

PLM Road Map™ & PDT Europe 2025

PLM's Integral Role in Digital Transformation From Strategy to Execution
Elevating PLM to an Enterprise Business Solution,
the PLM Professional's Road Map to Success
5 & 6 November



A Common Language as at scale digital continuity enabler

"A common language for aerospace, ... and beyond!"

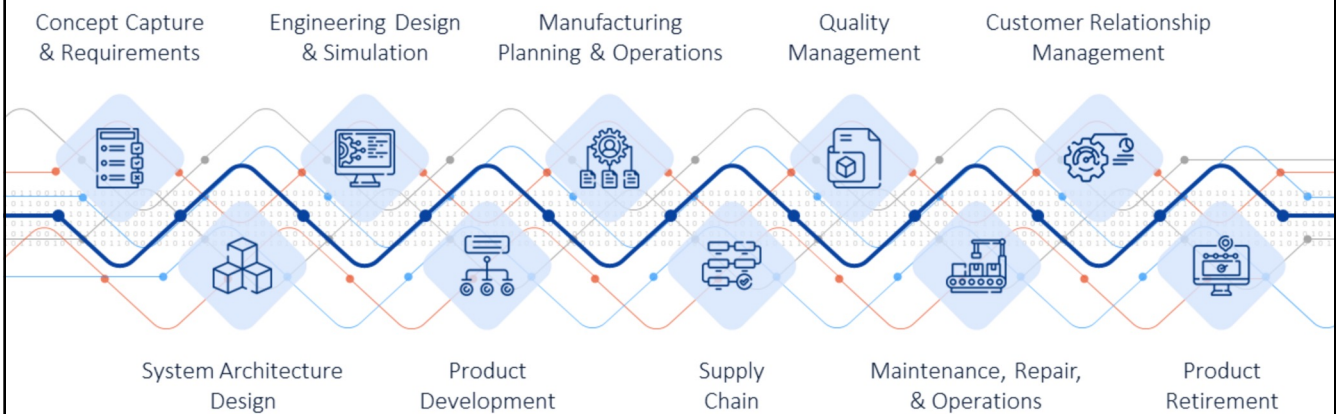
Presented by Thomas BARRÉ (thomas.barre@airbus.com / common.language@airbus.com)



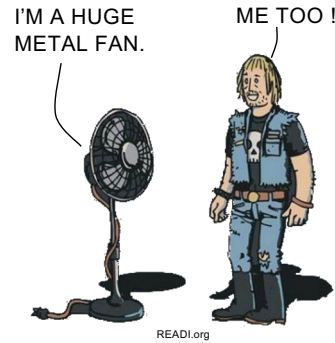
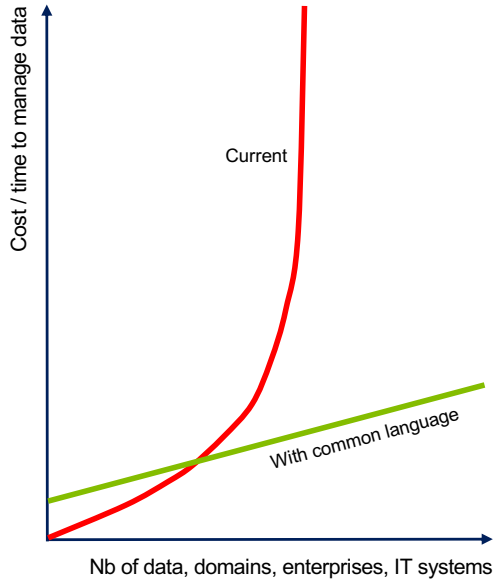
The vision

Data is the new gold.

Digital continuity & digital thread are key to co-operations & data-based studies



