



**33<sup>rd</sup>** Annual **INCOSE**  
international symposium

hybrid event

Honolulu, HI, USA  
July 15 - 20, 2023



INCOSE IS 2023 – Virtual experience Session V5.1.2 - Paper #65

# Common Language for Systems

# **COMMON LANGUAGE FOR SYSTEMS BY THE ISO/IEC 81346 REFERENCE MODEL**

INCOSE IS 2023 – Virtual experience Session V5.1.2  
Paper #65

# **TIMELINE**

- 2012** 4<sup>th</sup> generation of ISO/IEC 81346 standard released as the common language across disciplines
- 2014** ISO/IEC 81346 standard presented at IS 2014 in Las Vegas. Airbus found this relevant.
- 2017** Development and test of the Airbus Common Language (ACL)
- 2020**
  - Initial proof of concept. First initial tests.
  - Defining aircraft systems “RDS-A/C”
  - Defining manufacturing systems “RDS-MS”
  - Defining processes “RDS-PRO”
  - Defining properties for systems “RDS-PROP”
- 2021** C-19. Discovery of the RDS 81346 Reference Model
- 2022** Development of ontologies and missing RDS 81346 relations
- 2023** Increasing implementation of the ACL in projects
- 2023** Release of result as new parts of the ISO/IEC 81346 standard series
- 2026** with external partners.

# Reference Designation System

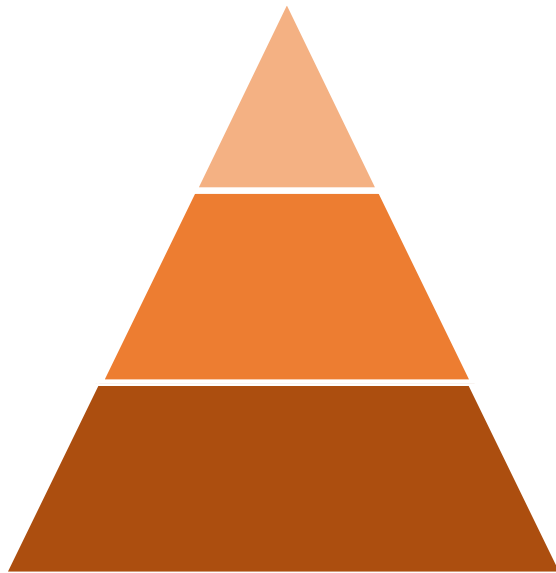
ISO/IEC 81346 Standard Series

Part 1 – 2 – 10 – 12 (-14) (-50) ...

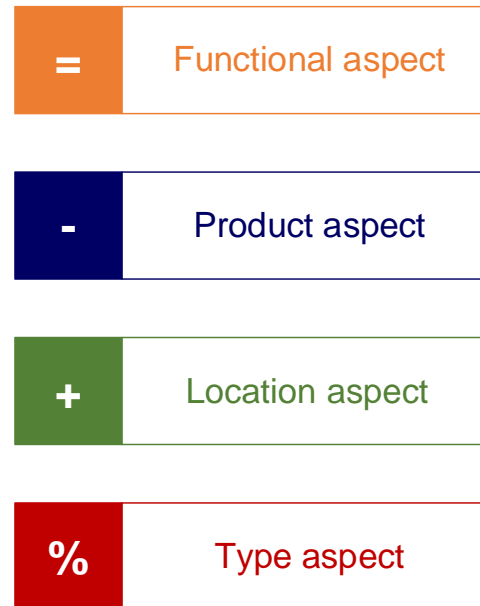


# RDS 81346 FUNDAMENTALS

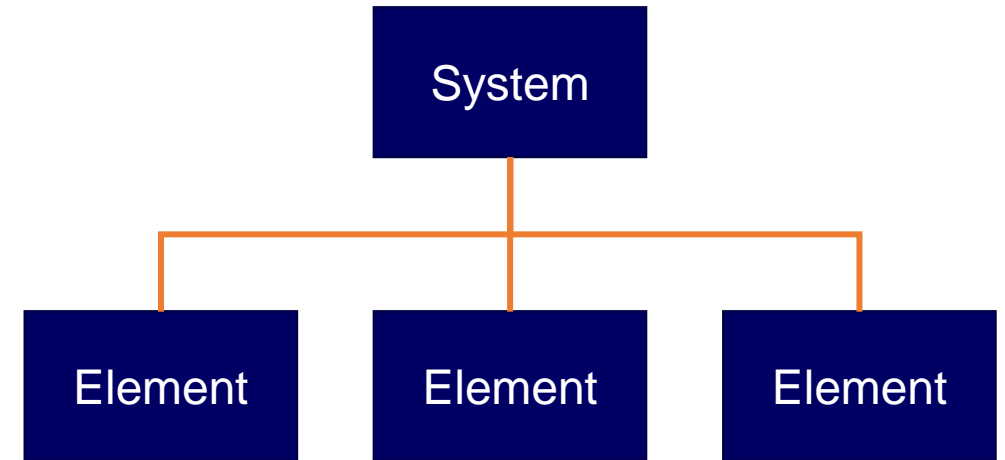
*The RDS 81346 Technique in a nutshell*



**1**  
**System  
libraries**



**2**  
**Different  
views**



**3**  
**System  
breakdown(s)**

# / RDS 81346 FUNDAMENTALS

Please see **Paper #65** for a basic introduction of  $1+2+3$

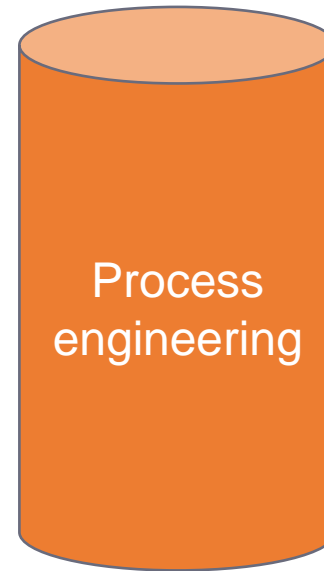
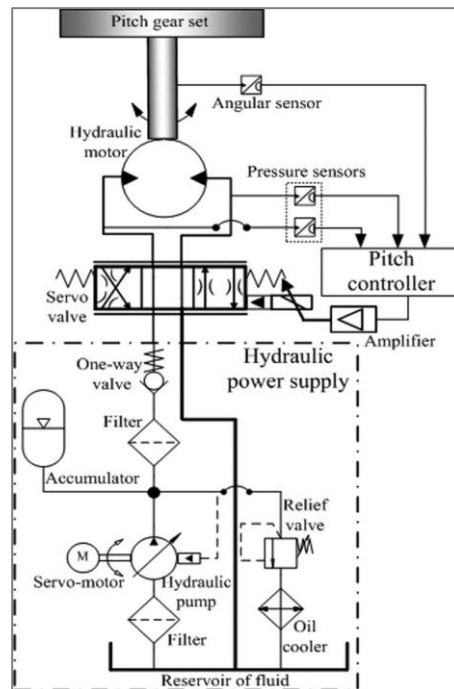
Visit **[www.81346.com](http://www.81346.com)** for more information and downloads

