

THE GRAND MODEL

Why Reference Designations are Key
to a Modern Organization

It's all about creating a common language™

SYSTEMS ENGINEERING A/S

A selection from our portfolio



SYSTEMS ENGINEERING A/S

Systems engineers certified by INCOSE



Philip Holmbjerg Kristiansen

BSc Eng, Partner

IEC 1906 Award

Associated Systems Engineering Professional



Henrik Balslev

BSc Eng, Managing Partner

IEC 1906 Award

Expert Systems Engineering Professional



Do you use ISO/IEC 81346 today?

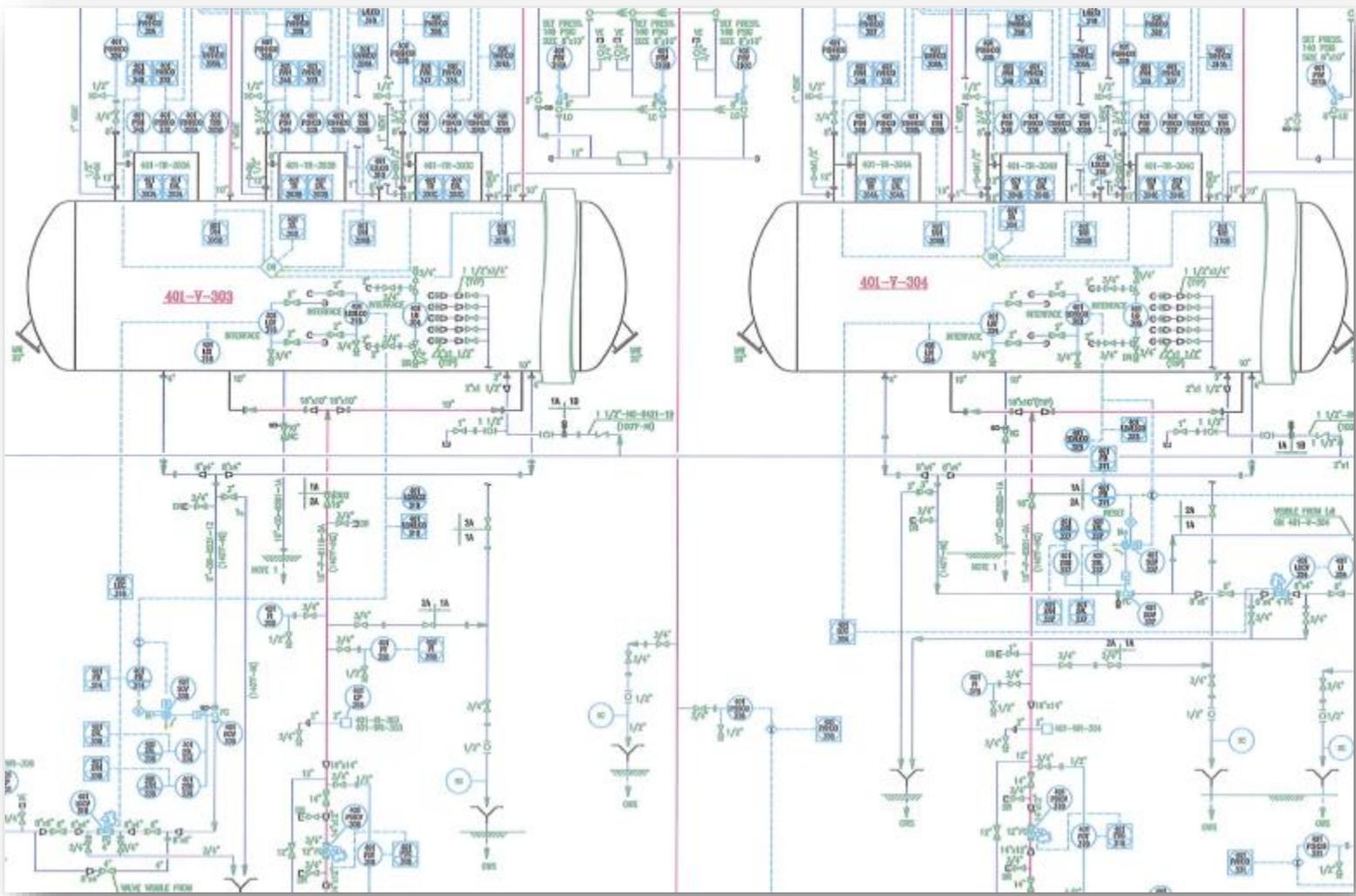
FROM
CHAOS
TO
CLARITY



Liquid
velocity
system

Pressure
unit

Pump





Technical diagrams



ERP

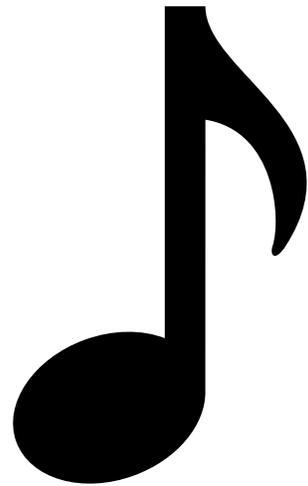
Maintenance logs

IoT Dashboards

CAD

/ THE MISSION

a common language

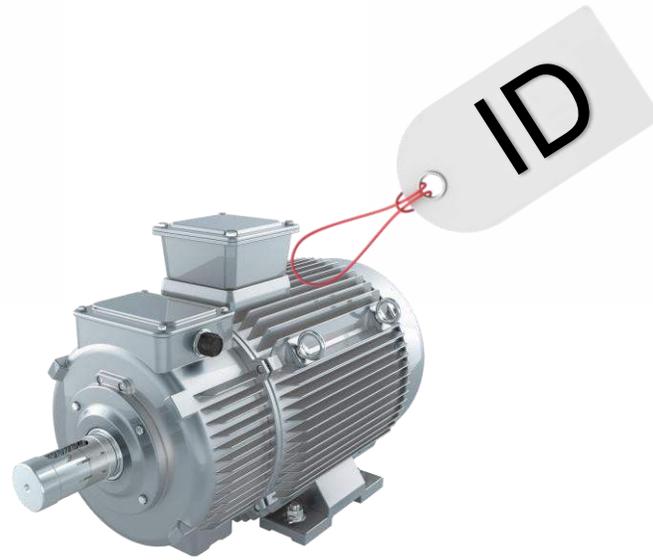
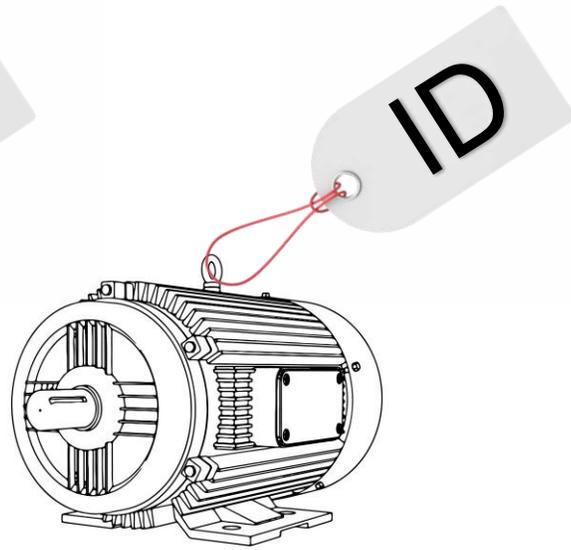
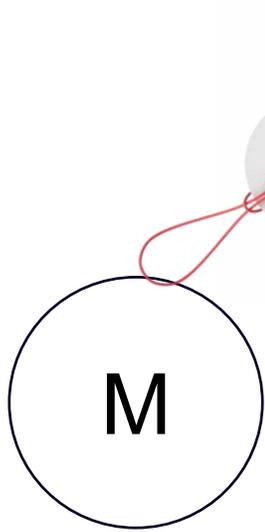


