Reference Designation Systems

It’s all about creating a common language™

INCOSE Webinar

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AGENDA

1. RDS & SYSTEMS ENGINEERING

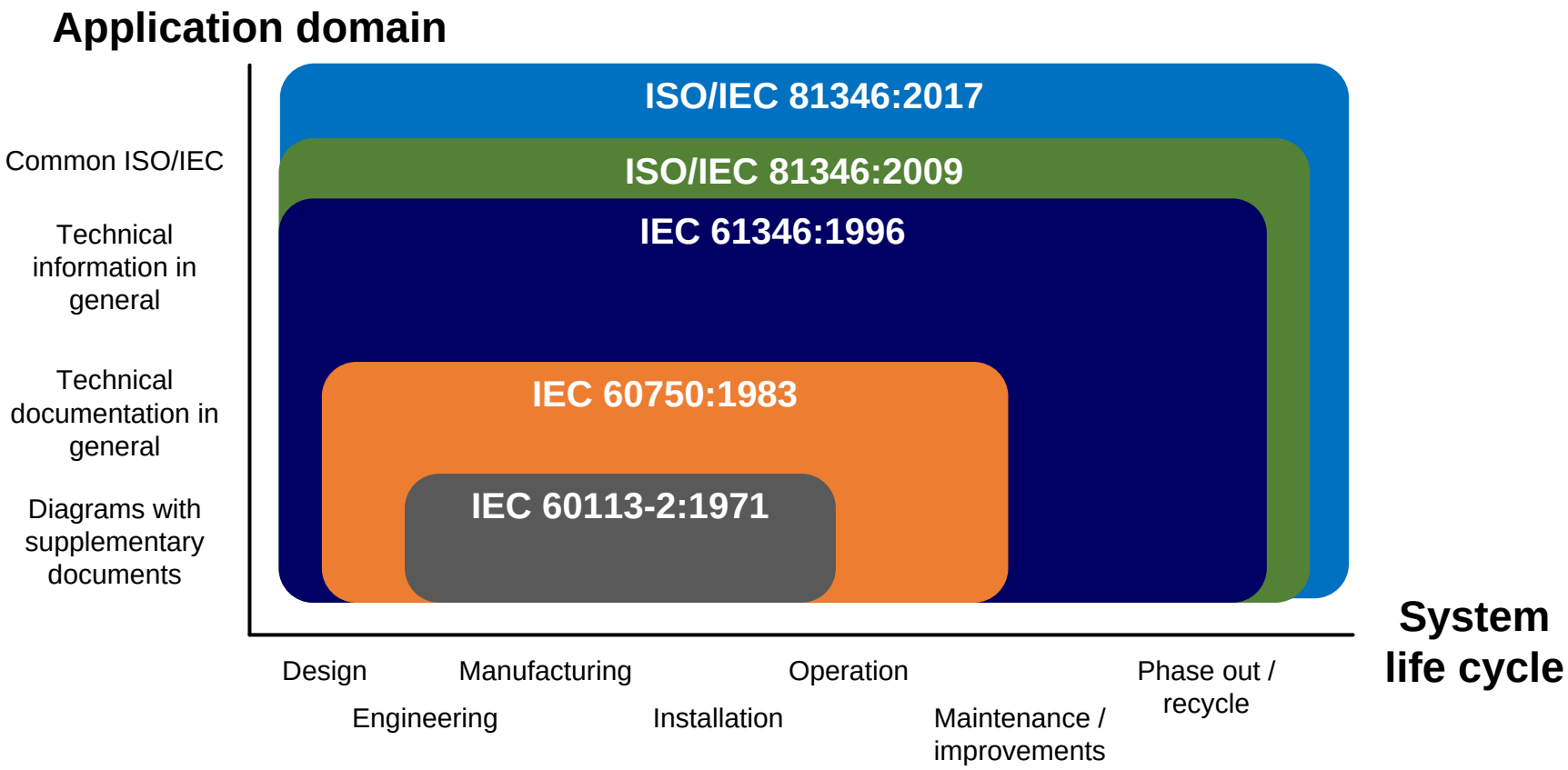
2. RDS FUNDAMENTALS

3. RDS EXAMPLES

1. RDS AND SYSTEMS ENGINEERING

The ISO/IEC 81346 series

Industrial systems, installations and equipment and industrial products



The ISO/IEC 81346 series

Industrial systems, installations and equipment and industrial products

RDS

Reference Designation System

International principles

Not stakeholder specific

IT compatible

Scalable for small and large projects

Life-cycle stable code

Easy to understand and implement

The ISO/IEC 81346 series

Industrial systems, installations and equipment and industrial products

RDS is a **common naming convention** for systems and their elements

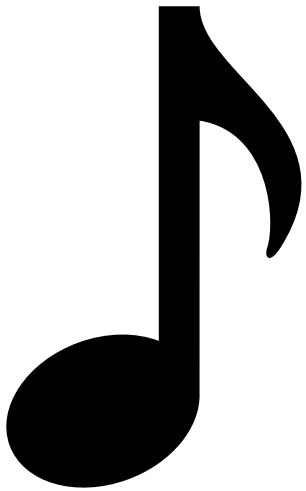
RDS is a **system of its own** which is used to **designate systems** and their elements

The output from RDS is a **reference designation**, also known as a TAG number

Part 1+2:	Fundamental rules
Part 10+12:	Industry specific applications

The mission

a common language



RDS and ISO/IEC/IEEE 15288

Technical processes

Business or mission analysis process	OFF
Stakeholder requirements definition process	OFF
System requirements definition process	OFF
Architecture definition process	OFF
Design definition process	OFF
System analysis process	OFF
Implementation process	OFF
Integration process	OFF
Verification process	OFF
Transition process	OFF
Validation process	OFF
Operation process	OFF
Maintenance process	OFF
Disposal process	OFF

Technical management processes

Project planning process	OFF
Project assessment and control process	OFF
Decision management process	OFF
Risk management process	OFF
Configuration management	OFF
Information management process	OFF
Measurement process	OFF
Quality assurance process	OFF

Agreement processes

Acquisition process	OFF
Supply process	OFF

Organisational project-enabling processes

Life cycle model management process	OFF
Infrastructure management process	OFF
Portfolio management process	OFF
Human resources management process	OFF
Quality management process	OFF
Knowledge management process	OFF

RDS and ISO/IEC/IEEE 15288

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[Source: ISO/IEC/IEEE 15288]

RDS and ISO/IEC/IEEE 42010

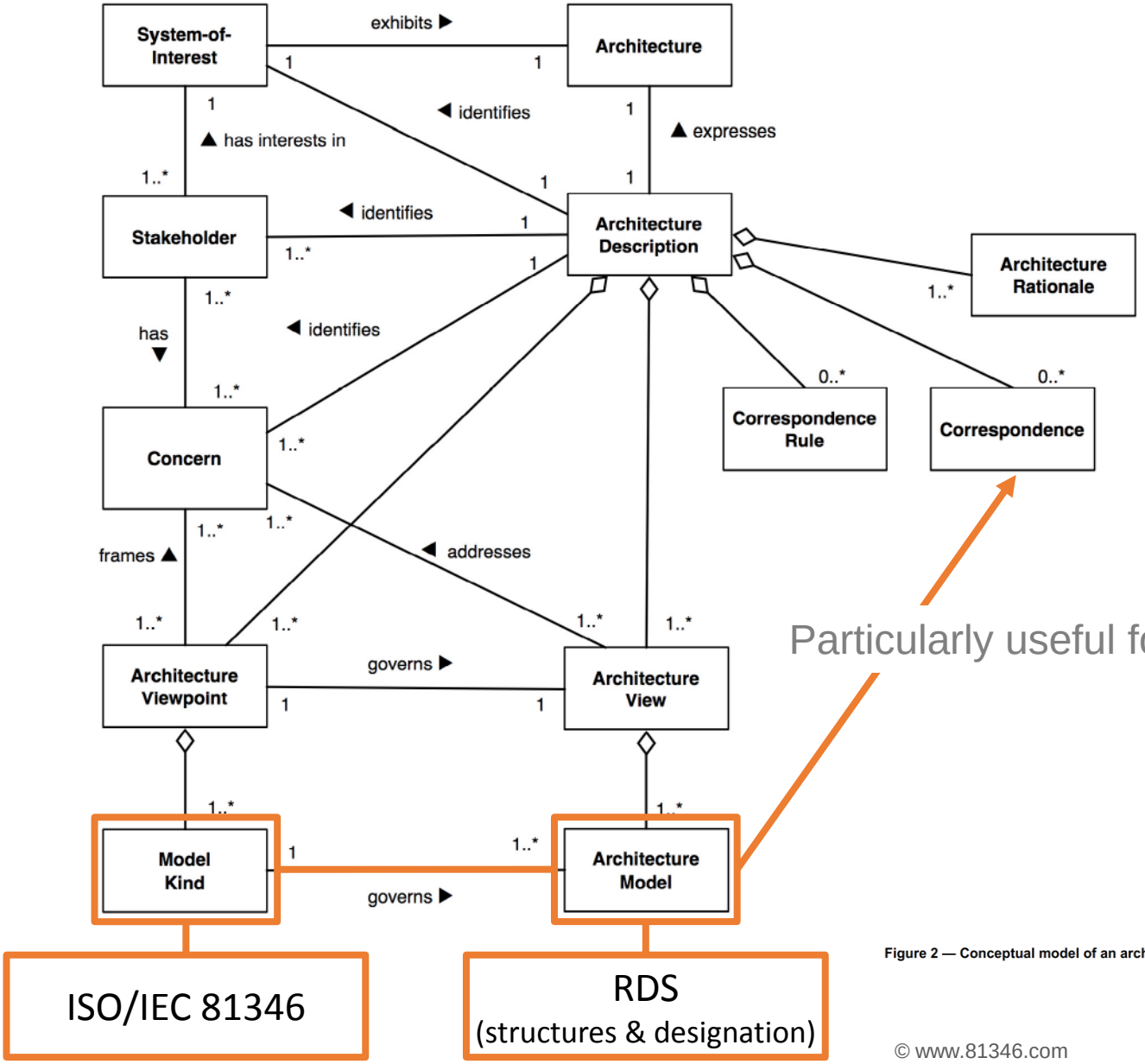
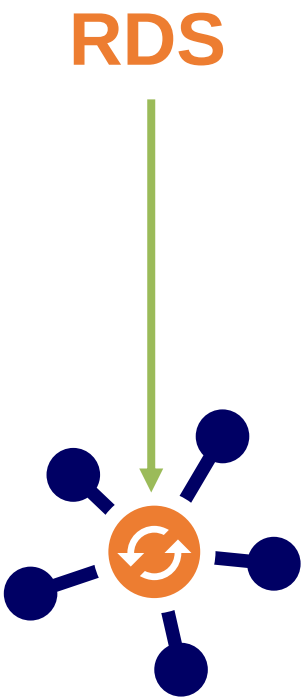


Figure 2 — Conceptual model of an architecture description

Model Correspondance



Point of synchronization across...

