

Gulfstream Simplifies Type Certification with the 3DEXPERIENCE Platform

Dan Ganser
Gulfstream

GLOBAL PRODUCT DATA INTEROPERABILITY **S U M M I T** 2017



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The Gulfstream Product Line

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G650ER		7,500 nm at M0.85
G650		7,000 nm at M0.85
G600		6,200 nm at M0.85
G500		5,000 nm at M0.85
G550		6,750 nm at M0.80
G450		4,350 nm at M0.80
G280		3,600 nm at M0.80
G150		3,000 nm at M0.75

3D Model Based Type Design (3D MBTD)

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- True 3D electronic representation of the aircraft
 - Includes fasteners, shims, hardware, veneer, etc.
- Relies on Geometry versus text
 - No dimensions on the models
 - Users interrogate models for relevant dimensional information
- Deployed to all users in the process
 - Engineering, Manufacturing, Quality, Purchasing, Product Support, etc.
 - Supply Base

Eliminates paper, design ambiguity and many costs

3DMBTD is the Enabler

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The Good!

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- No Data Conversion
 - CATIA V5 for everyone (Read Only License)
 - Everyone sees the same thing
 - Designers Validate what Operations uses
 - “Pull up that model and look at this...”
- Restrict the Use of CATIA V5 to entities that are supported by STEP
- Rules based EBOM on the fly from the CAD structure
 - NO Synchronization (CAD – EBOM)

The Bad!

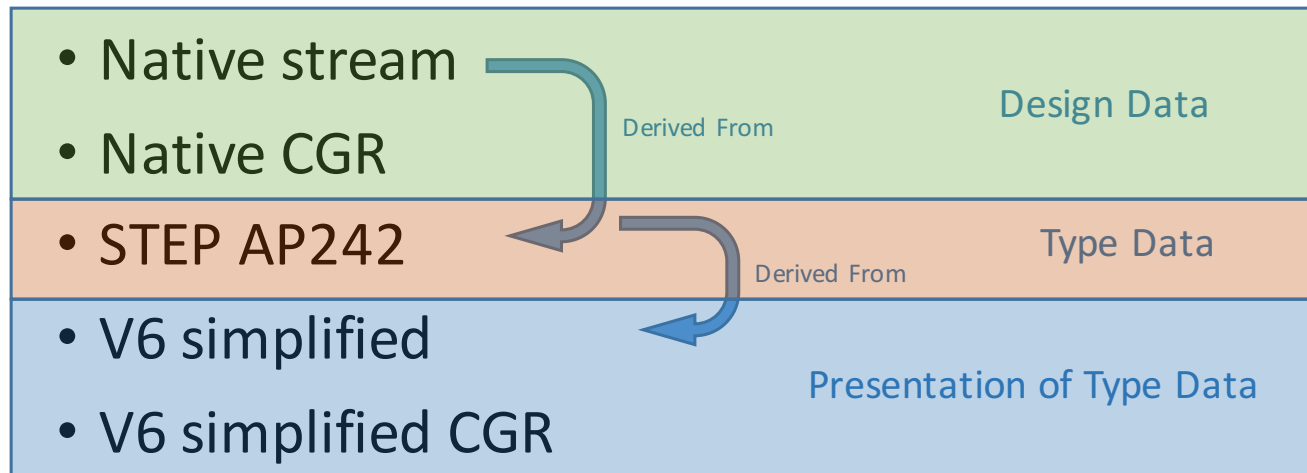
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- Life of the Product – Life of the Data
 - Aircraft have a 50 – 75 year life cycle, so the data must “live” for a very long time
 - Software and hardware will continue to evolve during the life of the product
 - How will V5 data work with Vxx?
 - What happens if the software company goes out of business?
 - What hardware will we be using 50 years from now?
 - Data goes corrupt
 - How do you know?
 - How does the user know?
- No Mobile Solution with CATIA V5

The Solution!

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- Integrate STEP AP242 into the design process and use it throughout the build process.
- Leverage 3DExperience to manage multiple file format conversions



Primary Goals of New 3DExperience Process

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- Reduced Cost to maintain complex geometry for Life.
- Use Type Data in the process, not just an archive byproduct.
- Leverage Type Data whenever possible
 - Designer is the best validator of a conversion
 - He/She must use the Type Data early in process
- Consistent Presentation to ALL Users
- Simple Presentation to ALL Users

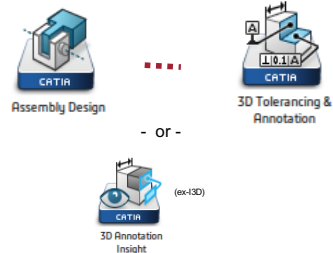
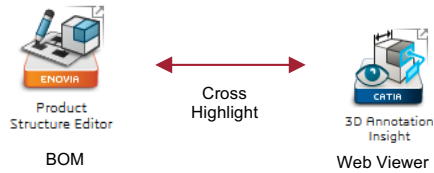
3D Data Consumption Modes

