LOTAR and Product Data Interoperability Standards

ASD SSG Workshop 3rd – 4th March 2026

Bernd Feldvoss – Airbus

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3 March 2026

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No Data Left Behind: Sustaining Operational Capability Through LOTAR

Services Commission (SVC) #65

Kyle Hall – Airbus

5 March 2026

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What are we to discuss?

What and why do we need product data interoperability standards?

Who contributes to these standards?

The role of LOTAR

Future challenges

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Product Data Interoperability Standards

There are three main axes covered by Product Data Interoperability Standards:

Enabling collaboration within Airbus and with Extended Enterprise partners without vendor lock in

Providing a solution for Long Term Archiving to fulfill authority requirements

Allowing for the re-use of information from legacy projects

The main goal is to move from document and 2D based drawings to "model based" and a data centric way of working

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What is standardization?

Development of content

• Including different perspectives

To make everything the same?

Finding consensus

Networking

CONTENT ➡ Experts
PROCESS ➡ ISO, IEC, ...

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Why do we need standards?

Approvals

Comparability

Annoying obstacles?

Knowledge transfer

Upscaling

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Who should join?

Airbus Amber

Public sector

Users

Industry

Labor unions

Safety at work

Environmental protection

Science and Research

Rule-making institutions

Consumer protection

Testing institutes

Only Profs/CEOs?

Expert ≠ Ph.D.

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Why should I get involved?

Assessing Model-Based Enterprise maturity

	Drawing-Centric	Drawing Model-Centric	Validated Model-Centric	Formalized Model-Based Definition	Trusted Model-Based Definition	Integrated Model-Based Enterprise	Extended Model-Based Enterprise
Level Name	Drawing-Centric	Drawing Model-Centric	Validated Model-Centric	Formalized Model-Based Definition	Trusted Model-Based Definition	Integrated Model-Based Enterprise	Extended Model-Based Enterprise
Level Identifier	L0	L1	L2	L3	L4	L5	L6
Level Theme	2D Drawings Only; Disconnected	2D Drawings & STEP Derived from 3D Models; Drawings Managed, Disconnected from Models	2D Drawings & Equivalent Derivatives from Validated 3D Models; Drawings Managed, Disconnected from Models	3D Models with Semantic PMI Added; Producing 3D Interactive Viewables; Managed as Part-Centric	Digital Model-Based Definition (MBD), Certified & Authorized; Managed & Sourced as Part-Centric	Enterprise Integrated from Trusted Digital Product Definition Dataset; Process Data Managed with Part-Centric	Enterprise Extended with Optimized Capabilities and Extended Partners