**AI
OVERLORD**

**MANUAL
MAPPING**

**VENDOR
LOCK-IN**





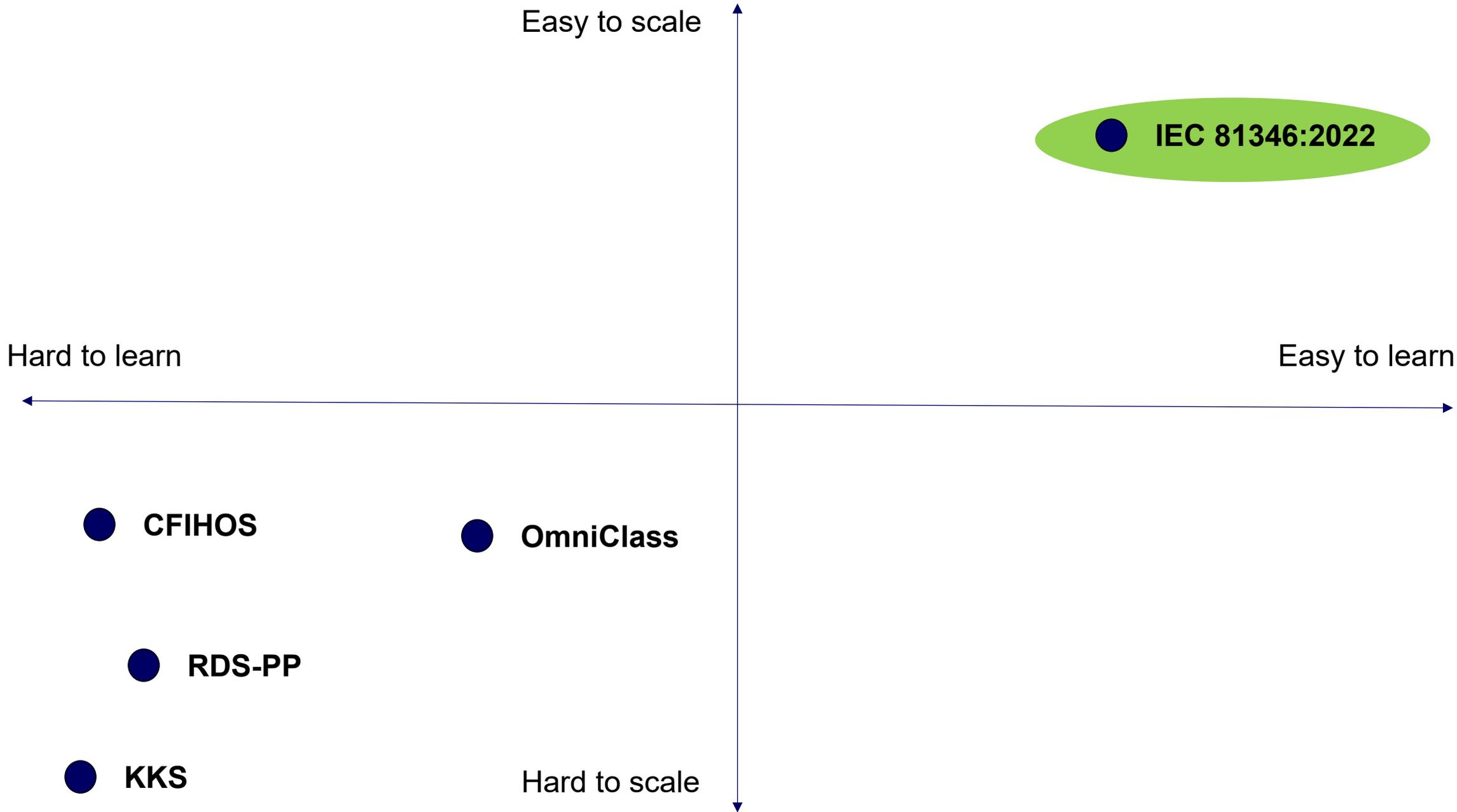
Concept

Design

Operation

Retirement

HOW?

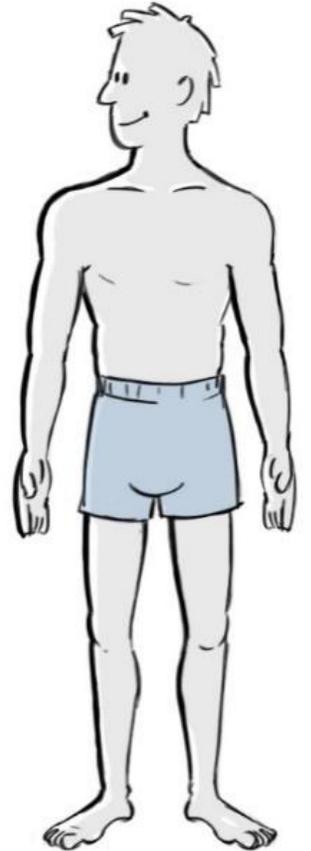


/ HOW DOES IT WORK?

1. Simple syntax to handle unlimited complexity
2. Proper classification framework with definitions
3. Allowing multiple structures and viewpoints

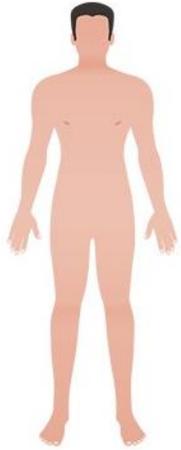
BUILDING A REFERENCE MODEL

/ THE PREMISE: SYSTEMS THINKING



The common language for engineers

/ THE 11 HUMAN BODY SYSTEMS



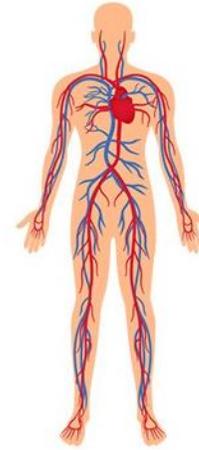
Integumentary System



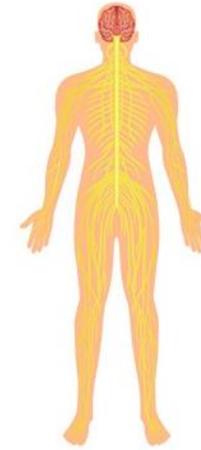
Muscular System



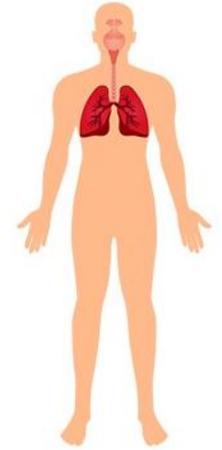
Skeletal System



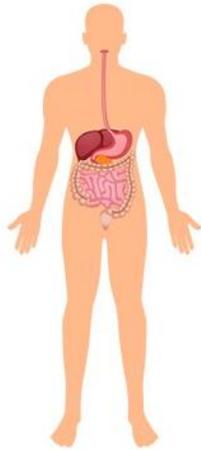
Cardiovascular System



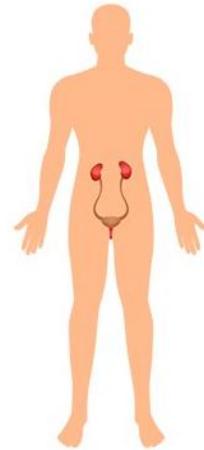
Nervous System



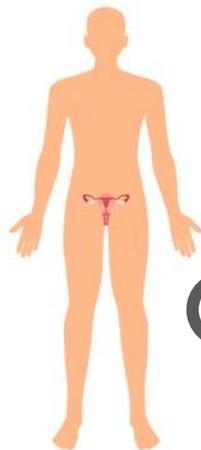
Respiratory System



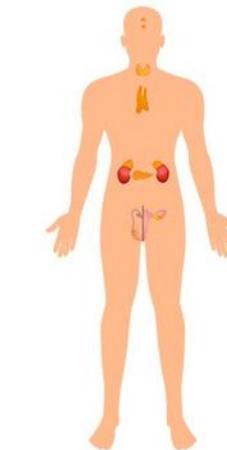
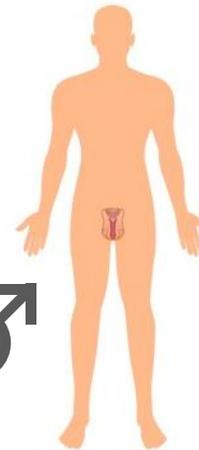
Digestive System



Urinary System



Reproductive System



Endocrine System



Lymphatic/Immune System

SYSTEM MODELLING

How to model a system easily

LEGO MODEL

10 pcs.



