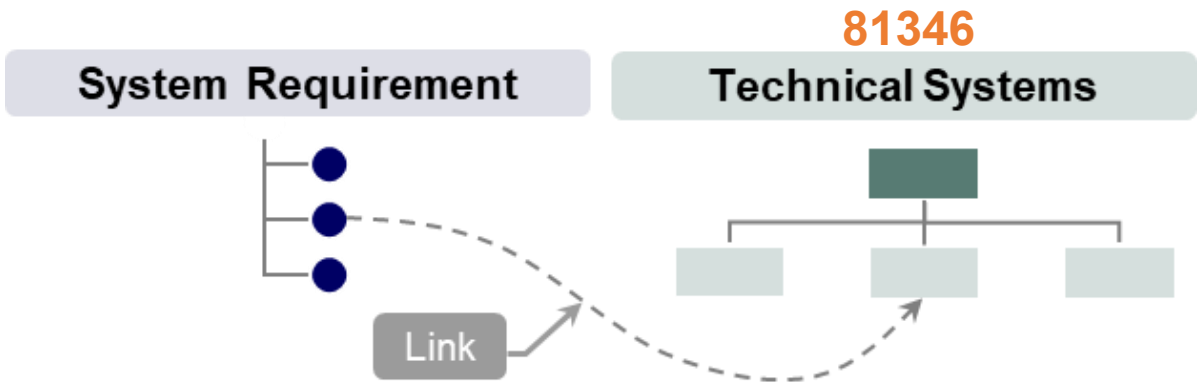


3. CONSTRUCTION



REQUIREMENT TRACEABILITY

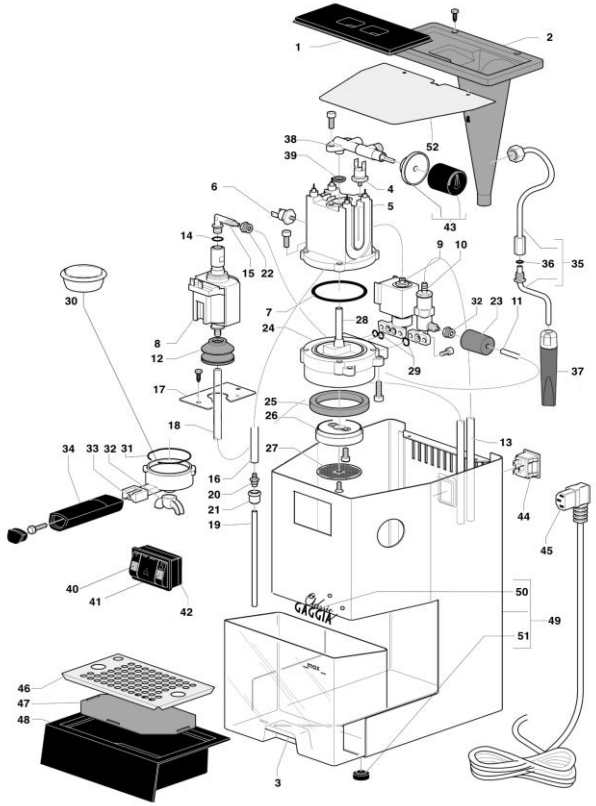
Linking Requirements to Systems



Linking an element of the System Requirement with an element of the ISO/IEC 81346 Systems – both consist of a hierarchal structure documents the dependency between the two elements and is the basis of **requirement traceability**.