From the pain to the solution

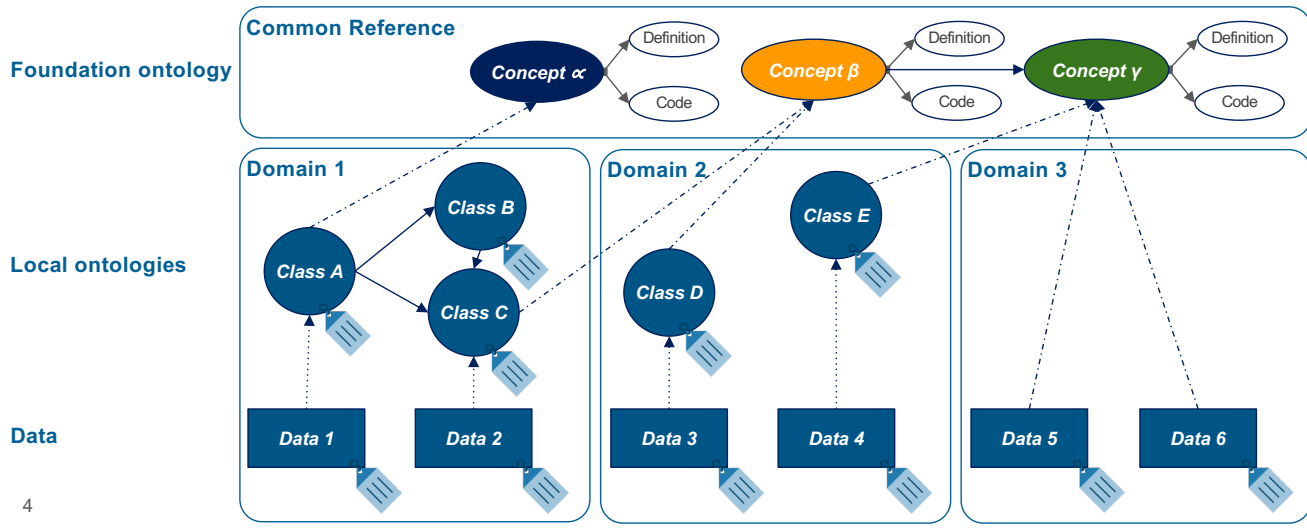


The ambition of this language based on proven international standards is to value data by providing practical solutions to clarify, federate & query data, at marginal cost and time, even at scale

Value proposal - common reference concept

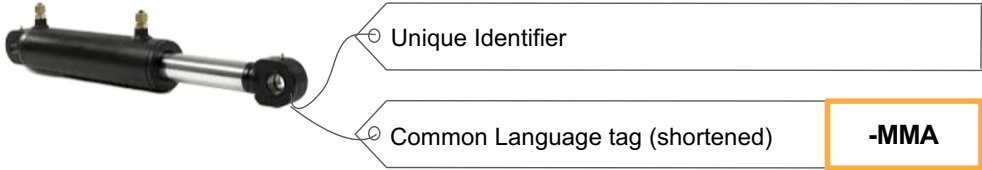
Tag link to common reference concept (e.g. using codes)

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



Value proposal - Example

This language is used to provide meaning to data thanks to tags applied on top of Unique Identifiers



MMA *“hydraulic cylinder”*:
System for providing mechanical movement or force,
powered by fluid displacement or pressure,
providing movement corresponding to a liquid volume.

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The origin



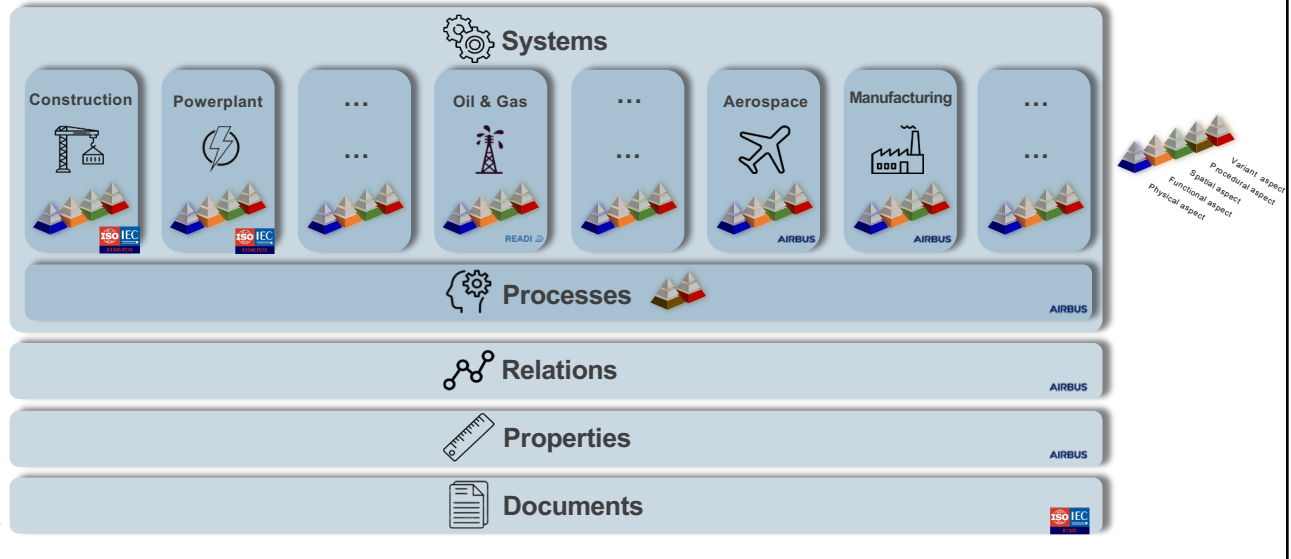
ISO/IEC 81346 Reference Designation System (RDS)