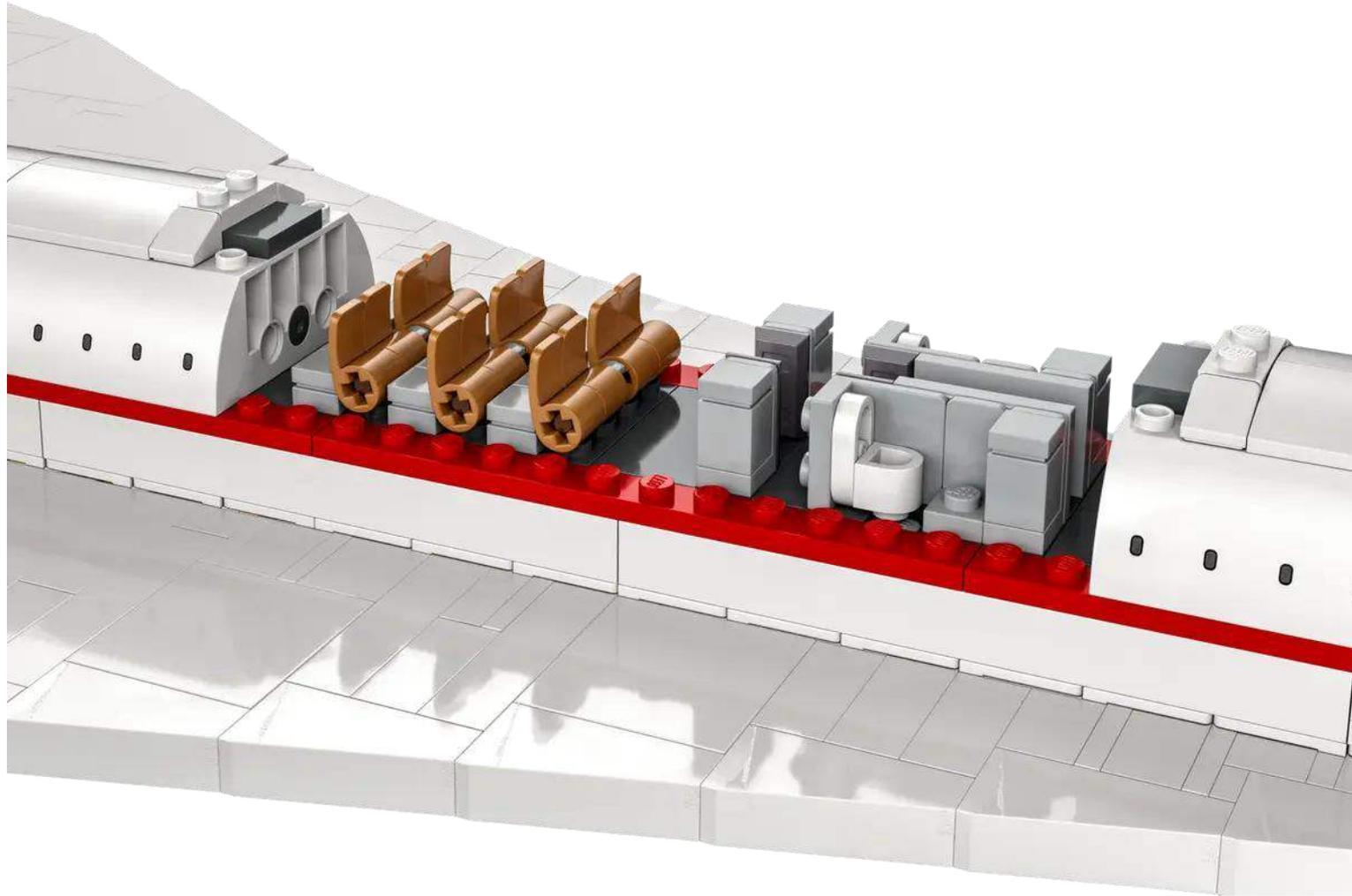
LEGO MODEL

2083 pcs.



LEGO MODEL

2083 pcs.



More elements -> More details

COMMON LANGUAGE FOR SYSTEMS

Making a model any engineer can refer to: The Reference Model

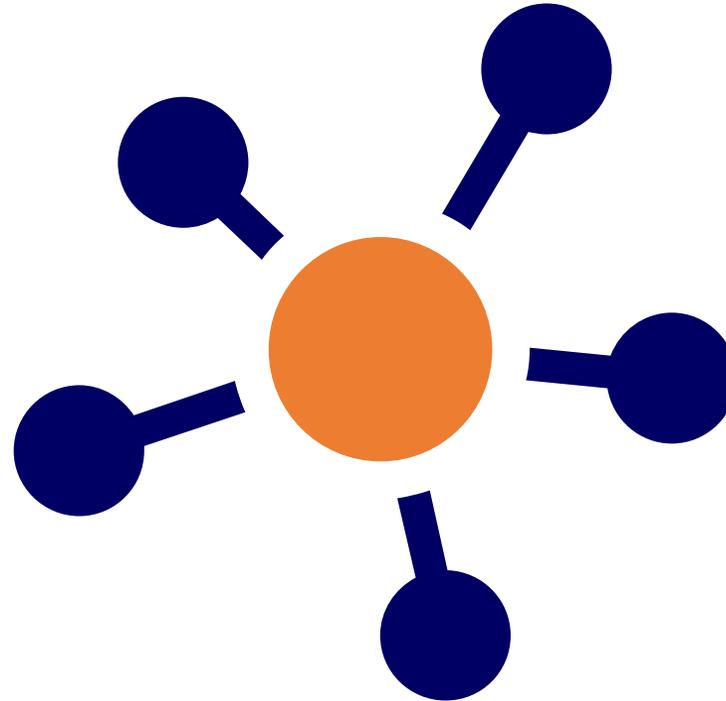
reference model

an informative representation
of an object, person or system
for reference purposes

SYSTEM REFERENCE MODEL

Combining “systems thinking” with “reference” and “model”

