

Welcome to the 2020 GPDIS Virtual Sessions!

Global Product Data Interoperability Summit | 2020

History and Focus of GPDIS

- Global Product Data Interoperability Summit (GPDIS) was formed in 2009. It was the consolidation of two conferences (Data Exchange and SOA Deep Dives) addressing integration technologies along with the non-proprietary exchange of data
- GPDIS functions as a communications hub for industry principals to foster knowledge through the exchange of ideas, solutions and methods.

2020 Theme: The Great Race of Digital Transformation

How is your model based enterprise today?

- Together we will explore digital transformation and what it will take us to FULLY achieve it. Using the Great Race as a metaphor, we will explore the building blocks of digital transformation and how interoperability will enable the digital transformation journey for industry.

**Mark your Calendars! GPDIS 2021 - September 13-17th
Scottsdale, AZ**

CAMSC

MBSE

ET/IT

3D MBD

DevOps

PLM Roadmap

PDES

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STANDARDS IMPACTING BUSINESS PERFORMANCE

Improved efficiency and
effectiveness through standards

GLOBAL PRODUCT DATA
INTEROPERABILITY
S U M M I T
2020



Virtual Sessions

Presenters

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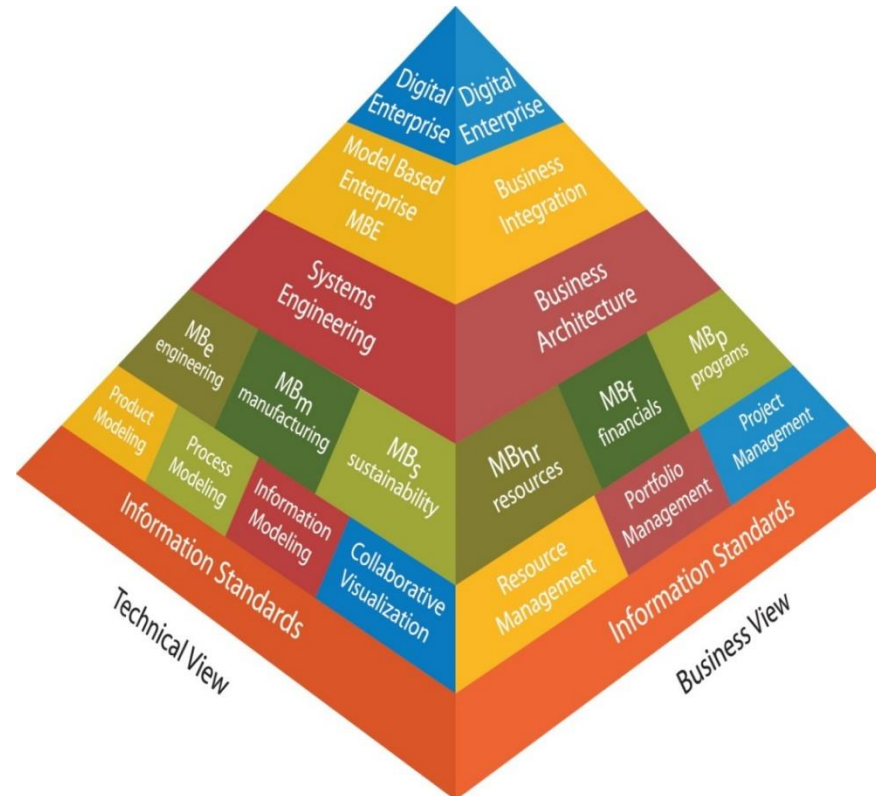
- **Jack Harris, CEO/GM, PDES Inc. and Director, Advanced Manufacturing Technology and Engineering, Rockwell Collins (Retired)**
- **Brandon Sapp, Lead for Boeing Strategy for Data Standards and Interoperability across the Enterprise, The Boeing Company**
- **Phil Spreier, Executive Director, 3DPDF Consortium**

Business Value Case Study – Rockwell Collins – Jack Harris

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- In 2004 an industry consortium defined the Model Based Enterprise and its fit with the Digital Enterprise

- BAE
- Boeing
- Honeywell
- ITT
- Lockheed Martin
- Raytheon
- Rockwell Collins
- Sandia National Labs



Business Value Case Study – Rockwell Collins – Jack Harris

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- Rockwell Collins (RC) led a Lean Thinking evaluation of the entire operations
- AMT&E led a review of improved efficiency and effectiveness
- Focused on Cost of Non-Conformance (CoNC): Scrap, Rework, ECO's, Warranty and problems associated with interoperability and communications
- Industrial studies have shown that between 15 and 20% of total sales are the total costs of CoNC – Gagen MacDonald Study – RC was similar

The Cost of Non-Conformance is the unplanned cost for not meeting customer requirements

Business Value Case Study – Rockwell Collins – Jack Harris

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- Internal data review found the much of the rework, scrap and ECO's were associated with interoperability
- Interoperability issues were both inside and in the supply chain
- Without an Interoperability solution remodeling drives the creation an opportunity for errors and bad parts
- Conservatively RC targeted 25% of the CoNC in savings through efficiencies

Multiple RC design resources with multiple systems working on the same design or a supplier remodeling in their CAM system

Business Value Case Study – Rockwell Collins – Jack Harris

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- Found that multiple location design resources were remodeling their native CAD systems
- Suppliers were remodeling to accommodate their CAM system
- Evaluated requiring same CAD system and platforms
- Finalized on utilizing common standard independent of tool provider
- Important for RC to collaborate pre-competitively in developing standards

Standards helped minimize modeling errors, improved supplier communications and collaborative standards development helped ensure our information needs addressed

Is there Help? – Brandon Sapp

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- **Why do organizations have trouble implementing standards?**
- **Is there framework to aid in the implementation of standards?**

Framework for Implementation – Brandon Sapp

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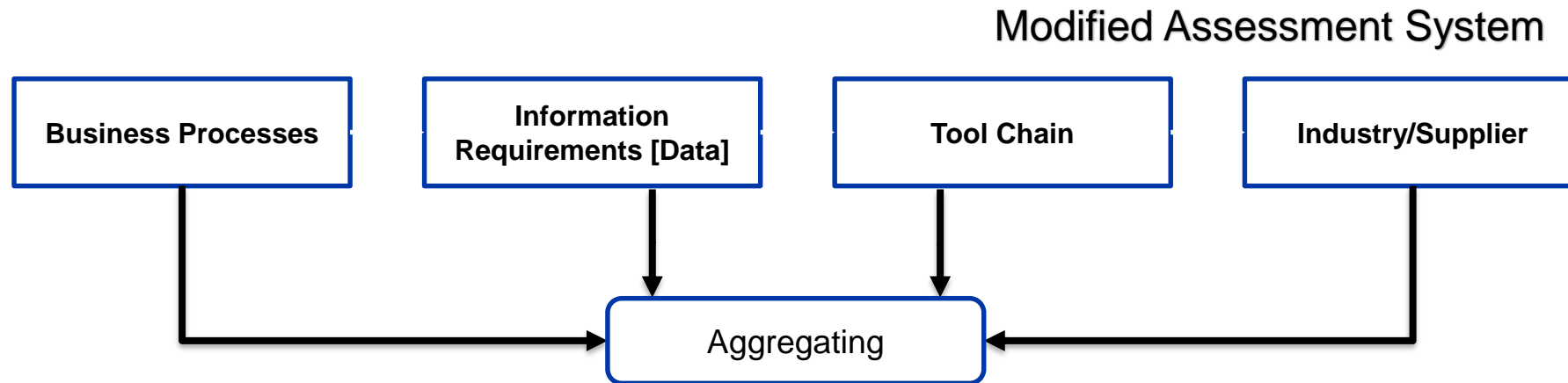
- **ISO 22549-1: Assessment on convergence of information and industrialization for industrial enterprises – Part 1: Framework and Reference Model**
- **ISO 22549-2: Assessment on convergence of information and industrialization for industrial enterprises – Part 2: Maturity Model and Evaluation Methodology**

These standards serve as a framework and normalization guide for enterprises to promote the convergence of information technology into the processes of production and operations management.

