

LOTAR the Right Approach

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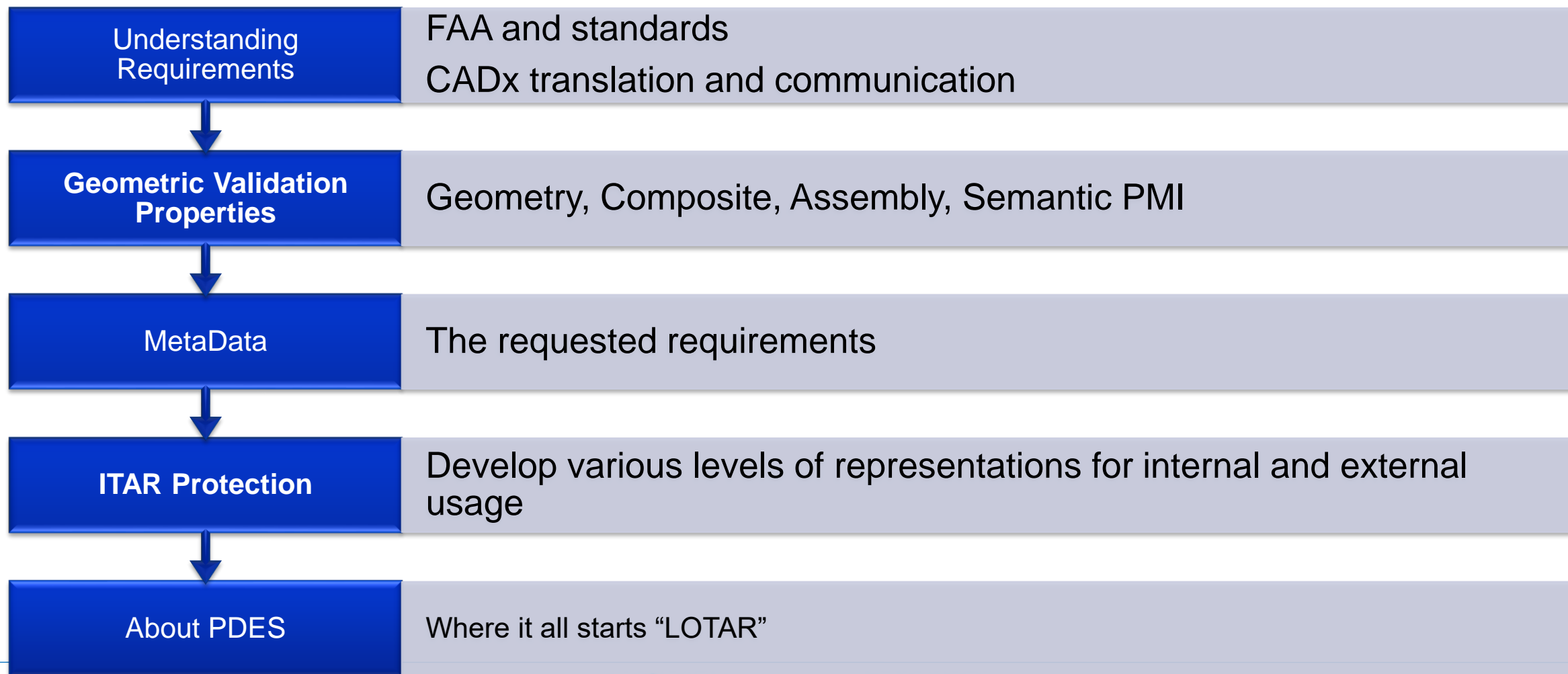
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GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2023



Agenda/Statement of Need

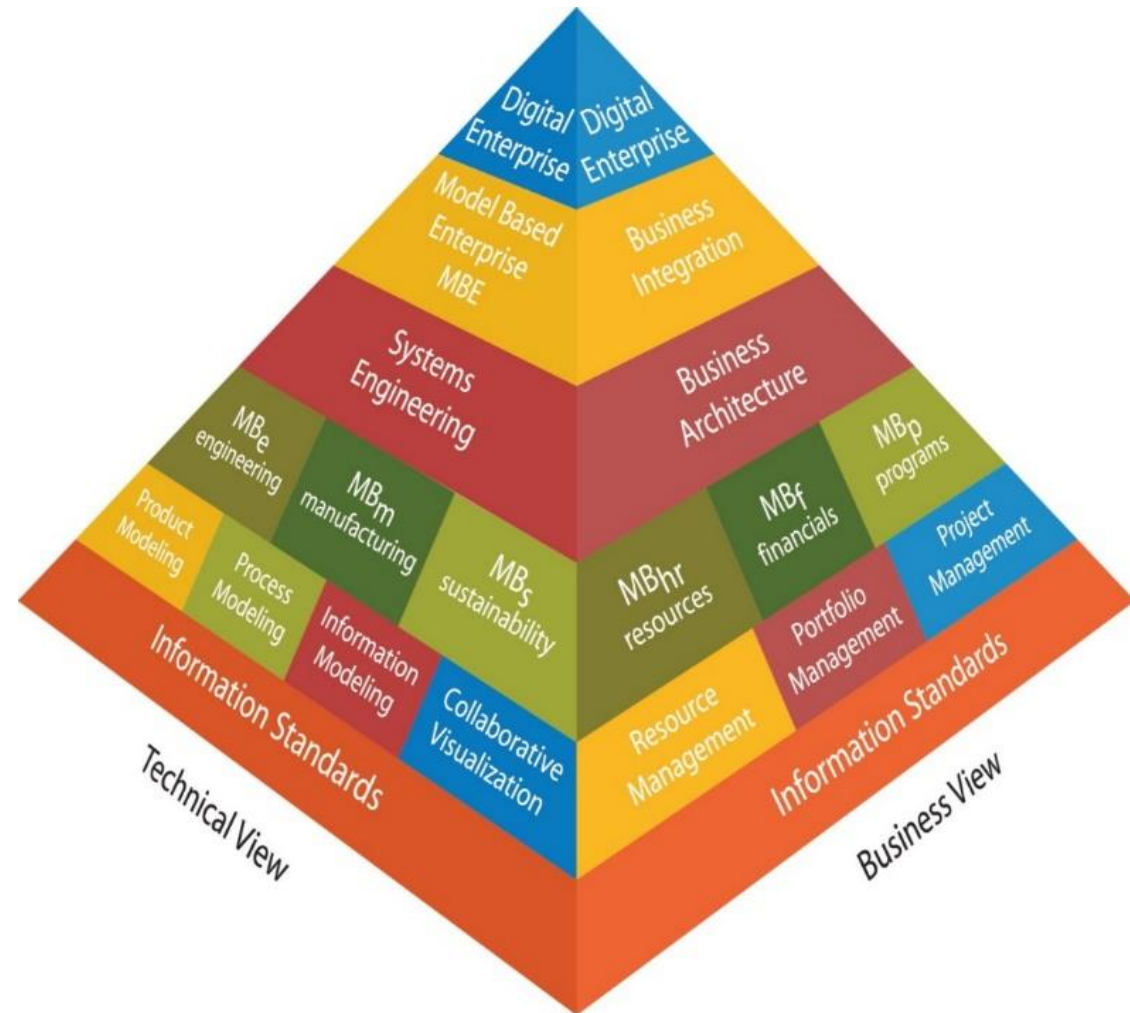
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Building the Digital & Sustainable Enterprise