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- Light – Shape Only (Facet)
- Review – Facet Shape (STEP)
 - PMI
 - GEOSSETS
 - Wireframe Geometry (Surface, Curves, Pts, etc.)
 - Canonical/Facet Measurement
- Review with BREP – Exact Shape (STEP)
 - PMI
 - GEOSSETS
 - Wireframe Geometry (Surface, Curves, Pts, etc.)
 - Exact Measurement
- Design – V6 Native Model

3D Data Applications

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Layer	Native CAD	Web Client
Apps	 <p>Assembly Design 3D Tolerancing & Annotation</p> <p>- or -</p> <p>CATIA 3D Annotation Insight (ex-3D)</p>	 <p>Product Structure Editor BOM</p> <p>↔ Cross Highlight ↔</p> <p>CATIA 3D Annotation Insight Web Viewer</p>
Roles	<p>Designer</p> <p>Reviewer</p> <p>Inspector</p>	<p>Designer</p> <p>Reviewer</p> <p>Inspector</p> <p>Operations</p>
Mode	<p>Light – V6 simplified CGR</p> <p>Review with BREP – V6 simplified</p> <p>Design – Native stream</p>	<p>Light – V6 simplified CGR</p> <p>Review – V6 simplified CGR</p>
Interactions	<p>Review - Measure Exact (STEP)</p> <p>- Cross Highlight BOM</p> <p>Design - Open Light</p> <p>- Switch Modes</p>	<p>Review – Measure Canonical / Facet</p> <p>– Send to CATIA (Sync)</p>

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STEP 242 Native Integration

Brian Christensen
Dassault Systemes
September 19, 2017

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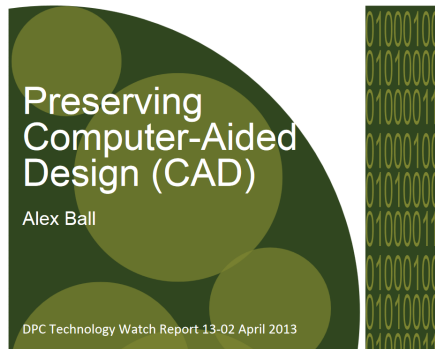
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STEP as a core DS strategy to support A&D Market



Medium and Long Term Goals – Software Compliance

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- OEMs and partners use software to prepare product definition data and TDPs
- Compliance may be limited by software
- Software must comply with applicable PMI standards
- Software should be developed with compliance with PMI standards in mind
- Software should be tested to verify compliance
- If software does not comply with PMI standards, OEMs and partners may fail to meet contractually imposed requirements

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CAD/CAM and the Exchange of Product Data

N.-J. Horny CERN, Geneva, Switzerland

Abstract

A 3D model defined in a CAD-system is used as a basis for design and product development. The concept of Computer Integrated Manufacturing (CIM) consists of sharing information between different applications used for design and manufacturing of a product so that the requirements of the manufacturing processes are taken into account already at the design stage, allowing shortened product development cycles. Later on in the product's life-cycle, the same product data could be used to support e.g. maintenance processes. This process requires that different CAX applications can share the same product model. These CDM puts stringent demands on the abilities of CAX tools to exchange product data and the methodology used in the design process. The emerging ISO Standard for the Exchange of Product Data (ISO 15926 STEP) addresses some of these needs, while use of existing de-facto standards require a pragmatic approach and careful selection of CAD-tools and planning of design methodology.

Keywords: CAD/CAM, Shape Geometry, Product Data, STEP, Engineering, Manufacturing

1 Introduction, CAD-data exchange is often the bottleneck

A Computer Aided Design (CAD)-system used to be a computerized drawing automation tool. Nowadays CAD/CAM systems are 3D solid modelling tool which allow for complete definitions of product geometry in an electronic form. This data can be used as a basis for numerous other applications. Typically the geometry of the CAD model is shared with applications for strength analysis such as FEM programs, rapid prototyping systems, or used to make up the instructions to guide NC-machine tools for the manufacturing process. The CAD-geometry can also be used as a basis for simulation processes, or is simply exported to visualization applications to generate e.g. a film showing the future product in its environment.

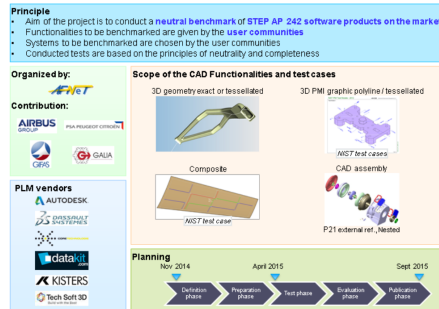
Smooth and reliable exchange of product data between different CAX applications is therefore of utmost importance to ensure coherent product definitions and avoid duplication of design work.

