LOTAR

LONG TERM ARCHIVING AND RETRIEVAL

Overview of the LOTAR project and LOTAR standards, Status of implementation in Europe

Digital Preservation Coalition workshop
27th of July 2013, Bath

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Prepared with Jean-Yves Delaunay: EADS Airbus

AIA - ASD Stan LOTAR co project leader

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Table

- Introduction – objective
- Overview of the LOTAR project
- Overview of the LOTAR standards
- Summary of implementation of LOTAR standards in Europe
- Summary – next actions

Introduction

- End of the 1990ies: different initiatives are launched in USA and in Europe for L-T Preservation of Aerospace and Defence Definition Dossier based on CAD 3D and PDM information
- 2005: convergence of the US PDES Inc - AIA LTDR project and of the ASD Stan - ProSTEP iViP LOTAR project, under the IAQG
  - IAQG: International Aerospace Quality Group
- 2008: creation of the LOTAR International project
- 2012: publication of the NAS9300 / EN9300 standards
  : 2-ed2, 5, 7, 100, 110, 115, and sending for ballot of the part 120
  : foundation for LT Preservation of CAD 3D PMI “graphic presentation”
- 2012-2015: preparation of the standards for L-T Preservation of:
  - CAD 3D PMI “semantic representation” and 3D light visualization,
  - CAD 3D composite design ,
  - PDM information (priority 1 : “As design” product structure),
  - CAD 3D Electrical harness

Objectives of this presentation

- To provide an **overview of the LOTAR project**
- To provide a **status of the LOTAR standards**
- To focus on LOTAR parts for LT archiving and retrieval of CAD information
  - CAD 3D PMI (“Product and Manufavturing Information”)
  - CAD 3D composite design
  - CAD electrical harness
  - 3D visualization

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- Introduction – objective
- Overview of the LOTAR project
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- Summary – next actions

LOTAR International public web site : Overview

Why Lotar?
- ▶Mission, Objectives & Scope
- ▶Hosting Organizations
- ▶Legal & Business Motivation

LOTAR organization
- ▶External View
- ▶Internal View
- ▶Working together

LOTAR Workgroups
- ▶3D CAD with PMI
- ▶PDM
- ▶Composite
- ▶Electrical Harness
- ▶3D visualization
- ▶(Meta data for archive packages)

Communication
- ▶Public presentations
- ▶Progress Reports
- ▶Dates

LOTAR standards
- ▶Overview on parts
- ▶Industry use
- ▶Next steps

News
Links
Contact

http://www.lotar-international.org/home.html

?

LOTAR International project
A&D companies members in 2013

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Members (Americas)

- BAE Systems
- Boeing
- Bombardier
- Embraer
- General Dynamics
- General Electric
- Goodrich
- Honeywell
- Lockheed Martin
- Sandia National Labs
- Spirit Aero

Potential Members (Americas)

- Cessna

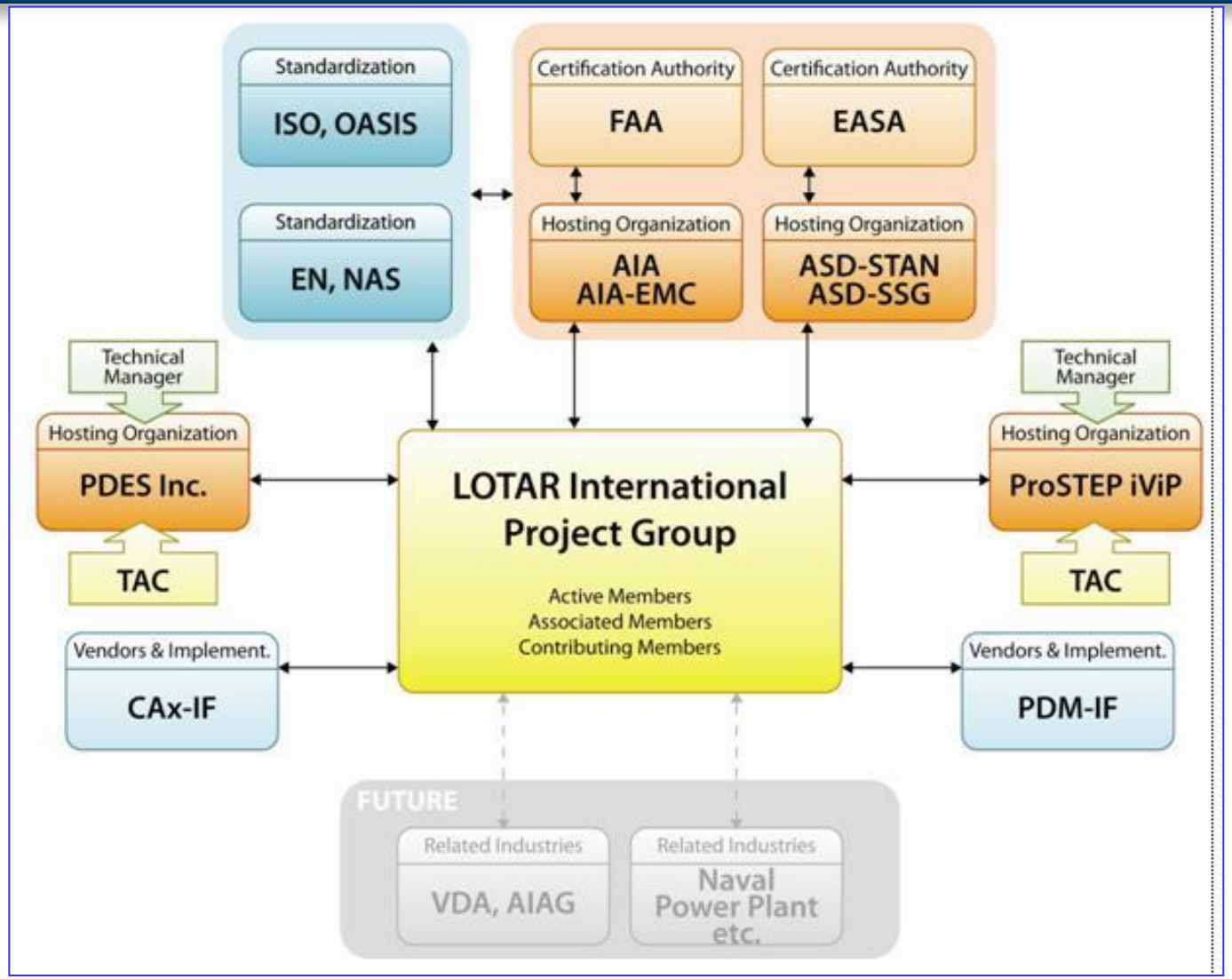
Members (Europe)

- *Airbus*
- *CASSIDIAN*
- *Dassault Aviation*
- *Eurocopter*
- *IAI (Israel Aerospace Industries)*
- *SAFRAN Labinal*

Potential Members (Europe)

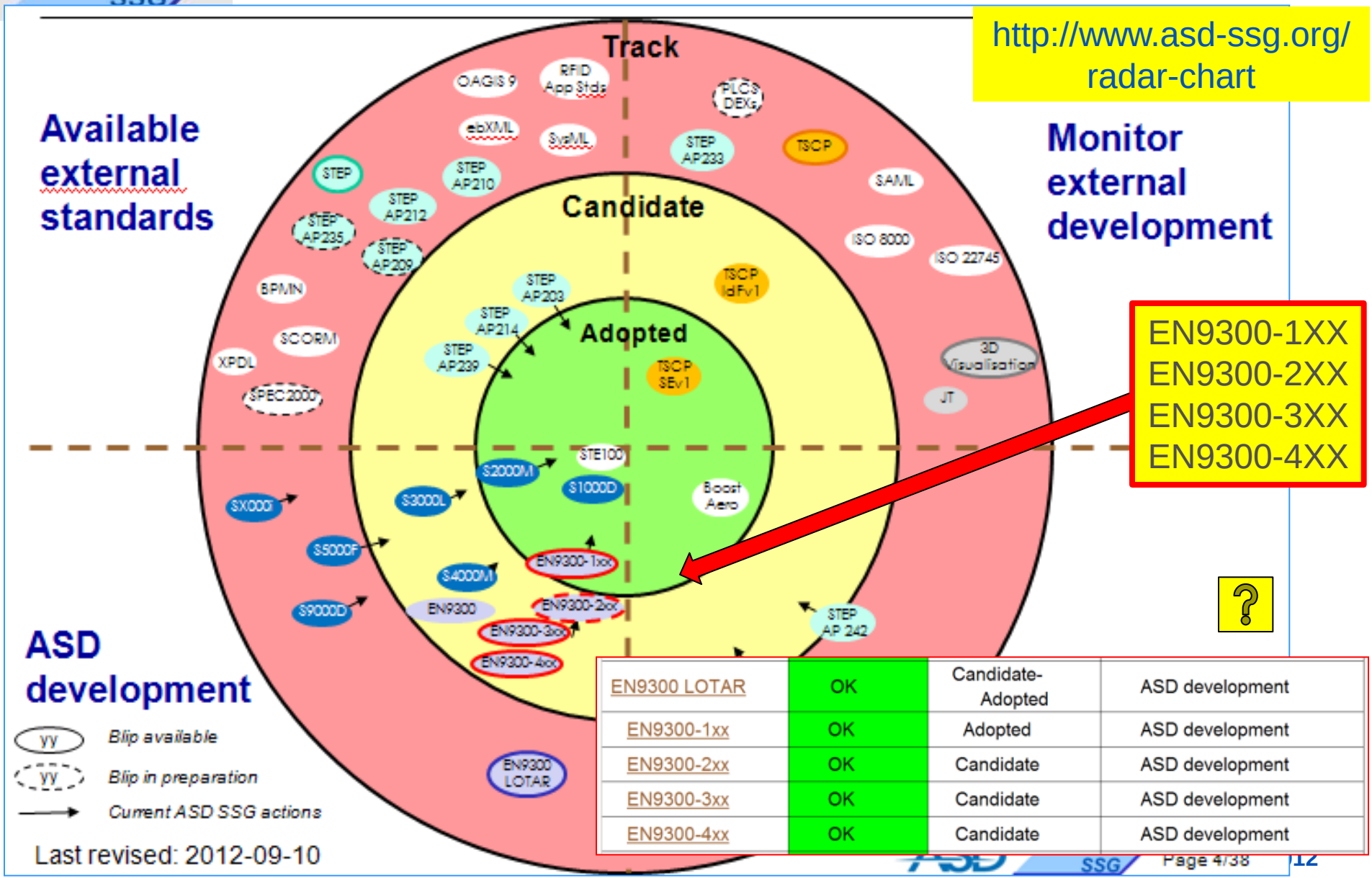
- *Thales*

LOTAR International project and external relationships



2013 status of the SSG « Radar screen » : EN9300 standard « adopted »

http://www.asd-ssg.org/radar-chart



EN9300 LOTAR	OK	Candidate-Adopted	ASD development
EN9300-1xx	OK	Adopted	ASD development
EN9300-2xx	OK	Candidate	ASD development
EN9300-3xx	OK	Candidate	ASD development
EN9300-4xx	OK	Candidate	ASD development

EN9300 standard summary of the ASD SSG and associated recommendations

AeroSpace and Defence Industries Association of Europe

E-Business SSG

Technology Radar Element Description

LOng-Term Archiving and Retrieval of 3D digital aerospace product information, such as CAD and PDM (LOTAR)

Abstract

The LOTAR project is designed to provide a capability to preserve digital aerospace and defense product information in a standard neutral form that can be read and reused throughout its lifecycle, independent of changes in the IT application environment originally used to cre

The multi-

processes

The LOTAR

LOTAR, su

AIA, under

Responsib

Steering Bo

Lead Orga

ASD Stan

ASD SSG

ASD LOTAR

ASD adoption statement

ASD recommends the use of EN9300 LOTAR standards by the European aerospace and defense industries for projects for LT Archiving and Retrieval of CAD 3D geometry and CAD assembly structure, with effect from March 2010.