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- Built on open standards
- Recognize multiple views of the data
- Provide data security
- Protect intellectual property
- Independent of process
- Independent of tools
- Independent of language



Questions to the Audience

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- **Why does a company need to validate its CADx files?**
- **How many companies with a show of hands have a validation process? STEP242 GVP (Geometric Validation Properties)**
- **How many companies understand the LOTAR (Long Term Archival and Retrieval)**
 - <https://lotar-international.org/>
 - <https://pdesinc.org/>
- **How many companies in the room have a Digital Thread process in place?**

FAA Regulations

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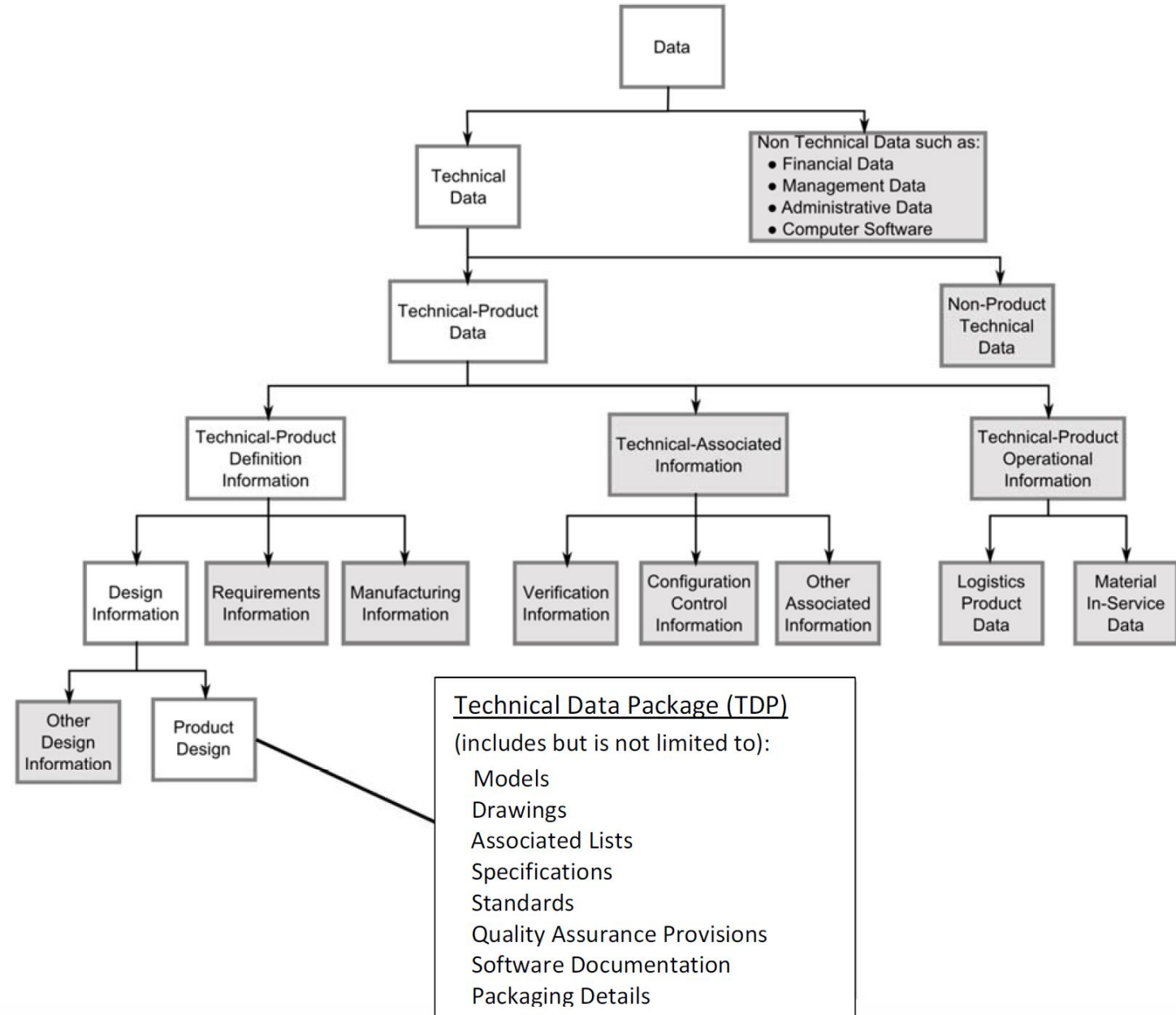
- Some regulations require certain types of CAD records to be retained indefinitely.
- For example, 14 CFR Part 25.1529 requires that records of structural repairs and alterations to large transport-category airplanes be retained for the airplane's life.
- It is important to note that these requirements apply to all individuals and organizations that maintain, operate, or certify aircraft within the United States.
- Failure to comply with these regulations can result in civil penalties, criminal charges, or the revocation of FAA certificates or authorizations.

ISO 10303-242:2020

- **Industrial automation systems and integration — Product data representation and exchange — Part 242: Application protocol: Managed model-based 3D engineering.**
 - <https://www.iso.org/standard/66654.html>

- **ISO 10303-242:2014/COR 1:2016**
 - **Industrial automation systems and integration — Product data representation and exchange**
 - **Part 242: Application protocol: Managed model-based 3D engineering**
 - **Technical Corrigendum 1**
 - <https://www.iso.org/standard/72059.html>

- **ISO 10303-242:2014**
 - **Industrial automation systems and integration — Product data representation and exchange — Part 242: Application protocol: Managed model-based 3D engineering**
 - [HTTPS://WWW.ISO.ORG/STANDARD/57620.HTML](https://www.iso.org/standard/57620.html)