Introduction to RDS 81346

# **THE COMMON LANGUAGE REFERENCE MODEL**

# /DIGITAL MODELS

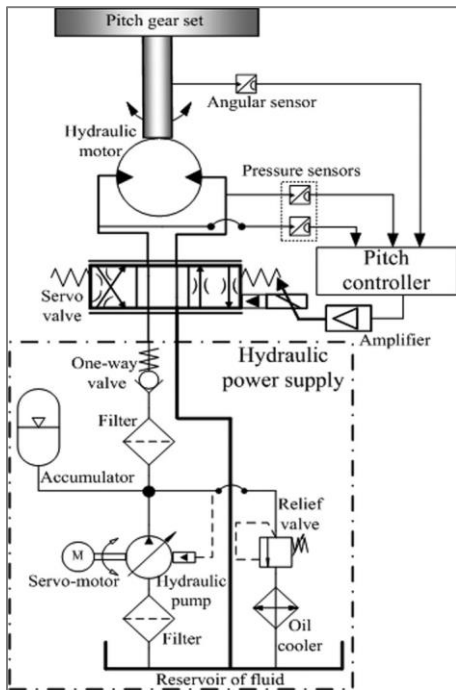
Piping & instrumentation  
perspective



**Model A**

# DIGITAL MODELS

Piping & instrumentation  
perspective



Process  
engineering

**Model A**

Designed for flow information

3D modeling  
perspective

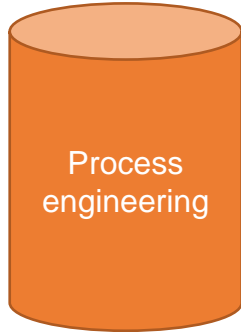
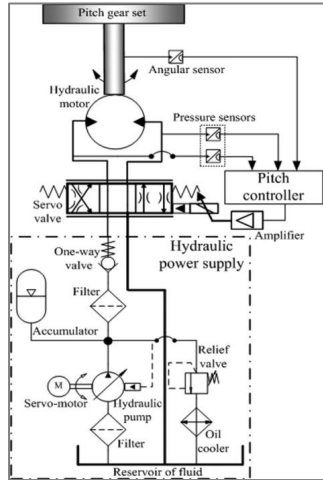


**Model B**

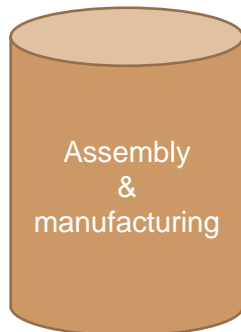
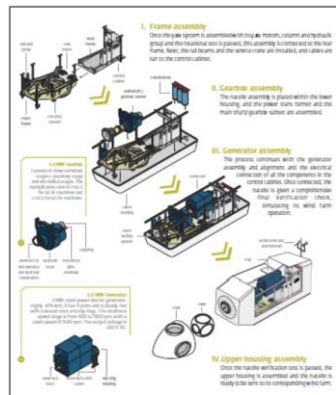
Designed for physical dimension information



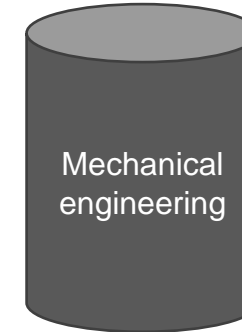
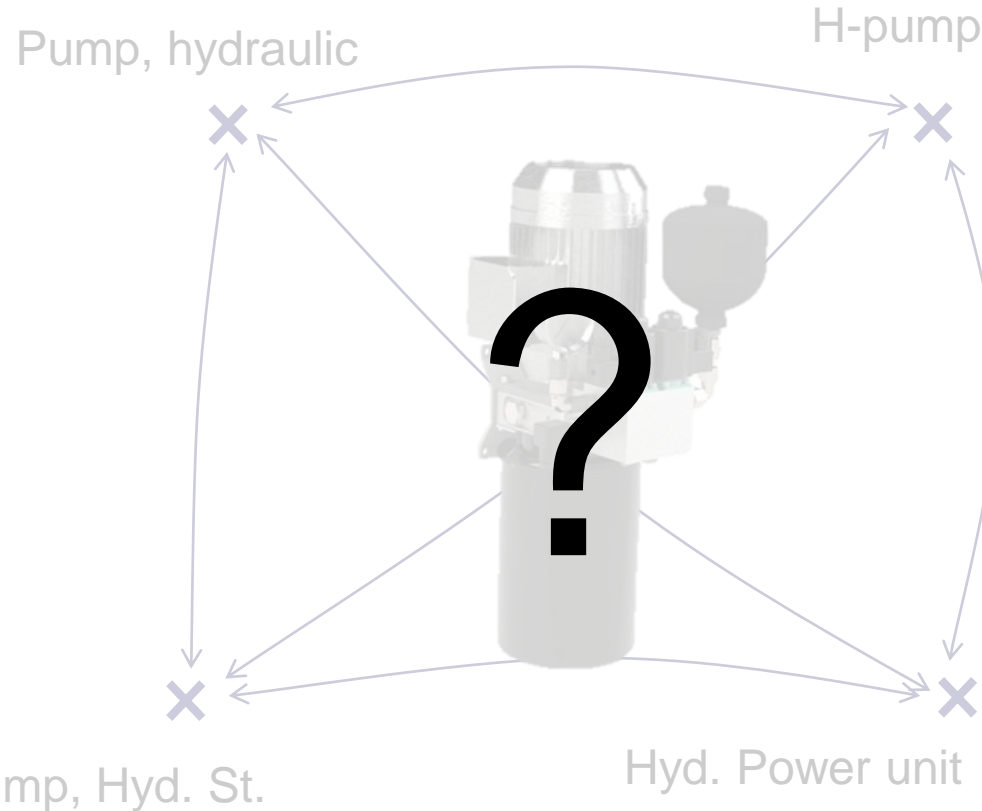
# DIGITAL MODELS



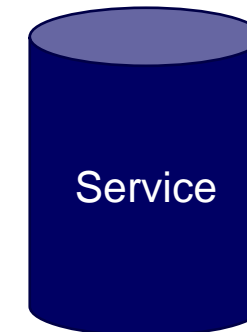
**Model A**



**Model C**



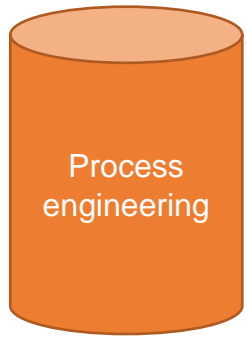
**Model B**



**Model D**

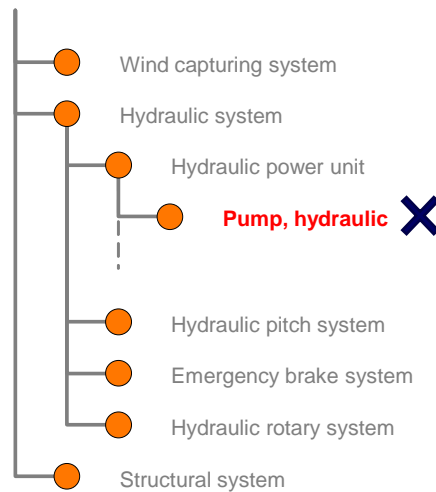


# RDS 81346 TECHNIQUE

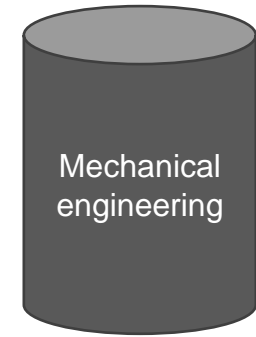
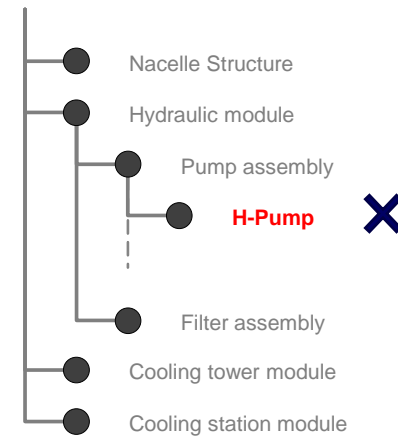