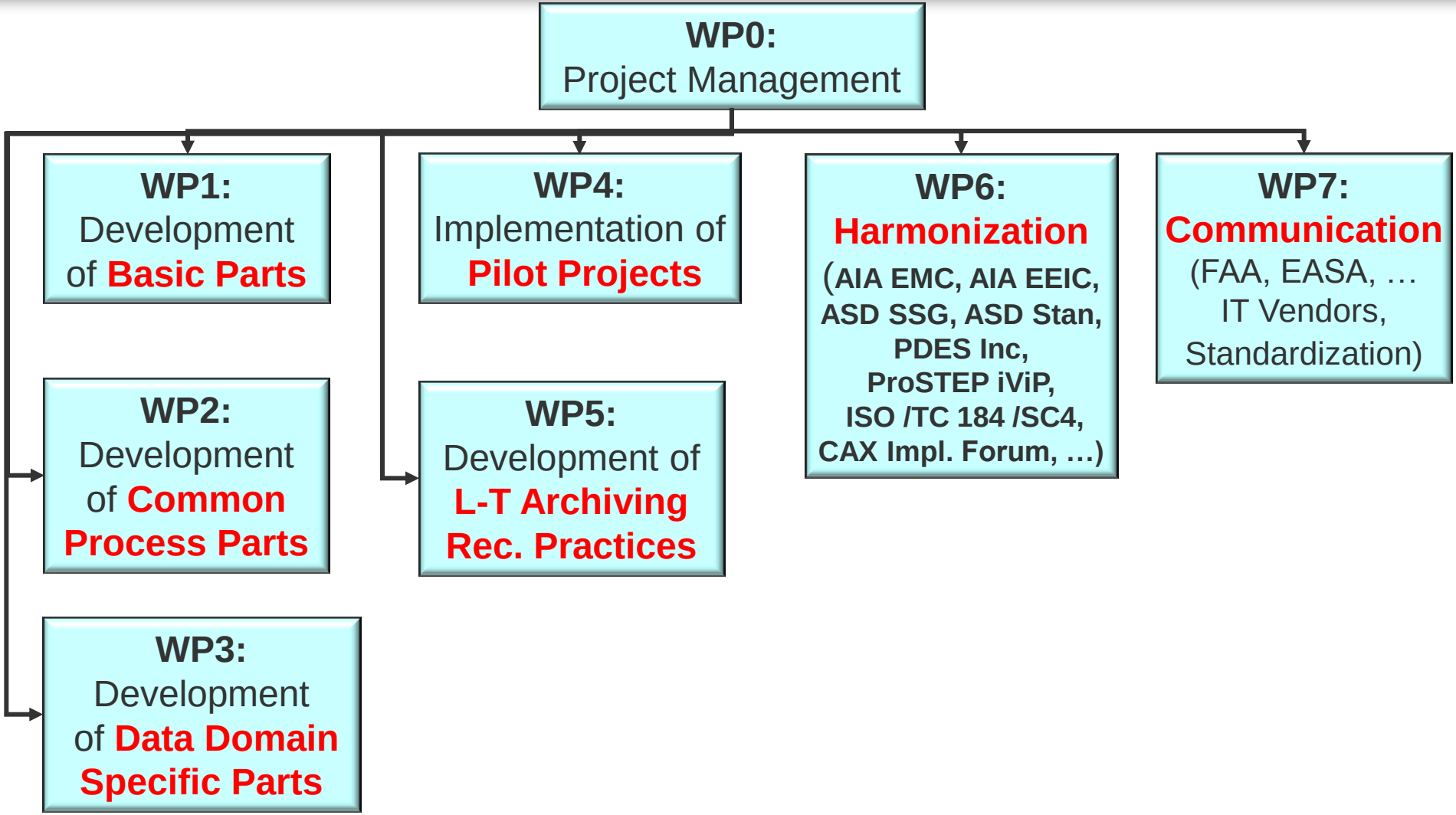
ASD recommendation

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

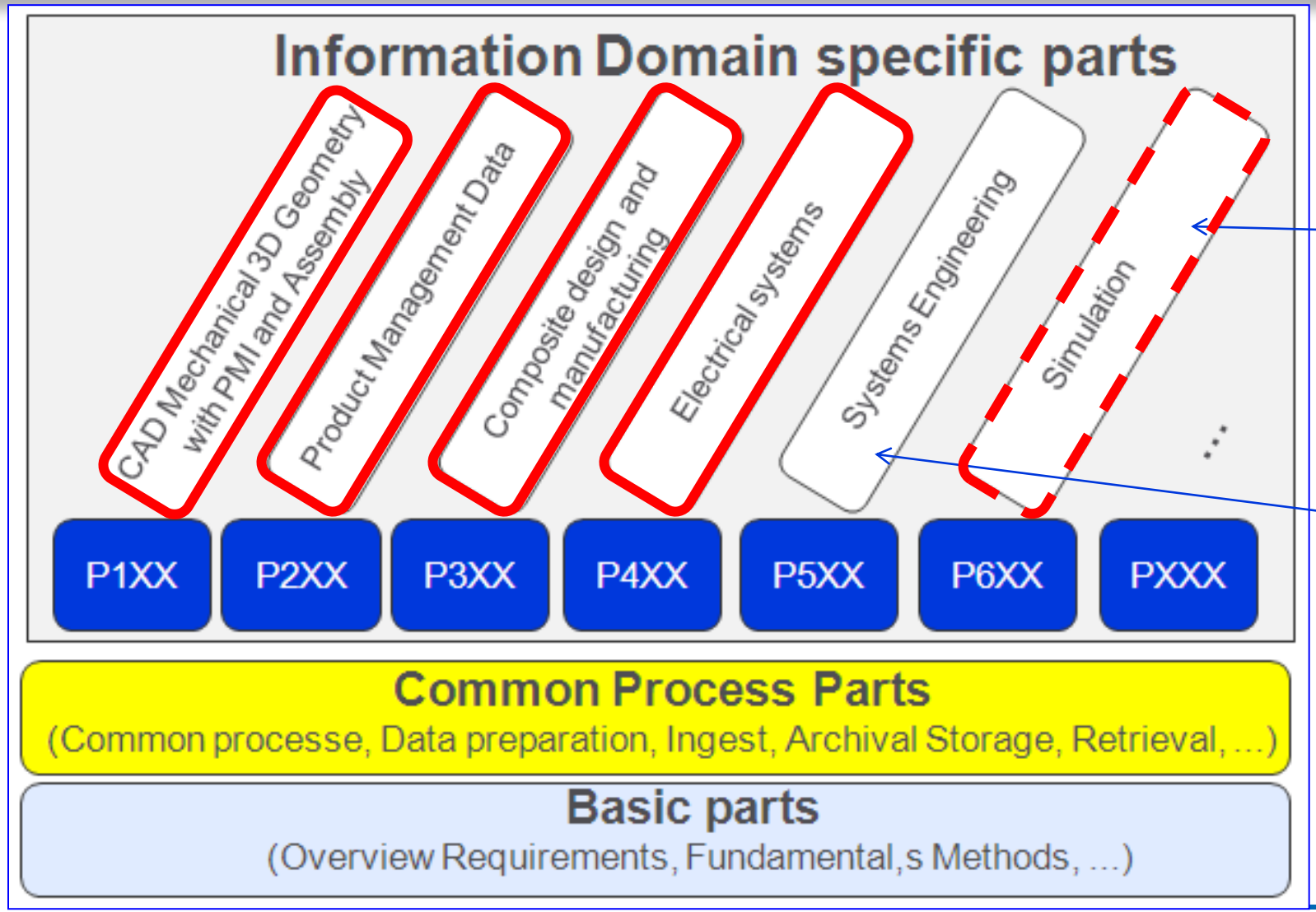
Link to a standards host site

http://www.lotar-international.org/

LOTAR 2013 WBS



Overview of NAS / EN 9300 LOTAR standards
An architecture for extensions according to business needs



Preparation of the creation of a new WG in 2014

Not planned

Active participation of A&D manufacturers, and coordination with standardization associations

- **4 international LOTAR workshops of 3 days:**
  - 11th – 13th of March 2013 USA, NIST (parallel to the PDES Offsite)
  - 11th – 13th of June 2013 Europe, Toulouse, Cimpa
  - 23th – 25th of Sept. 2013 USA, PDES Inc (parallel to the PDES Offsite)
  - 3th – 5th of Dec. 2013 Europe, Darmstadt, ProSTEP iViP

- **Weekly teleconferences of the main Working Groups:**
  - PDM WG, CAD 3D PMI WG, CAD 3D composite WG,
  - Coordination team

  Bi weekly teleconferences:
  - Elec. Harness WG, 3D visualization, WG, Meta data for Archive Pack. WG

- **Coordination with A&D and PLM standardization associations**
  - Aerospace and Defence manufacturers associations: AIA and ASD
  - PLM Standardization associations: PDES Inc and ProSTEP iViP

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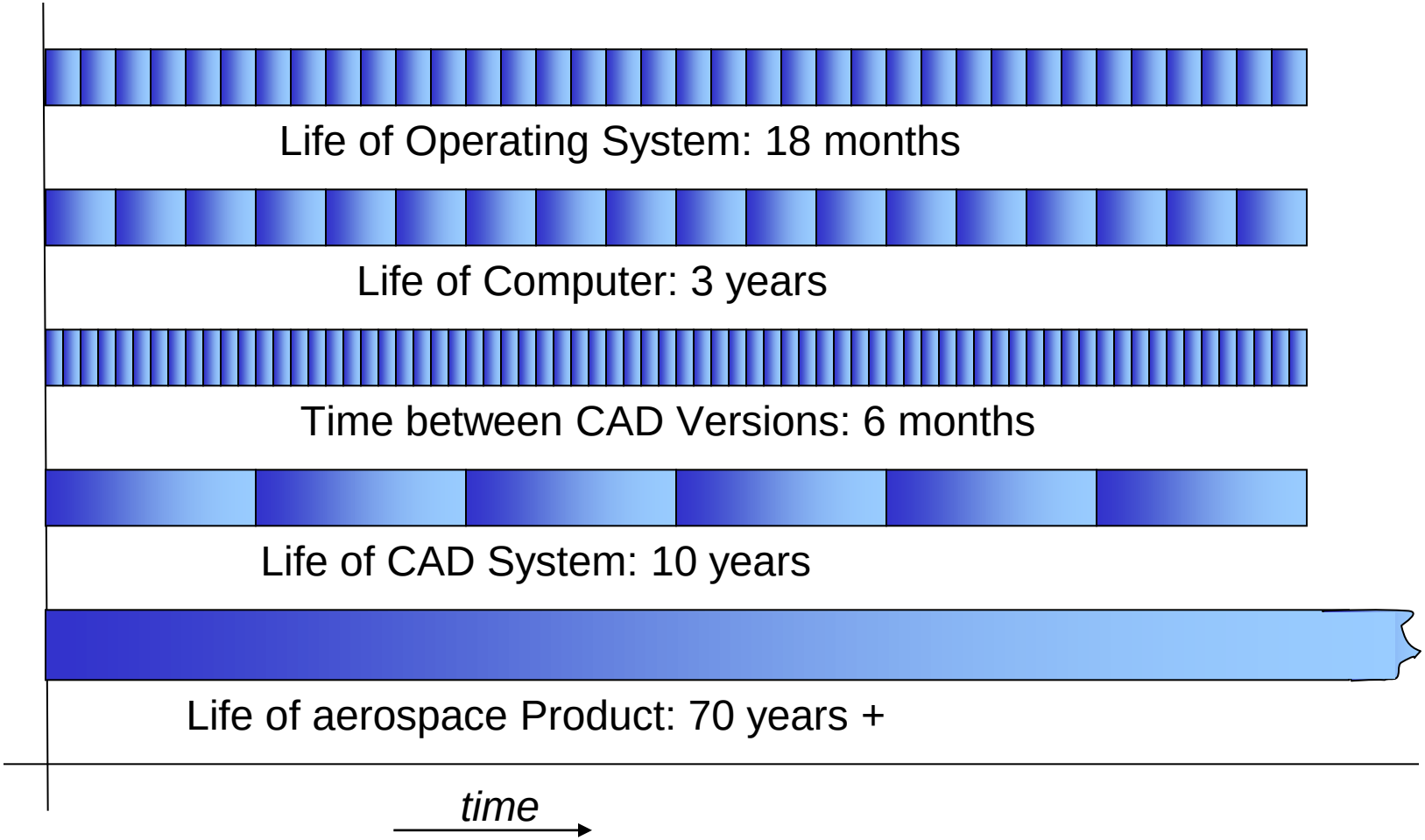
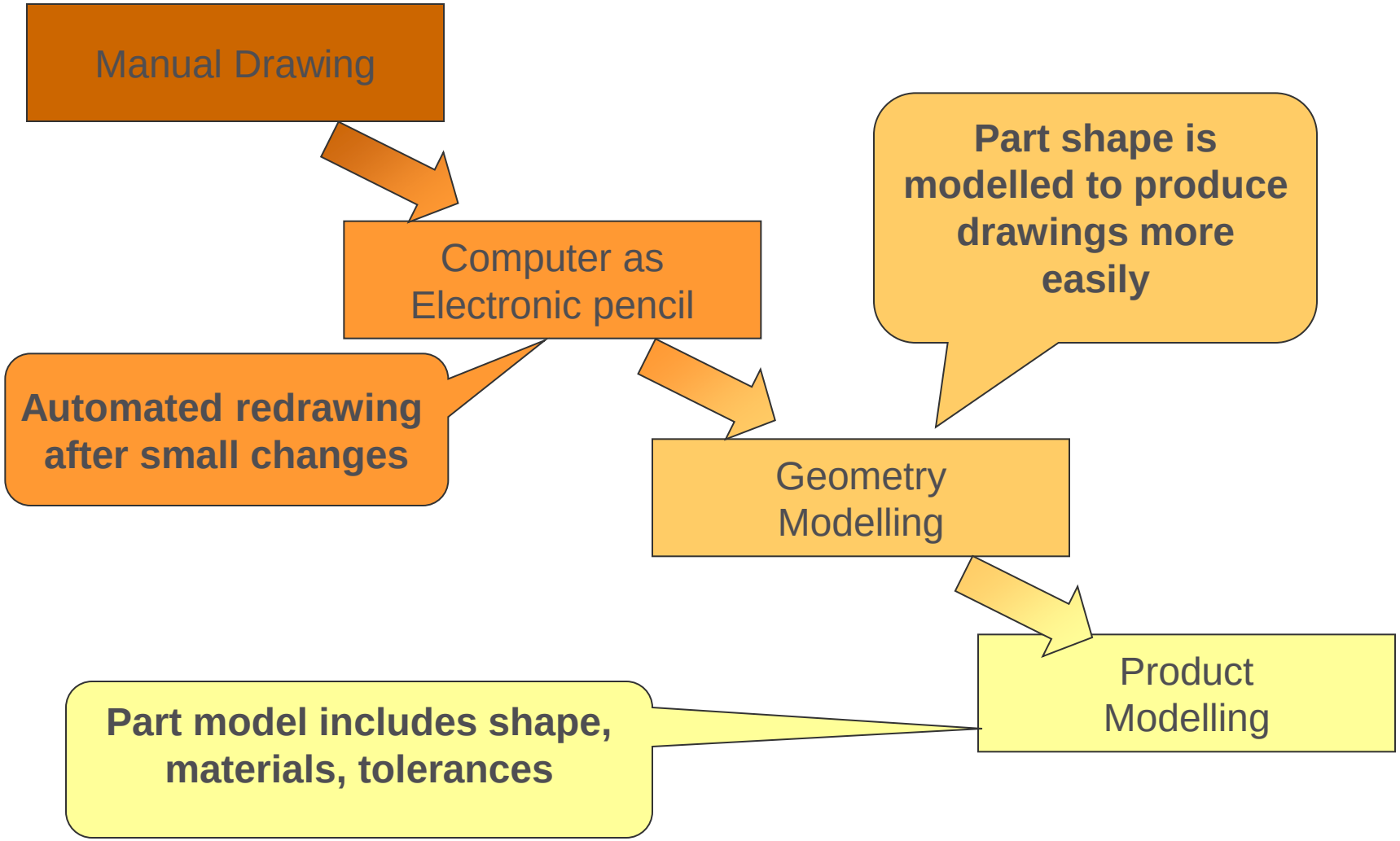
- Overview of the LOTAR standards
- Summary of implementation of LOTAR standards in Europe
- Overview of the Airbus project for Long Term Archiving and Retrieval of the A350 3D electrical harness installation
- Summary – next actions

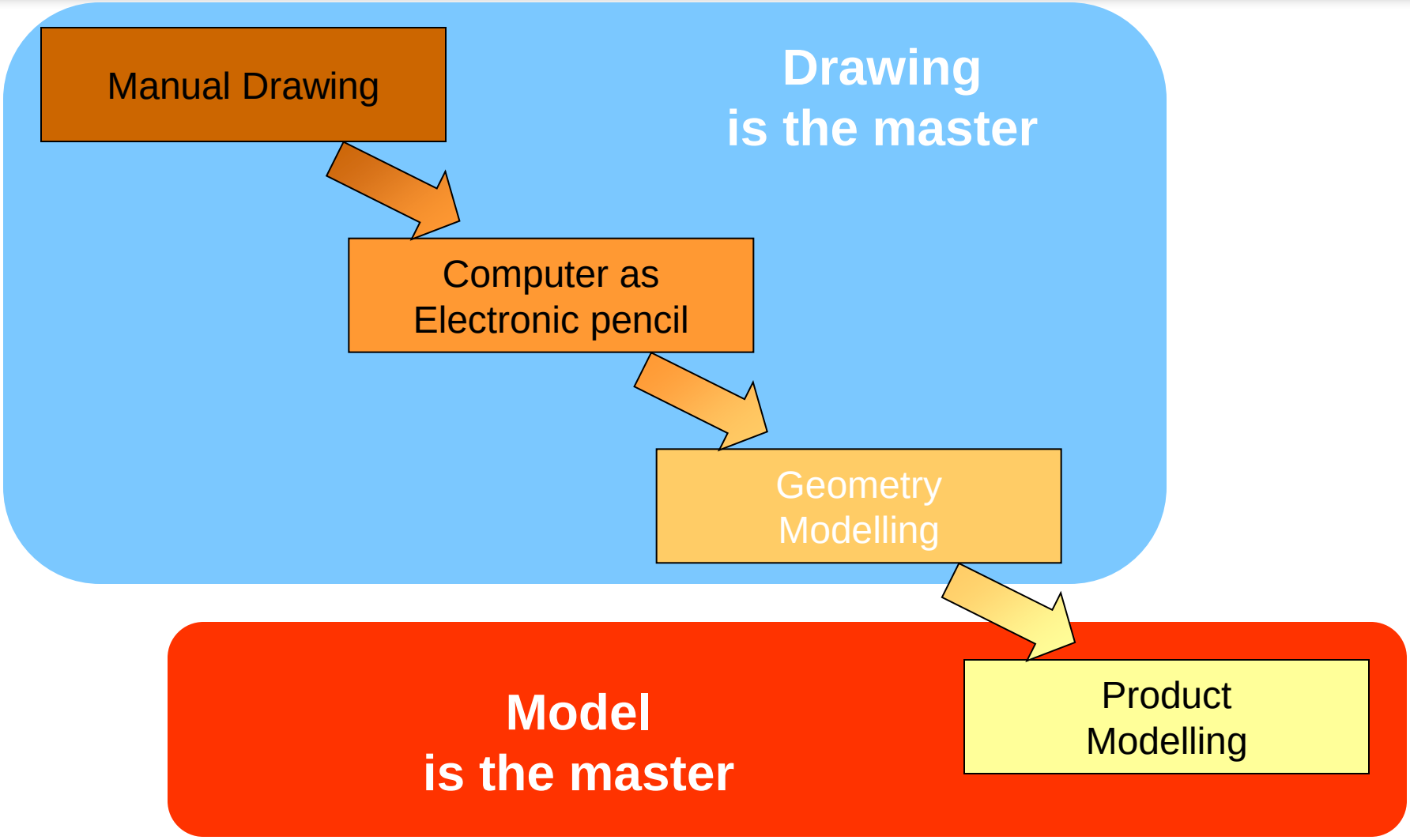
Rates of Change of technologies versus the longevity of an aerospace product



A Brief History of CAD



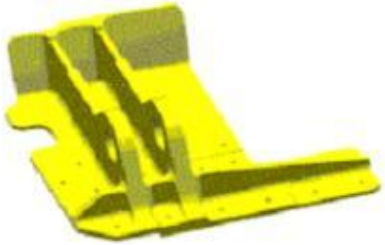
What is the master?