It's all about creating a common language™
www.81346.com

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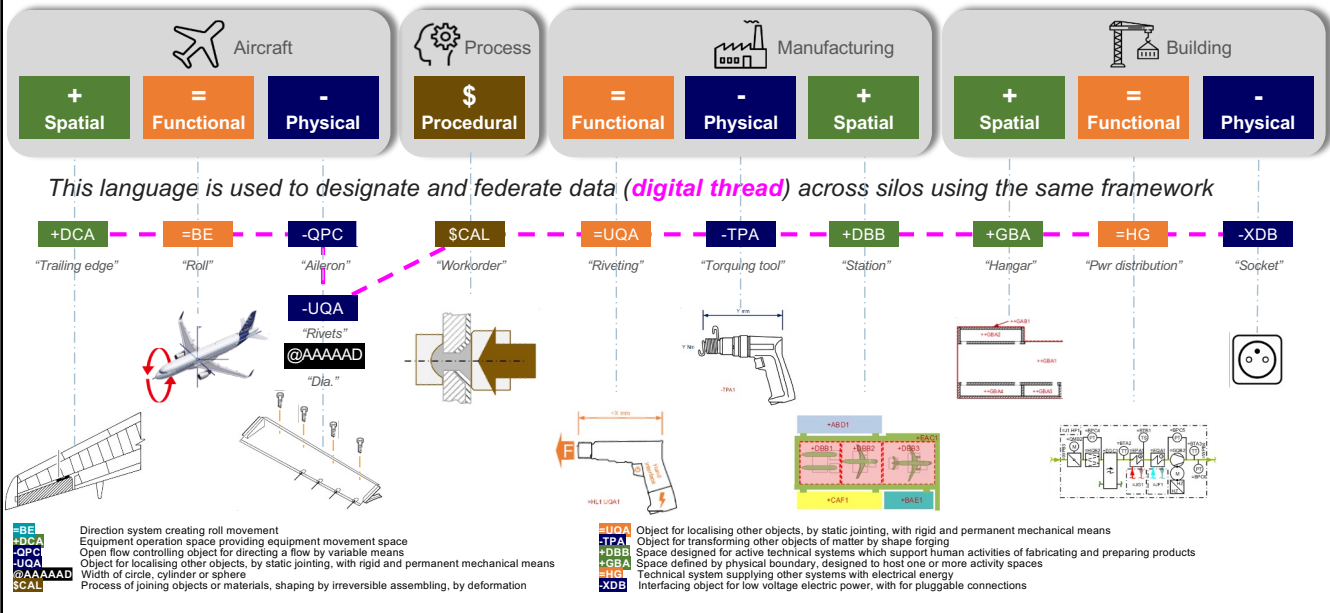
A common framework

The common reference is a set of structured concepts definitions & associated designation language
 It is made of 15 000 definitions & relations between them



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The reference model in action



The challenge



About **220.000** bolts types



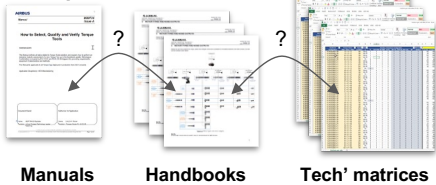
About **500.000** tools physical types

How to provide the list of applicable torquing tools per fastener?

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Torquing Tool Configurator

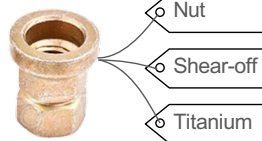
Examples of data sources



Manuals

Handbooks

Tech' matrices



ASNA2536P



Ordering application



Common Reference
220.000 bolts & 500.000 tools
fully described by 61.000.000 tags
in 2 months by 3 people



Graph Database



User interface to select appropriate tools

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Automatic suggestion of definitions

Nature System

Aspect Physical

Domain Manufacturing

GuessIt

Here are the terms I found:

current transformer

electric current sensing object, with scalar output

🔍

ampere meter

scalar display representing electric current

🔍

electric current sensing object

sensing object for electric current

🔍

power meter

power sensing object, with scalar output

🔍

current relay

electric current sensing object, with Boolean output

🔍

Please describe the concept you want to find ➤

ExploreIt

Choose a context: Search

System|Manufacturing|Physical|L3 Type a keyword... Search

To copy a term URI in your clipboard, double click on its line in the table.

Code	Name	Definition	Example
> K_	information processing obj...	object for treating input signals and providing an appropriate o...	
> M_	driving object	object for providing movement or mechanical force	
> N_	covering object	object for enclosing partly or fully another object	
> P_	presenting object	object for providing perceptible information	
> PF_	visible state indicator	presenting object in visible form of discrete states	
> PG_	scalar display	presenting object in a visible form of a single scalar variable	
PGA	voltmeter	scalar display representing electric voltage	
PGB	resistivity indicator	scalar display representing resistivity or conductivity	
PGC	ampere meter	scalar display representing electric current	
PGD	density indicator	scalar display representing density	
PGE	field indicator	scalar display representing field	
PGF	flow meter	scalar display representing flow	
PGG	dimension indicator	scalar display representing spatial dimension or position	angle indicator, caliber, measuring tape, position indicator, ruler
PGH	energy meter	scalar display representing energy	var-hour meter, watt-hour meter
PGJ	wattmeter	scalar display representing electric power	varmeter
PGK	clock	scalar display representing time	
PGL	level indicator	scalar display representing level	sight glass

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

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From table to graph

From a Human Operable Table to Human & Machine Operable Graph

Import a .xlsx file

Drag and drop file here

Limit 200MB per file

Browse files

Specify the project name

Create Project !