Assessment Model – Brandon Sapp

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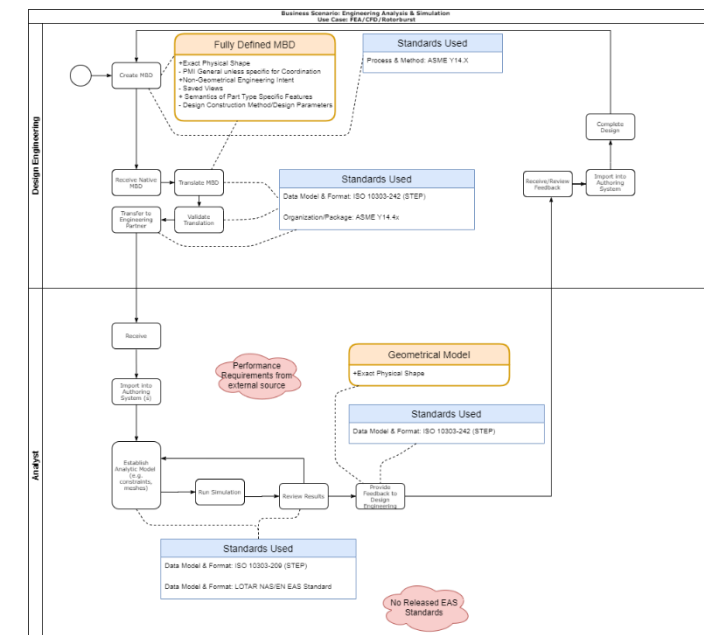
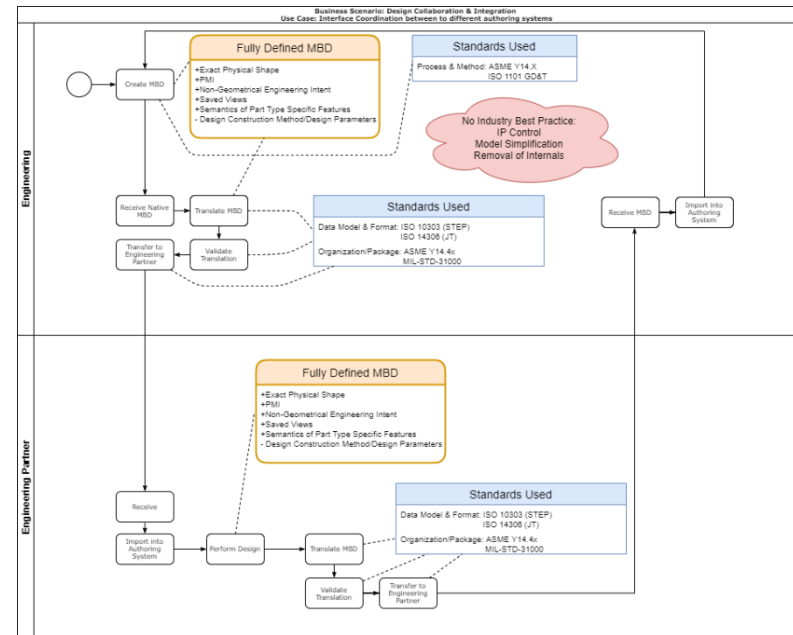
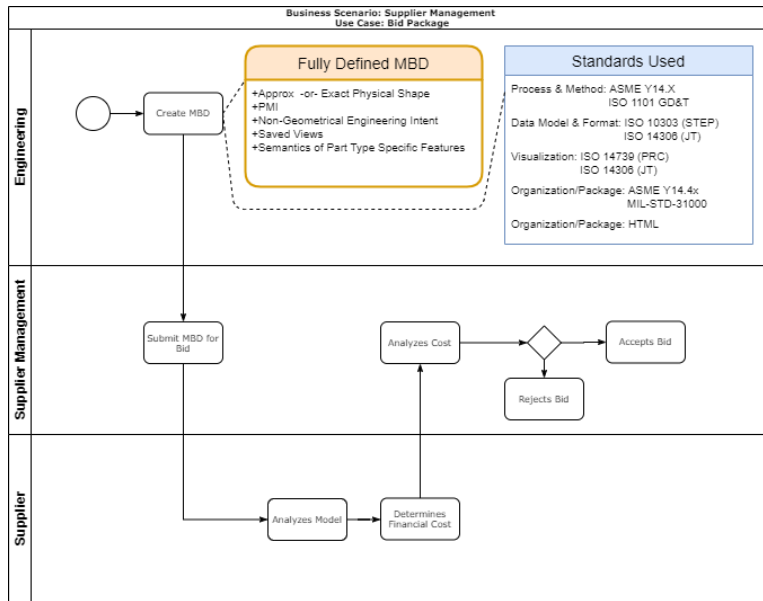
- Focus on 4 key areas to ensure a successful implementation



Identify Business Information Requirements

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


- Identify the data dependencies used by the processes



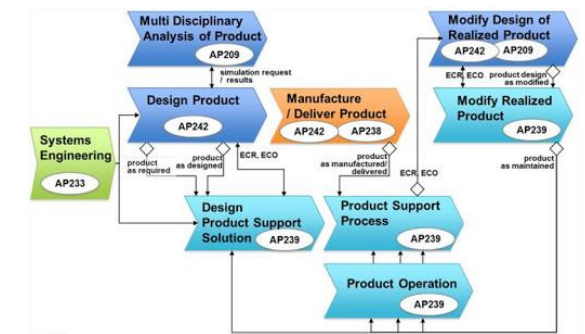
Find the right standard

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- ISO 10303 Provides a number of standards that can be used throughout the enterprise
- Map information requirements

PMI Entity			
Tolerances	PMI symbol	Name	Description
Form		Straightness	Form Tolerance
		Flatness	Form Tolerance
		Roundness (ISO) Circularity (ASME)	Form Tolerance
		Cylindricity	Form Tolerance
		Profile any line (ISO 1101:2012) Line Profile (ISO 1101:2017)	Form Tolerance
		Profile any surface (ISO 1101:2012) Surface Profile (ISO 1101:2017)	Form Tolerance

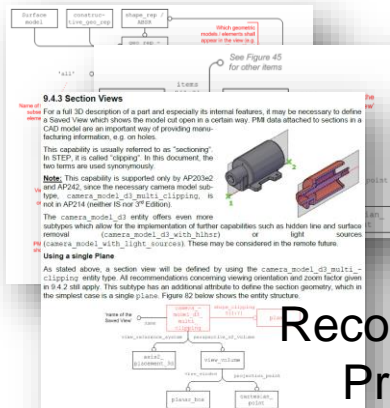
Interop standard						
STEP AP242 ed1	STEP AP242 ed2	Bugzilla numbe	Module	ARM entity	AIM entity	Rec Practice CAX-1
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Straightness_tolerance	straightness_tolerance	YES
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Flatness_tolerance	flatness_tolerance	YES
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Roundness_tolerance	roundness_tolerance	YES
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Cylindricity_tolerance	cylindricity_tolerance	YES
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Line_profile_tolerance	line_profile_tolerance	YES
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Surface_profile_tolerance	surface_profile_tolerance	YES



Understand how it's implemented.

