

LOTAR

LONG TERM ARCHIVING AND RETRIEVAL

LOTAR International Project Status to the Sponsoring associations

3rd of December, 2019

Rick ZURAY – LOTAR International Co-chair: AIA, Americas

Jean-Yves DELAUNAY – LOTAR International Co-chair: ASD, Europe



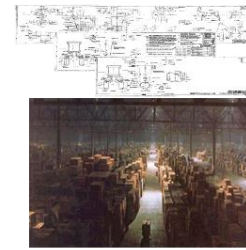
- We are looking for support of more A&D Manufacturers in LOTAR WGs
 - Importance of support of the AIA and ASD
- FAA representatives may participate to the LOTAR offsites in USA in 2020
 - In 2020 the LOTAR leadership plans to invite EASA representatives to attend a LOTAR offsite.
- Change in the scheduling of the quarterly LOTAR offsites in 2020, in order to strengthen the collaboration with the different Interoperability Forums
- Plan to deliver new standards for ballots in 2020
 - Composite: Part 300, 320,
 - Structural Analysis: Parts 600, 620

- LOTAR 5 years plan anticipates extensions to support LTA of the digital thread between MB Engineering & Advanced MB Manufacturing (Digital transformation)
- The successful implementation of LOTAR by the US & EU A&D industries relies on the governance through the time of open international product data standards:
 - ISO 10303: AP242 e2, AP243 MoSSEC, AP209 e2, AP239 e3 PLCS, AP238 e2, etc.,
 - completed by other standards such as QIF, SysML, FMI, AADL, etc.
- ➔ Need to prepare 5 years roadmap of these standards and the associated portfolio management
- Importance of the support of PDES, Inc., AFNeT and prostep ivip.
 - Support of the Interoperability Forums: CAx IF, EWIS IF, CAE IF, PDM IF, etc
- Proposal to organize a yearly coordination confcal with the sponsoring associations
 - Target date: end of Nov., beg. Of Dec. for 2020: ?

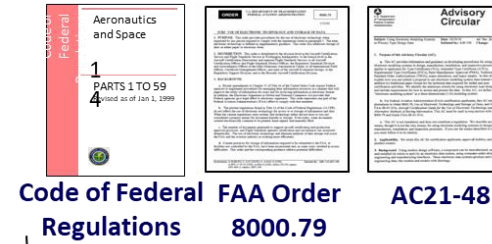
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- **Problem:** With the emergence of digital data based processes, including model based definition, requirements were identified which predicate the need for a long term data retention solution(s) to meet the regulatory and business requirements. Traditional legacy retention and retrieval methods do not support complex digital product definition data.
- **Opportunity:** Develop, publish and maintain standards designed to provide the capability to archive and retrieve digital product and technical information in a standard neutral form that can be read and reused throughout the product lifecycle.

LOTAR Mission



Paper-based process



Code of Federal Regulations
Requirements
FAA Order 8000.79
AC21-48



Digital-based process

Past

EN/NAS 9300-xxx LOTAR Stds

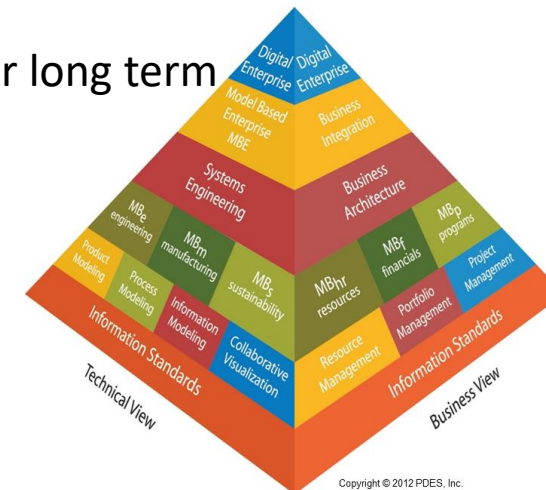
Future

Participation

- **Leadership Team:** R. Zuray (Boeing), J. Holmlund (L-Martin), JY Delaunay (Airbus), S. Rulhoff (PROSTEP AG), M. Jahadi (L-Martin)
- **3D Mech/PMI WG:** Rick Zuray (Boeing), Pierre Duchier (Airbus)
- **PDM WG:** Jeff Klein (Boeing), Frederic Darre (Airbus)
- **Composite/Adv Mfg. WG:** Rick Zuray (Boeing), Pierre Duchier (Airbus)
- **Electrical WH WG:** Dan Ganser (Gulfstream), Sophie Herail (Airbus)
- **MBSE WG:** Mark Williams (Boeing), Adrian Murton (Airbus)
- **Eng. Analysis & Sim WG:** TBD, Albert Levy (obo Airbus)

Benefits

- Support Increasing Product Complexity
- Built on open standards
- Preservation of Digital Design Intent for long term
- Provide data security
- Protect intellectual property
- Independent of process
- Independent of tools
- Independent of language



Highlights and Updates

- Mechanical /PMI WG started the development of P132 “Installation with Holes & Fasteners”
- Engineering Analysis and Simulation WG has a working relationship with NAFEMS consortium and signed a MOU with them.
- Q3 LOTAR Offsite was held the 9 - 13 September 2019
- Next LOTAR Offsite will be held the 9-13 December 2019

Status

- Supporting STEP AP209, AP238, AP239, AP242, AP243 MoSSEC projects.
- LOTAR MBSE is working on developing NAS/EN9300-5XX series of standards, working with MoSSEC, Incose, OMG.
- The EAS WG has drafted Parts 600 & 620 “Struct. Analysis” : ready for internal ballot,
- The Basic & Common Parts WG is reviewing parts 001-021 for content and updates in 2019 and 2020.