RDS[AI] 81346 Software

by SEC-Hub®



81346 USE CASE #2

Coffee Machine – From BOM list to System Breakdown

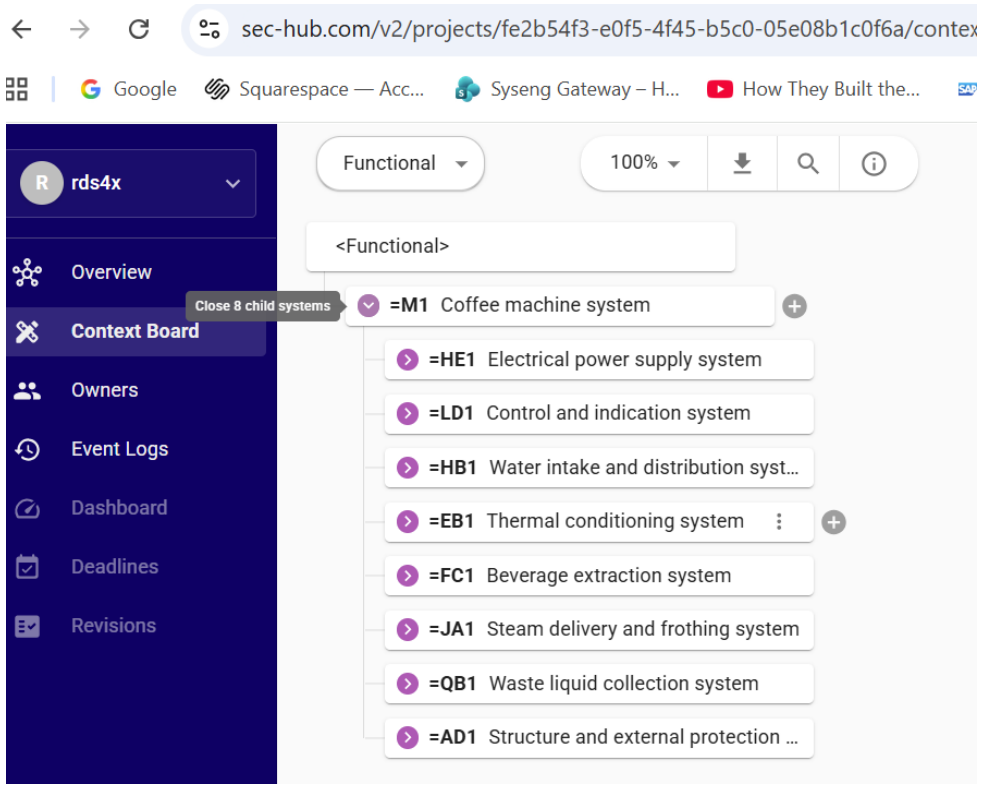
FROM BOM TO SYSTEMS…

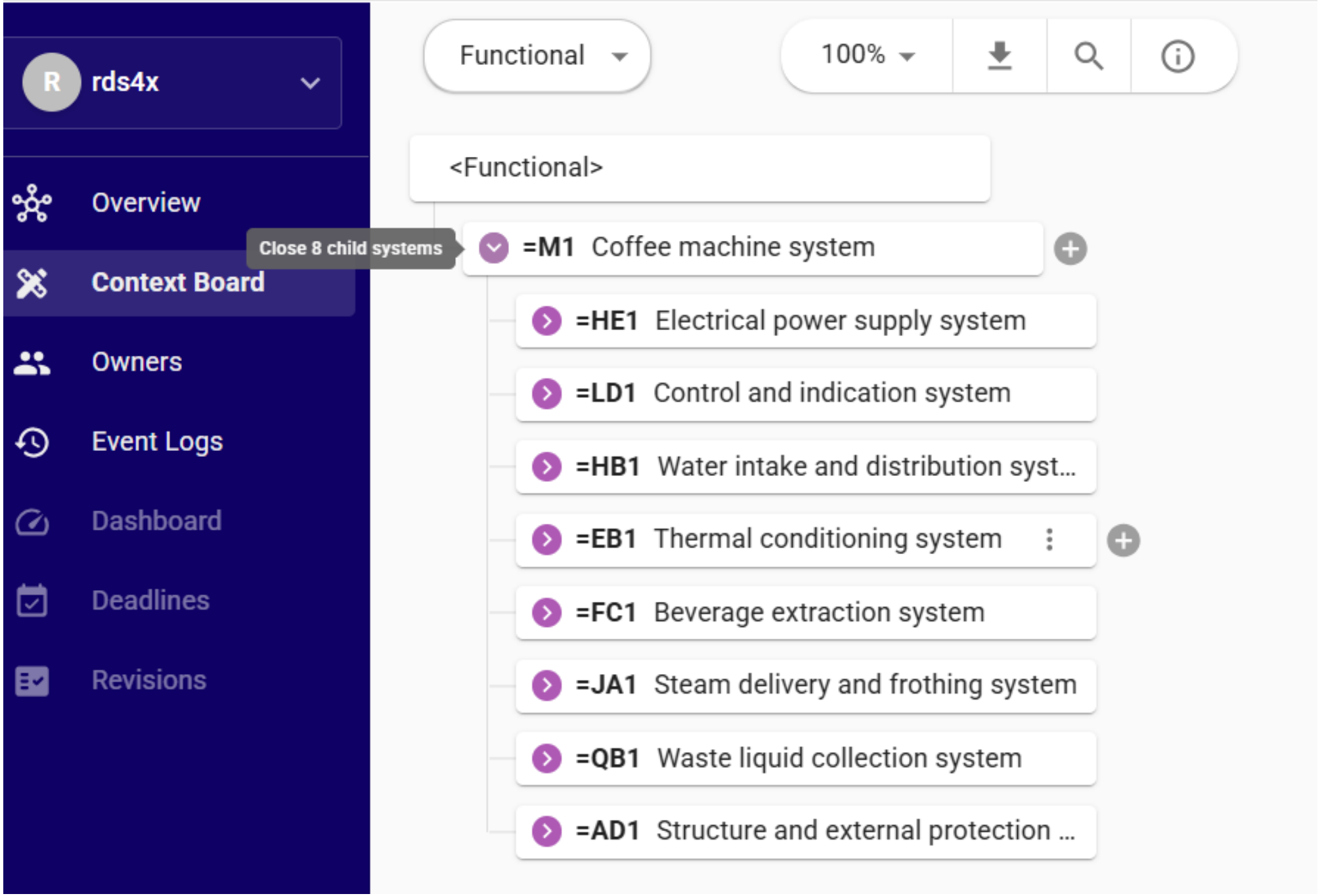
Easy start…

RDS^{AI} 81346 Software
by SEC-Hub®

1	Water tank lid	27	Shower
2	Water tank funnel	28	Copper pipe
3	Water tank	29	O-ring gasket
4	Steam temperature switch	30	Portafilter basket
5	Boiler assembly	31	Retention spring
6	Coffee temperature switch	32	2-way spout
7	Water heater gasket	33	Filter holder cup
8	Water pump	34	Portafilter handle
9	Solenoid valve	35	Steam pipe set
10	Electrovalve	36	O-ring for steam pipe
11	Silicone tube	37	Steam frother pipe
12	Flange for water pump	38	Steam valve assembly
13	Silicone tube	39	Gasket for steam valve
14	O-ring gasket	40	Power light (ON/OFF)
15	Elbow tube fitting	41	Temperature ready-light
16	Silicone tube	42	Control panel assemply
17	Water pump support bracket	43	Steam knob assembly
18	Silicone tube	44	3 pole pin
19	Outlet tube	45	Power cord
20	Rubber fitting for outlet tube	46	Drip tray grid
21	Nut for outlet tube	47	Drip tray grid support
22	Fastening nut	48	Drip tray
23	Safety rubber device	49	Outer housing
24	Group body	50	Classic metal logo
25	Filter holder gasket	51	Rubber foot
26	Shower holder plate	52	Top cover