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From table to graph

	A	B	C	D	E	F	G	H	I	J
1	skywise_aircraft	title	aircraft_msn	delivery_date	total_flight_hour	owner_code_ica	aircraft_model	engine_id	engine_option	engine_variant
2	A220-50015	A220 HB-JBF (5	MSN50015	3/8/2017	9722.27	86L	A220-100	A220-50015CEC	CEO	PW1524G
3	A220-50016	A220 HB-JBG (5	MSN50016	4/3/2017	9674.91	86L	A220-100	A220-50016CEC	CEO	PW1524G
4	A220-50023	A220 N104DU (5	MSN50023	12/31/2018	8913.52	DAL	A220-100	A220-50023CEC	CEO	PW1519G
5	A220-50030	A220 N111NG (5	MSN50030	6/6/2019	6338.08	DAL	A220-100	A220-50030CEC	CEO	PW1519G
6	A220-50032	A220 N113DQ (5	MSN50032	5/20/2019	6722.18	DAL	A220-100	A220-50032CEC	CEO	PW1519G
7	A220-50044	A220 N125DU (5	MSN50044	9/30/2019	7135.02	DAL	A220-100	A220-50044CEC	CEO	PW1519G
8	A220-50047	A220 N128DU (5	MSN50047	11/21/2019	4642.32	DAL	A220-100	A220-50047CEC	CEO	PW1519G
9	A220-50051	A220 N132DU (5	MSN50051	10/22/2020	4893.57	DAL	A220-100	A220-50051CEC	CEO	PW1519G
10	A220-50071	A220 (50071)	MSN50071	8/22/2023		AIB	A220-171	A220-50071CEC	CEO	PW1500G
11	A220-50074	A220 (50074)	MSN50074	9/22/2023		AIB	A220-171	A220-50074CEC	CEO	PW1500G
12	A220-50076	A220 (50076)	MSN50076	10/24/2023		AIB	A220-171	A220-50076CEC	CEO	PW1500G
13	A220-50079	A220 (50079)	MSN50079	12/15/2023		AIB	A220-171	A220-50079CEC	CEO	PW1500G
14	A220-50080	A220 (50080)	MSN50080	1/22/2024		AIB	A220-171	A220-50080CEC	CEO	PW1500G
15	A220-50081	A220 (50081)	MSN50081	2/8/2024		AIB	A220-171	A220-50081CEC	CEO	PW1500G
16	A220-50086	A220 (50086)	MSN50086	5/3/2024		AIB	A220-171	A220-50086CEC	CEO	PW1500G
17	A220-50090	A220 (50090)	MSN50090	8/6/2024		AIB	A220-171	A220-50090CEC	CEO	PW1500G
18	A220-50097	A220 (50097)	MSN50097	11/19/2024		AIB	A220-171	A220-50097CEC	CEO	PW1500G
19	A220-50098	A220 (50098)	MSN50098	11/28/2024		AIB	A220-171	A220-50098CEC	CEO	PW1500G
20	A220-50101	A220 (50101)	MSN50101	1/21/2025		AIB	A220-171	A220-50101CEC	CEO	PW1500G
21	A220-50102	A220 (50102)	MSN50102	1/30/2025		AIB	A220-171	A220-50102CEC	CEO	PW1500G
22	A220-50106	A220 (50106)	MSN50106	3/17/2025		AIB	A220-171	A220-50106CEC	CEO	PW1500G
23	A220-50107	A220 (50107)	MSN50107	4/1/2025		AIB	A220-171	A220-50107CEC	CEO	PW1500G
24	A220-50108	A220 (50108)	MSN50108	4/9/2025		AIB	A220-171	A220-50108CEC	CEO	PW1500G

From table to graph

The **AIRBUS** Common Language

test

Save Project

Navigation

- Source Designation
- Entities Designation
- Relationships Designation
- Serialize & Export Project

Delete Project

From a Human Operable Table to Human & Machine Operable Graph

Entities Designation

Describe Relative RDB Entities

Choose Concept

engine_id

View On Data

	engine_id
0	A220-50015CEO
1	A220-50016CEO
2	A220-50023CEO
3	A220-50030CEO
4	A220-50032CEO

Tagging

Manual Machine Assisted

Set MetaData

Choose Nature

System

Do Systems in the column have the Same Class ?

Yes No

according

engine

Choose Domain

Aircraft

Choose Aspect

Physical

Choose Level

Library-Level-2

What is the Class of the Systems ?

HA - Engine system

Create Entity

Delete Entity

Here is displayed the graph data model:

Mapping View

From table to graph

The AIRBUS Common Language

test

Save Project

Navigation

- Source Designation
- Entities Designation
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Delete Project

From a Human Operable Table to Human & Machine Operable Graph

Relationships Designation

Describe Relative ROE Relations between Entities

What is the Start Node of the Relation ?

engine

What is the Class of the Relation ?

BAA - System composes

What is the End Node of the Relation ?

skywise_aircraft

Create Relation

Delete Relation

Here is displayed the graph data model:

Mapping View

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From table to graph

Engine system

Engine system^{en}

Types:

- ACL:Physical_Component
- DWL:NamedIndividual

RDF Rank:

0

Search instance properties

SKOS:example
Engine (including nacelle), motor, powerplant, jet, jetengine, turbofan^{en}

SKOS:prefLabel
Engine system^{en}

SKOS:definition
Supply system for thrust^{en}

ACL:hasCode
HA

SKOS:notation
HA

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

From text to graph

The screenshot shows a software interface for converting text into a graph. At the top, a network graph is visualized over an open book. The graph consists of numerous nodes and edges, with a color gradient from blue to orange. On the left, a sidebar contains two main sections: 'NER' (Named Entity Recognition) with 'System' (red box) and 'Relation' (green box) options, and 'IE' (Instance Extraction) with 'Document' (purple box) and 'Property' (cyan box) options. On the right, a 'Documents' panel shows '[0] - A350.txt' and a 'Paragraphs (1)' list containing 'Paragraph [0]'. At the bottom, a 'Logs' panel is divided into three sections: 'Glossary (0)', 'Classes (0)', and 'Triples (0)'. The 'Classes (0)' section contains a '+' sign. The number '17' is visible in the bottom left corner.