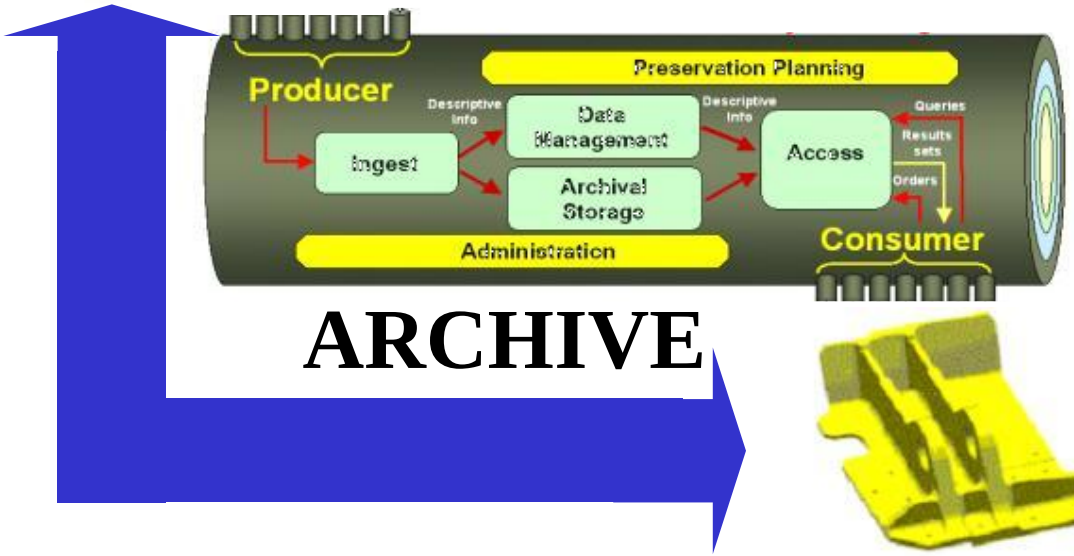


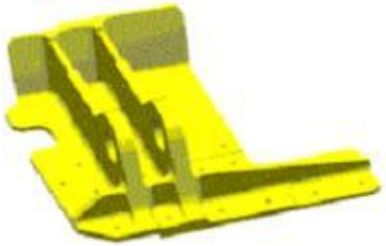
Model Verification

For model as master, we need to prove we have retained the master

What Went In







Is What Came Out

The LOTAR project: To support the **longevity** of Aerospace & Defense 3 D Model based definition

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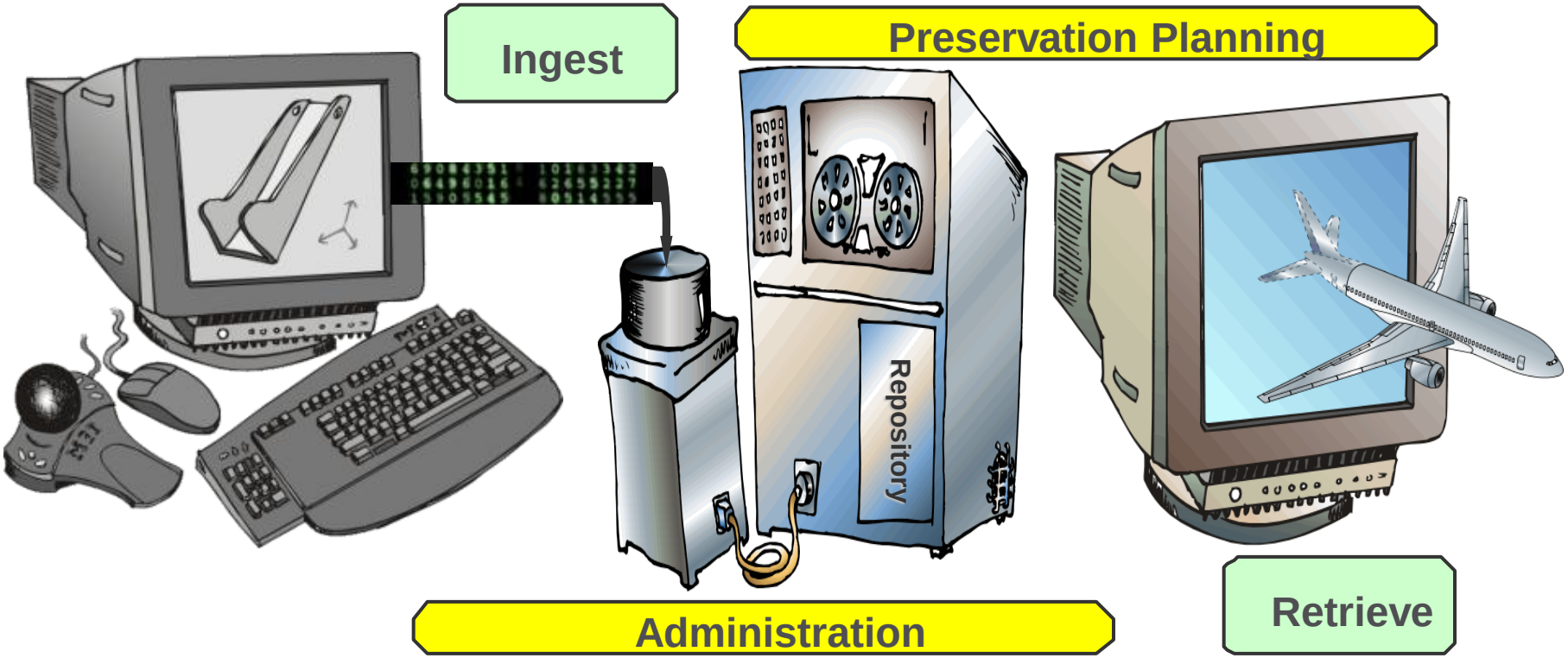
- CAD S/W versions change every **6 to 12 months**, CAD generations change every **10 years**.
- Aircraft lifecycle of **70+ years**
- The Lifecycle of software & hardware is short compared to the lifecycle of an aircraft or a defence system (nuclear missile, ...)



Status of NAS/EN 9300 Basic Parts

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001: Common Overview

– Objective, structures of the EN9300 parts

Publi. Q2 2012

002: Requirements

– Business Requirements **(Acceptance, legal, security, certification)**
– Functional Requirements based on the OAIS reference model

Publi. Q2 2012

003: Fundamentals and concepts

– Product model, OAIS ISO, ISO Open product data standards (STEP), representation - presentation, validation / verification, key characteristics

004: Methods **(description)**

– Scope/ scenario, Use Case diagram, process, data, system architecture

Publi. Q2 2012

005: Authentication and Verification

– Electronic Keys, Electronic signature, Hash Code, Authentication, Verification, electronic time signatures

006: Architecture Framework (new)

– Identification of sub-systems with associated functions

Publi. Q2 2012

007 Terms and References (new)

– Common to all parts of EN9300 (updated with new parts)

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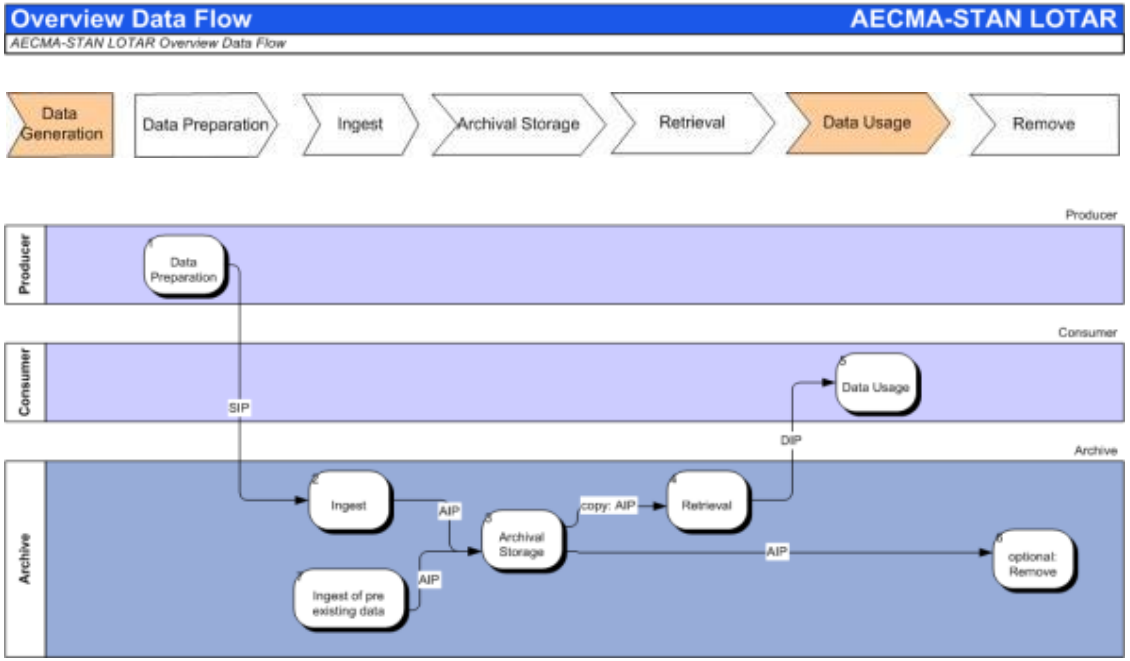
Status of NAS/EN 9300 Common Process Parts

- 010: Overview Data Flow
- 011: Data Preparation
- 012: Ingest
- 013: Archival Storage
- 014: Retrieval
- 015: Removal



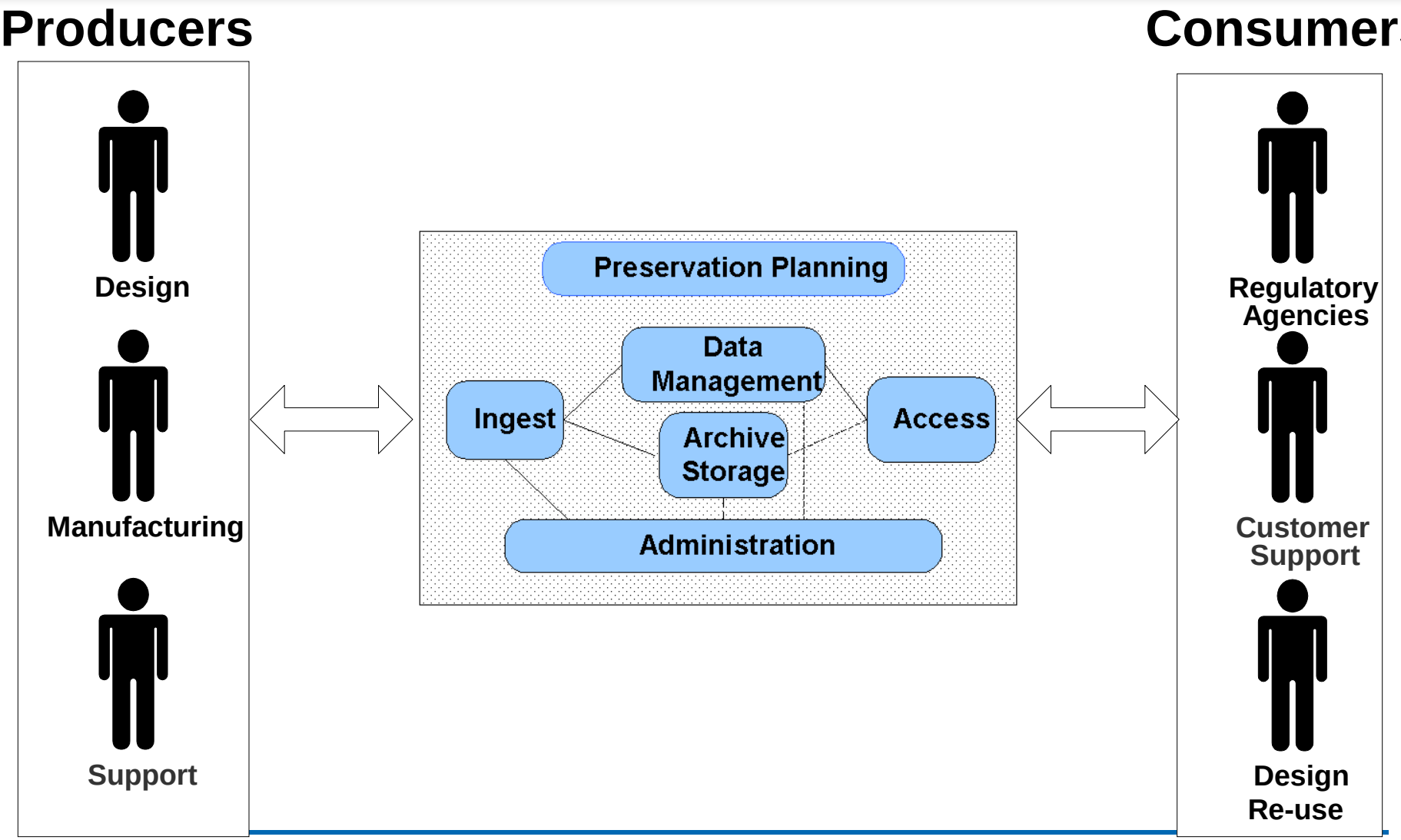
- 016: Test Suites

- 020: Governance and planning

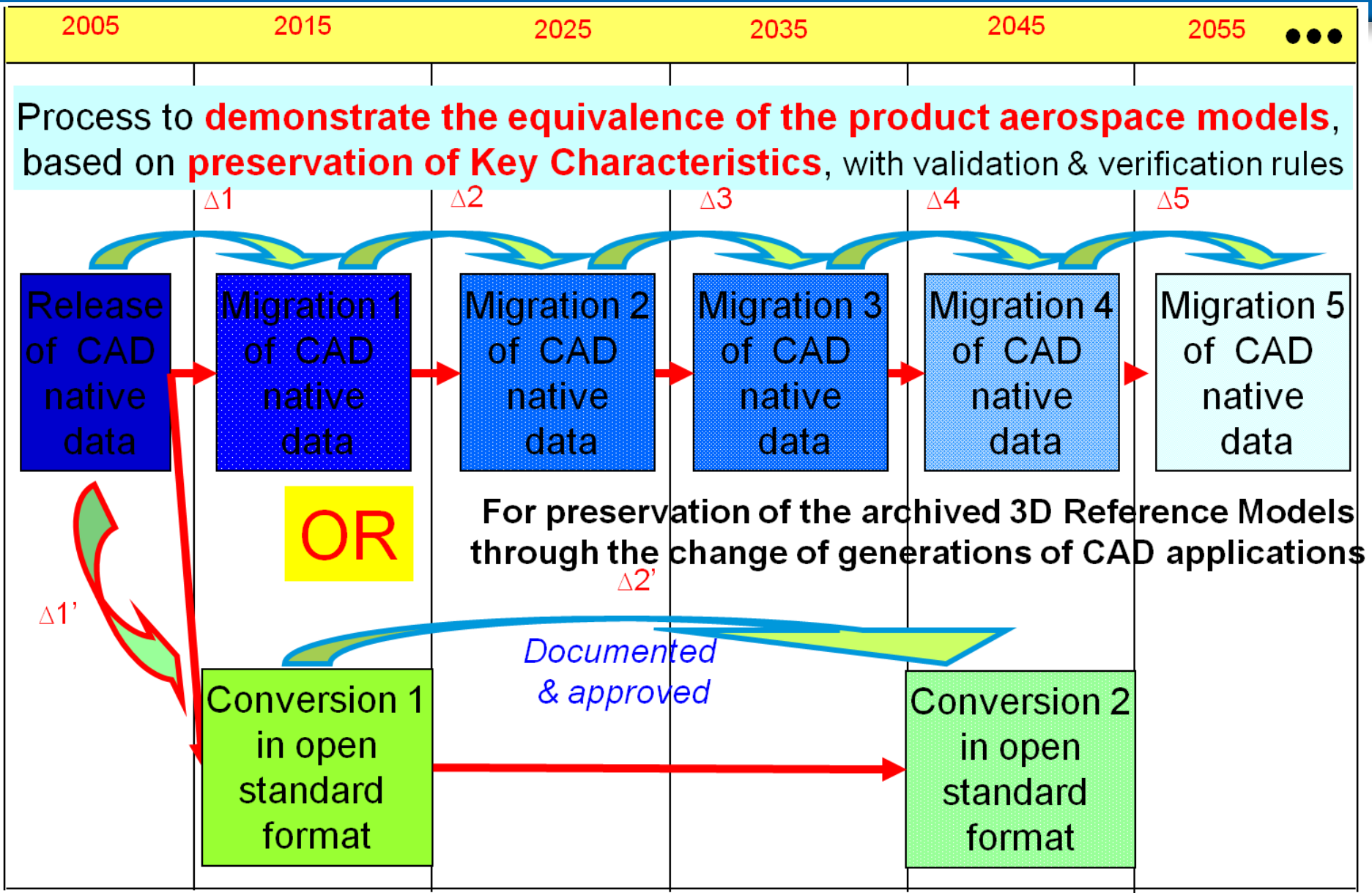
Ballot
S2 2013

- 02X: Audit (of the LT Archiving and retrieval system) > 2014
- 02X: Security (of the LT Archiving and retrieval system) > 2014