**More elements
provides
more details**



**Syntax to address
any system
or system element**

**Not made with LEGO bricks
but “SYSTEM” bricks
defined by ISO/IEC 81346**

HOW 81346 WORKS

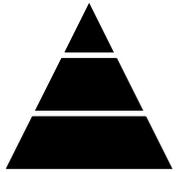


ISO/IEC 81346
Standard Series

THE 81346 SYSTEM LIBRARIES

Different tables for different systems in different industries

Basic
systems



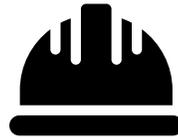
Part
2

Power
systems



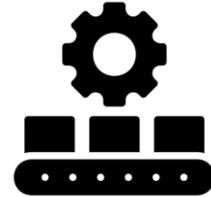
Part
10

Construction
systems



Part
12

Manufacturing
systems



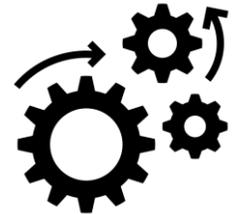
Part
14

Vehicle
systems



Part
20

System
processes



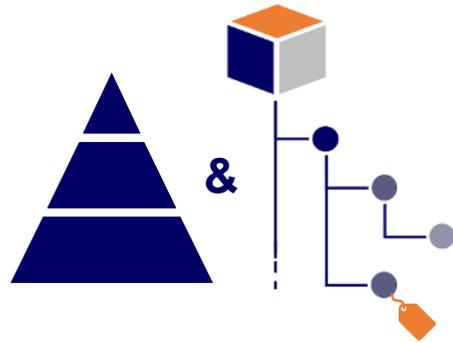
Part
50

Part 8 – Properties

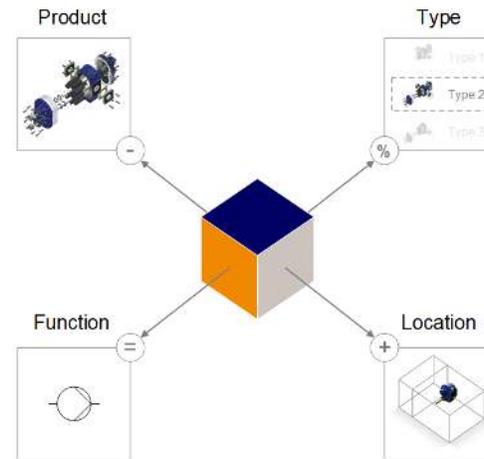
Part 1 – Rules and Principles

THE ISO/IEC 81346 STANDARD SERIES

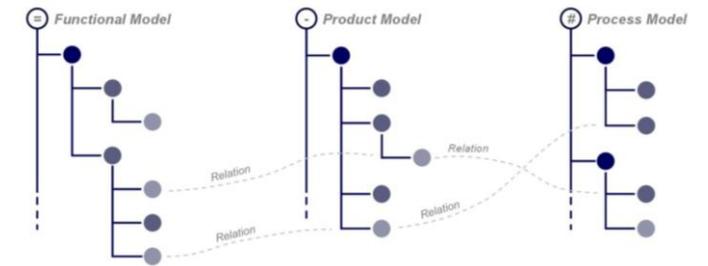
The common language systems



System breakdown



Aspects



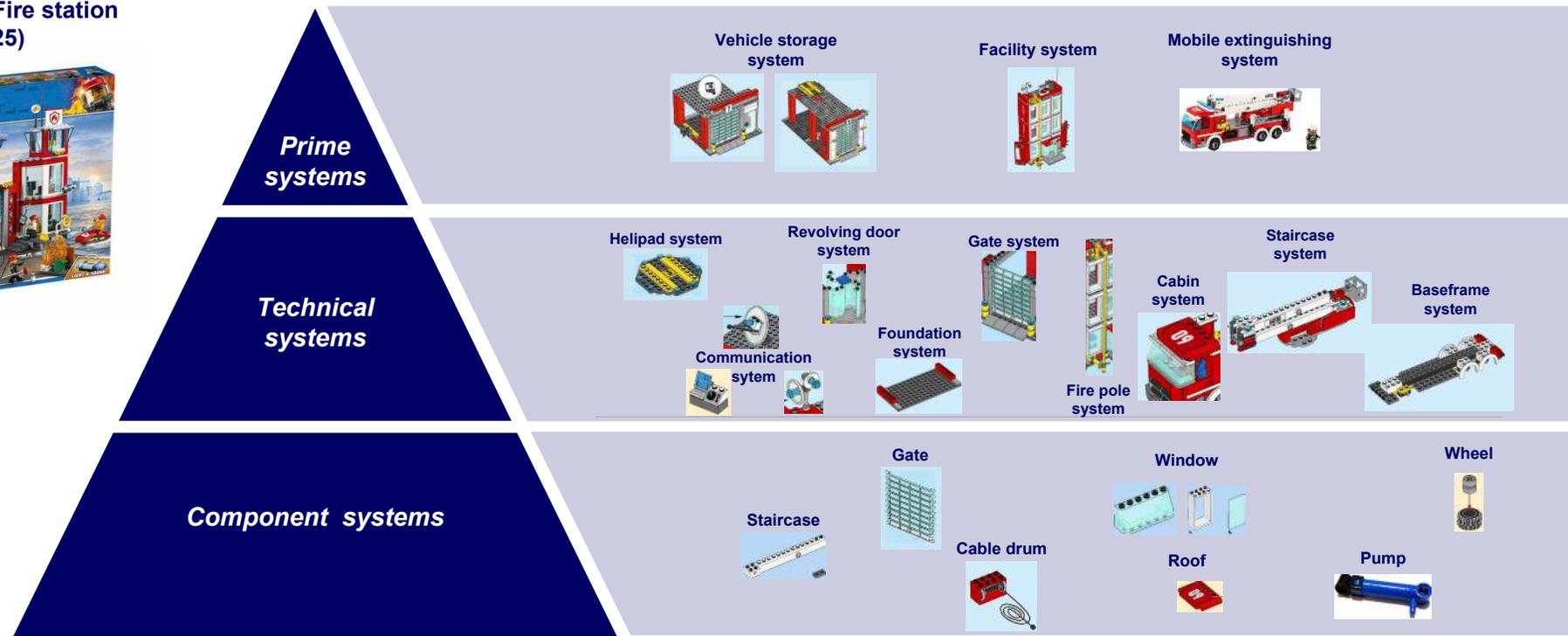
Relations

System Reference Model

THE 81346 "BOX OF SYSTEMS"

Example of system libraries

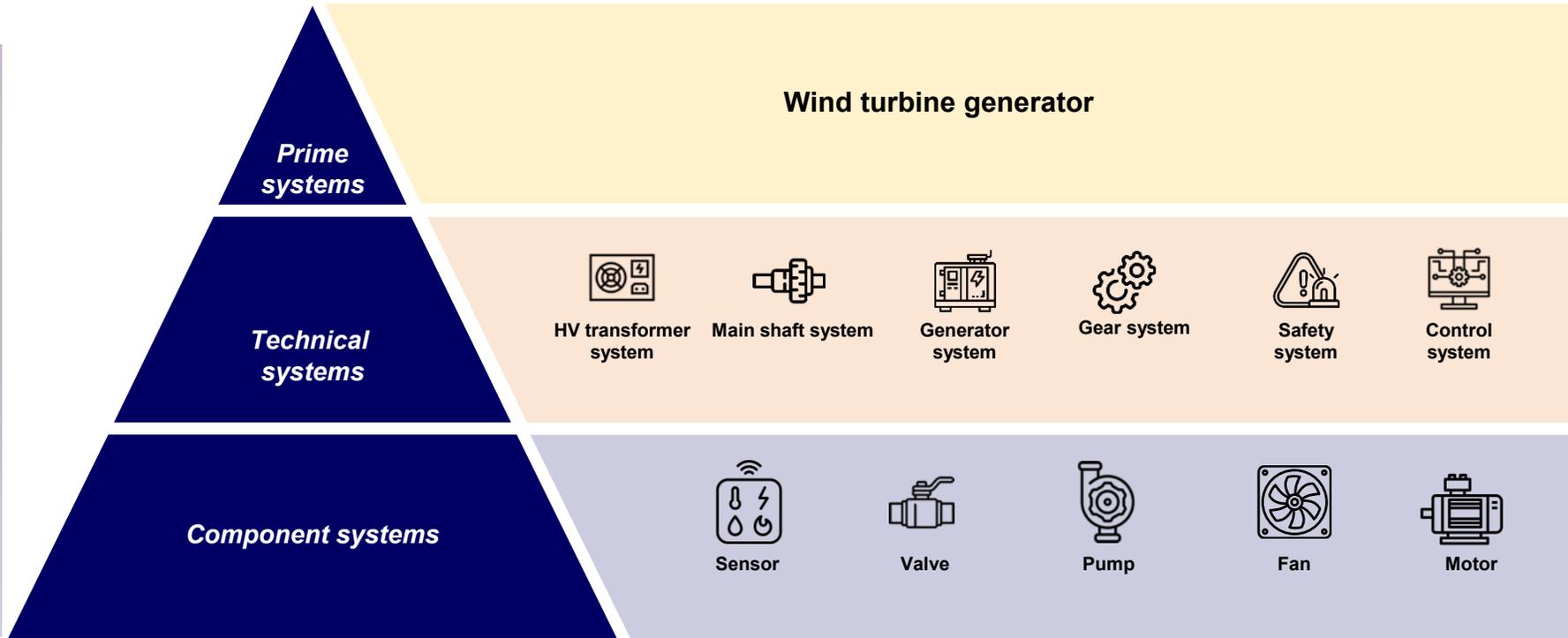
LEGO CITY: Fire station (60125)



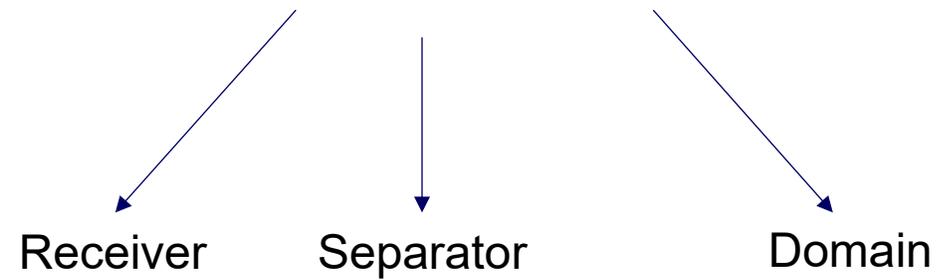
Illustrations used with kind permission from LEGO System A/S

RDS-PS (81346-10) BOX OF POWER SYSTEMS

Examples of Power Systems



hb@syseng.dk



RDS 81346 SYNTAX

The 81346 reference designation syntax

Prefix

Defines from which aspect the system is viewed.