From text to graph

This screenshot shows the same interface as the previous one, but with a text box containing the sentence: "The A350 has 2 variants : A350-900 and A350-1000 . Those aircrafts can be characterised by many properties as MTOW , size , weight , etc ." The text box is highlighted in orange. A yellow mouse cursor is positioned over the text. The rest of the interface, including the sidebar, document panel, and logs panel, remains the same. The number '18' is visible in the bottom left corner.

From text to graph

The **A350** has 2 variants : **A350-900** and **A350-1000** . Those **aircrafts** can be characterised by many properties as **MTOW** **size** **weight** , etc .

NER: System, Relation, Document, Property

IE: Property

Documents: [0] - A350.txt

Paragraphs (1)
Paragraph [0]

Logs: Glossary (0) Classes (0) Triples (0)

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From text to graph

Mode: class, relation, Options, new, same as

The **A350** has 2 variants : **A350-900** and **A350-1000** . Those **aircrafts** can be characterised by many properties as **MTOW** **size** **weight** , etc .

NER: class, relation, Options, new, same as

IE: class

Documents: [0] - A350.txt

Paragraphs (1)
Paragraph [0]

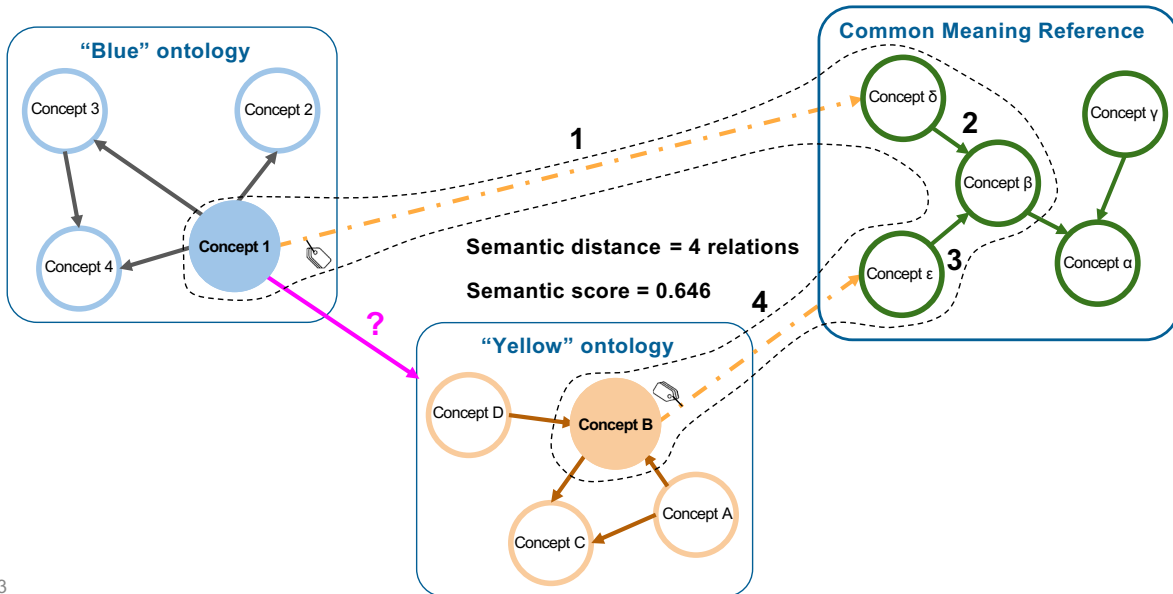
Selection1: A350-1000 +[1] Selection2: None

Logs: Glossary (0) Classes (7) Triples (0)

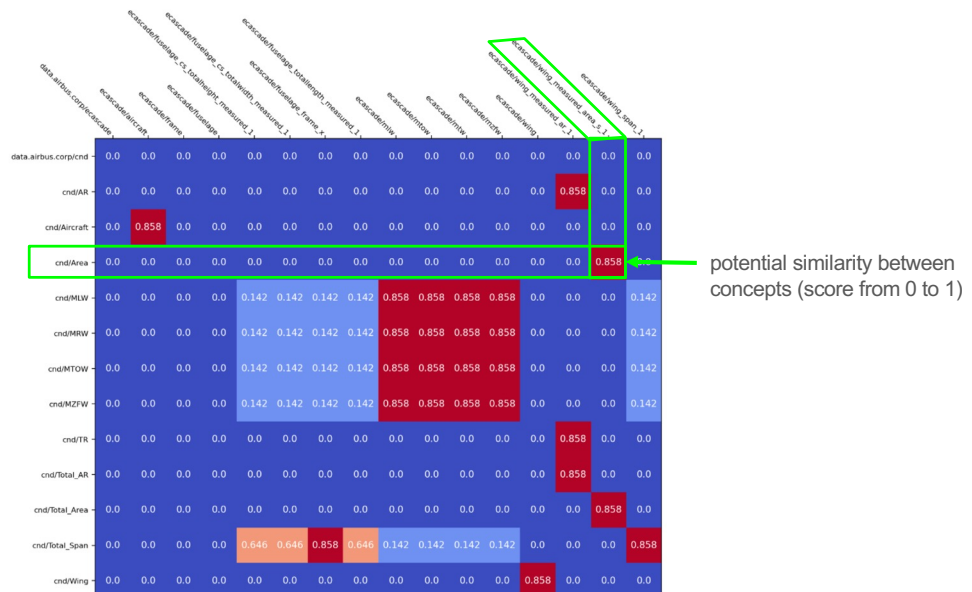
Classes (7)	
A350	Flying system
A350-900	Flying system
A350-1000	Flying system
Aircraft	Flying system
MTOW	Mass
Size	Product geometry, shape and size
weight	Weight

