Welcome to the 2020 GPDIS Virtual Sessions!

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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Global Product Data Interoperability Summit | **2020**

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PDES, Inc.®
Connecting the Digital Enterprise

STANDARDS IMPACTING BUSINESS PERFORMANCE

Improved efficiency and effectiveness through standards

GLOBAL PRODUCT DATA INTEROPERABILITY

SUMMIT 2020

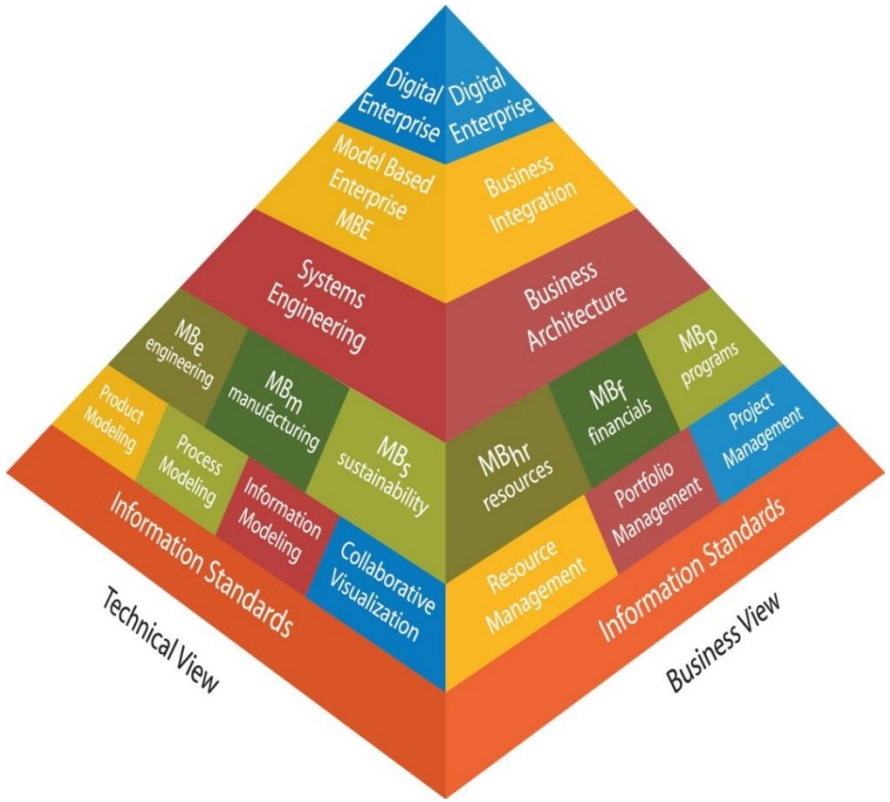
Virtual Sessions

Presenters

- **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

- **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

- **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

- **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

- **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

- **Why do organizations have trouble implementing standards?**

- **Is there framework to aid in the implementation of standards?**

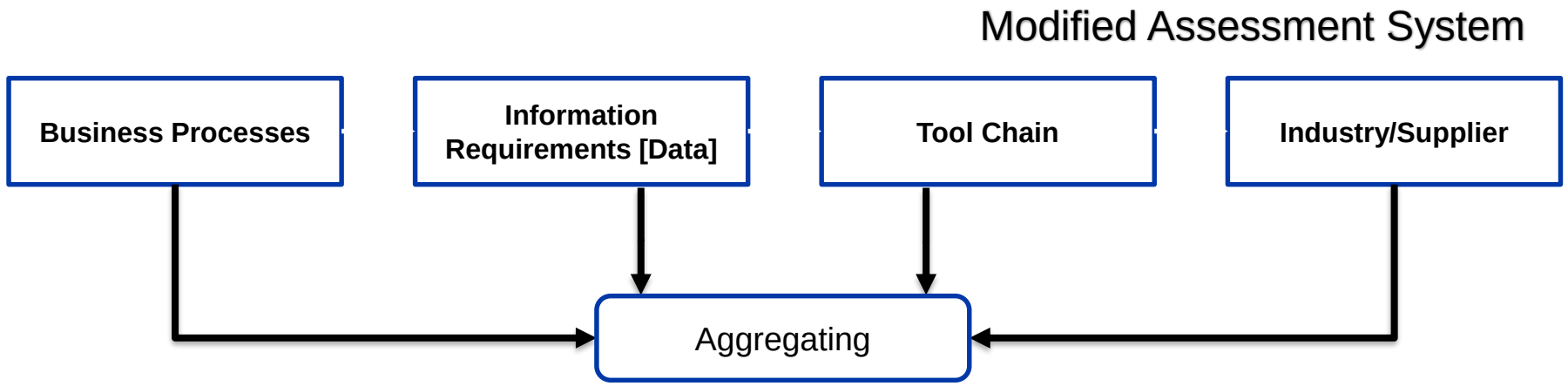
Framework for Implementation – Brandon Sapp

- **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.