… data sources & models

… life cycle

… stakeholders

Model Correspondance

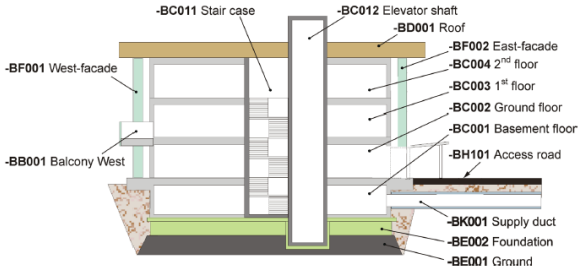


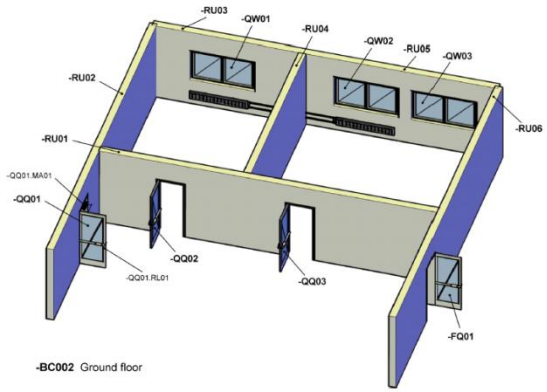
Figure B.1 — Graphical representation of construction works, example plant 1

Der er i CCS valgt en klassificering, der har til formål at kunne skelne bygningsdele fra hinanden i en form for "grovsortering", fx kunne skelne mellem dør, vindue, kabel, rør etc. Dette medvirker dels til at lave en enkelt og stabil klassifikation, dels at begrænse antallet af nødvendige klasser betragteligt.

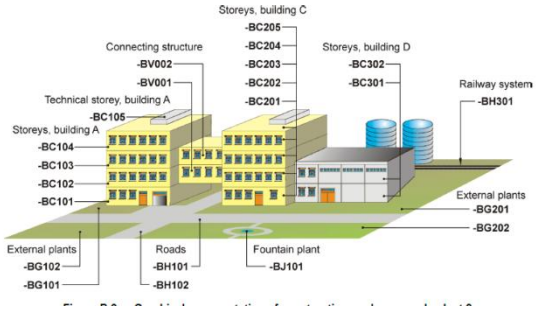
Inddelingskriteriet i CCS klassifikationen er den *egenfunktion*, som en given bygningsdel har "indbygget". Ved egenfunktion forstås i praksis "hvad et objekt egentlig gør, isoleret set", eller mere teknisk korrekt "objektets iboende tekniske funktion". Egenfunktionen af et objekt anses for stabil, set over livscyklus.

Øvrige egenskaber, fx type af materiale (stål, træ, beton), form ("Dannebrogsvindue", "Sadeltag", "Spidstag") etc. håndteres i CCS som selvstændige egenskaber, og medtages ikke som en del af den klassificerende kode. Det gør klassificeringen mere enkel og frem for alt stabil.

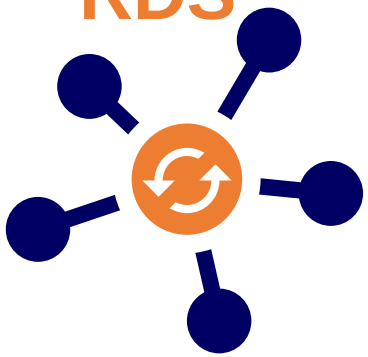
Fordelen ved en helt stabil klassifikationskode er, at koden ikke skal ændres undervejs. Det betyder i praksis, at alle objekter kan kodes på forhånd i et objektbibliotek, og at CCS objektklassen altid er kendt, når et objekt vælges og indsættes i et projekt.



-BC002 Ground floor



RDS

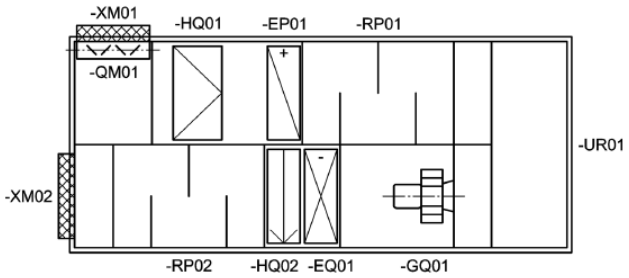


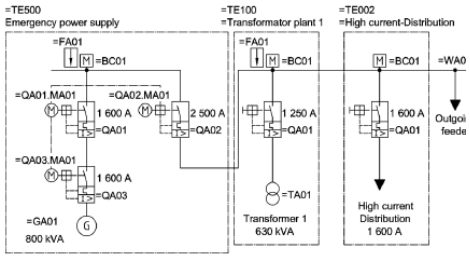
Fresh air inlet

Supply from power grid

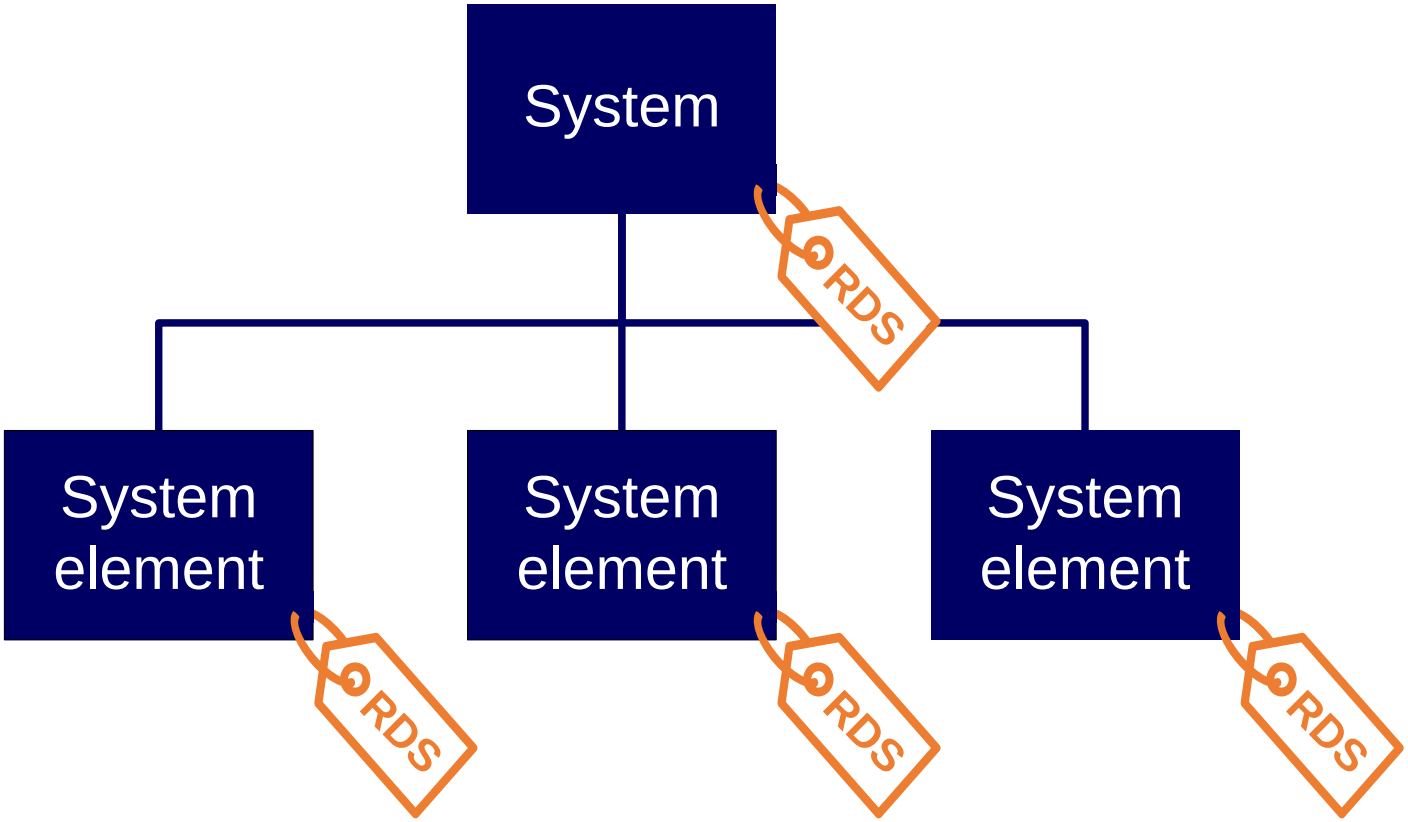
Discharge

Cooling & Heating System	Cooling Heating	Design paramteres	Status signals
Design parameters	**Ventilation System**	Design parameters	Status signals
Power supply	Power supply	**Electrical System**	Power supply, Status
Control signals	Control signals	N/A	**Control System**