Success Story: Validation of Neutral file format for LOTAR

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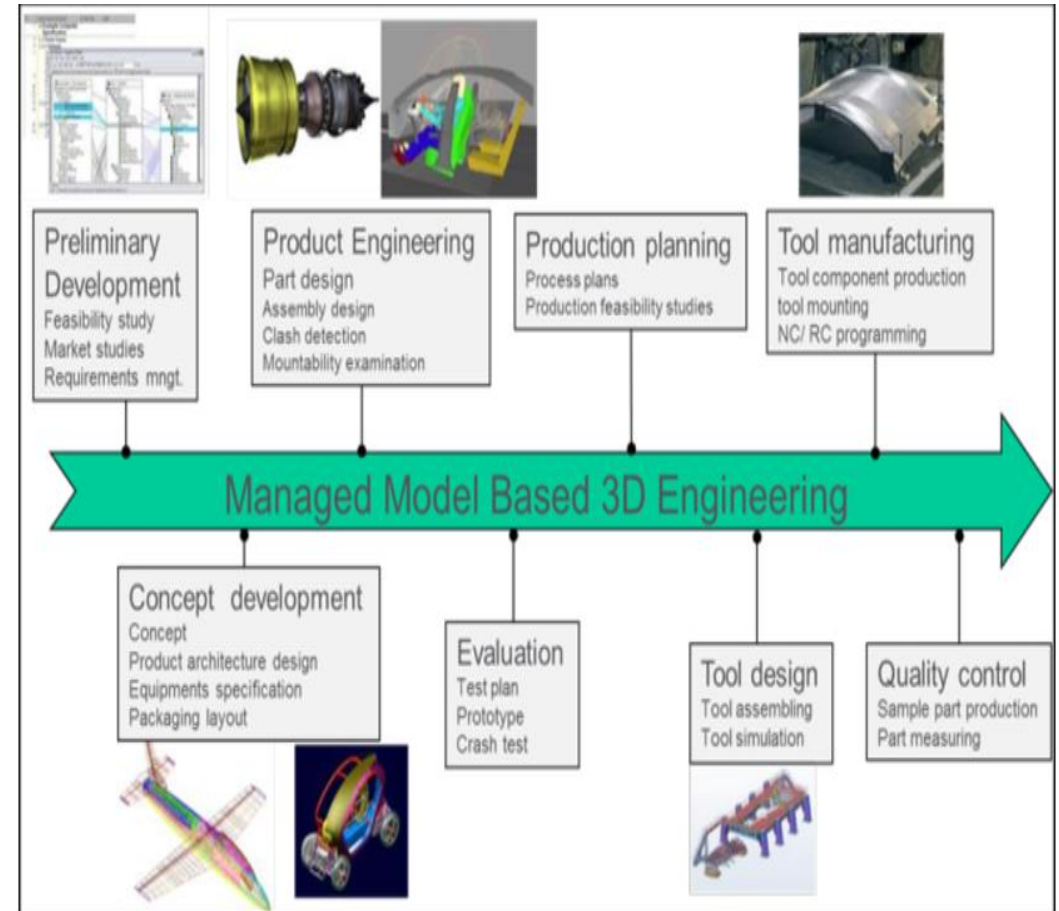
Business: Aerospace



Challenge: Airbus 380 engineers in Germany and Spain were on an earlier version of CATIA V4 and the French and British offices had upgraded to CATIA V5. That meant the German teams couldn't add their design changes for the electrical wiring back into the common three-dimensional digital mockup being produced in Toulouse.

Solution: CoreTechnologie developed a validation check (GVP) for the standard consortium ISO standard STEP242 of assembly, geometry, PMI, composites and saved views. The validation of data that is shared within the Airbus team now shows consistent results with the standard requirements of the government bodies globally.

Value: Airbus was able to use the STEP242 for downstream applications in CAE, and CAM. Moreover, the semantic representation is used in the model-based definition of the digital twin.



Success Story: Engineering Change

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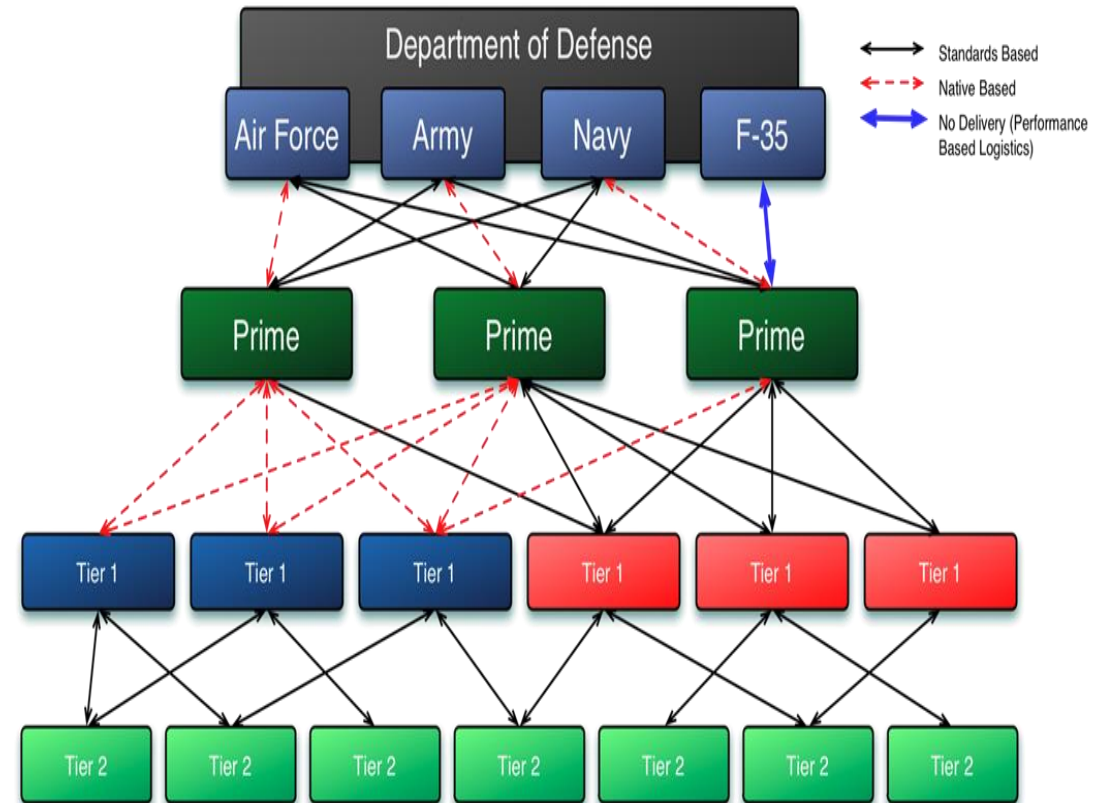
Business: Aerospace and Defense