Use Cases for STEP AP242

- Accurate data exchange
 - STEP has a long history of being able to accurately capture product definition and provide data interoperability between native systems
- Product data repurposing and reuse
 - CAM and CMM solution providers are currently working to enable the processing of AP242 PMI representation data for the automation of manufacturing and inspection planning
- Consistent long term archival
 - LOTAR International, a PDES Inc. project, completed a review of STEP and concluded that STEP is very stable for long term archival (>70 years) and recommends the use of STEP for complying with NAS/EN 9300 (Long Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data)

14 | 16 Dec 2014

A. Barakat Fawcett (Systems Integration Director)



PLM Harmonization Center

EADS SSC
("Strategic Standardization Committee")

Overview of NAS/EN 9300 LOTAR standards and
ISO STEP AP 242 "managed model based 3D Engineering"
Example of use of LOTAR and STEP AP 242 within Airbus

ISO /TC 183 /SC 4 workshop, Paris
Afnor Industry Day – 5th of June 2013

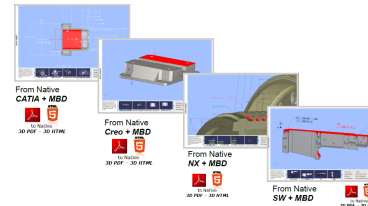
Presented by
Jean-Yves Delaunay : EADS Airbus

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Anark creates a Common 3D-MBE from multi-CAD

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Consumers of Engineering Data want low-cost Open Platforms

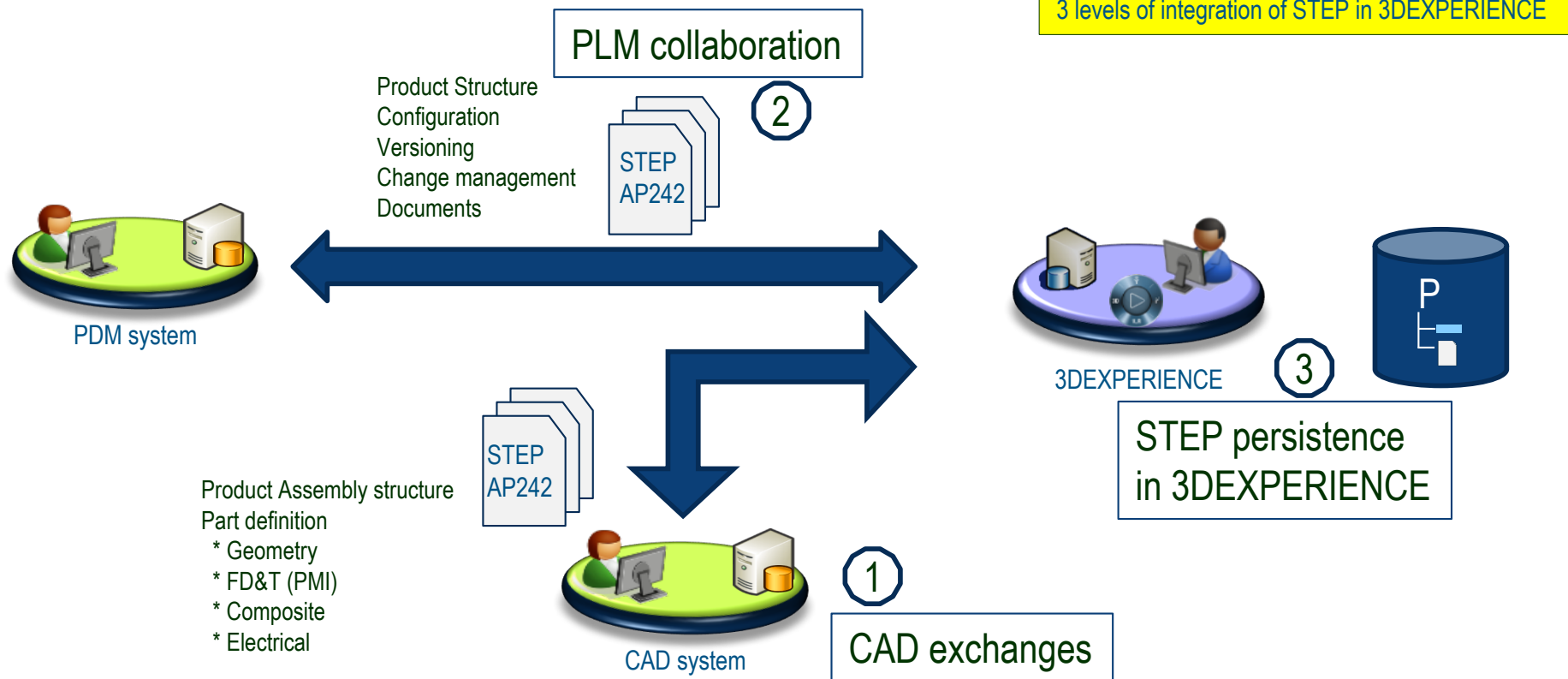
Don't Do Digital Design Wrong:
3D Technical Data Use Doesn't End at Design