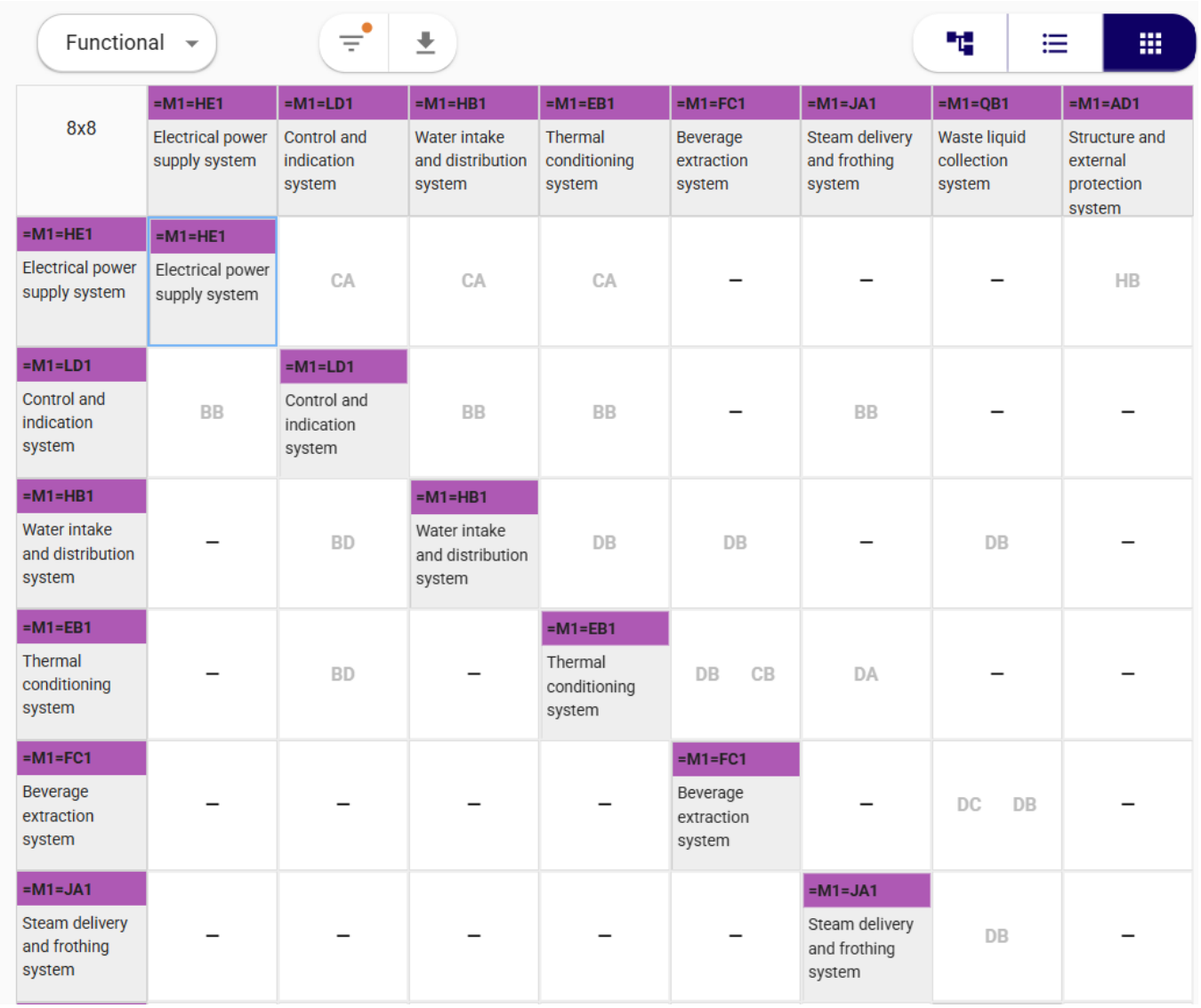
RDS^{AI}




R
rds4x
Overview
Context Board
Owners
Event Logs
Dashboard
Deadlines
Revisions
Functional
100%
<Functional>
Close 8 child systems
=M1 Coffee machine system
=HE1 Electrical power supply system
=LD1 Control and indication system
=HB1 Water intake and distribution syst...
=EB1 Thermal conditioning system
=FC1 Beverage extraction system
=JA1 Steam delivery and frothing system
=QB1 Waste liquid collection system
=AD1 Structure and external protection ...