NAS/EN 9300 Fundamentals and concepts N°1 : Use of ISO OAIS (Open Archive Information Model)



NAS/EN 9300 Fundamentals and concepts N°2 : L.-T. Preservation based on open standards



NAS/EN 9300 Fundamentals and concepts N°2 : Use of the suite of ISO STEP standards and related 3D light visualization standards

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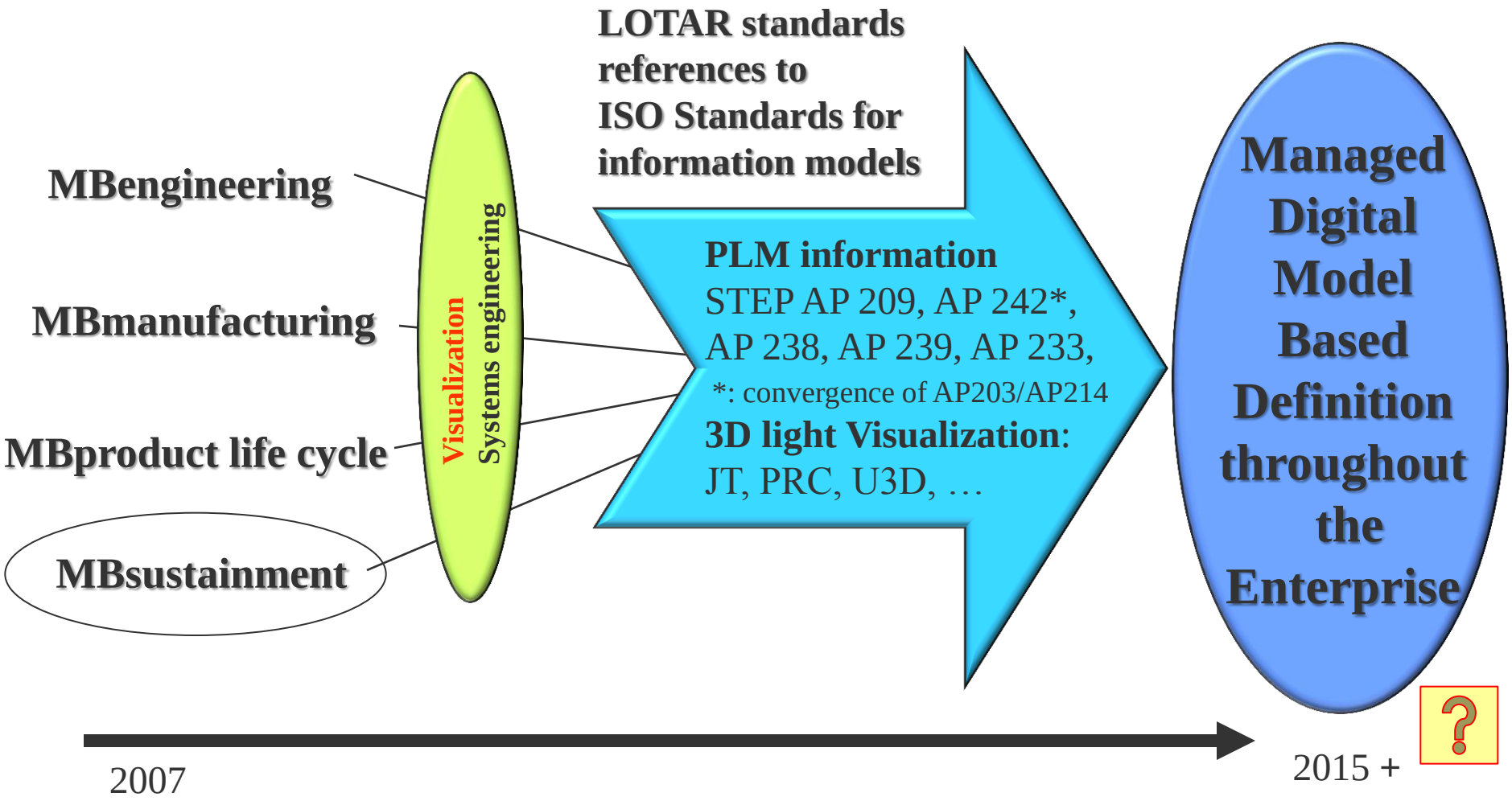

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Overview of LOTAR standards & relationships with ISO 10303 STEP Application Protocols

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LONG TERM ARCHIVING AND RETRIEVAL

Process & use cases

Basic Parts

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

Common Process Parts

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

Data Domain Specific Parts

CAD Mechanical 3D Geometry & Assembly with PMI	Product Management Data	Composite Design	Electrical Harness	Systems Engineering *(not yet started)*	Engineering Analysis *(not yet started)*	...
P1xx	P2xx	P3xx	P4xx	P5xx	P6xx	P7xx

Information

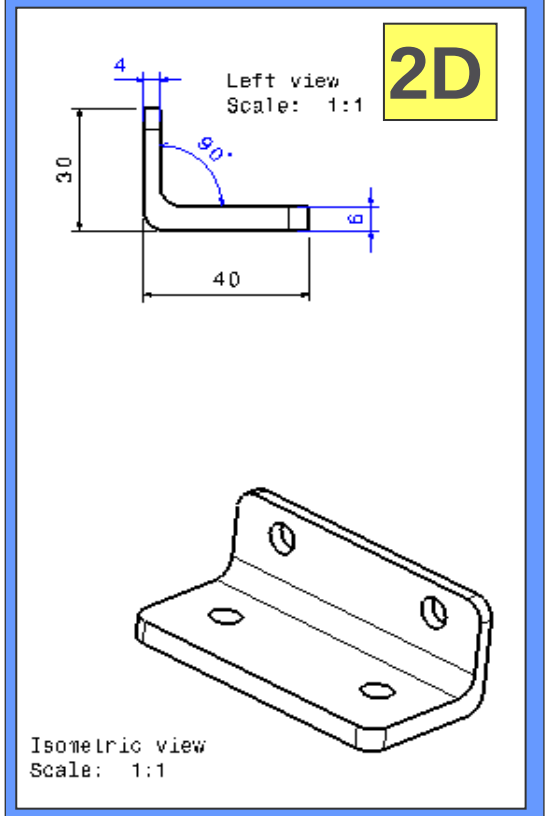
Applicable Data Models (ISO 10303 STEP)

AP203e2 AP214e3 AP242e1	AP239 AP242e1	AP203e2 AP242e1	AP242e2 *(target)*	AP233 *(target)*	AP209e2 *(target)*	AP2xx

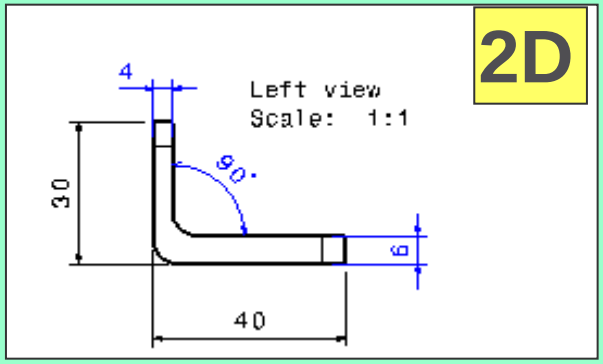
PART 100: Common concepts for Long term archiving and retrieval of CAD 3D mechanical information

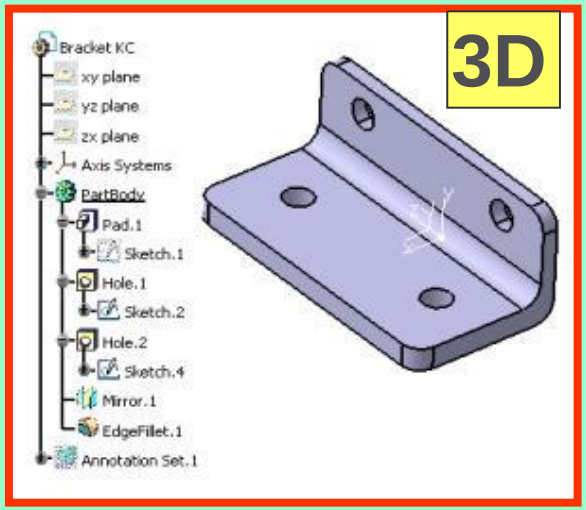
LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

Method Generation 1 (2D drawing only)

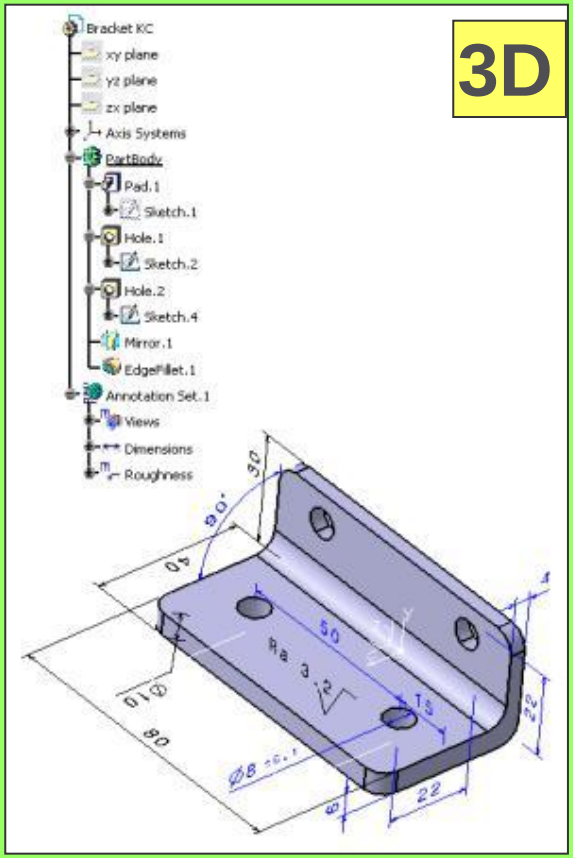


Method Generation 2 (2D & 3D)





Method Generation 3 (3D with GD&T as master)



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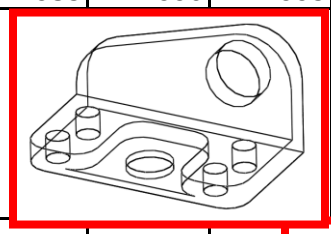
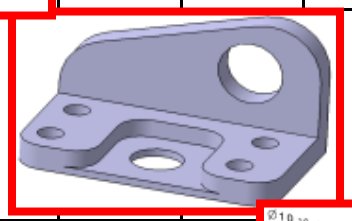
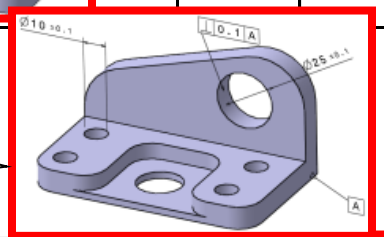
Overview of the NAS/ EN9300-100

Illustration of different CAD data functionalities for mechanical design, and the related generation

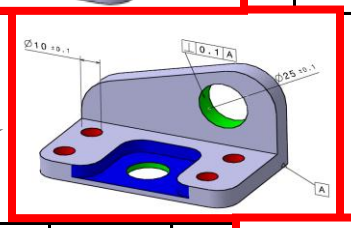
CAD generation technology break	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
3D surfaces											
3D Explicit Solid											
3D Explicit Solid Geometry with GD&T (Geometric Dimensions & Tolerances)											
3D Explicit Solid Geometry with GD&T & machining Form Features											
3D parametric Geometry with Construction History											



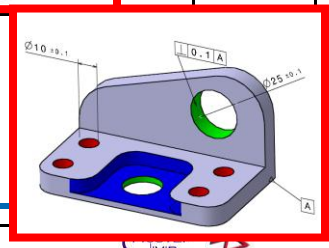




+ Dimensions
& Tolerances



Hole
General pocket
General_outside_profile



Capability to update the part using construction history / parametric

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PART 100: Common concepts for Long term archiving and retrieval of CAD 3D mechanical information

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Document structure of EN9300-1XX family

9300-100	Common concepts for LT Archiving of CAD 3D mechanical information
9300-110	Long Term Archiving of CAD 3D Explicit Geometry
9300-115	Long Term Archiving of CAD Explicit Assembly Structure
9300-120	Long Term Archiving of CAD 3D Explicit Geometry with 3D Product and Manufacturing Information (PMI)
9300-125	Long Term Archiving of CAD Explicit Assembly Structure with 3D Product and Manufacturing Information (PMI)
9300-130	Long Term Archiving of CAD 3D parametric geometry
9300-135	Long Term Archiving of CAD parametric Assembly Structure

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Template for the table of contents of a part of the family EN9300-1xx.

1 - Scope

2 - Normative references

3 - Terms, definitions and abbreviations

4 - Applicability

5 - Fundamental concepts (if requested)

5 - Business specifications

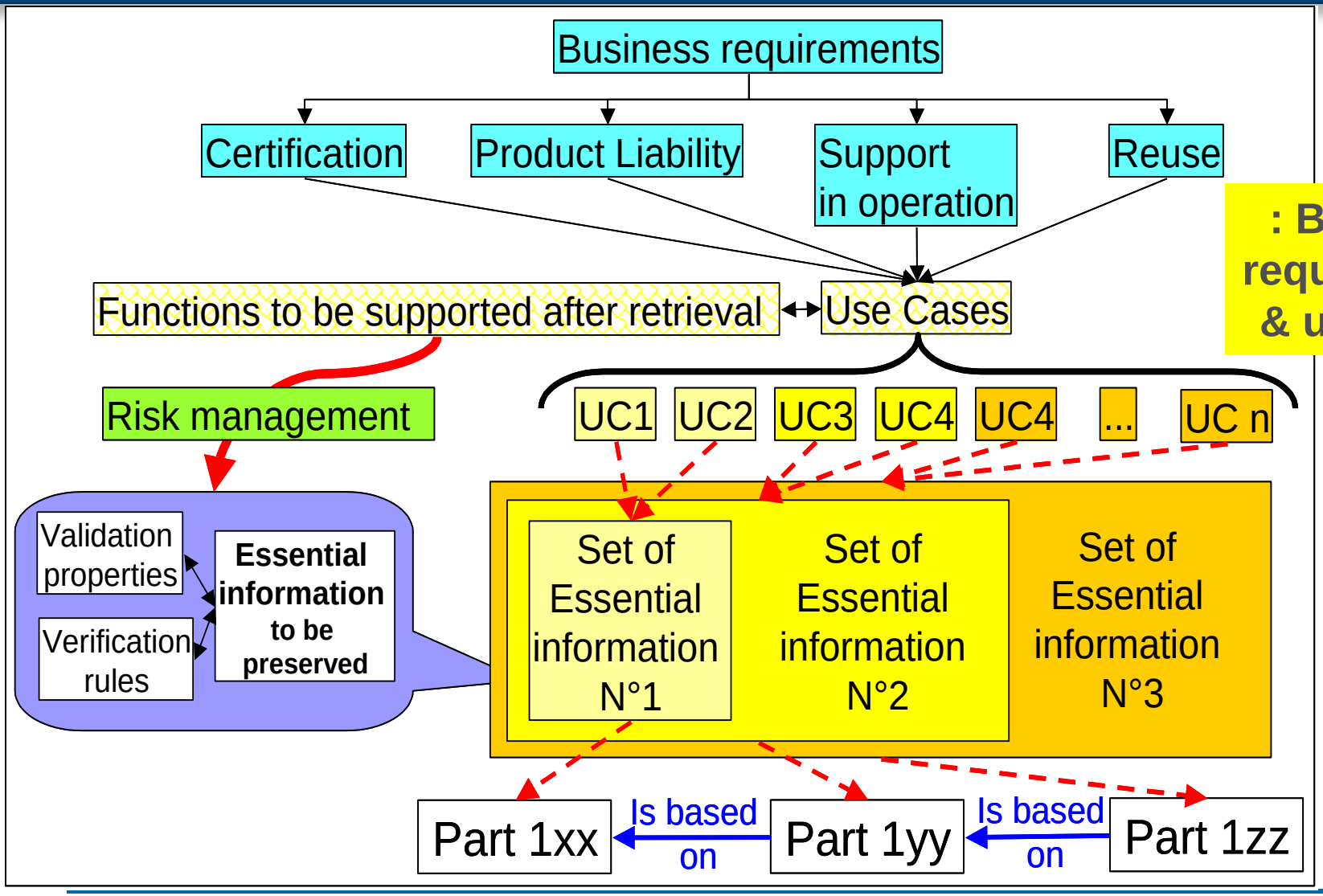
6 - Essential information

7 - Definition of the core model

8 - Verification rules

9 - Validation rules

PART 100: Common concepts for Long term archiving and retrieval of CAD 3D mechanical information