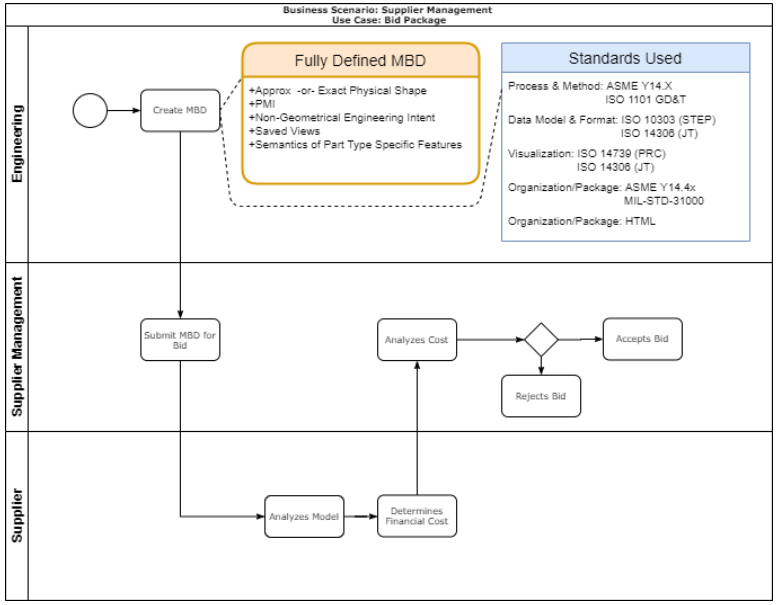
Assessment Model – Brandon Sapp

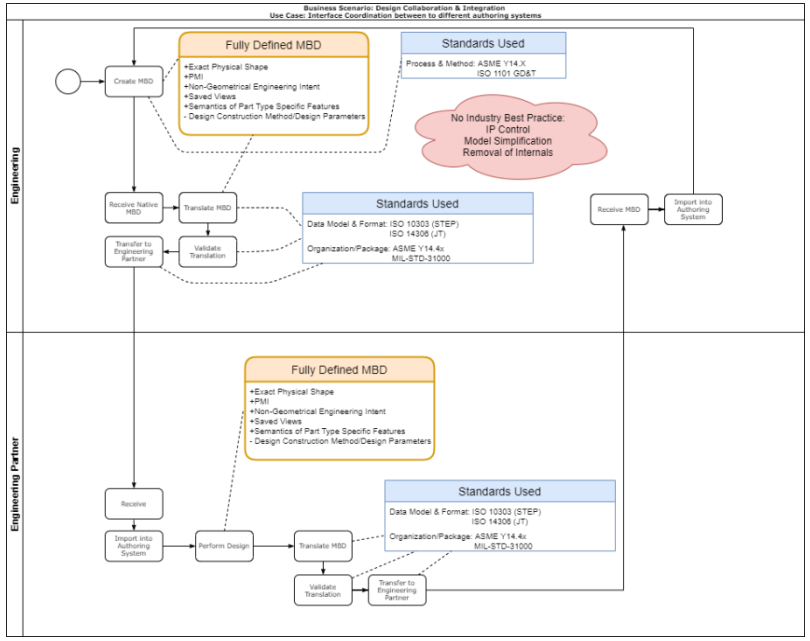
- **Focus on 4 key areas to ensure a successful implementation**

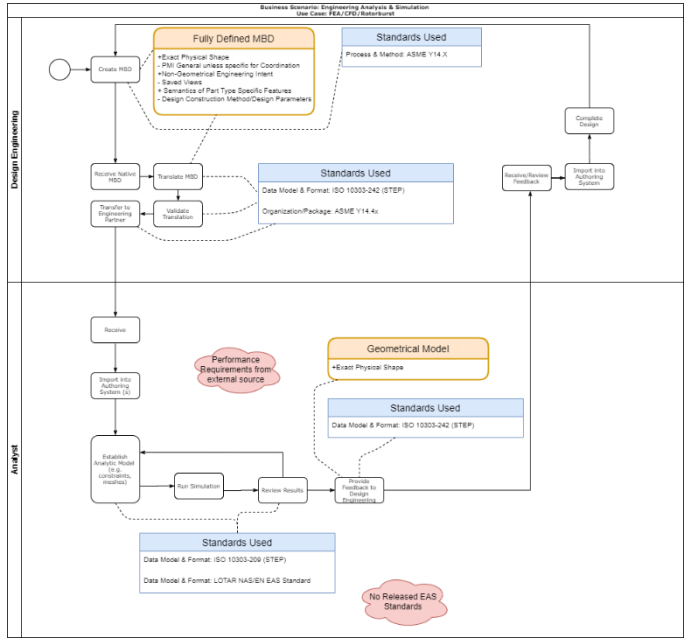


Identify Business Information Requirements

- **Identify the data dependencies used by the processes**

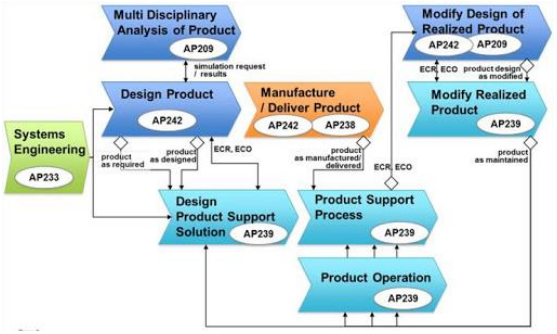






Find the right standard

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



PMI Entity			
Tolerances	PMI symbol	Name	Description
Geometric tolerance			
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

ISO

Application module: AP242 managed model-based 3D engineering

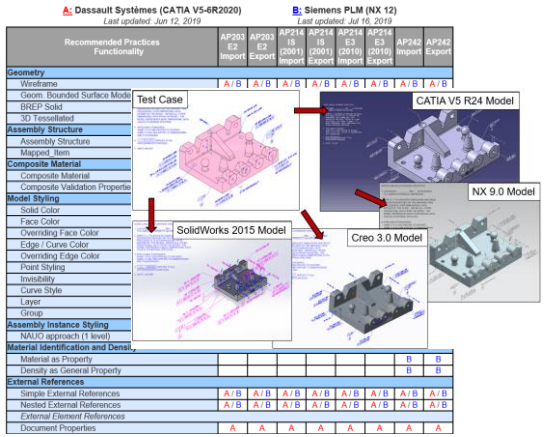
TECHNICAL SPECIFICATION ISO/TS 10303-442:2019-05(E)

Industrial automation systems and integration — Product data representation and exchange

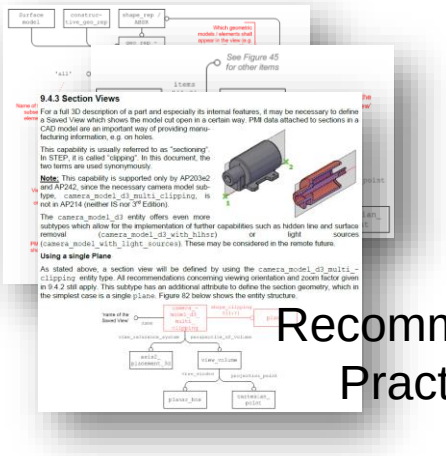
Interop standard						
STEP AP242 ed 1	STEP AP242 ed 2	Bugzilla numbe	Module	ARM entity	AIM entity	Rec Practice CAX-I
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Straightness_tolerance	straightness_tolerance	YES
YES	YES		ISO/TS 10303-1051:2013-01 Geometric tolerance	Flatness_tolerance	flatness_tolerance	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.

