

Teamcenter Integration with STEP via PLMXML

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Agenda

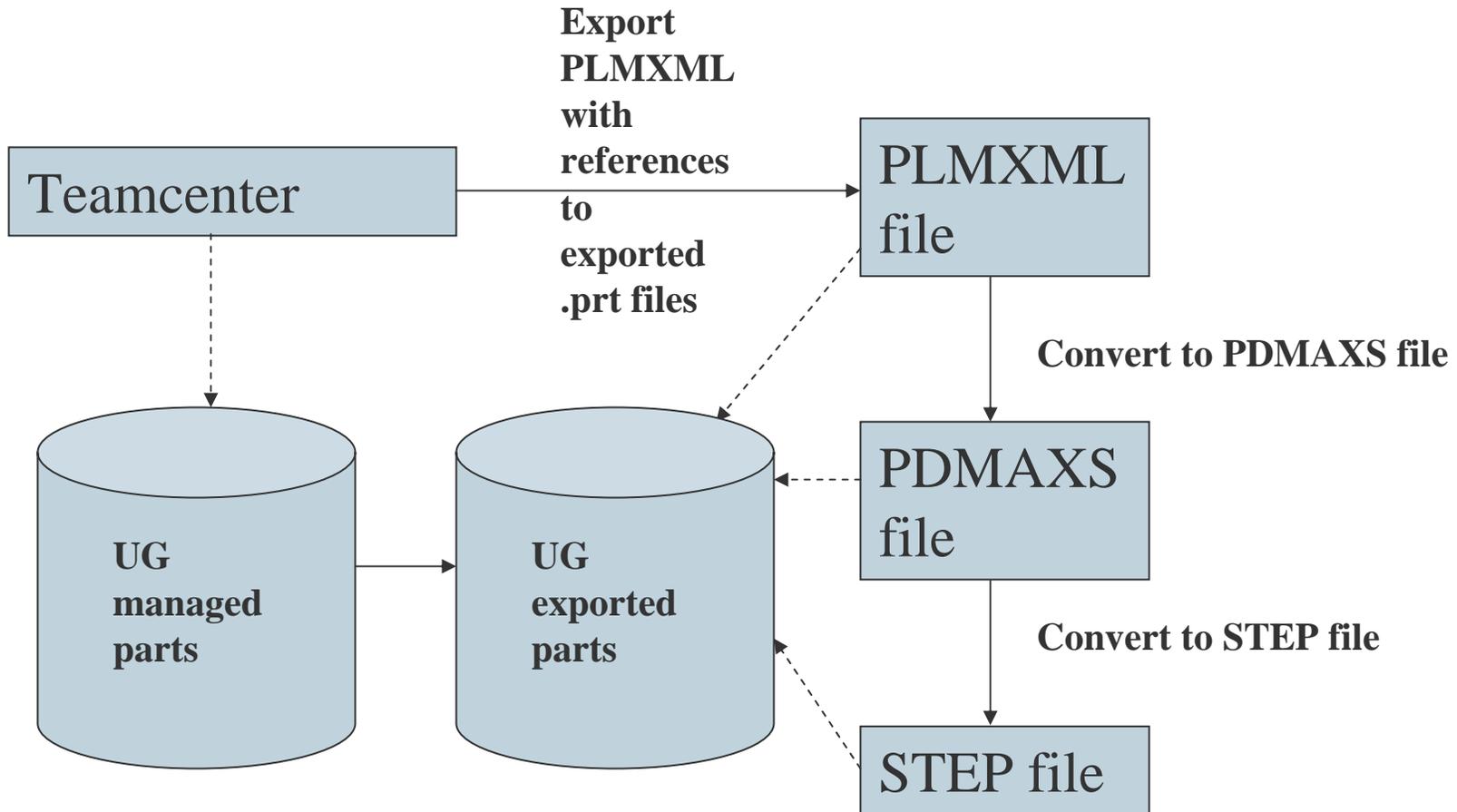
- PDES Inc. AEA Pilot
- Teamcenter - PLMXML
- PDMAXS
- Mapping PLMXML to PDMAXS.dtd
- Creation of STEP file with external references
- ExtreSTEP
- Demonstration
- JT Developments

- Aerospace Engine Alliance Pilot
- Objective : Develop and test methods for the exchange of configuration controlled interface information and associated 3D geometry between airframe structure and propulsion systems
- Scope : PDM/CAD interoperability using AP214 and AP203 E2 including net change