MBE Summit 2017

Tom Paris
April 6, 2017

LMI

3DEXPERIENCE platform: STEP integration





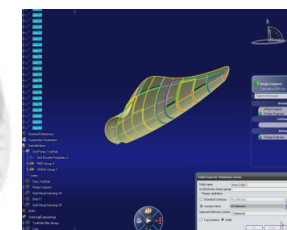
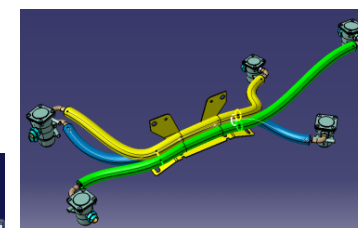
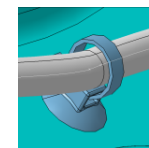
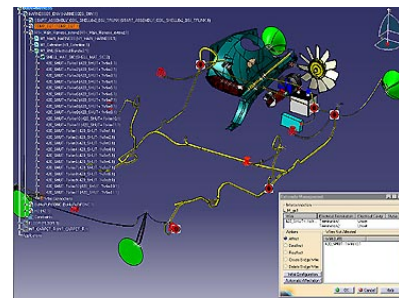
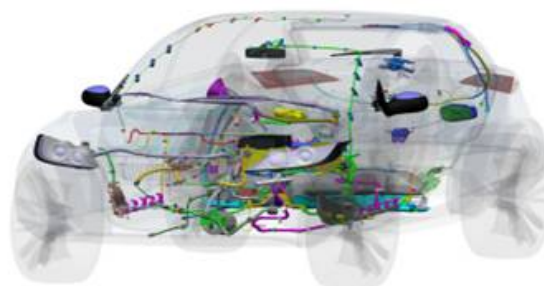
STEP AP242 CAD exchanges

3DEXPERIENCE®

STEP 3D Geometry

► 3D Explicit geometry calculated from specifications:

- Electrical Harness
- Piping & Tubing
- Multidiscipline equipments
- HVAC
- Composite result



► Validation Properties for end to end Quality Control

Status DS		
Availability	V5	V6/3DEXperience
AP242	V5-6R2013	V6R2013X

STEP AP242 : achievements and plans



3DS.COM © Dassault Systèmes | Confidential Information | 9/19/17 | ref.: 3DS_Document_2015





PDM Collaboration Hub with STEP

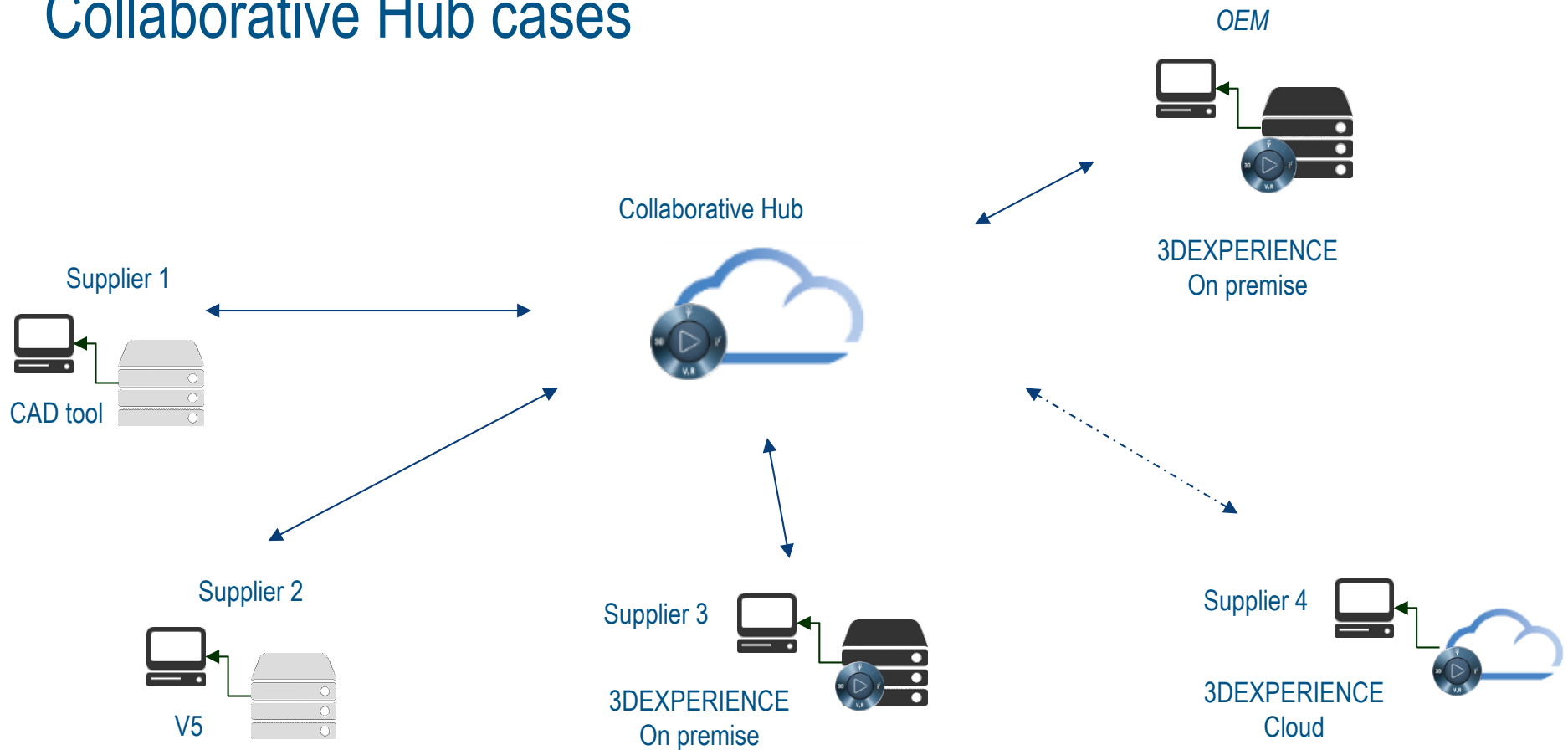
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Main Objectives of Collaborative Hub