- **Engage with the MBx Interoperability Forums**

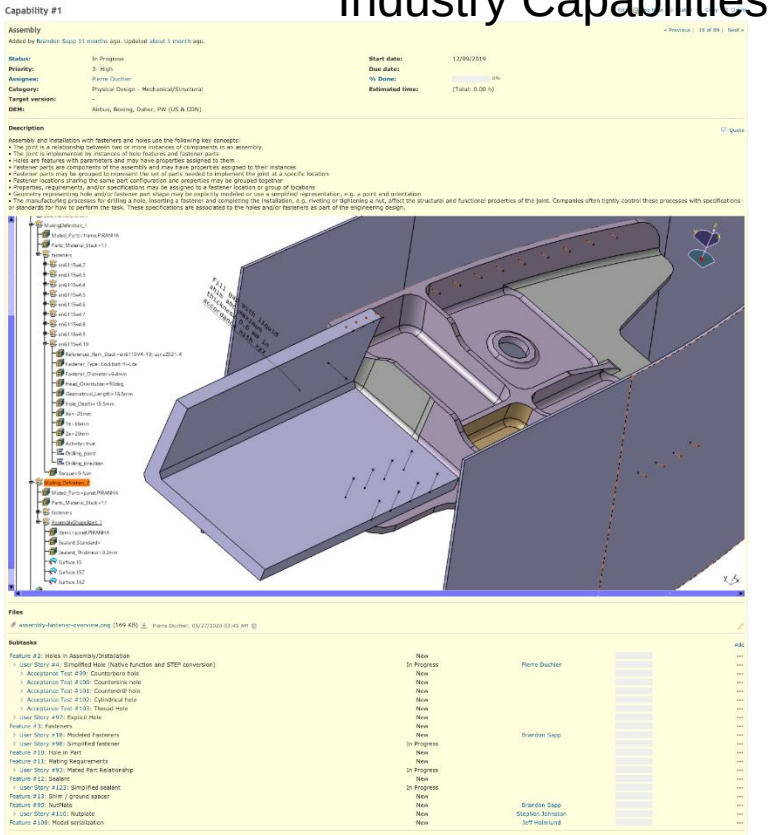


Benchmarks



Recommended Practices

Industry Capabilities



Aggregate the Information

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

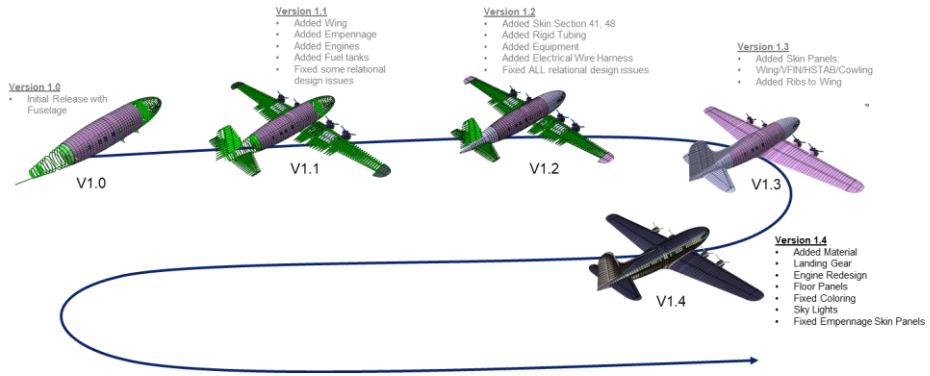
Not Ready:
- STEP AP242e2 Translator and Validator

Actions to Close:
- Internal funding, prioritization, resourcing, purchase, development….

Participate in Future Development of ISO 10303

- **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

Global Product Data Interoperability Summit | **2020**

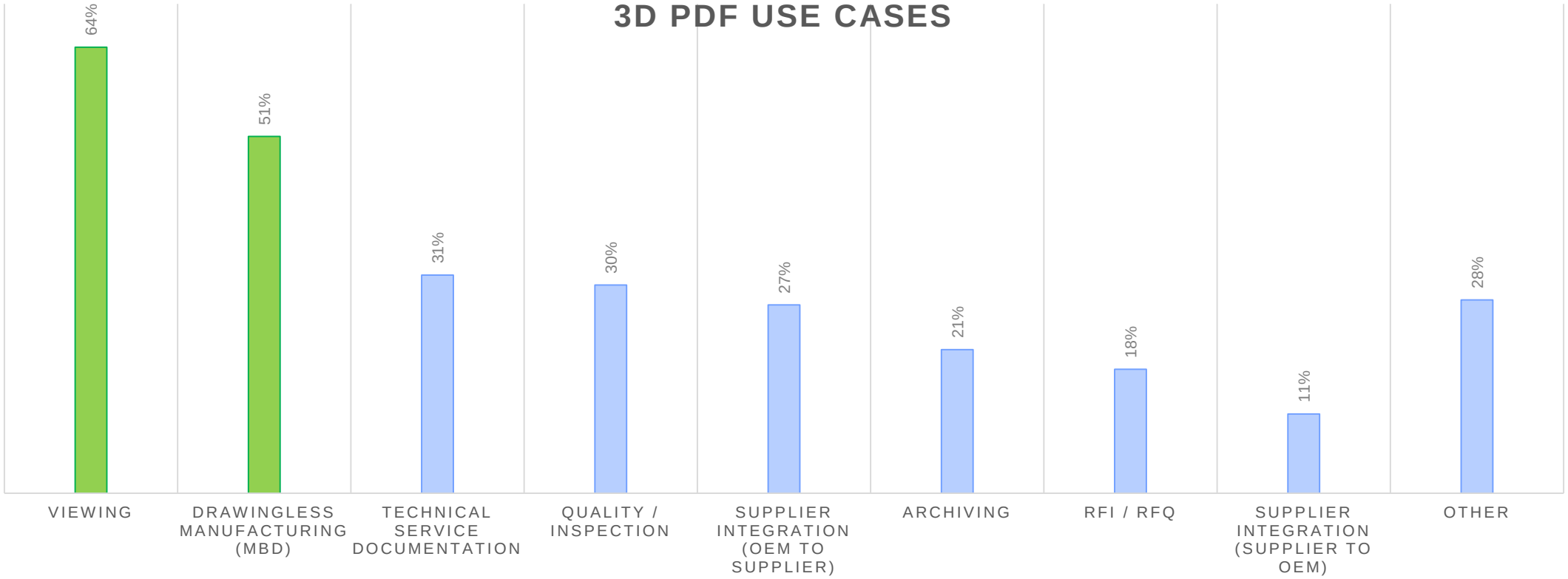
The 3D PDF Consortium is merging with PDES, Inc.