RDS[AI] 81346 Software

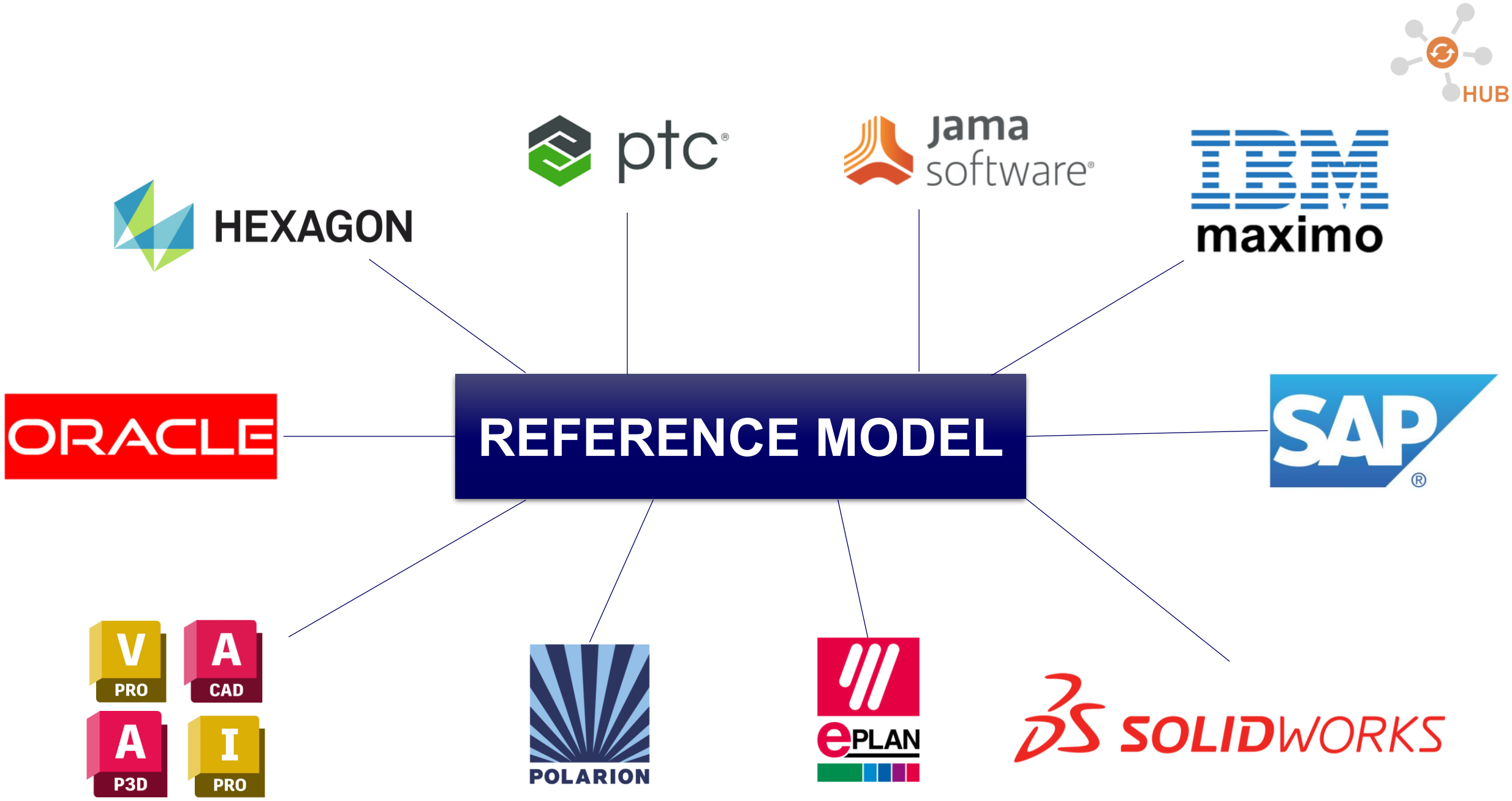
by SEC-Hub®



8x8	=M1=HE1 Electrical power supply system	=M1=LD1 Control and indication system	=M1=HB1 Water intake and distribution system	=M1=EB1 Thermal conditioning system	=M1=FC1 Beverage extraction system	=M1=JA1 Steam delivery and frothing system	=M1=QB1 Waste liquid collection system	=M1=AD1 Structure and external protection system
=M1=HE1 Electrical power supply system	=M1=HE1 Electrical power supply system	CA	CA	CA	–	–	–	HB
=M1=LD1 Control and indication system	BB	=M1=LD1 Control and indication system	BB	BB	–	BB	–	–
=M1=HB1 Water intake and distribution system	–	BD	=M1=HB1 Water intake and distribution system	DB	DB	–	DB	–
=M1=EB1 Thermal conditioning system	–	BD	–	=M1=EB1 Thermal conditioning system	DB CB	DA	–	–
=M1=FC1 Beverage extraction system	–	–	–	–	=M1=FC1 Beverage extraction system	–	DC DB	–
=M1=JA1 Steam delivery and frothing system	–	–	–	–	–	=M1=JA1 Steam delivery and frothing system	DB	–