- =** Functional
- Product
- +** Location
- %** Type

Class

Defines the system type and relative size/complexity.

- _** Prime system
- Technical system
- Component system

Number

Running number to distinguish from other systems of the same class within the same parent system

1, ... n

Reference designation example

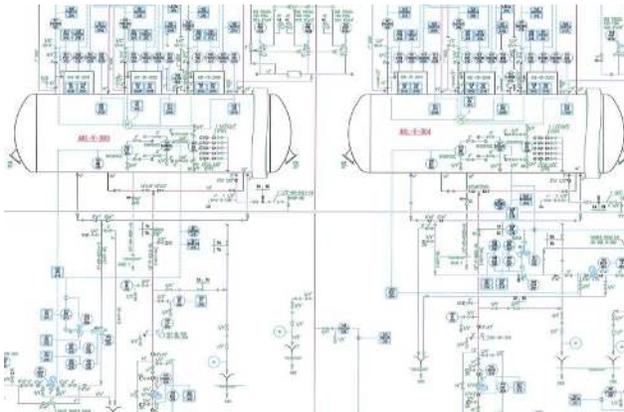
=M1=MS1=ULN1

Thrust system – Combustion engine system – motor block

MY ENTRY POINT TO SYSTEMS ENGINEERING

This is where we always recommend new beginners to start with systems engineering: **The system breakdown model**