3D PDF Survey

Global Product Data Interoperability Summit | **2020**

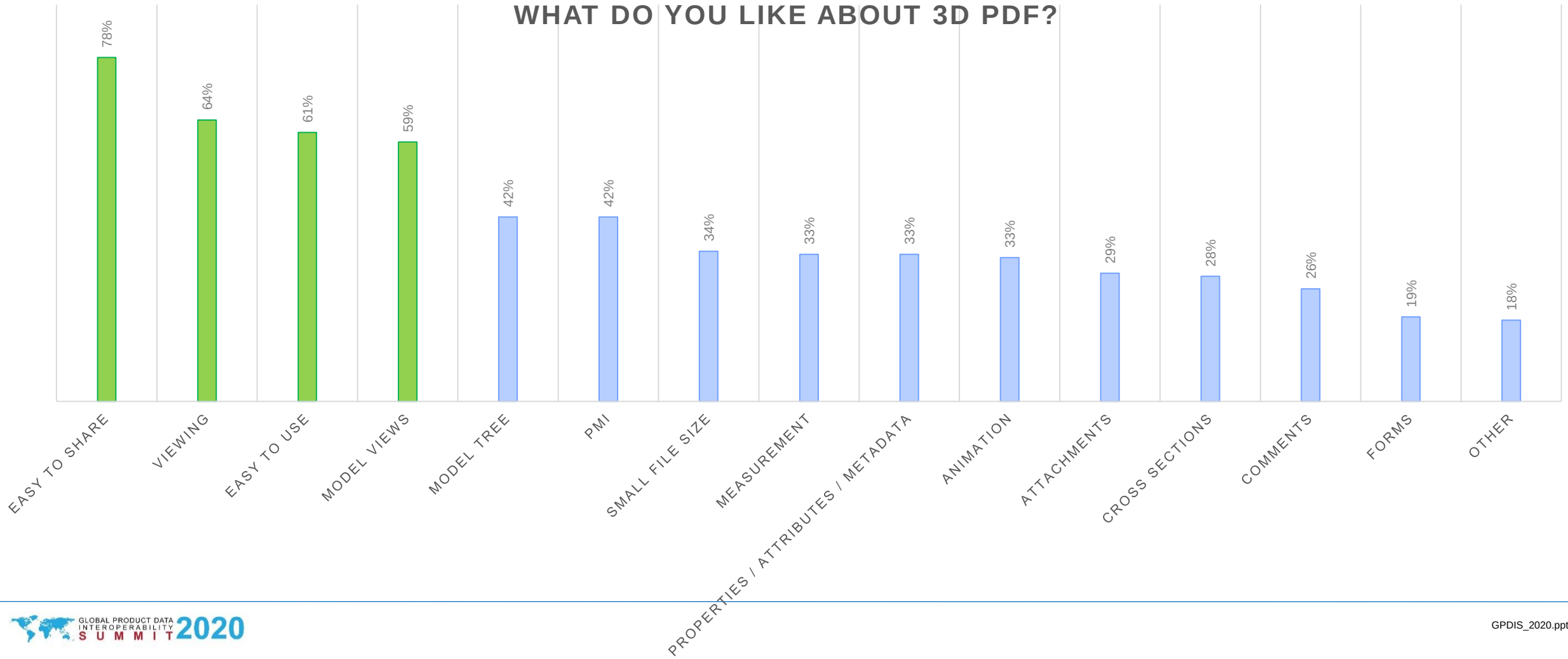
Last year, the 3D PDF Consortium conducted an on-line survey of 3D PDF Users

- **~200 participants**



3D PDF Survey

Global Product Data Interoperability Summit | **2020**



Why PDF?

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

Delivery in compliance with MIL-STD-31000

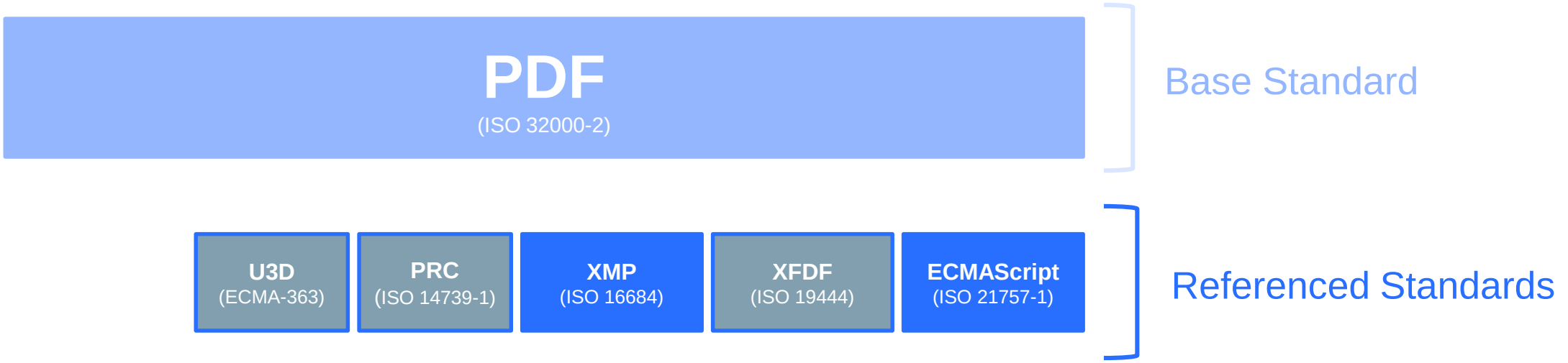
Delivery / Access to Co-Production Partners