: Business requirements & use cases

PART 100: Common concepts for Long term archiving and retrieval of CAD 3D mechanical information

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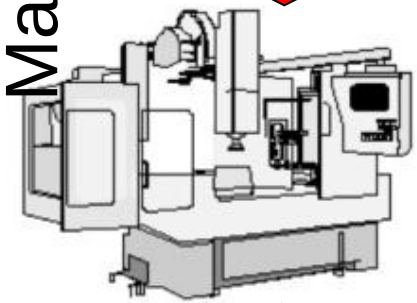
Manufacturing

Design
"Definition Dossier"

Definition of Key Characteristics of the part, with tolerances



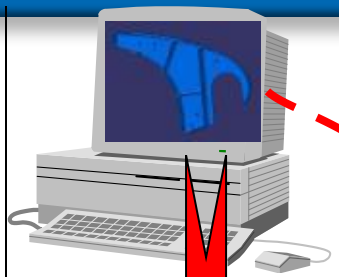
Manufacturing

Control based on predefined Key Characteristic (with tolerances)

Physical Part N°1

Physical Part N°2

The 2 parts are different to some minor geometry shapes, but are in the tolerance for its Key Characteristics



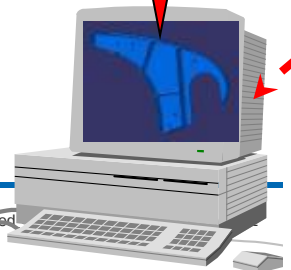
LT Archiving

2000

3D Geometric Model for LT preservation

Long Term Archiving System

3D Geometric Model



3D Geometric essential information is preserved, with the associated tolerance

Information semantic integrity is controlled, based on definition of essential information, and tolerances

For Support in operation, Product Liability, Certification

2030

ıts reserved

Part 110: Long Term Archiving and Retrieval of CAD mechanical 3D Explicit geometry information

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- **Scope:** **The archiving of_3D Explicit geometry**

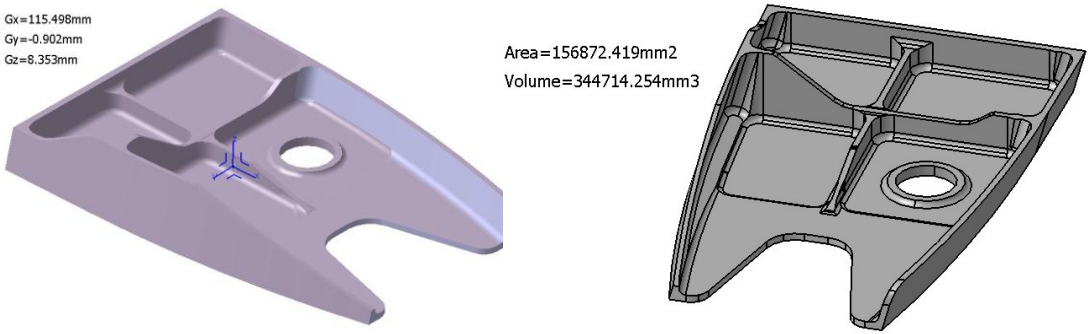
  Out of scope:
  - Implicit or parametric geometry (planned in part 130)
  - Drawing
  - Annotation (see part 120)
  - Assembly structures. (see part 115)

- **Use cases**
  - Documentation of Aerospace & Defense product design for regulatory and contractual compliance
  - Aerospace & Defense Industry incident investigation
  - Design re-use – product modification
  - Product lifecycle & supply chain support and disposal.

- **Essential information:** The 3D exact shape

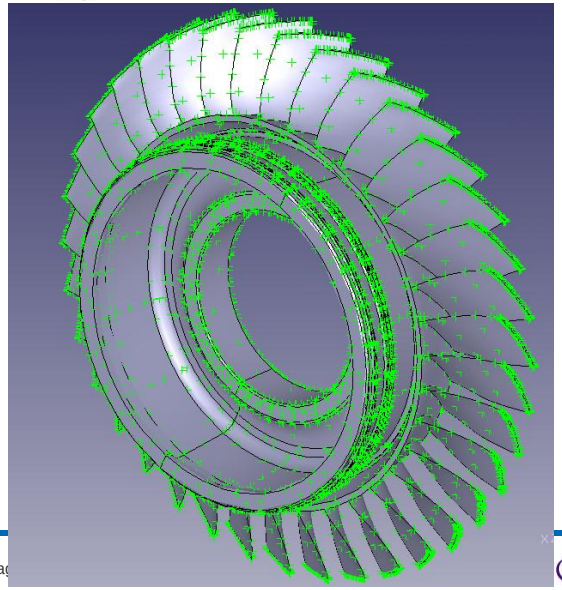
- **Core model**: ISO 10303-514 (Advanced boundary representation)
  used by **STEP AP203 and AP 214**

- **Validation :**
  - Validation properties level 1 : Volume, centroid and area



  - Validation properties level 2:

    Optional: Clouds Of Points



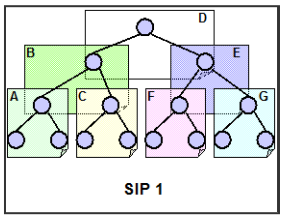
PART 115: explicit CAD assembly structure

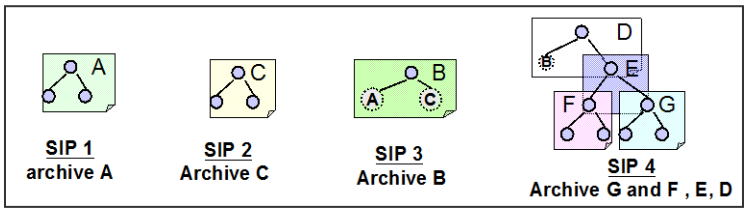
- **Scope:** CAD assembly structure

  Out of scope: geometric model (see part110)

- **Essential information:** Nodes + basic attributes + relationship

- **Use cases:** full archiving & incremental archiving



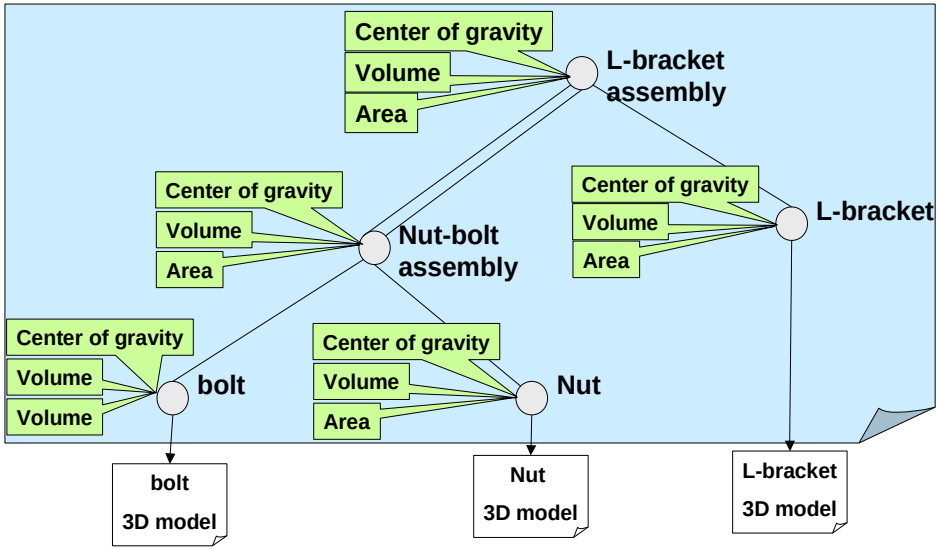


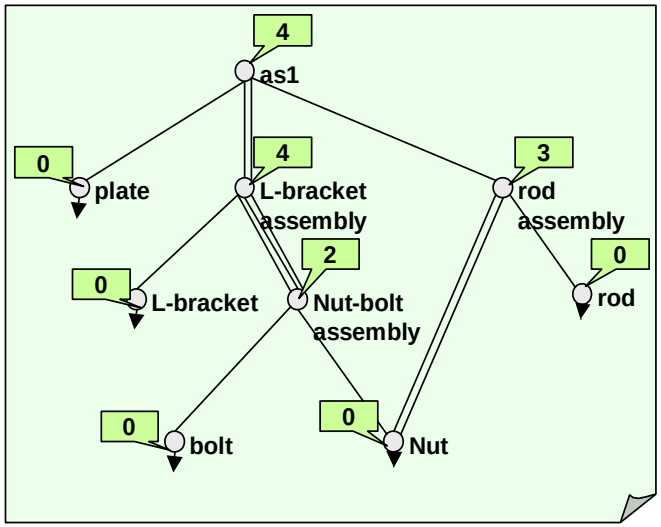
- **Core model** (ISO 10303 STEP AP 203 and AP 214):
  - Based on the PDM schema and the associated usage guide
  - CAX-IF recommended practices

PART 115: explicit CAD assembly structure

- **Verification**
  - Some simple rules like no acyclic assembly structure

- **Validation**:
  - Geometric validation properties: volume, centroid and area
  - Assembly validation properties





Part 12x family : 3D with PMI and machining form feature

(PMI = « Product and Manufacturing Information »)

- **Part 120: PMI Graphic Presentation**
  - Balloted; planned publication in Sept. 2013
- **Part 121: Semantic PMI Representation**
  - Draft available
  - Planned ballot in 2014
- **Part 122: Machining Form Features**
  - Start in 2014
  - Planned ballot in 2015 – 2016

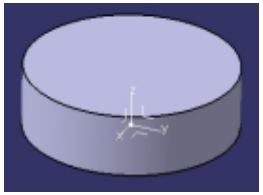
Nota: new numbering of LOTAR parts 12x agreed during the June 2013 LOTAR workshop

Main categories of CAD information of a Definition Dossier based on 3D with PMI

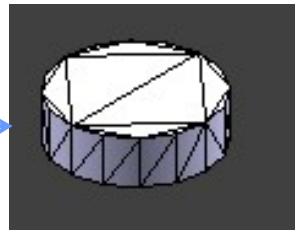
(PMI = « Product and Manufacturing Information »)

Illustration of the main types of information of 3D PMI:

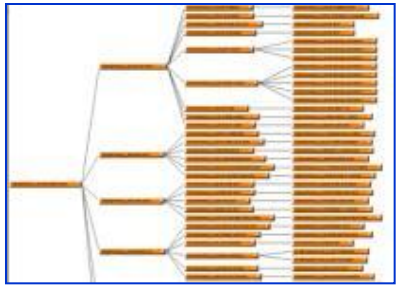
3D exact shape



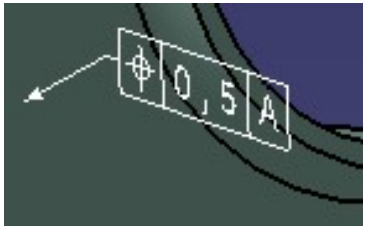
3D simplified – facettized (“context”)



Assembly structure and associated meta data



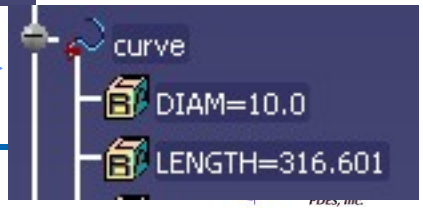
3D dimensioning & tolerancing (GD&T)



3D annotations

3D symbols (E.g. welding, fasteners, ...)

Specific properties associated to 3D geometry (UDA)

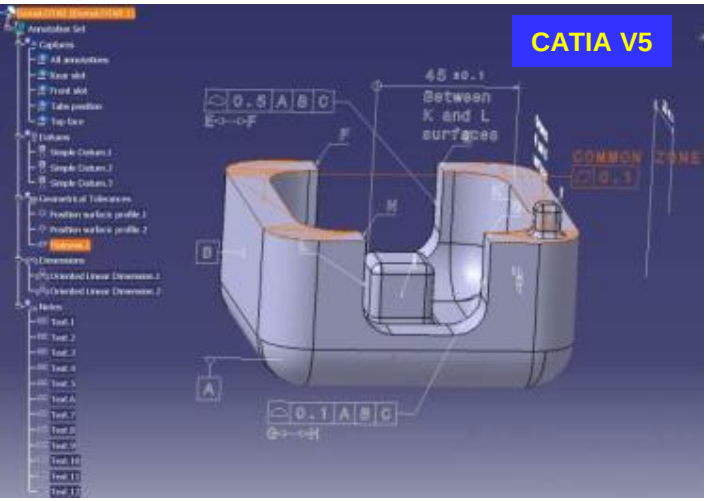


LOTAR Part 120 “3D PMI presentation STEP with 3D PMI “polyline presentation”

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

•Example of LOTAR pilot set up in 2009 to demonstrate the feasibility of the interoperability between different CAD systems.

• The following figures shows example of conversion with STEP 3D PMI “presentation as polyline”

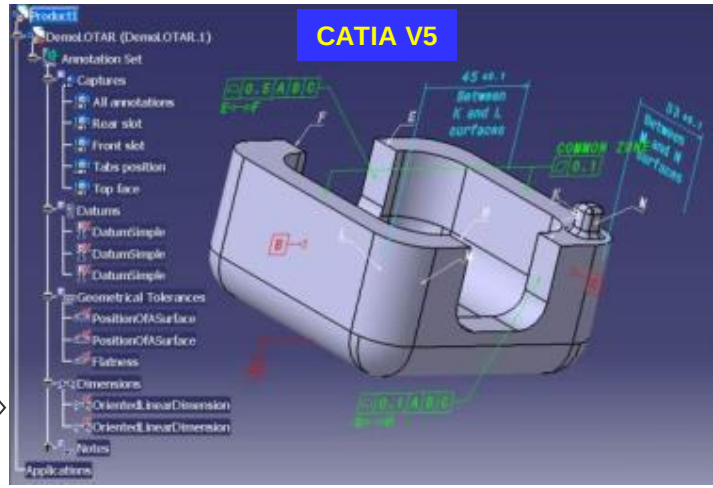


• Dassaul Systems solution:
Catia V5-R19 GA SP2 (Q1 2009)

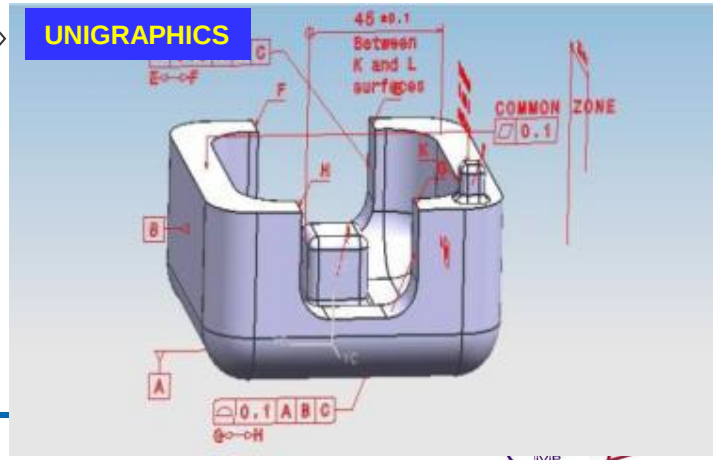
Export

STEP
AP203

Import



Theorem



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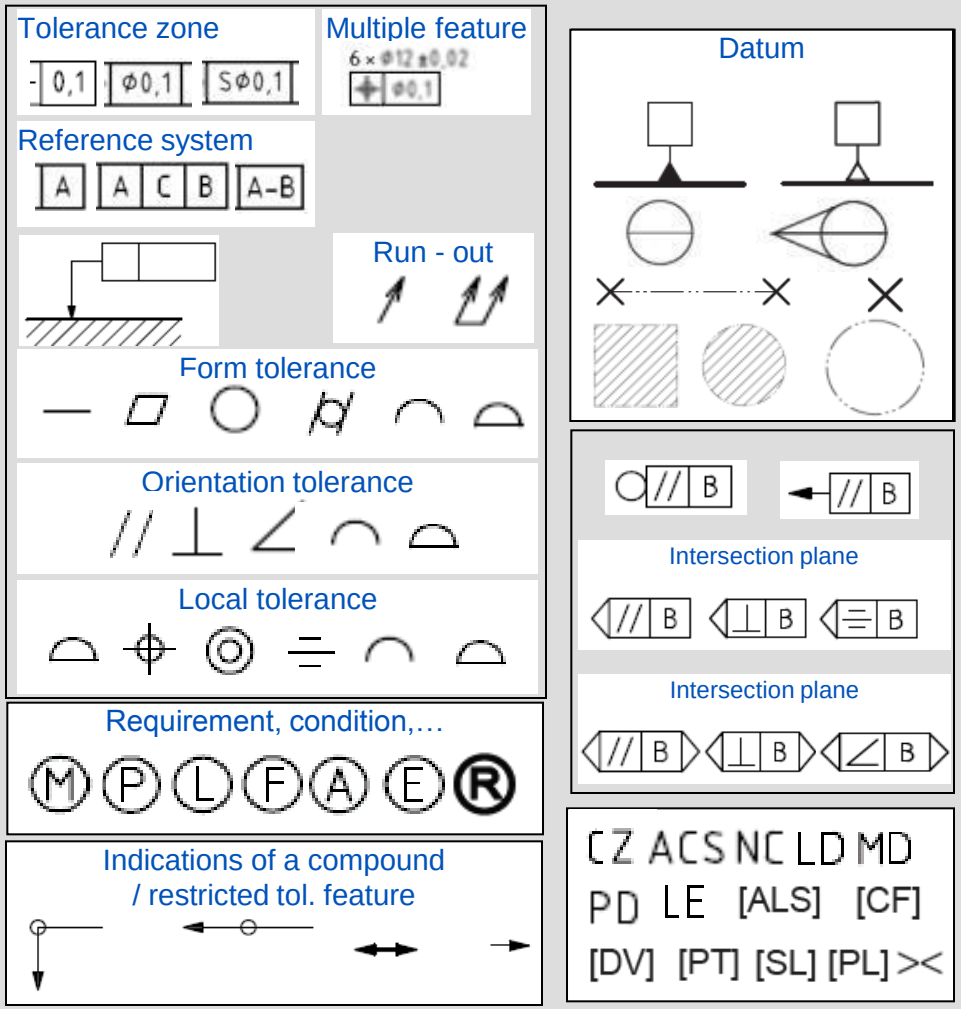
LOTAR part 121 “3D PMI representation”
Types of ISO GD&T to take into account
(GD&T: Geometric Dimensioning and Tolerances)