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Engage with the MBx Interoperability Forums



Dassault Systèmes (CATIA V5-6R2020)		Siemens PLM (NX 12)	
Last updated: Jun 12, 2019		Last updated: Jul 15, 2019	
Recommended Practices	Functionality	AP203 E2 Import	AP203 E2 Export
Geometry		AP214 E2 Import	AP214 E2 Export
Wireframe		AP214 E2 Import	AP214 E2 Export
Geom. Bounded Surface Model		AP214 E2 Import	AP214 E2 Export
BREP Solid		AP214 E2 Import	AP214 E2 Export
3D Tesselated		AP214 E2 Import	AP214 E2 Export
Assembly Structure		AP214 E2 Import	AP214 E2 Export
Assembly Structure		AP214 E2 Import	AP214 E2 Export
Composite Material		AP214 E2 Import	AP214 E2 Export
Composite Material		AP214 E2 Import	AP214 E2 Export
Composite Validation Properties		AP214 E2 Import	AP214 E2 Export
Model Styling		AP214 E2 Import	AP214 E2 Export
Solid Color		AP214 E2 Import	AP214 E2 Export
Face Color		AP214 E2 Import	AP214 E2 Export
Overriding Face Color		AP214 E2 Import	AP214 E2 Export
Edge / Curve Color		AP214 E2 Import	AP214 E2 Export
Overriding Edge Color		AP214 E2 Import	AP214 E2 Export
Point Styling		AP214 E2 Import	AP214 E2 Export
Irregularity		AP214 E2 Import	AP214 E2 Export
Curve Style		AP214 E2 Import	AP214 E2 Export
Layer		AP214 E2 Import	AP214 E2 Export
Group		AP214 E2 Import	AP214 E2 Export
Assembly Instance Styling		AP214 E2 Import	AP214 E2 Export
NAUO approach (1 level)		AP214 E2 Import	AP214 E2 Export
Material Identification and Denial		AP214 E2 Import	AP214 E2 Export
Density as General Property		AP214 E2 Import	AP214 E2 Export
External References		AP214 E2 Import	AP214 E2 Export
Simple External References		AP214 E2 Import	AP214 E2 Export
Nested External References		AP214 E2 Import	AP214 E2 Export
External Element References		AP214 E2 Import	AP214 E2 Export
Document Properties		AP214 E2 Import	AP214 E2 Export

Benchmarks

Industry Capabilities

Capability #1

Assembly

Added by Brandon Sapp 11 months ago. Updated about 2 months ago.

Start date: 12/01/2019

Due date:

Priority: 3 - High

% Done: 6%

Estimated time: (Total: 0.00 h)

Category: Physical Design - Mechanical/Structural

Target version: -

DEH: Airbus, Boeing, Daimler, Pw (US & CAN)

Description

Assembly and installation with features and notes use the following key concepts:

- The part is a subassembly between two or more instances of components in an assembly.
- The part is represented by a number of files, including a CAD file.
- Notes are features with parameters and may have properties assigned to them.
- Reference parts are components of the assembly and may have properties assigned to their instances.
- Reference parts may be grouped to represent the set of parts needed to implement the part of a specific location.
- Properties, requirements, and/or specifications may be assigned to a feature (subset or group of features).
- Geometric features may have major design or assembly rules for assembly or for assembly.
- The part may have properties for defining a part, including a number and describing the relationship, e.g. finding or identifying a part, affect the structural and functional properties of the part. Compliance often tightly control those processes with specifications or standards for how to perform the task. These specifications are associated to the notes and/or features as part of the engineering design.

Files

assembly-features-overview.png (349 KB) 2 - Pierre Duchon, 02/22/2020 03:45 AM 0

Subtasks

Feature #2: Notes in Assembly/Installation	Now	Pierre Duchon
1. User Story #1: Simplified Note/Feature Function and STEP conversion	Now	
2. Acceptance Test #29: Counterparts Rule	Now	
3. Acceptance Test #30: Counterparts Rule	Now	
4. Acceptance Test #31: Counterparts Rule	Now	
5. Acceptance Test #32: Counterparts Rule	Now	
6. Acceptance Test #33: Counterparts Rule	Now	
7. User Story #37: Physical Note	Now	
8. User Story #38: Physical Note	Now	
9. User Story #39: Physical Note	Now	
10. User Story #40: Physical Note	Now	
11. User Story #41: Physical Note	Now	
12. User Story #42: Physical Note	Now	
13. User Story #43: Physical Note	Now	
14. User Story #44: Physical Note	Now	
15. User Story #45: Physical Note	Now	
16. User Story #46: Physical Note	Now	
17. User Story #47: Physical Note	Now	
18. User Story #48: Physical Note	Now	
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20. User Story #50: Physical Note	Now	
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50. User Story #80: Physical Note	Now	
51. User Story #81: Physical Note	Now	
52. User Story #82: Physical Note	Now	
53. User Story #83: Physical Note	Now	
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66. User Story #96: Physical Note	Now	
67. User Story #97: Physical Note	Now	
68. User Story #98: Physical Note	Now	
69. User Story #99: Physical Note	Now	
70. User Story #100: Physical Note	Now	

Recommended Practices

Aggregate the Information

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Over All Readiness Summary

57

Ready: Manual creation of partially complete AP242e1, 1 Class and 5 Internal documents

Not Ready: 1 Class, 4 Internal documents and Automated Tool Chain to create complete Ap242

Major Next Steps to Close: Work with external organizations to close on industry capabilities

Data Standard

90

Ready: AP242e1

- Shape Representation, Some PMI/Composites

Almost Ready:

- AP242e2

Actions to Close:

- Incorporate needs [e.g. Mech Sys/Hyd] into AP242e3

Internal Processes

54

Ready:

- 1 Class, 5 Internal business documentation

Not Ready:

- 1 Class, 4 Internal business documentation

Actions to Close:

- Agreement with end users on methods
- Creation of content

Industry/Supplier

42

Ready:

- 2 Partial Commercial Implementations
- 4 Partial Free Implementations

Not Ready:

- 0 Fully Implemented solutions

Actions to Close:

- Provide requirements to implementers

Tool Chain

40

Ready:

- Manual CATIA V5 of partially complete AP242e1

Not Ready:

- STEP AP242e2 Translator and Validator

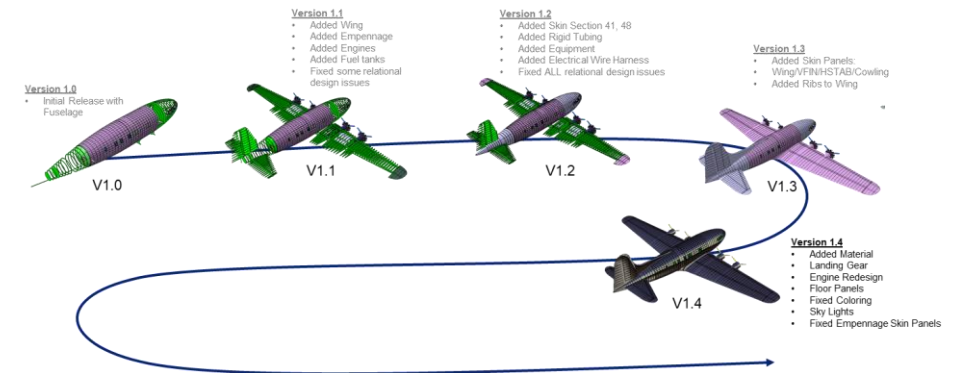
Actions to Close:

- Internal funding, prioritization, resourcing, purchase, development....

Participate in Future Development of ISO 10303

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- PDES is collecting requirements for the next editions of AP242, AP239, AP233 and Test Rounds for the Interoperability Forums:
- Proposed new and enhanced capabilities include:
 - Enhancements to MBD Part Types: Composites, Additive, etc.
 - New MBD Part Types: Mechanical Systems
 - Digital Twin/Thread
 - Digital Manufacturing
 - Metrology
 - Model Based Systems Engineering
 - Simulation & Analysis



Get your requirements in now by joining PDES!

The 3D PDF Consortium

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The 3D PDF Consortium is merging with PDES, Inc.