Honeywell

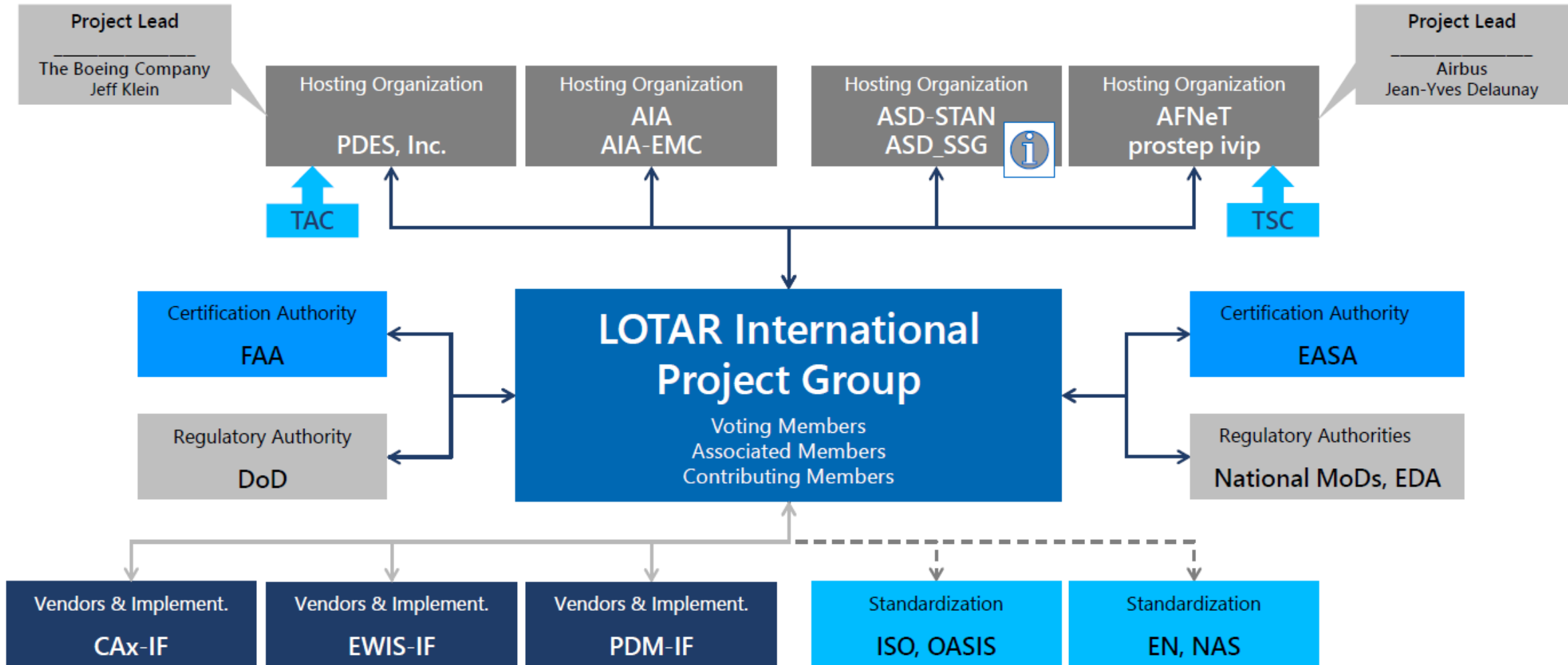
Challenge: Honeywell, has a vast enterprise of product and services to which it provides to countless customers and suppliers. It has a gap in collaboration of CAD files for downstream communications with its enterprise in providing the right CADx information at the right time while documenting the validation of accuracy of the engineering change.

Solution: Utilization of batch functions within the PLM created with 3D Evolution, that is not dependent on the access of the CAD API's within Teamcenter. Furthermore, with easy to edit scripts.

Value: Having CADx in the target format prior to the customer, employee and supply chain prior to asking, was able to allow better and quicker down time in the Product Cycle Management process.

