

MBx Interoperability Forum

Enabling the Digital Thread with STEP AP242

Jochen Boy, PROSTEP
Pierre Duchier, Airbus
Frédéric Darré, Airbus
Guillaume Hirel, T-Systems
Pascal Hubert, AFNeT Services

Thu., 1 October 2026 | nh Frankfurt Airport West | Raunheim, Germany

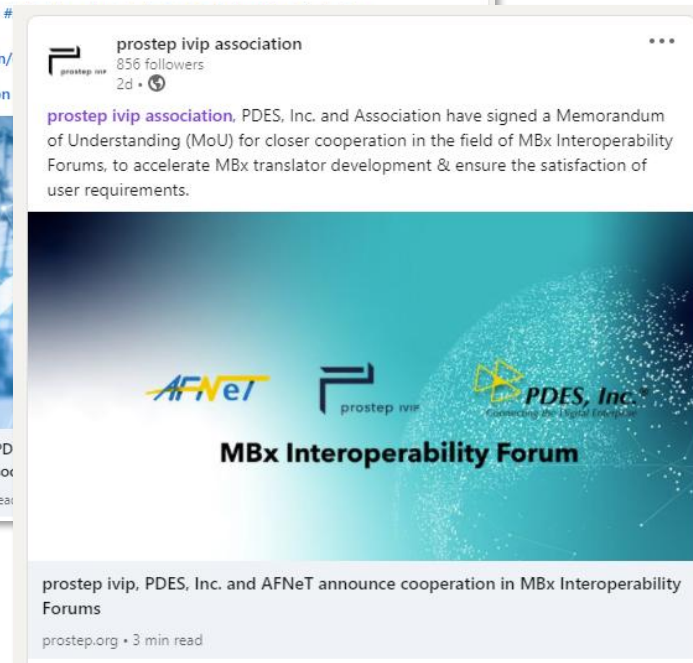
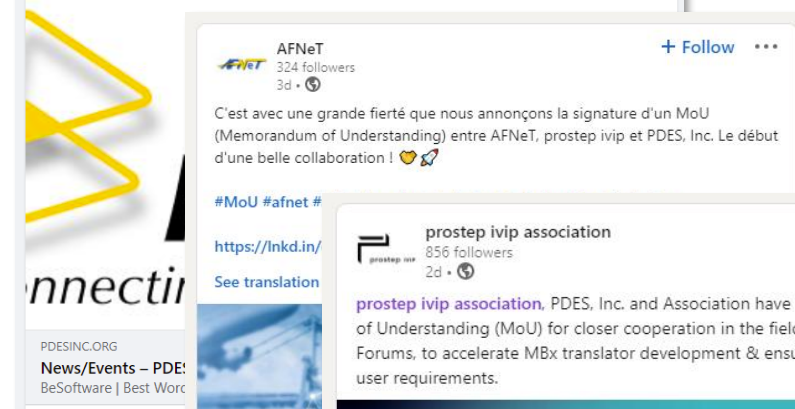
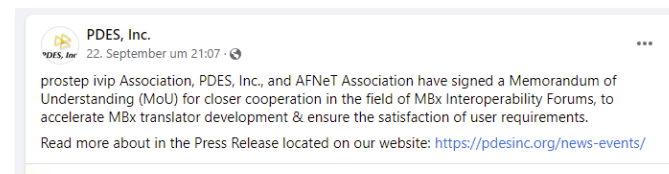
What is the MBx-IF?

- Umbrella organization over the various Interoperability Forums focused on ISO 10303 (STEP):
 - CAx-IF
 - EWIS-IF
 - PDM-IF
 - CAE-IF (on hold)
- Jointly hosted by AFNeT, PDES, Inc., and prostep ivip
- Provides a common organization and infrastructure for the Interoperability Forums
- Brings together users and vendors from different domains to discuss common issues

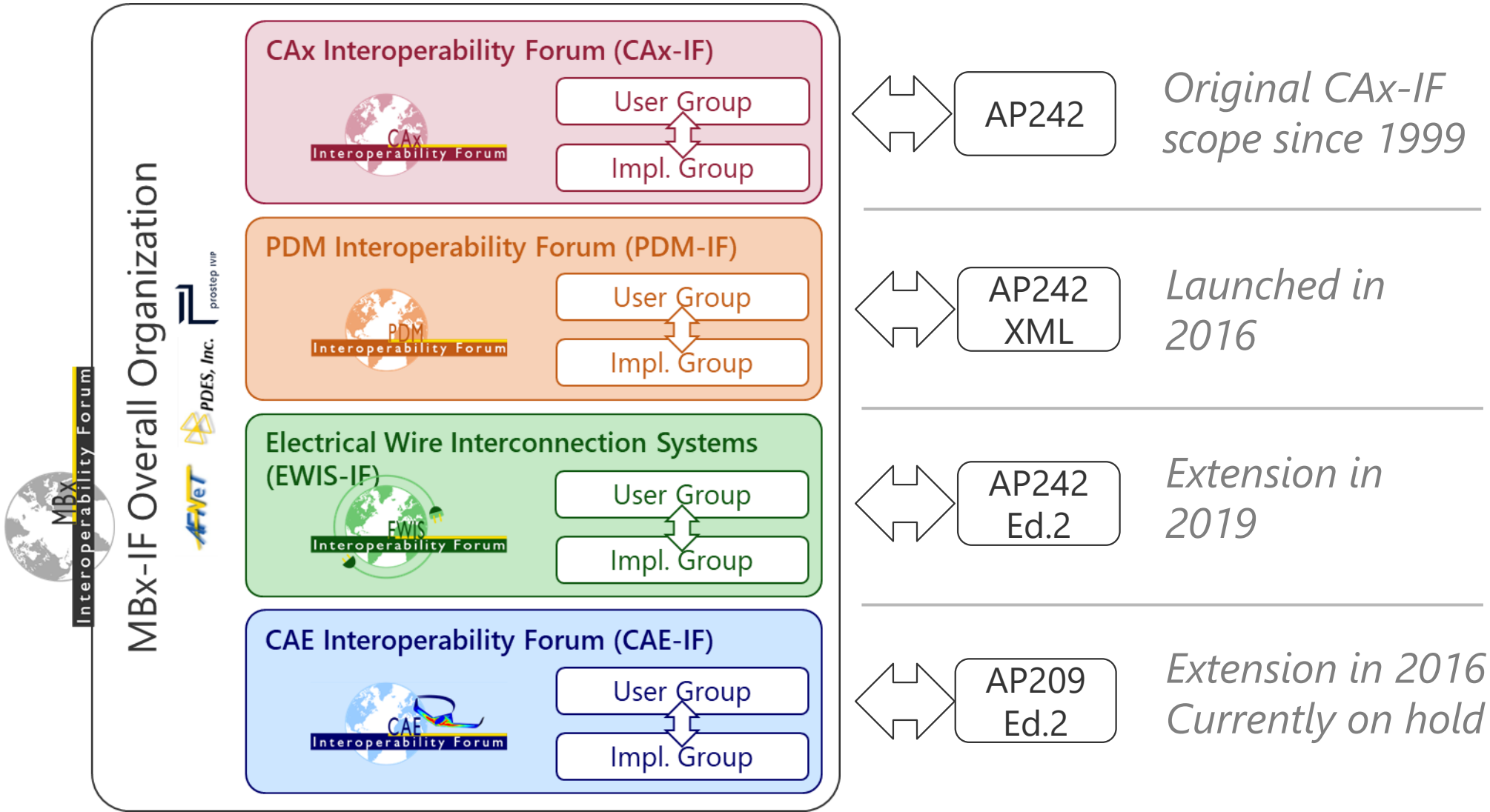


MBx-IF Memorandum of Understanding

Signed by AFNeT, prostep ivip & PDES, Inc.