RDS designates systems



2. RDS FUNDAMENTALS

Objects and relations

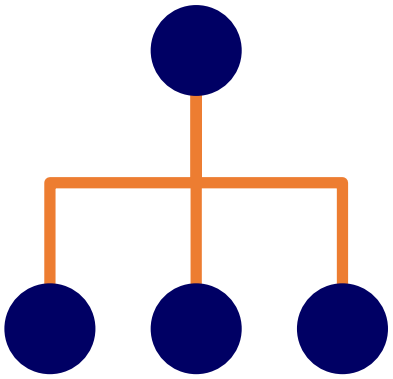
Hierarchical

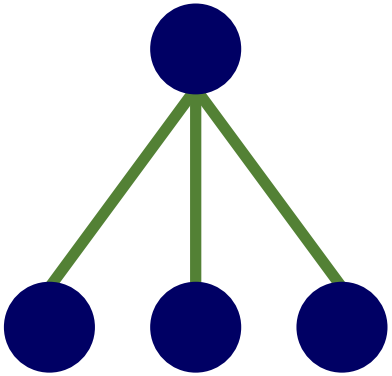
Non-hierarchical

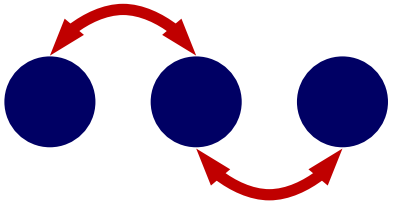
Part-of

Type-of

Pragmatic



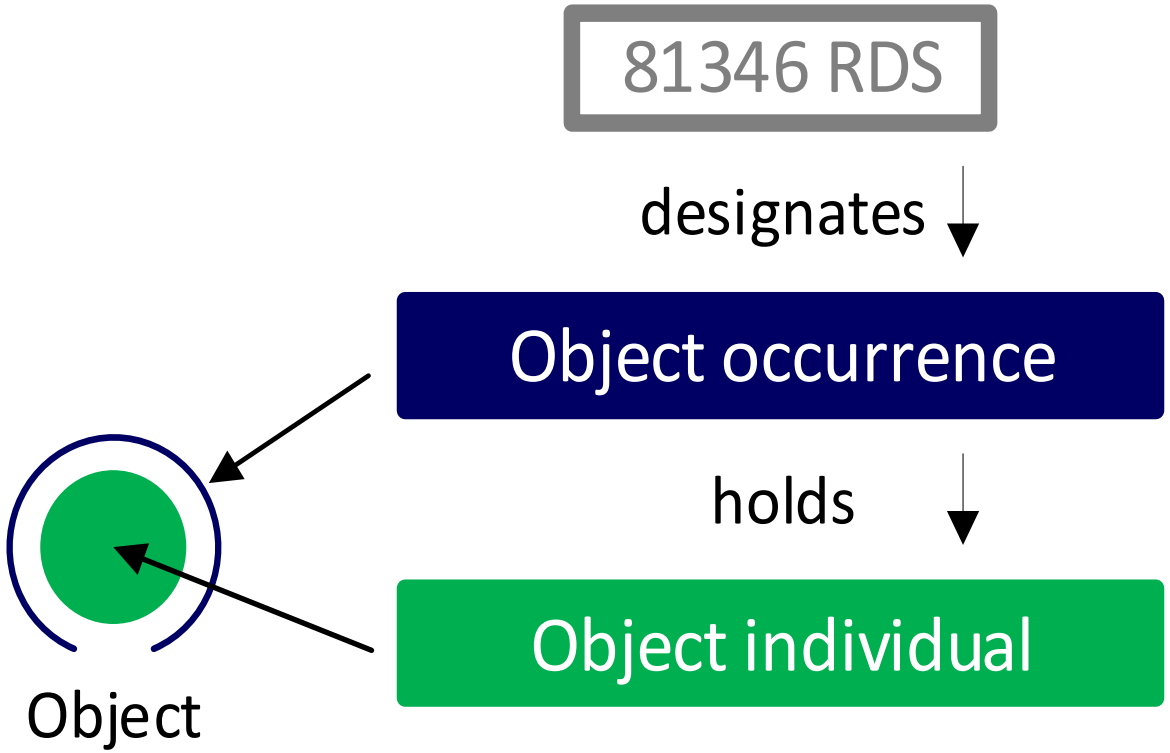




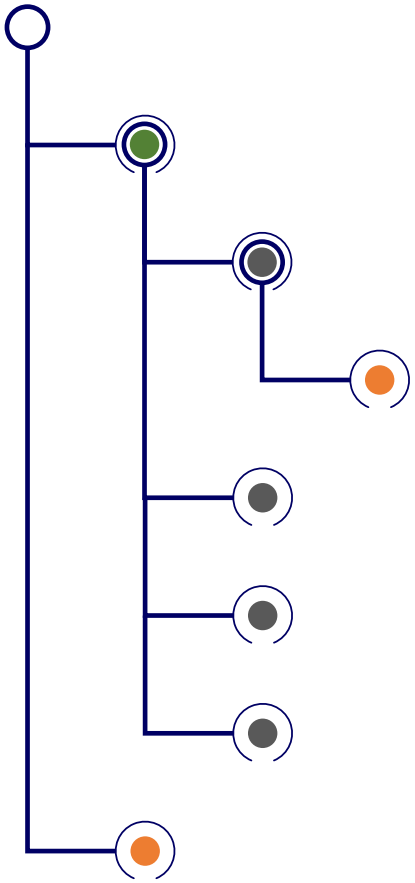
ISO/IEC 81346-1

ISO/IEC 81346-2

RDS Designates Object Occurrence

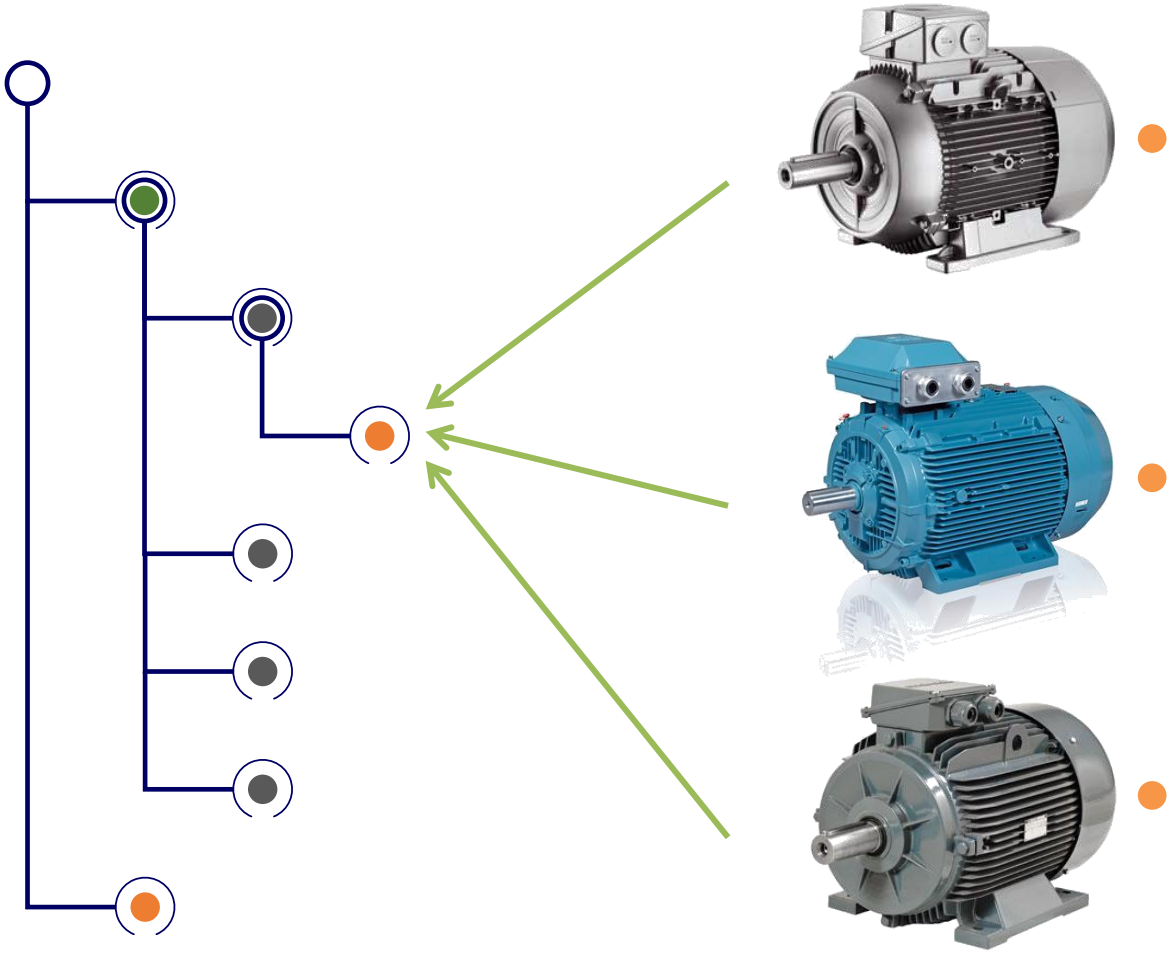


Object occurrences & individuals



- Object individual: A sub-system
- Object individual: A sub-sub system
- Object individual: A component

Object occurrences & individuals



Object occurrences & individuals

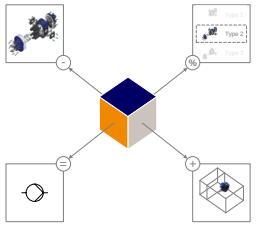
Context	Types	Occurrences	Individuals
Component manufacturer's engineering and support	OEM manufacturer's type designation Article (part) number	Reference designation	Order number OEM manufacturer's serial number
Component manufacturer's sales organisation	Internal type designation Article (part) number	Not applicable	Internal serial number
Technical system planner (investigator, surveyor, etc)	Letter codes for generic types	Reference designation	Not applicable
	Identifier of typicals		
Technical system assembler (contractor)	Manufacturer's type designation	Reference designation	Order number Manufacturer's serial number
Technical system user	Manufacturer's type designation, User's internal article (part) number	Reference designation	Manufacturer's serial number User's inventory number
NOTE The shaded areas show the context of reference designations and the classification provided by the letter codes.			

[ISO/IEC 81346-1, Table 1]

The three core elements of RDS

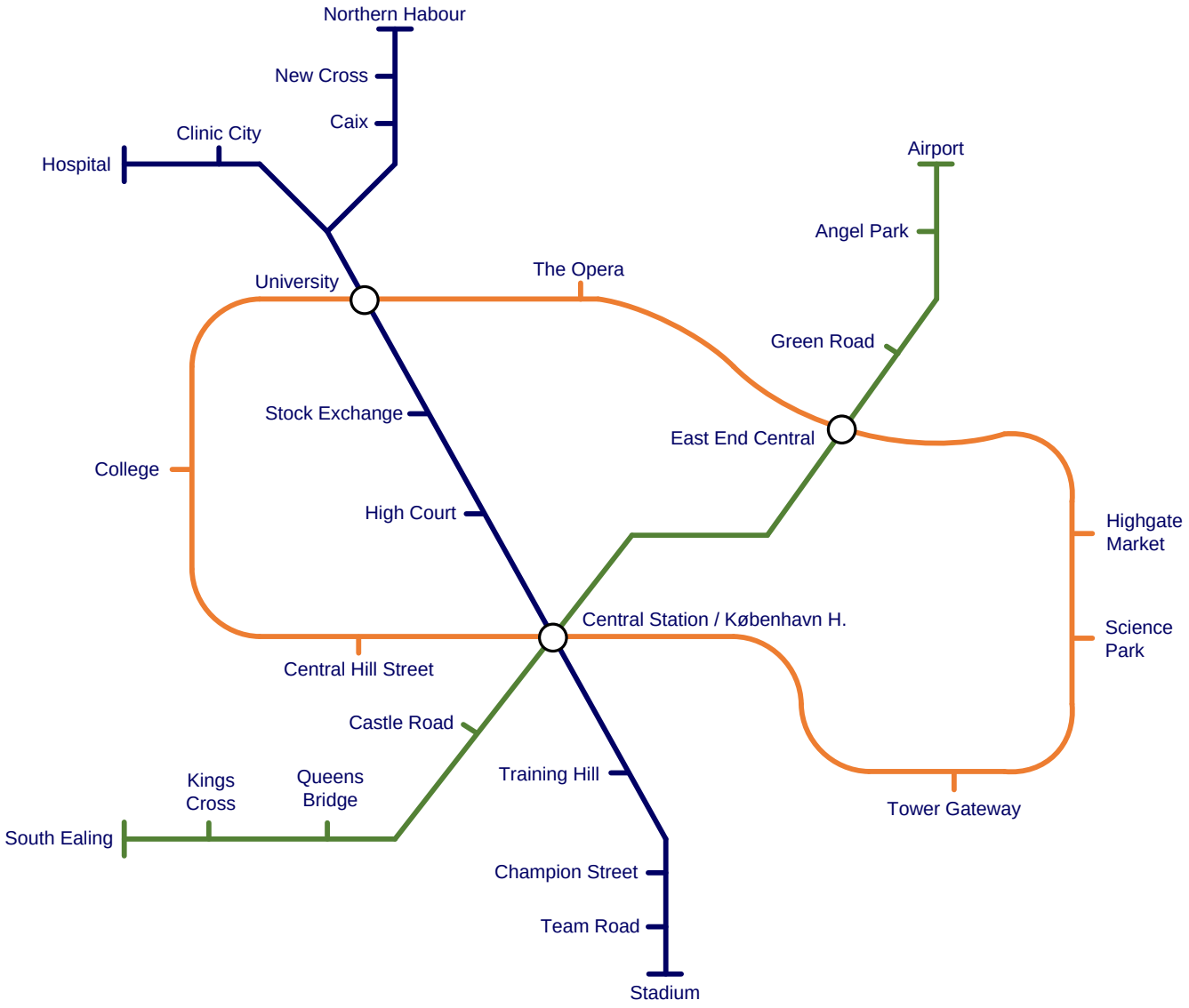
Aspect	How the system is viewed
Structure	How system elements are related (part-of relations)
Classification	What kind of system elements (type-of relations)