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Collaboration Challenges

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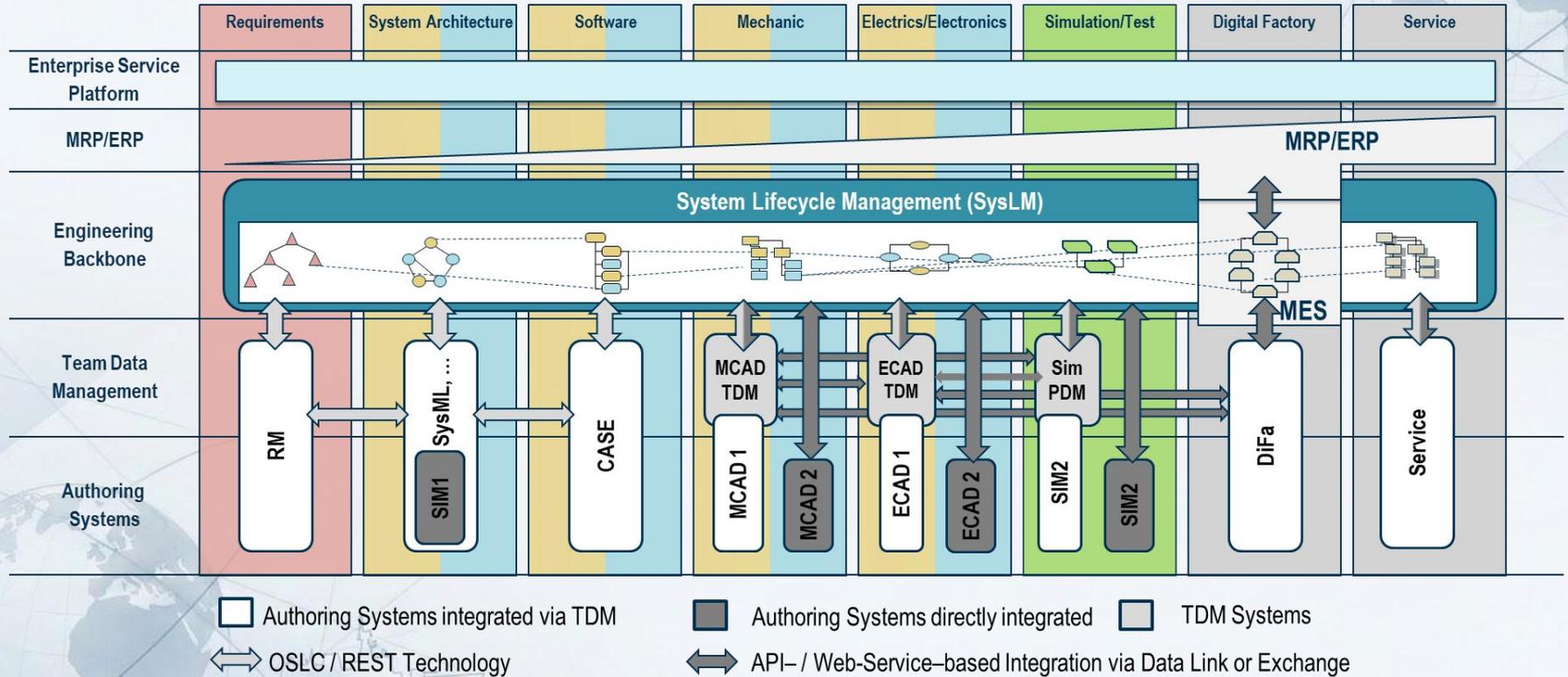
US DoW Digital Engineering

2018

2019

2020

2023

2026

Digital Engineering

Systems Engineering

Modular Open Systems Approach (MOSA)

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Standards Development Organizations (SDO's)

Associations & Initiatives supporting Standardization

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Interoperability Standards - Who/Where?

Activity	Purpose	🌐	🇺🇸	🇪🇺	🇫🇷	🇩🇪	🇬🇧
Trades Associations	Define the governance Influence the standard developments of a specific trade	AD PLM Action Group	AIA	ASD / ASD SSG	GIFAS	BDLI	ADS
Standardization Bodies	Stamp the standard Publish the norm	ISO/IEC / OMG	SAE	CEN/CENELEC / ASD STAN	BNAE		
National Standardization Organisations	Organise the ballot at national level		NIST / ANSI		AFNOR	DIN	BSI
Standardization Associations	Lead the standardisation proposal and maintenance	OPC Foundation	PDES Inc. / DMSC		AFNeT	prostep ivip / IDTA IDSA	Team Defence
Standard Developers	Act in developing the standardisation proposal	INCOSE / Modelica		Eurostep / JOTNE	AFNeT Services	Prostep AG	
Implementer Forums	Define the use cases Prototype recommended practices Test editors solutions Link from bodies to editors and users		CAx IF / EWIS IF		CAx IF / PDM IF / EWIS IF / RV&V IF	CAx IF / PDM IF / JT IF	

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LOTAR - LOng Term Archiving and Retrieval
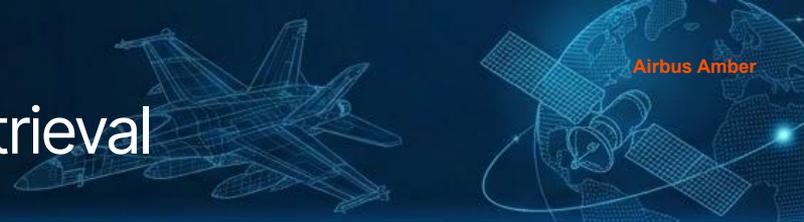
LOTAR is an international consortium of Aerospace manufacturers.

Its primary objective is the creation and deployment of the EN/NAS 9300 series of standards for the long-term archiving and retrieval of digital data, which is based on standardized approaches and solutions.

The project's goal is to develop, publish, and maintain standards to enable the archiving and retrieval of digital product and technical information, including 3D CAD and PLM data, in a standard neutral form that can be read and reused throughout the product lifecycle.