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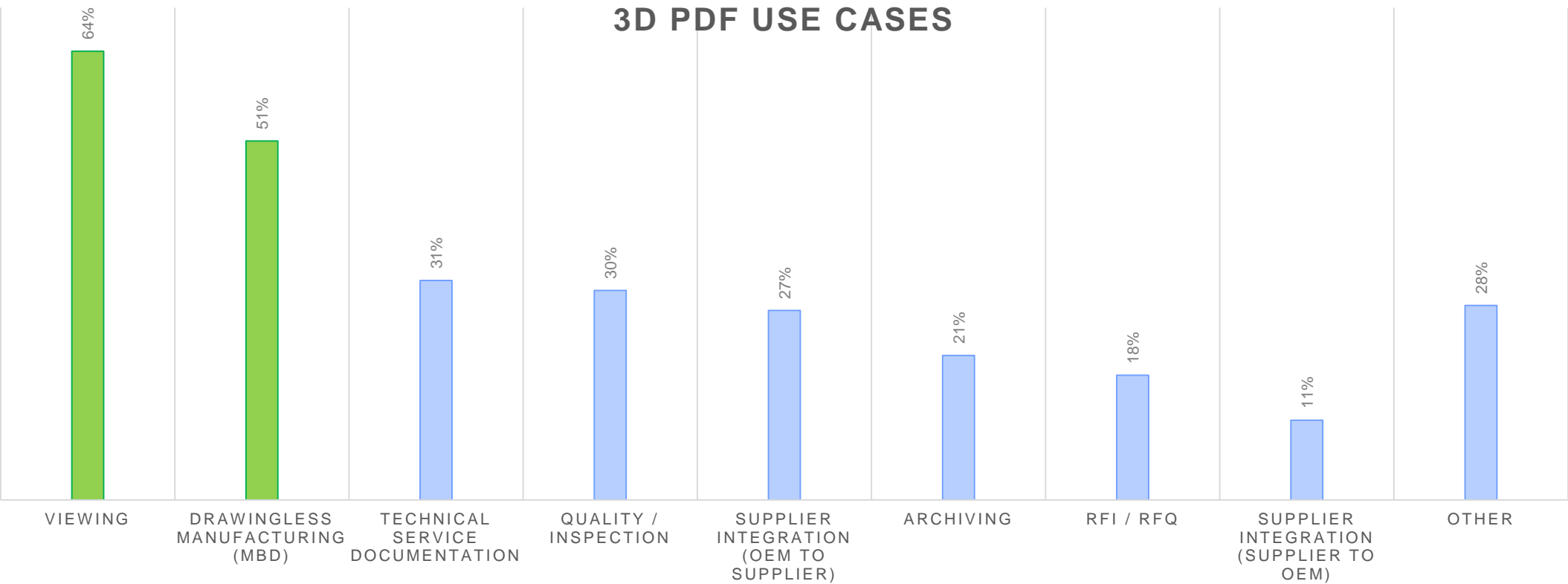


3D PDF Survey

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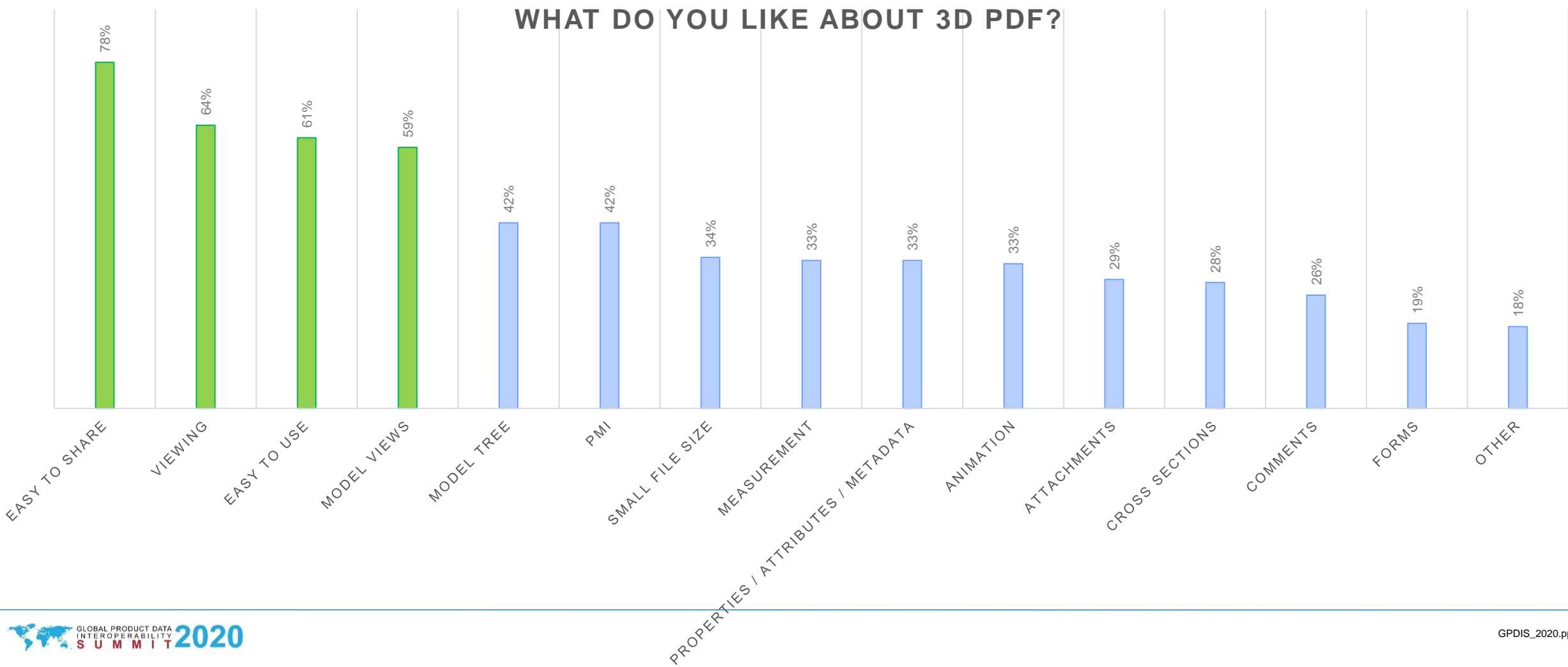
Last year, the 3D PDF Consortium conducted an on-line survey of 3D PDF Users

- ~200 participants



3D PDF Survey

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Why PDF?

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- **The delivery mechanism for a model based enterprise**