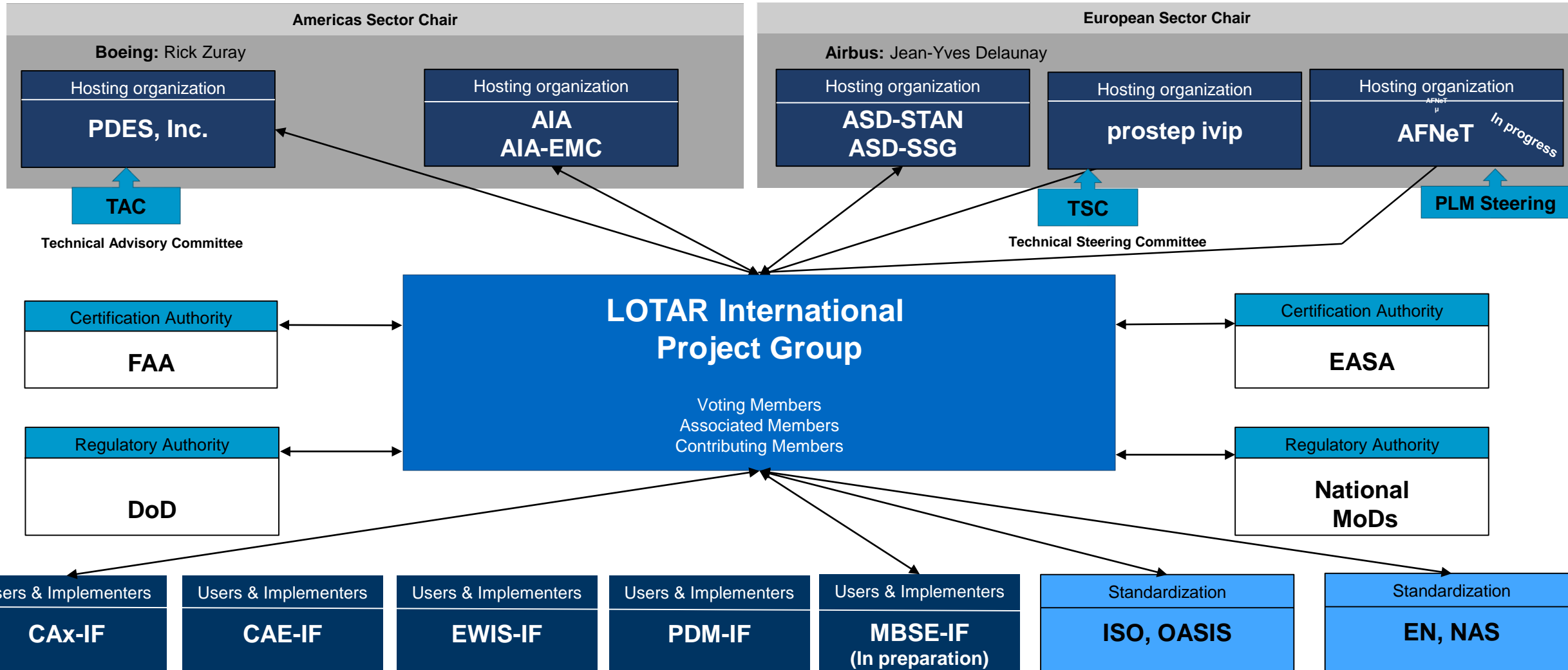
Key Project Milestones for 2020

- Standing up test case models repository for Domain specific test cases, including the Boeing Stratoliner models.
- Implementing a new set of Interoperability Forums and associated User Groups to support various product domains : MBx-IF, PDM-IF, CAx-IF, EWIS-IF, CAE-IF, MBSE-IF, etc.
- Working closely with AIA and ASD Stan to ballot and review NAS / EN 9300-xxx series standards more efficiently.
- Training and Mentoring new talent to continue this work.

Challenges/Help Needed

- Need additional company resources to support the WG activities.
- All WGs need active support.
- Need Subject Matter Experts (SME) in the area of Composites/Adv Mfg., MBSE, PDM/PLCS, and Engineering Analysis and Simulation.
- Need to find leaders / co-leaders for Composite, Basic & Common Parts and EAS WGs
- Need to recruit more resources from Sponsoring Orgs.

LOTAR Organization: External view



- Europe

- AFNeT
- Airbus
- Airbus Helicopter
- Airbus Defense & Space
- SAFRAN Engine

- Americas

- BAE Systems
- Boeing
- Embraer
- General Electric
- Gulfstream
- Lockheed Martin
- Sandia National Labs
- UTC: in progress (Pratt Whitney, Collins Aerospace, Goodrich, Raytheon)

	AIA (America)	ASD (Europe)
LOTAR project leader	R. ZURAY	JY DELAUNAY
Basic Parts coordination	R. ZURAY	T. MUELLER
P1XX Mechanical and PMI WG	R. ZURAY	P. DUCHIER
P2XX Product Data Management WG	J. KLEIN	F. DARRE
P3XX “Advanced Manufacturing” WG	R. ZURAY	P. DUCHIER
P4XX “Electrical Wiring Harness” WG	D. GANSER	S. HERAIL
P5XX “Model Based Systems Engineering” WG	M. WILLIAMS	A. MURTON
P6XX “Engineering Analysis & Simulation” WG	X	A. LEVY

Persons of the standardization associations supporting the LOTAR project

AFNeT : JM Crepel

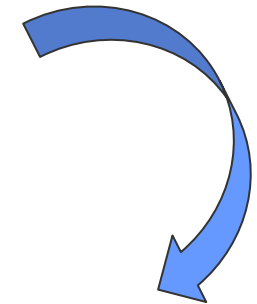
PDES Inc : P. Rosche

prostep ivip : S. Rulhoff & J. Boy

LOTAR International Quarterly Offsites in 2019



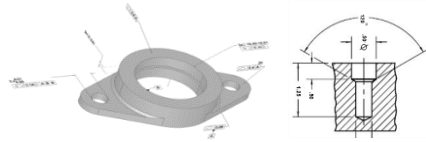
- 1st meeting: (10) 11th – 14th of March, Asheville – NC, USA : done
- 2nd meeting: (20) 21st – 23rd of May, Toulouse, France : done
- 3rd meeting: (8) 9th – 12th of September, Atlanta, USA : done
- 4th meeting: (9) 10th – 12th of December, Darmstadt, Germany



Access to
LOTAR meeting summary
on LOTAR public web site

[http://www.lotar-international.org/
communication/
progress-reports.html](http://www.lotar-international.org/communication/progress-reports.html)

2019			
Document	Date	Venue	Download
2019 Year-End Report			
4th Qtr. Workshop Summary	December 09-12, 2019	Darmstadt, Germany	
3rd Qtr. Workshop Summary	September 08-12, 2019	Atlanta, GA, USA	PDF
2nd Qtr. Workshop Summary	May 20-23, 2019	Toulouse, France	PDF
1st Qtr. Workshop Summary	March 10-13, 2019	Asheville, NC, USA	PDF

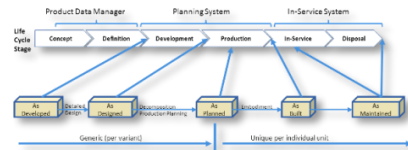


Mechanical 3D CAD with Product and Manufacturing Information (PMI)