The standards are published as the NAS 9300 (US) and EN 9300 (Europe) series and cover both the information content and the processes required to ingest, store, administer, manage, and access the information.

The LOTAR (EN/NAS 9300) process standards are based on the Open Archive Information System (OAIS) standard (ISO 14721).

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LOTAR Organisation

LOTAR Industry Usage

Airbus Amber

A&D company	Area of application	Scope	NAS / EN 9300 LOTAR parts (CAD)				ISO formats	Project status
			CAD 3D Exact Geometry	CAD 3D Tessellated Geometry	CAD 3D PMI Present.	CAD Assembly structure		
			Part 110	Part 110	Part 120	Part 115	ISO 10303 "STEP"	
Airbus Commercial	A350	3D Electrical Harness Installation & Definition	Yes	Yes	Yes	Yes	AP 214 ed3 (°) + AP 242 ed1	PROD
Airbus Defence & Space		"Full 3D" model based	Yes	Yes	Yes	Yes	AP 242 ed1	DEV
Dassault-Aviation	Falcon 7X	complete definition of the aircraft (airframe, brackets, pipes, harness)	Yes	No	Yes	Yes	AP 214 ed3 (°)	PROD
Snecma	New parts of engines	3D definition with PMI of new mechanical part	Yes	No	Yes	No	AP 214 ed3 (°)	PROD
Boeing	787	3D definition with PMI with assemblies	Yes	No	Yes	Yes	AP 203 ed3 (°) + U3D PDF	PROD
Gulfstream	G500, G600, G650	3D mBD mechanical, electrical and composite	Yes	No	Yes	No	AP 203 ed2 (°)	PROD
Lockheed-Martin	F35	3D mBD mechanical, electrical and composite	Yes	No	Yes	Yes	AP 203 ed2 + AP242 ed1	PLANNED
EMBRAER	Legacy 450 & Legacy 500	complete definition of the aircraft	Yes	No	Yes	Yes	AP 242 ed1	DEV
MTU Aero Engines	New parts of engines	3D definition without PMI of new mechanical part	Yes	No	No	In Prep.	AP 214 ed3	PROD

PLANNED : project planned
DEV : project in development
PROD : project on production
(°): Plan to migrate to STEP AP 242 ed1 when possible

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Motivation & Drivers

Driven by **legal and business requirements** of the aerospace and defense industry

Conversion to stable formats mitigates information loss risk and minimizes migration costs

Digital data archiving is a **legal obligation** (FAA, EASA, internal policies)

EN/NAS 9300 standards consider legal rules, long-term archiving, design reuse, and operational support

Short lifecycle of **software/hardware** vs. **long aircraft lifespan** (70+ years) makes preservation a challenge.

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Regulatory requirements for LOTAR

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

EU (EASA) Regulation Requirements

EC No 748/ 2012 Part 21A.55	EC No 748/ 2012 Part 21A.105	Part 21A.107	EN9100
Record keeping for Type Certification	Record keeping for Modification	Continued Airworthiness	§4.2.4 Control of Records

US (FAA) Regulation Requirements

14 CFR Part 21B.20	14 CFR Part 21B.41	14 CFR Part 21A.3	14 CFR Part 21B.49
Records of Compliance with requirements for Type Certificate	Type Certificate (Type Design + Records of Compliance + Limitations)	Reporting of failures, malfunctions and defects	Availability of Type Certificate to FAA or NTSB

The FAA and EASA have promoted efforts to harmonize the regulations, so there are many similarities between them.

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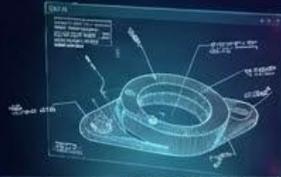# LOTAR Working Group