81346 IN SOFTWARE

The landscape so far

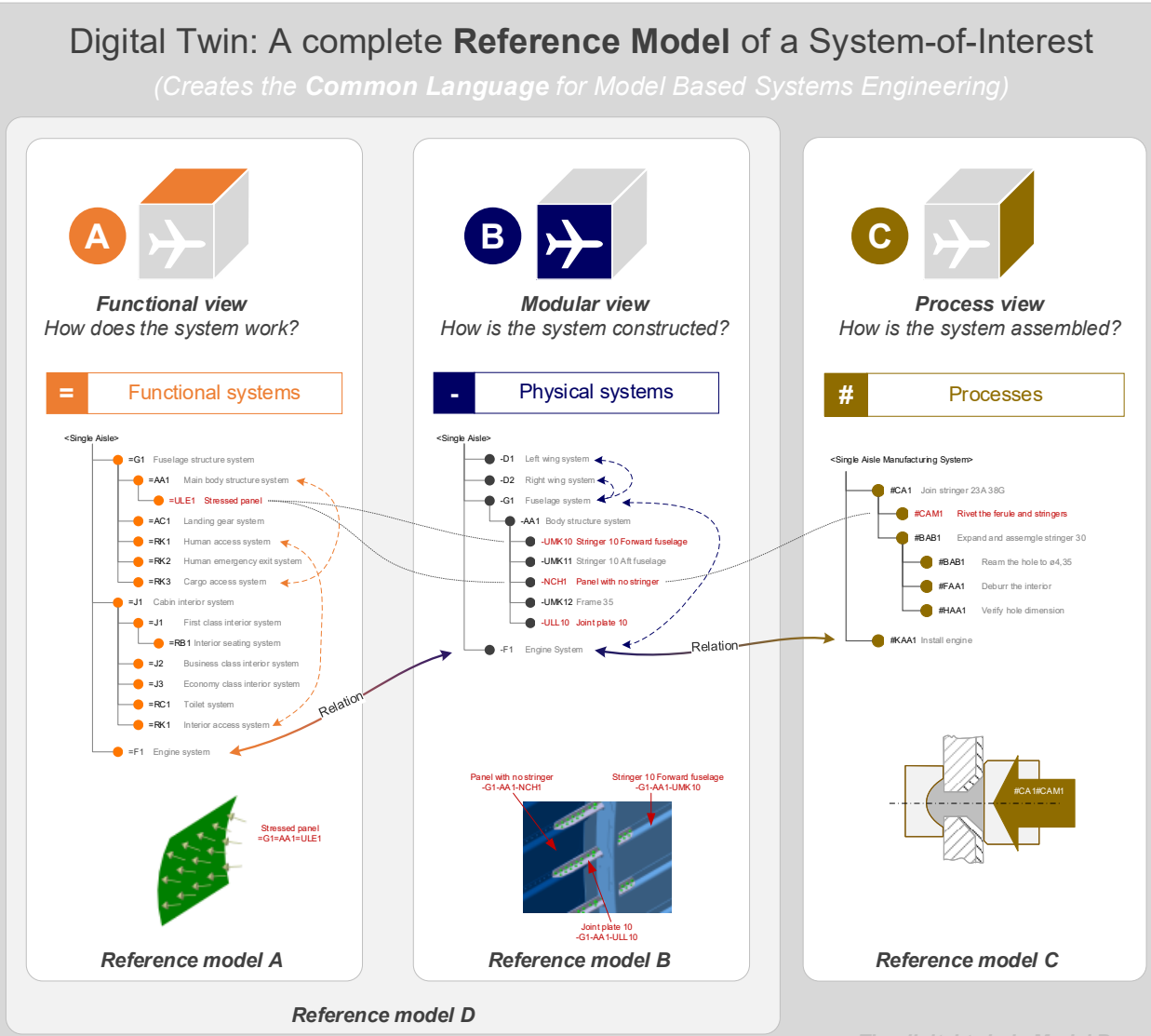

HUB
ptc
Jama software
HEXAGON
IBM maximo
ORACLE
REFERENCE MODEL
SAP
V PRO
A CAD
A P3D
I PRO
POLARION
ePLAN
SOLIDWORKS

ONE COMMON REFERENCE MODEL

Common foundation in the RDS model

Digital Twin: A complete **Reference Model** of a System-of-Interest

*(Creates the **Common Language** for Model Based Systems Engineering)*



3 - TYPES OF SOFTWARE IN SCOPE

1. High-level descriptive-oriented data object systems

- Typically, document management systems
- Primary data objects are files (Excel, PDF, WORD, TEXT,…)
- Metadata is limited and revolves around approval and version control
- Objects are unique and have no hierarchy

MasterControl
SharePoint
Google Drive

2. Component-oriented data systems

- Typically, resource management systems
- Primary data objects are vast and focus on Components quantities, location, flow and processes.
- Metadata is vast and flexible
- Name and meta data provides the context in which the object can be understood
- Objects are unique, often not generated in any hierarchy

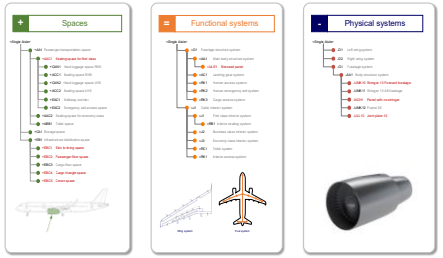
POLARION
ptc
HEXAGON
ORACLE
SAP
Jama software

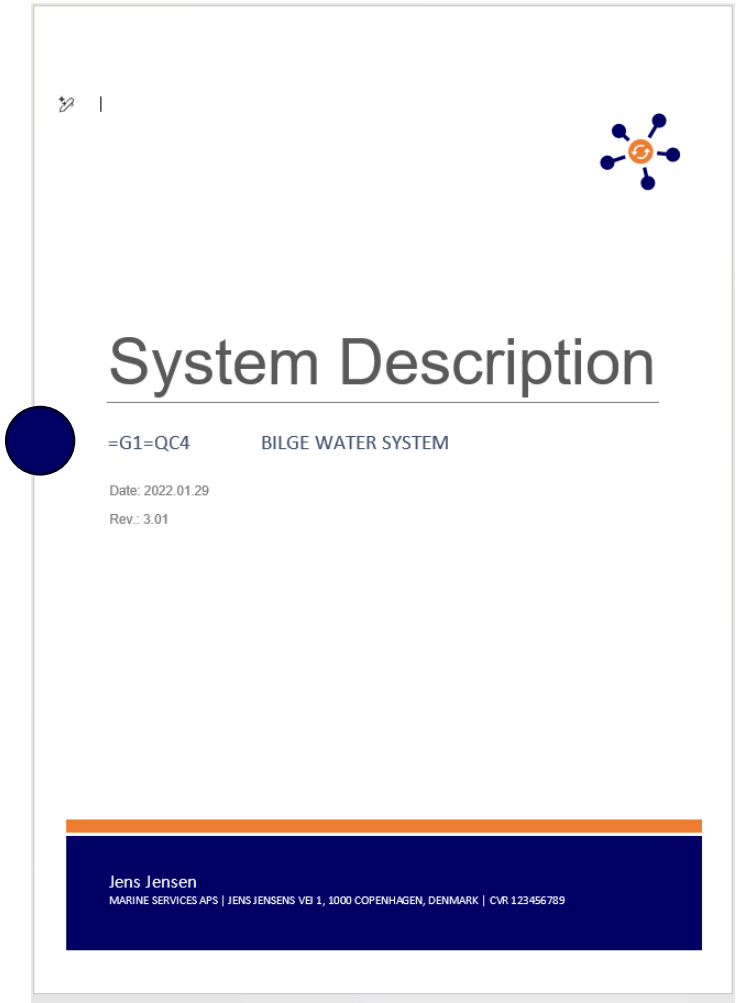
3. RD orient data systems

- Typically, a solution that uses hierarchy as part of its RD
- Data Objects are moderate in numbers and focus on Engineering and human readability
- Electrical diagrams, PLM systems
- Has specific logic to handle RD, such as the ripple effect in RD.