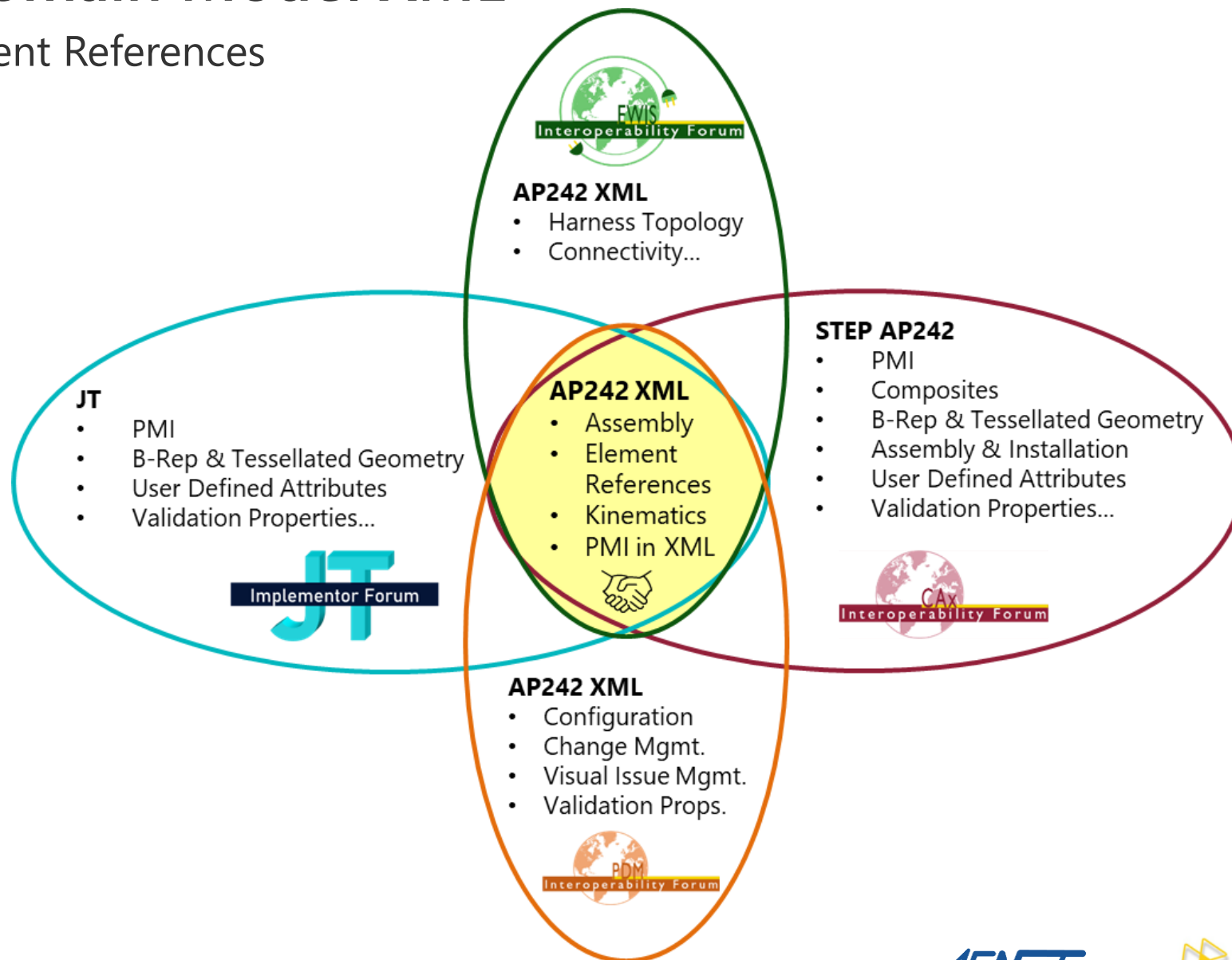


MBx-IF Project Framework

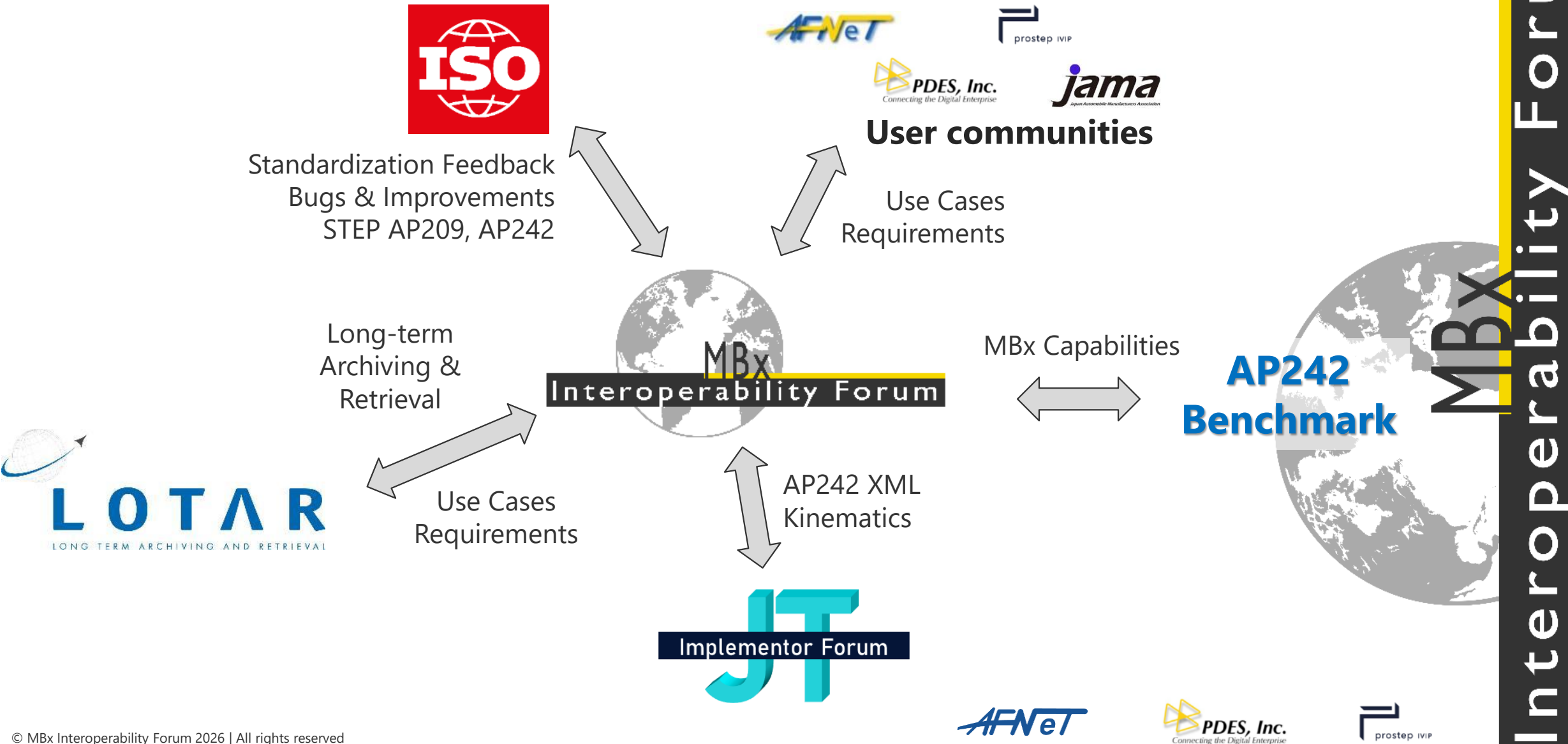


AP242 Domain Model XML

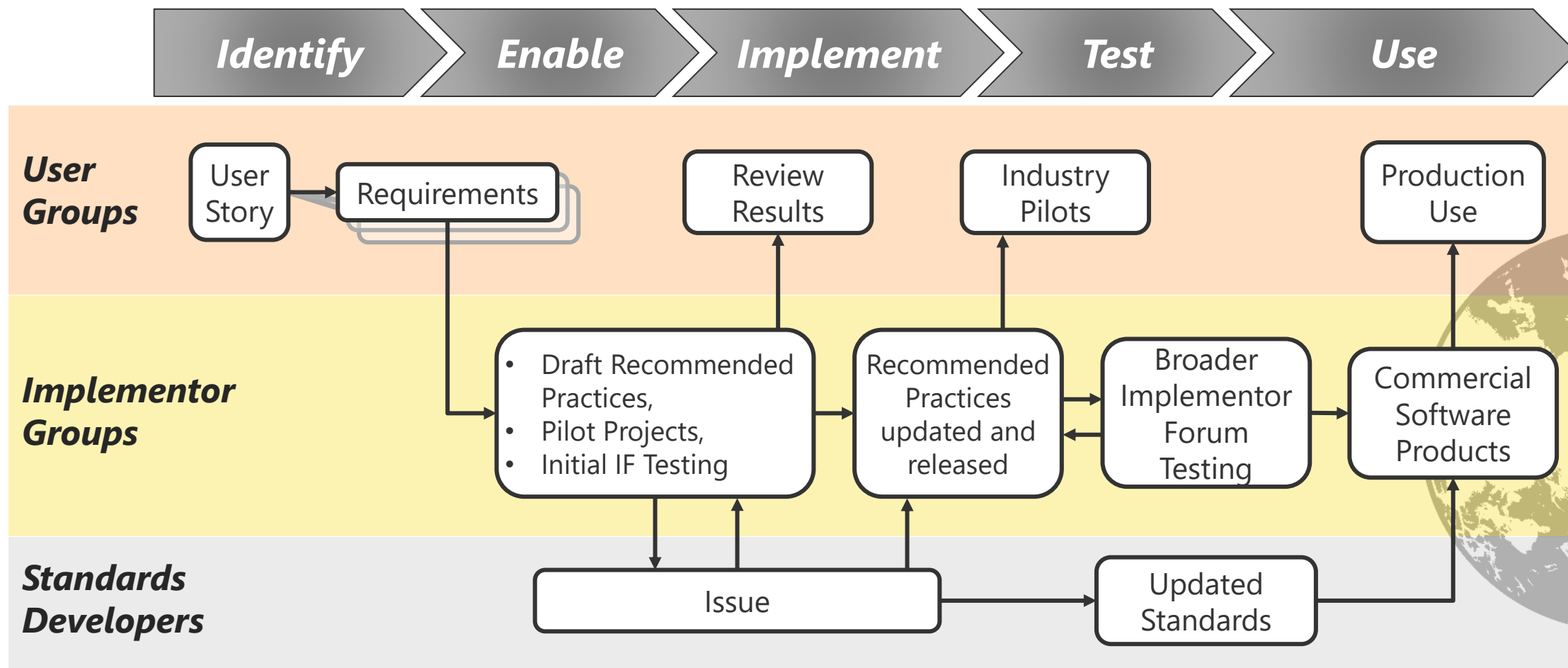
External Element References



MBx-IF Interaction with other Organizations and Projects

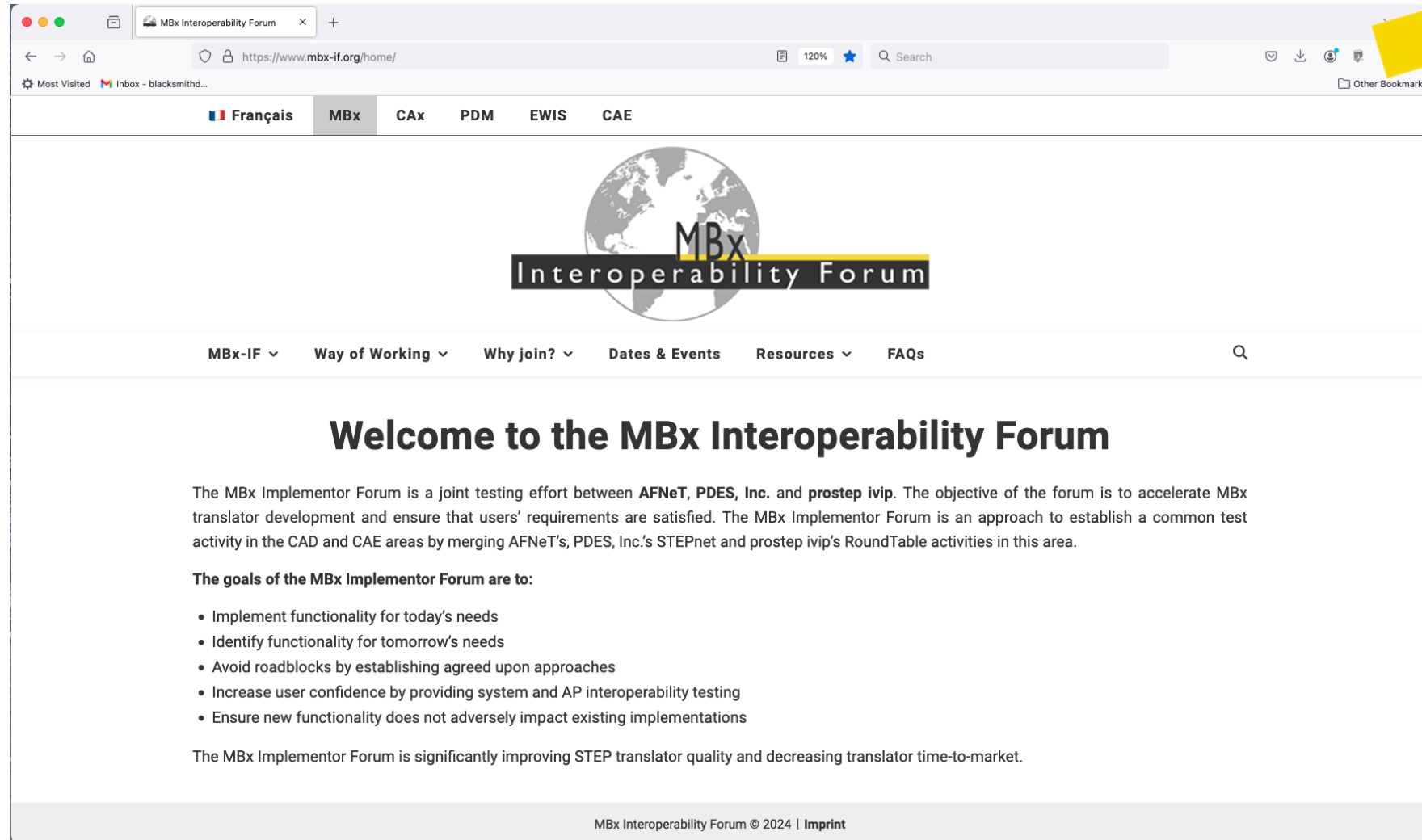


Way of Working between Users, Implementors, and Standards



MBx-IF Homepage

<https://www.mbx-if.org/home/>





CAX-IF User Group

Pierre Duchier, Airbus

CAX-IF User Group

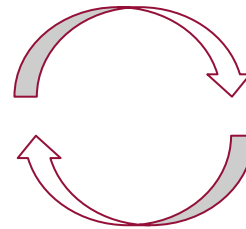
Members

1. Airbus
2. Boeing
3. Bosch
4. DAHER
5. GE
6. Gulfstream
7. Lockheed Martin
8. MBDA
9. MTU
10. Pratt & Whitney Canada
11. SAFRAN
12. Schaeffler
13. JAMA/JAPIA

Objectives

User group (UG) exists since 2019 :

- Defines business requirements
- Defines use cases and scenarios
- Provides roadmap & priorities
- Provides test cases and validation requirements
- Defines user best practices



Implementor group (IG) exists since 1999



CAX-IF User Group

User Requirement database overview

Backlog items	Open
Capability	15
Feature	47
User stories	158

List of capabilities:

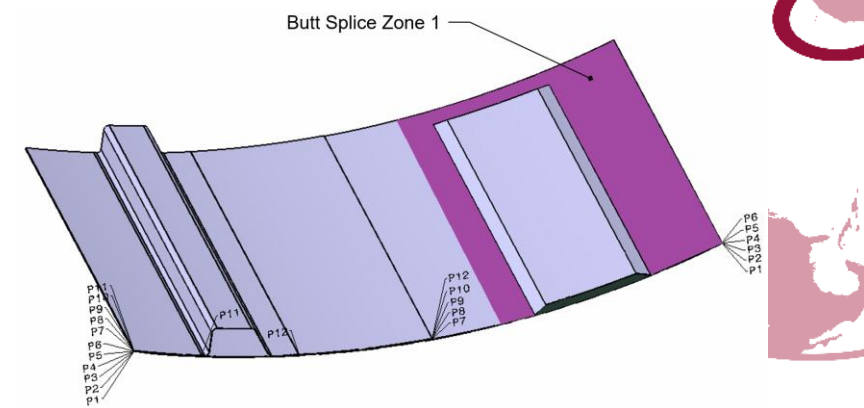
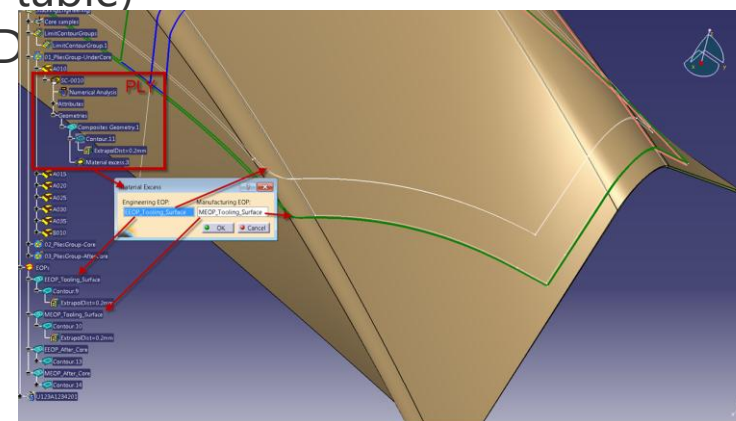
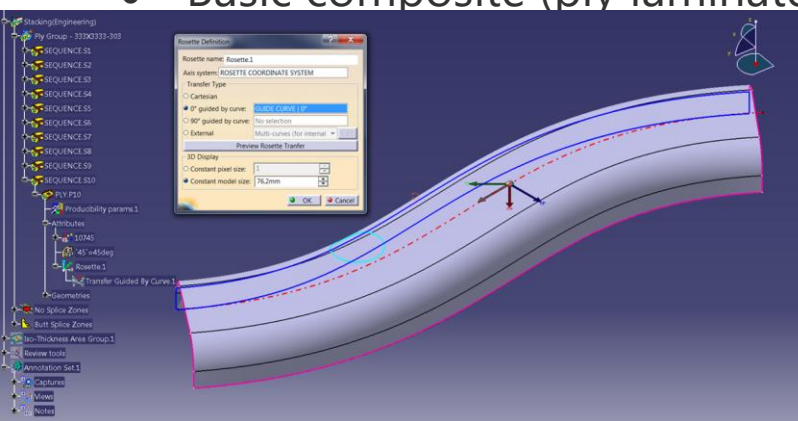
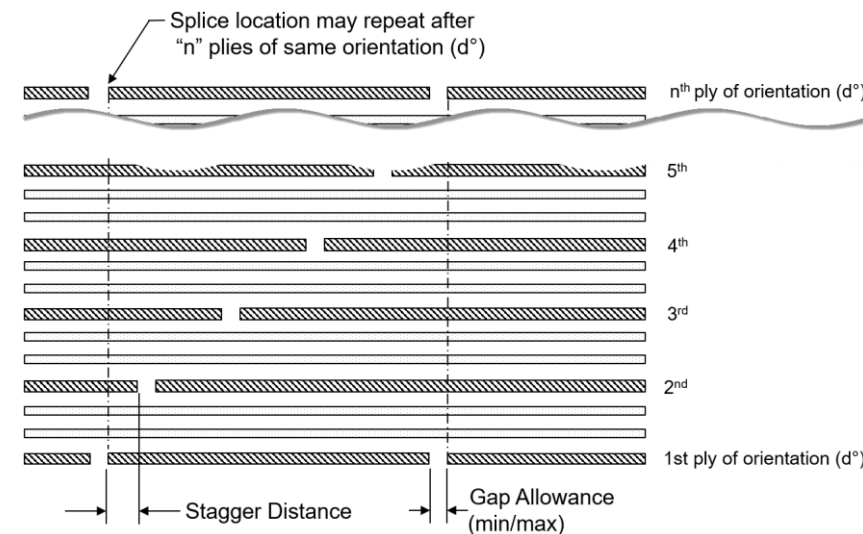
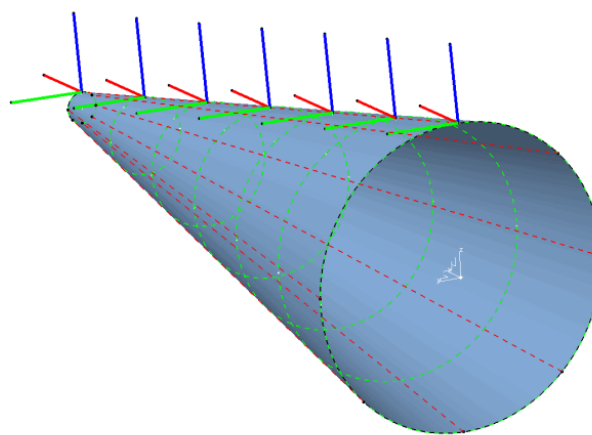
- 1. Composite
- 2. Product Manufacturing Information
- 3. CAD model Metadata
- 4. tracing PMI and parameter data
- 5. Welding
- 6. Parametric Collaboration
- 7. Sheet metal
- 8. Assembly with fastener
- 9. Downstream Consumption
- 10. Requirement Management
- 11. Casting/Forging
- 12. Mechanical System Installation
- 13. Visualization
- 14. Kinematics
- 15. Additive Manufacturing



Composite capability

List of features identified:

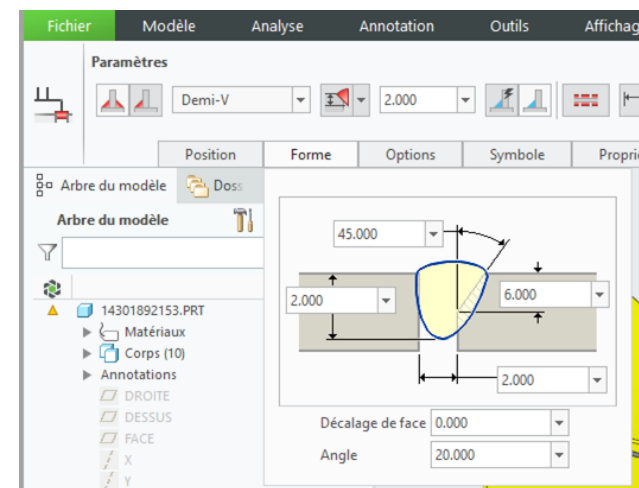
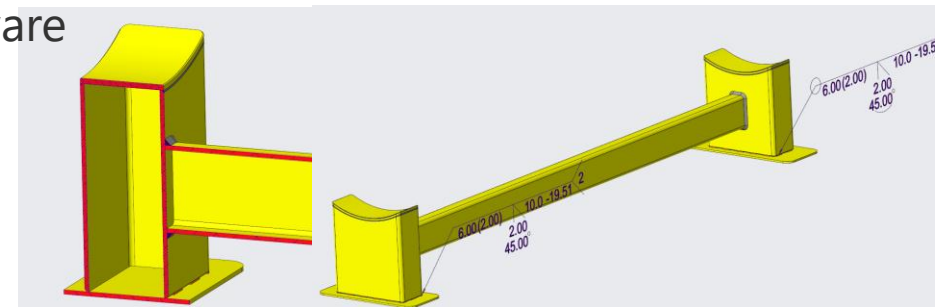
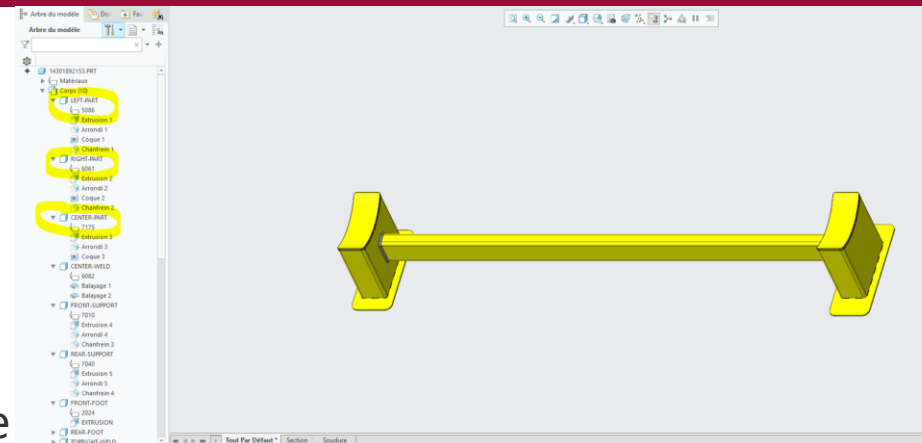
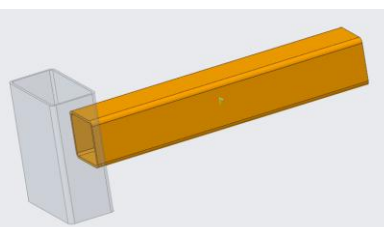
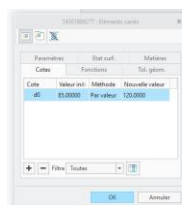
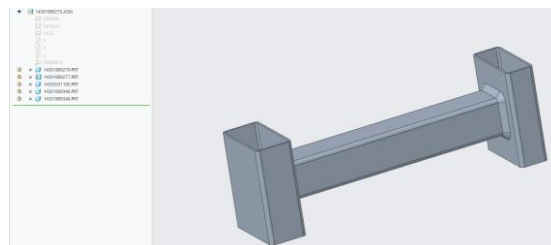
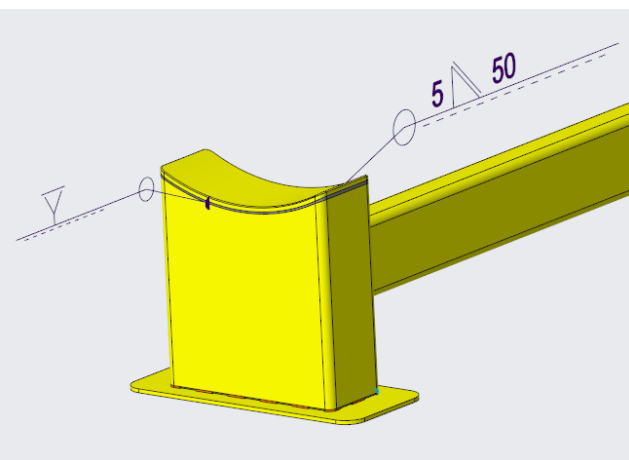
- Composite Fiber Orientation
- Composite Ply shape
- Composite parameter
- Composite material
- Composite Validation properties
- Mass, area & center of gravity
- Limited Length or Area Indication
- Placement Strategy
- Basic composite (ply laminate table)



Welding

List of features identified:

- Multi-bodies Materials assignment
- Section views on a multi-bodies machine-welded model
- Welding symbols from the CAD software welding module
- Welding symbols manually generated with the CAD software "Symbols" tool
- Flexibility in a machine-welded assembly
- Weld function from the CAD software welding module



Sheet metal

Overview:

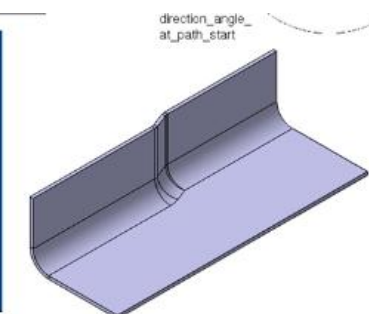
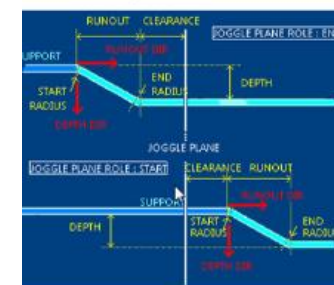
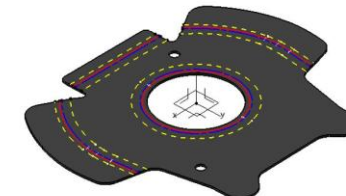
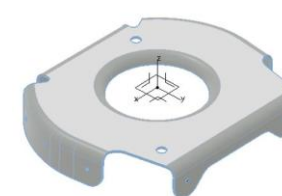
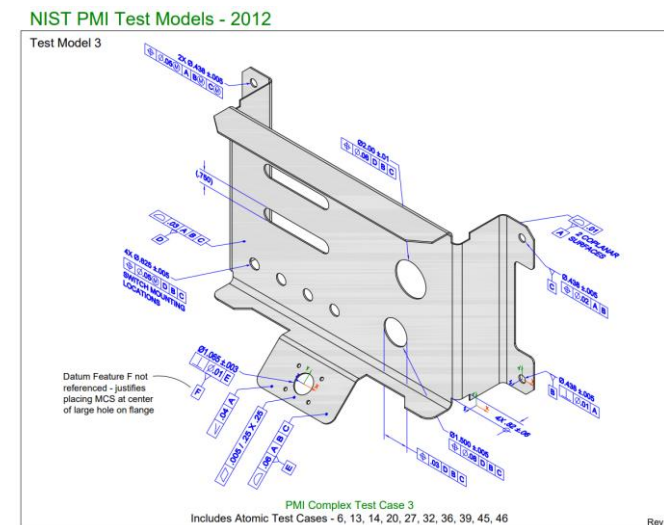
Standardizes sheet metal part definitions data exchange and archiving—including system-generated and user-defined parameters (material thickness, bend radius, K-factor, bend allowance, bend deduction)—to minimize re-mastering between CAD/CAM systems. These parameters are essential to ensure the final part can be accurately formed using press-brake bending or hydroforming techniques.

Downstream Capabilities Enabled:

- Standardized capture and sharing of sheet metal parameters and custom design data.
- Association of folded and unfolded (flat pattern) CAD model representations.
- Support for advanced forming operations (joggles, hems, ribs, flanged holes, gussets, louvers).