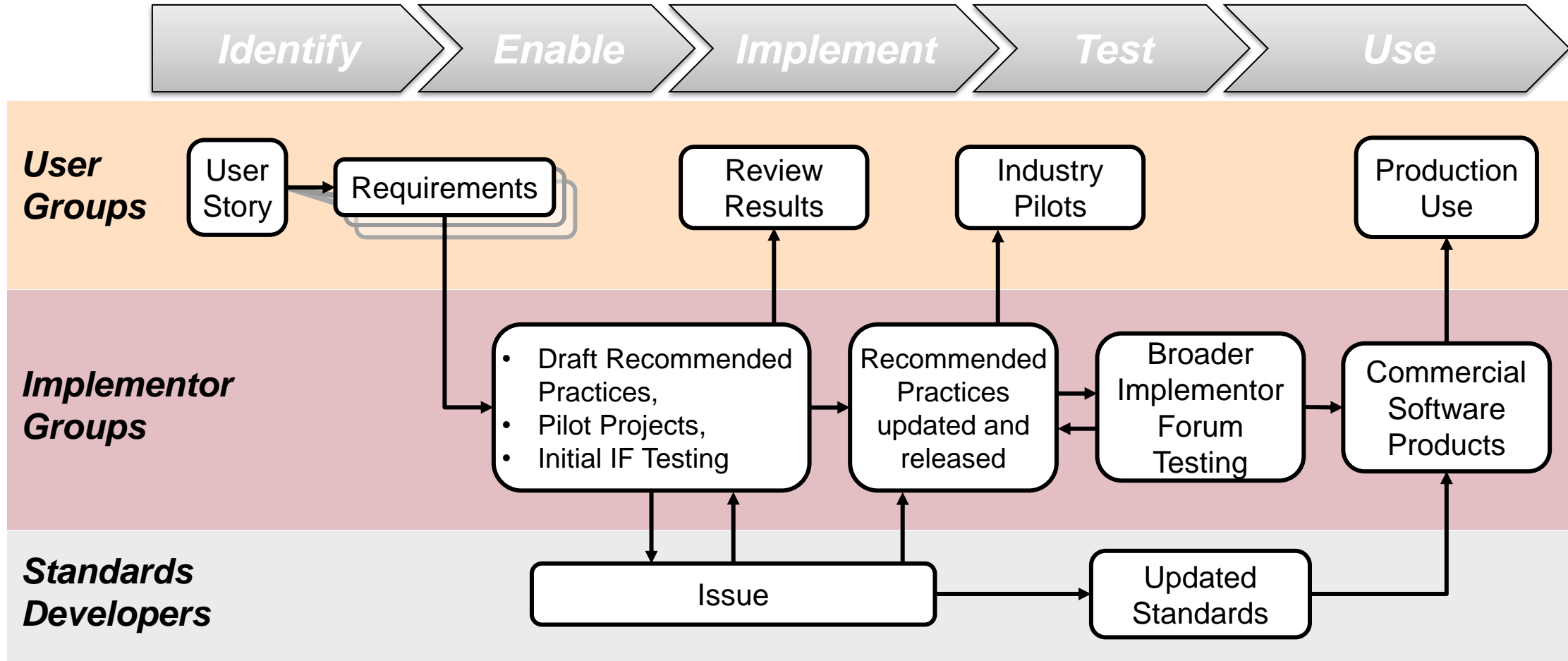


How does it all work



Way of Working between Users, Implementors, and Standards

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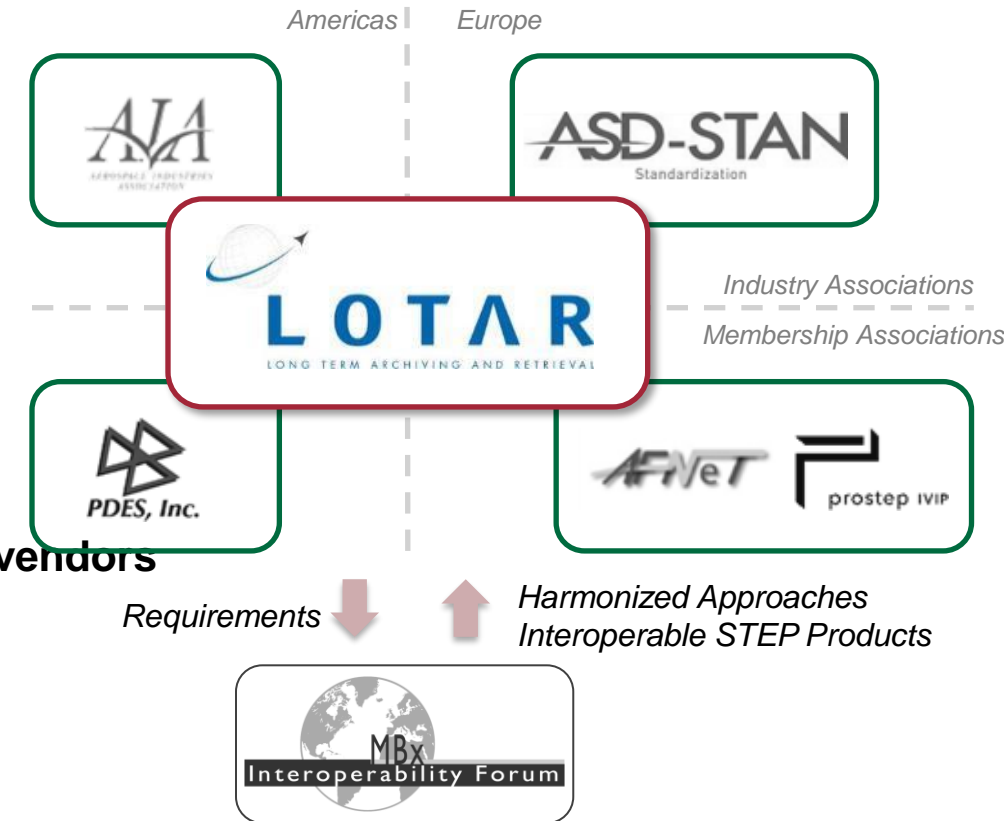
- **LOTAR is an international consortium of Aerospace manufacturers**
- **Prime objective is creation and deployment of the EN/NAS 9300 series of standards for long-term archiving and retrieval of digital data, based on standardized approaches and solutions.**
- **Integration of LOTAR requirements in software tools ensured by close cooperation with:**

MBx Implementor Forum (MBx-IF):

- **Facilitated by AFNeT, PDES, Inc. and prostep ivip**
- **Consists of CAD, CAE, EWIS STEP Translator & Validation Tool vendors**
- **Supports AP203, AP209, AP214, AP239, AP242**

PDM Implementor Forum (PDM-IF):

- **Facilitated by AFNeT and prostep ivip**
- **Consists of PDM and STEP Translator vendors**
- **Supports AP242 Domain Model XML**



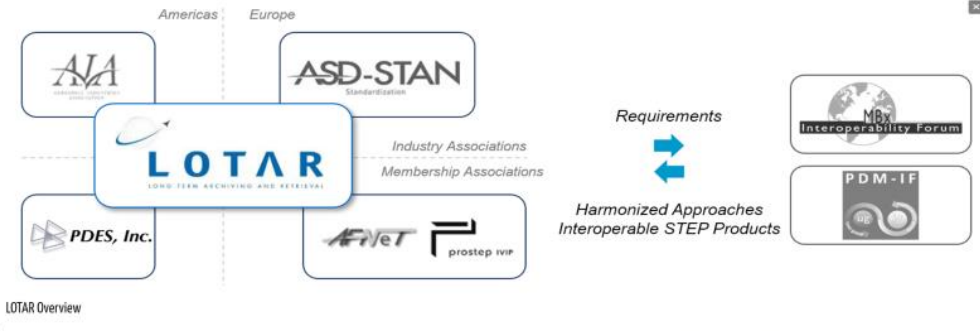
EN = European Norm (Standard)
NAS = National Aerospace Standard
CAx = Computer Aided "x" (Design, Engineering...)
PDM = Product Data Management

Goals of LOTAR

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- EN/NAS 9300 series of LOTAR standards
- Methods, processes, and data models
- Develop recommendations and requirements of long-term archiving
- Work together:
- Solution providers develop COTS capabilities
- MBx-IF – testing, feedback, capability assessment
- Standards teams – gaps, requirements, funded projects

LOTAR Overview



The prime objective is the creation and deployment of the EN/NAS 9300 series of standards for long-term archiving and retrieval of digital data, based on standardized approaches and solutions. The integration of LOTAR requirements into software tools is ensured by close cooperation with the [MBx Interoperability Forum](#) and the [PDM Implementor Forum](#).

LOTAR Requirements Structure



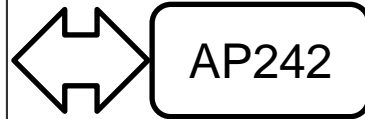
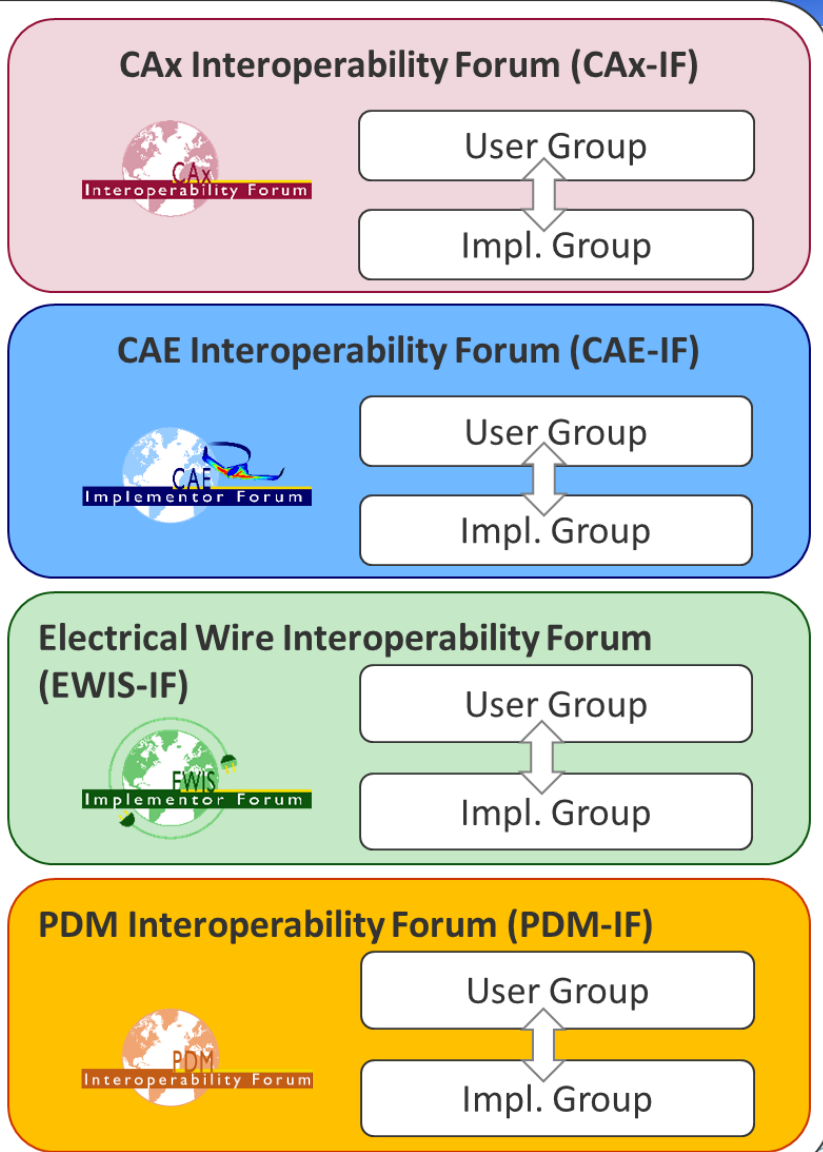
- Meeting the legal and business requirements of the aerospace and defense industry:
 - EN/NAS 9300 considers requirements coming from:
 - Legal and certification rules FAA-FARs, EASA-EARs, DoD & MoD requirements specifications
 - Regulations on long term archiving of technical documentation
 - Design Reuse
 - Support in operation