EN/NAS 9300-1xx series

STEP AP203 ed2
STEP AP214 ed3
STEP AP242 ed1 & ed2

2004 launch

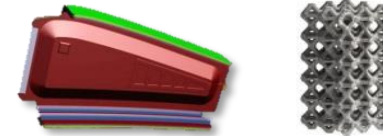


Product Data Management (PDM)

EN/NAS 9300-2xx series

STEP AP239
STEP AP242 ed1 & ed2

2004 launch

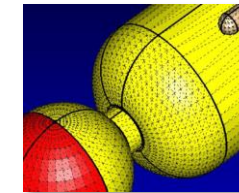


Composites and Advanced Manufacturing

EN/NAS 9300-3xx series

STEP AP203 ed2
STEP AP242 ed1 & ed2

2009 launch



3D Visualization

Requirements and Compliance Documents

2012 launch
2017 Complete

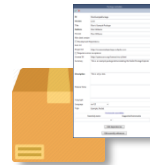


Wiring Harness

EN/NAS 9300-4xx series

STEP AP242 ed2

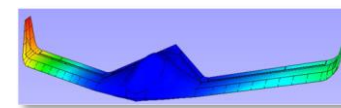
2012 launch



Meta Data for Archive Packages

EN/NAS 9300-21
STEP AP239 ed3
STEP AP 242 ed2

2012 launch

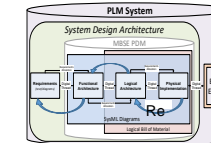


Engineering Analysis and Simulation

EN/NAS 9300-6xx series

ISO STEP AP209 ed2

2014 launch



Model-Based System Engineering

EN/NAS 9300-5xx series

STEP AP233 ed2
STEP AP239 ed3
STEP AP243 ed1,
FMI, SysML, etc

2018 launch



Basic & Common Parts

EN/NAS 9300-001-099 series

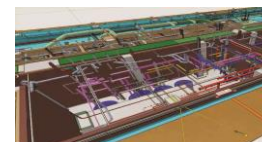
2004 launch



Electronics (PCB, etc.)

EN/NAS 9300-700 series

Launch TBD



Mechanical Transport Elements (Tubing, Mech/Hydr., HVAC, etc.)