Primary Business Impact:

- Minimizes data re-mastering and manual entry between design and manufacturing.
- Reduces manufacturing errors in press-brake bending and hydroforming processes.
- Improves cross-domain collaboration and design manufacturability.





CAX-IF Implementor Group

Jochen Boy, PROSTEP

CAX-IF Implementor Group

Member Organizations

1. Anark – **new 2026**
2. Autodesk
3. CT CoreTechnologie
4. Dassault Systèmes
5. Datakit
6. Elysium
7. InnovMetric – **new 2026**
8. ITI
9. Jotne – **new 2026**
10. Kubotek Kosmos

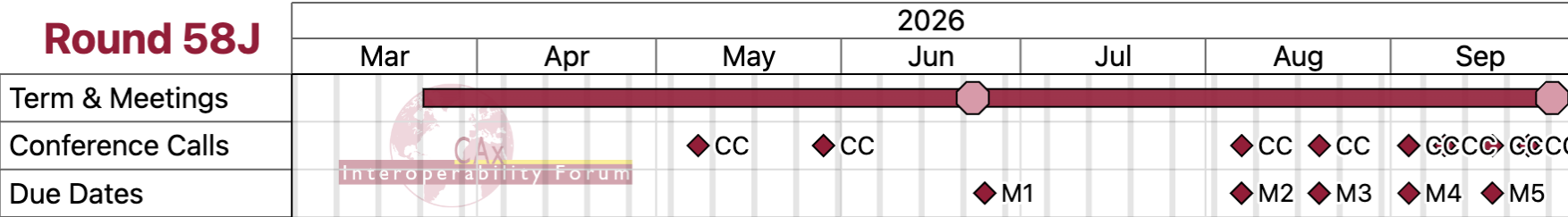
11. Mitutoyo
12. nVariate – **new 2026**
13. Open Cascade
14. Open Design Alliance
15. PROSTEP
16. PTC
17. Siemens

Candidate (currently in discussion):

18. Tech Soft 3D



Round 58J Schedule



M1: Test Suite and Rec. Pracs. available - M2: Initial STEP files and native stats due
M3: Initial release of files for testing - M4: Initial target stats due - M5: Preliminary results available

Date	Action
7 May 2026 (Thu)	Round 57J Follow-up / Round 58J Preparation Call
28 May 2026 (Thu)	Round 57J Follow-up / Round 58J Preparation Call
24 Jun 2026 (Wed)	CAX-IF Round 58J Kick-Off Meeting / Test Suite and Rec. Pracs. available
6 Aug 2026 (Thu)	1 st CAX-IF Round 58J Conference Call / Initial STEP files and native stats due
19 Aug 2026 (Wed)	2 nd CAX-IF Round 58J Conference Call / Initial release of files for testing
3 Sep 2026 (Thu)	3 rd CAX-IF Round 58J Conference Call / Initial target stats due
9 Sep 2026 (Wed)	4 th CAX-IF Round 58J Conference Call
17 Sep 2026 (Thu)	5 th CAX-IF Round 58J Conference Call / Preliminary results available
23 Sep 2026 (Wed)	6 th CAX-IF Round 58J Conference Call
28 Sep 2026 (Mon) - 30 Sep 2026 (Wed)	CAX-IF Round 58J Review Meeting in Frankfurt, Germany

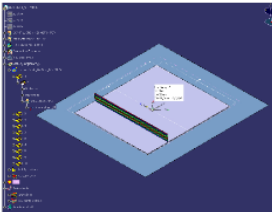


CAX-IF Round 58J

Results - Highlights

Round 58J - CO6

Mar 2026 - Sep 2026



Functionalities tested (including 7 User Stories):

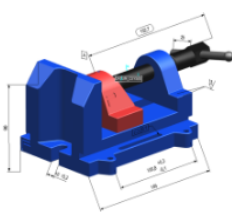
- Composite Materials
- Composite Validation Properties

- Four different vendors participating (two new)
- Most issues related to translators catching up to current recommendations
- More vendors expected to join in near-term
- Great collaboration with CAX User Group

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Round 58J - AP2

Mar 2026 - Sep 2026



Functionalities tested (including 1 User Story):

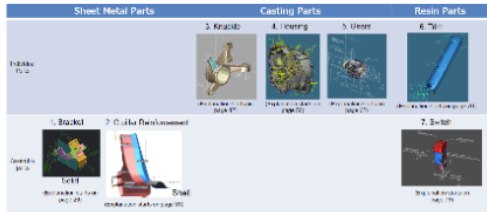
- Assembly-level Semantic PMI (Part 21)
- PMI Representation

- First formal test of Semantic PMI at assembly level in Part 21
- Promising initial results
- Identified improvements for PMI Recommended Practices
- Continue in Round 59J

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Round 58J - JPMI

Mar 2026 - Sep 2026



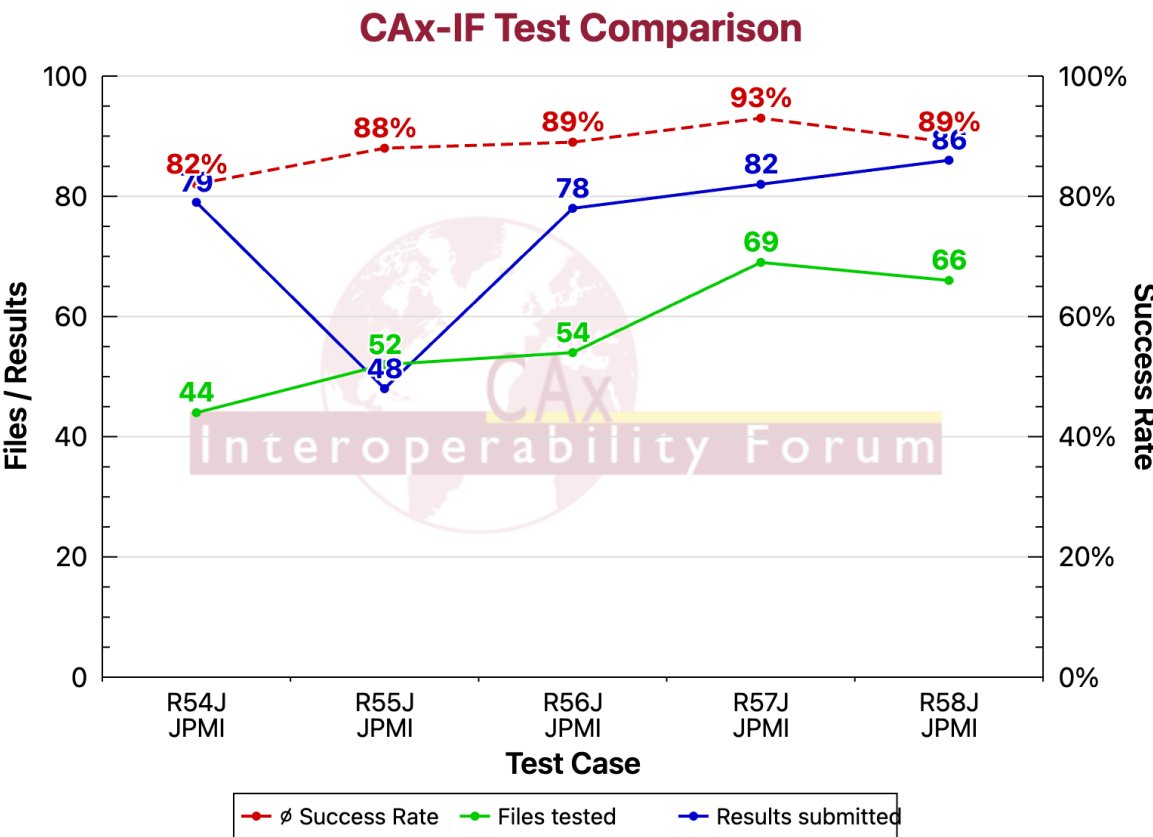
Functionalities tested (including 3 User Stories):

- PMI Representation
- PMI Graphic Presentation

- Continued tests of models provided by JAMA / JAPIA
- Increasing robustness of STEP translators
- Detailed model quality analysis
- New, challenging test model coming up

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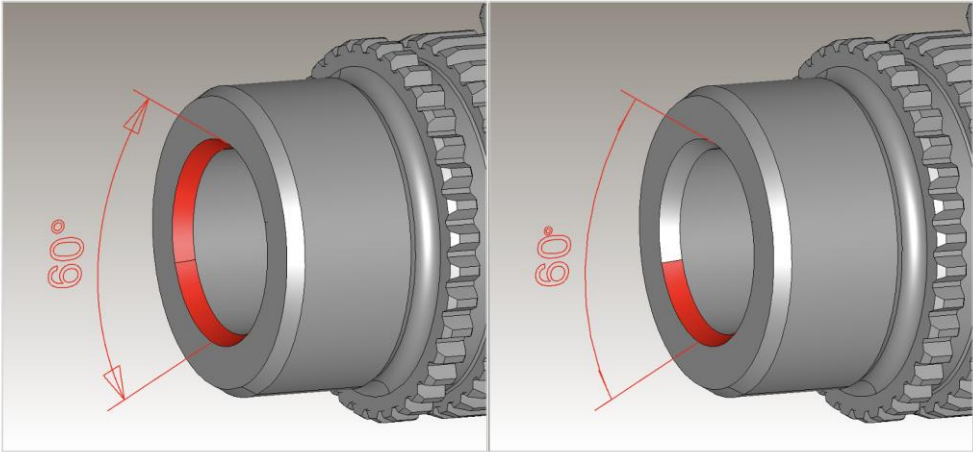
A closer look at PMI



Graphic created by CAESAR

© CAx-IF 2026

Associated Faces Lost
(partial, smoothly-connected)



Courtesy of  ITI
a wipro company

Presentation Text Rotated
(overlapping characters between annotations)



Introduction to Persistent Identification (PIDs)

Global Product Data Interoperability Summit | 2026

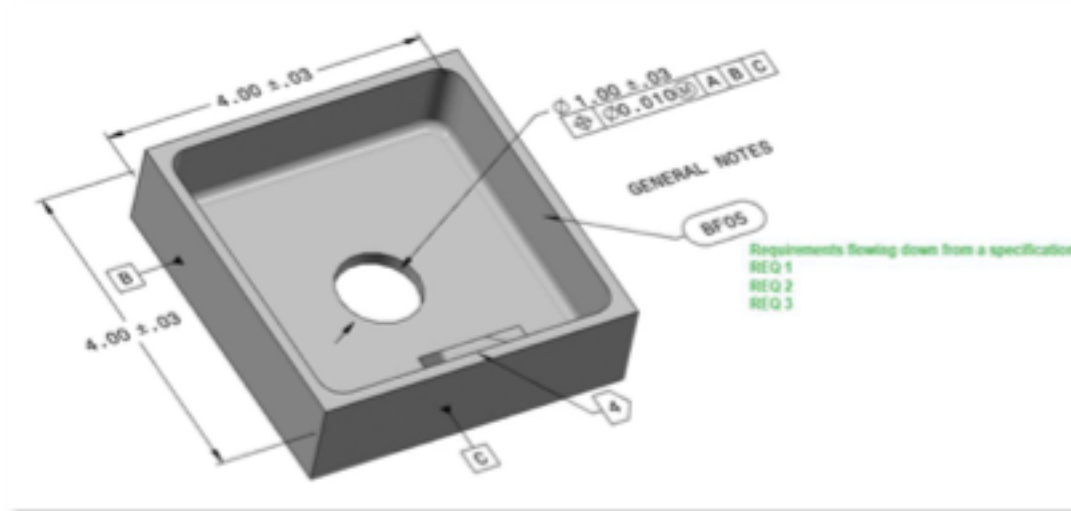
prostep ivip ProductData Journal 2026-1

Sewing the Digital Thread

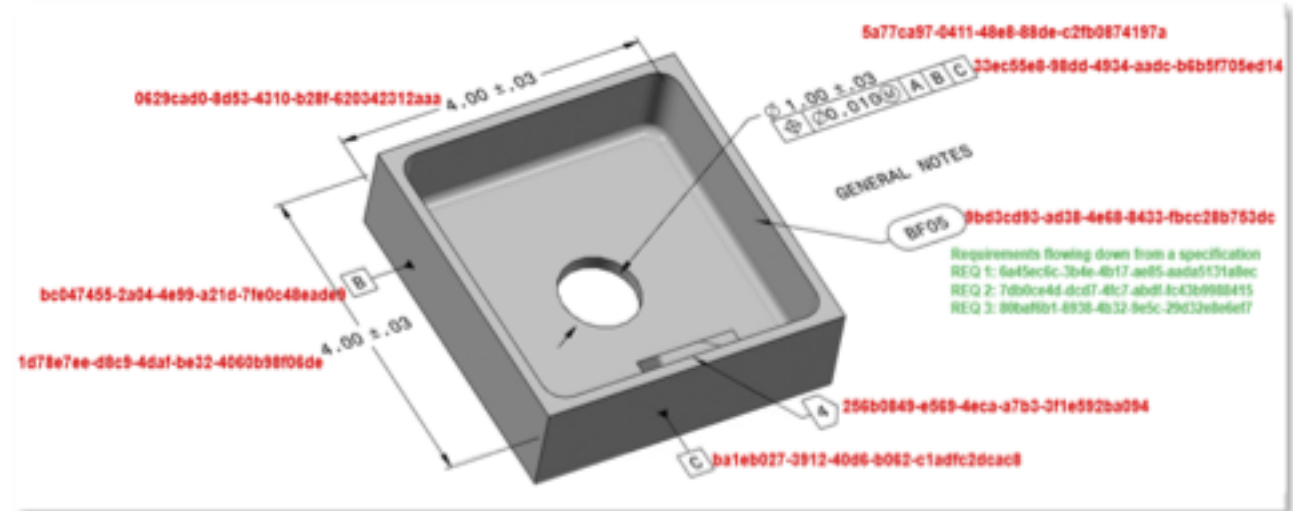
Together via Standards



Persistent IDs ARE - unique values tied to discrete features that are consumable & support digital thread automation
Persistent IDs DO - Identify the geometry and PMI across engineering, manufacturing and inspection systems