MBx-IF Project Framework

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MBx
Interoperability Forum

MBx-IF Overall Organization



AP242

Original CAx-IF scope since 1999



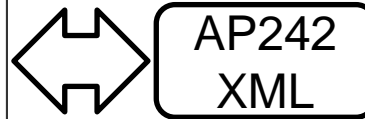
AP209
Ed.2

*Active 2016-2019
Currently on hold*



AP242
XML

Launched in 2019

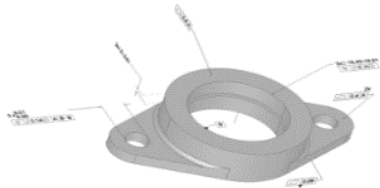


AP242
XML

Launched in 2016

EIGHT LOTAR WORKING GROUPS AT PRESENT

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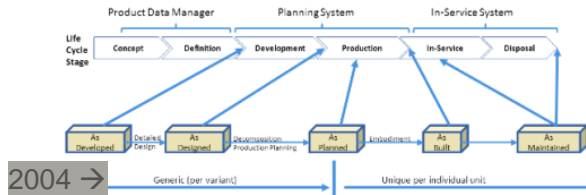


2004 →

Mechanical 3D CAD with Product and Manufacturing Information (PMI)

EN/NAS 9300-1xx series

STEP AP203 Ed.2, AP214 Ed.3, AP242



2004 →

Product Data Management (PDM)

EN/NAS 9300-2xx series

STEP AP239, AP242

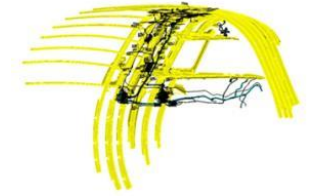


2009 →

Composites and Advanced Manufacturing

EN/NAS 9300-3xx series

STEP AP203 Ed.2, AP242

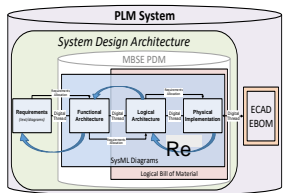


2012 →

Electrical Wiring Harness

EN/NAS 9300-4xx series

STEP AP242 Ed.2

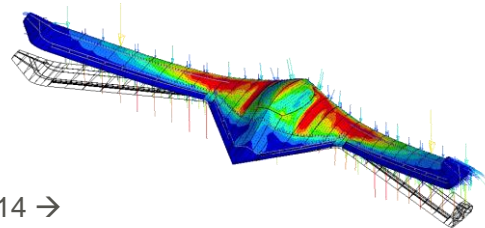


2018 →

Model-Bases Systems Engineering (MBSE)

EN/NAS 9300-5xx series

STEP AP233, AP239, AP242, AP243
FMI, SysML, AADL, ReqIF...