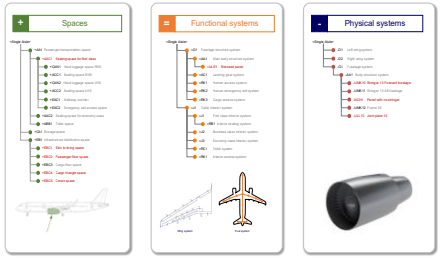
A CAD
I PRO
ePLAN

1. DOCUMENT SYSTEMS



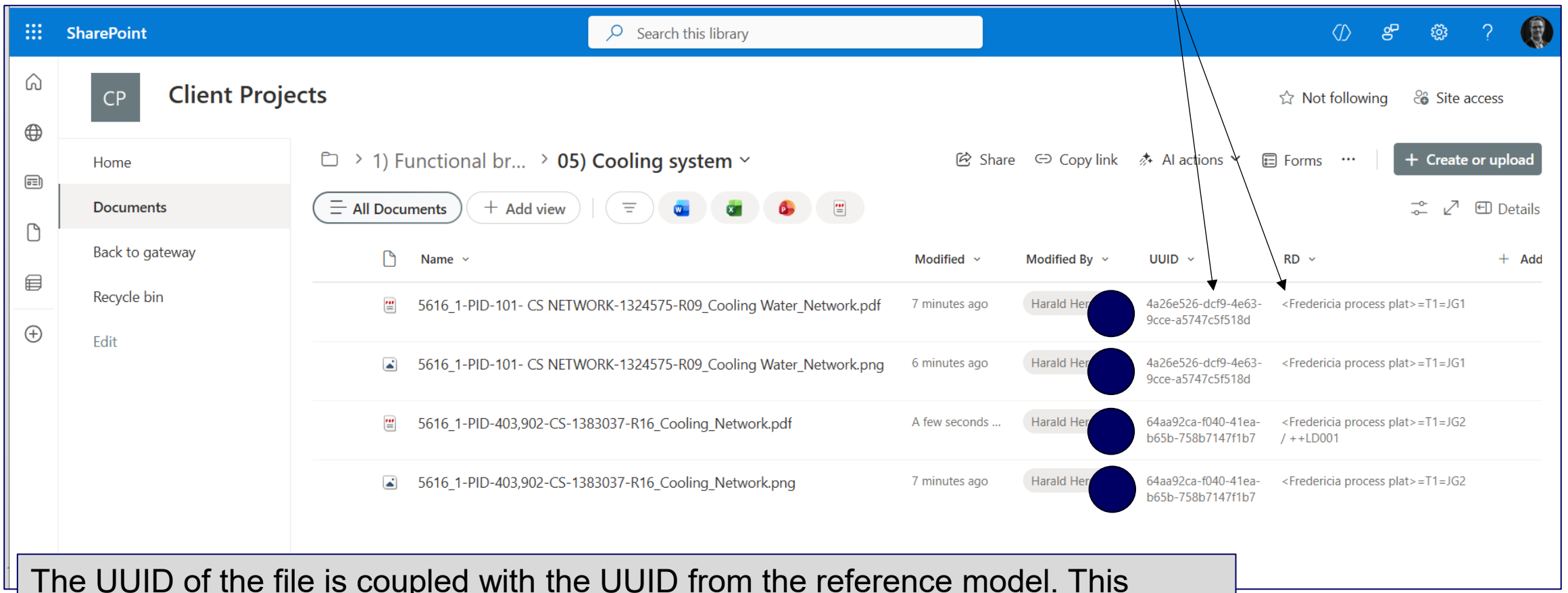


1. DOCUMENT SYSTEMS



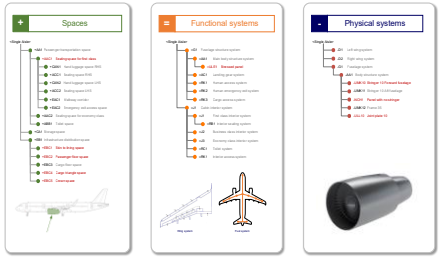
SharePoint

Text field



The UUID of the file is coupled with the UUID from the reference model. This allows us to receive/send, and RD associated with this code through API

2. RD RECOGNISED SYSTEMS



Actions ▾ Part - WCDS0000000532, 01-10000.asm, A.1 (Design) In Work

Details | Structure | Related Objects | Changes | History | Where Used | New Tab 1

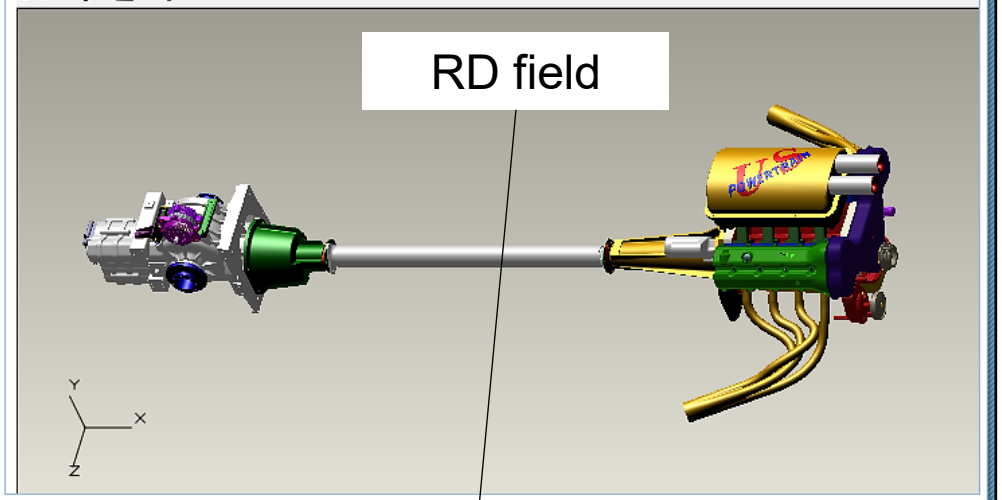
Editing: Insert Existing, Remove, Insert New, Edit
Check Out/In: Check Out, Undo Checkout, Check In, My Checkouts
Clipboard: Paste, Copy
Viewing: Show/Hide, Views, Display
New/Add To: New, Add to
Filter: Edit Filter, Current Filter, Saved Filters
Tools: Compare, Open in
Reports: Reports