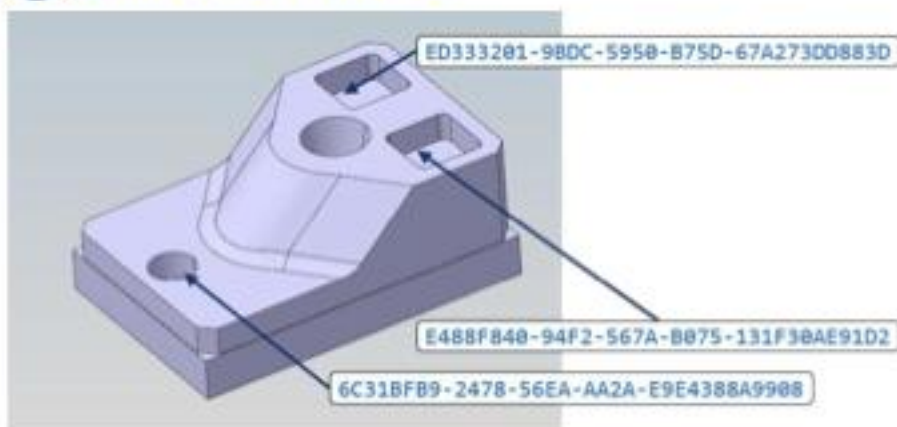


What the human sees



What the machine/system sees

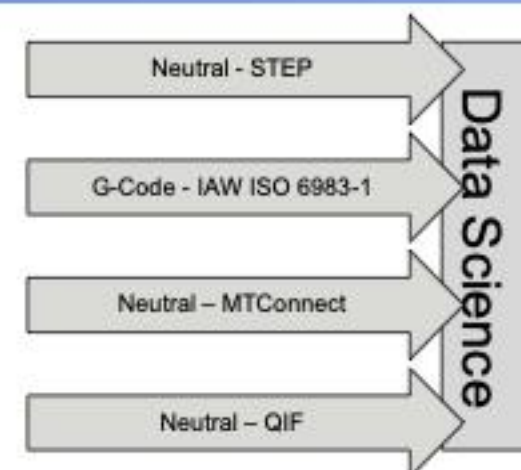
1 CAD / STEP AP242



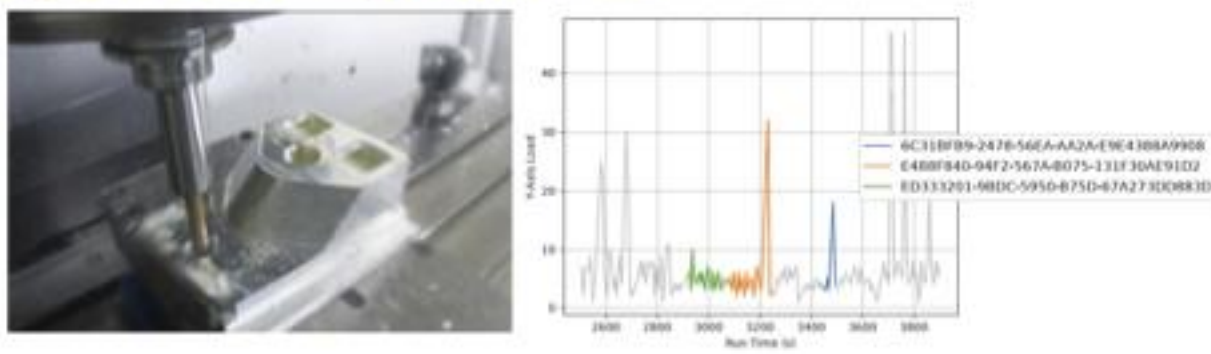
2 CAM / NC Program

```

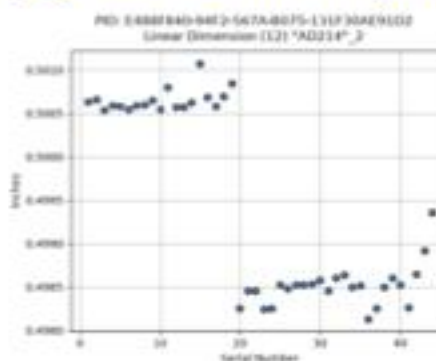
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1201 G45 F9735 A10. B9001 C0. I35044. J16432. K62100. I31318. J30128. K7955. I44592
1202 G1 Z-.39 F25.
1203 X-.9808 Y.4324 F50.
1204 G3 X-.9 Y.4181 Z-.4 I.0808 J.2219
1205 G1 X-.44
1206 G3 X-.4181 Y.44 I0. J.0219
1207 G1 Y1.36
1208 G3 X-.44 Y1.3819 I-.0219 J0.
1209 G1 X-1.36
1210 G3 X-1.3819 Y1.36 I0. J-.0219
1211 G1 Y.44
1212 G3 X-1.36 Y.4181 I.0219 J0.
1213 G1 X-.9
1214 X-.7
1215 G3 X-.6192 Y.4324 Z-.39 I0. J.2362
1216 G1 X-.597 Y.4404
1217 ( FEATURE END UID: E488F840-94F2-567A-B075-131F30AE91D2 )
    
```



3 CNC Machining MTConnect



4 CAI / CMM Inspection



CAX-IF Recommended Practices

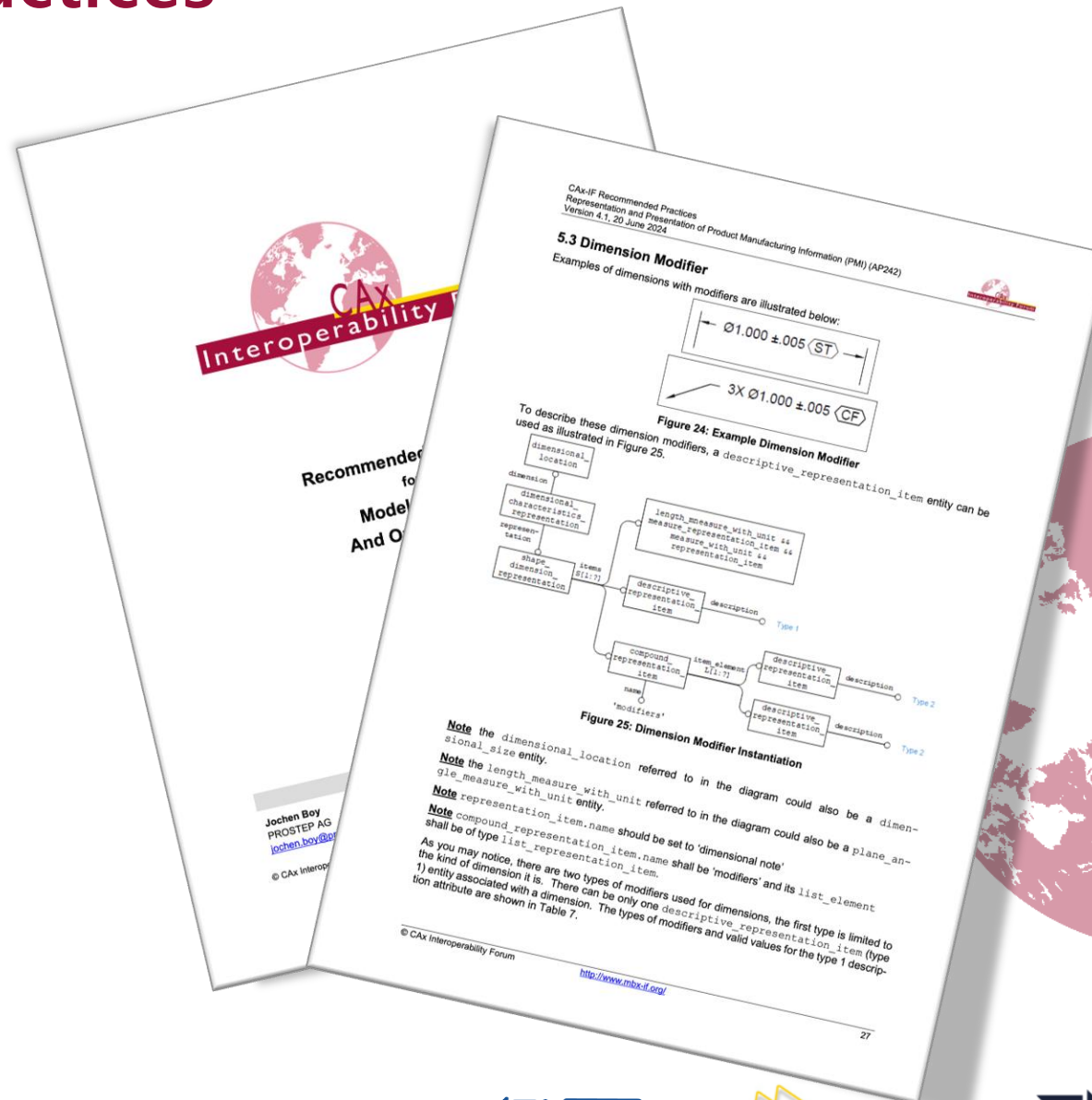
Work Items 2026 (more than 20 total)

■ Published

- Composite Material Validation Properties
- Cross-Domain Exchange for Downstream Uses
- Persistent Ids

■ In Work:

- Bill of Operational Features
- Material Identification & Properties
- Model Styling & Organization
- PMI
- Surface Texture



Interoperability Forum



PDM-IF User Group & Implementor Group

Frédéric Darré, Airbus
Guillaume Hirel, T-Systems

Members

Associations

Industrial leaders:
Coordinators:

User Group

Implementor Group

PDM systems, connectors,
convertors, viewers













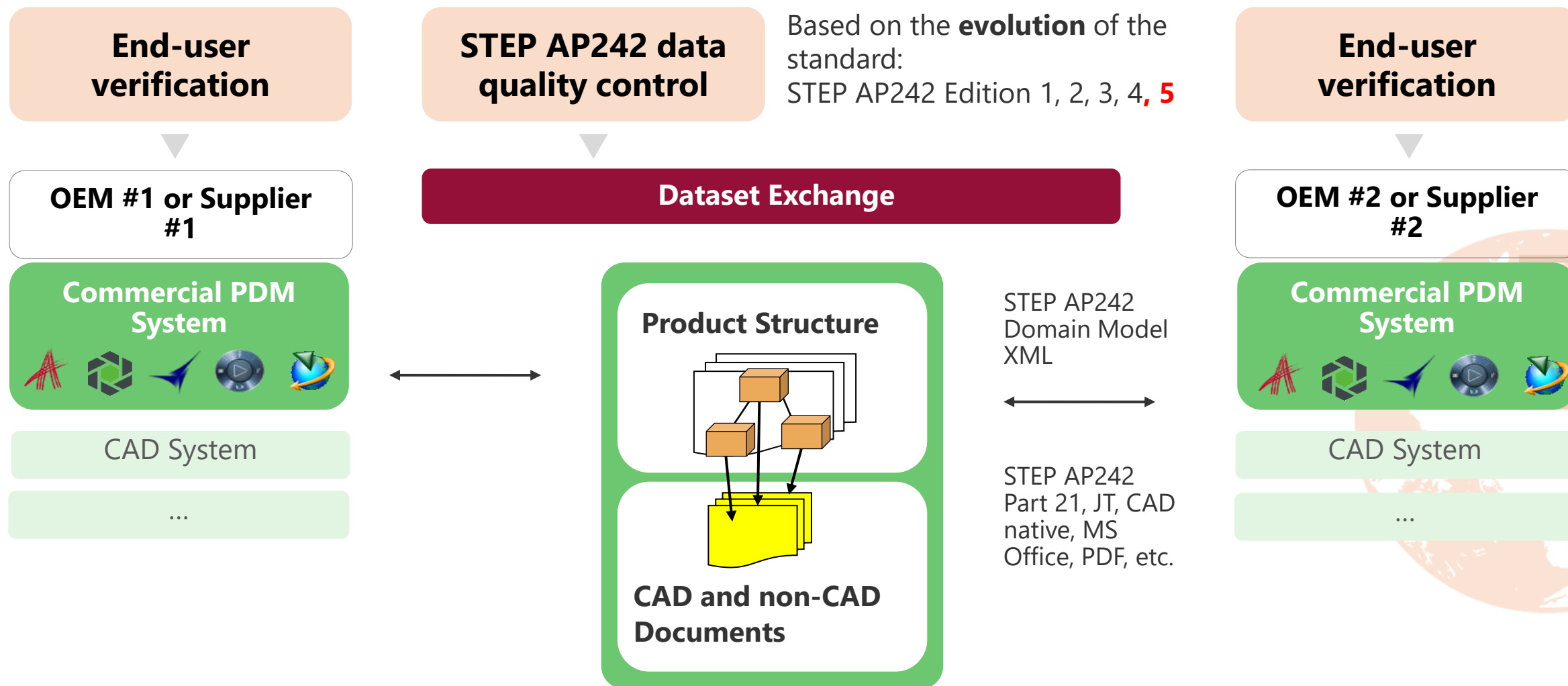


PDM Interoperability Forum

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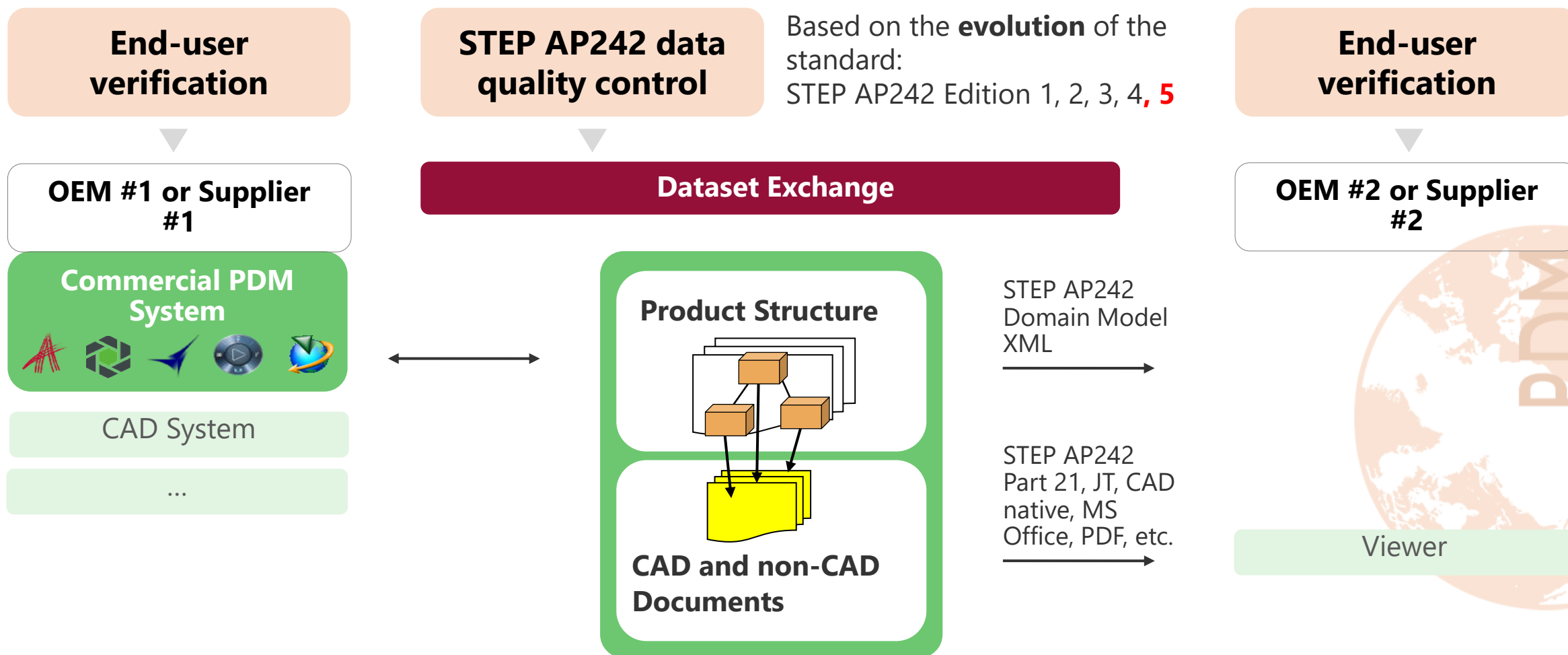
Generic PDM-IF Use Cases

PDM<->PDM or PDM<->CAD Data Exchange



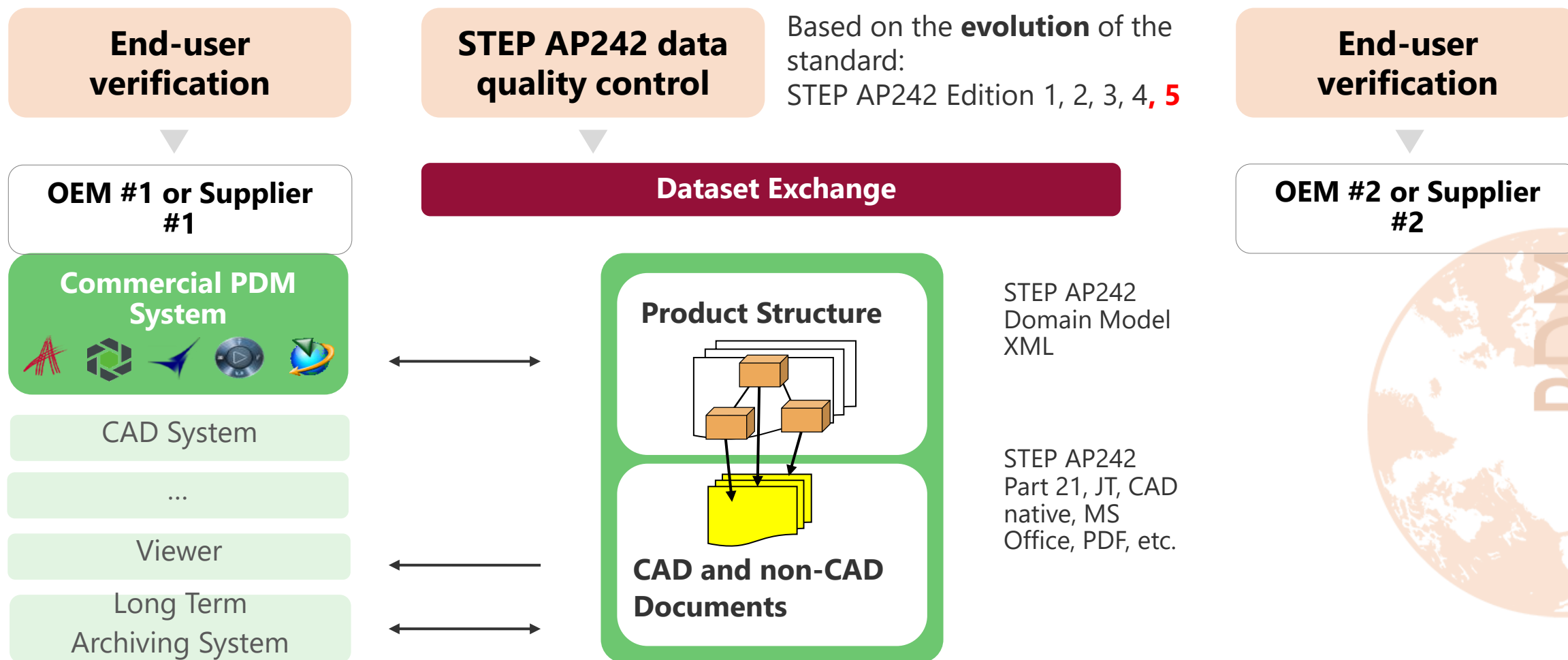
Generic PDM-IF Use Cases

PDM <-> Viewer



Generic PDM-IF Use Cases

PDM <-> Archiving or Viewing out of an Archive

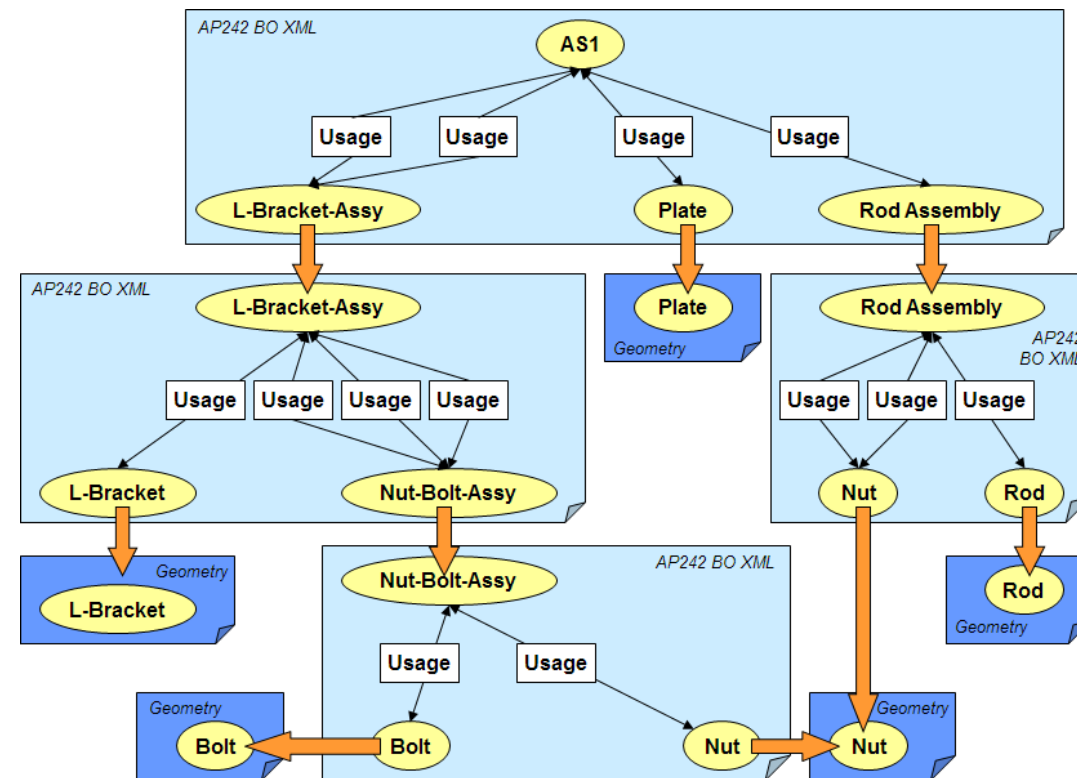




USE CASES

Nested Files based on UUID v5 EERs (Ed.4)

