



What's Up with STEP

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Agenda

- PDES, Inc. Ecosystem
- STEP: Why? Current. Roadmap. In progress.
- Persistent Identification for the Digital Thread

PDES, Inc. Ecosystem



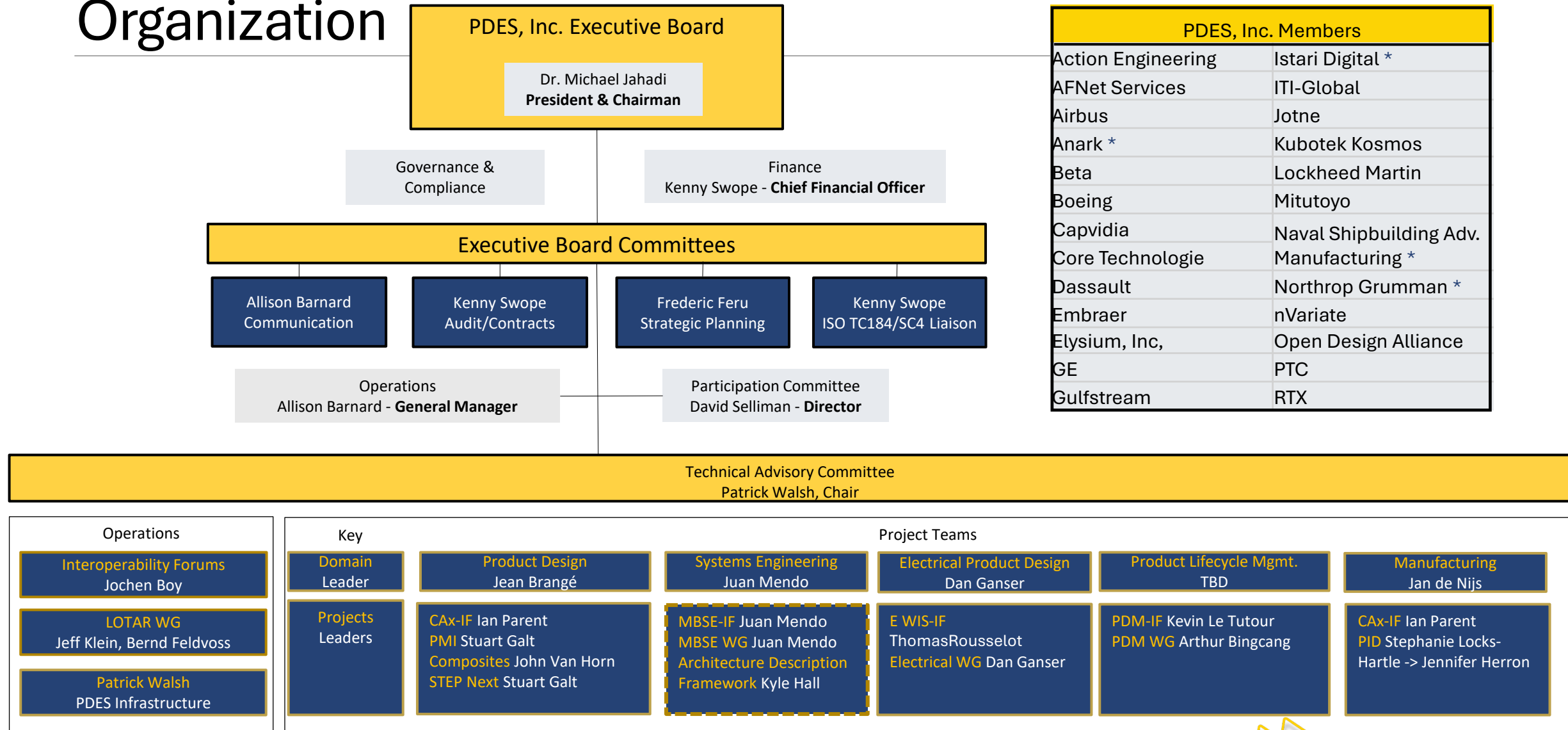
PDES, Inc.

PDES, Inc. is committed to accelerating the development and implementation of product data standards in the Digital Enterprise.

- Members collaborate to advance towards a scalable, data-driven, model-based enterprise that transforms design into production faster than ever before.
- PDES is driving the effort to synchronize data exchange across the digital thread, specifically aligning ISO STEP AP242, MTConnect, and QIF standards to ensure consistent, reliable product definition from design through manufacturing and inspection.
- Standards are only as good as the software that implements them. PDES has provided a trusted forum for software vendors to agree on implementation details and collaboratively test interoperability of pre-market software translators for more than 30 years.



Organization



PDES, Inc. Members	
Action Engineering	Istari Digital *
AFNet Services	ITI-Global
Airbus	Jotne
Anark *	Kubotek Kosmos
Beta	Lockheed Martin
Boeing	Mitutoyo
Capvidia	Naval Shipbuilding Adv. Manufacturing *
Core Technologie	Northrop Grumman *
Dassault	nVariate
Embraer	Open Design Alliance
Elysium, Inc,	PTC
GE	RTX
Gulfstream	

One PDES, Three Initiatives

PDES, Inc. has three main initiatives aligned with our mission and driving our work.