Delivery / Access to Customers

Delivery / Access to Suppliers & Shopfloor

PDF - Standards Stack

PDF - Standards Stack



PDF - Standards Stack

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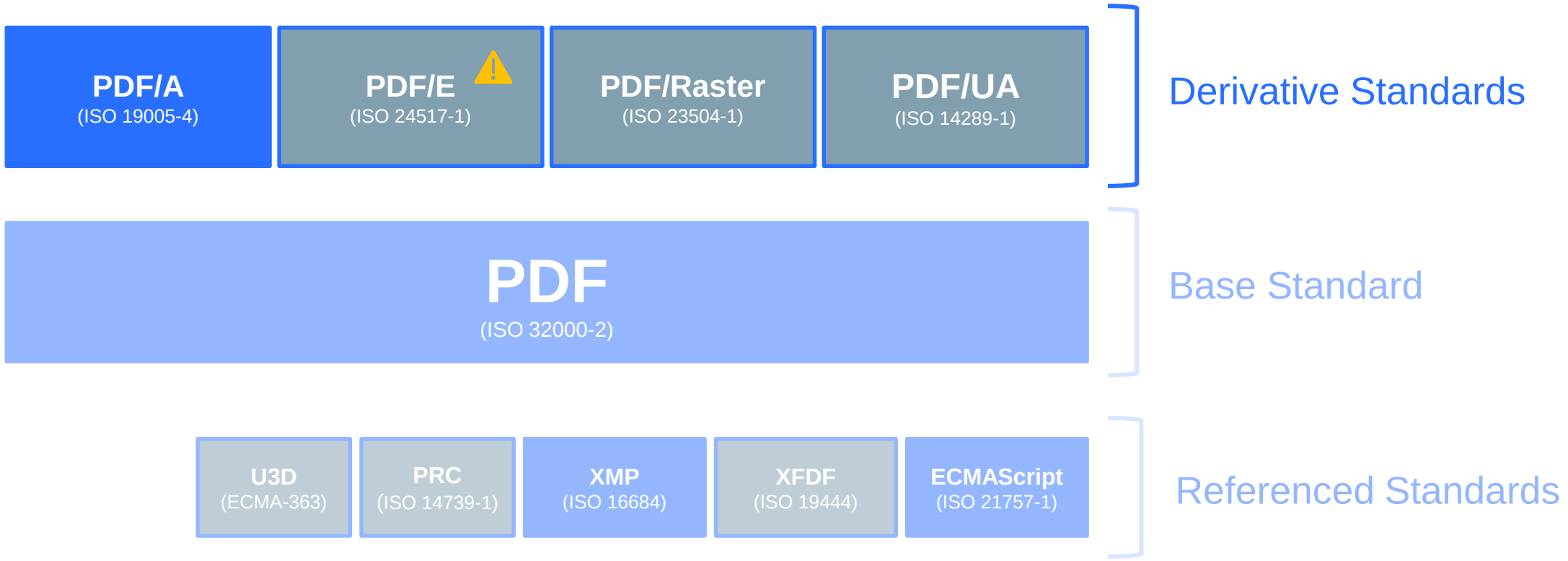
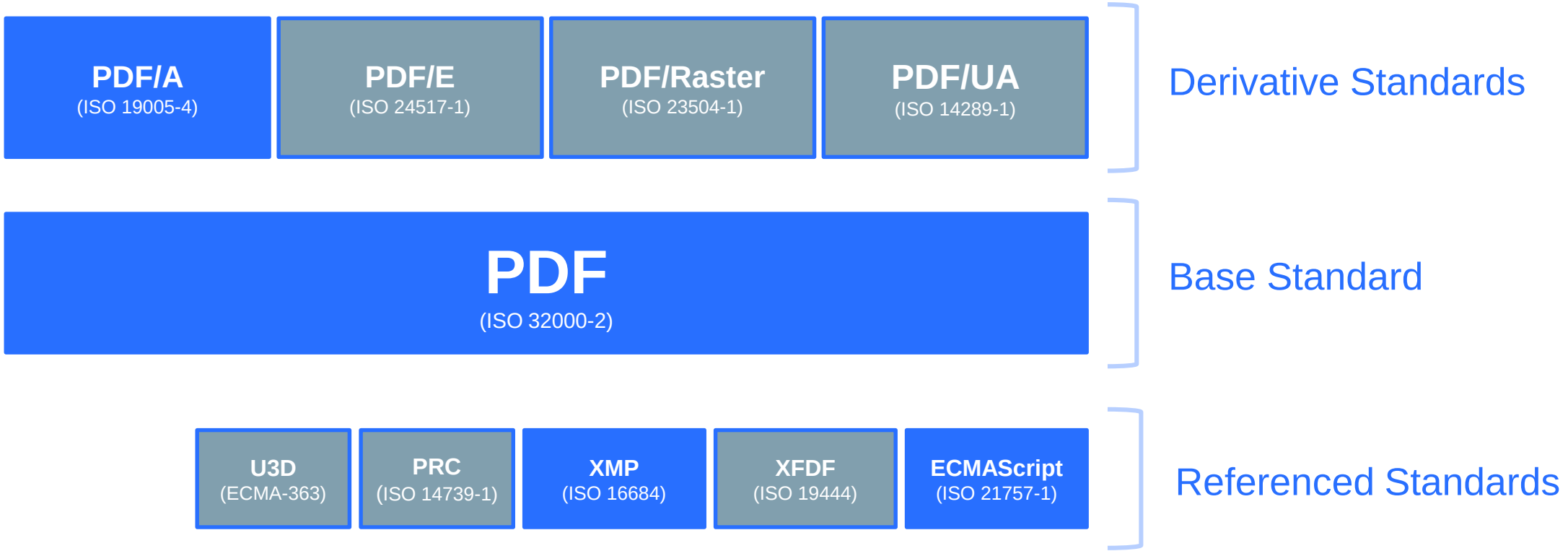


PDF - Standards Stack



PDF - Standards Stack

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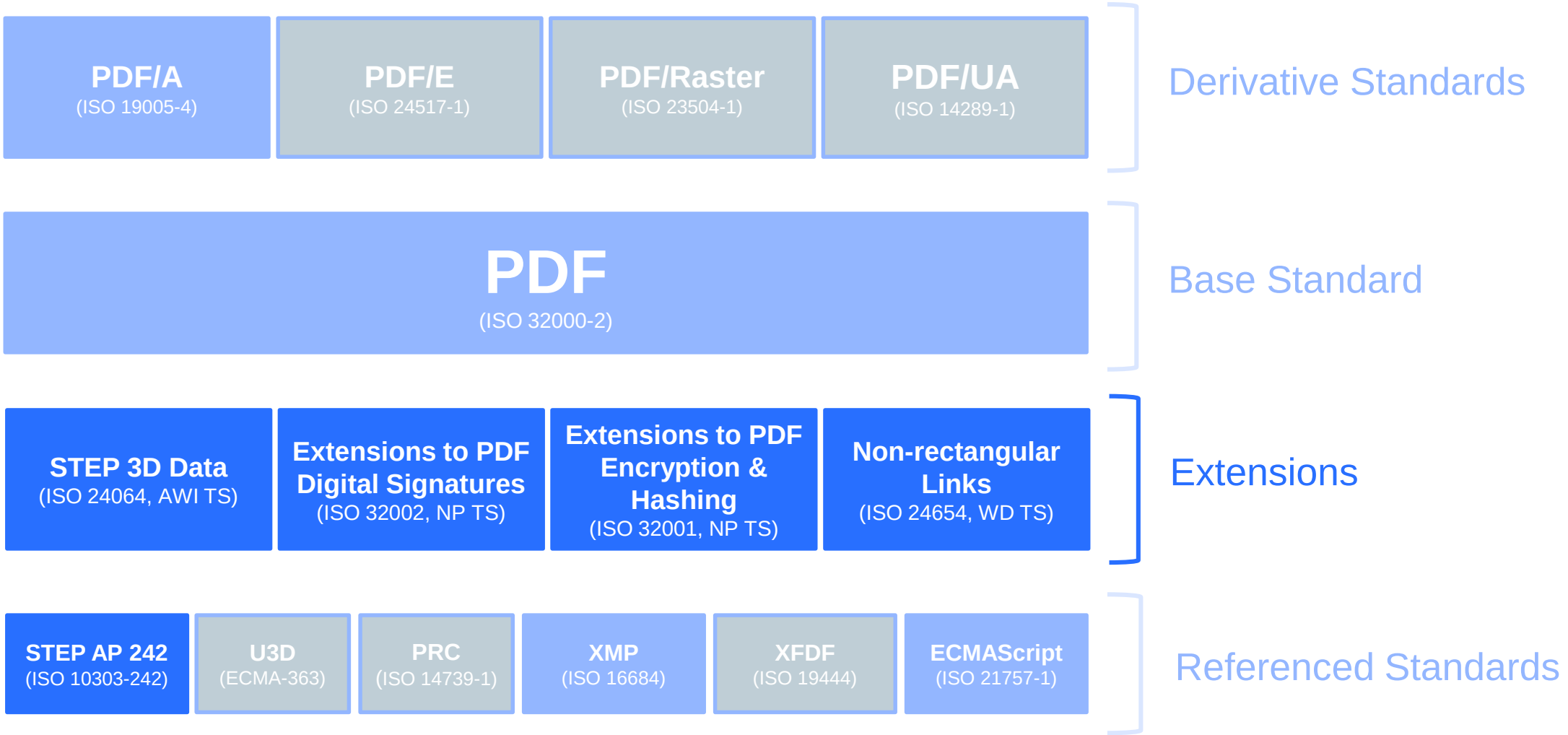