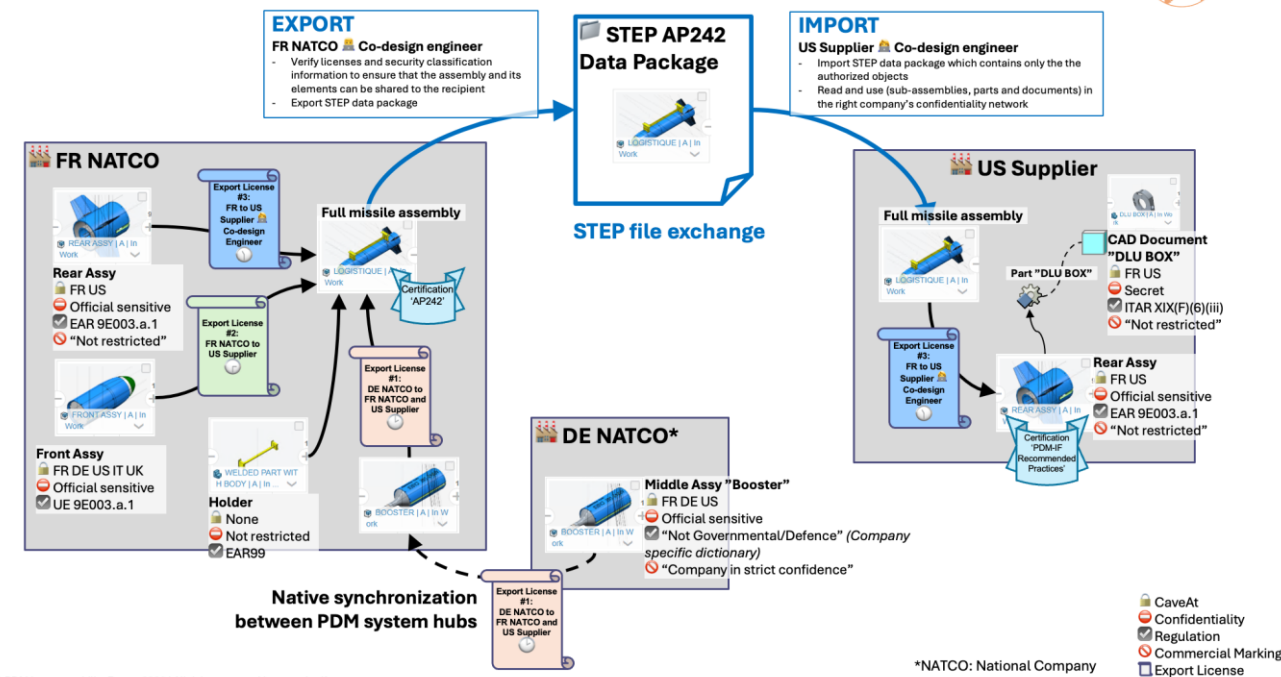
- New capability of AP242 Edition 4
 - Overtaken from Part 15 (mapping of XSI to XSD)
- Same External Element References for
 - AP242 XML -> AP242 XML
 - *Nested Files (Archiving)*
 - Incremental Exchange
 - Delta Exchange
 - AP242 XML -> STEP/JT/Native Geometries
 - Kinematics High Order Pairs (Point on Curve, ...)
 - Assembly PMIs



Export Control (Ed.4)

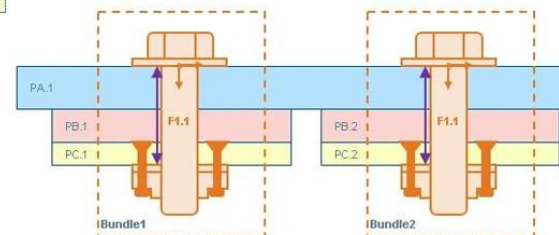
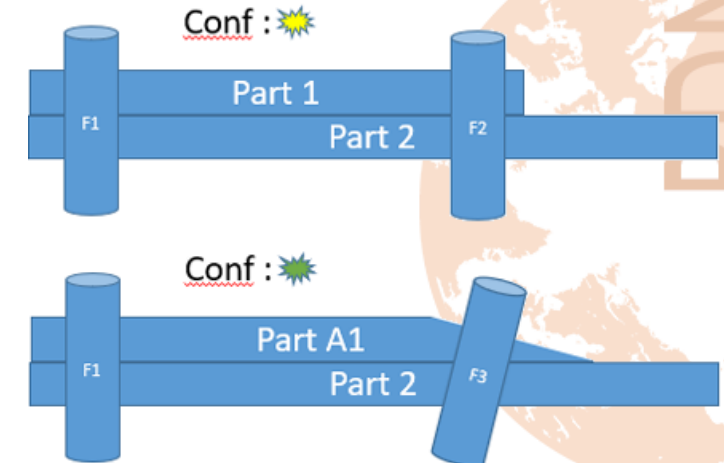
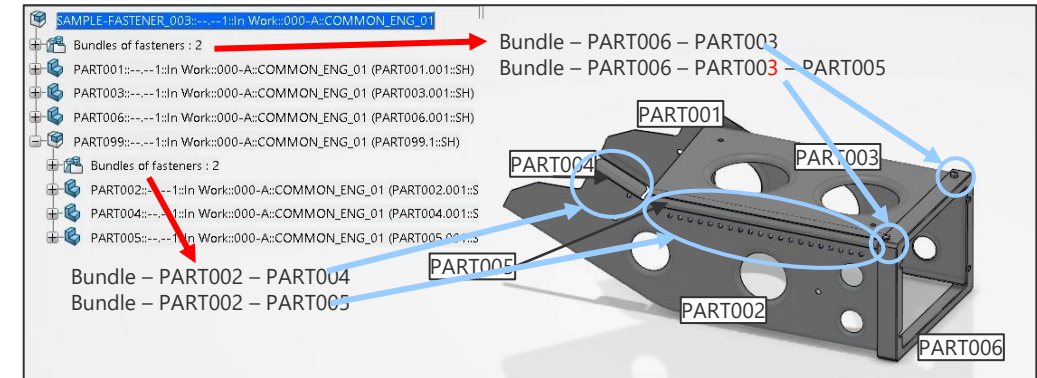
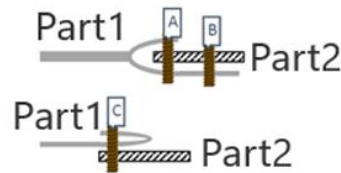
- Security Classification
 - Confidentiality level, regulation, country caveat
- Export License
 - Official authorization from DGA, MoD, ... to share data between OEM, supplier, partners
- Certification
 - required personnel qualification
- On Parts and Documents within the product structure
- Enables during export:
 - check if the data be shared to the recipient
 - which communication channel shall be used
- Enables during import:
 - which recipient's organization network shall be used
 - check from whom the data can be read

Export Control at PDM-IF: use case process & test case scenario



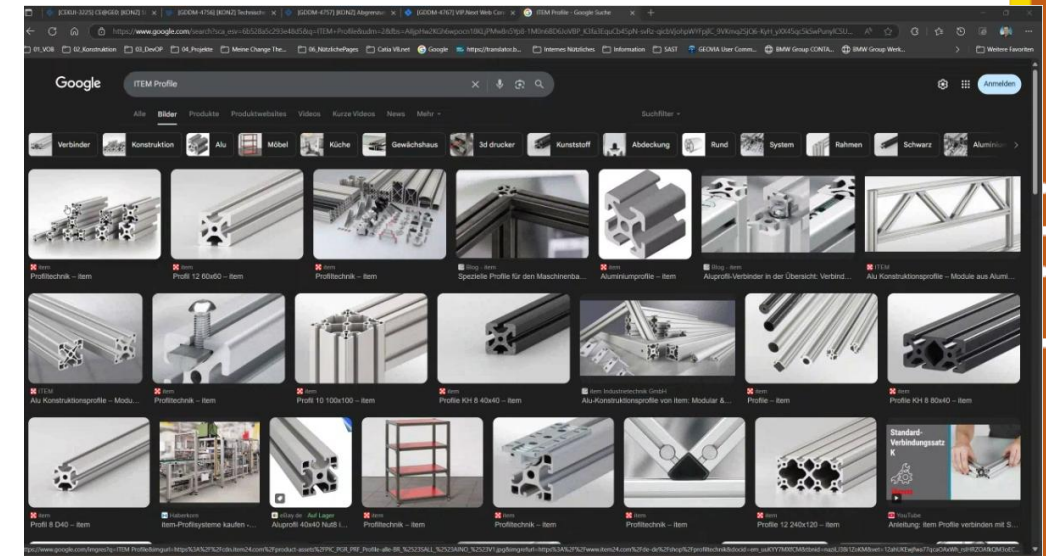
Fasteners (Ed.5)

- Type of mating
 - screwing, welding, riveting, clips, gluing, ...
- Which parts are mated together (so-called linked parts)
- In which order (stacking)
- Which fasteners are used
 - defined by parameters (χMCF ISO/PAS 8329:2024) + geometry
- Reuse, 3D positioning and direction of the fasteners
- Mating attributes (tightening torque, ...=
- In case of 150% BoM: configuration of the involved fasteners and of their 3D positioning
- Nested Fasteners
- Out of Scope (see CAX-IF):
 - CAD level features, surface contacts



Material data (Ed.5)

- Raw Material, Catalogue Part, Semi-finished part, Final Part
 - ‚make from‘ Relationship
- Alternative Raw Materials (early design phase)
- Material Condition (Heat treatment like annealing, ...)
- Material properties
 - Density, conductivity, hardness, ...
 - Overtaken from international or company Standard, or customized
- Surface Condition(s)
- Coating Layer(s) with Material identification, thickness and optional Surface Condition
- Can be applied to any company process (for example use of VDA 231-200)
- Out of scope (see CAX-IF): CAD body level material data or CAD shape level Surface Conditions



Part Evolution and Interchangeability (Ed.4)

Major revision with different FFF => new Part in AP242

- Rules that cause a Minor revision, a Major revision or a new Part to be created are company specific

- Common mapping to AP242 according to Form/Fit/Function/Interface aspects

- Substitute relationship

- with same effectivity
 - with overlapping effectivities**

- Together-with



- Stock Management

- How to handle stock of raw material, finished parts, mounted parts, spare parts
 - For example use up, scrap, ...

- Obsolescence of a Part

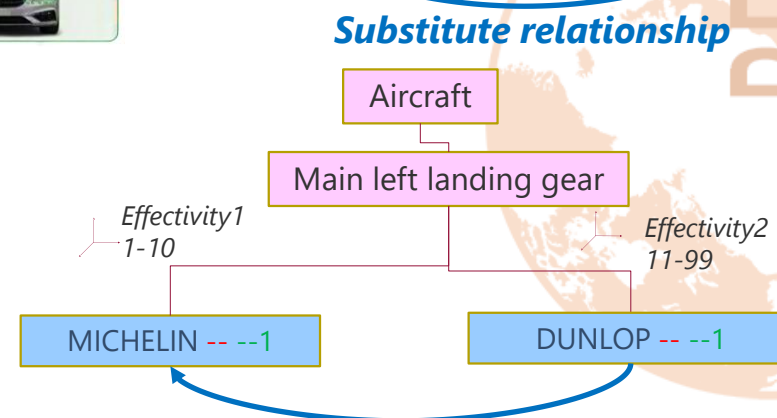
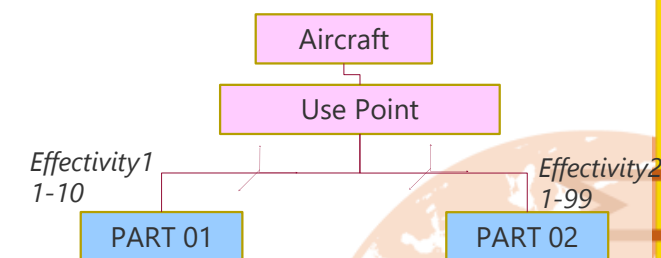
- When it shall not be built/used anymore
 - for example due to new regulations

- Interchangeability relationship that overrules the effectivities

- For example during Service

[F10X211001002 A1] --2

[F10X211001002 A2] --1



Interchangeability relationship



CONCLUSION

Deliverables

- Use Cases (<https://www.mbx-if.org/home/pdm/usecases>)
- Recommended Practices (<https://www.mbx-if.org/home/pdm/recpractices>)
 - Product Assembly Structure (PAS)
 - Configuration Management
 - Change Management
 - (NEW) Export Control
 - (NEW) Material
 - (NEW) Mating
- Quality Checking based on Schematron Rules
 - Product Assembly Structure (PAS) => PDM-IF Use Cases partially implemented: 75%
 - Nested Files => partially implemented: 80%
 - Export Control => planned
 - Configuration Management => next step
 - Change Management => next step
- IT Vendor solutions (<https://www.mbx-if.org/home/pdm/implementation-coverage>)



Outlook

- Consolidate the requirements for AP242 Edition 5 (2027)
- Continue the execution of
 - User-Driven Test Cases
 - Implementor Driven Back-log Tests
- Mix of short term and middle term topics
 - Covering of generic functionality
 - Enable more complex use cases
- Progress on AFNeT AP242 XML Quality Checker
- Maintain Recommended Practices
- Support disruptive solutions for the new challenges of PLM data exchange
 - Cross-discipline (MBx-IF joint use cases)
 - Web Services (Part 18)
 - Ontologies





EWIS Interoperability Forum

Dan Ganser, Gulfstream

EWIS Interoperability Forum

2027 Project Plan and 2026 Remaining Activities

2027 Objectives • Develop new use cases and future requirements • Test the AP242 EWIS capability implementations • Correct comments for AP242 ed5 FDIS • Maintain AP242 Recommended Practices and Test Suites	Finance & Participants Target 2027: 38.5 k€ Budget 2026: 29 k€ Contributors: Airbus, MBDA, Ariane Group, Alstom, LOTAR, Datakit, AFNeT Services
2027 Deliverables • Any EWIS use cases development and XML example • Extension and update of Test Suite (v6) • Starting AP242 Recommended Practices update with ed5 • EasySTEP Viewer with EWIS capabilities	2026 Remaining activities • AP242 ed5 JIRA issues correction for new needs (75% done) • Update XML examples and test cases for new capabilities of ed5 (done) • Test case of topology (from ECAD) with the as installed data from Mechanical (To start) • Extension and update of Test Suite (v6) - postponed due to shortage of funding