RDS is Aspects & Structure & Classification



ASPECTS

Aspects – a way of viewing the world



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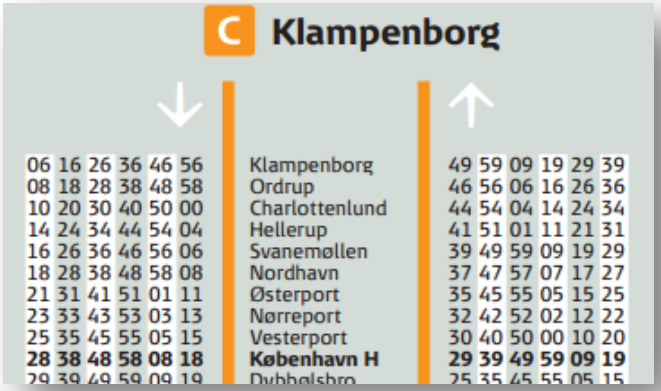
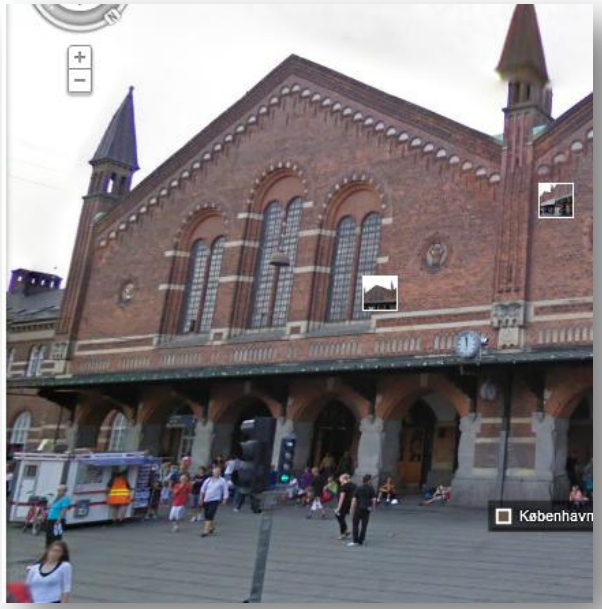




The four RDS aspects

Structuring based on..

Function what a system is designed to do

Product how the system is built

Location the intended or actual location of the system

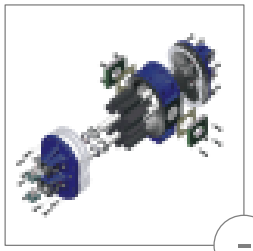
Type the commonality of systems with common properties

Typical terminology

Function	System, Function, Functional system
Product	System, Product, Module, Assembly, Unit, Plant
Location	Space, Area, Volume, Section, Floor, Room
Type	Type, Design type, Group, Master, Family, Platform

The four RDS aspects

Product



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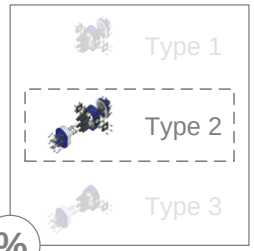
Type



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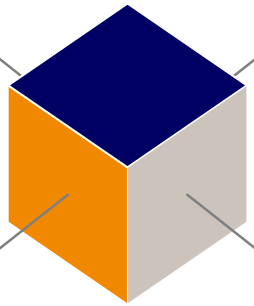

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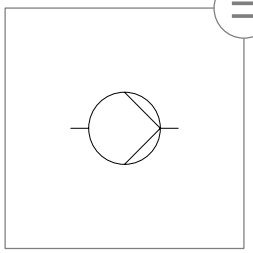
Function



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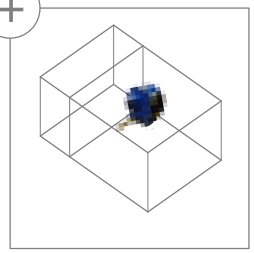
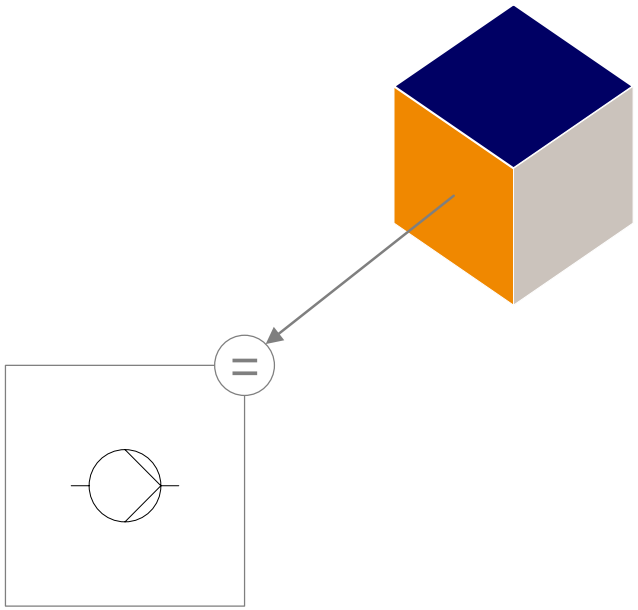
Location



RDS aspects

Function what a system is designed to do



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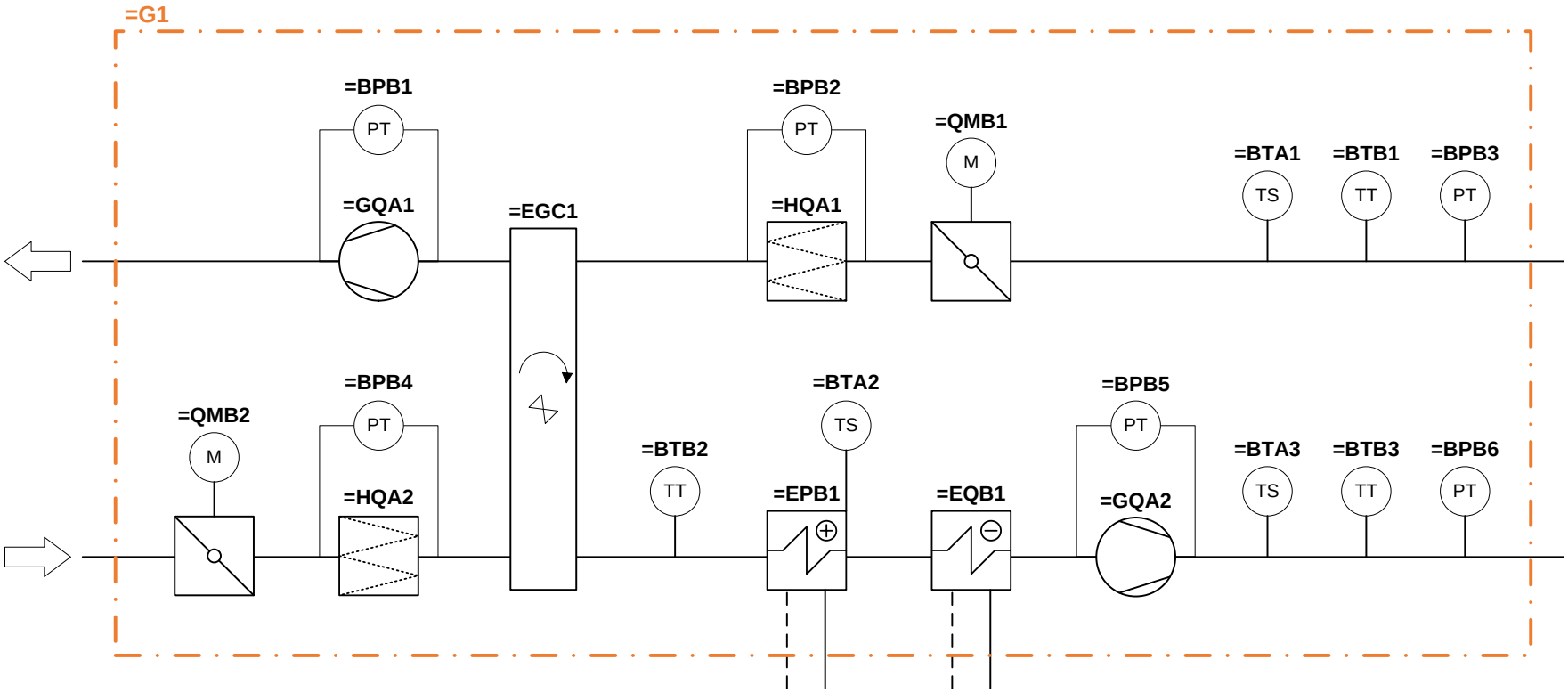
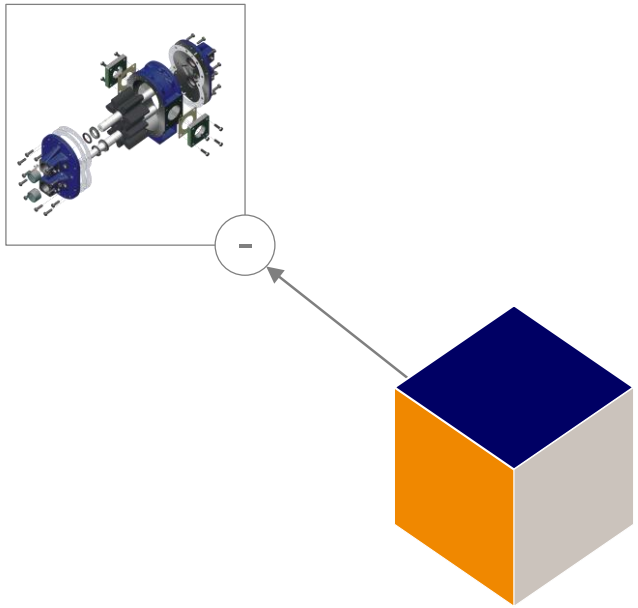