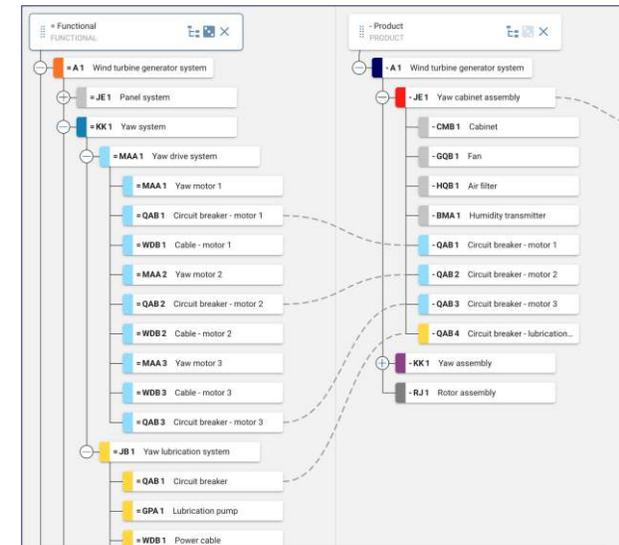
MAKING A SYSTEM REFERENCE MODEL



Explicit knowledge



Implicit knowledge

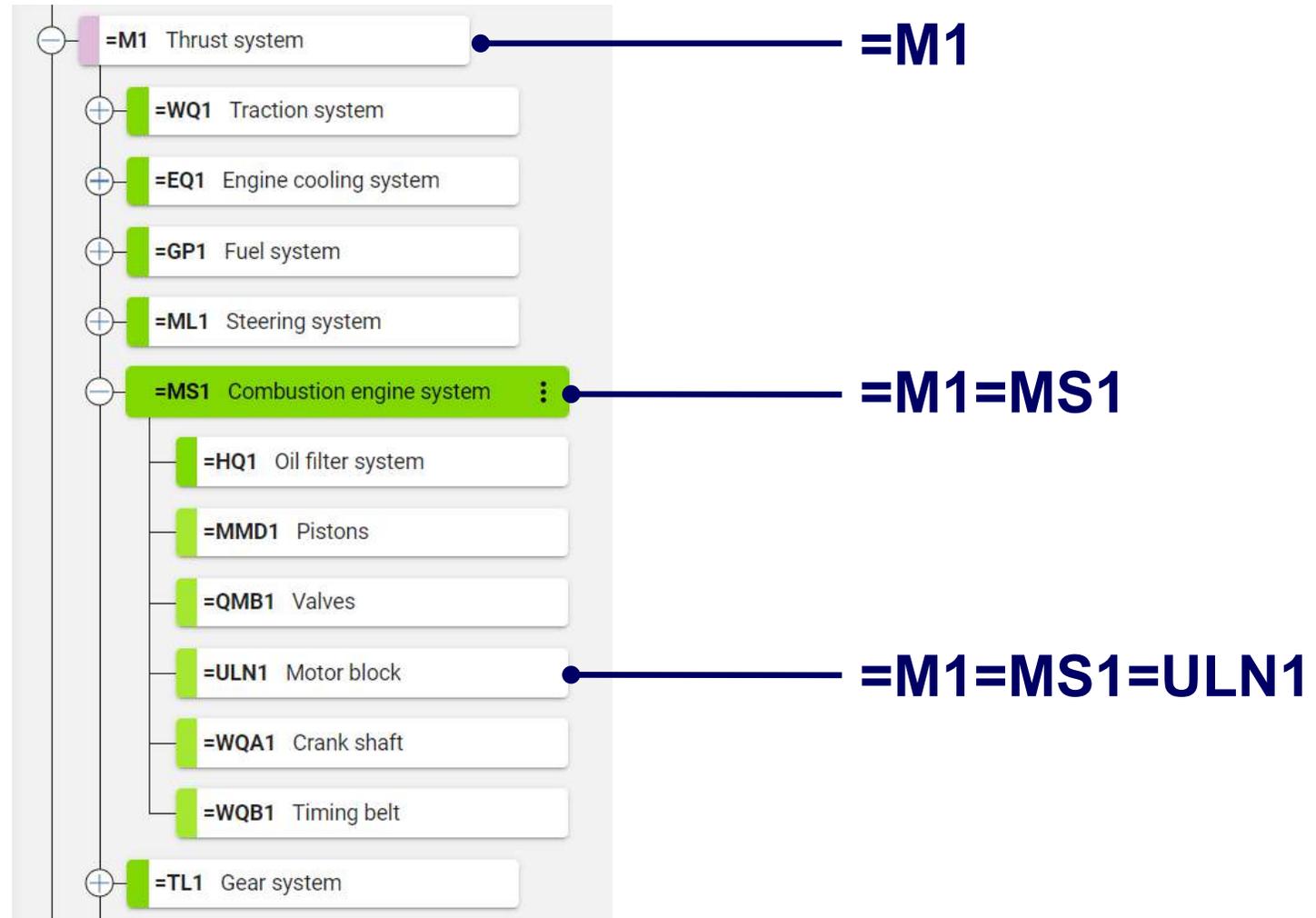


Relations knowledge

System breakdown model = The 81346 system reference model

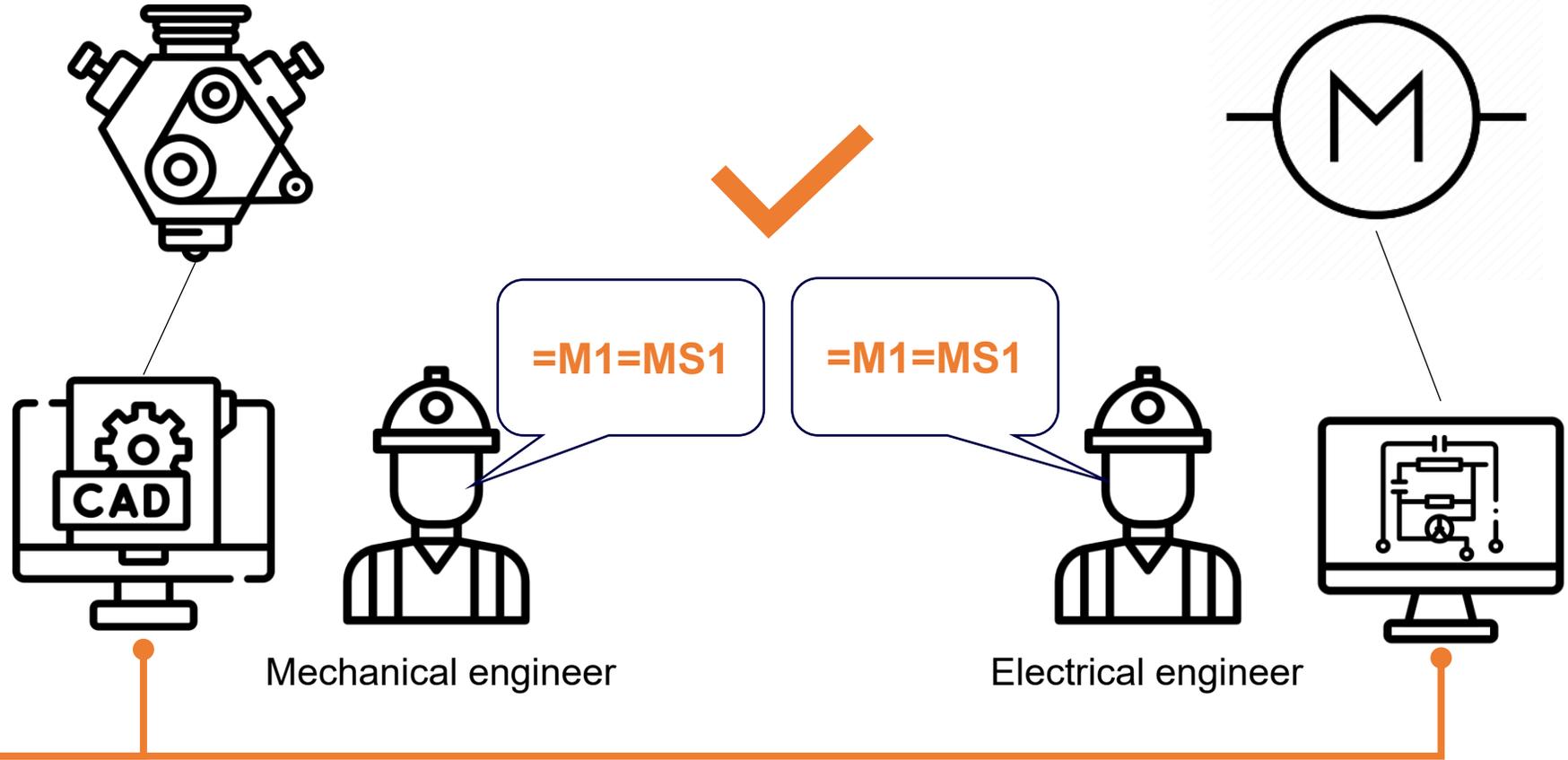
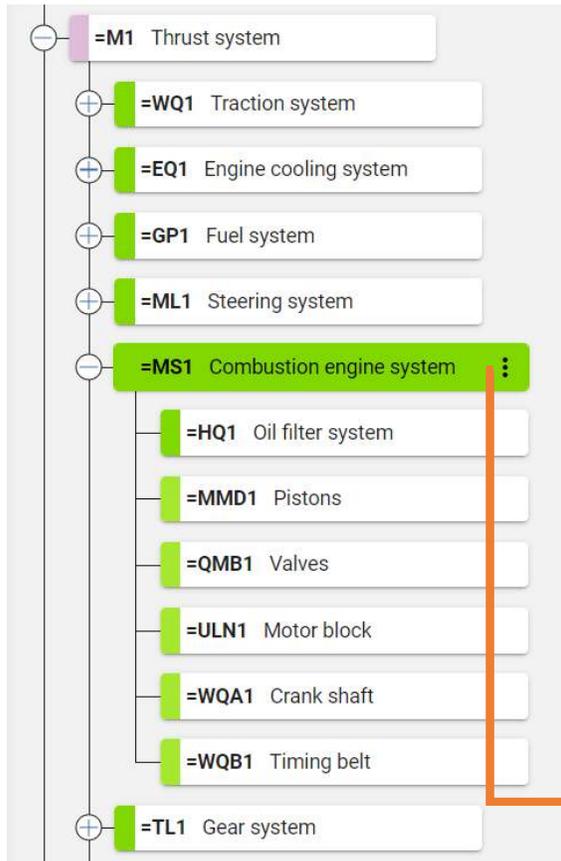
SYSTEM REFERENCE MODEL

Using the ISO/IEC 81346 common language for systems



SYSTEM REFERENCE MODEL

Different disciplines “talks the language of systems”



OUTPUT FROM 81346

Selected 81346 offers (i.e. what can you use it for)

WHAT 81346 OFFERS BY AI

I asked AI what 81346 offers, and this is the response:

- 1.Reference Designations:** Structured identifiers for systems, components, and assets.
- 2.System Architecture Models:** Clear, hierarchical representations of complex systems.
- 3.Cross-domain Consistency:** Unified naming and classification across electrical, mechanical, software, and civil domains.
- 4.Digital Twin Enablement:** Foundational structure for interoperable digital representations.
- 5.Improved Lifecycle Management:** Better traceability from design to operation and maintenance.

TRANSITIONING TO RDS 81346

WHERE TO BEGIN...

Its about the transition



WHERE TO BEGIN...

Its about the transition



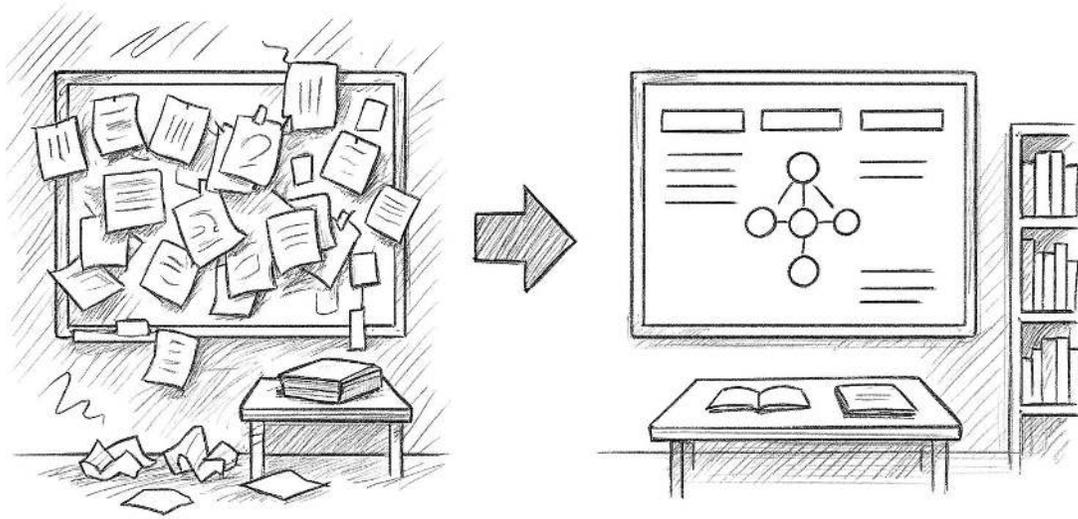
- **Assess legacy systems**
- **Start small**
- **Prioritize areas**



Which argument do you think resonates most with leadership when adopting RDS

WHERE TO BEGIN...