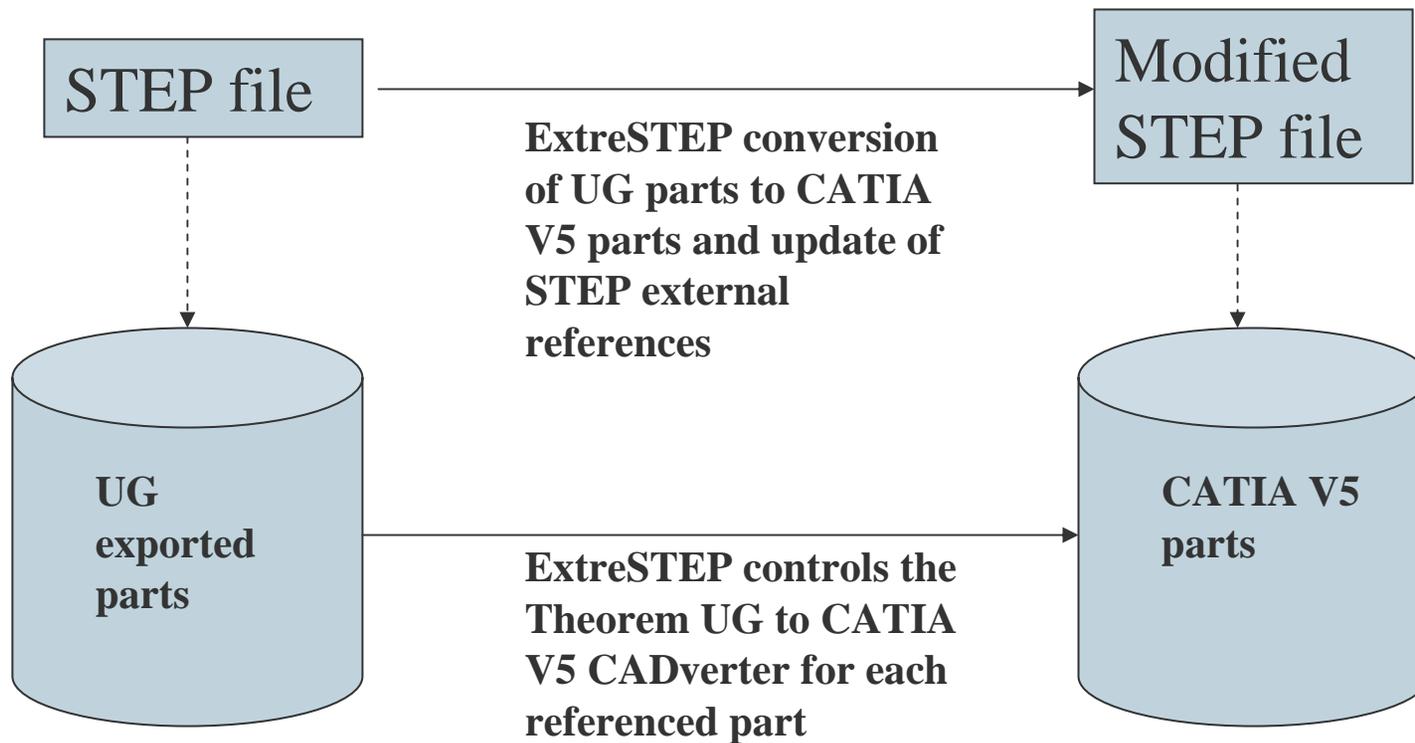
PDES Inc. AEA Pilot participating companies

- UTC/Pratt & Whitney
- EPM
- Airbus
- UGS PLM Solutions
- Theorem Solutions

Conversion to STEP



ExtreSTEP Modification of STEP file



ExtreSTEP = External Reference STEP processor

Teamcenter PLMXML

- PLMXML is an xml representation of the data in the Teamcenter database
- The PLMXML data is exported from the Teamcenter implementation
- For the purposes of this project, the relevant data are
 - the product structure (assembly hierarchy)
 - the positional information
 - the component geometry Unigraphics files
 - associated cmdata

PLMXML Relevant Data structure

- Header
- ProductDef
- Product
- ProductRevision
- ProductView
- ExternalFile

ProductDef Attributes

- ProductDef
 - InstanceGraph
- ProductInstance
 - partRef
 - transformRef
 - userData
 - ProductRevisionView
 - revisionRef
 - instanceRefs

ProductDef Attributes XML

■ ProductDef

- `<ProductDef id="id21"><InstanceGraph id="id22" rootInstanceRef="id23">`

■ ProductInstance

- `<ProductInstance id="id23" partRef="#id24"`
- `transformRef="id72" sequenceNumber="10">`