EN/NAS 9300-800 series

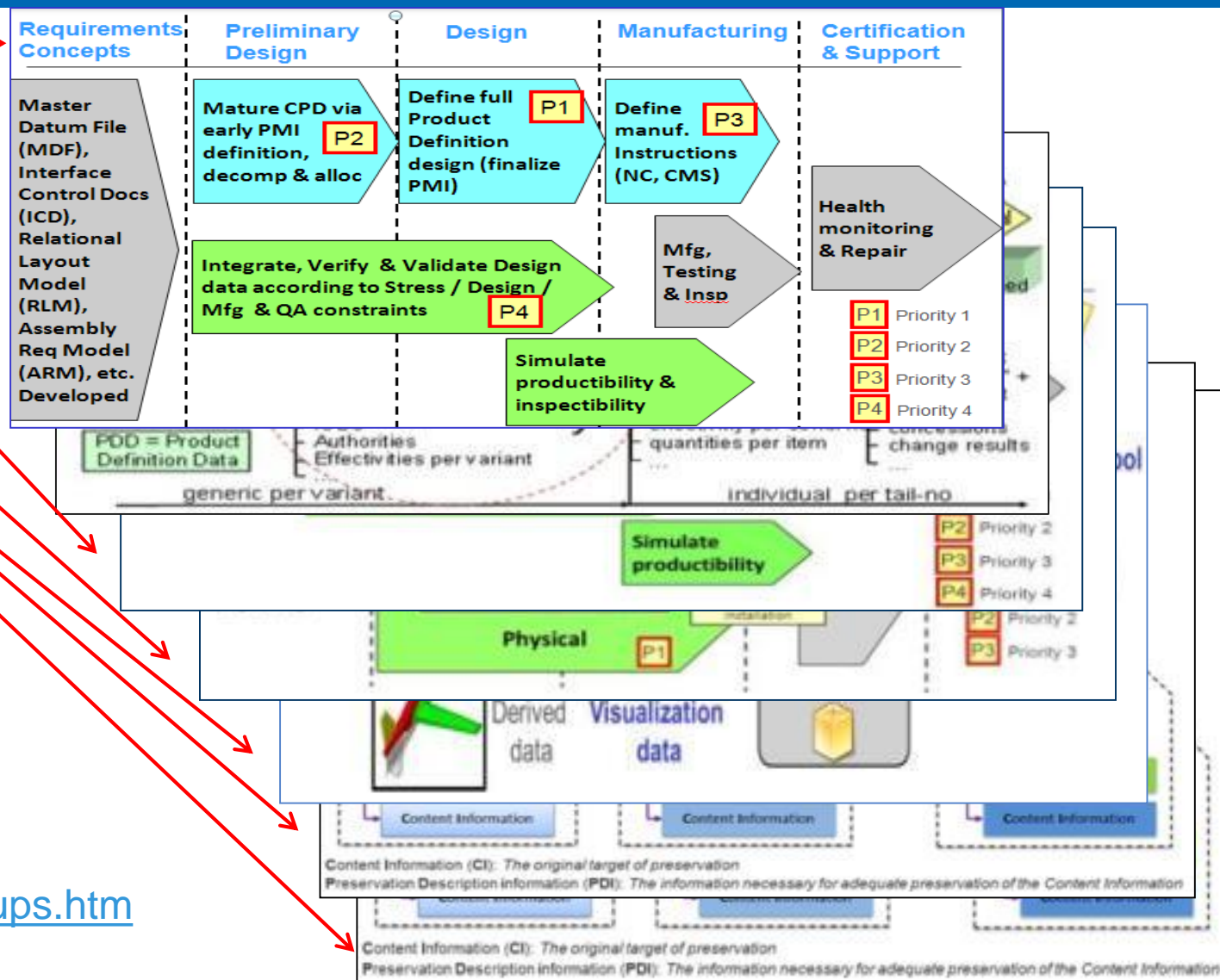
Launch TBD

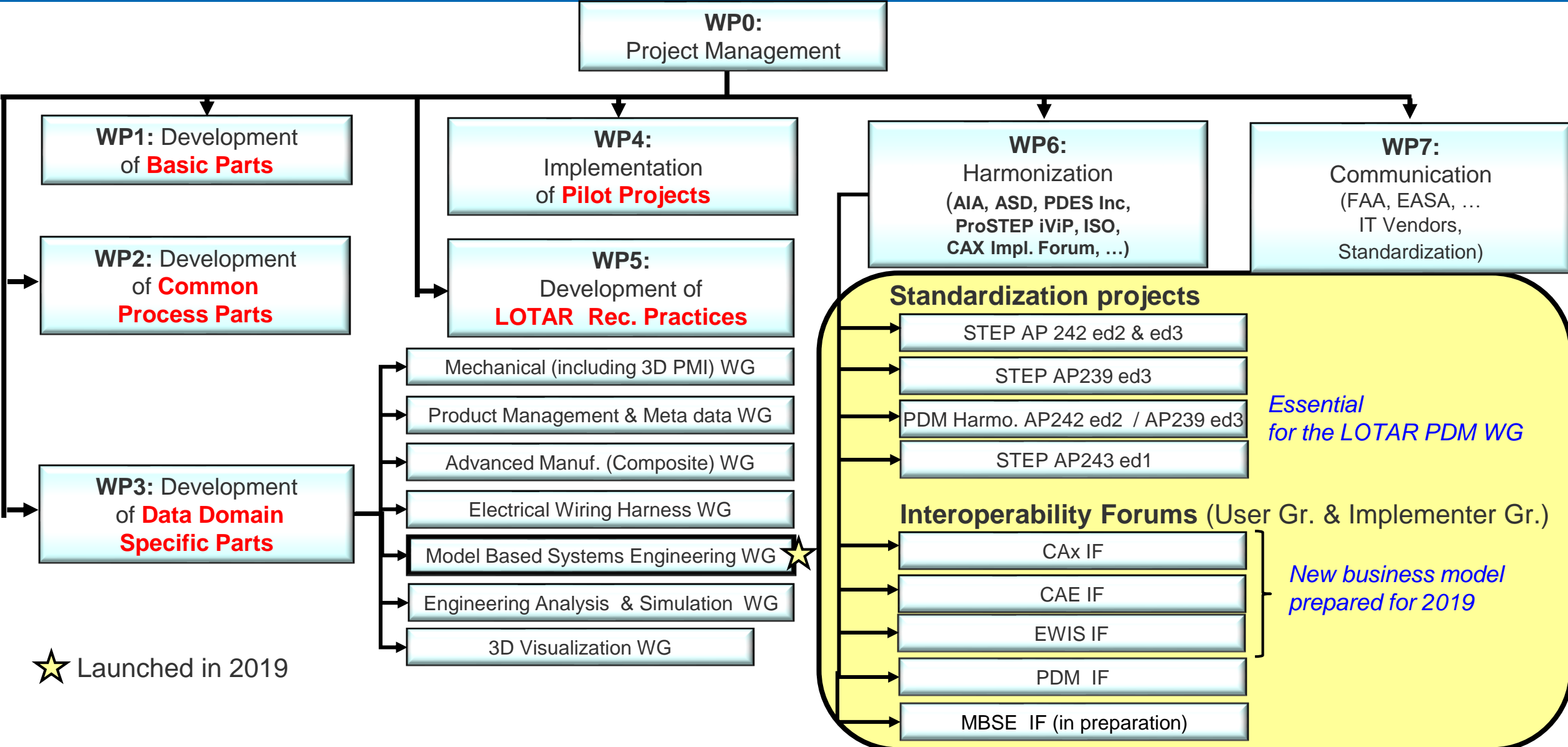
- 3D Mechanical / PMI WG
- PDM – Conf. Management data WG
- Advanced Mfg. - Composite WG
- Electrical Wiring Systems WG
- 3D Visualization WG
- Meta data for archive packages
- Model Based System Engineering WG
- Engineering Analysis & Simulation WG

Description of a LOTAR WG web page

- Goals and Objectives
- Associated LOTAR use cases
- LOTAR Family of Standards
- Associated ISO 10303 Information Models
- Meetings & teleconferences
- Accomplishments
- Related standardization projects