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Semantic distance through Common Reference




Calculate similarities matrix between ontologies' concepts

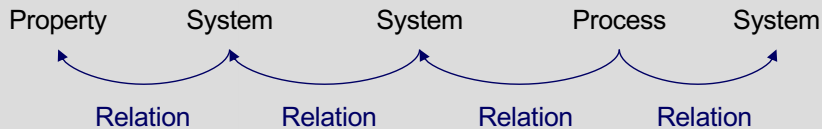


With common language & no modelling expertise it takes seconds to connect ontologies

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 



To retrieve all (and only) the relevant informations, search by meaning instead of words

Translate in common language \Leftrightarrow Just select key elements, their definitions & relationships

With no query language expertise any user can perform advanced searches by meaning



Executive Summary



Data assets management at scale is a must



A common language is a key enabler:



Explicit data operable by humans & machines



Robust & proven

Scalable (e.g. distributed mode, incremental deployment)
Low footprint on IT for new & legacy data

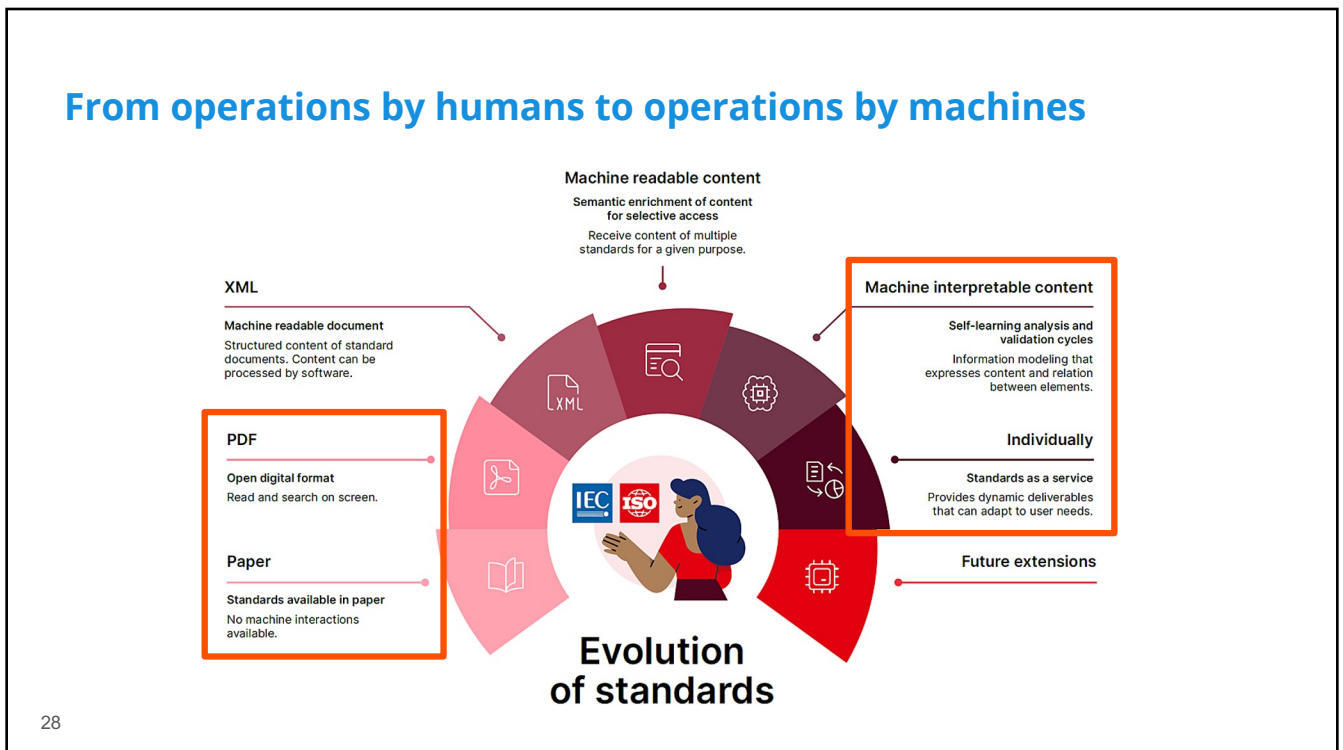
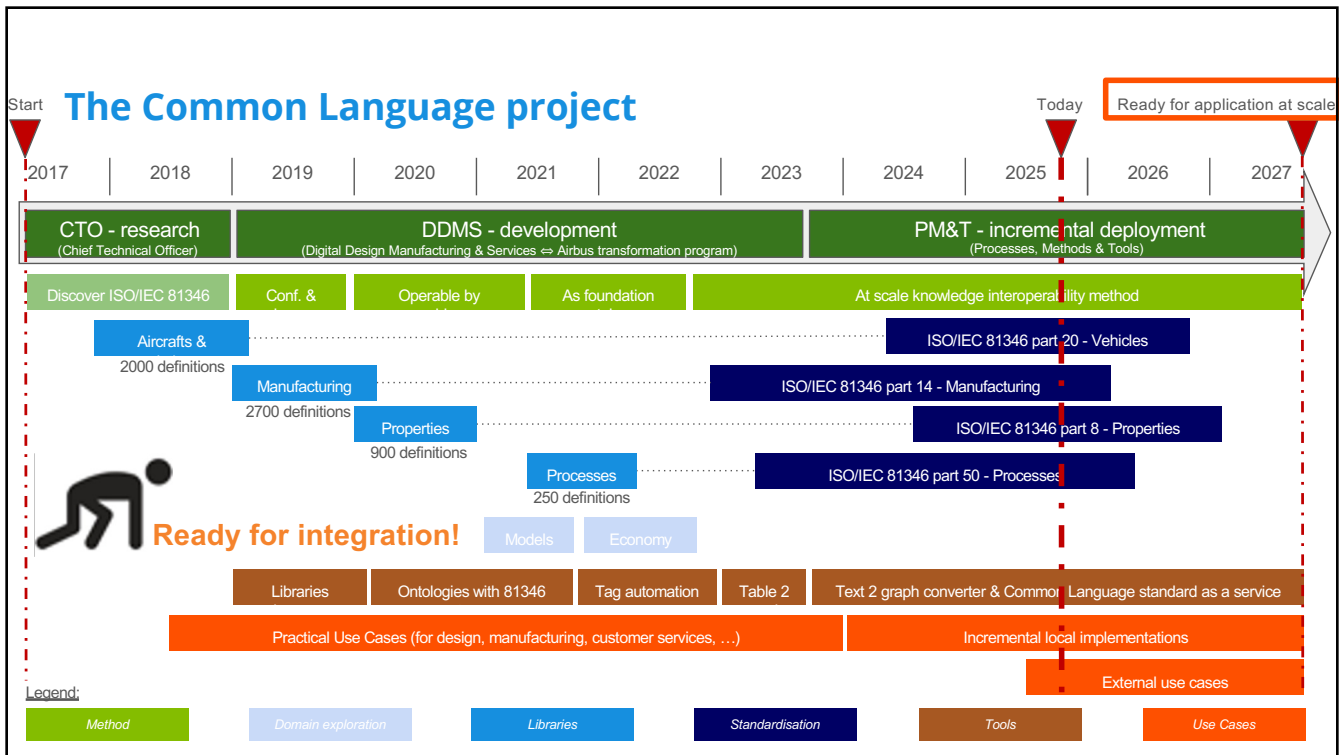