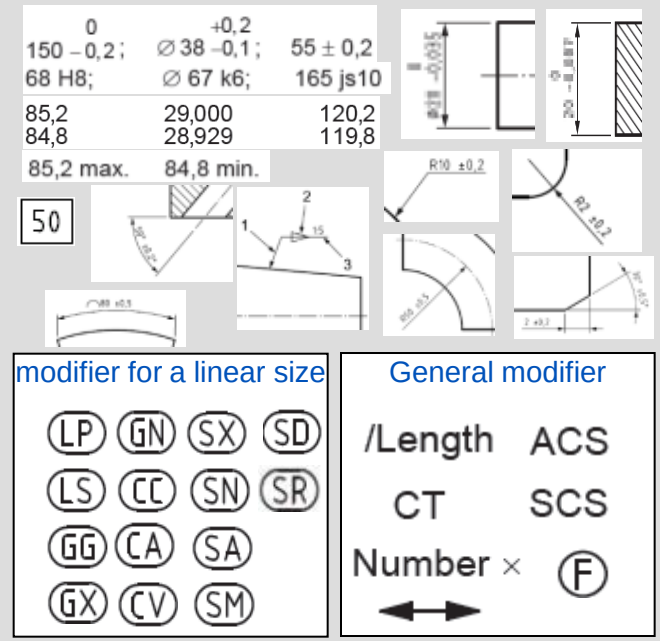
LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

LOTAR pilots of increasing complexity started since 2010

Geometric tolerance



Dimension



surface texture

Text annotations

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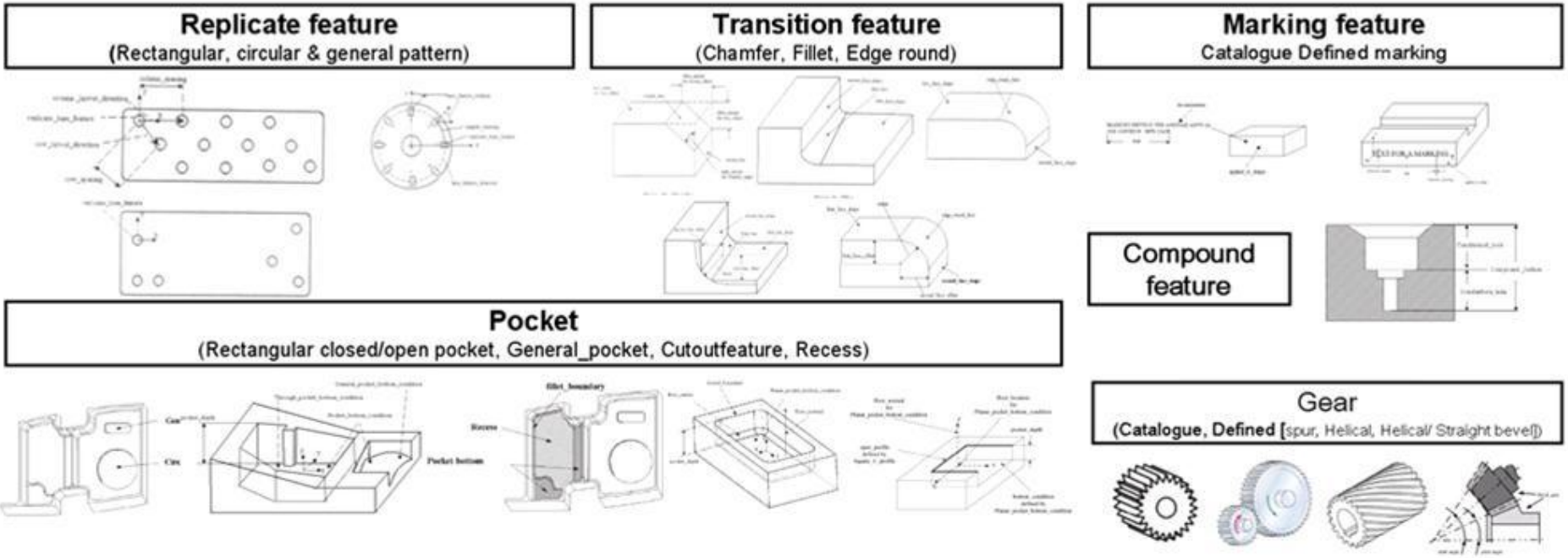
LOTAR part 122
“3D PMI with Machining Form Feartures”

Illustration of types of machining form features to take into account



Planned start of the part 122 in 2014

LOTAR Composite WG

(statusJune 2013)

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

Project Description/Purpose:

- A Lack of Functionality – support advanced, multi-function structures in a model based environment.
- Product vs Part Representations and explicit representations of advanced composites.
- Support for Neutral Exchange Formats– STEP AP203e2 and then AP242e1. Future explicit MBDs will be focused on tessellated representations linked to meta-data such as material, orientation and rosette reference.
- Support the production of LOTAR parts 300/310

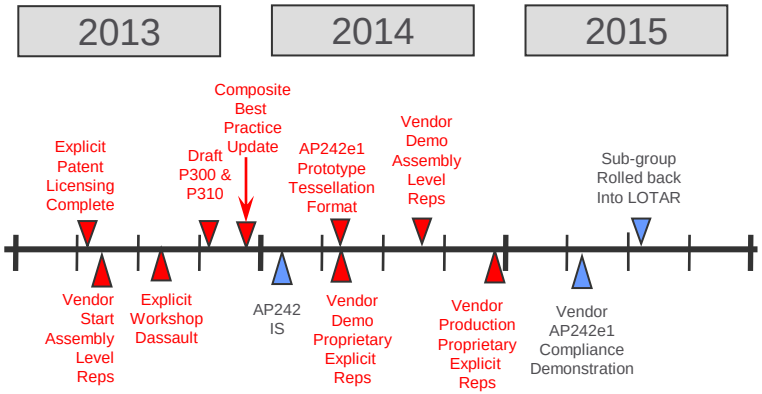
Deliverables:

- Additional Test cases and Use cases
- Generate Validation properties
- LOTAR standards – Parts 300 & 310
- Updated STEP Composite Recommended Practices
- Enhancement of STEP standard
  - Contributions to 3D tessellated geometry pilot
  - Contributions to “External element reference” pilot
- Summary page for LOTAR website
- Glossary for Composite terms for Parts 300 & 310
- Develop implementation approaches for more complex rosettes

Achievements during workshop :

- Telecon with Dassault on Status
- Telecon with Siemens/Fibersim Status
- Work on Validation Properties
- Work on Recommended Practices V2
- Review of Websites – Lotar and AP242
- Workshop with Dassault on Explicit confirmed
- Definition of 4 Rosette Transformation types defined
- Meeting with Dassault Developer in Toulouse
- Composite Glossary refined – reduced 70%
- External Element Reference and BO Model discussion

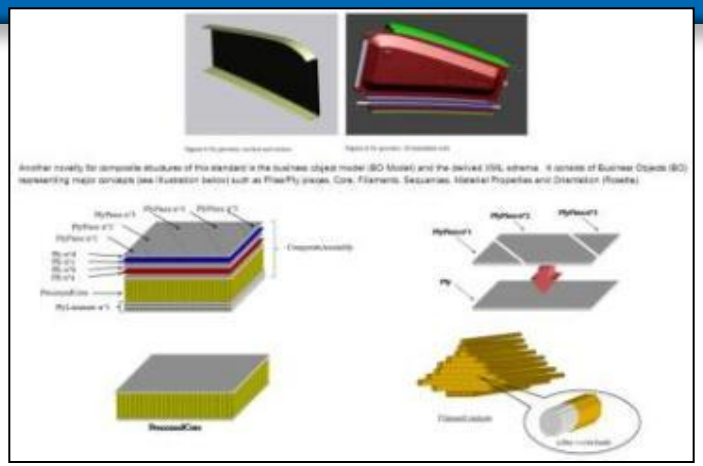
Overall Schedule:



Performance: Schedule: Technical

STEP AP242 public web site
: Composite interoperability web page

- **Overview and illustration of capabilities**



- **Examples of associated use cases**

- **Dependencies / related standards**

- **Status of availability of COTS solutions**

- **Status of rec. practices / implementers forums**

- **Examples of associated use cases**

  - **Interoperability between different systems**

CAD-CAD	CAD 3D composite design exchange with the supply chain
CAD-CAE	CAD 3D composite design to Engineering Analysis
CAD-CAM	CAD 3D composite design to Manufacturing

  - **Long Term Archiving and retrieval (LTA&R)**

  LTA&R of CAD 3D composite design for certification

  LTA&R of CAD 3D composite design for manufacturing and repairs

  - **Visualization of archived CAD 3d composte design information**

List not exhaustive: for more information refer to the CAX IF use cases and the STEP AP 242 use cases described by the respective industry associations

- **Dependencies / related standards**

The data model of AP 242 for CAD 3D composite design is based on STEP AP 203 and STEP AP209.

- **Status of availability of COTS solutions**

Beta version interfaces for CAD composite design are in test for different systems.

More information to be published in 2014.

- **Related recommended practices**

STEP recommended practices for CAD 3D Composit design: draft available: link

Associated CAx Implementer Forum for Composite design: planned to start in 2014.

LOTAR "Electrical Harness" WG

(status 11th of June 2013)

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

Project Description/Purpose:

- Development of LOTAR parts for Long term archiving and retrieval of electrical harnesses
  - P400: "fund. and concepts for LOTAR of elec. harness"
  - P410 "LOTAR of phys. elec harness design & construction"
  - P420 "LOTAR of CAD 3D elec. harness installation",
- To support the development of the STEP AP 242 ed2 standard for LOTAR and interoperability of electrical harness
- To set up pilots / prototypes demonstrating the feasibility of the new concepts specified by the P4XX standards
- To ensure the appropriate coordination with the CAX IF and the other related standardization projects

Deliverables:

- New LOTAR parts of the family 4XX
- Processes, use cases and test cases
- Essential information and associated Validation Properties / verif.
- Test round reports and prototypes of PLM vendors
- Support to the prep. of STEP AP 242 ed2 for Electrical Harness
- Communication actions (LOTAR public web page, …)

Dependencies / Issues / Actions

- VDA VEC / KBL recommendations (AP 212), STEP AP 210 , AP239
- Preparation of STEP AP 242 ed2 for the Sept. 2012 workshop

Performance:

Schedule	G	Technical	G

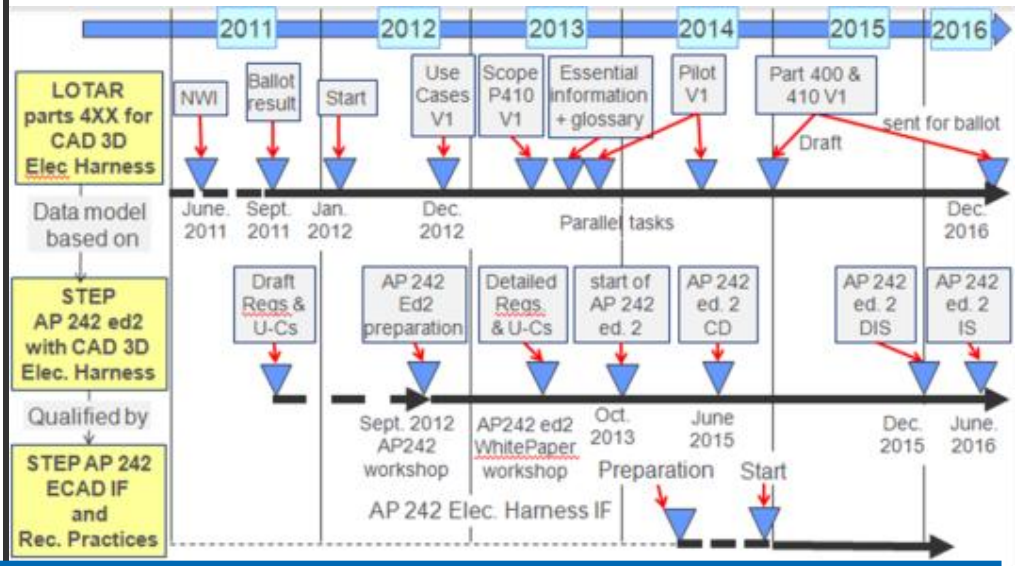
Achievements since the previous workshop :

- 3 teleconferences since the March. LOTAR workshop
- Enhancement of Harness test cases for design & construct.
- Continuation of identification of essential info. of harness definition for design & construct. (reference designator, …)

Next Steps until the Sept. Workshop:

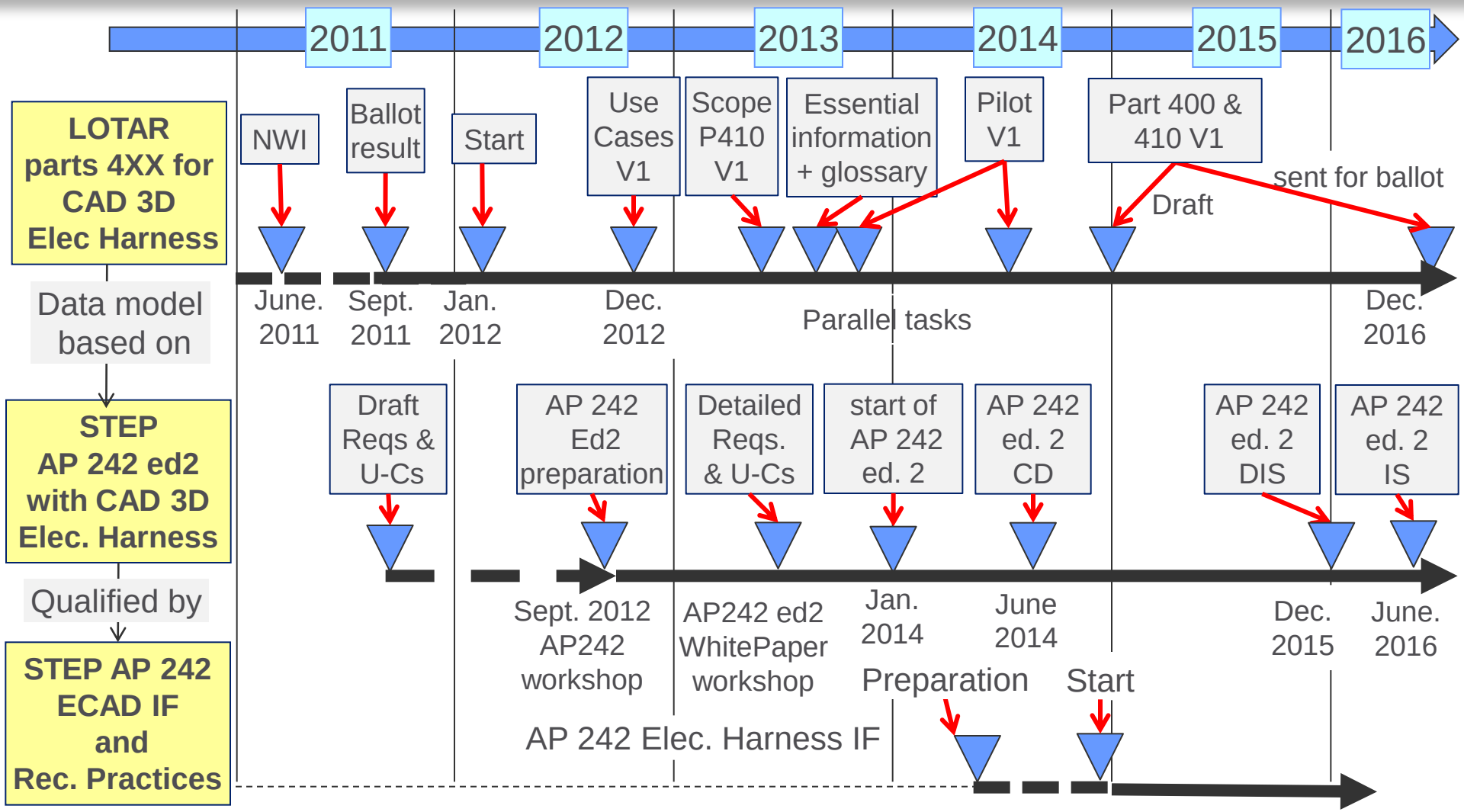
- Review of use cases and test cases for LOTAR of Physical electrical Harness design and construction. For:
  1) certification, 2) reuse, and 3) exchange in the EE
- Same for CAD 3D electrical Harness installation
- VDA VEC KBL tutorial as input for prep of STEP AP 242 ed2
- Participation to the workshop for STEP AP 242 ed2 white paper for extension to electrical harness