ISO Standards Development – PDES, Inc. is a Liaison to ISO TC 184/SC 4. PDES members participate in WG12 and PDES projects to develop industrial data standards and needed infrastructure



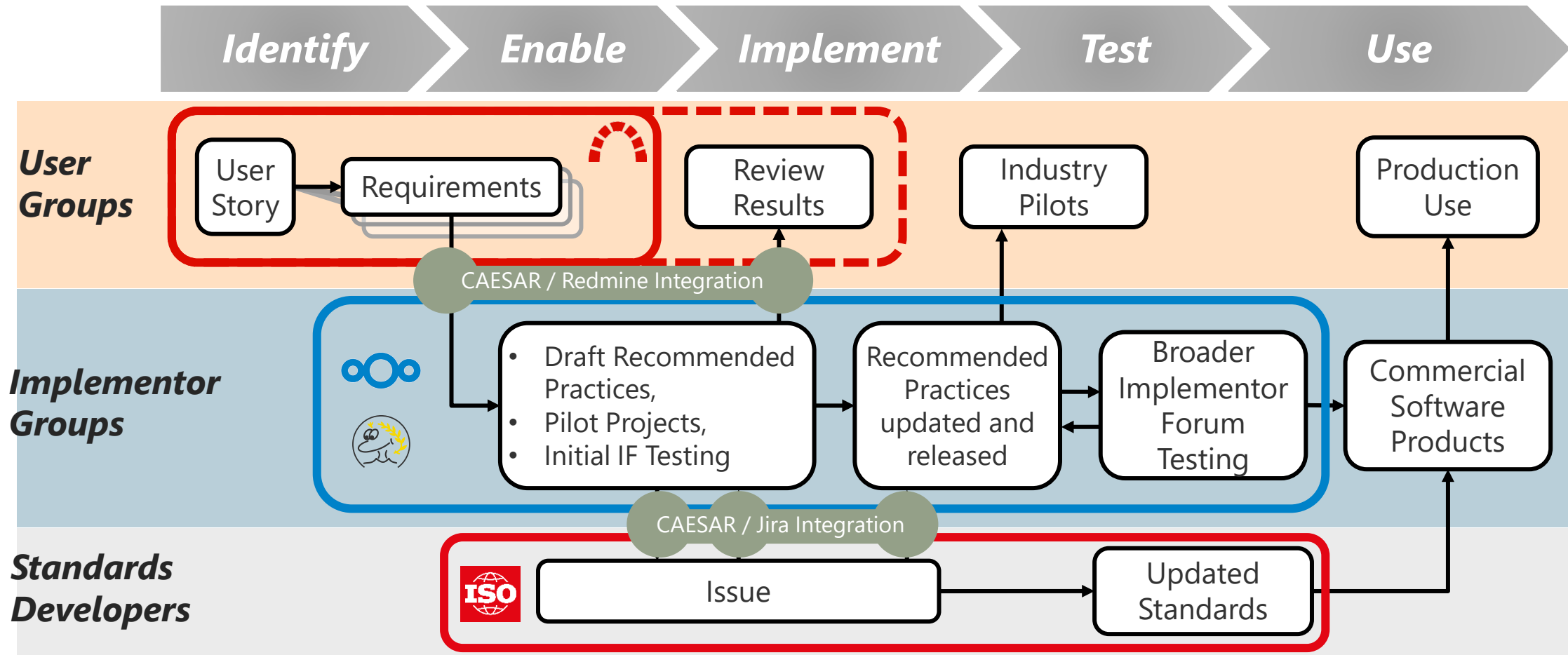
Standards Implementation – PDES is partnered with AFNET and prostep in the Model-Based X Interoperability Forum (MBx-IF). We prioritize member requirements and work with vendor community to get these capabilities implemented consistently in commercial software.



Long Term Archival and Retrieval (LOTAR) Standards Development – PDES is partnered with prostep and aerospace manufacturers to create and deploy EN/NAS 9300 standards for long-term archiving and retrieval of digital data, based on standardized approaches and solutions.