RDS aspects

Product How the system is built



RDS aspects

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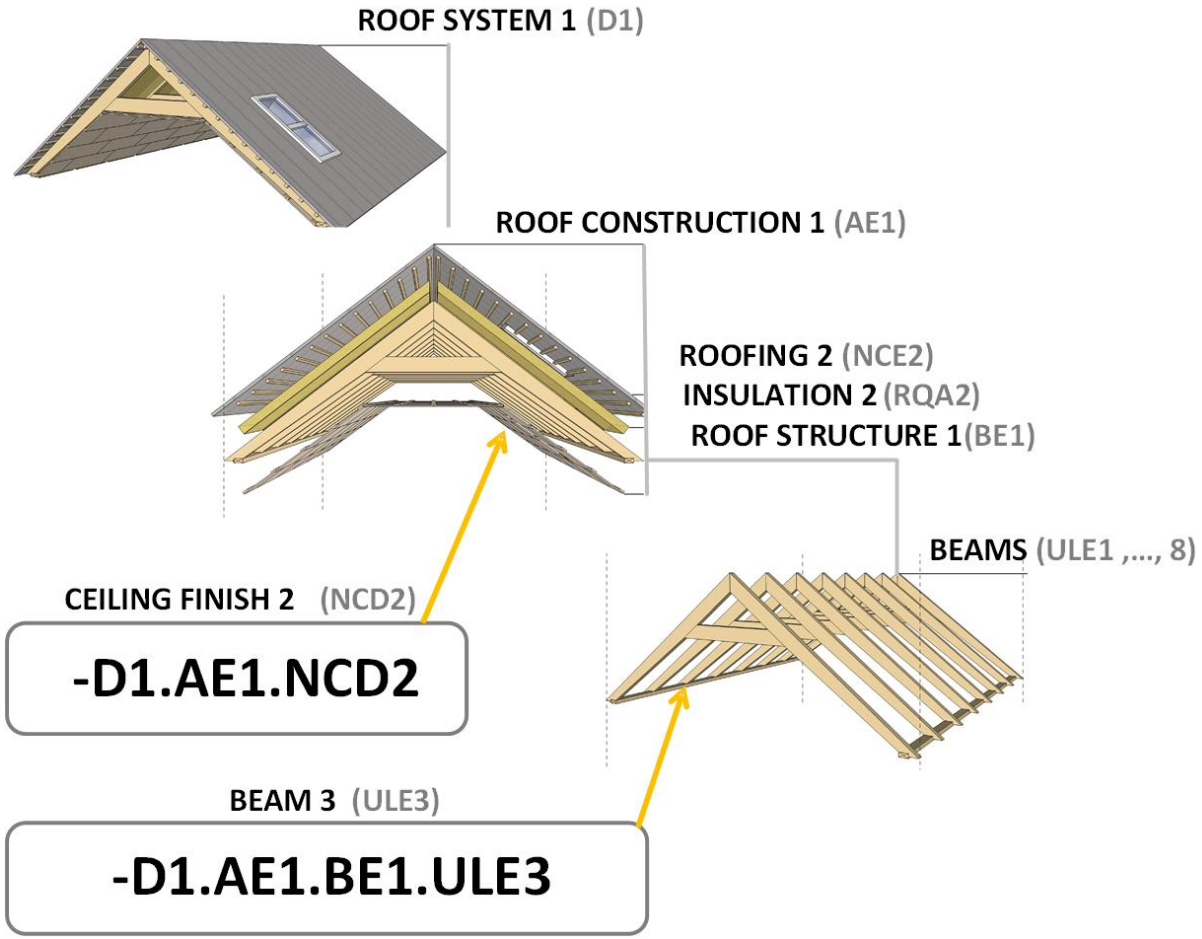
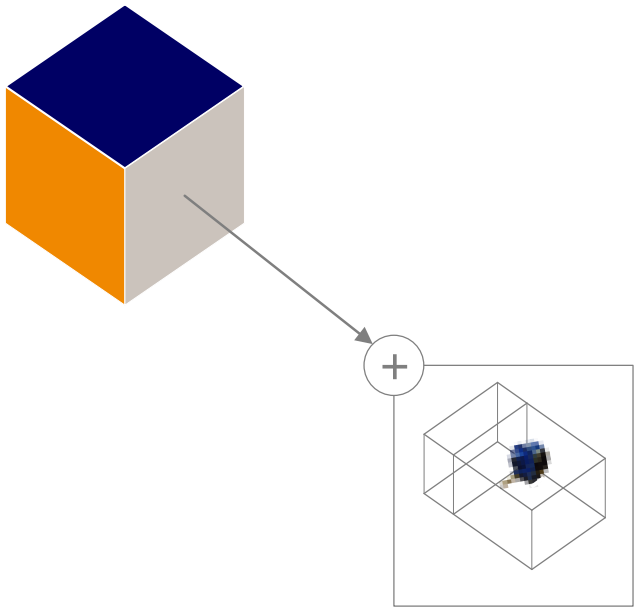


RDS aspects

Location the intended or actual location of the system



RDS aspects

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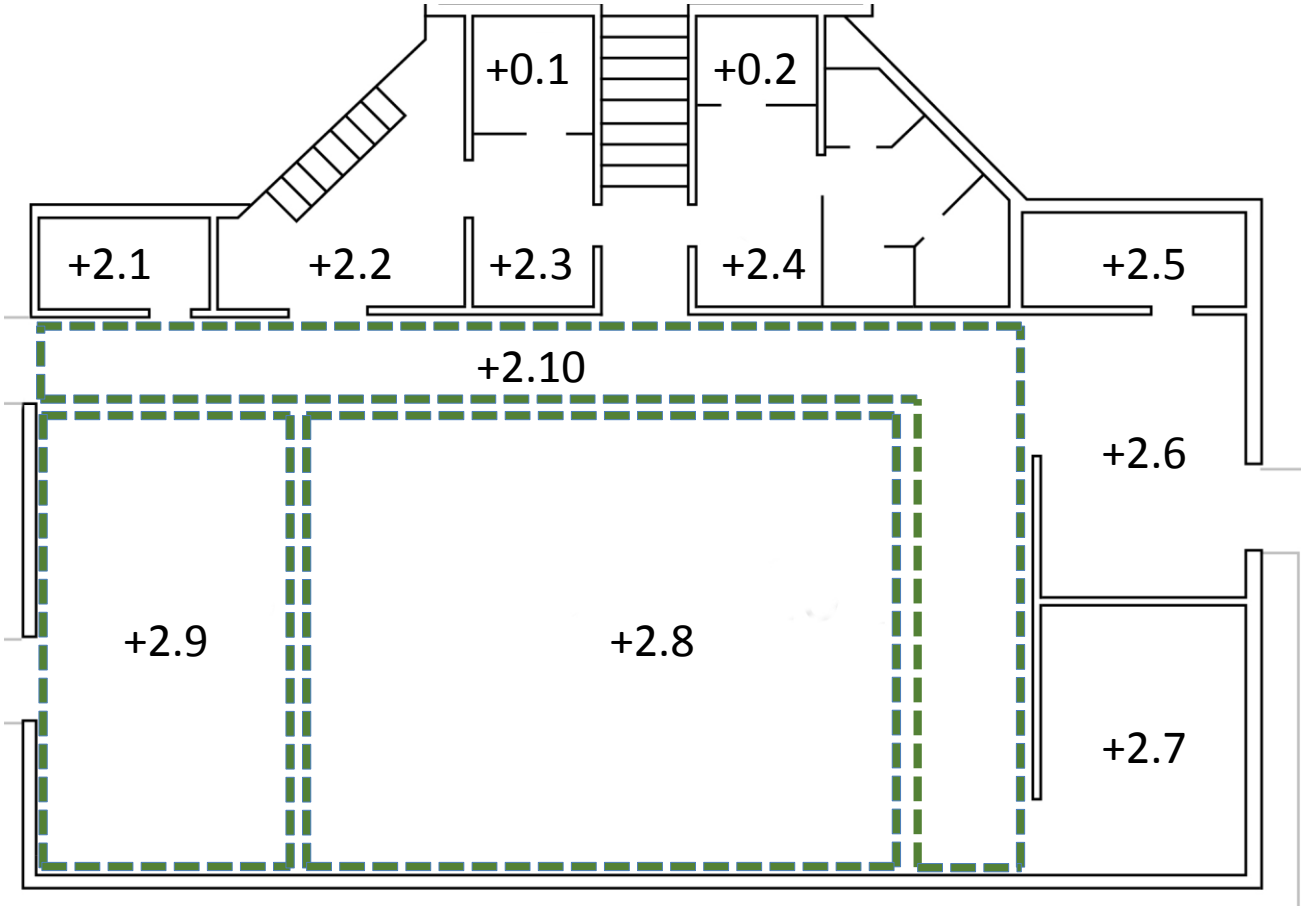
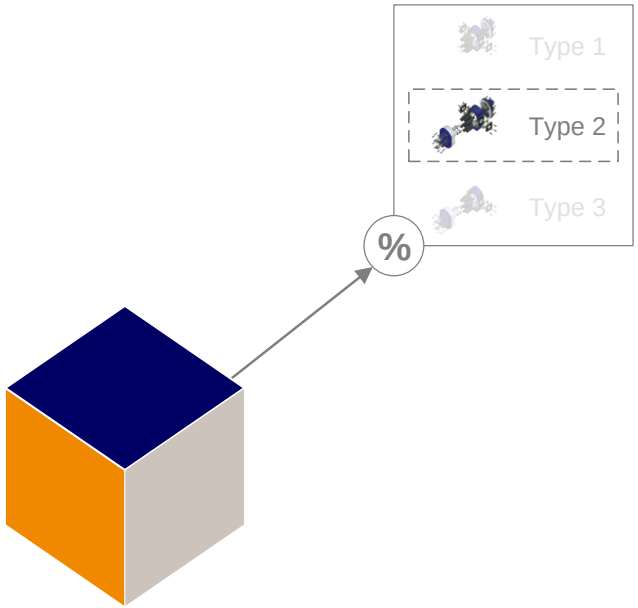


RDS aspects

Type the commonality of systems with common properties



RDS aspects

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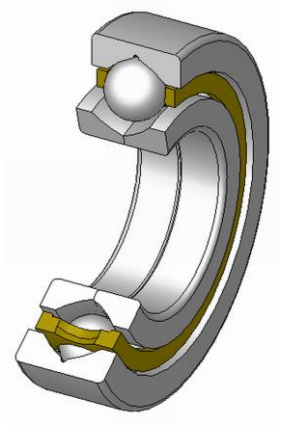
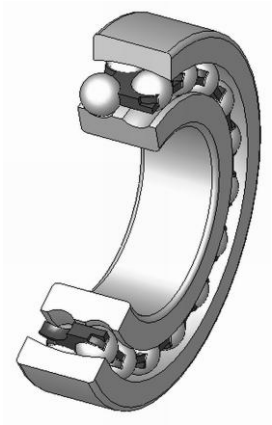


%UPA1

Bearing type no.1

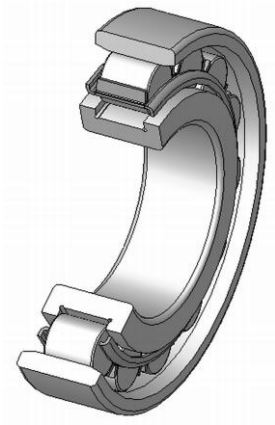
Four point contact bearings



%UPA2

Bearing type no. 2

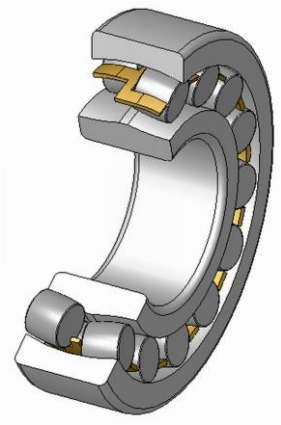
Spherical ball bearings (double row)



%UPA3

Bearing type no. 3

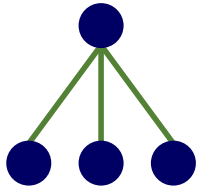
Cylindrical roller bearings



%UPA4

Bearing type no. 4

Spherical roller bearings (double row)