EWIS Interoperability Forum

2026 Use cases and corresponding Test Cases

- Mating definition (with sub-groups of Occurrence)
- AssemblyShapeJoint with AuxiliaryMaterials
- De-insulation of wires/cables
- Modification of PropertyDefinitionEnum for wire colour and signals support
- Higher-level EWIS capability (in progress)
 - Signal
 - Signal harness (power, ground, ...)
 - Usage of a harness occurrence in a higher-level assembly (e.g. vehicle)
- Nested terminals/features and joints



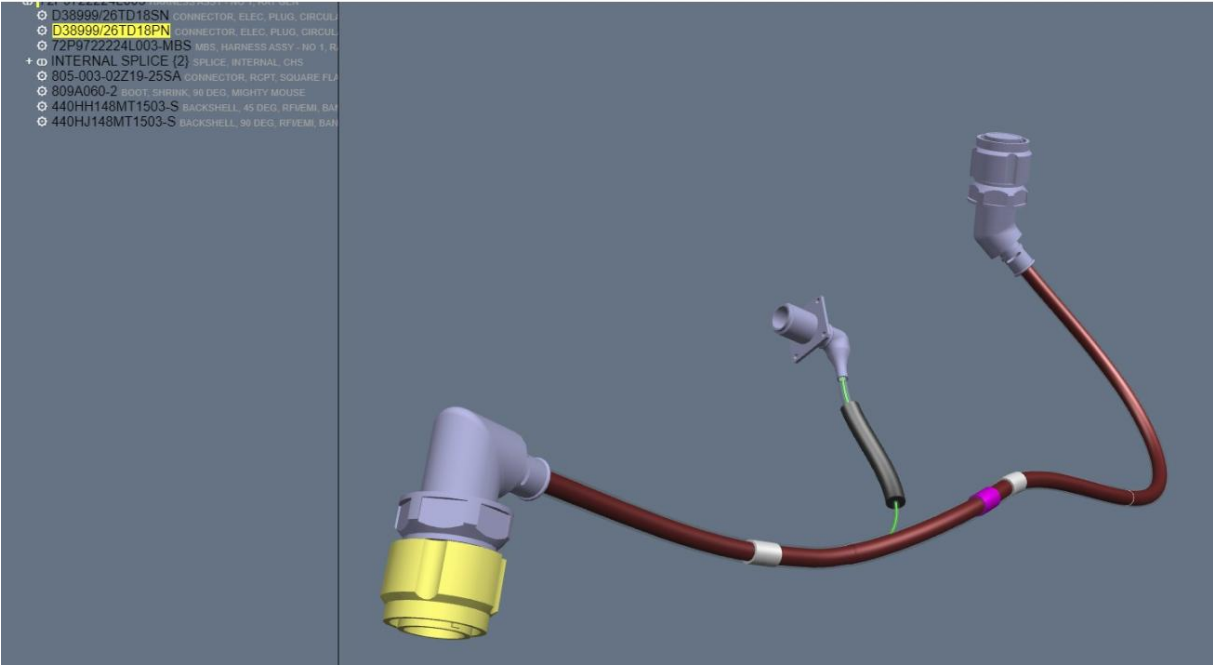
EWIS Interoperability Forum

2026 Deliverables

- AP242 Ed.5 issues correction – **In progress**
 - 15 issues corrected
 - 0 issue in progress
 - 7 issues to correct
 - 6 issues cancelled
- Update XML examples and test cases for new capabilities of ed5 – **In progress**
 - New test case developed (with its related stpx file)
 - Mating capability
 - Auxiliary materials
 - De-insulation of wire/cables
- Extended and updated Test Suite (v6) – **Postponed**



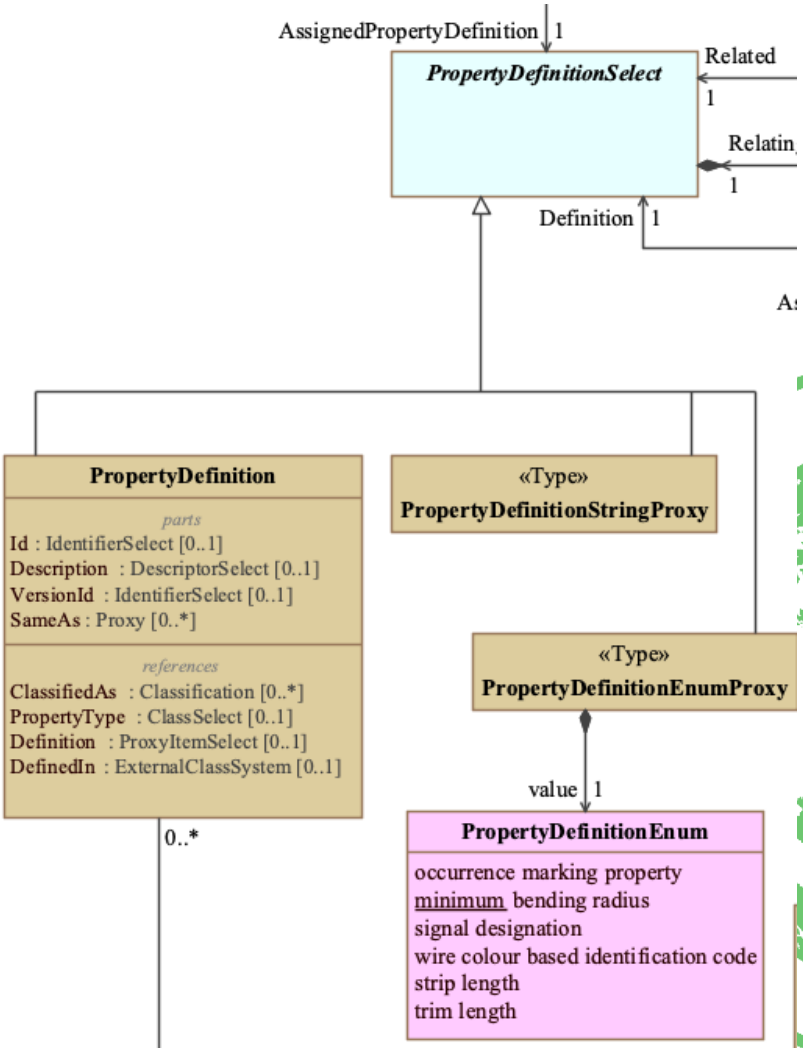
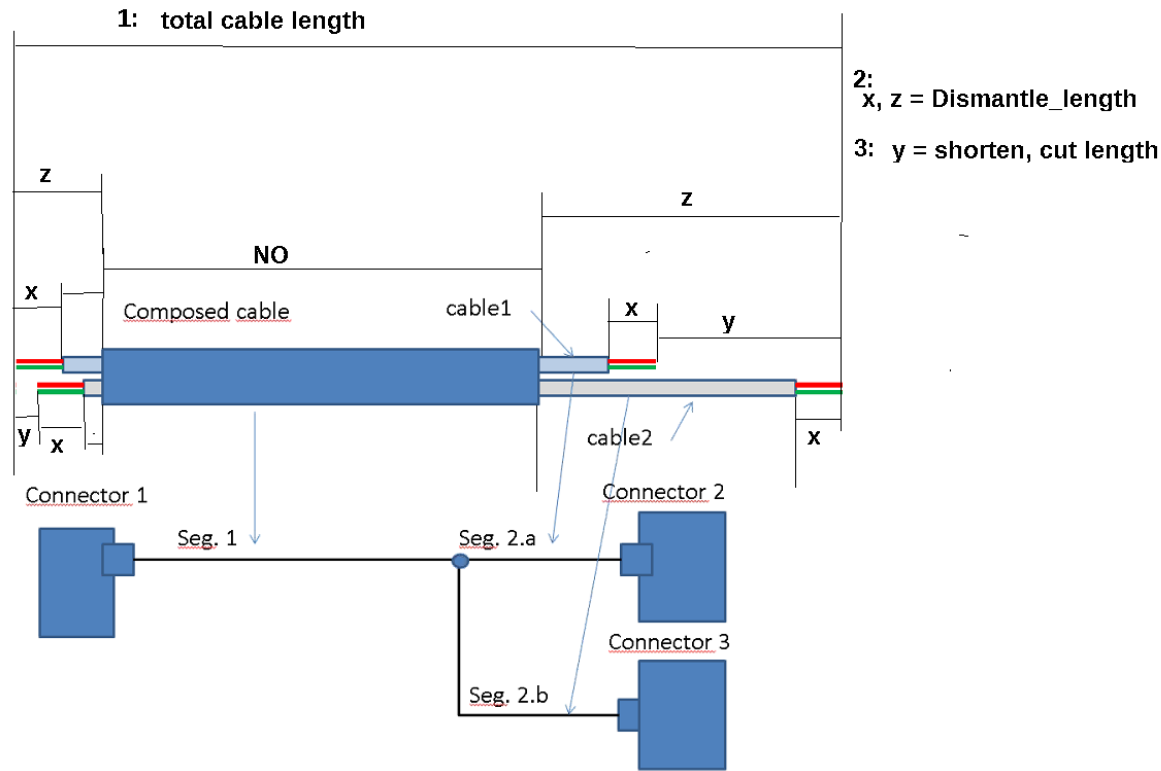
EWIS-IF Test Case - Production Model



Part Name	Qty	AP242 Part Category	Part Number	Supplier Na	Length
112233L001	1	wiring_harness			
036A2P6	1	connector_housing	D38999/26TD18SN	MIL-SPEC	
036A2P6-770-003S304W1	1	shrink_boot	770-003S304W1	GLENAIR	
036A2P6-M85049/128-3	1	? fastener ?	M85049/128-3	MIL-SPEC	
036A2P6E	1	backshell	440HH148MT1503-S	GLENAIR	
223-2S1	1	cable	04049A22A04T24		29,00
223-2S1A	1	(lead wire of splice)	(Part of W224E5)		6,00
223-2S2	1	cable	04049A22A04T24		29,00
223-4S1	1	cable	04049A22A04T24		29,00
223-4S2	1	cable	04049A22A04T24		29,00
223-4S2A	1	(lead wire of splice)	(Part of W224E6)		6,00
422DB20P1	1	connector_housing	D38999/26TD18PN	MIL-SPEC	
422DB20P1-770-003S304W1	1	shrink_boot	770-003S304W1	GLENAIR	
422DB20P1-M85049/128-3	1	? fastener ?	M85049/128-3	MIL-SPEC	
422DB20P1E	1	backshell	440HJ148MT1503-S	GLENAIR	
422DB26J1	1	connector	805-003-02Z19-25SA	GLENAIR	
422DB26J1-600-057	1	? fastener ?	600-057	GLENAIR	
422DB26J1-809A060-2	1	shrink_boot	809A060-2	GLENAIR	
ATUM_W112233-X3_1	1	protective_covering	ATUM 8/2-0	TYCO	2,00
COVER831B-N_W112233-R1_1	1	protective_covering	COVER831B-N	OEM	16,56
COVER831B-N_W112233-X2_1	1	protective_covering	COVER831B-N	OEM	5,91
COVER831B-N_W112233-X3_1	1	protective_covering	COVER831B-N	OEM	3,84
COVER831B-N_W112233-X3_2	1	protective_covering	COVER831B-N	OEM	2,50
TAPEBA050PK_W112233-R1_1	1	tape	TAPEBA050PK	OEM	
TAPEBA050WE_W112233-R1_1	1	tape	TAPEBA050WE	OEM	
TAPEBA050WE_W112233-X2_1	1	tape	TAPEBA050WE	OEM	
W224E5	1	splice	M83519/2-8	MIL-SPEC	
W224E6	1	splice	M83519/2-8	MIL-SPEC	
X716B22-4	1	wire	04034-22-9		15,00
(contacts may come with connectors)	1	connector_contact	809-205	GLENAIR	
(contacts may come with connectors)	18	connector_contact	M39029/56-351	MIL-SPEC	
(contacts may come with connectors)	18	connector_contact	M39029/58-363 SAE AS39029/58 ...	MIL-SPEC	
(plugs may come with connectors)	5	cavity_plug	MS27488-20-2		

EWIS-IF Test Case - Production Model

De-insulation of wire and cables



<https://sd.iso.org/jira-pilot/browse/TCSC410303-746>



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Thank you for
your time,
your energy,
and your invaluable insights.