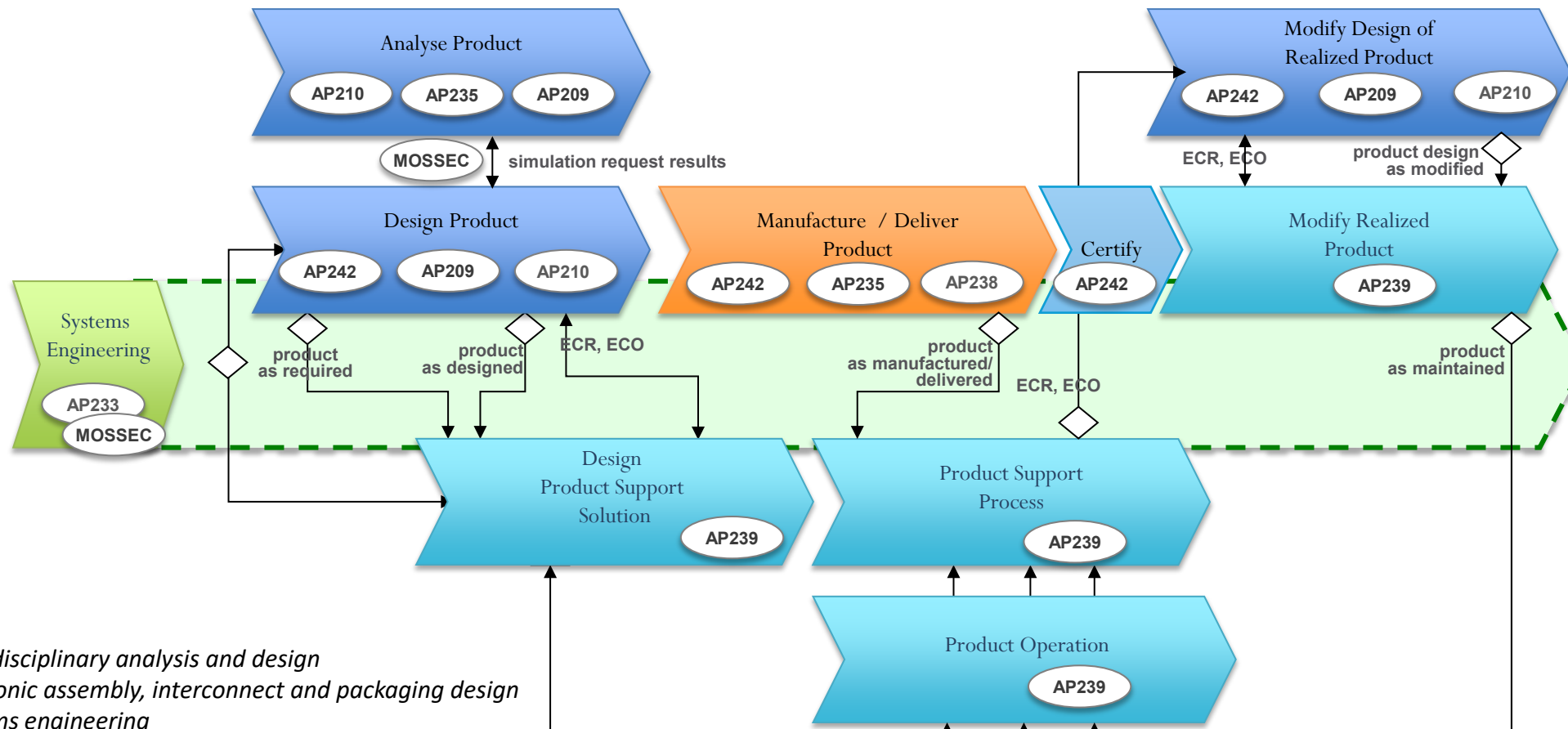
PDES, Inc. Workflow



ISO 10303: Product Data Representation and Exchange



Why STEP Matters

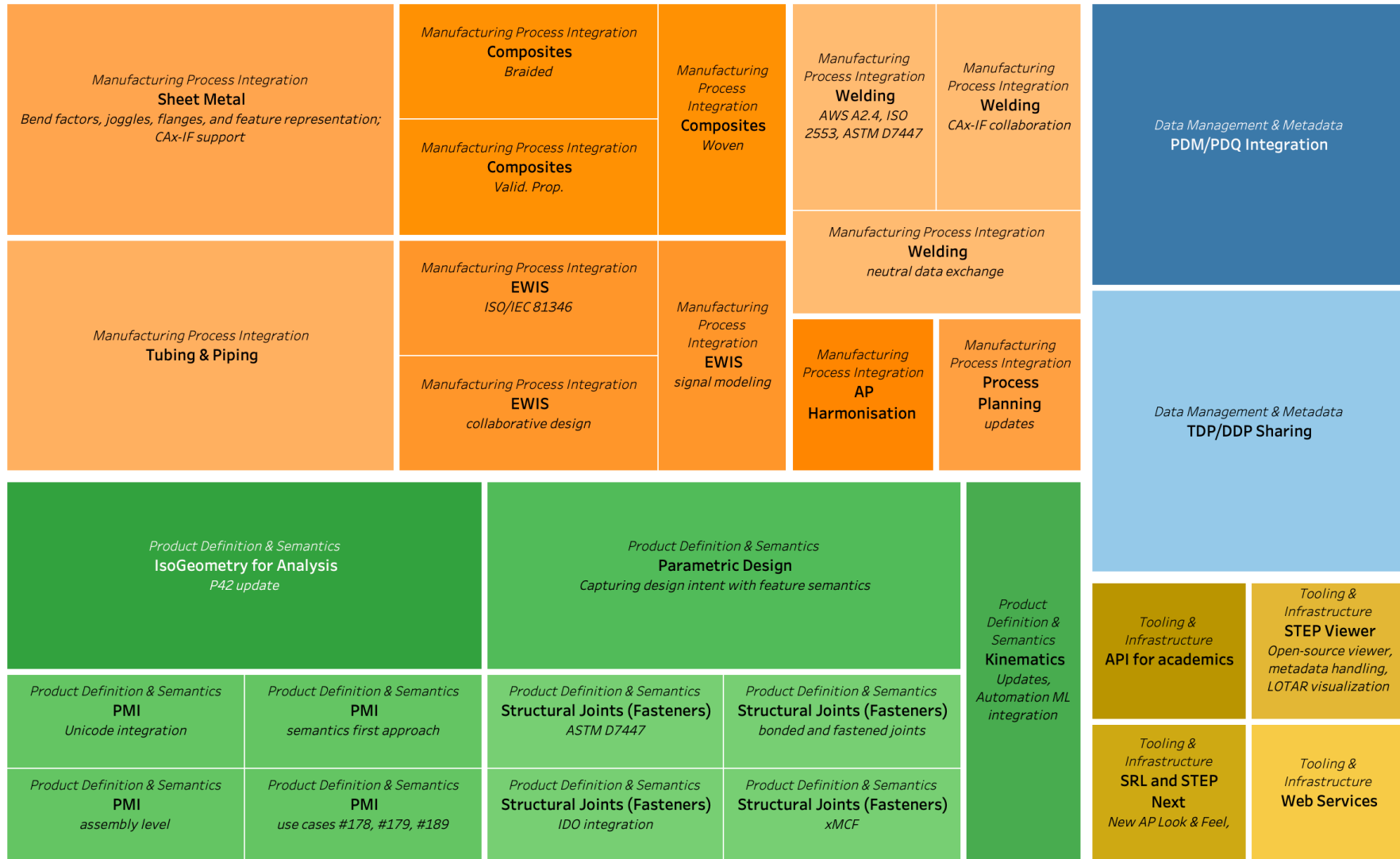


AP209 Multidisciplinary analysis and design
 AP210 Electronic assembly, interconnect and packaging design
 AP233 Systems engineering
 AP235 Engineering properties for product design and verification
 AP238 Model based integrated Manufacturing
 AP239 Product life cycle support
 AP242* Managed model-based 3D engineering, replaces AP203 & AP214
 AP243 MoSSEC: modelling and simulation information in a collaborative systems engineering context

10303-2: STEP Vocabulary
 10303-11: EXPRESS language
 10303-21: Part 21 files .stp
 10303-15: XSD schemas for XML files for Domain Models .stpx
 10303-18: SysML XMI to Web services transformation