**Model A**

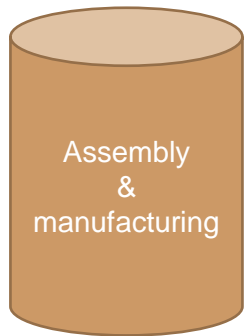
Functional structure



Product structure

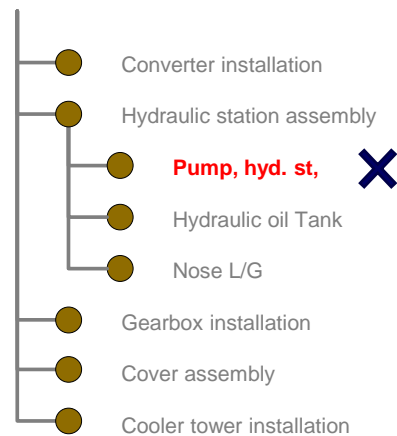


**Model B**



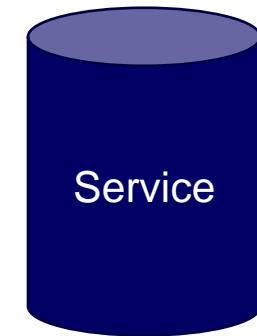
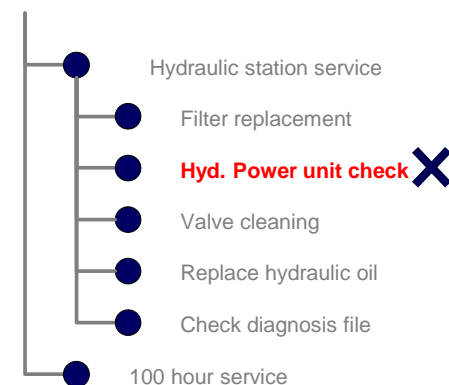
**Model C**

Assembly structure



RDS 81346

Service structure

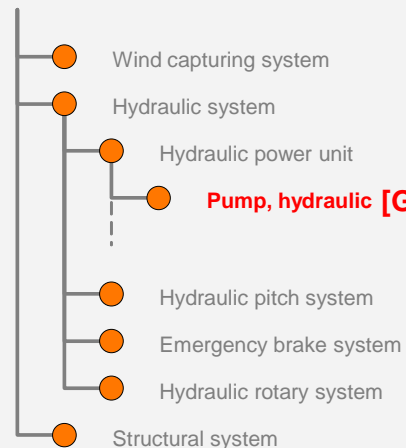


**Model D**

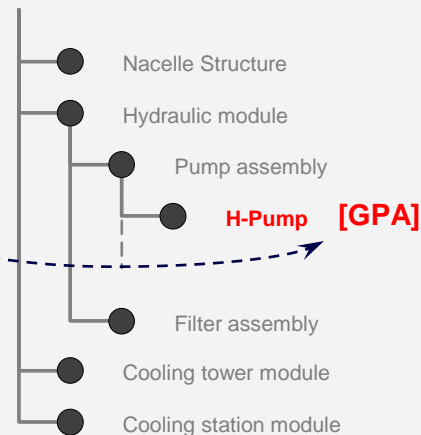


# REFERENCE MODEL

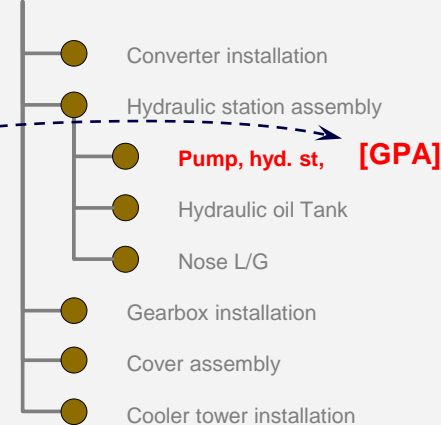
## Functional structure



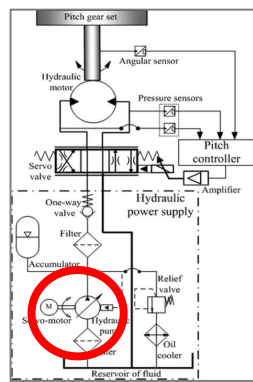
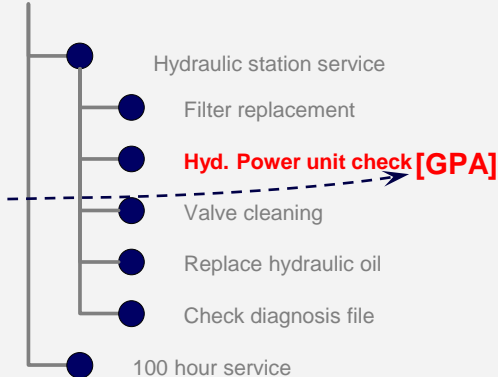
## Product structure



## Assembly structure



## Service structure



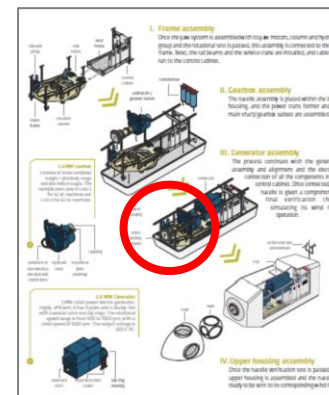
## Model A

Process engineering



## Model B

Mechanical engineering



## Model C

Assembly and manufacturing



## Model D

Service manual



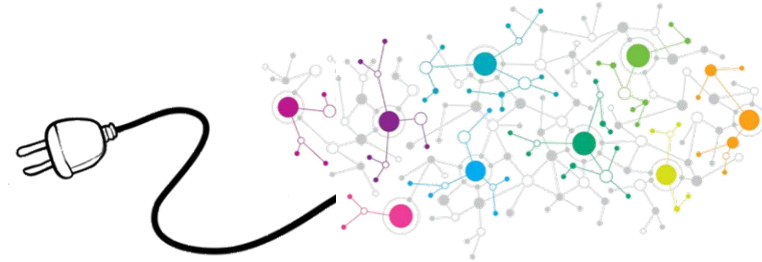
# **APPLICATION OF RDS 81346 @ AIRBUS**



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international symposium  
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July 15 - 20, 2023

**AIRBUS**

**Common**



# A common language as at scale digital continuity enabler

From ISO/IEC 81346 to “The Airbus Common Language”, ... and beyond!

Presented by Thomas BARRE ([thomas.barre@airbus.com](mailto:thomas.barre@airbus.com) / [common.language@airbus.com](mailto:common.language@airbus.com))