PDF - Standards Stack

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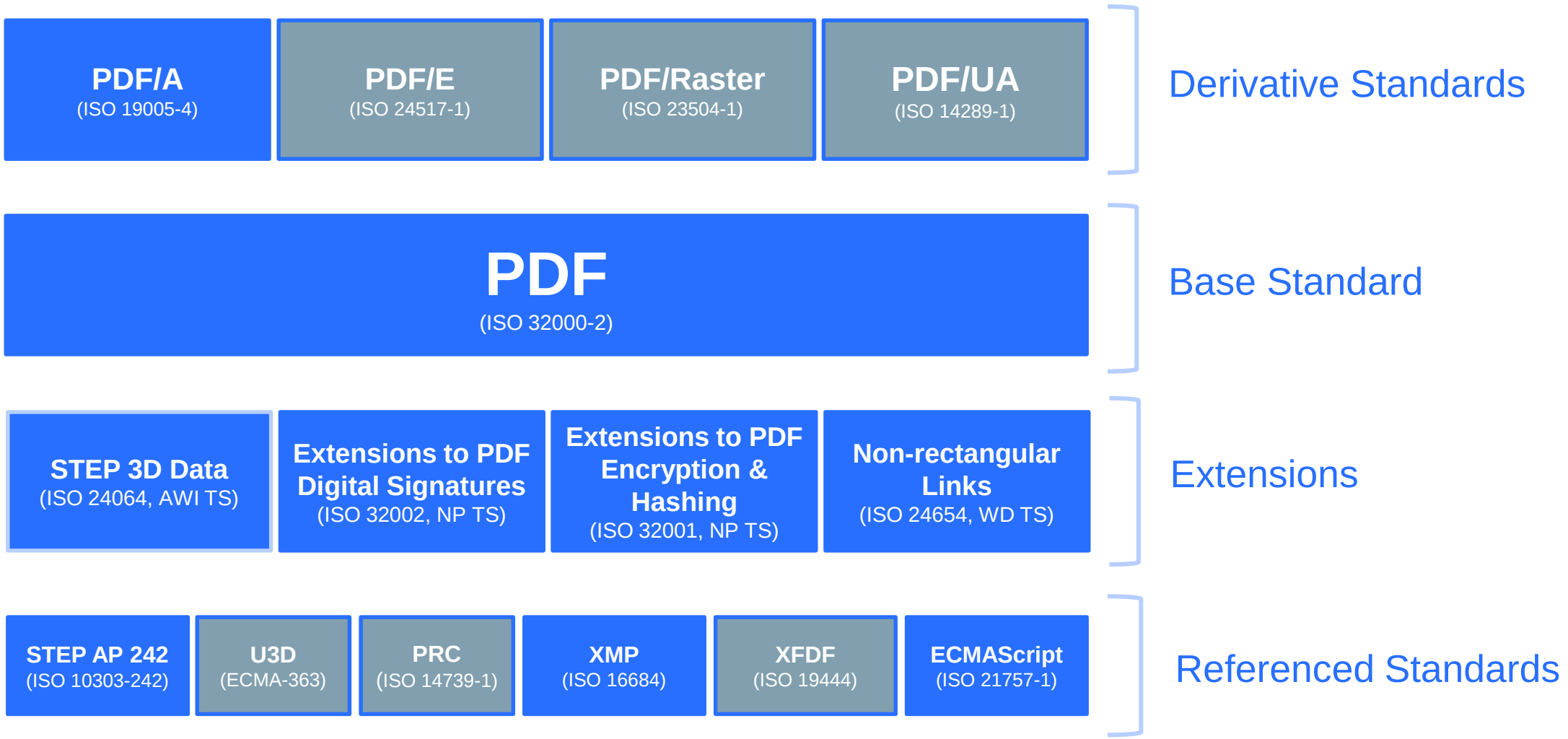
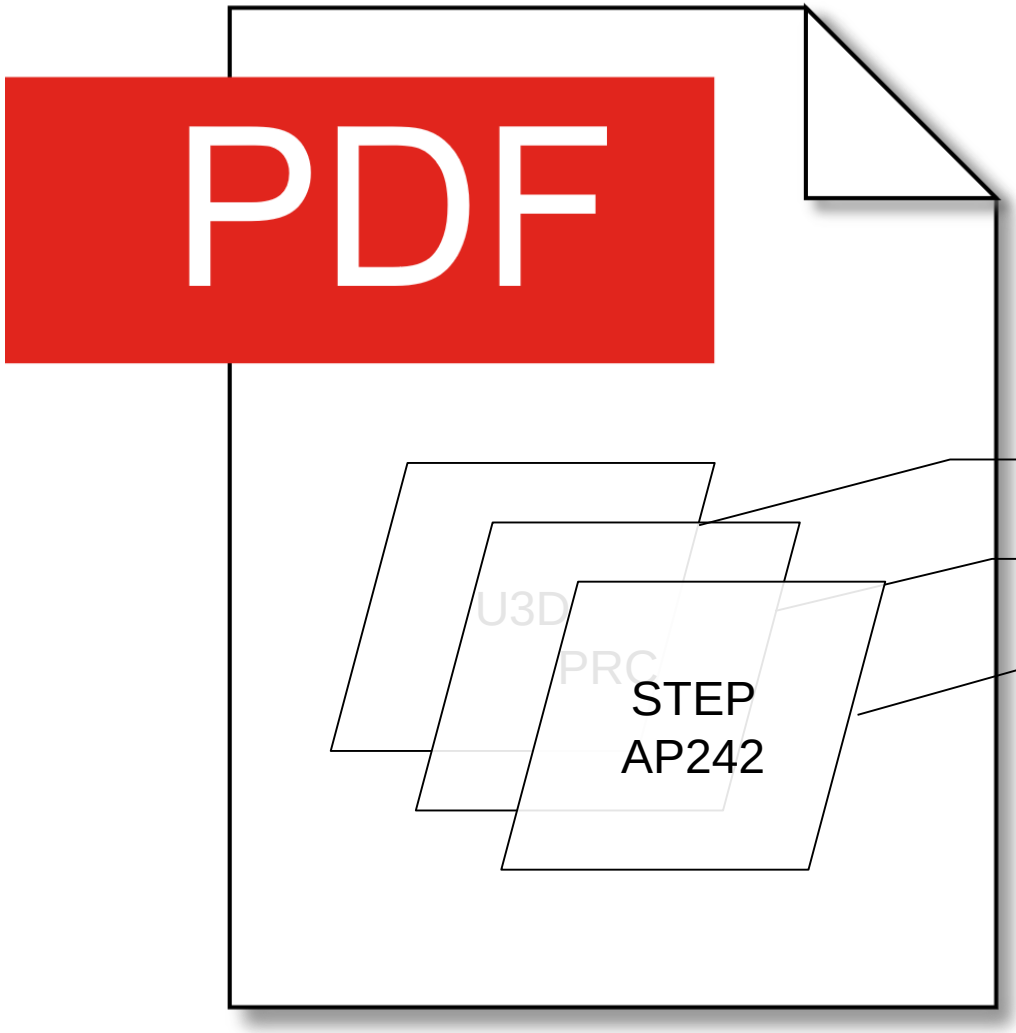