Interoperability enabler across silos

Compatible with any IT language & software



Easy to learn & to apply



Toward full knowledge interoperability at scale - architecture

Upper layer

Beliefs valid for all usages

Domain layer

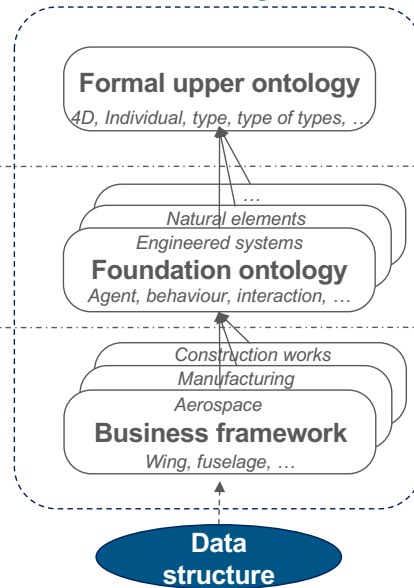
Principles used per domain of discourse

Application layer

Principles used per particular sector

-----> mapping

-----> specializes



The future of ISO/IEC 81346:

- Ontologies provide the data meaning
- Organized in 3 layers to be governed & operated by machines at scale

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Toward full knowledge interoperability at scale - expressiveness