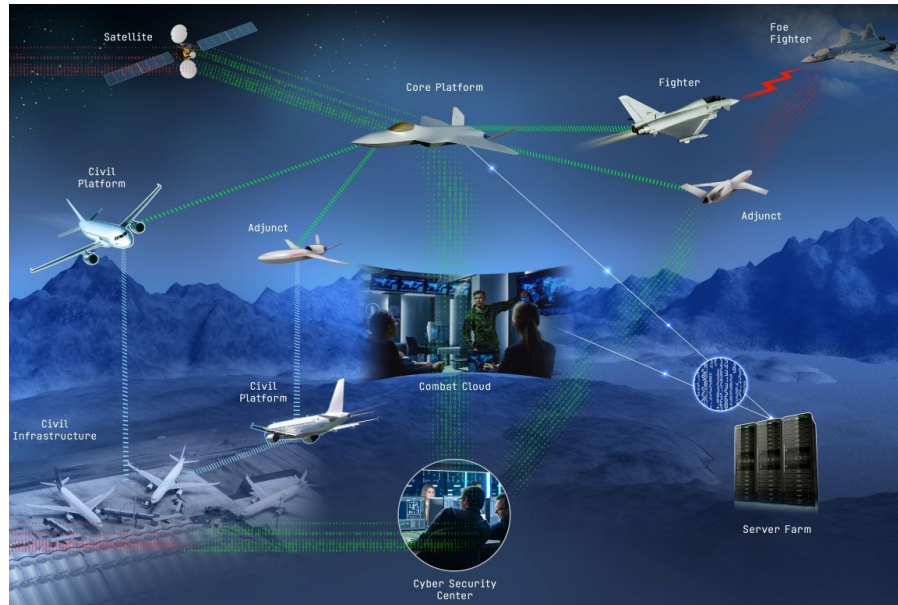
# The vision

*Data is the new gold. Digital continuity is the new Graal.*

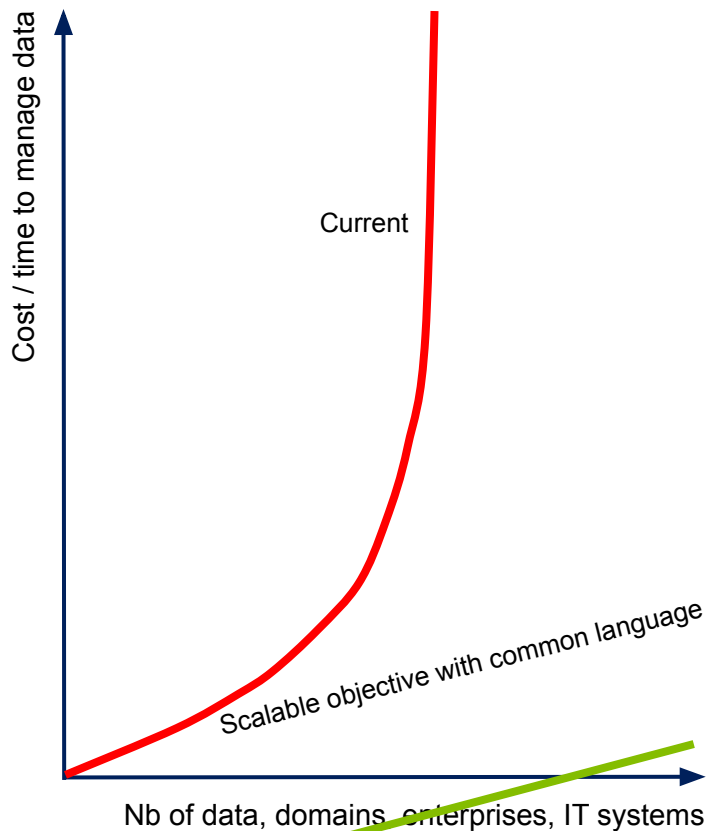


# The vision

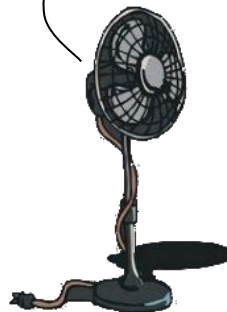
*Digital continuity is the key to co-operations & data-based studies*



# From the pain to the solution



I'M A HUGE  
METAL FAN.



READI.org

ME TOO !



*The ambition of this language  
based on proven international standards  
is to value data by providing practical solutions  
to clarify, federate & query data,  
at marginal cost and time, even at scale*

# Value proposal - common reference concept

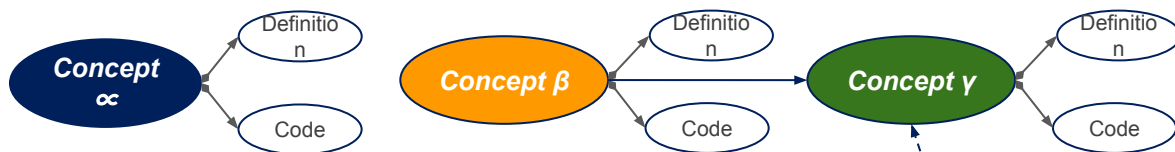
Tag

link to common reference concept

*The innovation is to use a common business language on tags as bridge between data sets: now new & legacy data are understood & operated across silos (domains, enterprise, IT solutions, ...), at marginal cost and time*

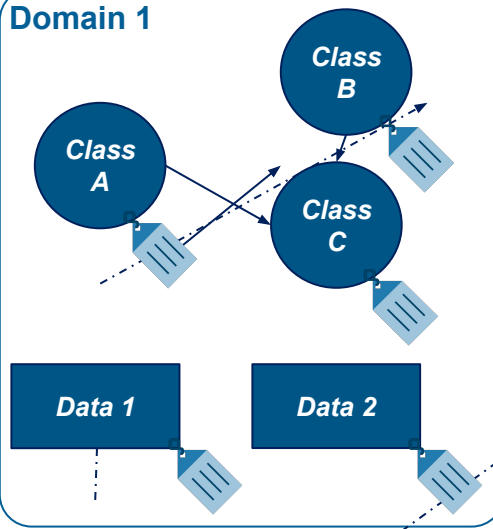
Foundation ontology

Common Reference

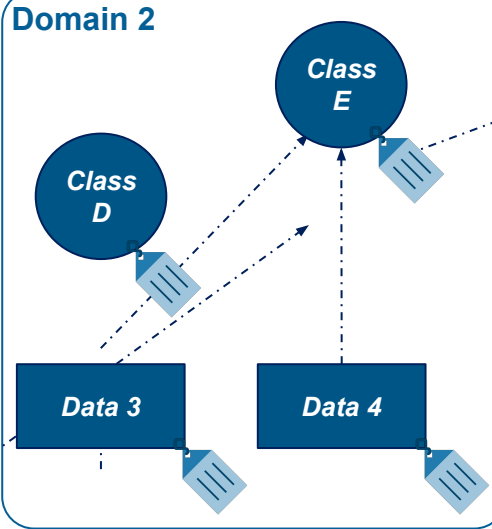


Domain ontologies

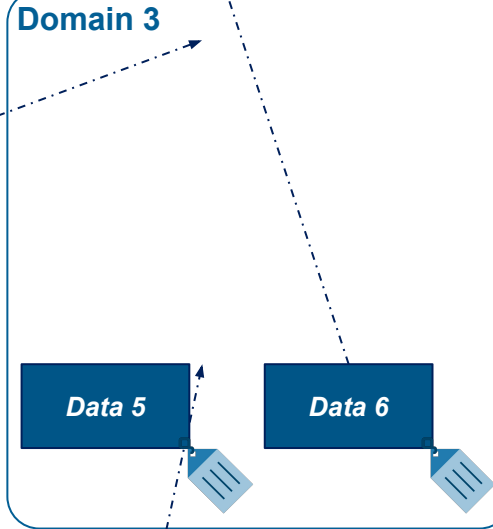
Domain 1



Domain 2



Domain 3



Domain Data

## Value proposal - Example

*This language is used to provide meaning to data thanks to tag applied on top of unique identifiers*



Unique Identifier

e.g. **254562AB**

Common Language tag

e.g. **-MMA**

**MMA** (hydraulic cylinder): system for providing mechanical movement or force, powered by fluid displacement or pressure, providing movement corresponding to a liquid volume.