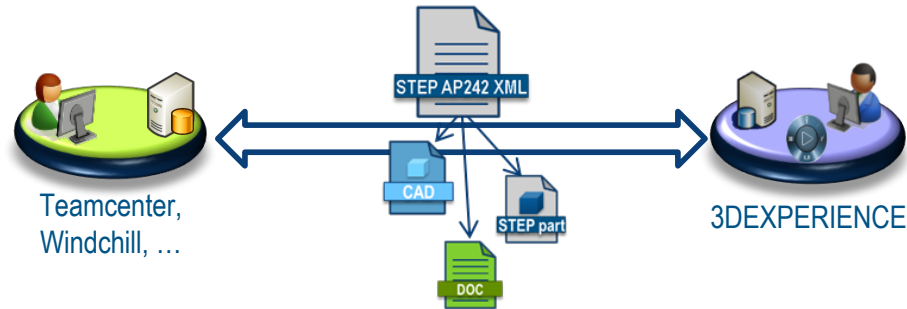
High End Integrated Value Streams across the supply chain

- ▶ Provide an affordable collaboration model by **limiting CAPEX**
- ▶ Provide a secured online environment independent from the actual Prime/Suppliers environment allowing **multi-tier collaboration**
- ▶ Normalized Data Exchange through **standard (STEPAP242)**
- ▶ Provide new ways to collaborate through **online services** and to operate a collaborative network (profiling, ratings, auditing, social collaboration,..)
- ▶ Provide **Online Authoring Applications** through **dedicated solution Engineered to Fly for Suppliers**

Collaborative Hub cases



STEP PDM Collaboration with 3DEXPERIENCE



► Scenarios targeted with STEP AP242 XML.

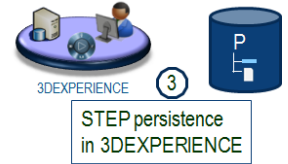
- ▷ Exchange of assemblies referencing CAD files (STEP or native) and non-CAD documents (PDF, Office,...)
- ▷ STEP PDM Collaboration with lifecycle management
 - Iterative imports with data update and versions management
- ▷ STEP PDM Collaboration with effectivities management
- ▷ Exchange between customized PDM system.



STEP persistence in 3DEXPERIENCE

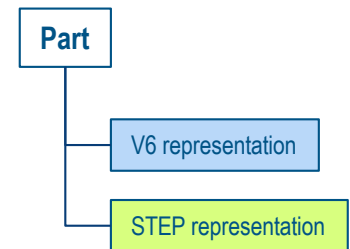
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STEP persistence in 3DEXPERIENCE



- ▶ Ability to persist STEP files in 3DEXPERIENCE as alternate representation of native part
 - ▷ Users can work in session either with the native parts or with the STEP Parts, depending on their activity.
 - ▶ Design done with native Parts
 - ▶ Review, measurement, clash can be done directly with STEP Parts

- ▶ Long Term Archiving taken into account since the design stage
 - ▷ STEP reference data can be checked all along the lifecycle
 - ▷ Archiving can be done easily (no geometrical conversion required)