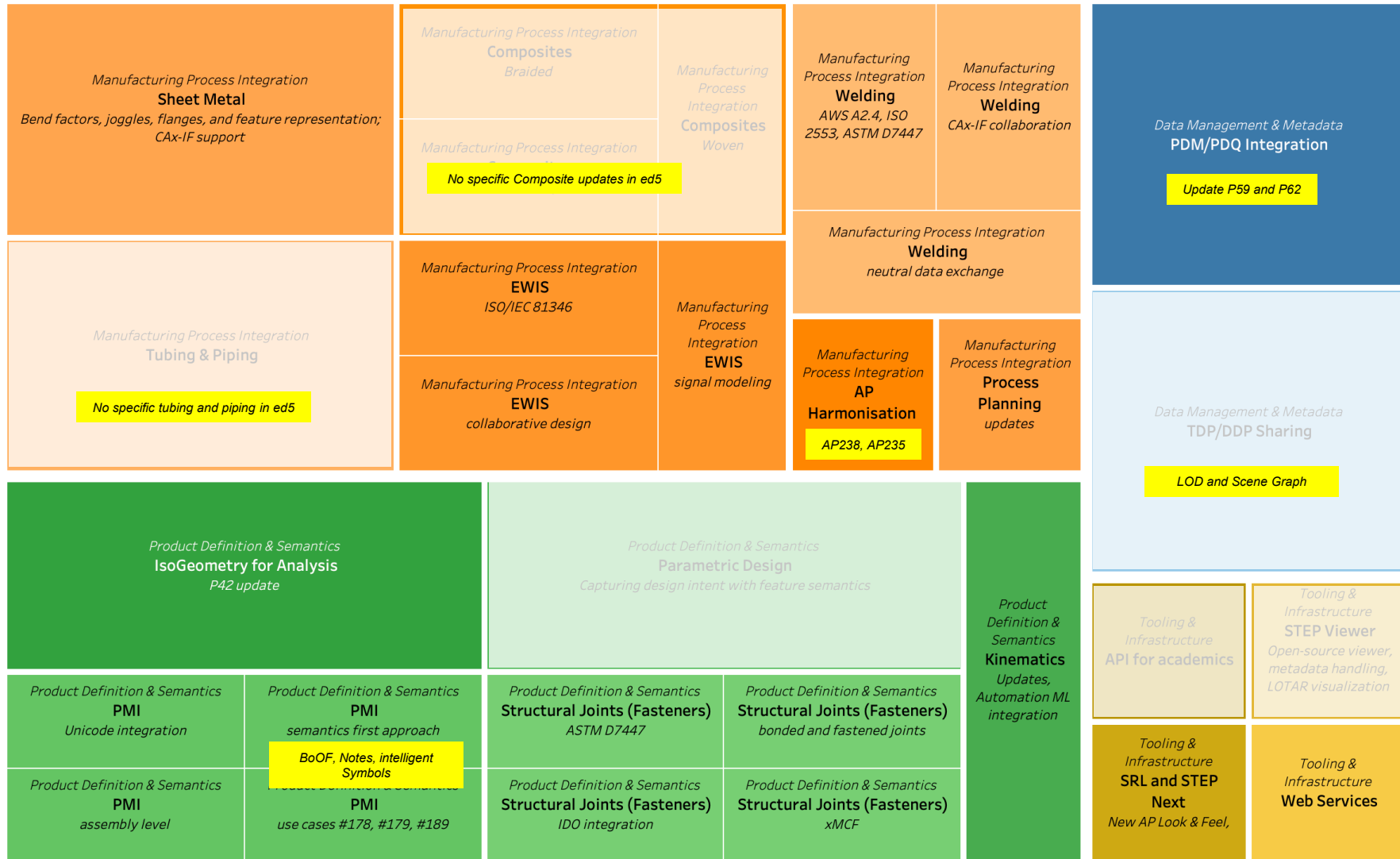
Connecting the Digital Enterprise

STEP Roadmap: Industrial Requirements



- Data Management & Metadata, PDM/PDQ Int..
- Data Management & Metadata, TDP/DDP Sha..
- Manufacturing Process Integration, AP Harm..
- Manufacturing Process Integration, Composit..
- Manufacturing Process Integration, EWIS
- Manufacturing Process Integration, Process P..
- Manufacturing Process Integration, Sheet Me..
- Manufacturing Process Integration, Tubing & ..
- Manufacturing Process Integration, Welding ..
- Product Definition & Semantics, IsoGeometry ..
- Product Definition & Semantics, Kinematics
- Product Definition & Semantics, Parametric D..
- Product Definition & Semantics, PMI
- Product Definition & Semantics, Structural Jo..
- Tooling & Infrastructure, API for academics
- Tooling & Infrastructure, SRL and STEP Next
- Tooling & Infrastructure, STEP Viewer
- Tooling & Infrastructure, Web Services

AP242 ed5 Scope



- Data Management & Metadata, PDM/PDQ Int..
- Data Management & Metadata, TDP/DDP Sha..
- Manufacturing Process Integration, AP Harm..
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- Tooling & Infrastructure, API for academics
- Tooling & Infrastructure, SRL and STEP Next
- Tooling & Infrastructure, STEP Viewer
- Tooling & Infrastructure, Web Services

Domain model + AP module

AP Module only

 Improved in edition 5

New in Edition 5

Part Identification, Physical Part
Characteristics, Document Management
General Management Information
Activity & Work Management, Delta Change
Approval And Certification
Effectivity, Specification, Breakdown, Configuration
Project Management, Contract Management.

Requirements, Validation & Verification

Production Rules

Interface Management

Ki67 (CD56)
Strong positive of tumor

Presentation (Colours, layers,etc)

Message

Mating definition

Process Planning

3D Kinematics

Mechanisms

- Joint
 - Revolute
 - Cylindrical
 - Rigid
 - Cylindrical
 - Rigid
 - Revolute
- Commands
 - Command
- Fix Part
- Links
- Speeds-Accelerations

Simulation

Triangulated shape data quality

PMI data quality

A close-up photograph of a grey plastic component, likely a part of a medical device. A blue rectangular box highlights a specific feature on the component. The text "(R) 5 Axis Pocket" is visible on the left side of the component.

A 3D diagram showing a rectangular box containing a purple sphere, a purple cone, and a green cylinder. The box is labeled with dimensions: length (L), width (W), and height (H). The sphere is labeled with radius (R). The cone is labeled with radius (R) and height (H). The cylinder is labeled with radius (R) and height (H). The diagram illustrates the concept of bounding boxes and LOD.

The diagram illustrates five different ways to represent a 3D object (a mechanical part):

- 3D Exact Explicit Geometry:** Shows a smooth, continuous 3D model of the part.
- 3D Tessellated Explicit Geometry:** Shows the 3D model with a visible mesh of triangles. A blue box highlights a specific area of the mesh.
- 3D curved triangle representation:** Shows a wireframe view of the 3D model, highlighting the curved nature of the triangles used to approximate the surface.
- Surface Texture:** Shows the 3D model with a color-coded texture map applied to its surface.
- 3D Parametric & Construction History:** Shows the 3D model with a blue box highlighting a specific feature. An inset shows a detailed view of this feature, illustrating the parametric construction history.