## Value proposal - The origin



### **ISO/IEC 81346 Reference Designation System (RDS)**

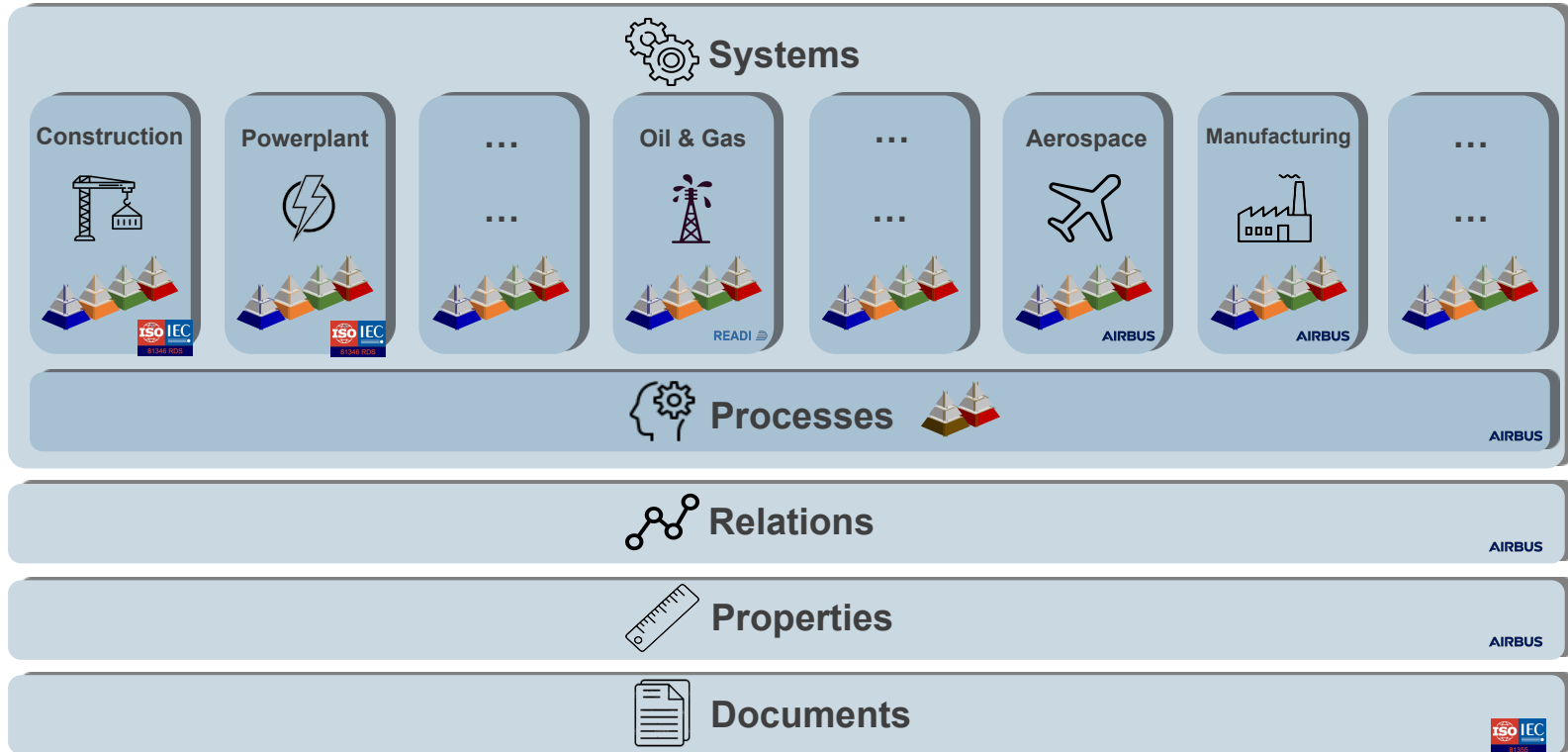
*It's all about creating a common language™*

[www.81346.com](http://www.81346.com)



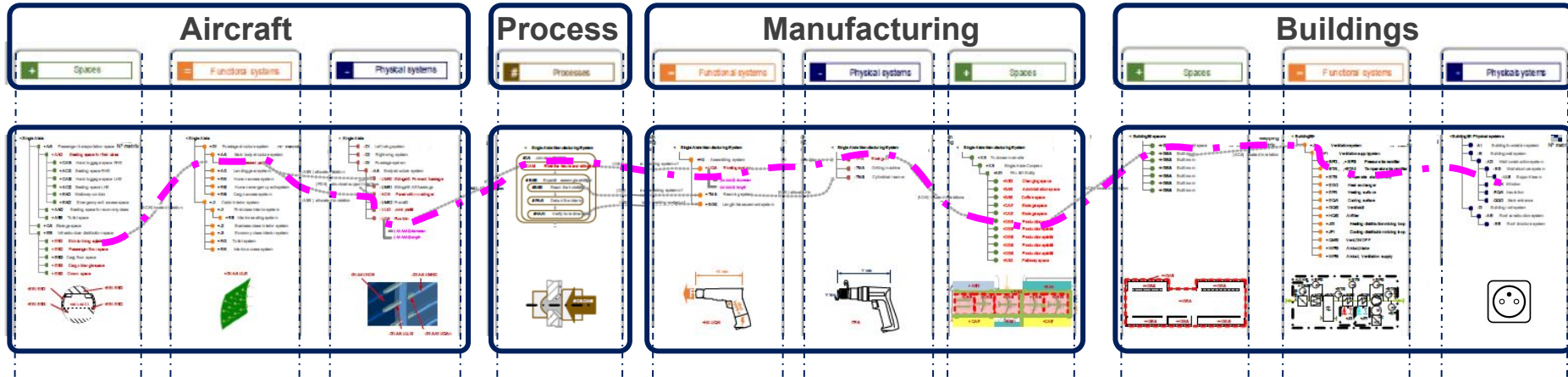
# A common framework

*The common reference is a set of structured concepts definitions and its associated designation language*



# The reference model in action

*This language is used to designate and federate data across silos using the same framework*



— • — Digital thread

## The challenge



About **220.000 bolts** types are registered in AIPS-01-02-008



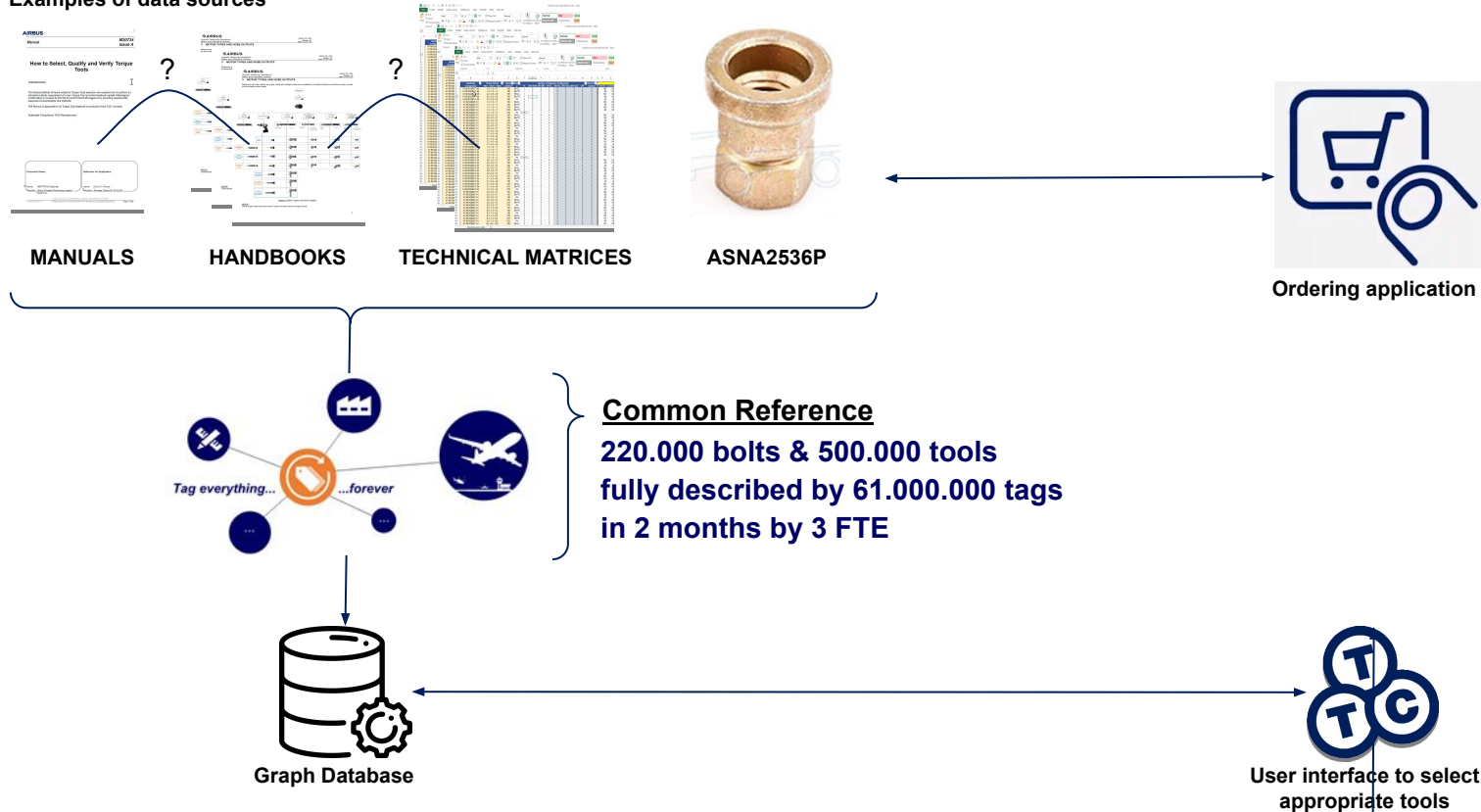
About **500.000 tools** physical types are proposed to torque them depending on:

- Bolt shape, torque, speed, ...
- Worker position, environmental constraints, energy, ...
- ...

**Which tool type(s) can be used to torque a given bolt type?**  
**How to rationalize the tools inventory?**

# Torquing Tool Configurator (TTC)

Examples of data sources



# Definitions browser

AIRBUS

Name It PROD

Tag Reader

Explore Library

Settings

?

1

Hi, Thomas BARRE

Home > Explore RDS Library

Library

Library Type: 

System

 Domain: 

Aircraft

 Aspect: 

Physical

Submit

Search class ID, class name, class definition, class example

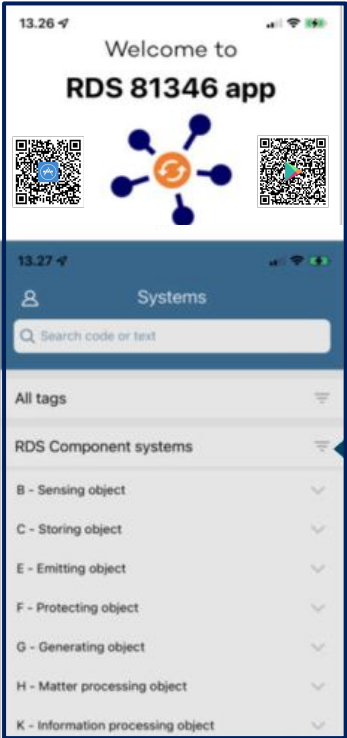
☐ Highest abstraction level

☐ Medium abstraction level

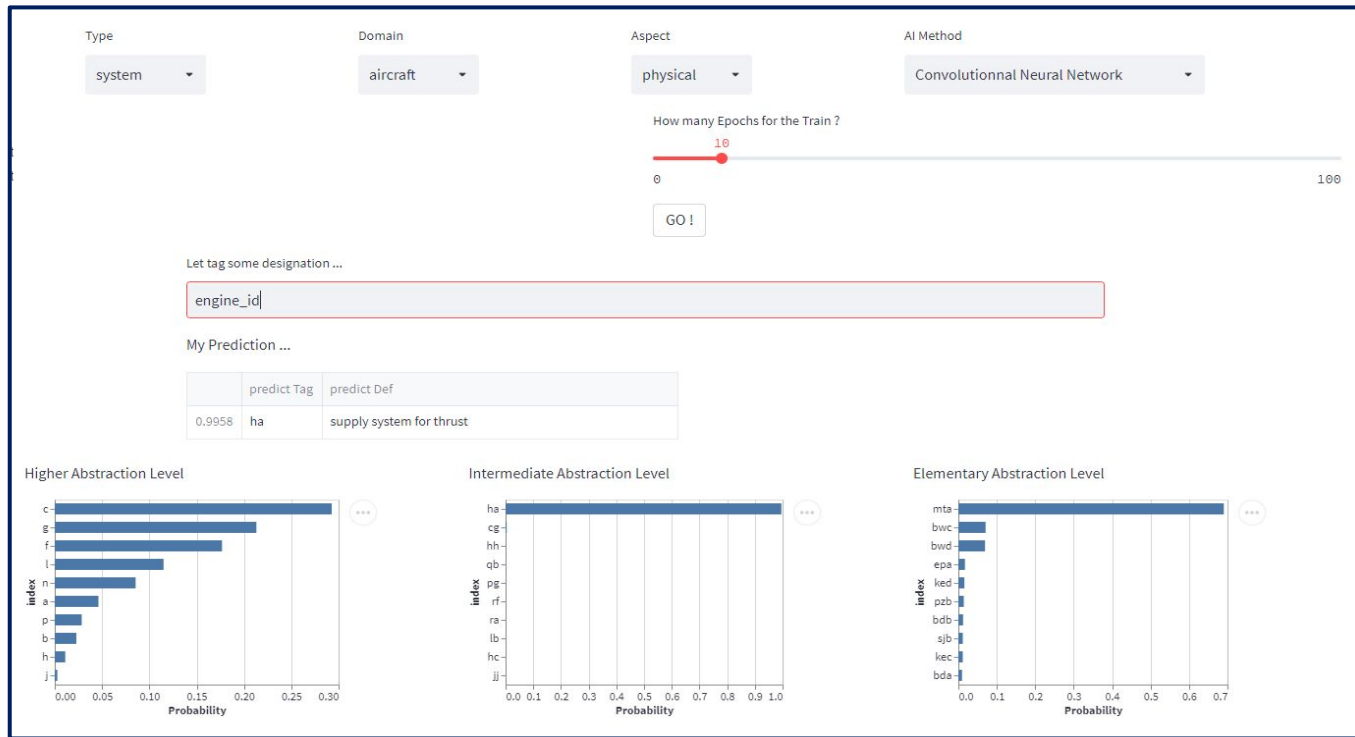
☒ Elementary abstraction level

Search...

| Class ID | Class Name                        | Class Definition   | Class Example                                     |
|----------|-----------------------------------|--|---|
| Q        | Q                                 | Q  | Q   |
| ~ B_     | sensing object                    | object for picking up information and providing a representation |   |
| ~ BA_    | electric potential sensing object | sensing object for electric potential                            |   |
| BAA      | voltage transformer               | electric potential sensing object, with scalar output            | coupling capacitor, measuring voltage transformer |
| BAB      | voltage relay                     | electric potential sensing object, with Boolean output           | measuring voltage relay                           |
| ~ BB_    | resistivity sensing object        | sensing object for resistivity or conductivity                   |   |
| ~ BC_    | electric current sensing object   | sensing object for electric current                              |   |
| ~ BD_    | density sensing object            | sensing object for density                                       |   |
| ~ BE_    | field sensing object              | sensing object for field   |   |
| ~ BF_    | flow sensing object               | sensing object for flow  |   |
| ~ BG_    | physical dimension sensing object | sensing object of spatial dimension and/or position              |   |
| ~ BH_    | energy sensing object             | sensing object for energy  |   |
| ~ BJ_    | power sensing object              | sensing object for power   |   |
| ~ BK_    | time sensing object               | sensing object for time  |   |
| ~ BL_    | level sensing object              | sensing object for level   |   |