Classification A, B, C…

… so you can recognize objects within and across aspects

Other classification systems

OmniClass 211

18 doors in Elements
66 doors in Products
127 doors in Work result

Uniformat 29

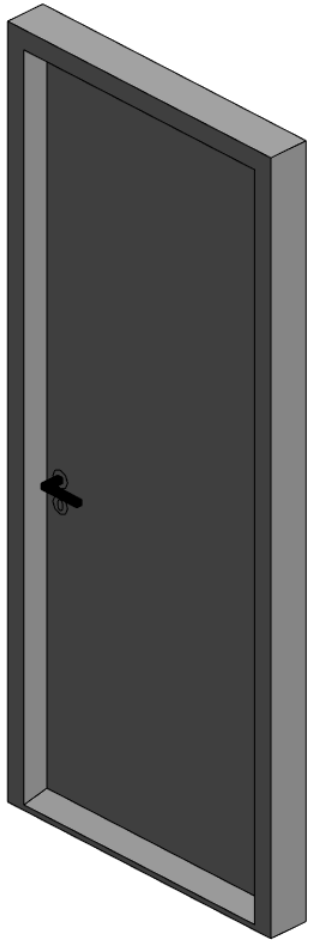
Uniformat Classification	Revit Category
No classification	
B - Shell	
B20 - Exterior Enclosure	
B2030 - Exterior Doors	
B2030100 - Glazed Doors & Entrances	Doors
B2030110 - Exterior Glazed Doors - Aluminum	Doors
B2030120 - Exterior Glazed Doors - Steel	Doors
B2030130 - Exterior Glazed Doors - Wood	Doors
B2030200 - Solid Exterior Doors	Doors
B2030210 - Exterior Solid Doors - Aluminum	Doors
B2030220 - Exterior Solid Doors - Steel	Doors
B2030230 - Exterior Solid Doors - Wood	Doors
B2030300 - Revolving Doors	Doors
B2030400 - Overhead Doors & Roll-up Grilles	Doors
B2030410 - Overhead Doors	Doors
B2030420 - Roll-up Grilles	Doors
B2030500 - Door Wall Opening Elements	Doors
B2030900 - Other Exterior Doors	Doors
C - Interiors	
C10 - Interior Construction	
C1020 - Interior Doors	
C1020100 - Interior Doors	Doors
C1020110 - Interior Doors - Metal	Doors
C1020120 - Interior Doors - Wood	Doors
C1020200 - Interior Door Frames	Doors
C1020210 - Interior Door Frames - Metal	Doors
C1020220 - Interior Door Frames - Wood	Doors
C1020300 - Interior Doors with Frames	Doors
C1020310 - Interior Metal Doors with Metal Frames	Doors
C1020320 - Interior Wood Doors with Metal Frames	Doors
C1020330 - Interior Wood Doors with Wood Frames	Doors
C1020400 - Interior Door Hardware	Doors
C1020410 - Door Hardware	Doors
C1020500 - Interior Door Wall Opening Elements	Doors
C1020600 - Interior Door Sidelights & Transoms	Doors
C1020700 - Interior Hatches & Access Doors	Doors

RDS Classification System

A door is a door!

1

… with many properties!



Classification by Inherent Function

some benefits…

a lifecycle stable code

all objects can be pre-coded

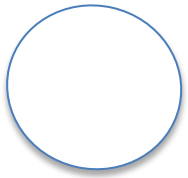
simple coding – easy for humans to recognise

Classification – “A door is a door”

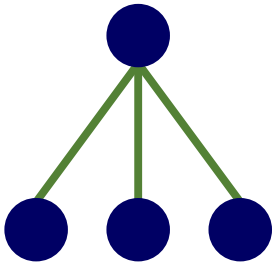
81346-2 (2017)

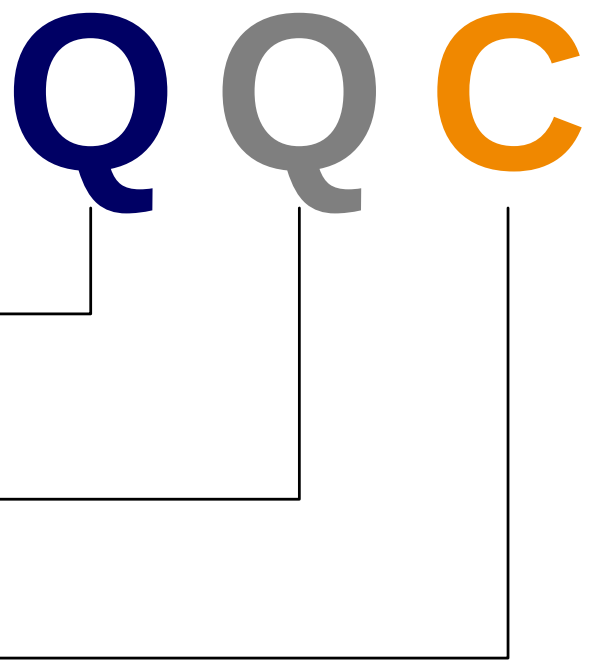
Class	**QQC**
Definition	*space access object* for use by persons
Class name	Door
Synonyms	entrance, exit, …
Properties	Material: Glass, wood, steel, … Width: 600…2500mm Height: 2000…2500mm

User specified



Classification: type-of relations





Entry class IEC 81346-2:2017 table 1

Sub-class IEC 81346-2:2017 table 2 (option)

Sub-class IEC 81346-2:2017 table 3 (option)

Entry classes

Code	Class definition (ISO/IEC 81346-2 2017-edition)	Class name
B	*object for* **picking up information and providing a representation**	sensing object
C	*object for* **storing for subsequent retrieval**	storing object
E	*object for* **emitting**	emitting object
F	*object for* **protecting against the effects of dangerous or undesirable conditions**	protecting object
G	*object for* **providing a controllable flow**	generating object
H	*object for* **treating matter**	matter processing object

Entry classes

	Code	Class definition (ISO/IEC 81346-2 2017-edition)	Class name
	**K**	*object for* **treating input signals and providing an appropriate output**	information processing object
	**M**	*object for* **providing mechanical movement or force**	driving object
	**N**	*object for* **enclosing partly or fully another object**	covering object
	**P**	*object for* **providing perceptible information**	presenting object
	**Q**	*object for* **controlling access or flow**	controlling object
	**R**	*object for* **restricting or stabilising**	restricting object

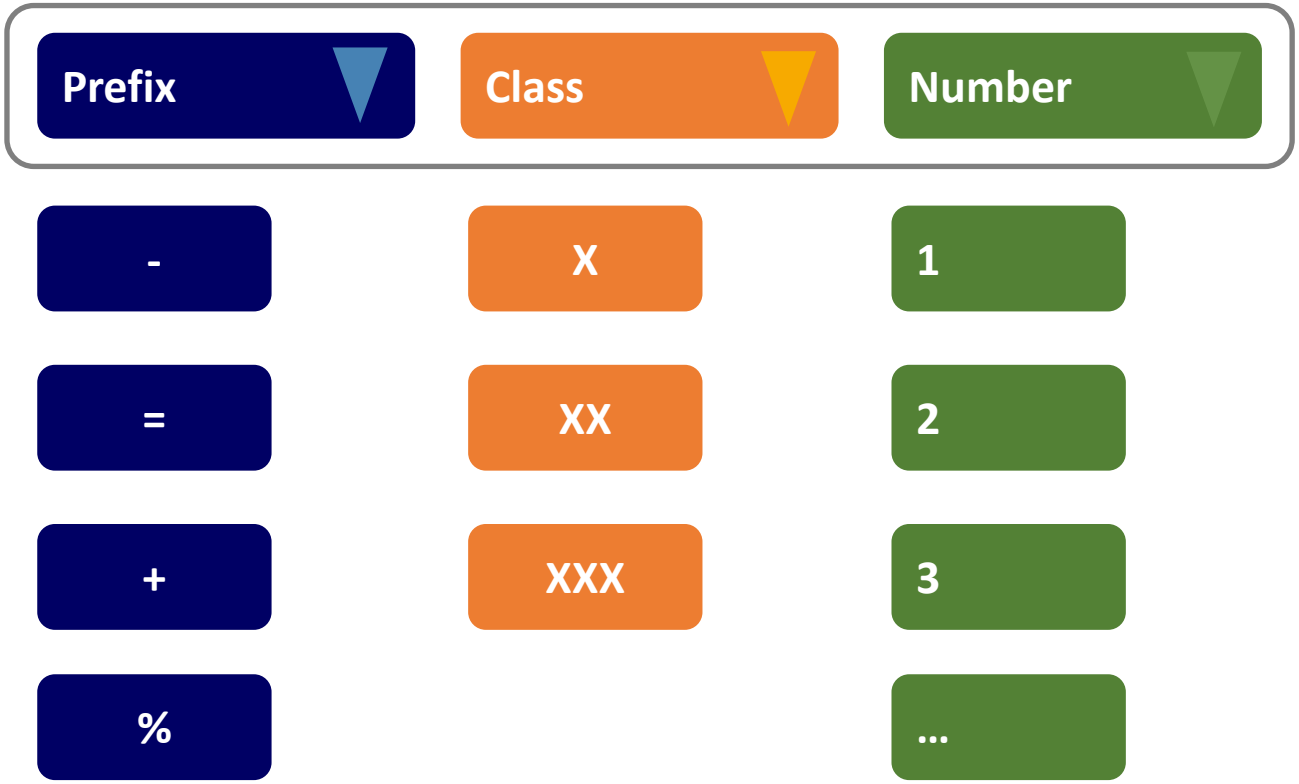
Entry classes

	Code	Class definition (ISO/IEC 81346-2 2017-edition)	Class name
	**S**	*object for* **detecting a manual action and providing an appropriate response**	manual interacting object
	**T**	*object for* **transforming**	transforming object
	**U**	*object for* **structural positioning of other objects**	holding object
	**W**	*object for* **leading from one place to another**	guiding object
	**X**	*object for* **interfacing an object**	interfacing object