Manufacturing



BoOF

BoOF

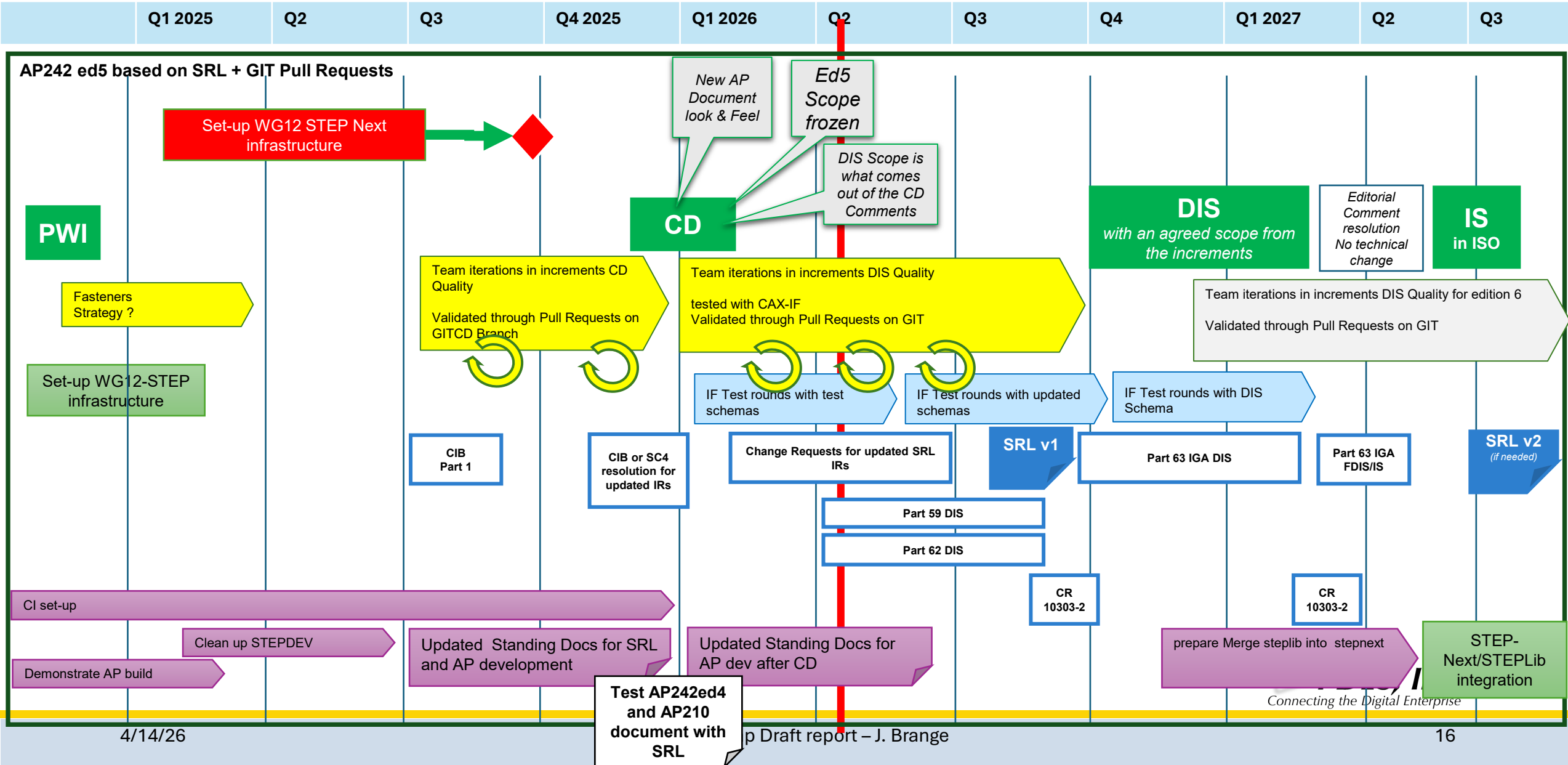
Notes, Intelligent
symbols, Surface
Texture

Threads, Design oriented mechanical features

IsoGeometric Analysis

Sheet Metal

Schedule for AP242 ed5



Persistent Identification for the Digital Thread



Digital Thread Persistent ID (PID)

Scope: AP242 and QIF for Design, Manufacturing and Inspection

- Objectives:** Demonstrate *operational feature* bi-directional traceability from Native CAD to AP242 and QIF using UUIDs
- Define and test bi-directional traceability between AP242 and QIF
 - With participating PDES software vendors, evaluate the persistence of feature and characteristic IDs in a single part across the lifecycle.
 - Progressively test components, from unit tests to integration tests. The workflow for each test starts with Native CAD (CATIA v5 & 3DX, Creo 11+, and NX 2306+) to STEP AP242, to QIF, to CNC and CMM. Show TRL maturation of each unit test
 - Develop recommended practices for PID in STEP and QIF
 - Standardize automation of feature decomposition
 - Evaluate MTConnect incorporation