PDF with STEP



- **We are adding STEP AP242 to PDF**

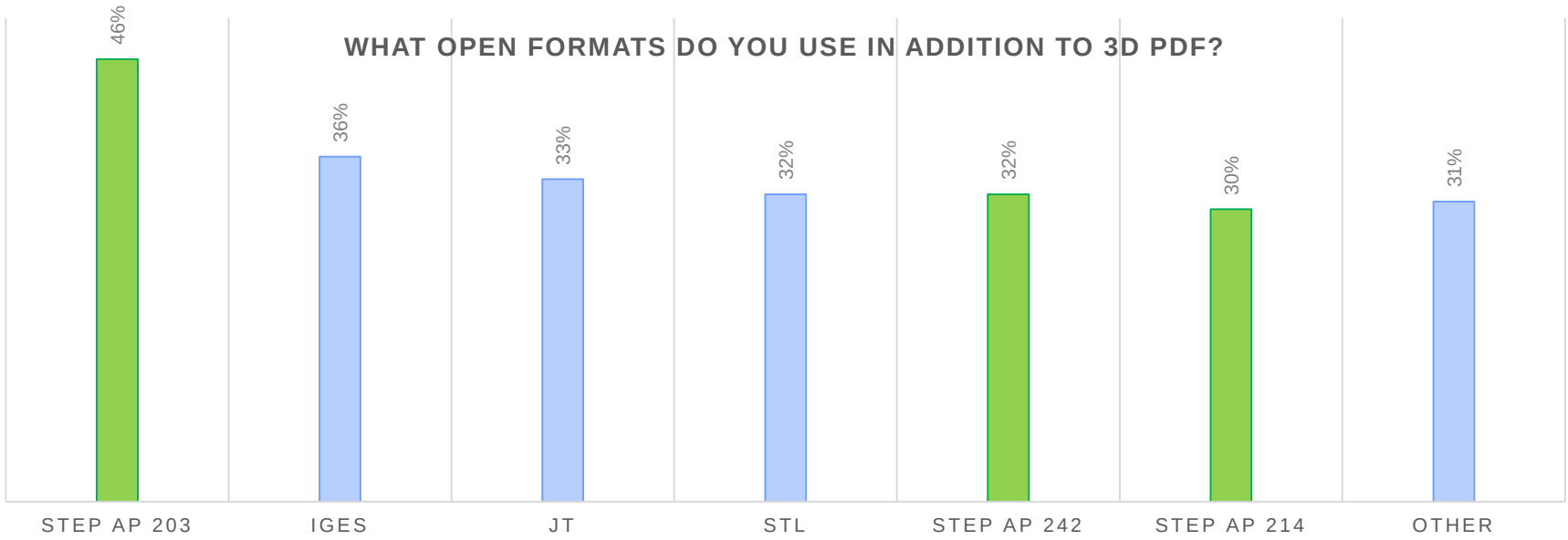
ECMA-363 edition 3

ISO 14739

ISO 10303:242

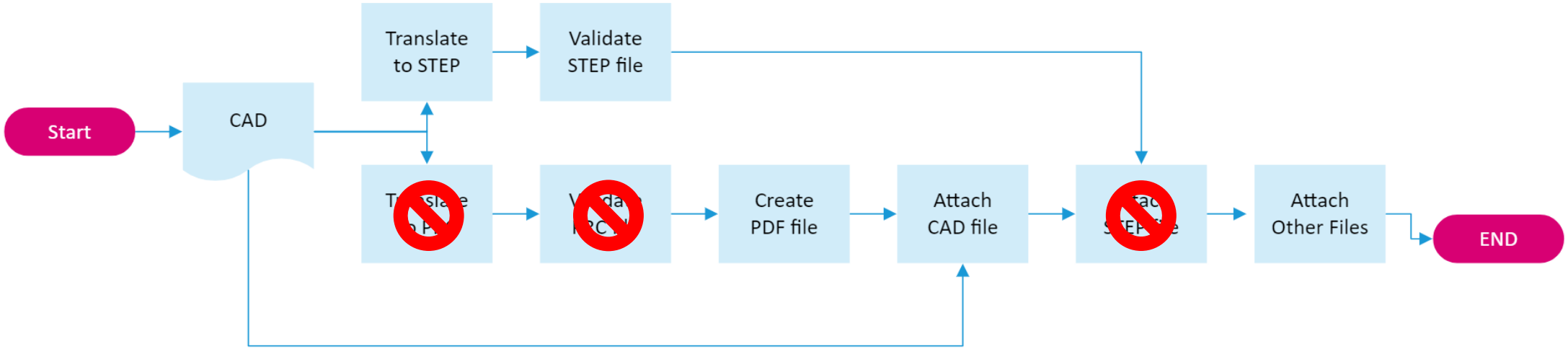
Why STEP and PDF?

- **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?

- **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?

- **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

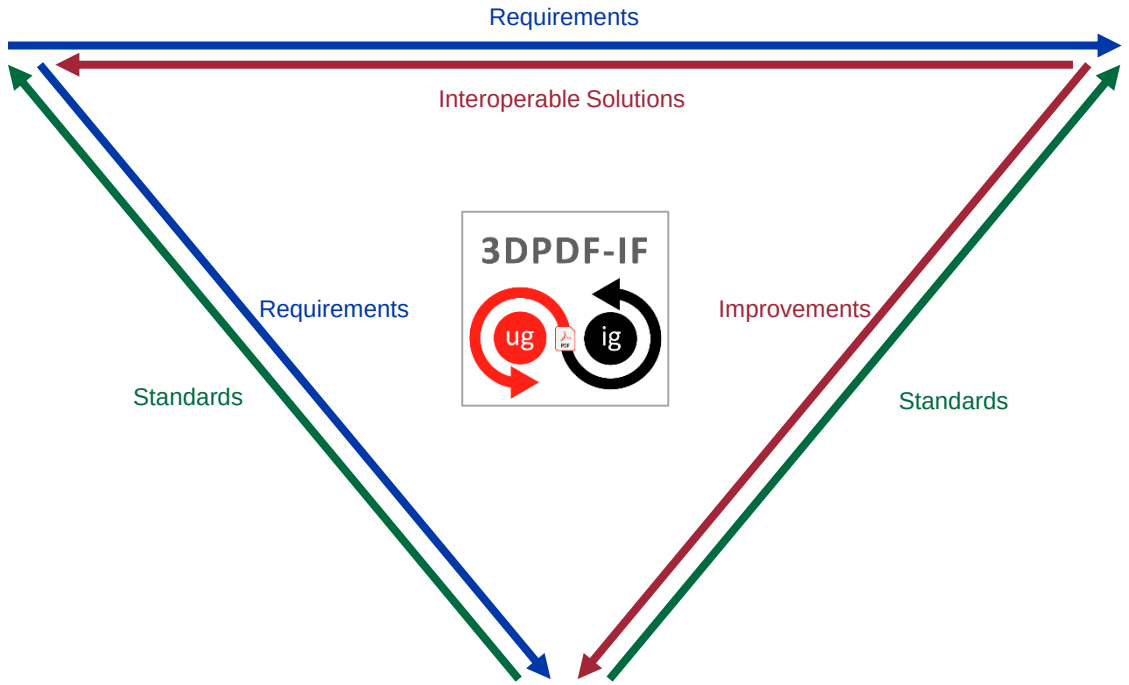
Stage	Version	Description	Target date	Limit date	Started	Status
20.00	1	New project registered in TC/SC work programme			2019-06-10	Current
30.00		Committee draft (CD) registered	2021-01-28			Awaiting
50.00		Final text received or FDIS registered for formal approval	2021-10-24			Awaiting
60.60		International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