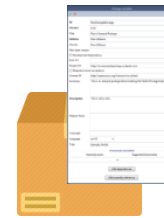


2014 →

Engineering Analysis and Simulation (EAS) *(on hold)*

EN/NAS 9300-6xx series

STEP AP209 Ed.2

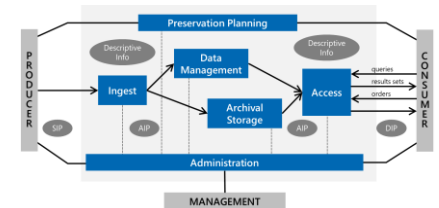


2021 →

Meta Data for Archiving *(Cross-Domain WG)*

EN/NAS 9300-21 & Domain Parts

STEP AP239, AP242, AP243



2018 →

Basic & Common Process Parts

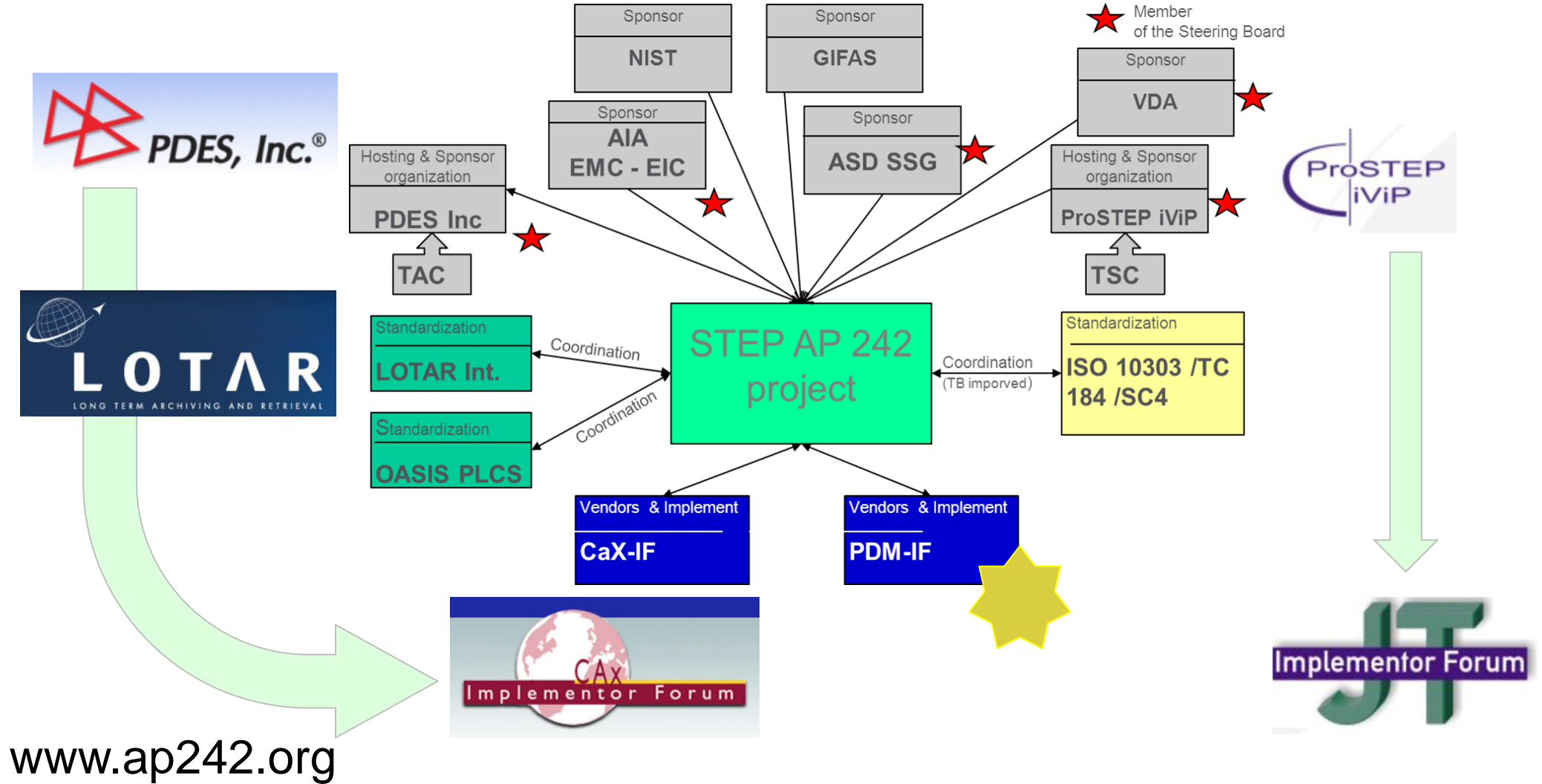
EN/NAS 9300-00x & -01x series

MBx-IF Vendor Participation

Vendor	CAx-IF	PDM-IF	EWIS-IF
Autodesk	X		
Beta CAE		X	
CT CoreTechnologie	X	X	X
Dassault Systemes	X	X	
Datakit	X	X	X
Elysium	X	X	
EMCoS			X
ITI Global	X		
LKSoft			X
Kubotek Kosmos	X		
Open Design Alliance	X		
PD Tec		X	
PROSTEP		X	
PTC	X		
Siemens PLM	X		
T-Systems		X	
Tech Soft 3D	X		

STEP AP242

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How Industry benefits from the MBx-IF

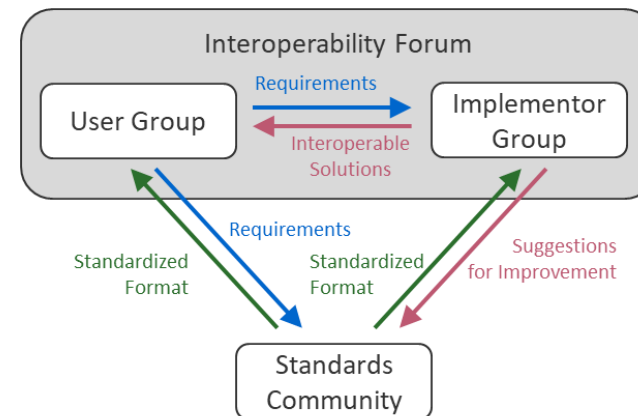
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Member / Vendor Benefits

- Testing in a closed, trusted environment
- Early detection of errors leads to **faster development cycles**
- Beta-testing with other systems **enhances product interoperability and robustness** even before production release
- User requirements can be communicated, and **common implementation approaches** agreed.

User / Customer Benefits

- **Stability of new capabilities**
 - E.g. PMI Polyline Presentation: Since testing started in 2008, no major changes to implementation structure. Widely used in industry now!
- **Early feedback on requirements**
 - Concerning feasibility, and timeframe for support in various tools



Initial list of topics of common interest

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Proposed
by

CAX-IF

1. Export Control
2. Schematron rules : share common methods and tools for quality control rules
3. Semantic Assembly PMI ((link with EWIS Item 5)
 1. External Element reference
 - 2. Saved Camera View***
4. Assembly and installation with fasteners and holes

Interop
points of
common
interest

EWIS-IF

1. Export Control
2. Schematron rules : share common methods and tools for quality control rules **(P1, IG)**
3. External element references from the XML domain files to the AIM P21 files **(P1, UG)**
4. Exchange of Electrical Wiring harness models with configuration management information **(P2, UG)**
5. Electrical wiring harness installation with GD&T

PDM-IF

1. Export Control
2. Schematron rules : share common methods and tools for quality control rules
3. Visual Issue Management – **Saved Camera View***
4. Harmonized functionality of the AP242 XML Viewers (including **CAD** data in AP242 P21 and JT)
5. Harmonized **EWIS-IF** Rec. Pracs (building on existing PDM-IF Rec. Pracs)
6. Compatibility in **tools** of the UDA (User defined attributes) approach and customized PDM properties approach
7. Promethea UC1: Part + Req

Saved camera view * : added after meeting to highlight a topic common to CAX-IF and PDM-IF

List of available STEP Viewers

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- In addition to CAD solutions, validation tools, and file translators, STEP is also supported by a wide range of viewing applications
- Many of these already support AP242 as well, some of them even the new capabilities

The screenshot shows the website www.mbx-if.org. The navigation menu includes: CAx Domain, CAx User Group, Public Testing Information, Implementation Support, Participating Vendors, AP242 Implementation Coverage, STEP Viewers, CAx Member Area, CAE Domain, EWIS Domain, MBX-IF Calendar, and Links. The 'Implementation Support' and 'STEP Viewers' items are highlighted with red boxes and arrows. The 'STEP FILE VIEWERS' section contains a table of available applications.