<http://www.lotar-international.org/lotar-workgroups.htm>

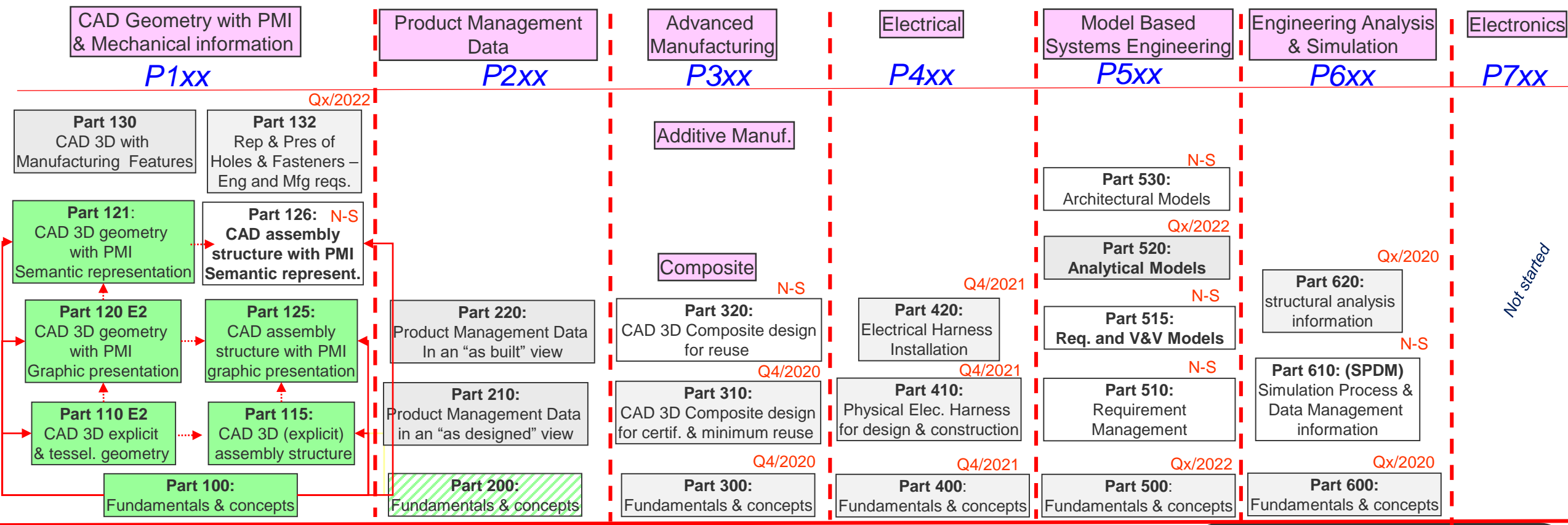




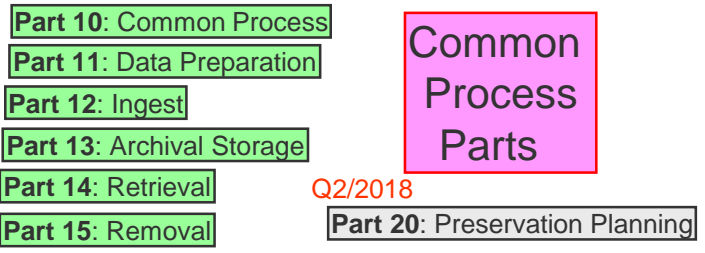
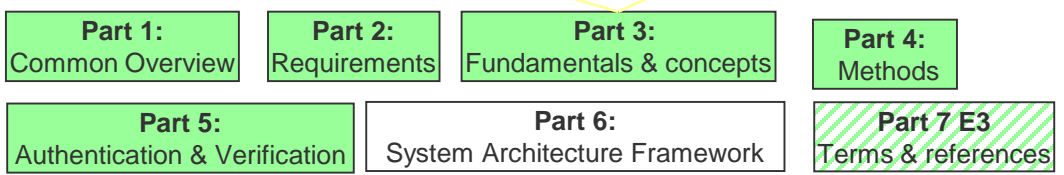
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Data Domain Specific Parts



Basic Parts



REL	: Release NAS9300 / prEN9300
FINAL REV.	: Comments received answers/update in progress
BALLOT	: Sent for ballot by ASD & AIA
DRAFT	: In preparation
Q3/20	: planned data Start of AIA & ASD ballot
N-S	: no started

3 parts send for publication to ASD Stan and AIA: P120 ed2, part 121, part 125.

2019	2020	2021	2022	2023
	Review and Update Basic Parts (001-009)			
	Review and Update Common Parts (010-099)			
	Dev and Update Mech/PMI Parts (115e2, 126e1 Assembly PMI)			
	Dev and Update Mech/Mfg. Parts (130-132 - Mach Features, Holes/Fasteners)			
	Dev and Update Mech/QIF Parts (140-145 Quality V&V, Measurement)			
	Dev and Update PDM/PLM Parts (200e2, 210e1, 220e1 As-Designed, As-Built)			
	Dev and Update Composite Parts (300e1, 310e1 – Supporting AP209e2, AP242e2/e3)			
	Dev and Update Advanced Mfg. Parts (350e1, 360e1 – Supporting AP242e2/e3)			
	Dev and Update Electrical WHParts (400e1, 410e1, 420e1 – Supporting AP242e2/e3)			
	Dev and Update MBSE Parts (500e1, 510e1, 520e1 – Supporting AP233e2/AP243e1)			
	Dev and Update Eng. Sim & Analysis Parts (600e1, 610e1, 620e1 – Supporting AP209e2, AP209e3/e4 dev.)			

Supporting AP242e2 and e3

Supporting AP239e3 and AP242 ed2

EUROPE:

- AFNeT
- Airbus
- Airbus Helicopter
- Airbus Defense & Space
- SAFRAN Engine

AMERICAS:

- BAE Systems
- Boeing
- Embraer
- General Electric
- Gulfstream
- Lockheed Martin
- Sandia National Labs
- UTC: in progress (Pratt Whitney, Collins Aerospace, Goodrich, Raytheon)

- 1st meeting: (16) 17 - 19 March, Toulouse, France, hosted by AFNeT
- 2nd meeting: (14) 15 - 17 June, USA, hosted by PDES Inc
- 3rd meeting: (7) 8 -11 Sept., Darmstadt hosted by prostep ivip
 - GPDIS 2020: 14th – 18th of September, USA
- 4th meeting: (6) 7 - 9 Dec., USA, hosted by PDES Inc

The Leadership Team in conjunction with AFNet, PDES, Inc. and prostep ivip, decided to alternate meeting locations bi-yearly in order to strengthen the collaboration between Interoperability Forums and associated User Groups.

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Overview of AIA and ASD SSG recommendations to use LOTAR standards: ASD SSG recommendations



EN9300 LOTAR (LOng-Term Archiving and Retrieval of 3D digital aerospace product information, such as CAD and PDM)	OK	Track	ASD development
EN9300-1xx (Long-Term Archiving and Retrieval of 3D Geometry, CAD structure and Product Manufacturing Information)	OK	Adopted	ASD development
EN9300-2xx (LOng-Term Archiving and Retrieval of Product Management Data & Configured Mechanical Product Structure)	OK	Track-Candidate	ASD development
EN9300-3xx (LOng-Term Archiving and Retrieval of Composite information)	OK	Track-Candidate	ASD development
EN9300-4xx (LOng-Term Archiving and Retrieval of Electrical Harness information)	OK	Track-Candidate	ASD development
EN9300-5xx (LOng-Term Archiving and Retrieval of Model-based Systems Engineering information)	OK	Track	ASD development
EN9300-6xx (LOng-Term Archiving and Retrieval of Engineering Analysis and Simulation information)		Track	ASD development

<http://www.asd-ssg.org/web/asd-ssg/radar-chart>

EN9300 LOTAR 1xx

ASD recommends the use of EN9300 LOTAR standards parts 100, 110, 115 and 120 by the European aerospace and defense industries for long-term archiving and retrieval of CAD 3D explicit geometry, 3D Product Manufacturing Information and CAD assembly structure, with effect from July 2012.

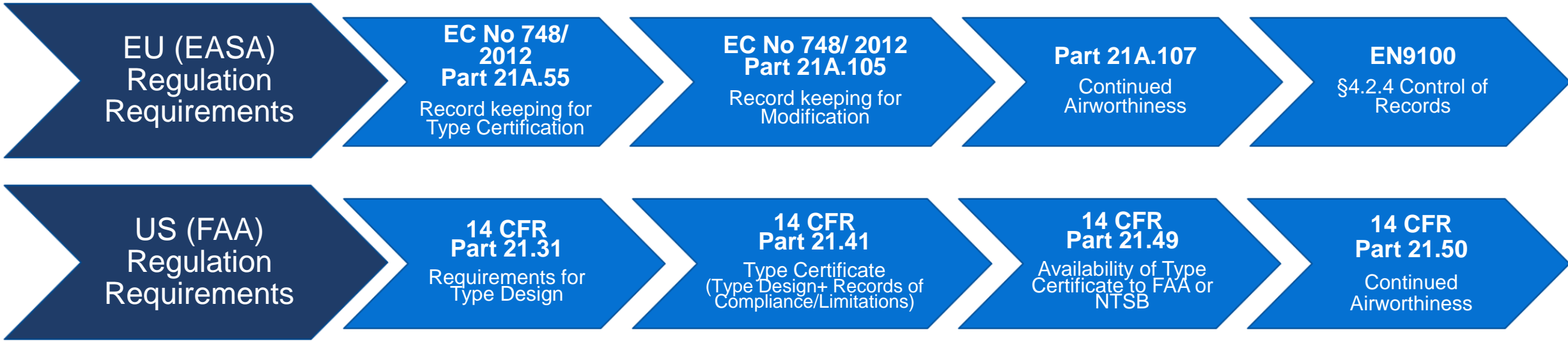
The SSG recommends European aerospace and defence OEM to participate in the LOTAR PDM working group in order to speed up the development of the different parts according to their business priorities.