Delivery in
compliance
with MIL-STD-
31000



Delivery /
Access to Co-
Production
Partners



Delivery /
Access to
Customers



Delivery /
Access to
Suppliers &
Shopfloor

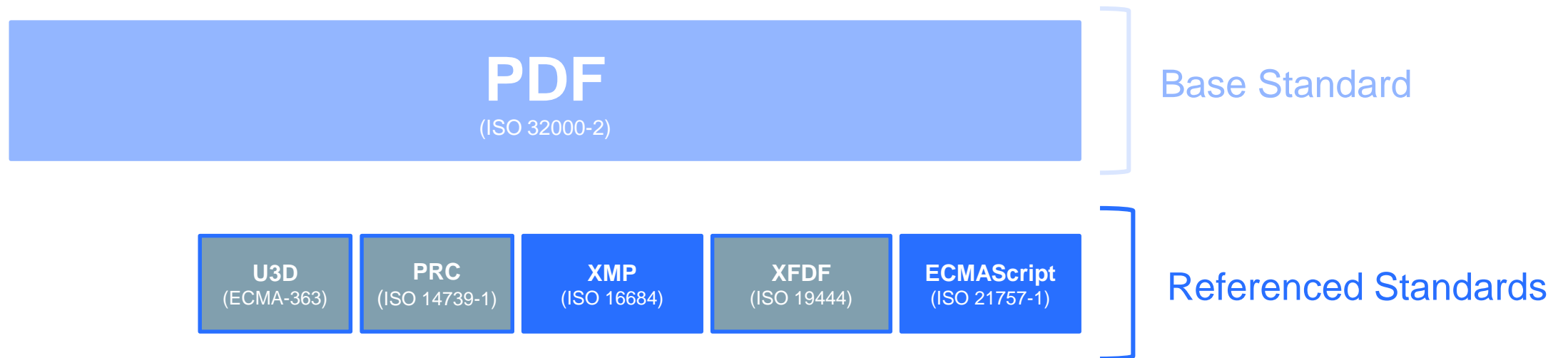
PDF - Standards Stack

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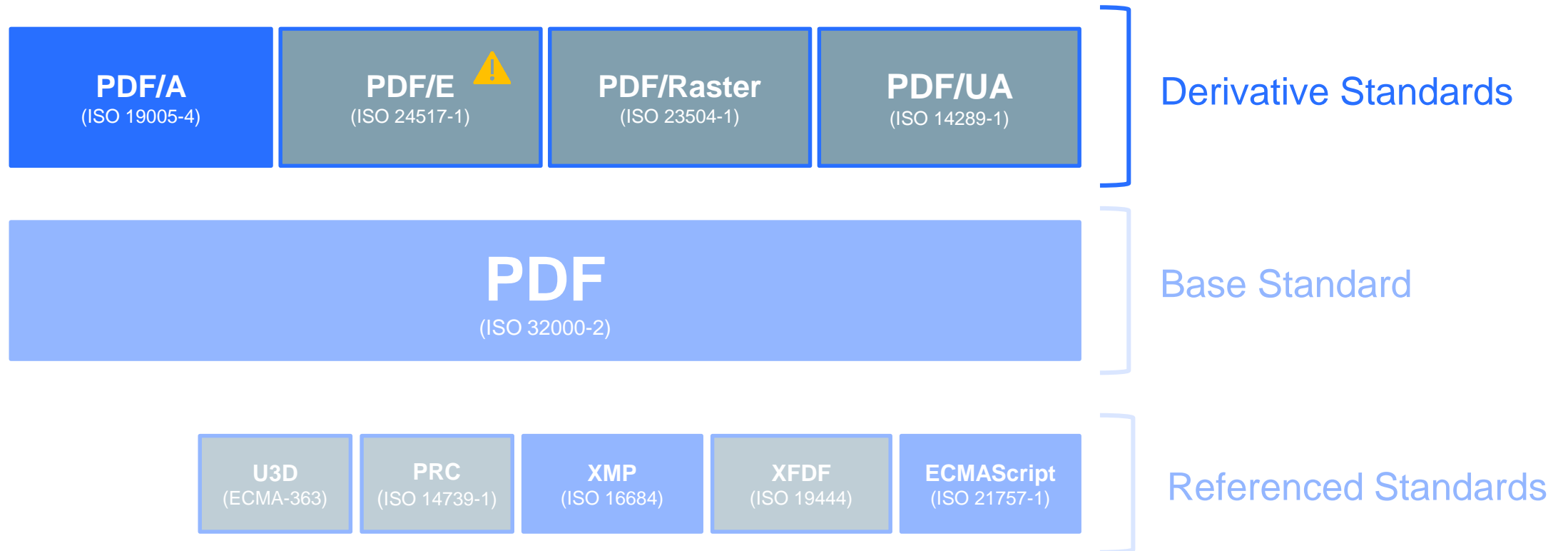
PDF - Standards Stack