Overall Schedule:



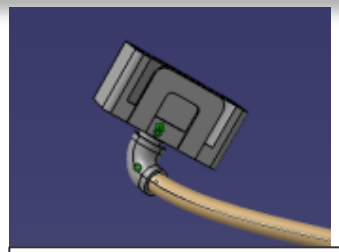
Overall planning and link with the development of AP 242 ed2

Draft planning

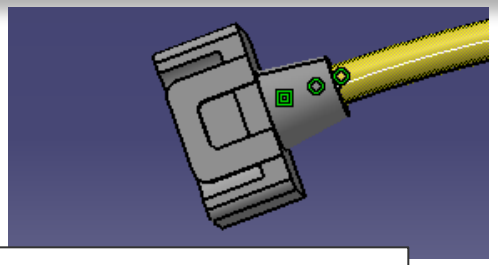


Test case illustration – Example of essential information to preserve

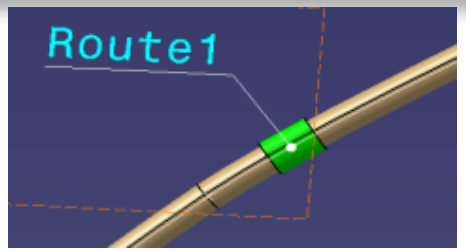
LOTAR
LONG TERM ARCHIVING AND RETRIEVAL



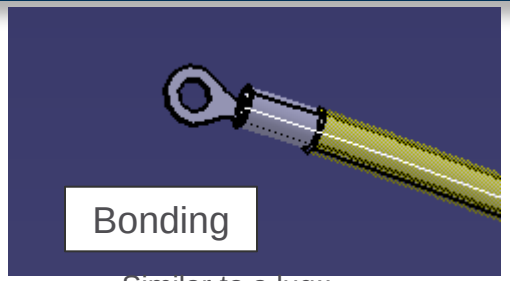
Connector with 90° backshell



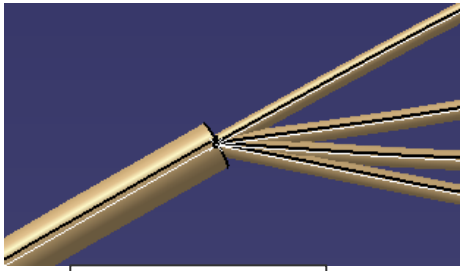
Connector with « Straight » backshell



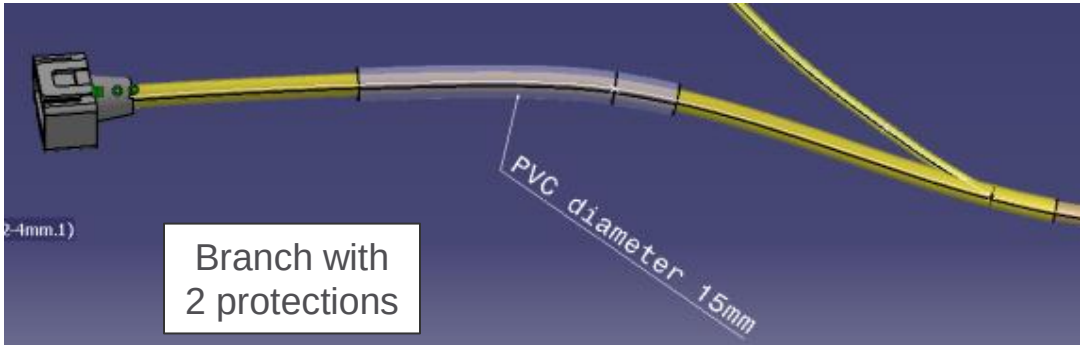
Marker



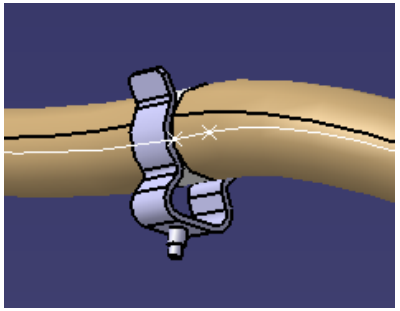
Similar to a lug::
A terminal without a connector with a reference designator



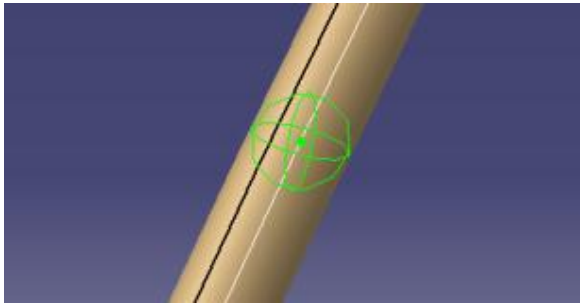
Derivation



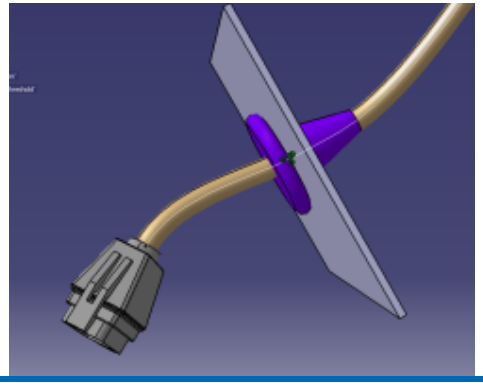
Branch with 2 protections



Fixing



Splice



Grommet

Different types of grommets
- chafing,
- seal pressure,
- vibration

LOTAR "Visualization" WG

(status June 2013)

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

Project Description/Purpose:

define common aerospace recommendations for LT Archiving and Retrieval of 3D light visualization information, consistent with LT Archiving and Retrieval of CAD 3D product models, throughout the full product life cycle.

Deliverables:

- Requirements Diagram and Document
- Use Cases for Verification of Requirements
- Best Practices / Processes for the LTA of Viz Data
- Trade Studies and Compliance Matrix for generally accepted formats
- Viz Data for Testing and Public Display
- Glossary of Terms

Dependencies / Issues / Actions

- N/A

Achievements since the previous workshop :

- 5 bi-weekly teleconference
- Use cases development
- start the requirements definition

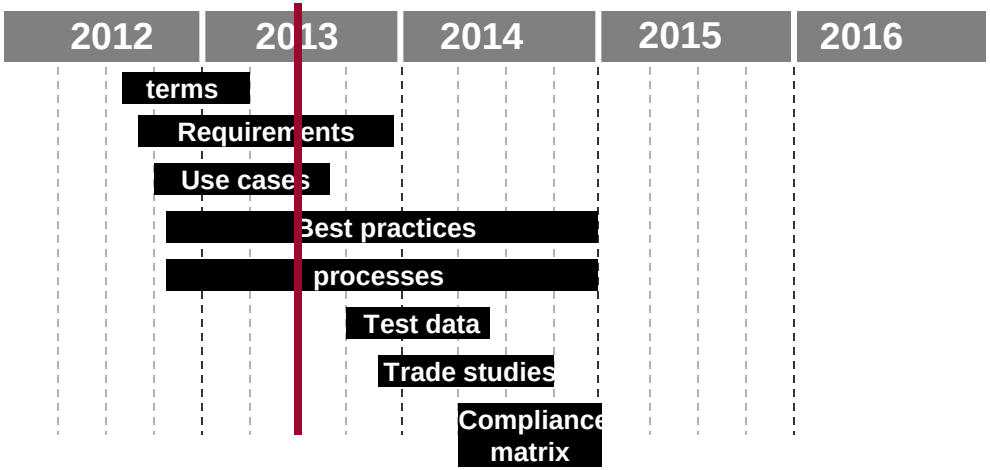
Workshop achievement:

- Continue the use cases development
- Continue the requirements identification
- Initiate the Trade study discussion

Next Steps until the September Workshop:

- Requirements finalized
- Use cases description released
- Trade study development

Overall Schedule:



Performance:

Schedule	G	Technical	G

Table

- Introduction – objective
- Overview of the LOTAR project
- Overview of the LOTAR standards
- Summary of implementation of LOTAR standards in Europe
- Summary – next actions

Summary of implementation of the LOTAR standards in Europe

			NAS / EN 9300 LOTAR parts (CAD)					
A&D company	**Area of application**	**Scope**	CAD 3D exact geometry	CAD 3D tessellated geometry	CAD 3D PMI	CAD Assembly structure	**ISO formats**	**Project status**
			Part 110	**Part 100**	**Part 120**	**Part P115**	**ISO 10303 "STEP"**	
Airbus	A350	3D electrical harness installation	Yes	Yes	Yes	Yes	AP 214 ed3 (*) + AP 242 ed1	DEV.
EADS		"Full 3D" model based	Yes	Yes	Yes	Yes	AP 242 ed1	DEV.
Dassault-Aviation	Falcon 7X	complete definition of the aircraft (airframe, brackets, pipes,	Yes	No	Yes	Yes	AP 214 ed3 (*)	OPER.
Snecma	New parts of engines	3D definition with PMI of new mechanical part (TBC)	Yes	No	Yes	No	AP 214 ed3 (*)	OPER.
Boeing	787	3D definition with PMI with assemblies	Yes	Yes	Yes	Yes	AP 203 ed2 (*) + U3D PDF	DEV.
Lockheed-Martin	F35	3D mBD mechanical, electrical and composite	Yes	No	Yes	Yes	AP 203 ed2 + AP242 ed1	PLANNED

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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Table

- Introduction – objective
- Overview of the LOTAR project
- Overview of the LOTAR standards
- Summary of implementation of LOTAR standards in Europe
- Summary – next actions

The LOTAR project and the coordination with other PLM standardization projects

- The LOTAR standards define the processes, use cases, quality control rules, for the preservation of the PLM information

- They rely on other ISO TC 184 SC4 STEP standards defining the PLM information models

=> It relies on the setting up of a **coordination of the LOTAR project with other PLM standardization projects**, for example:

- Funding of STEP AP 242 and STEP AP 239 “Product Life Cycle Support” harmonization for PDM information model
- Funding of the STEP CAX Implementor Forum
- Funding of the development of specific functionalities of STEP AP 242,
- Liaison to be set up with ISO TC 171 “Technical documentation” for PDF A3 / PRC

STEP AP 242 as the cornerstone for LT Archiving & retrieval of CAD information : scope of AP 242 edition 1

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

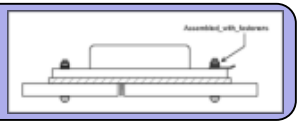
PDM
Part identification, Physical part
Characterictics, Document Management
General management information
Activity and work management
Effectivity
Specification, Breakdown and configuration

Process Plans

Requirements

Design Rules

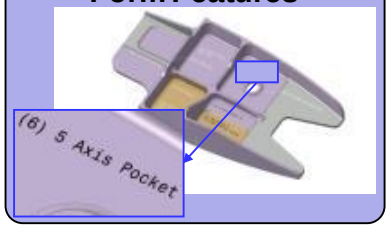
Mating definition



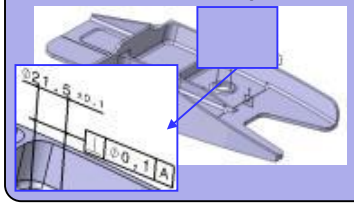
Presentation

3D shape Data Quality

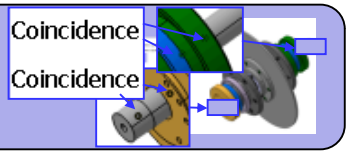
3D Machining Form Features



3D PMI
(Product & Manufacturing Information)

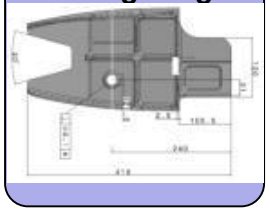


3D assembly constraints



3D kinematics

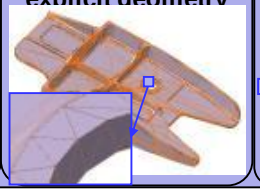
2D draughting



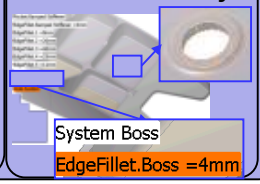
3D shape (explicit and parametric)

3D exact explicit geometry

3D tessellated explicit geometry



3D parametric & constr. History



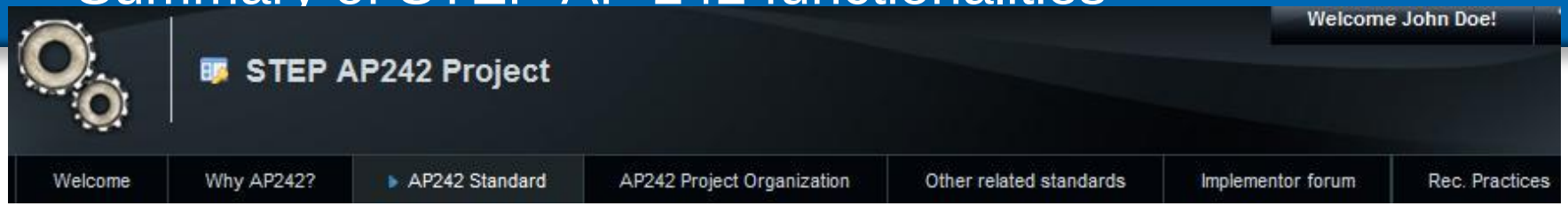
3D Composite design

Addressed by the BO model:

- PDM system
- Requirement Managt. system
- CAD system
- Process Planning system

STEP AP242 public website

Summary of STEP AP 242 functionalities



- Welcome
  - Site map
  - Contact
- Why AP242?
  - Use Cases
- AP242 Standard
  - AP242 Ed1
    - AP242 on a page
    - CAD 3D interoperability
    - Machining Form Features Interoperability
    - Composite Design Interoperability
    - Kinematics Interoperability
    - PDM Interoperability
    - Requirement Interoperability
  - AP242 Ed 2 preparation
- AP242 Project Organization
  - AP242 Ed1 project
- Other related standards
- Implementor forum
  - CAX-IF
  - PDM-IF(in preparation)

Site map

http://www.ap242.org/

Structure of the web site:

- Welcome
- Why AP242?
- AP 242 standard
- AP 242 project organization
- Other related standards
- Implementer Forums
- Rec. Practices

Summary

- The LOTAR project has **delivered standards now used** by the US and European Aerospace and Defences manufacturers

- The LOTAR project **prepares new LOTAR standards** in order to extend the current capabilities :
  - PDM « As design », CAD 3D composite design, CAD electrical harness
  - recommandation for LT Archiving of 3D light visualization