Find in Structure

Identity

- WCDS0000000532, 01-10000.asm, A.1 (Design)
  - WCDS0000000023, 01-20000.asm, A.1 (Design)
    - WCDS0000000044, 01-2_engine.asm, A.1 (Design)
      - WCDS0000000048, water_pump_housing.prt, A.1 (Design)
      - WCDS0000000100, power_steering_pump.prt, A.1 (Design)
      - WCDS0000000127, 01-2_block_v.prt, A.1 (Design)
      - WCDS0000000133, 01-2_crankshaft.asm, A.1 (Design)
        - WCDS0000000285, 01-2_crankshaft_ground.prt, A.1 (Design)
        - WCDS0000000374, connecting_rod.asm, A.1 (Design)
          - WCDS0000000046, connecting_rod_bolt_nut.prt, A.1 (Design)
          - WCDS0000000050, connecting_rod.prt, A.1 (Design)
          - WCDS0000000159, connecting_rod_bushing.prt, A.1 (Design)
          - WCDS0000000258, connecting_rod_bolt.prt, A.1 (Design)
          - WCDS0000000738, connecting_rod_cap.prt, A.1 (Design)
        - WCDS0000000469, 01-2_damper_pulley.prt, A.1 (Design)
        - WCDS0000000533, 01-2_crankshaft.prt, A.1 (Design)
        - WCDS0000000689, 01-2_piston.asm, A.1 (Design)

Attributes | Visualization

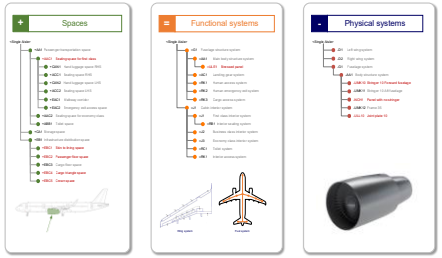


Uses | Occurrences

Number	Name	Version	End Item	Line Number	Quantity	Unit	Trace Code	Reference Designator	Find Number
WCDS0000000023	01-20000.asm	A.1 (Design)	No		1	each	Untraced	5≤Plant X>=A1=TA1=MAA1	
WCDS0000000094	01-31000.asm	A.1 (Design)	No		1	each	Untraced	7≤Plant X>=A2=QM1=TMA2	
WCDS0000000244	01-33110.prt	A.1 (Design)	No		1	each	Untraced	7≤Plant X>=A2=JG1=GPA3	
WCDS0000000360	01-40000.asm	A.1 (Design)	No		1	each	Untraced	6≤Plant X>=A2=JG1=GPA4	
WCDS0000000361	01-50000.asm	A.1 (Design)	No		1	each	Untraced	5≤Plant X>=A2=JG1=GPA5	

Displaying 1 - 7 of 7

2. RD RECOGNISED SYSTEMS



POLARION

Collections Demonstration

Climate System Software Component

Search

Adrian
My Polarion

Current
Collections Demonstration

Design

Software Requirement Specification

Software Test Case Specification

Project scope & feasibility

Requirements

Standards

200881

Collections

baugi1

Normal | Segoe UI | 10

RD field

2.2 User Console

CD-334 - The User Console will resemble a typical dashboard display and include options f...

The User Console will resemble a typical dashboard display and include options for system configuration.

Should Have, Approved, ~~Version 1.0 (2017-07-31)~~

2.2.1 DrivePilot iPad Console Application

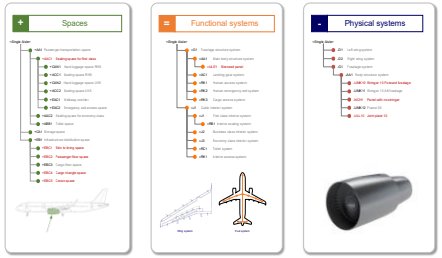
CD-345 - iPad User Interface application can be downloadable through AppStore, but requir...

iPad User Interface application can be downloadable through AppStore, but requires authentication code from DrivePilot to