Funding

- PDES Sub-contracts \$30k
- Member In-Kind commitments

Stakeholders

OEMs

- Lockheed, Northrup Grumman, RTX, P&W Canada

SMEs

- Asa Trainer (WG12)
- Tom Kramer (DMSC)
- Tom Thurman (WG12)
- Jennifer Herron

Vendors

- Mitutoyo, nVariate, Kubotek, Istari, Hexagon, Datakit, Elysium, Core Technologie, Capvidia, MasterCAM

SDOs

- ISO – Jean Brange (WG12), Martin Hardwick (WG15)
- DMSC – Sam Gambrell, Jennifer Herron
- ASME – Evan Kessick, Jennifer Herron, Sam Yang
- MTConnect – Will Sobel

Strategic Capability Alignment:

- From CAX-IF User Group – Redmine User Stories
 - 410: Digital Thread Process traceability
 - 249: Downstream Consumption
 - 5: Product Manufacturing Information
 - 189: Surface Roughness
- From BOD Top Priorities & Focus Areas
 - Reaffirm Value and Drive Adoption
 - Lifecycle integration / Suppliers, Clients / Connected Ecosystem
 - Accelerate Digital Thread & AI Readiness
 - Seamless data flow / Digital Thread / Standardization
 - Address Industry Pain Points
 - Standardizing digital twin lineage
 - Supply chain data manage – quality & traceability

Major Deliverables:

1. **[Mar. 27, 2026 - COMPLETE]** Perform testing on CAX-IF R57J PID test cases
2. **[April 2026]** Recommend New PID Test Cases for CAX-IF 58J
3. **[June 2026]** Create New Test Cases for R58J
4. **[Dec. 2026]** Write New and Revised Vendor Recommended Practices
5. **[Dec. 2026]** Write New Business Practice for Users
6. **[Dec. 2026]** Create SDO Recommendations
7. **[Dec. 2026]** Initial Mapping for Cross-Domain Features