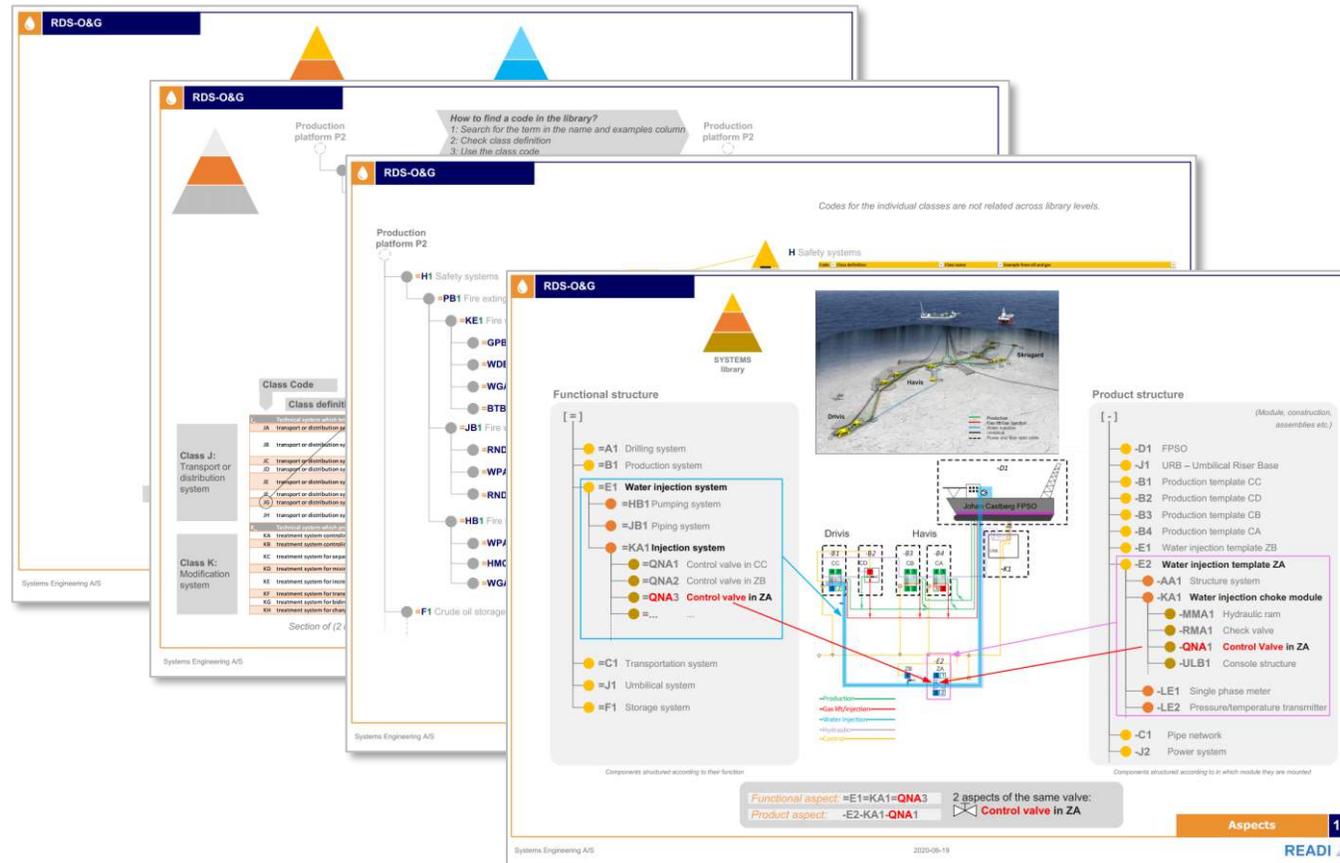
Its about the transition



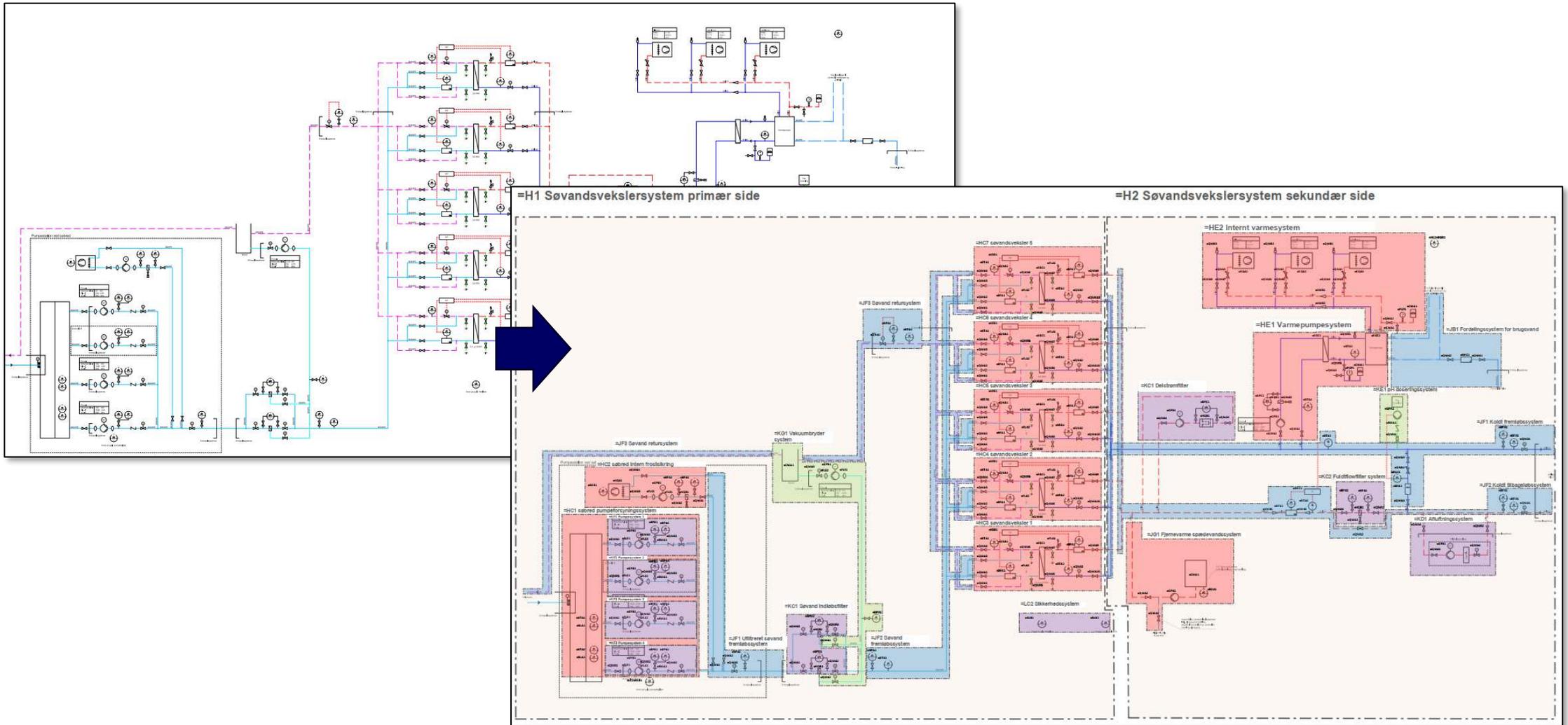
- **Develop rules for application**
- **Engage stakeholders**
- **Pilot and iterate**