2018
Basic & Common Process Parts
EN/NAS 9300-00x, -01x series & -021

STEP AP203, AP214, AP242

2004
Mechanical 3D CAD with Product and Manufacturing Information (PMI)
EN/NAS 9300-1xx series

STEP AP203, AP214, AP242

2004
Product Data Management (PLM)
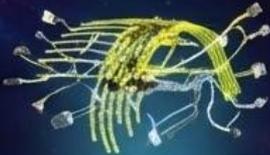EN/NAS 9300-2xx series

STEP AP239, AP242

2009
Composites and Advanced Manufacturing
EN/NAS 9300-3xx series

STEP AP203, AP242

2012
Electrical Wiring Harness
EN/NAS 9300-4xx series
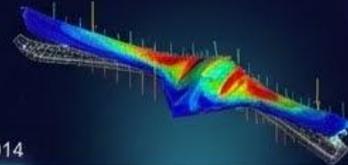
STEP AP242

2018
Model-Based 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

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LOTAR Standards Overview

Data Domain Specific Parts

3D Mechanical CAD & PMI	Product Management Data & Configured Product Structure	Composite Design & Advanced Manufacturing	Electric Wiring Harness	Model-Based Systems Engineering	Engineering Analysis and Simulation	Electronics *(not started)*
P1xx	P2xx	P3xx	P4xx	P5xx	P6xx	P7xx

Common Process Parts
(Common Process, Data Preparation, Ingest, Archival Storage, Retrieval, ...)

Basic Parts
(Overview, Requirements, Fundamentals, Methods, ...)

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LOTAR Industry Members

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BOEING

EMBRAER

GE Aviation

Gulfstream

LEONARDO

LOCKHEED MARTIN

Pratt & Whitney

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LOTAR Potential new members

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LOTAR Recent Achievements

Basic and Common Standards

⚙️ EN/NAS 9300-002 Ed. 2 in preparation

✅ EN/NAS 9300-003 Ed. 2 Published December 2025

⚙️ EN/NAS 9300-005 Ed. 2 in preparation

✅ EN/NAS 9300-010 Ed. 2 Published November 2025

⚙️ EN/NAS 9300-021 publication in preparation

Domain Specific Standards

✅ EN/NAS 9300-100 Ed. 2 Published June 2025

⚙️ EN/NAS 9300-110 Ed. 2 publication in preparation

✅ EN/NAS 9300-120 Published in September 2025

✅ EN/NAS 9300-121 Published in September 2025

✅ EN/NAS 9300-125 Published in September 2025

✅ EN/NAS 9300-205 Published in December 2025

✅ EN/NAS 9300-210 Published in June 2025

⚙️ EN/NAS 9300-230 publication in preparation

⚙️ EN/NAS 9300-300 publication in preparation

✅ EN/NAS 9300-500 Published in January 2026

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LOTAR Workshops 2026

1st Qtr. Workshop:
23-27 March 2026;
North Charleston, SC, USA.

In conjunction with MBx-IF Workshop
(CAx-IF Round 57J Review;
EWIS-IF Meeting).

3rd Qtr. Workshop:
28 September – 2 October 2026;
Frankfurt Area, Germany

In conjunction with MBx-IF Workshop
(CAx-IF Round 58J Review; EWIS-IF Meeting).

In conjunction with Engineering
Interoperability Day (STEP AP242 & JT Day).

2nd Qtr. Workshop:
23-26 June 2026; Online Meeting.

In conjunction with MBx-IF Workshop.

4th Qtr. Workshop:
1-3 December 2026; Online Meeting.

In conjunction with MBx-IF Workshop.

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MBx Interoperability Forum - Recommended Practices

- CAx IF
- PDM IF
- EWIS IF

prostep ivip

- SysML v2 IF (launching in March 2026)

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Product Data Interoperability Standards - Challenges

FOUNDATIONAL SHIFTS

Data centric way of working

Collaboration Digital Engineering
- Data Exchange
- Data Sharing
- Data Federation

MANAGEMENT & SECURITY

Metadata Alignment
- Whole Lifecycle → Change Management
- Extended Enterprise → IP Protections, Export Controls, Cybersecurity, Fixity, Circular Economy

INITIATIVES & STANDARDS

Dataspaces
- Gaia-X
  - Catena-X
  - Aerospace-X
  - Decade-X

OMG CASCaRA

SMART Standards

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SMART Standards

Machine readable content
Semantic enrichment of content for selective access
Receive content of multiple standards for a given purpose.

XML
Machine readable document
Structured content of standard documents. Content can be processed by software.

PDF
Open digital format
Read and search on screen.

Paper
Standards available in paper
No machine interactions available.

Machine interpretable content
Self-learning analysis and validation cycles
Information modeling that expresses content and rslation between elements.

Individually
Standards as a service
Provides dynamic deliverables that can adapt to user needs.

Future extensions

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