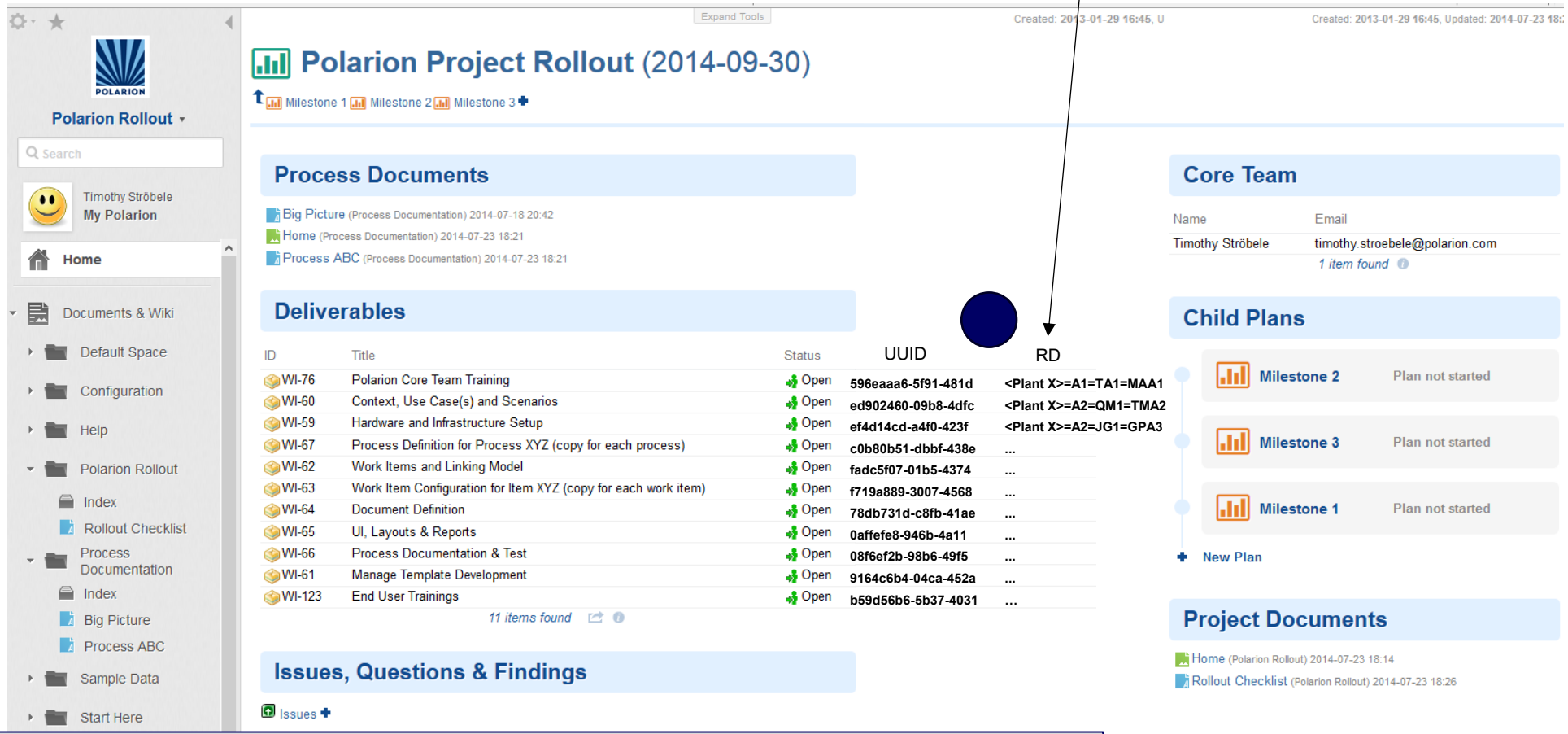
3. RD Code

<Plant X>=A1=TA1=QMA1

2. RD RECOGNISED SYSTEMS

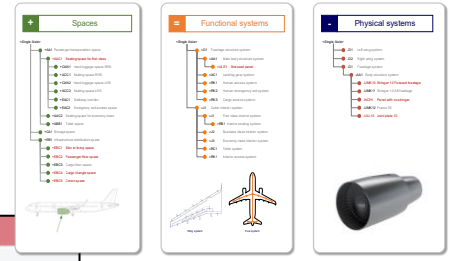


RD field

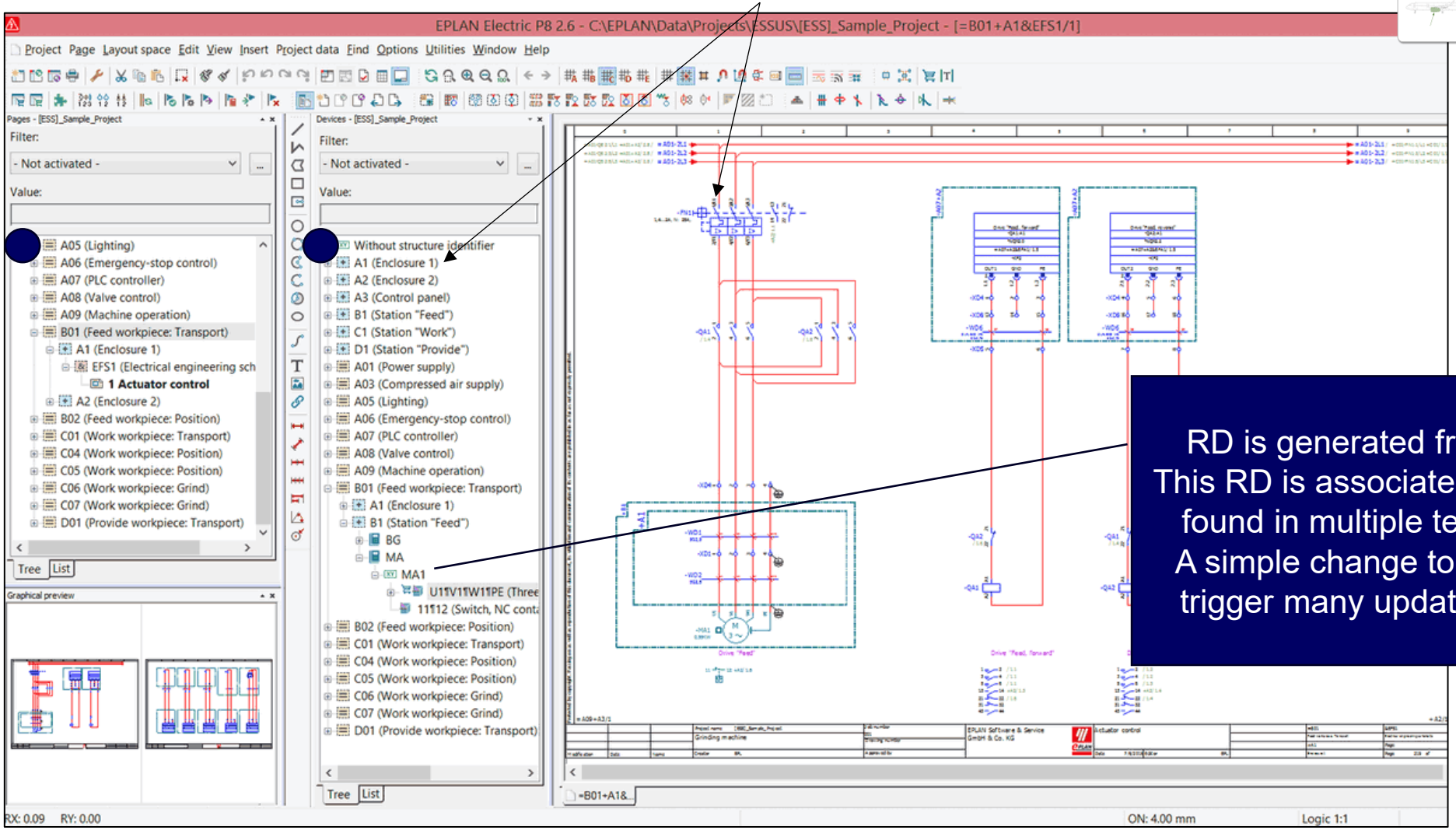


The UUID of the Object is coupled with the UUID from the reference model.
This then allows us to receive an RD associated with this code through API.

3. AUTOMATIC RD GENERATOR



RD field



RD is generated from the hierarchy.
This RD is associated with a component found in multiple technical drawings.
A simple change to the structure may trigger many updates (Ripple effect).

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THANK YOU
FOR YOUR ATTENTION

ヘンリック・バルスレフ
創業者（そうぎょうしゃ）

hb@syseng.dk