DEVELOP RULES FOR APPLICATION

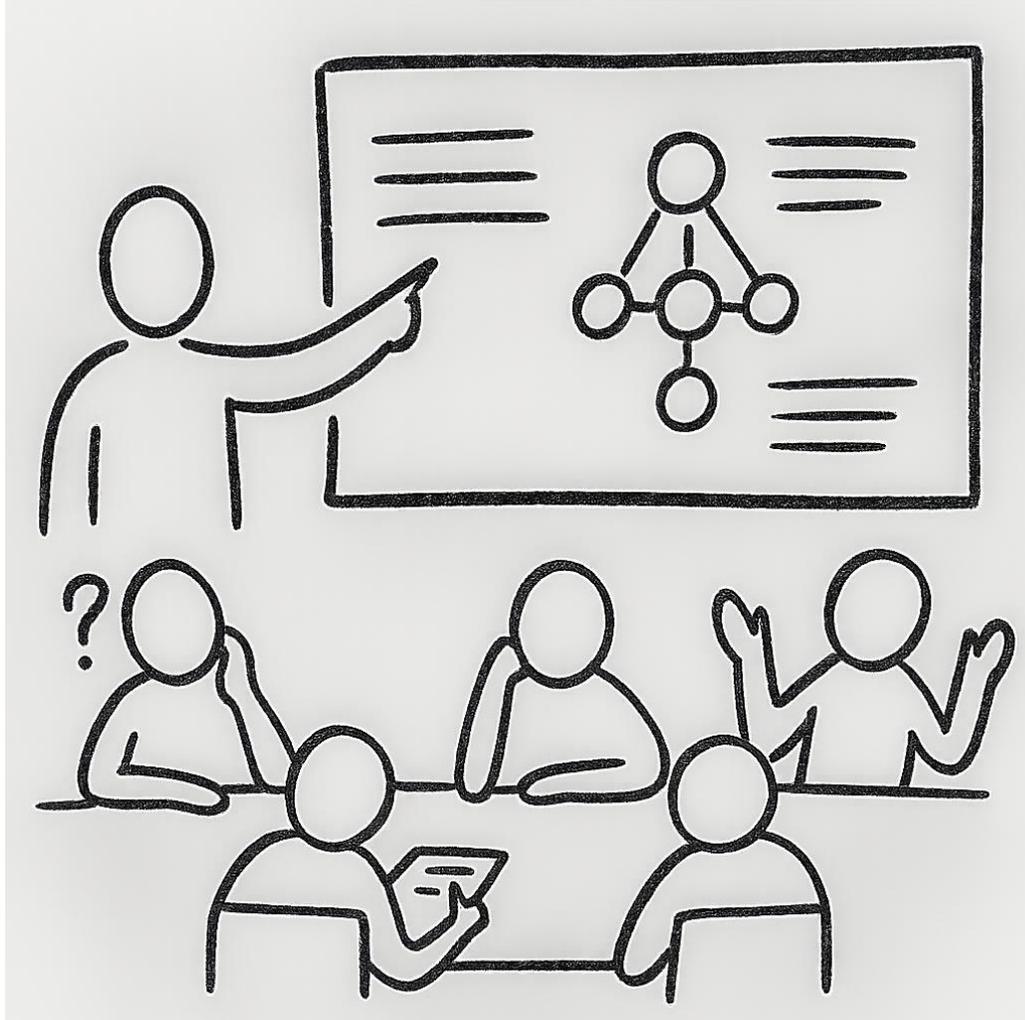
Its about the transition



DEVELOP RULES FOR APPLICATION

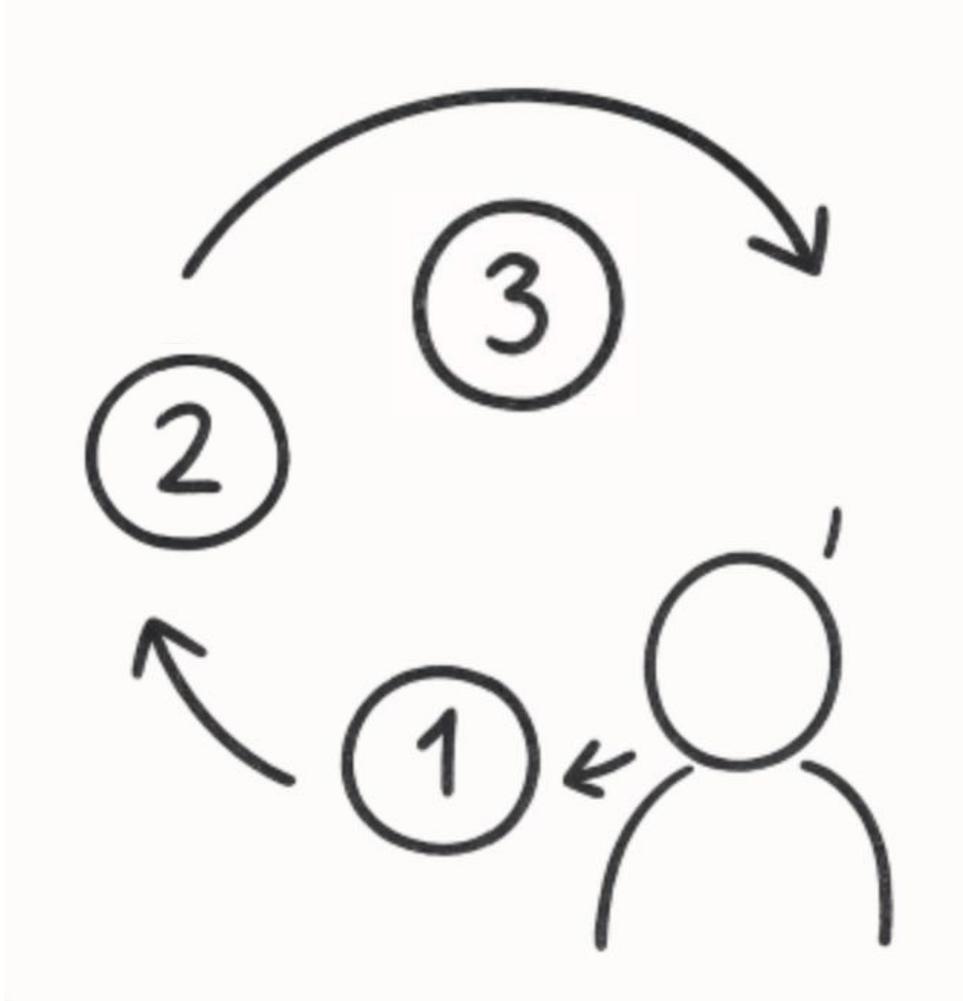


ENGAGE STAKEHOLDERS



- Do you know your stakeholders?
 - Operation and maintenance
 - Engineering and technical teams
 - IT
 - Procurement and supply chain
- Designate an RDS owner!

PILOT AND ITERATE



- Early involvement
- Feedback loops
- Define core principles and then extensions
- Make it work one step at a time

/ KEEP IN MIND



- Keep scope tight

/ KEEP IN MIND



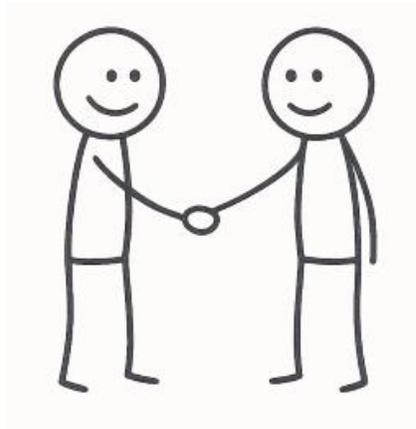
- Keep scope tight
- Visualize results

/ KEEP IN MIND



- Keep scope tight
- Visualize results
- Document rigorously

/ KEEP IN MIND



- Keep scope tight
- Visualize results
- Document rigorously
- Engage operators early

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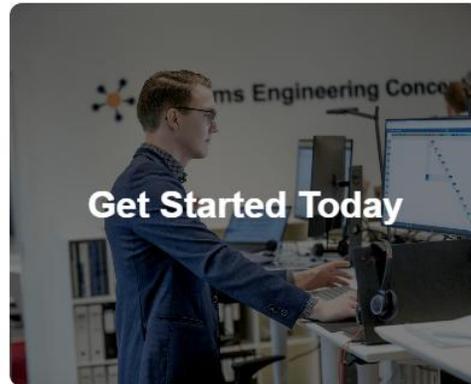


ISO/IEC 81346 Software Free Material



[Get Started](#)

ISO/IEC 81346 Standard Series



THANK YOU FOR YOUR ATTENTION

W: www.syseng.dk, T:+45 25 94 80 30

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It's all about creating a common language™