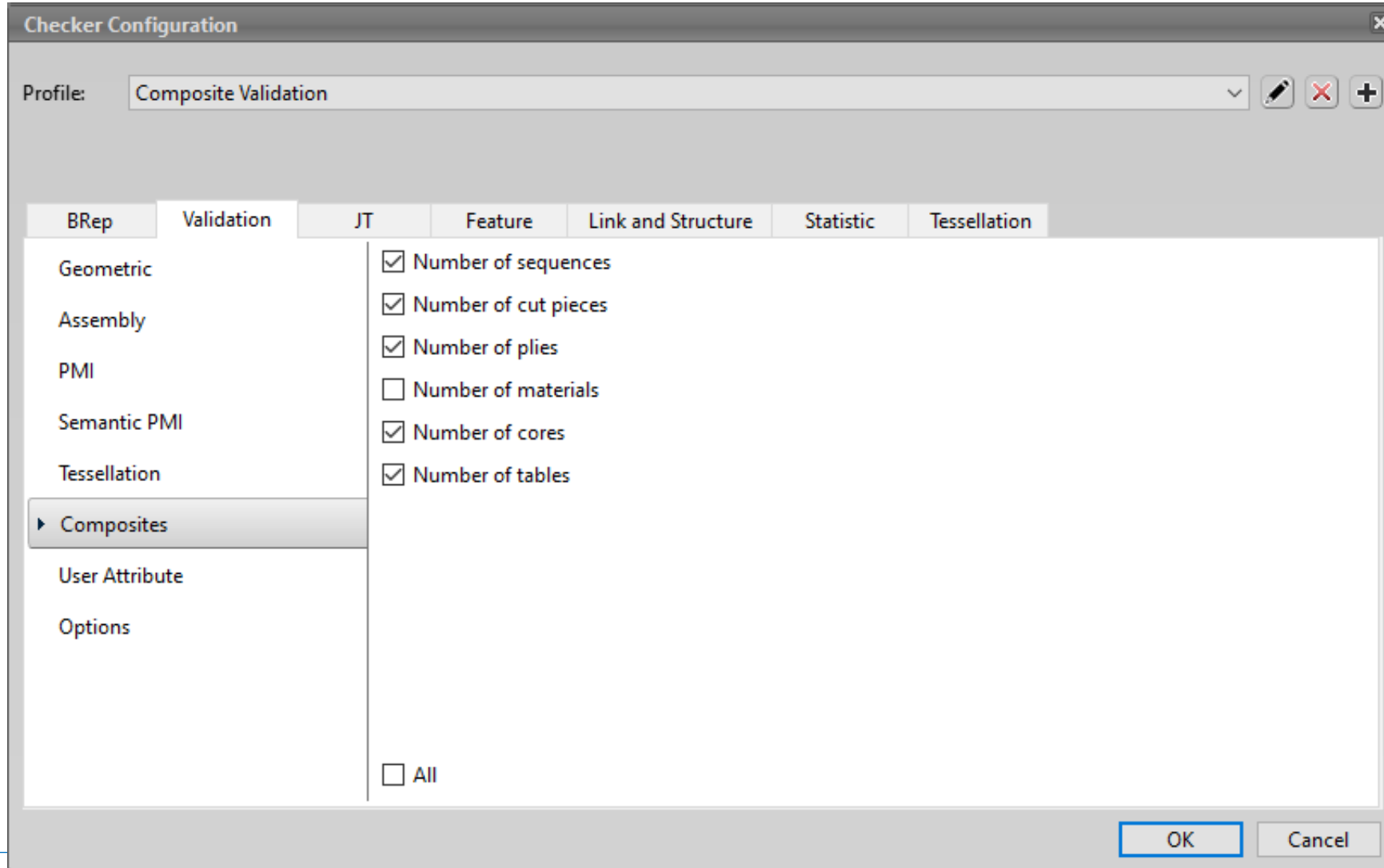
STEP FILE VIEWERS

The following table lists available STEP geometry viewing applications. The intent of this list is only informational potential users with a guide to STEP viewing applications on the market.

NOTE:
The STEP file viewers have not been tested by the CAx-IF. The fact that a STEP file viewer is listed here is no statement about availability, functionality, or quality of the application. The list is sorted alphabetically by vendor.

Vendor	Viewer	URL	Licence
Actify	CAD Viewer	www.actify.com	paid license, fre
Autodesk	Viewer	viewer.autodesk.com	online; free regi
CADCAM-e	EnSuite-View	www.cadcam-e.com	free license
CADEX	CAD Exchanger	www.cadexchanger.com	paid license, fre
CadSoftTools	ABViewer	www.cadsofttools.com	paid license, fre
Capvidia	MBDvidia	www.capvidia.com	paid license, fre
CT CoreTechnologie	3D_Analyzer	www.coretechnologie.de	paid license
Dassault Systèmes	SOLIDWORKS eDrawings	www.solidworks.com	free license
eMachineShop	STEP Viewer	www.emachineshop.com	free license
FreeCAD Team	FreeCAD	www.freecadweb.org	free license (LC Commons)
Glovius	Glovius Viewer	www.glovius.com	paid license, fre
ideaMK	STP viewer	www.stpviewer.com	free license, do
Kisters	3DViewStation	viewer.kisters.de	paid license, fre
Kubotek	Spectrum CAD Viewer	www.kubotek3d.com	paid license, fre
LKSoft	IDA-STEP	www.ida-step.net	free and paid lic
Machine Research	STEP Viewer	www.machineresearch.com	paid license, fre
NIST	STEP File Analyzer and	www.nist.gov	free license

Validation configuration



Attribute Validation use case 1 of 2

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Existence validation:

Using a seed file as a baseline, we can compare parts and determine which and how many attributes are included in it

Attribute	Field	First Assembly	Second Assembly
StringMetaData	CHECKER_NAME	Only in first object	Not in second object
StringMetaData	CONTRACT_NUMBER	Only in first object	Not in second object
StringMetaData	MATERIAL_ENGINEER	Only in first object	Not in second object
StringMetaData	DOC_TYPE	Only in first object	Not in second object
Original Name	Value	12600527_A1.PRT	19207_12600527.PRT
Input Format and Emitter	Value	Creo Parametric 5.0.0.4	Creo Parametric 4.0
Analyze Id	Id	2	3
StringMetaData	PROI_REVISION	Not in first object	Only in second object

Participation Requirements

Most PDES, Inc. participants pay annual dues and all participate in the consortium’s technical activities. Participation requirements vary with the type and size of the organization.

The table below summarizes the financial and resource contribution requirements for each type of participant. Note the Industry category is sub-defined by size and type of business in order to allow for variations in the amount of annual dues.

First year participation dues are payable at the start of the participant’s term; the second and subsequent years’ dues are payable on the anniversary of the start date.

Participant Type	Participation ID	Organization Type/Size	Term	Fee	Board Seat
Industry	Industry 1	Corporate User - Sales Greater than \$1B	2 Years	\$50K	Yes
Industry	Industry 2	Corporate Division Users - Sales Greater than \$1B	2 Years	\$35K	Yes
Industry	Industry 3	Corporate User - Sales Between \$100M-\$1B	2 Years	\$25K	Yes
Industry	Industry 4	Corporate User - Sales Less than \$100M	2 Years	\$15K	Yes
Industry	Industry 5	Solution Provider - Sales Greater than \$50M	2 Years	\$25K	Yes
Industry	Industry 6	Solution Provider - Sales Less than \$50M	2 Years	\$6K	Yes
Industry	Industry 7	Small Manufacturing User - Less than 500 Employees	2 Years	\$3K	No
Government Associate	Govt Agency 1	DoD, DoE, Natl Labs - Sales N/A	2 Years	\$25K	Yes
Universities & Community Colleges	Academic Associate	Endorsed by an Industry Participant	2 Years	No Fee	No
Non Profit Associate	Industry Consortium	Endorsed by an Industry Participant	1 Year	\$24K	No

Organization Types:

- “User” is a commercial entity that utilizes STEP in conducting its business operations – for example by using CAD, CAM, CAE tools
 - “Solution Provider” is a commercial entity that develops and/or sells STEP-related software products and interfaces
 - “Small Manufacturing User” is an entity that is typically a supplier to a “User” company, a Small and Medium Enterprise

For more information about PDES, Inc. participation requirements, please contact General Manager Brian Chiesi.

Conclusions

- **Rapidly evolving competitive, technological and regulatory environments requires businesses to create, move and store data across disparate applications and systems with minimum friction and duplication**
 - Increased Product and Systems Complexity
 - Evolving Technologies and Processes
 - Global Collaboration
 - Regulatory data retention and retrieval
- **PDES, Inc. is uniquely positioned to support members' needs in identifying requirements. developing recommended best practices, and implementation test cases for connecting the digital enterprise**
- **More information on PDES, Inc. - pdesinc.org**

Contact Us

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Questions?



Contact us



Check us out

Organization Structure

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