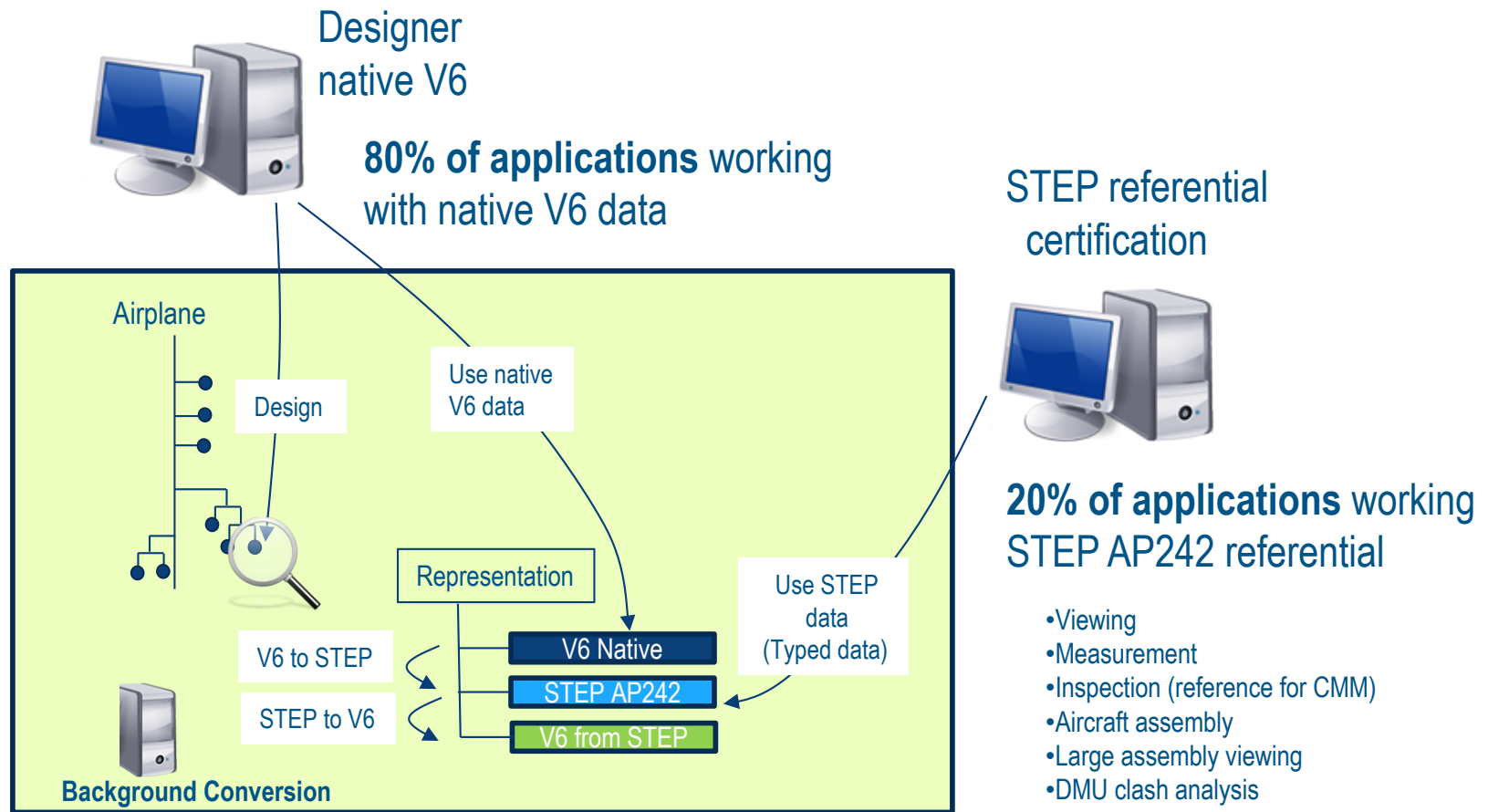


Measurement using STEP data

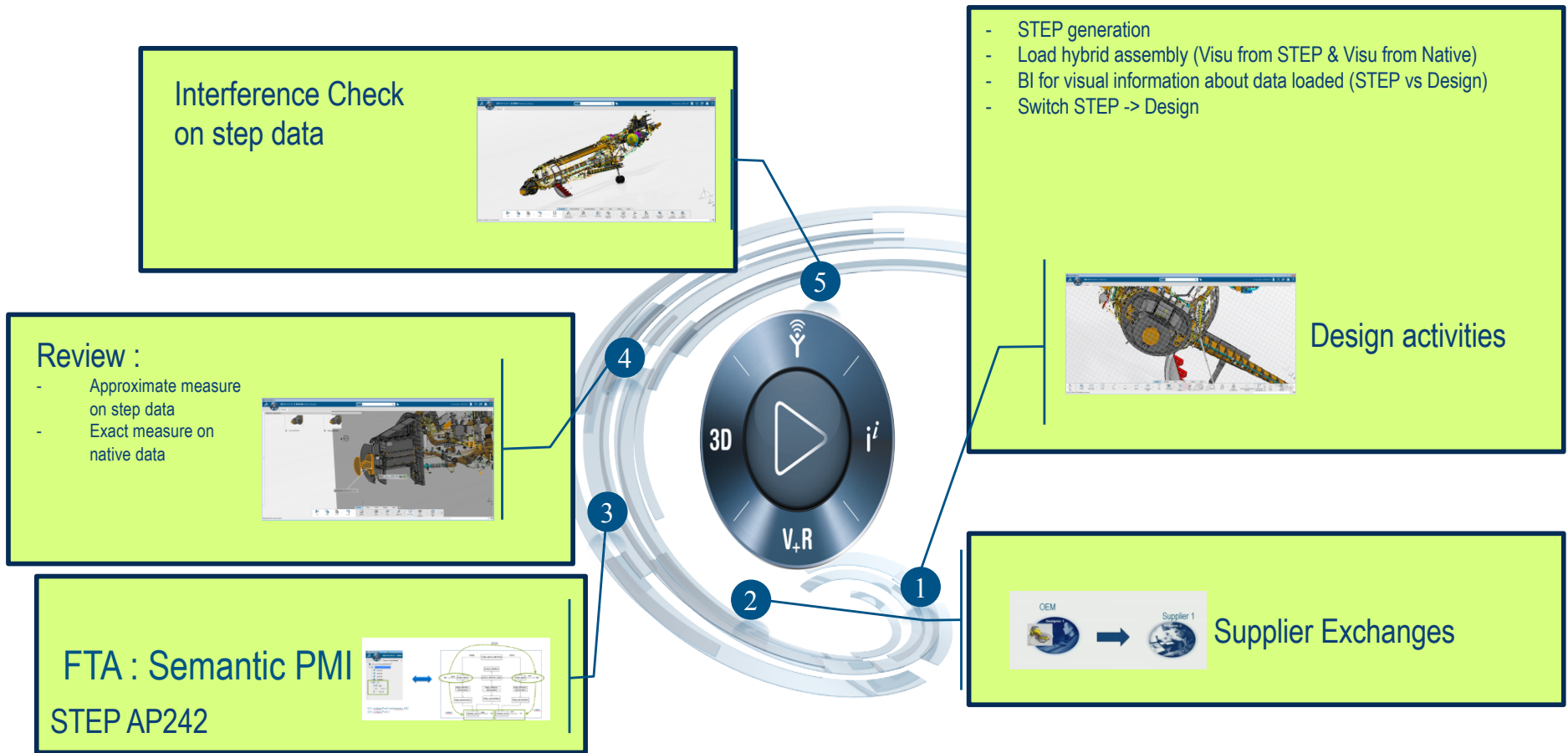


3DEXPERIENCER2017x LA

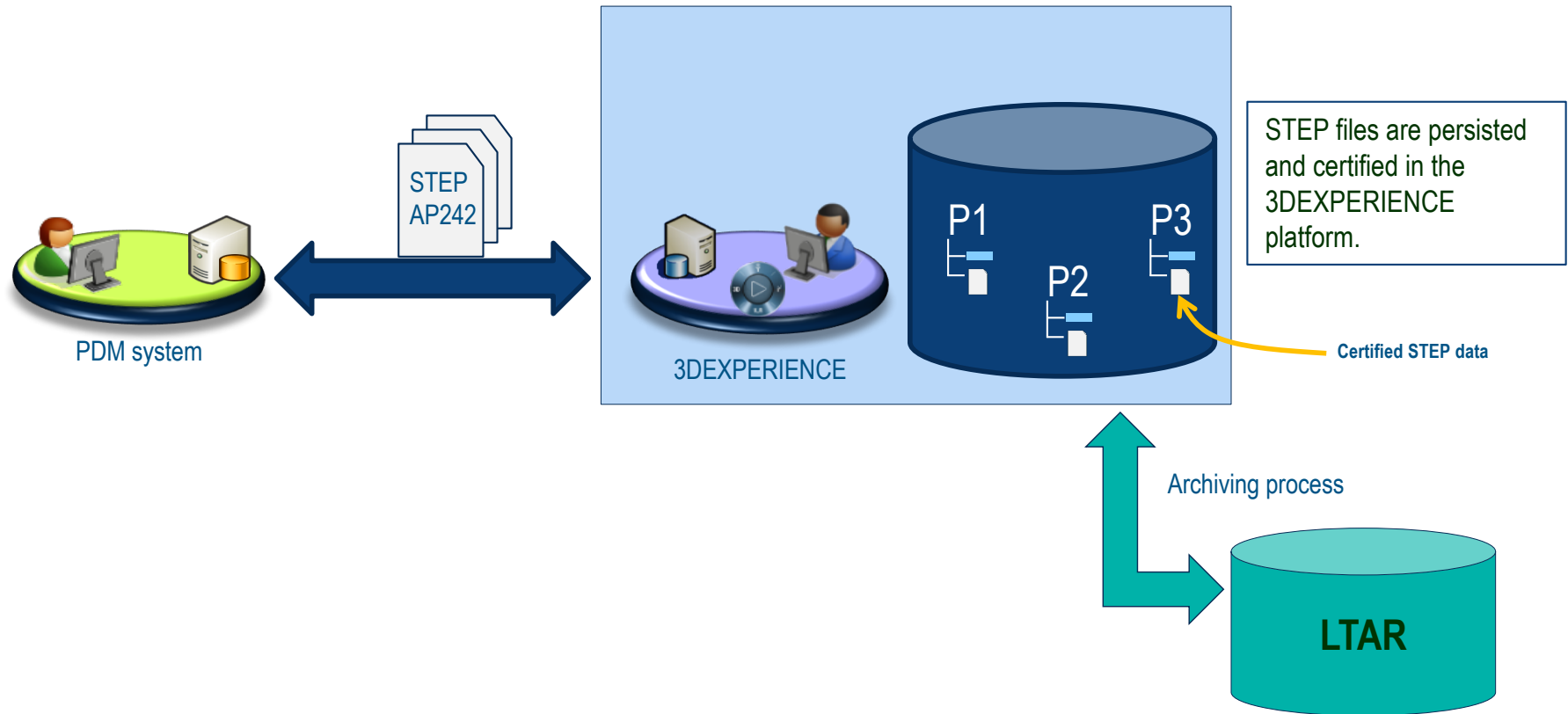
Native data – STEP data



Type Data Scenarios



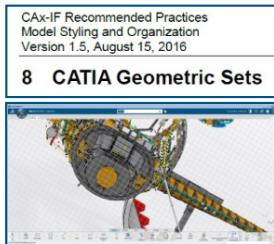
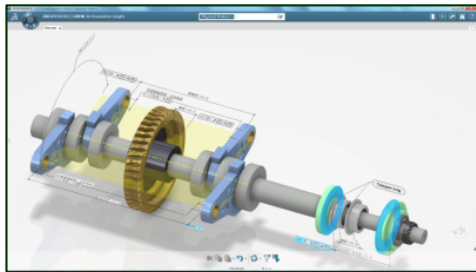
3DEXPERIENCE platform: Long Term Archiving



Collaboration using STEP 242 (ISO)