Recommendation formally agreed by ASD SSG on 5th of October 2012.

Related blip: [EN9300 LOTAR 3D-PMI](#)

<http://www.asd-ssg.org/recommendations>

Document & Data Archiving is a legal obligation defined by external requirements and by internal company policies.



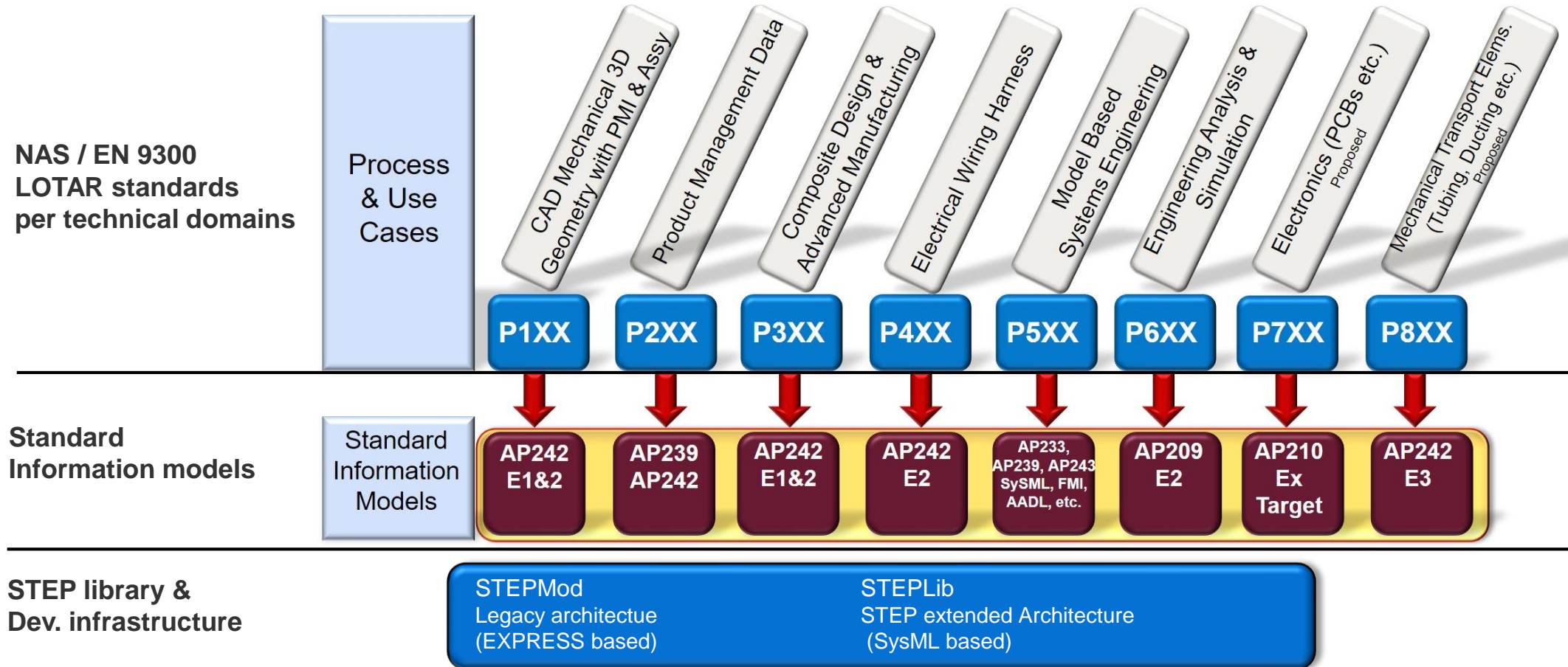
The FAA and EASA have promoted efforts to harmonize the regulations, so there are many similarities between them. This may have to be updated to support digital processes and definitions.

- Summary of AIA BTIC meeting on the 6th of Nov. with FAA
 - Interest raised by the FAA to participate in LOTAR meetings organized in USA in 2020

- Preparation of ASD Stan LOTAR meeting with EASA for the status of NAS / EN 9300 LOTAR standards in 2020
 - Potential participation of EASA to LOTAR meetings in Europe

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LOTAR Domains and Related standards Information Models