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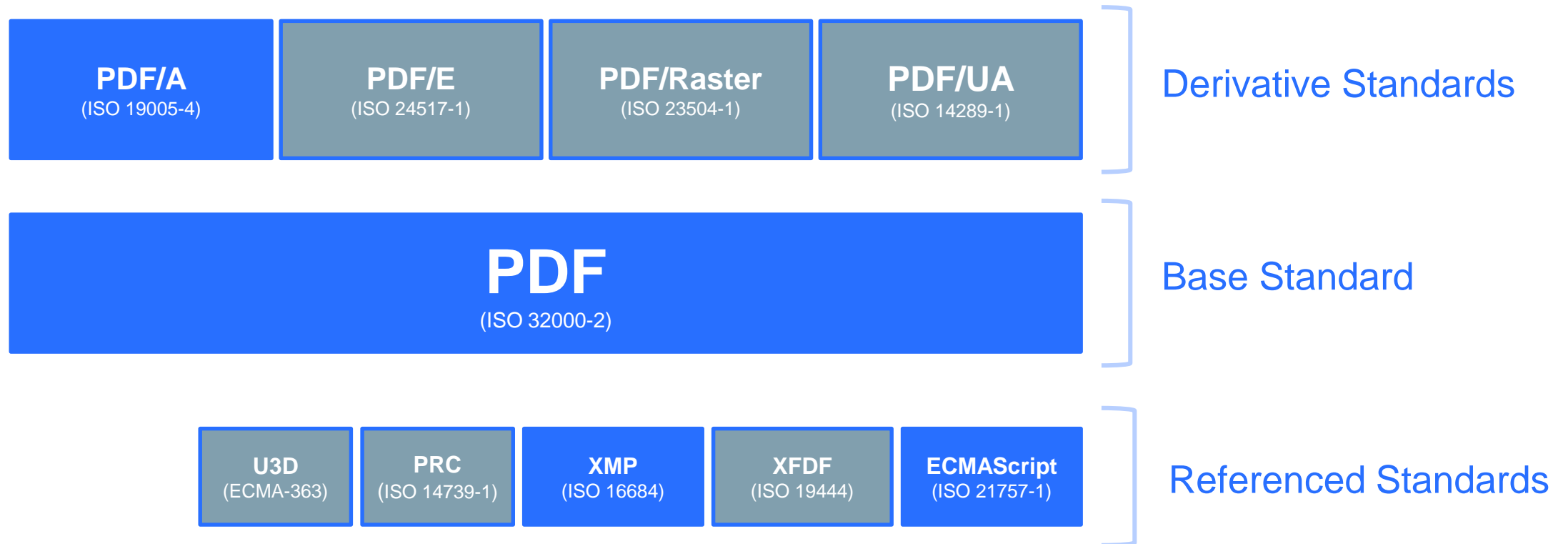
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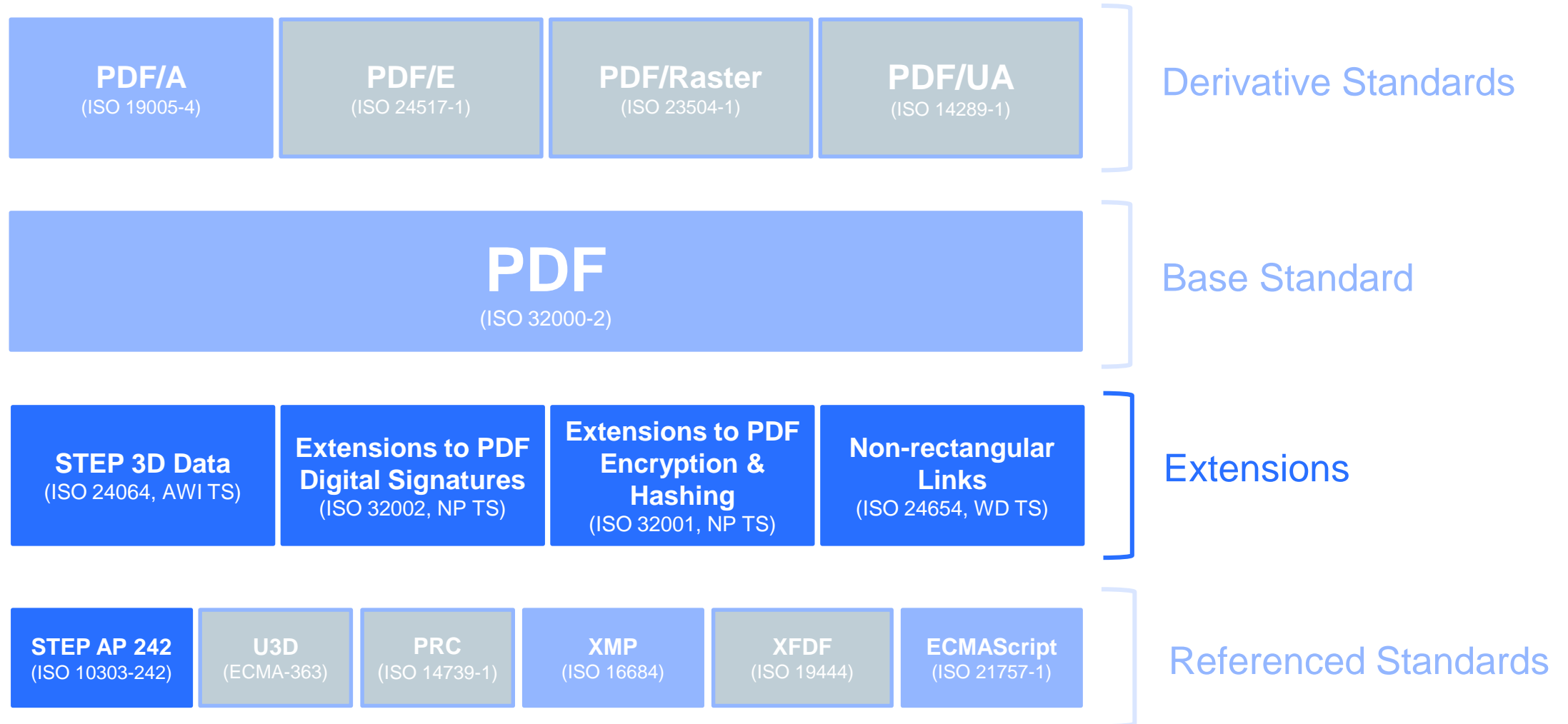
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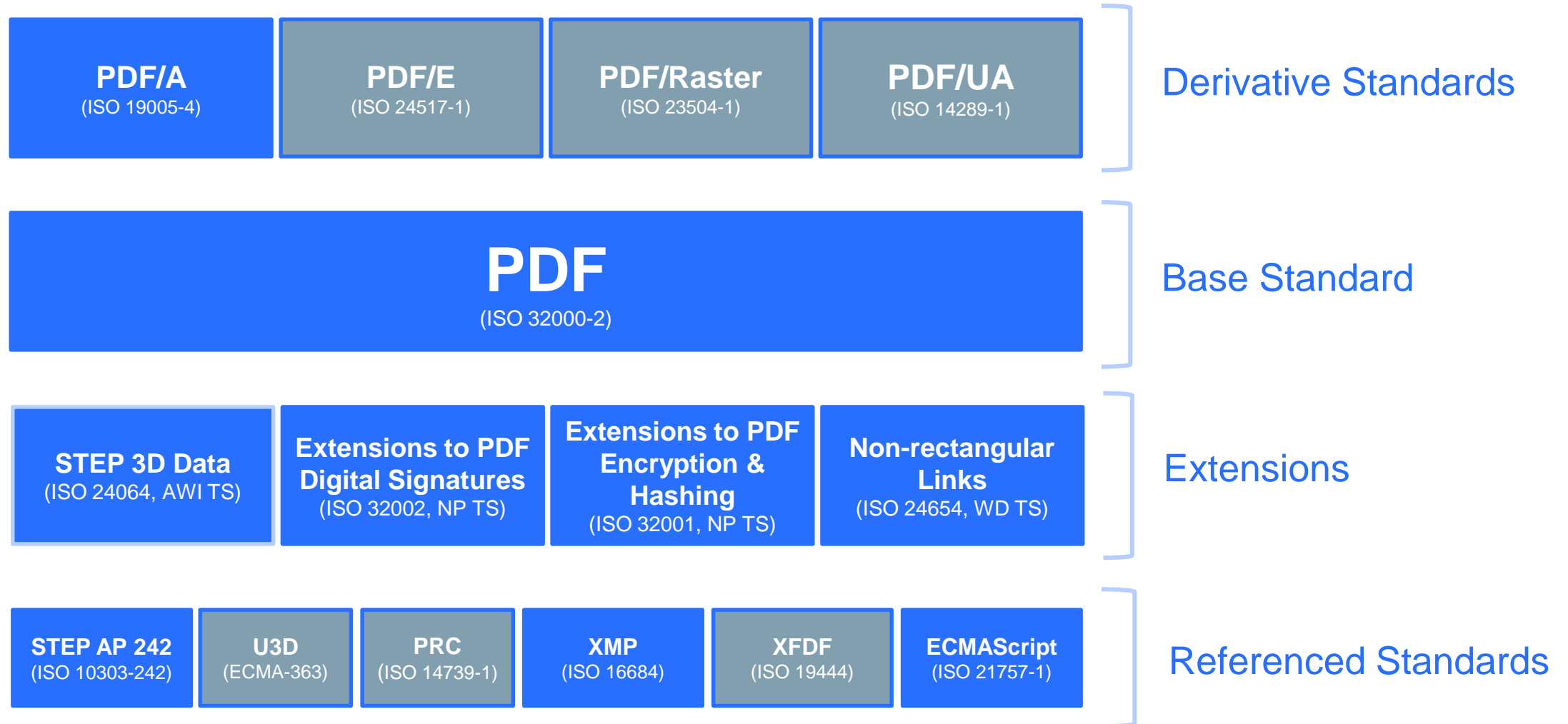
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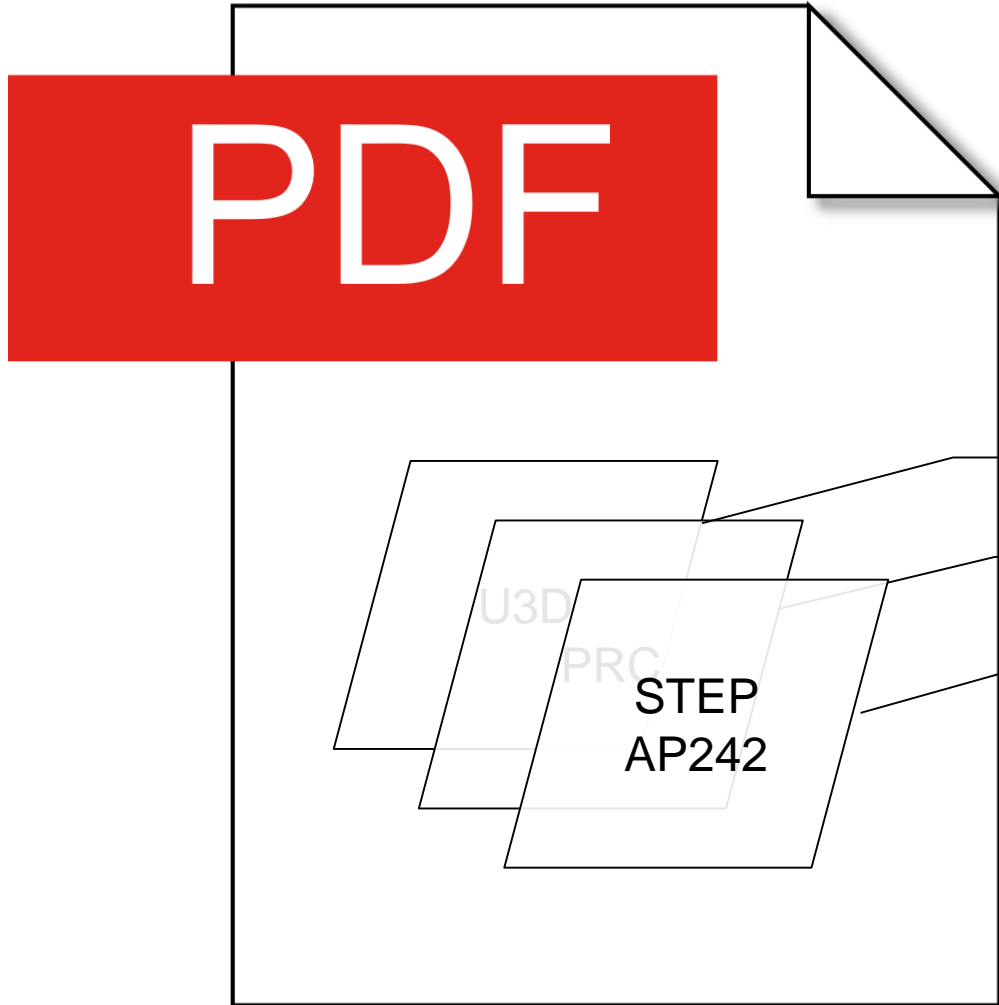
PDF - Standards Stack