Upper layer

Beliefs valid for all usages

Domain layer

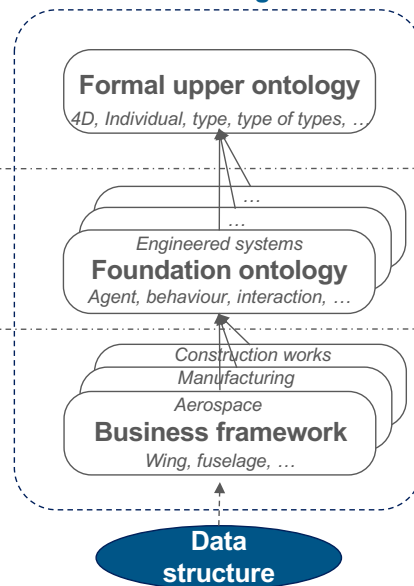
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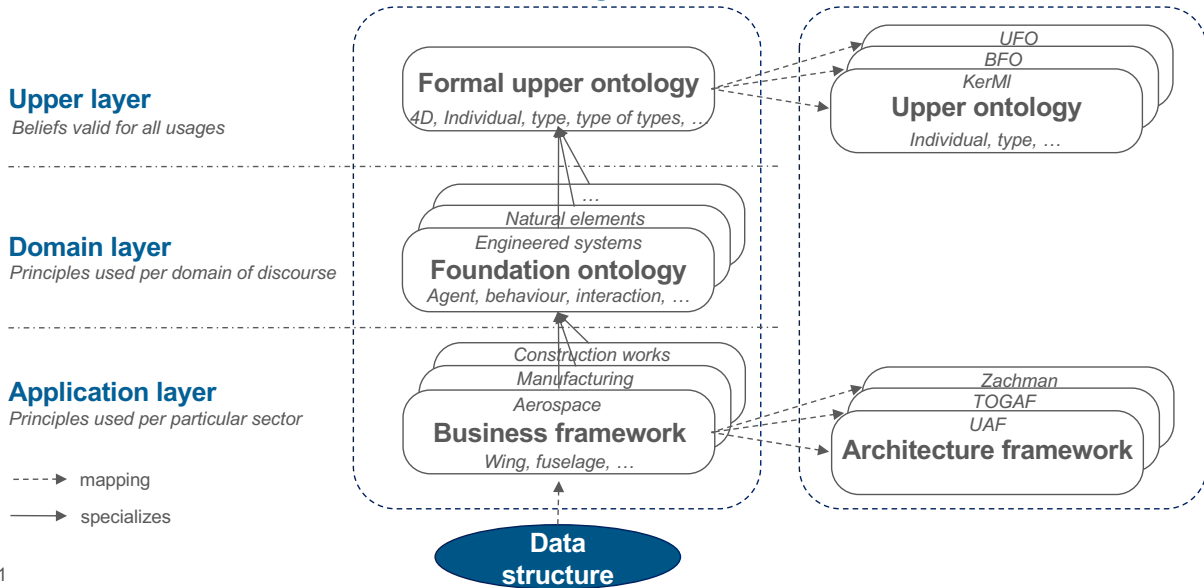


- Ecology (natural elements & capital*, environment, ...)

*: living or non-living assets used for the production of goods and services
- Economy, legal & regulation
- Mobility, transport, supply, infrastructure
- Health & Medical
- Security & Military
- Geometry & Shapes
- ...

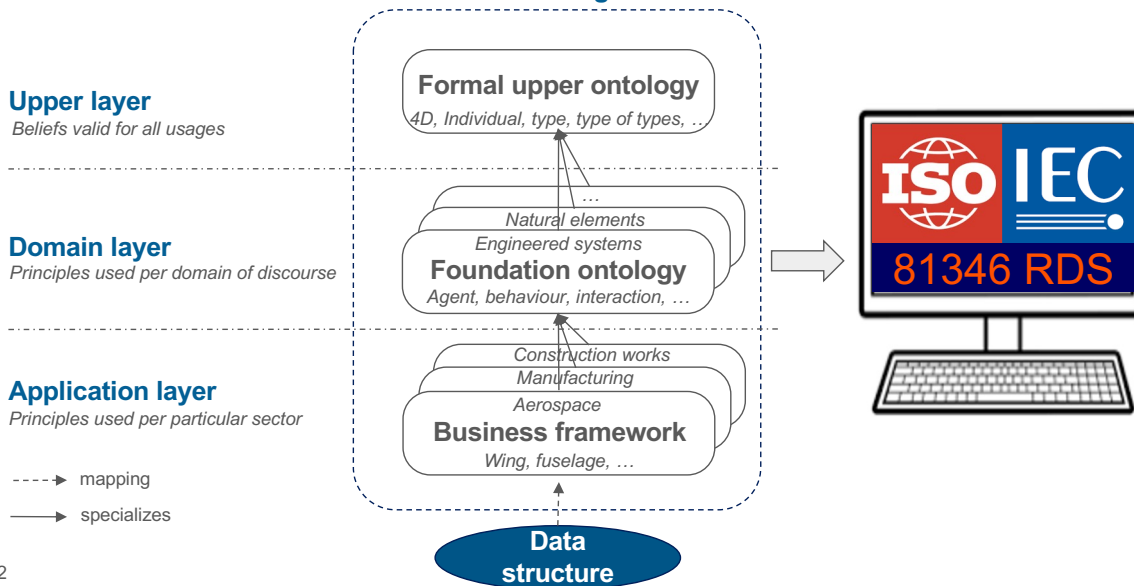
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Toward full knowledge interoperability at scale - references



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Toward full knowledge interoperability at scale - toolchain



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Toward full knowledge interoperability at scale - implementation

RDS4X.org

Advancing the implementation of ISO/IEC 81346

Our Mission

This **Implementor Forum** is designed to facilitate collaboration among stakeholders involved in the implementation of ISO/IEC 81346

Our Core Principles

Promoting seamless integration and compatibility among systems and stakeholders
The operating model ensures transparency, alignment, and efficiency

Contact Us

info@rds4x.org



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Join the early adopters for at scale applications!



Want to try? Any question? => common.language@airbus.com



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Thank you!



SCAN THE QR CODE!

To send email to:

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**SCAN THE QR CODE!
PLEASE GIVE ME FEEDBACK
ON MY PRESENTATION**

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