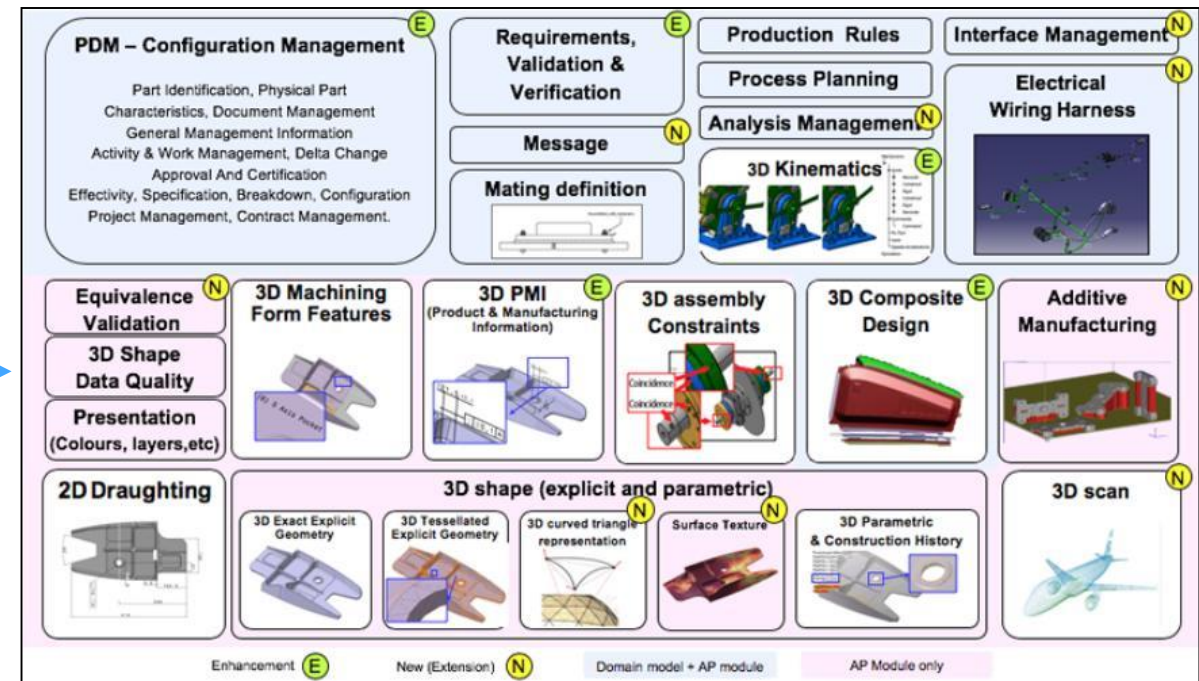


Need to ensure

- the longevity / enhancement of the international product information standards (ISO 10303 STEP and other standards such as FMI, SysML, etc), including their development infrastructure as part of the preservation plan,
- the consistency between standards.

■ Main interdependencies with – Technical information standards

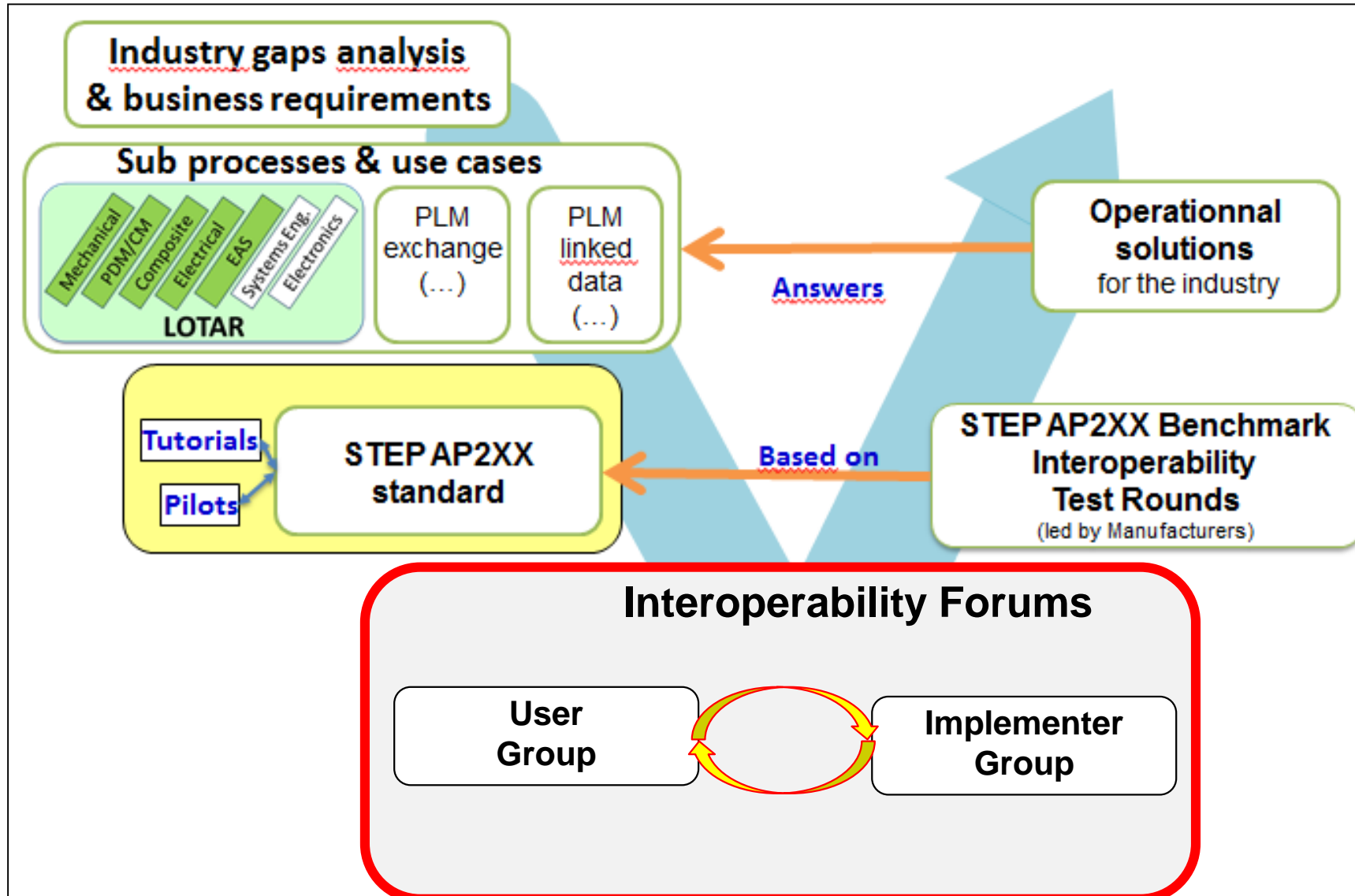
- ISO 10303 STEP:
 - AP242 ed1 / [ed2](#) →
 - AP209 ed2,
 - AP243 MoSSEC,
 - AP239 ed3 PLCS,
 - (AP238 ed2 - future)
 - AP233 ed2, etc
- ISO 23952 QIF (DIS adoption in progress)
- Non ISO standards Modelica FMI, OMG SysML, etc







To be published as International Standard by ISO in Q1 2020

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Interdependancies between Business requirements, LOTAR, STEP standards and associated Implementer