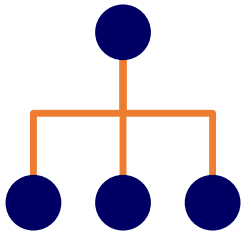
%ULE4
=QMA5
+8
-RNC2

RDS SYNTAX

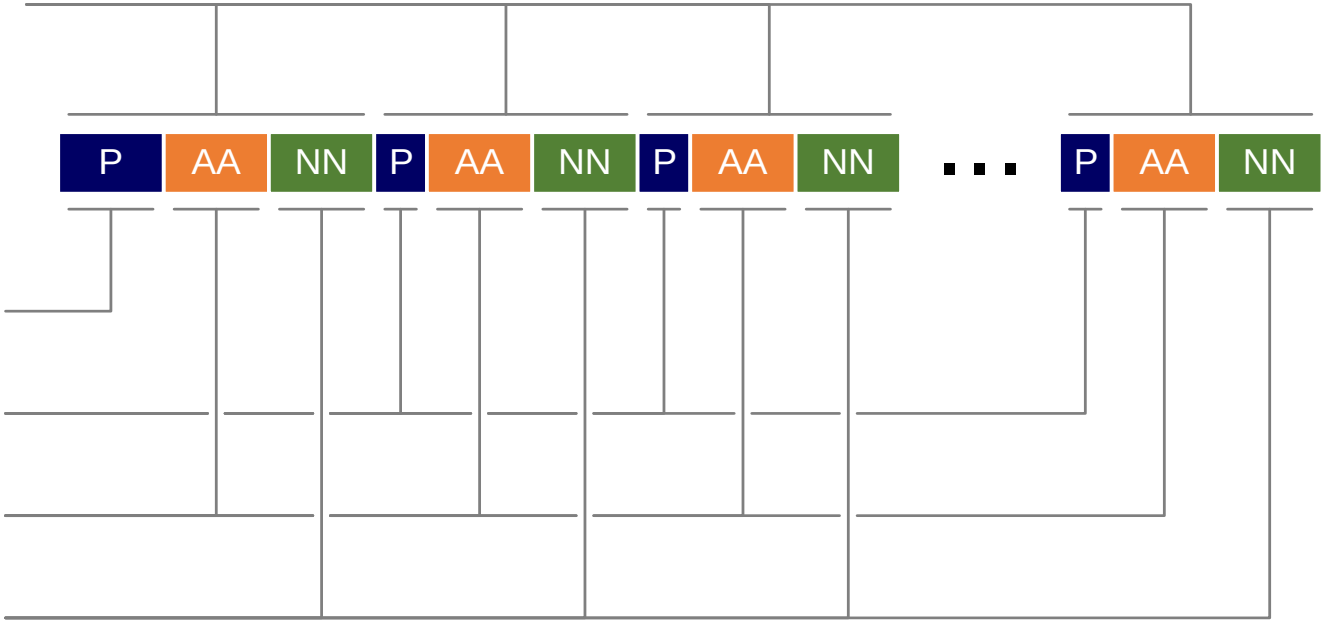
Creating reference designations



Multi-level reference designation



Single-level reference designation



Prefix
= / + / - / # / %

Prefix, space or ”.”

Class letter code
See Appendix A

Number

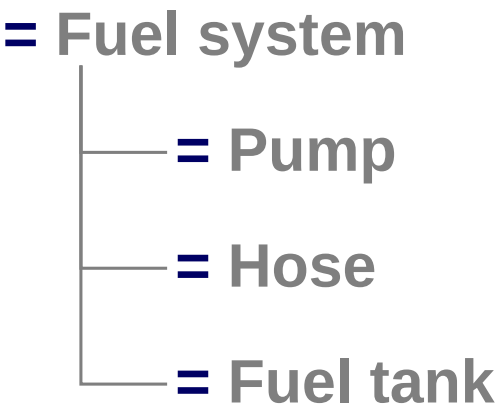
RDS reflects the system breakdown – this means no FIXED RDS structure!