Complete

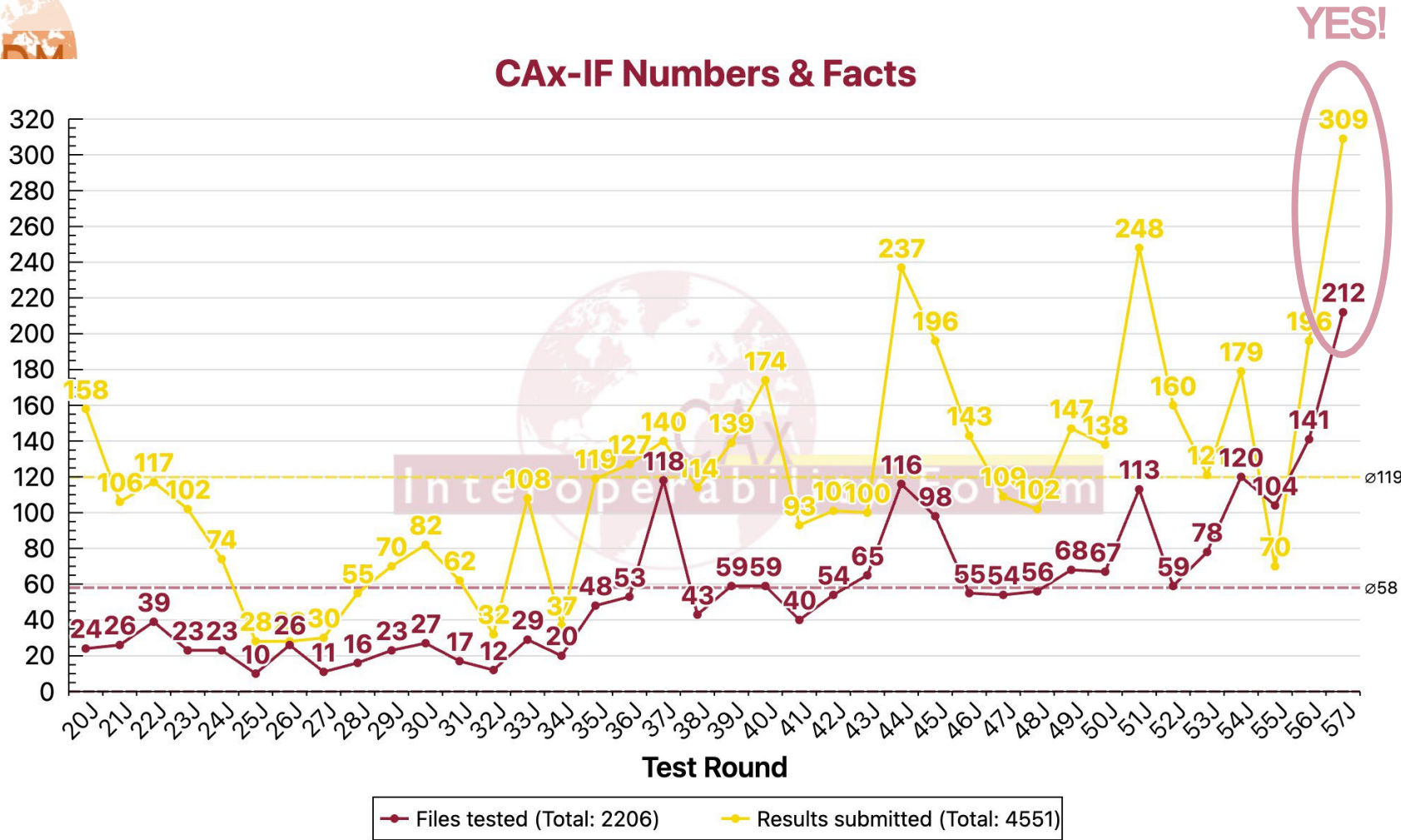
In-Progress

Revised, Mar. 26, 2026

Connecting the Digital Enterprise

CAX-IF Testing Participation

Are we testing what the vendors are interested in?



Graphic created by CAESAR

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Persistent IDs IV

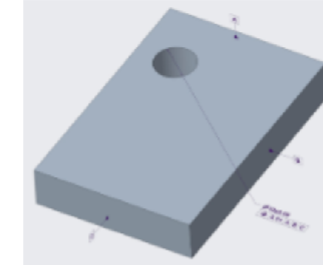
Design Iteration (PDI)

- Record participation!
 - Six vendors
 - 75 files, 160 results
- Refining the statistics definitions eliminated mismatches encountered in previous rounds.
- Persistent ID Rec. Practices were updated to consider system behavior for splitting and merging of faces and edges.
- There are limitations where CAD system APIs do not expose all required internal IDs to third-party translators.
- Re-test only for newcomers.

Round57J - PDI



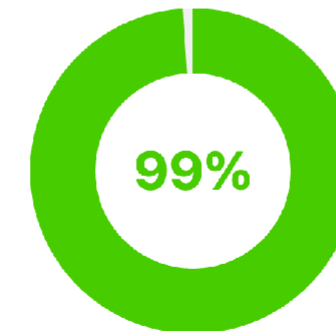
Sep 2025 - Mar 2026



Functionalities tested (including 5 User Stories):

- Persistent IDs for Design Iteration

Overall Success Rate:



Participation:

- Files provided: 75
- Results submitted: 160
- Vendors participated: 6

CROSS-DOMAIN EXCHANGE

STEP – QIF traceability

- Step 1: Consume STEP file into metrology application and create a QIF Plan file
 - All UUIDs transferred successfully
 - Mismatches due to ambiguity in the statistics (count all faces vs. count only faces with characteristics)
- Step 2: Creation of QIF Results file
- Goal: complete backtrace from QIF results to STEP features
- Participation by Mitutoyo and Hexagon
- To be continued and extended in Round 58J

Round57J - CDE



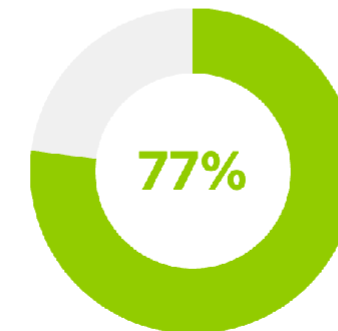
Sep 2025 - Mar 2026



Functionalities tested:

- Cross-Domain Exchange for Downstream Uses

Overall Success Rate:



Participation:

- Files provided: 7
- Results submitted: 7
- Vendors participated: 4

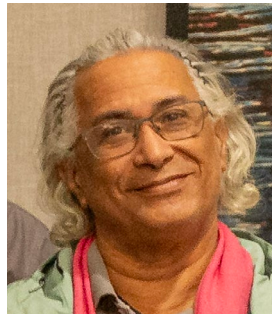
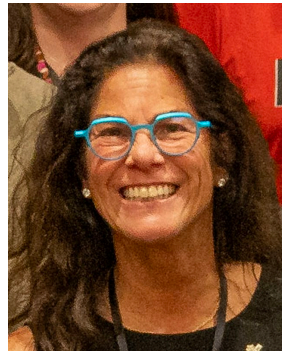
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Technical Discussion Highlights

- Persistent IDs
 - Joint sessions on all three days with User Group, PDES, Inc. Persistent ID team and PID accelerator project
 - Extended scope and downstream participation
- Started work on a “Feature Ontology”
 - Discussed with MBSE team to compare & contrast their Feature Ontology
- Other topics:
 - Composite materials – 3D explicit tessellated representation for plies
 - Saved views with “static flat to screen” annotations and complex section geometry
 - Security classification and export control
 - PMI updates for Rec. Practices and AP242 Ed.5



Questions?



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