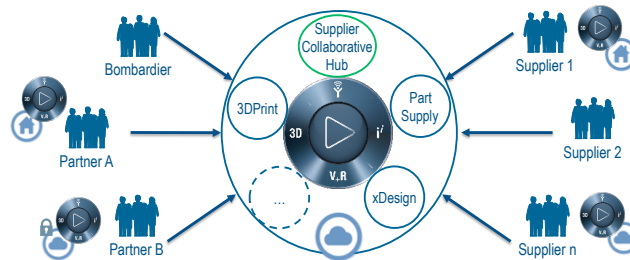
1

Comprehensive Coverage



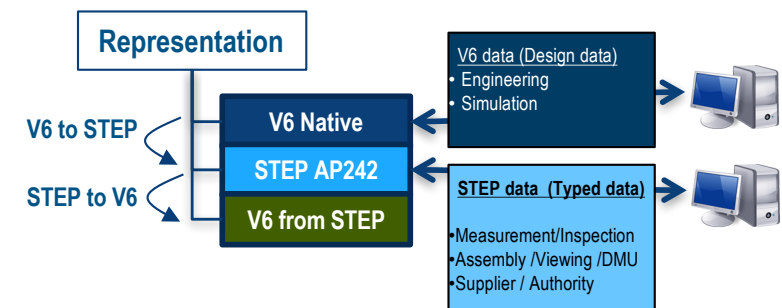
2

Supplier Collaboration Cloud



3

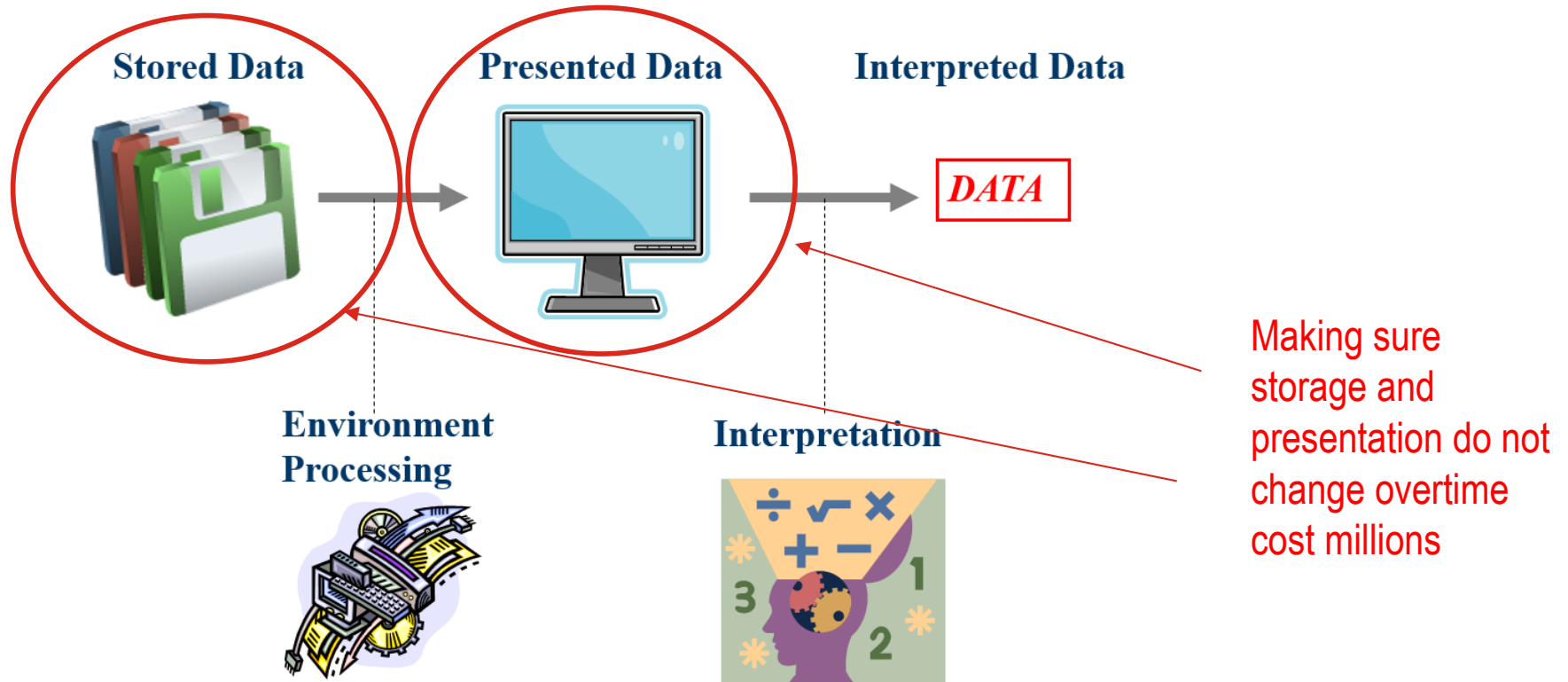
Native LOTAR Compliancy



ISO 10303-242:2014

Industrial automation systems and integration -- Product data representation and exchange -- Part 242: Application protocol: Managed model-based 3D engineering

The cost of maintaining Type Design Data



3D Data stream concept