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PDF with STEP

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- We are adding STEP AP242 to PDF

ECMA-363 edition 3

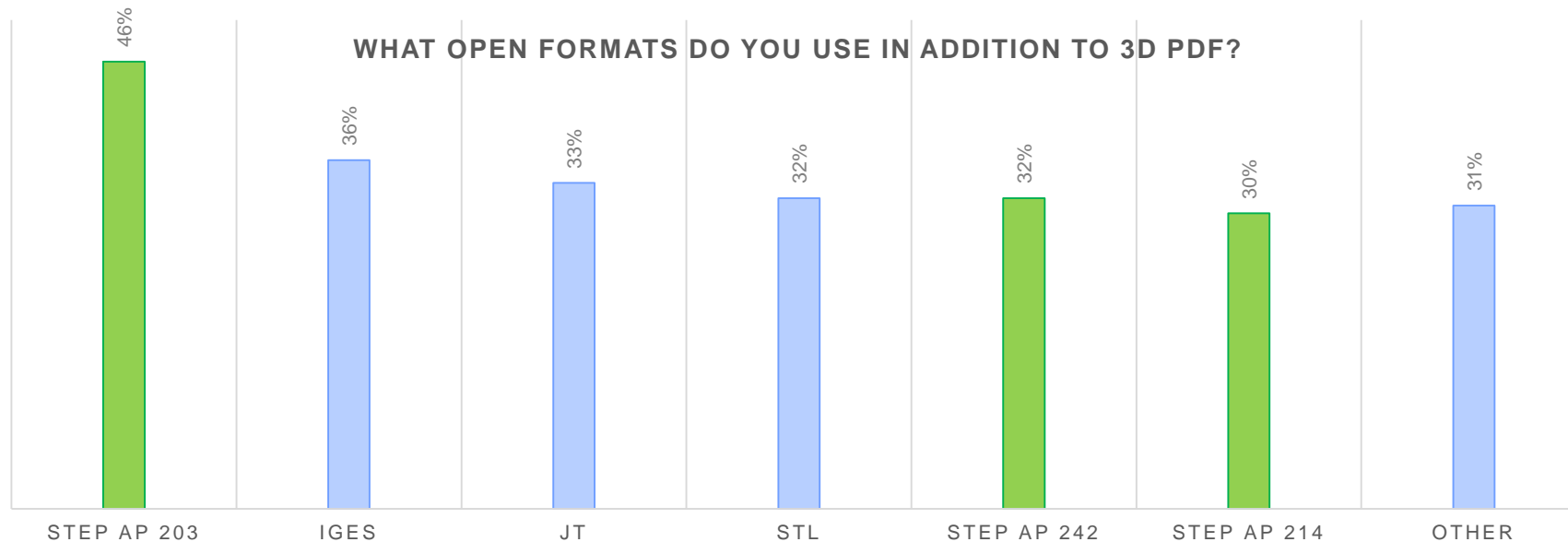
ISO 14739

ISO 10303:242

Why STEP and PDF?

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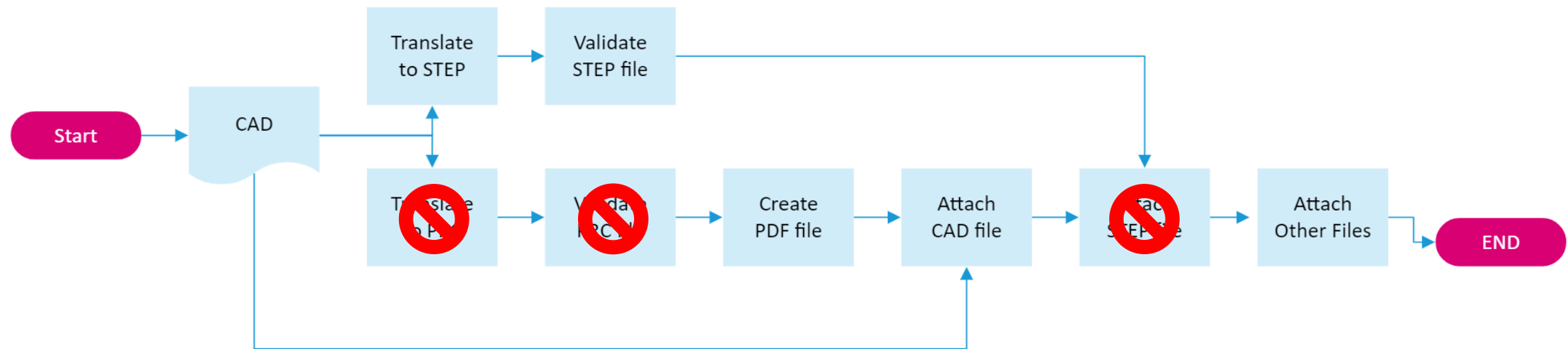
- **STEP is an active, popular open standard for manufacturing**
- **PDF is an active, popular open standard for documents**
- **The two formats are often used together for Technical Data Packages (TDP)**



Why STEP and PDF?

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- **Putting STEP into PDF raises efficiency and lowers cost of sharing 3D**
 - Adds security, compression and visualization to STEP
 - Provides one authoritative source for 3D data
 - Removes cost and risk of translating to PRC or U3D



How are we doing it?

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- **Technical Specification (TS) – ISO/AWI TS 24064**
 - A TS addresses **NORMATIVE work still under technical development**, or where it is believed that there will be a future, but not immediate, possibility of agreement on an International Standard. A TS may be used as a means to obtain feedback.