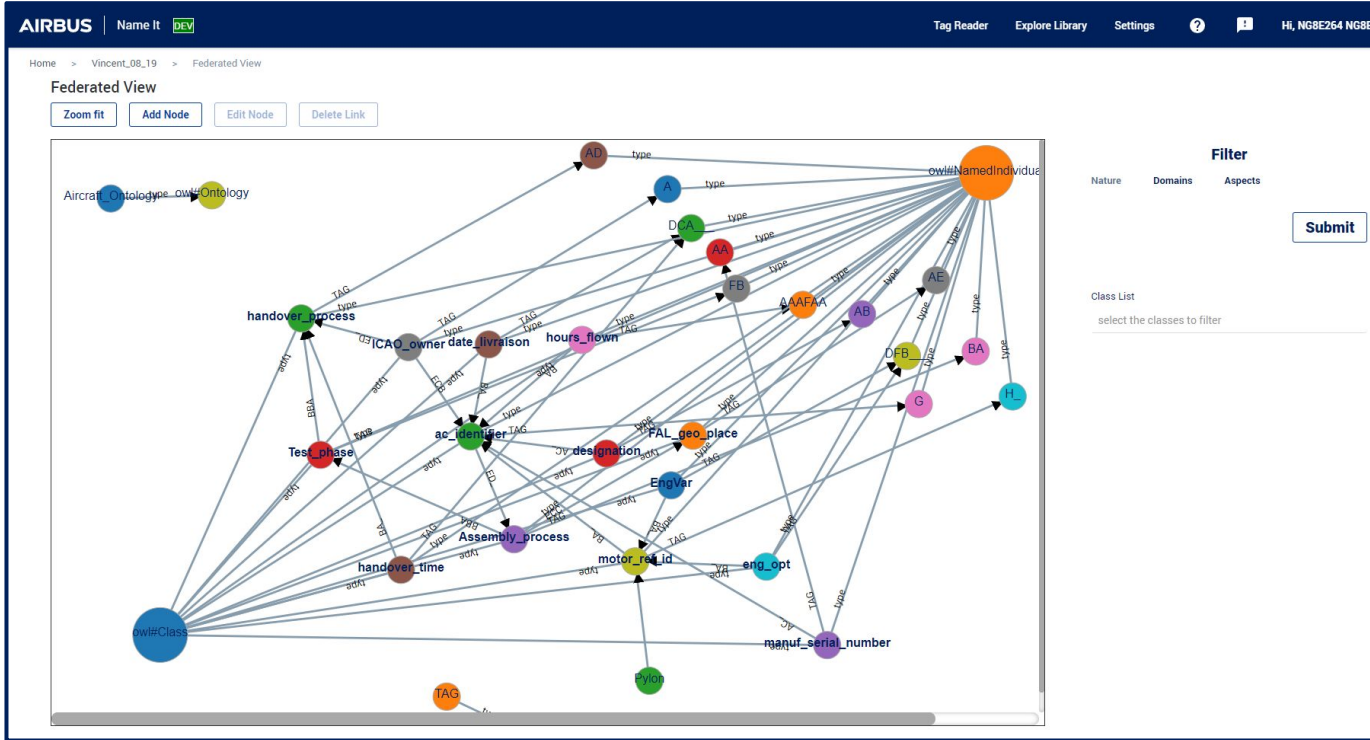


# Automatic suggestion of definitions

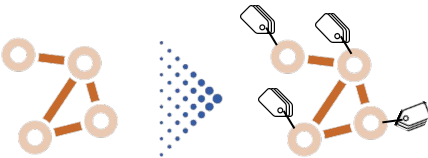


Automatic suggestion of definitions thanks to machine learning: the quickest way to select your tag

# Create and/or tag ontologies

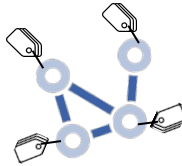


In some clicks all the concepts have explicit meaning



# From table to graph & tags

## From a human operable table to human and machine operable graph



Import a .xlsx file



Drag and drop file here

Limit 200MB per file

Browse files

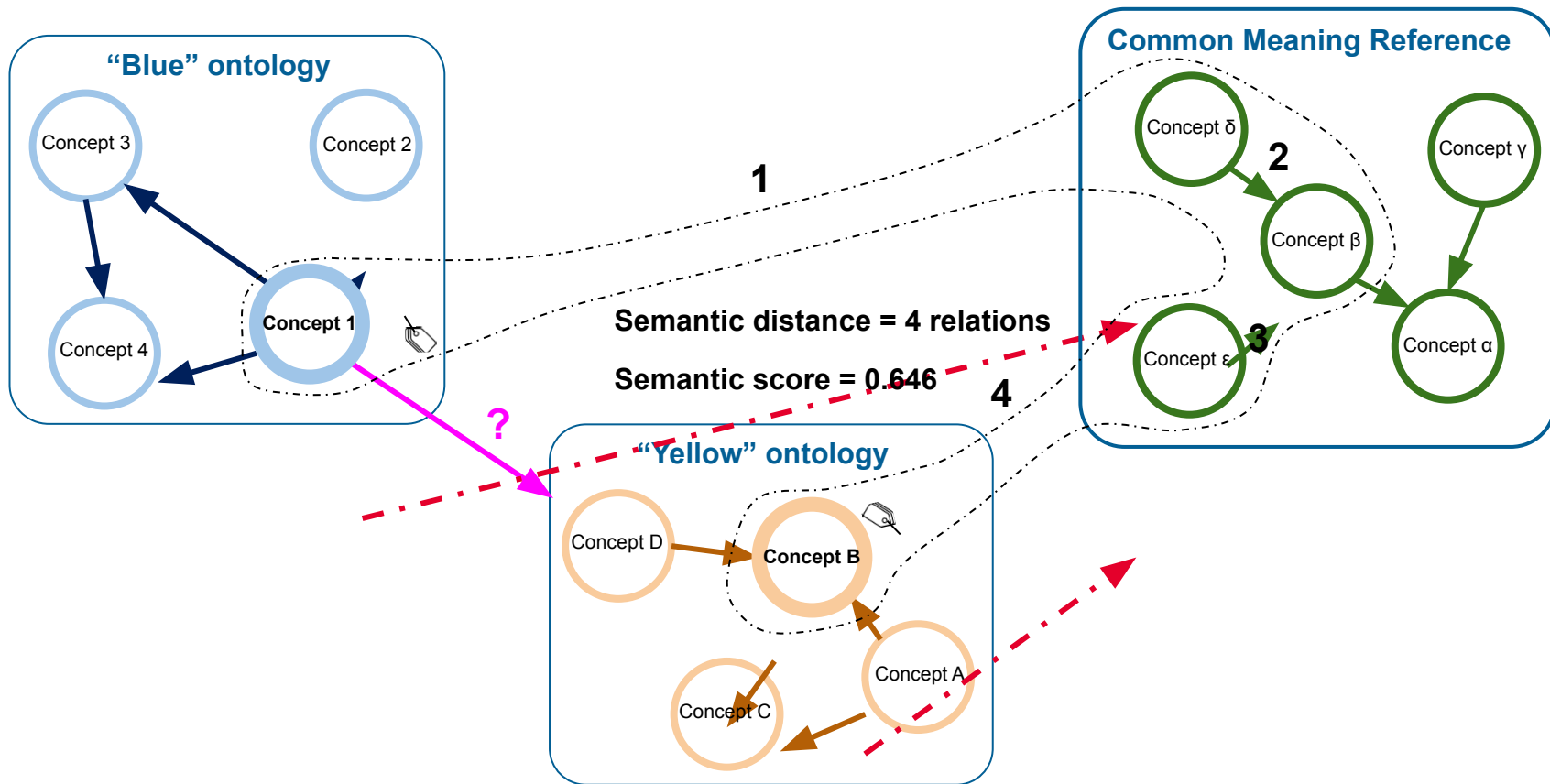
Specify the project name

Create Project !