Show all stages

How are we doing it?

User Group

Defines
- Roadmap
- Use Cases
- Requirements
  - For PDF standards
  - For implementations based on these standards
- Recommended Practices



Implementor Group

- Reviews Use Cases
- Conducts tests to improve PDF data exchange quality
- Develops Recommended Practices
- Provides feedback to standards community

Standards Community

PDF Standards
- ISO TC 171 SC 2

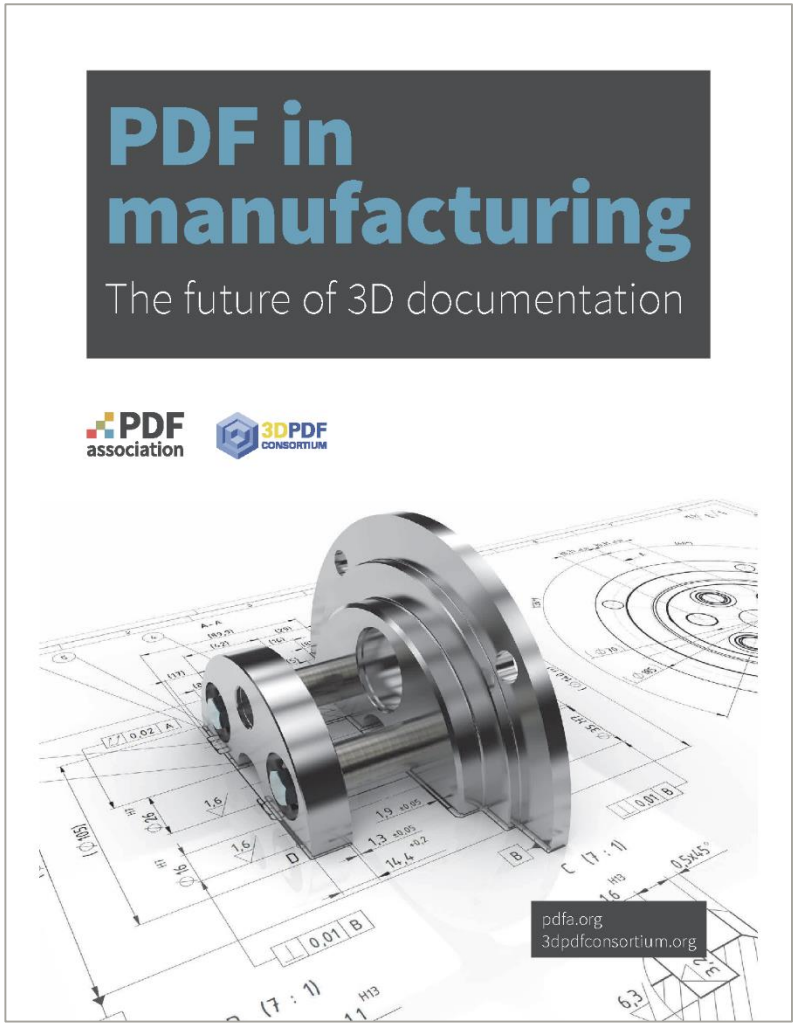
STEP Standards
- ISO TC 184 SC 4

What's Next?

- **Stay tuned…**

Find out more…

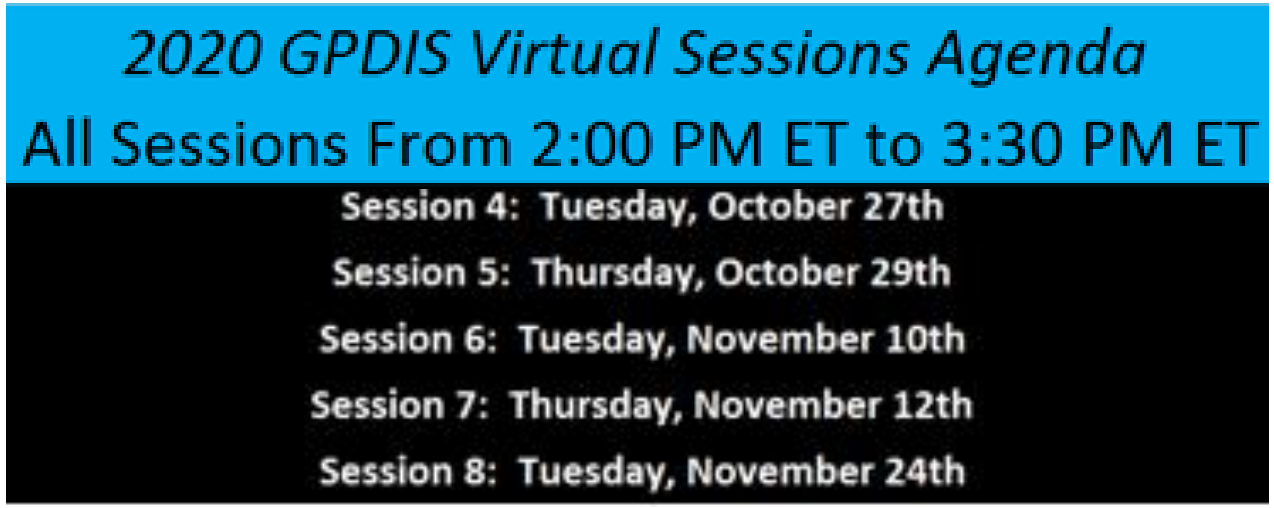
- **Download “PDF in Manufacturing” http://bit.ly/GPDIS-PDFinMfg**
- **Help us to shape the future of 3D PDF by joining the 3DPDF Interoperability Forum www.3dpdfconsortium.org**



Thank you attending this session

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



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

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