3. RDS EXAMPLES

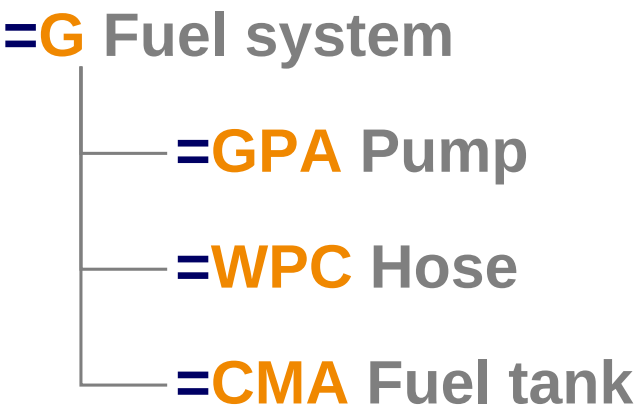
Aspect selection

= Function

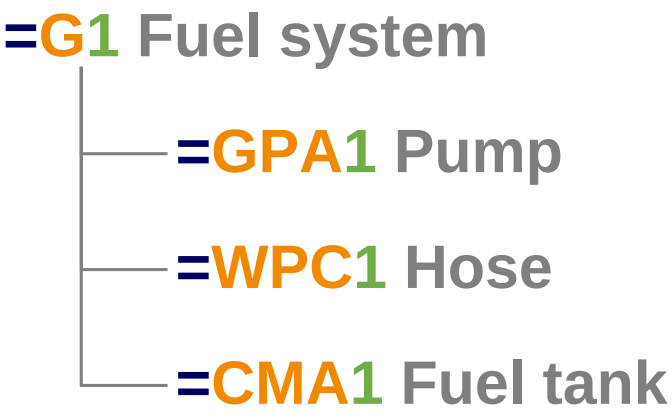
Structuring in part-of



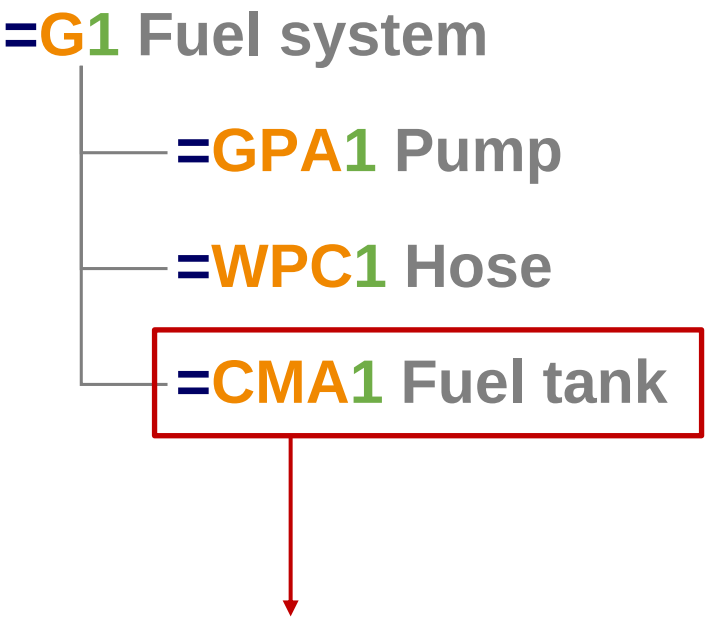
Classification from type-of



Numbering



The Reference Designation



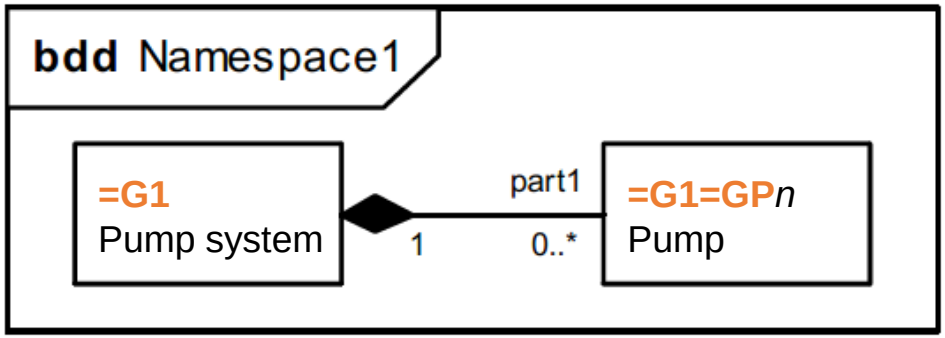
Reference Designation **=G1=CMA1**

Meaning Fuel tank no. 1 part-of Fuel system 1

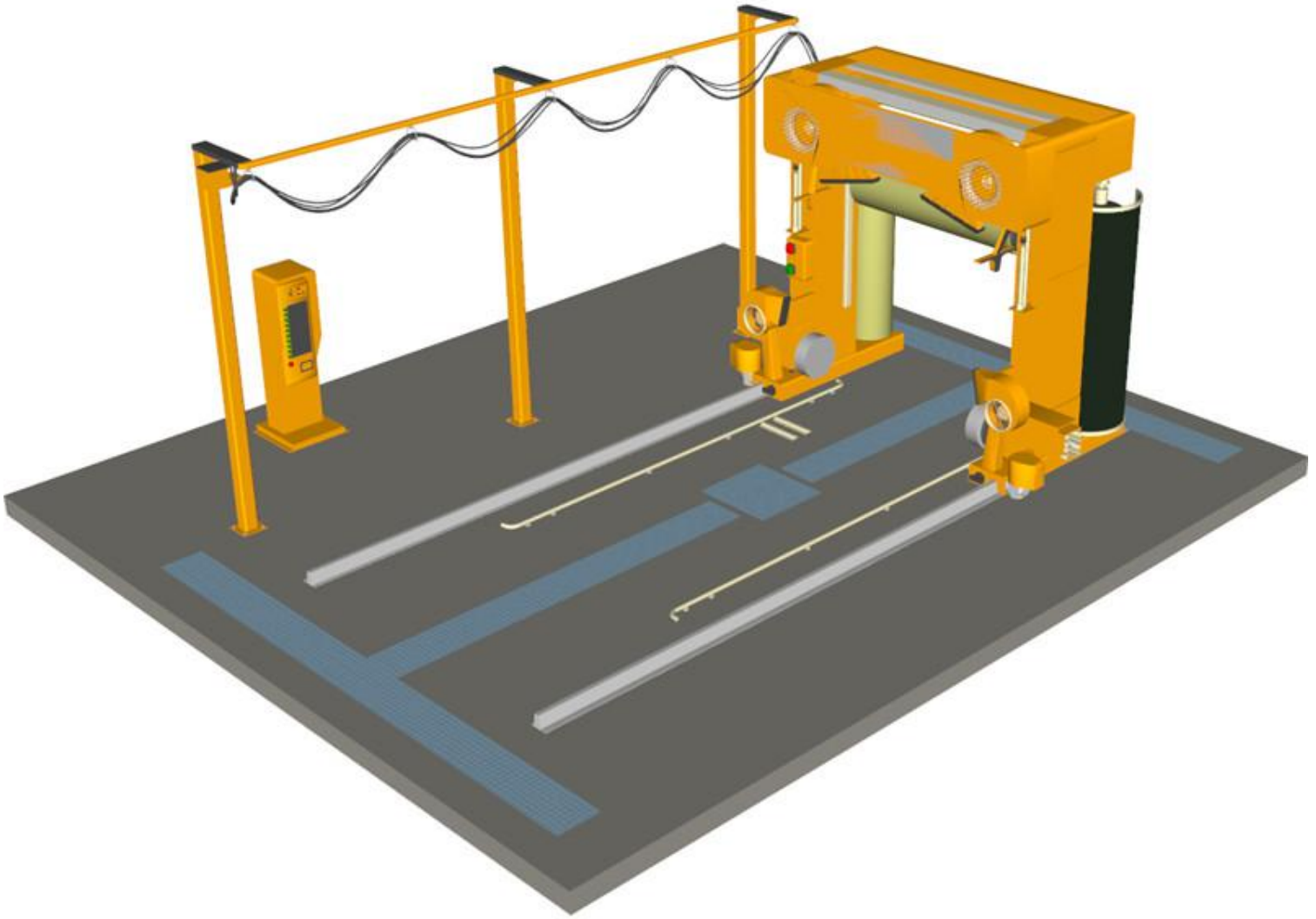
ISO/IEC 81346 and SysML

81346 &

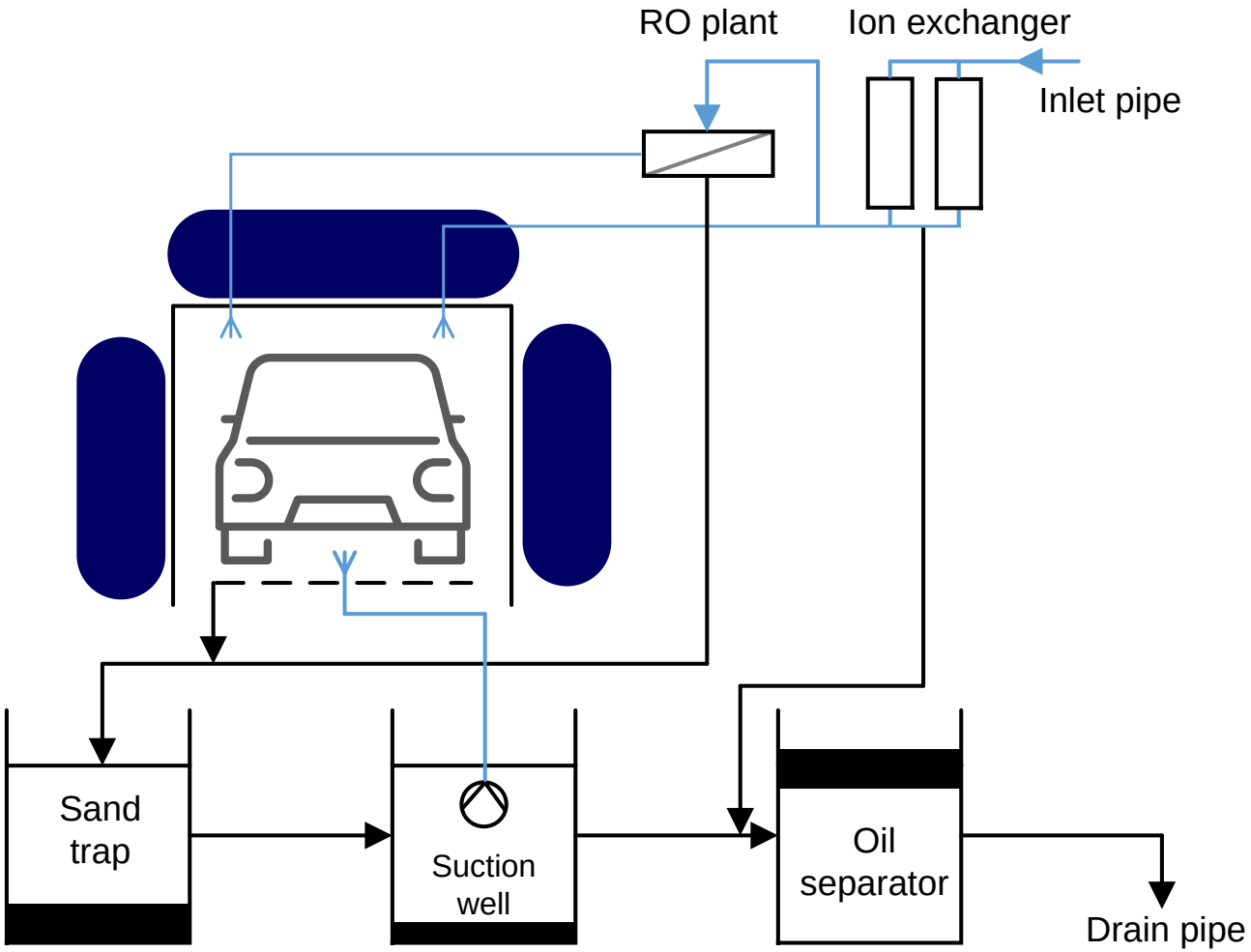
ISO/IEC 81346 offers a means of establishing a namespace for model elements based on system structures and element classification



Portal Car Wash 3D Model

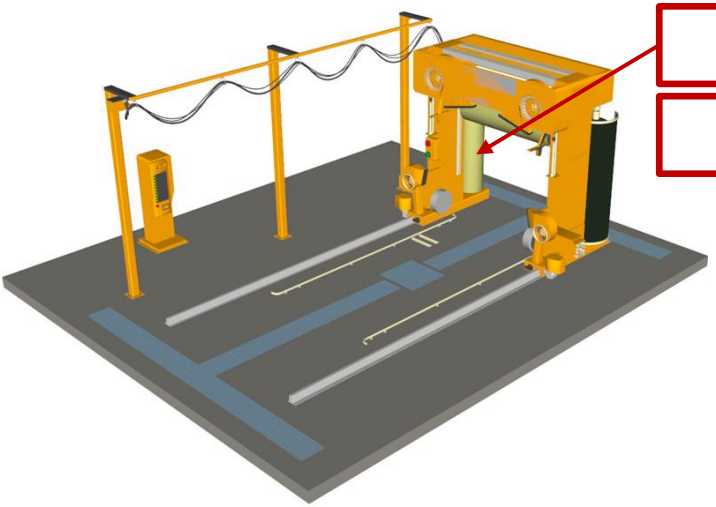


Portal Car Wash Water Diagram



RDS Functional Structure

Model Correspondence

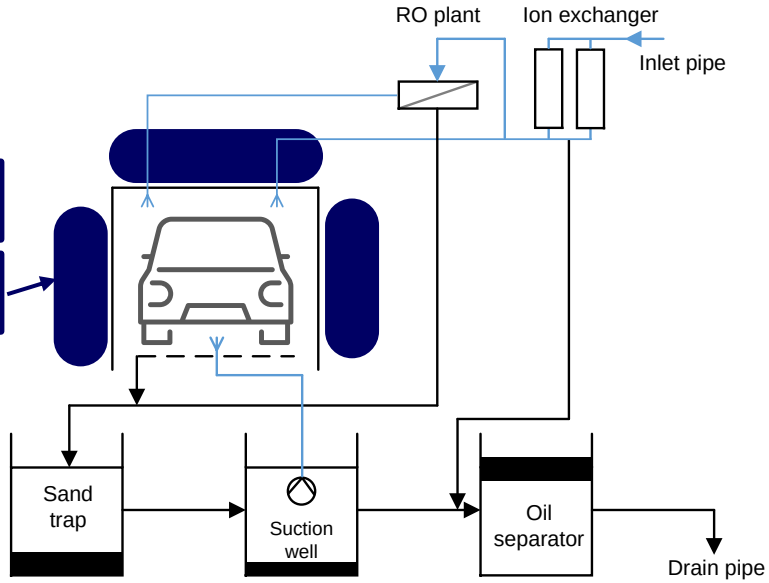


Left brush

=H1=HK2=HKB1

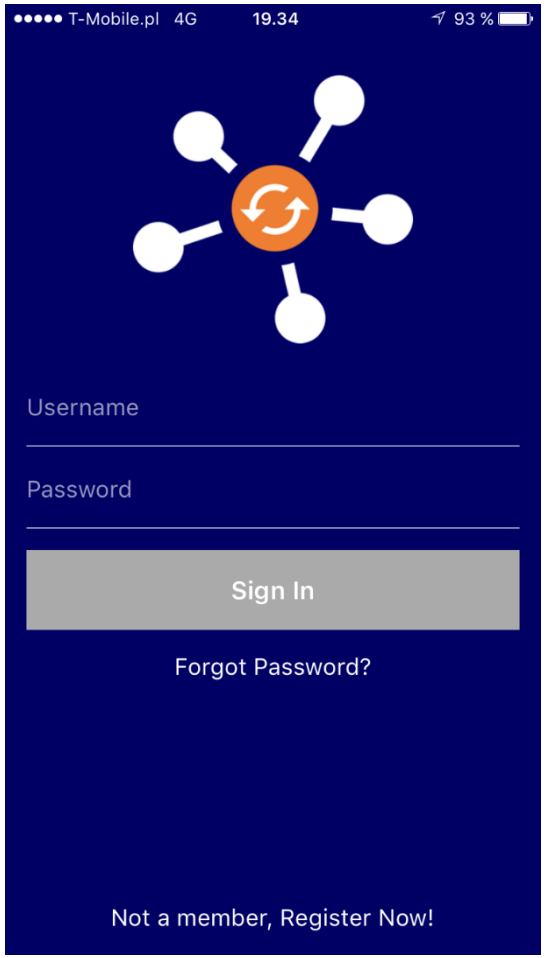
=H1=HK2=HKB1

Brush 1



EXPLORE RDS

The RDS 81346 app



Free to use!

ISO/IEC 81346-2 (system classification)

IEC 61355 (document classification)

Download on the App Store

GET IT ON Google Play

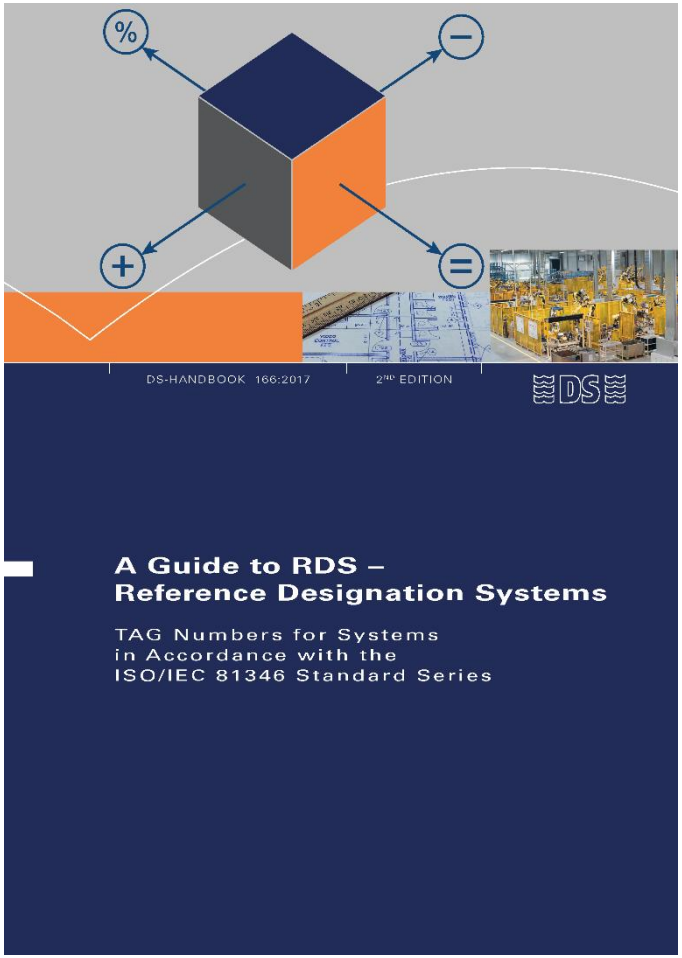
The 81346 Handbook

Complements the 81346 series

A guide on how to establish system awareness and subsequently prepare reference designations, structuring, and modularization.

Free downloads and newsletter!

Please visit **www.81346.com**

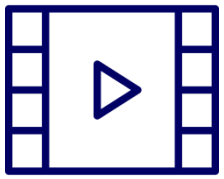


More information

Services – References - Contacts

Please visit our homepage

www.syseng.dk



And see the

81346 movie

on YouTube!

“It’s all about creating a common language”