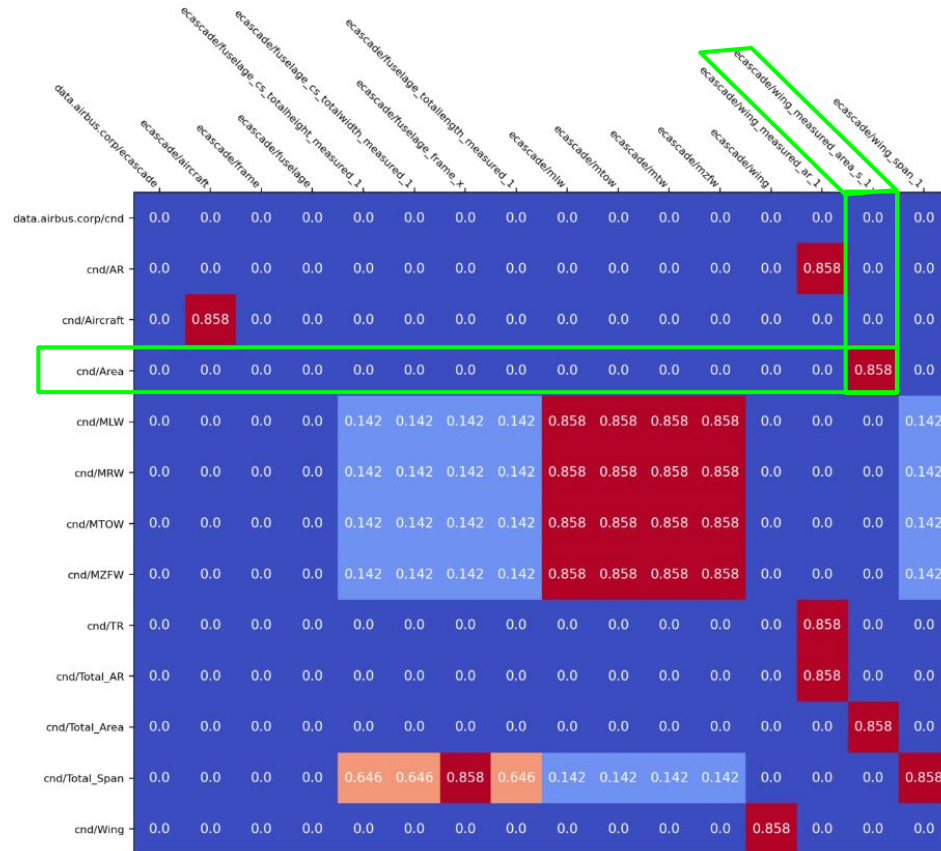
**Without modeling expertise, by simply answering to basic questions, tables are converted into graphs with explicit definitions**



# Semantic distance through Common Reference



# Semantic scores between ontologies' concepts



# Easy data query through common language definitions

 **Filter It** *Retrieve your data through their semantics*

Mass of the fuselage of the aircraft that was built in this factory



Property

System

System

Process

System

Relation

Relation

Relation

Relation



To retrieve information, users just answer to basic questions even without query language expertise

# Value proposal - Common Language advantages

*It takes advantage of the latest modelling trends & proven IT principles:*



*Robust, proven & scalable  
Low footprint on IT for new & legacy data*



*Interoperability enabler across silos  
Compatible with any IT language & software*



*Easy to learn & to apply*

# Market Size - Who Benefits from the Referential ?



*Today digital continuity is not achieved:*

- *a lot of time/money are spent to manage data across silos*
- *data based studies are not efficient*



*Tomorrow digital continuity will be achieved:*

- *simplified data management system*
- *easy data queries across current silos*
- *reliable studies at scale*

# Business Model & Deployment Steps



*Currently this solution is financed by internal customers and transformation projects*

*Tomorrow it will be financed through its benefits:*

- *Cheaper than the current workarounds*
- *Reduces time to market*
- *Enables new services*



*Today we are working toward deployment:*

- *Integrate this language in ISO/IEC 81346*
- *Incremental incorporation into standard operations*
- *More implementations*

## Executive summary



*Data assets management at scale is a must*



*A common language is a key enabler:*

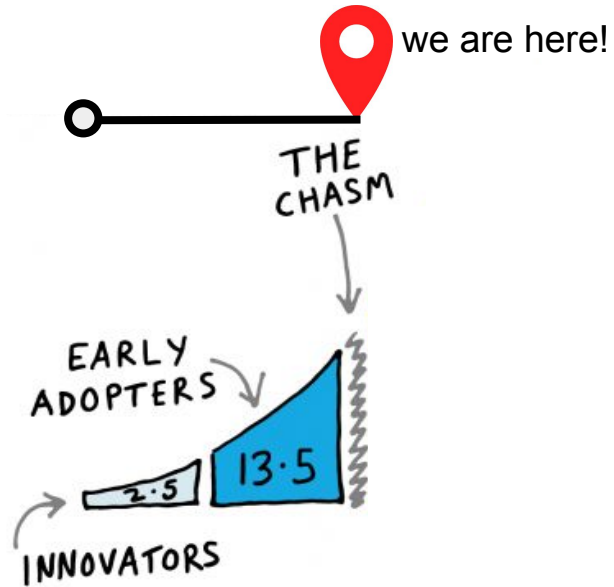
- *Explicit data usable by humans and machines*
- *Data linked across silos*
- *Relevant & trusted data*



*This language is ready for integration:*

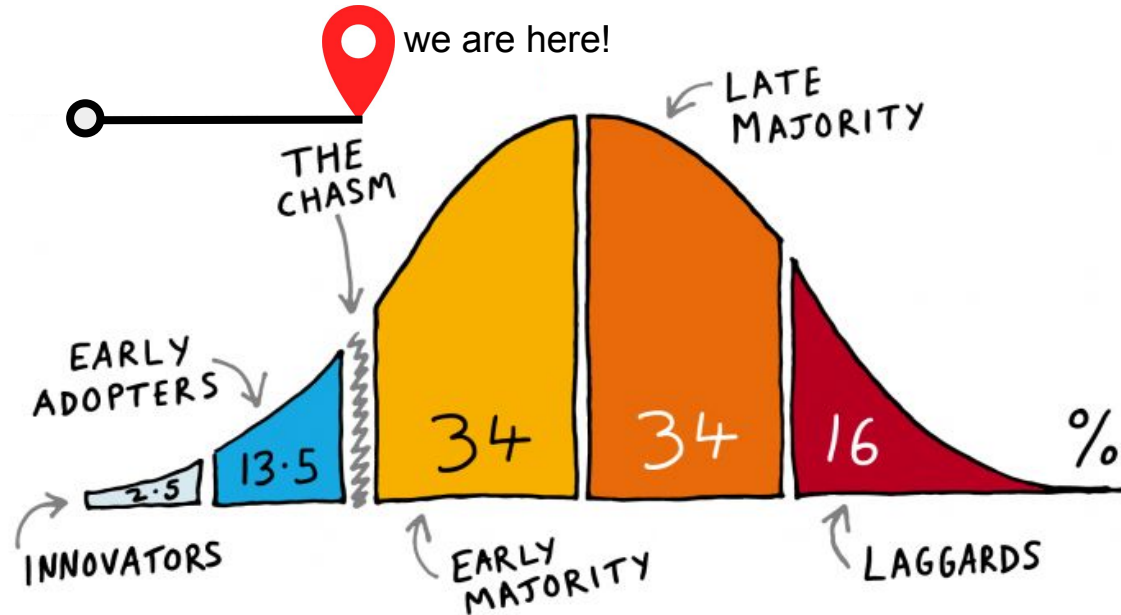
- *Proven practical solution*
- *Applicable at scale to any data, allowing digital continuity*
- *Standardization into ISO/IEC 81346 in progress*

# Where are we on the diffusion of Innovation?





## Join us for at scale applications!



=> Questions? Want to try?

=> Ask now or e-mail to [common.language@airbus.com](mailto:common.language@airbus.com) and [www.81646.com](http://www.81646.com)



# Thank you!

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