- Need of close coordinations with other initiatives in Europe , USA and Asia for long term preservation of product information, such as CAD 3D models
  - Shall rely on ISO open standards for product information models
  - Unconsistent recommendations will weeken the positions of the industries and increase the cost / risk for LT preservation of PLM information, such as CAD 3D models

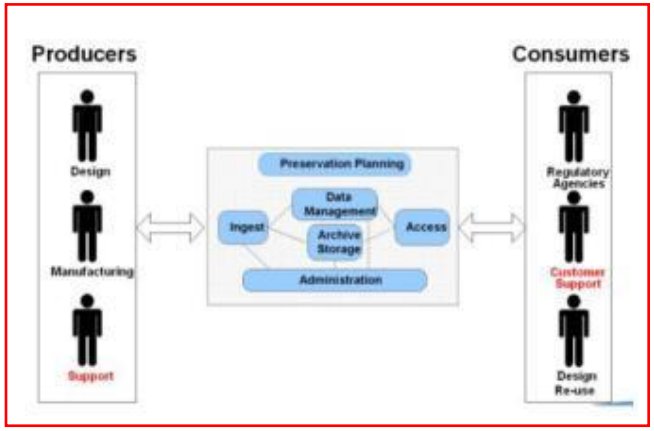
Back up slide

LOTAR business requirements part 2 edition 2

- **BUSINESS REQUIREMENTS**
  - 6.2.1 ACCEPTANCE
  - 6.2.2 LEGAL REQUIREMENT
  - 6.2.3 SECURITY REQUIREMENT
  - 6.2.4 CERTIFICATION

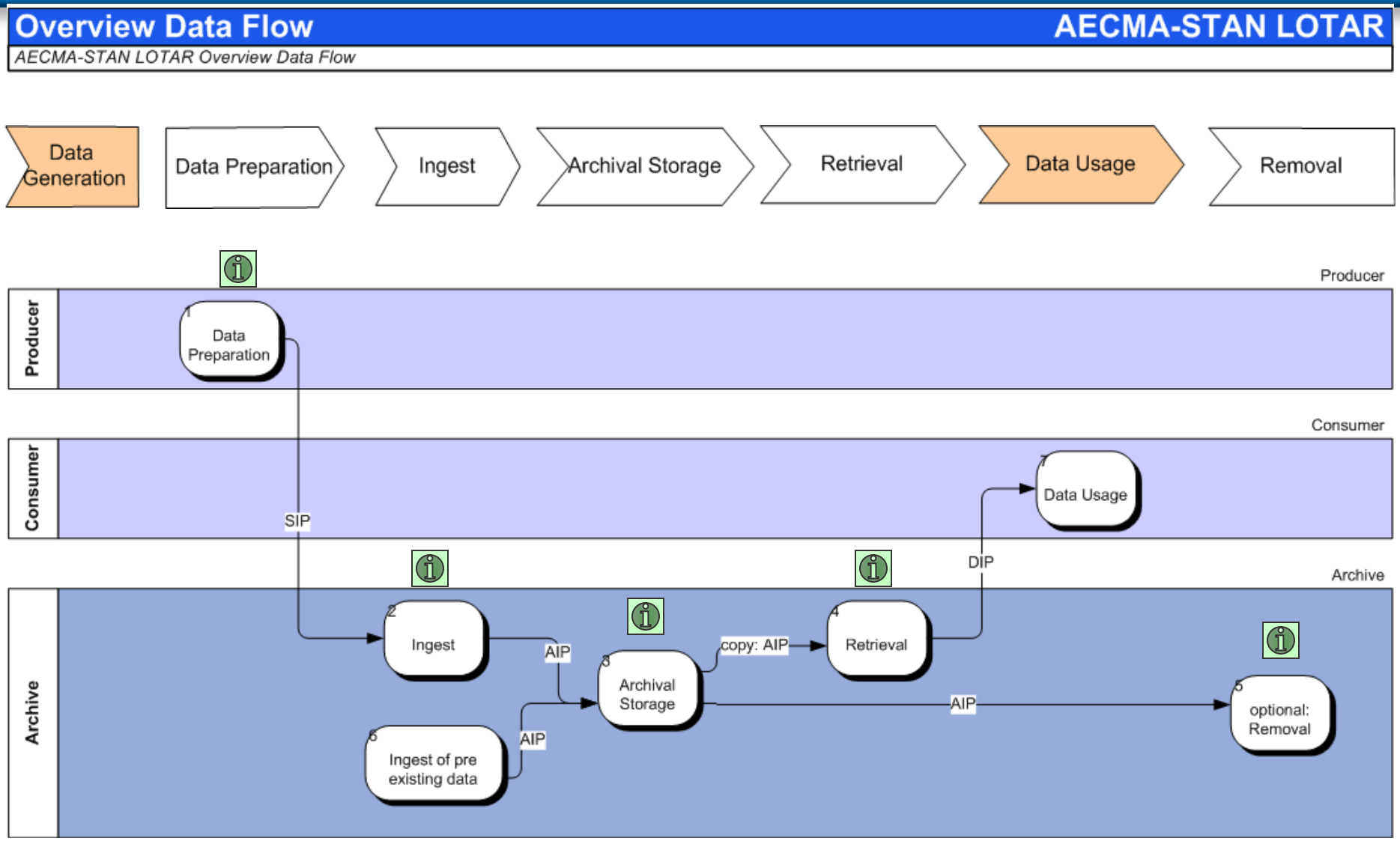
- **FUNCTIONAL REQUIREMENTS based on the OAIS reference model**

Preparation	9
Ingesting Product Definition into Repository/Archive	5
Archive Storage	11
Disaster Recovery:	4
Data Management:	42
Administration	5
Preservation Planning:	15
Access	8



- **SPECIFIC REQUIREMENTS per TYPES OF 3D CAD-PDM DATA to preserve**
  - REQUIREMENTS for LT Preservation of **3D PARTS** (3D EXACT SOLID BOUNDARY REP.)
  - " " LT Preservation of **EXPLICIT CAD ASSEMBLY STRUCTURE**
  - " " LT Preservation of **PDM cDMU** INFORMATION OF THE A380
  - " " LT Preservation of **CAD 3D EXPLICIT GEOMETRY WITH GD&T**

NAS/EN 9300 Process parts
PART 010: Overview Data Flow



NAS/EN 9300 Part 20
"Governance and Preservation Planning"

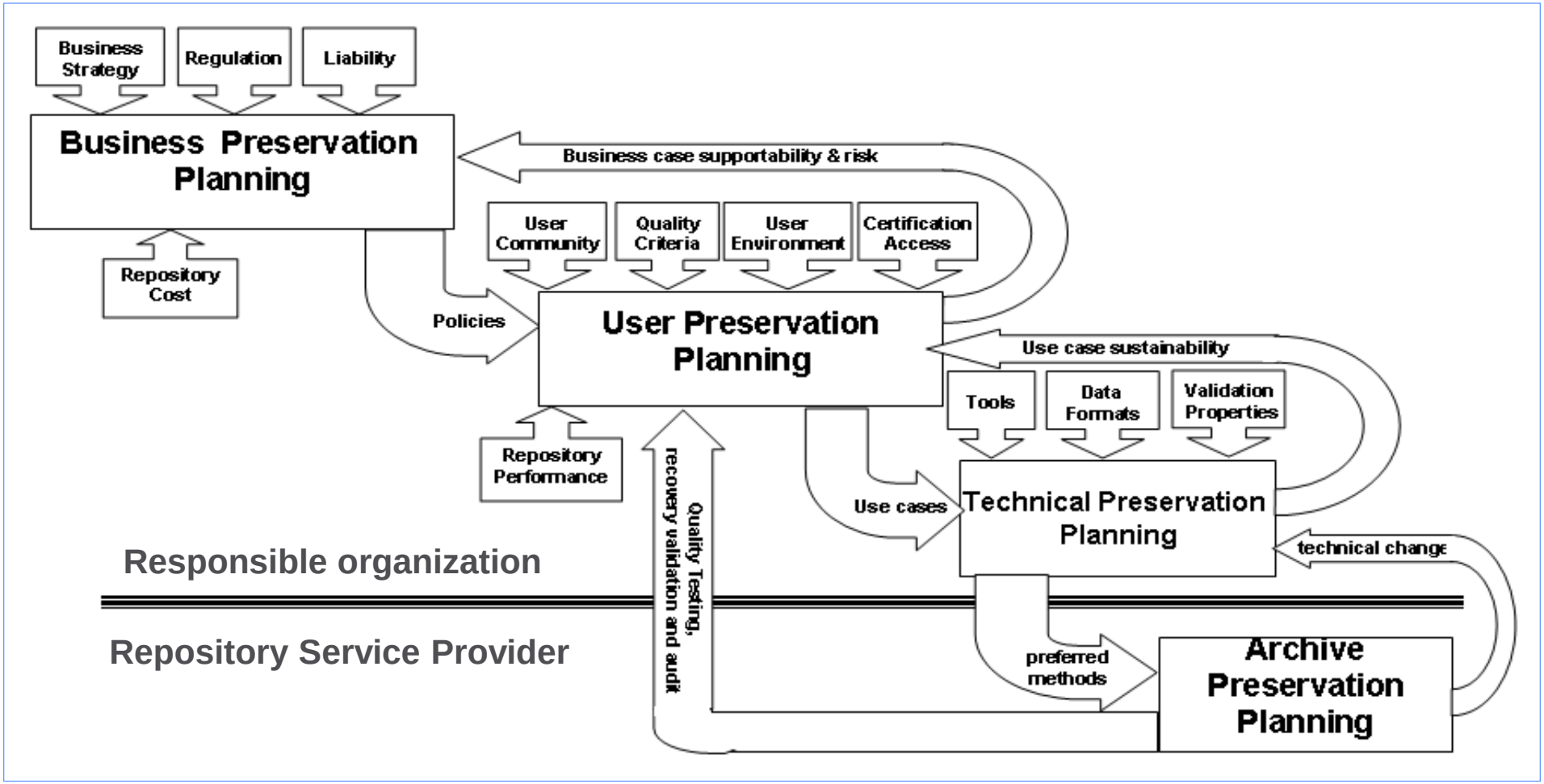
Table of content

1 Introduction
2 Scope
3 Normative references
4 Terms, definitions and abbreviations
5 Applicability
6 Responsibility Model
7 Business Preservation Planning
8 User Preservation Planning
9 Technical Preservation Planning
10 Knowledge Management
11 Risk Management
12 Organizational Compliance with LOTAR
13 Repository Responsibilities

Appendix A Relationship between OAIS and LOTAR
Appendix B Organization Structure

NAS/EN 9300 Part 20
"Governance and Preservation Planning"

- 4 levels of preservation planning: **business** level, **user** level (E.g, design office), **technical** level (E.g, Information system organization), + **archive system level**



Overview of the LOTAR standards P2XX for Long Term Archiving and Retrieval of Product Management data

Data domain specific part	*Document Number*
*Product Management Data in an **as designed view***	*NAS / EN 9300-**210***
*Product Management Data in an **as planned view***	*NAS / EN 9300-**220***
*Product Management Data in an **as delivered/ maintained view***	*NAS / EN 9300-**230***
*Product Management Data **In-development** (including prelim design review, critical design review, FAI, etc.)*	*NAS / EN 9300-**240***
Change documentation	*NAS / EN 9300-**250***

LOTAR part 200
« Common concepts for Long Term archiving and retrieval of product structure information »

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

1 Preface

2 Scope

3 Normative References

4 General Terms, Definitions and Abbreviations

5 Applicability

6 Fundamentals and concepts for LTA of PDM data

7 Requirements for customization of off-the-shelf PDM systems

8 Methods of implementation of the given requirements

9 Preservation Planning for archived PDM information

10 Auditing in the PDM environment (specific requirements, constraints, etc.)

11 Administration and monitoring

12 Definition of Archive Information Packages for PDM Data

13 Conformance Classes

14 Annex

Ready for internal ballot

LOTAR part 210 « L-Term archiving and retrieval of Product Management Data in an as designed view »

LOTAR
LONG TERM ARCHIVING AND RETRIEVAL

Title under review

1 Introduction
2 Normative References
3 Terms, definitions and abbreviations
4 Applicability
5 Business scenarios and use cases for LTA of as designed PDM data
6 Essential information for ‘as designed’ PDM data
  6.1 PLCS information subset in the scope of EN 9300-210
  6.2 Essential information common to all use cases
  6.3 Essential Information specific for each use case
7 Core Information Model for LTA of as designed PDM data
8 Qualification methods for LTA of as designed PDM data
  8.1 Verification rules
  8.2 Validation rules
9 Conformance requirements
  9.1 Conformance classes
    9.1.1 Passive data, viewing format only (CC1)
    9.1.2 Partly re-usable Data (CC2)
    9.1.3 Allowing full re-use of data (CC3)
Appendix A : Business scenarios

Overview of Airbus A350 “LTA3D” project

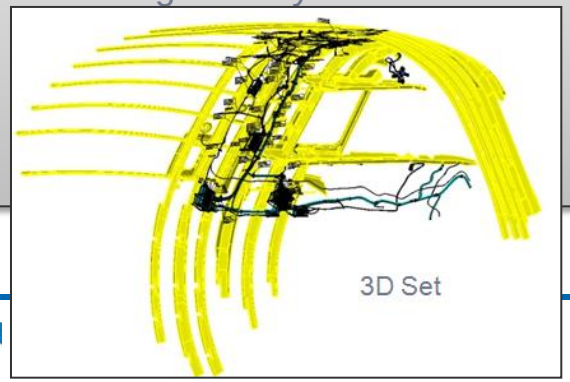
Goal of the project is to provide a 3D archiving solution for the Definition Dossier

Scope & Key Objectives of the phase 1

- *CAD 3D LT archiving for A350 XWB 3D harness installation only*
- *The solution shall be EN9300 LOTAR compliant*
- *The solution shall be fully integrated into the existing release process, and LT archiving shall be done in the existing Airbus corporate archive*
- *ISO 10303 STEP format shall become the used neutral format for LT archiving of CAD 3D PMI and PDM*
- *An external audit shall be performed on the solution implementation*
- *The solution shall be deployed before A350XWB type certification*

Essential information to be archived

- CAD Assembly structure,
- CAD 3D exact geometry,
- CAD 3D annotation,
- CAD 3D tessellated geometry



EN9300 LOTAR standards applied

Basic parts:

- EN9300 part 1, 2, 3, 4, 5, 7

Process parts

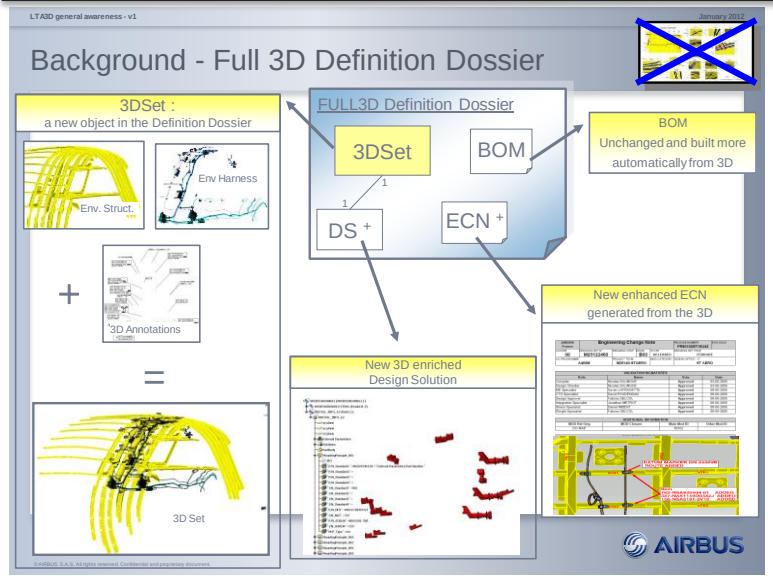
- EN9300 parts 10, 11, 12,13,14,15

CAD 3D geometry domain parts

- EN9300 part 100, 110, 115, 120

Background & Process of the Airbus A350 "LTA3D" project

Full 3D definition dossier



➔Usage of the "Full 3D" approach requires an implementation of a CAD 3D LT archiving solution to stay compliant with Airworthiness regulation

➔agreement with EASA has been reached on this subject for the A350 3D electrical harness installation scope

LTA3D "high level" process

Ingest

- **Fully integrated in release process:**
  - Conversion from native into to neutral format
  - Quality control of converted data using V&V
- **Transfer to archive**

Archive

- **Fully integrated in corporate LT archiving solution:**
  - Archival checks
  - Archival storage

Retrieve

- **Launched from corporate LT archiving solution:**
  - Retrieval of neutral archived format
  - Retrieval into native CAD format
  - viewing

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