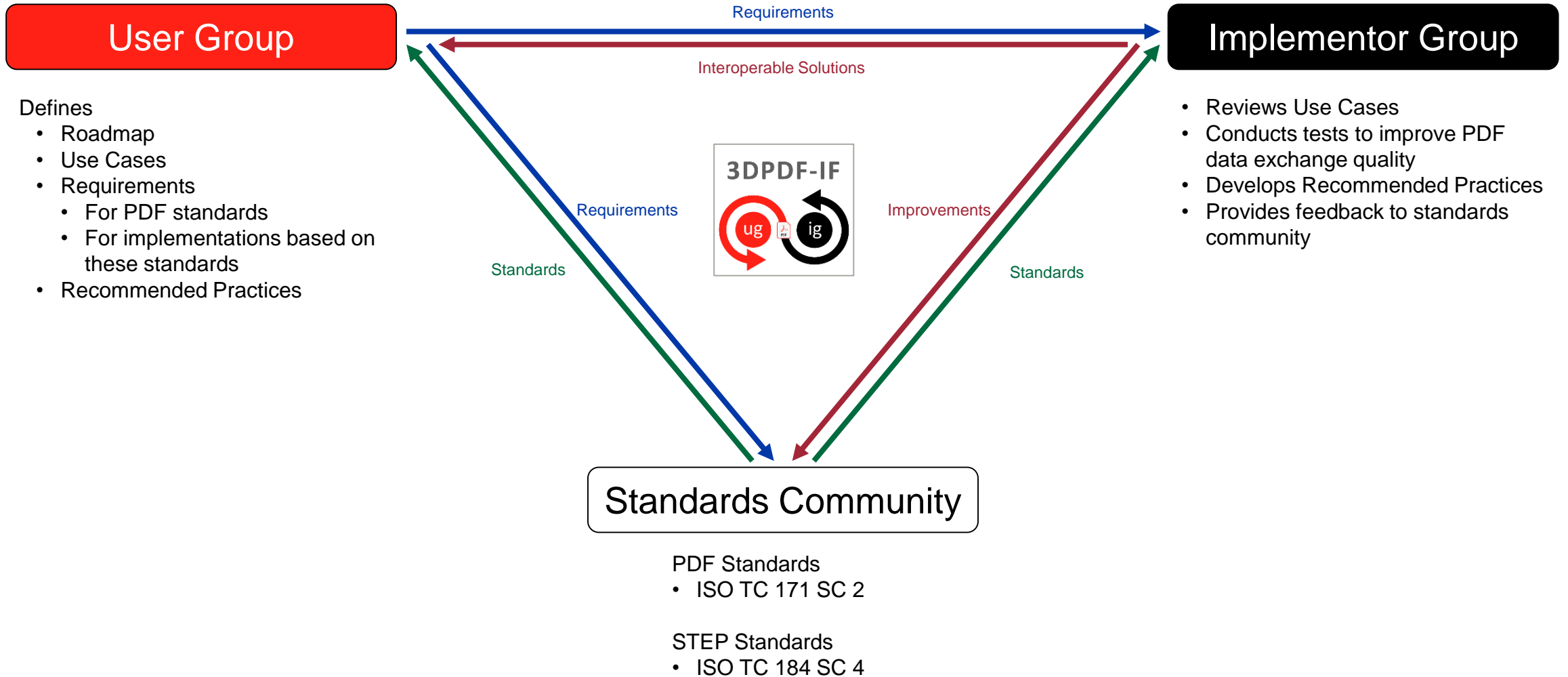
Stage 1

Stage	Version	Description	Target date	Limit date	Started	Status
20.00	1	New project registered in TC/SC work programme			2019-06-10	Current
30.00		Committee draft (CD) registered	2021-01-28			Awaiting
50.00		Final text received or FDIS registered for formal approval	2021-10-24			Awaiting
60.60		International Standard published	2022-07-24	2023-06-10 1		Awaiting

[Show all stages](#) ▼

How are we doing it?

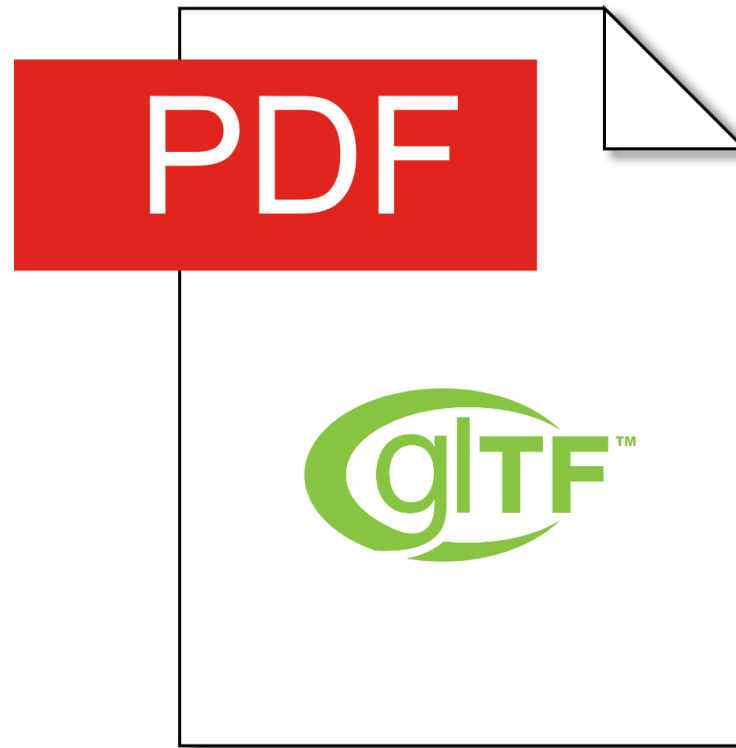
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What's Next?

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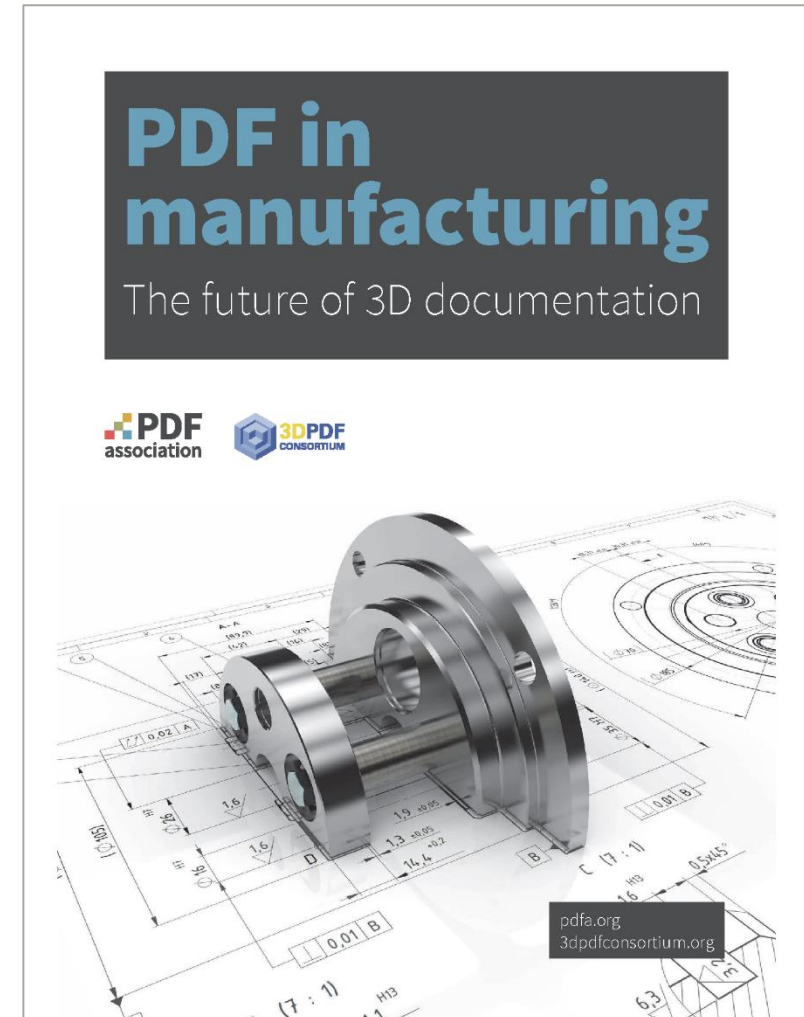
- **Stay tuned...**



Find out more...

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- Download “PDF in Manufacturing”
<http://bit.ly/GPDIS-PDFinMfg>
- Help us to shape the future of 3D PDF
by joining the 3DPDF Interoperability
Forum
www.3dpdfconsortium.org



Thank you attending this session

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Please join us for the next Session on Thursday October 15th,

Peter A. Bilello, President & CEO
CIMdata

Digital Thread—the PLM Professionals' Path to Delivering Innovation, Efficiency, and Quality

2020 GPDIS Virtual Sessions Agenda

All Sessions From 2:00 PM ET to 3:30 PM ET

Session 4: Tuesday, October 27th

Session 5: Thursday, October 29th

Session 6: Tuesday, November 10th

Session 7: Thursday, November 12th

Session 8: Tuesday, November 24th

Recordings and presentation decks can be found under the 2020 Presentations at <https://gpdisonline.com/event-history/>

CAMSC

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3D MBD

DevOps

PLM Roadmap

PDES