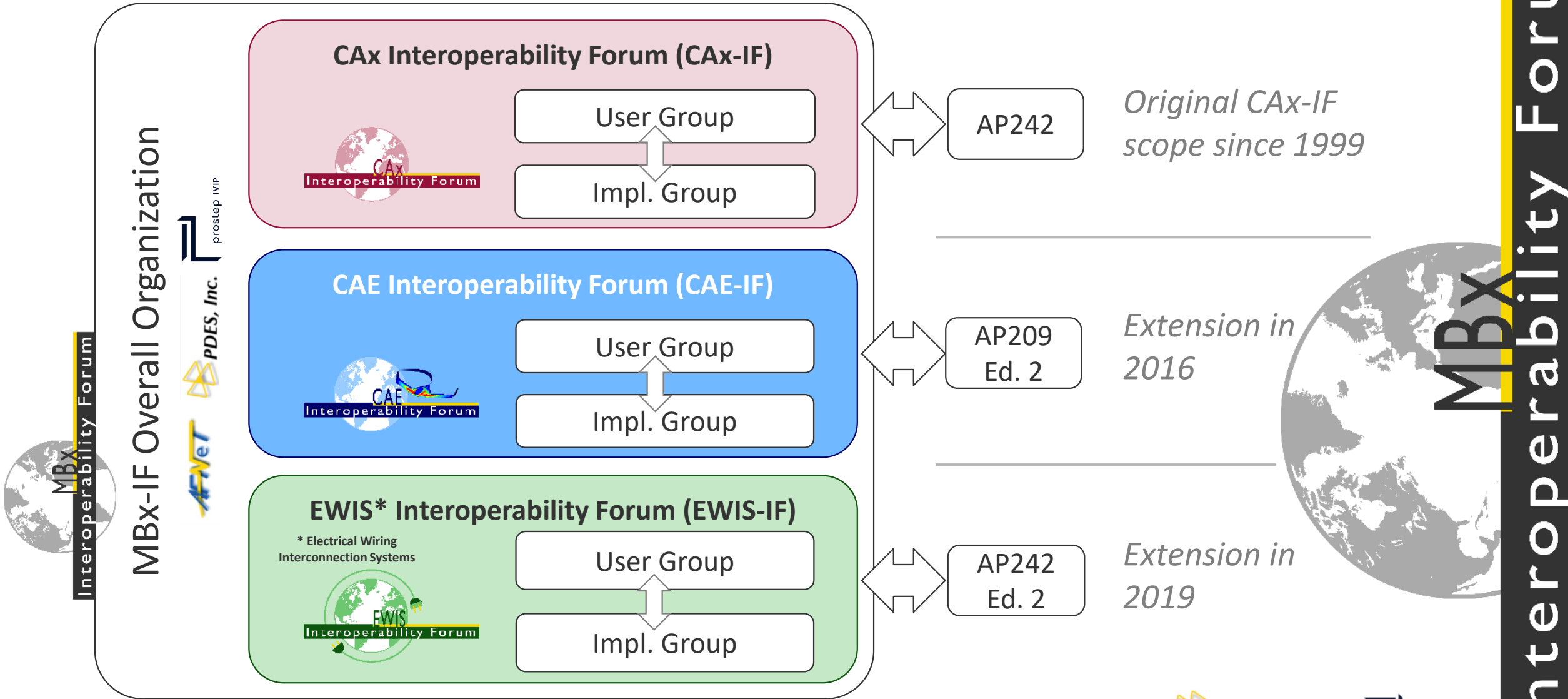


- Increasing need to speed up the deployment of PLM interoperability and LT Archiving solutions based on test rounds with PLM editors and integrators

- Participations of LOTAR WGs to the User Groups of Interoperability Forums:
 - **CAX IF:** for mechanical interoperability, based on AP242 
 - **EWIS IF:** for Elec. Wiring Harness interoperability, based on AP242 ed2 
 - **CAE IF:** for Structural Analysis interoperability, based on AP209 ed2, 
 - **PDM IF:** for PDM – CM interoperability, based on AP242 
 - *Future MBSE IF (in preparation)*

- Tri lateral MoU in progress between PDES Inc, prostep ivip and Afnet for a common template of Interoperability Forum

MBx-IF Project Framework



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 - Target date: end of Nov., beg. Of Dec. for 2020: ?

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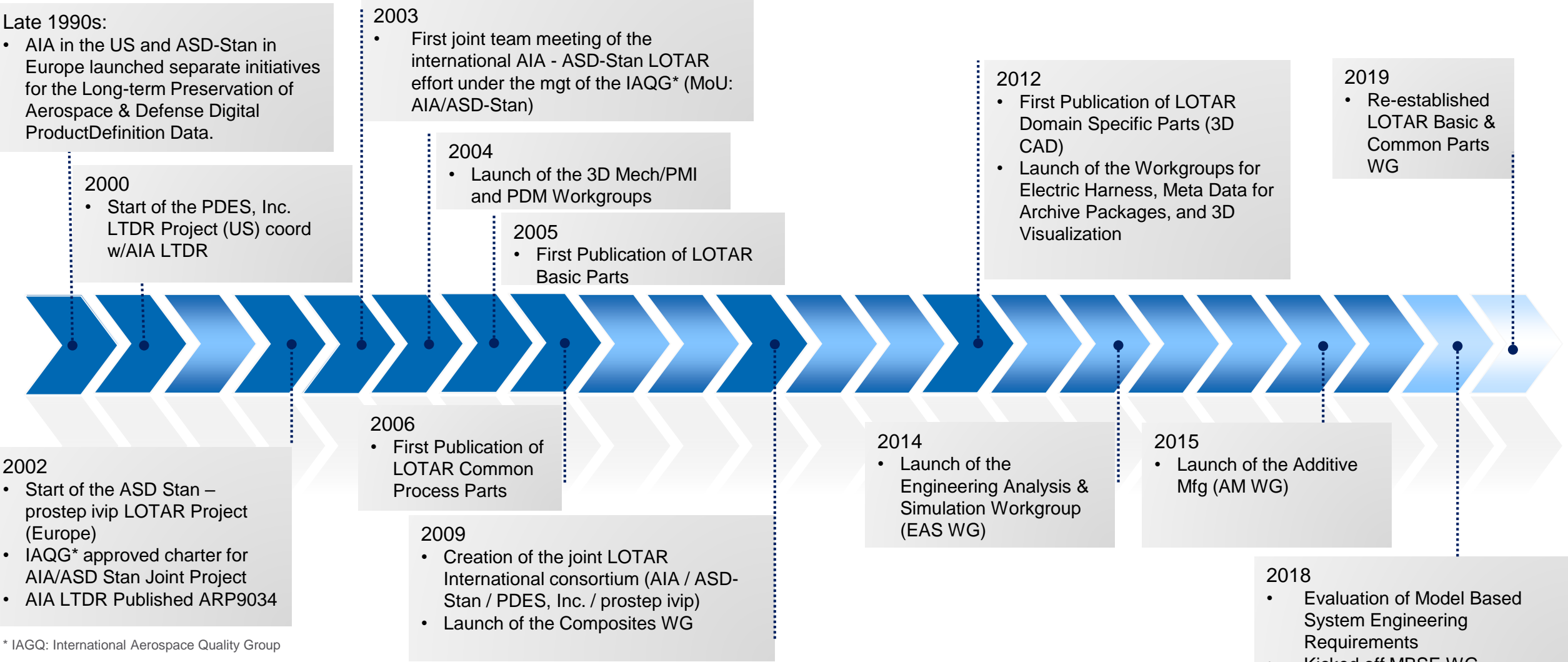
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BACK UP SLIDES



* IAQG: International Aerospace Quality Group