■ ProductInstance.ProductRevisionView

- `<ProductRevisionView id="id24" name="EXAMPLE BOM/A-view" viewRef="#id7" revisionRef="#id8" instanceRefs="id38 id264">`

Product and ProductRevision Attributes

- Product
 - name
 - productId
- ProductRevision
 - masterRef
 - name
 - revision
 - associatedDataSet

Product and ProductRevision Attributes XML

■ Product

- `<Product id="id20" name="EXAMPLE BOM" accessRefs="#id9" subType="Item" productId="EXAMPLE BOM">`

■ ProductRevision

- `<ProductRevision id="id8" name="EXAMPLE BOM" accessRefs="#id9" subType="ItemRevision" masterRef="#id20" revision="A">`
- `<AssociatedDataSet id="id45" dataSetRef="#id44" role="IMAN_specification"></AssociatedDataSet>`

ProductView, DataSet, External File Attributes

- ProductView
 - Occurrence
 - occurrenceRefs
- DataSet
 - memberRefs
- ExternalFile
 - locationRef
 - format

ProductView, DataSet, External File Attributes XML

■ ProductView

- `<ProductView id="id3" ruleRefs="#id2" rootRefs="id5" primaryOccurrenceRef="id5">`
- `<Occurrence id="id5" instancedRef="#id8" instanceRefs="#id23" occurrenceRefs="id29 id255" sourceRef="#id25">`

■ DataSet

- `<DataSet id="id44" name="ex-partname" accessRefs="#id9" version="2" memberRefs="#id46" type="UGMASTER">`

■ ExternalFile

- `<ExternalFile id="id46" accessRefs="#PLMXML(PLMXML-doc/id9/prt-doc)" locationRef="EXAMPLE BOM_A/ex-partname.prt" format="prt">`

Access to Product Structure

- There are 2 ways to access the tree
 - `ProductDef.InstanceGraph.RootInstanceRef`
 - `ProductView.primaryOccurrenceRef`
- Both define the same tree for the data of this project
- The Instance Graph mechanism supports “Configured Product Structure”

- PDMAXS is a simple way of accessing the PDM related CM Data held within a STEP file
- It is compatible with AP203 and AP214 - and supports any STEP AP consistent with the PDM Schema Module

PDMAXS

Theorem Solutions PDM AXS Level 2 Version 9.0.001 [File: P:\users\steve\as1temp.stp]

File Data Options Internet Help

AP203

P:\users\steve\as1temp.stp

- as1
 - /NULL
 - design
 - I-bracket-assembly
 - /NULL
 - design
 - plate
 - /NULL
 - design
 - rod-assembly
 - /NULL
 - design
 - I-bracket
 - /NULL
 - design
 - nut-bolt-assembly

as1~/NULL~/design

- rod-assembly~/NULL~/design
 - nut~/NULL~/design
 - nut~/NULL~/design
 - rod~/NULL~/design
- I-bracket-assembly~/NULL~/design
 - plate~/NULL~/design
- I-bracket-assembly~/NULL~/design
 - nut-bolt-assembly~/NULL~/design
 - bolt~/NULL~/design
 - nut~/NULL~/design
 - nut-bolt-assembly~/NULL~/design
 - bolt~/NULL~/design
 - nut~/NULL~/design
 - nut-bolt-assembly~/NULL~/design
 - bolt~/NULL~/design
 - nut~/NULL~/design

Product 2 of 9

Product ID: I-bracket-assembly
Name: I-bracket-assembly
Description:
Part Type: detail
Part Class:
Context Name:
Context Discipline: mechanical

Product Version 1 of 1

Version Name: /NULL
Description: version 0 for I-bracket-as-
Product Source: Not_Known

Product Definition 1 of 1

Definition ID: design
Description:
Life Cycle Stage: design
Context Name:
Shape Name:
Shape Description:

Product | **Version** | **Definition**

Roles | Approval | Security Classification

Effectivity | Change Management

Management Type : Change Request
Change Id : CP01 [Select] [Clear]
Version : A
Purpose : Quality improvement
Description : Strengthen Bracket
Status : Issued

Approval | Roles & Dates | Documents | Work Management

Approval 1 of 1

Status: approved
Purpose: Approval of Change
Approved By: TSL-007 Tony Ranger
Date Approved: 13/04/2006 14:01:49 GMT

PDMAXS

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File Data Options Internet Help

AP203

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Product 2 of 9

Product ID: I-bracket-assembly
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Product Version 1 of 1

Version Name: /NULL
 Description: version 0 for I-bracket-as:
 Product Source: Not_Known

Product Definition 1 of 1

Definition ID: design
 Description:
 Life Cycle Stage: design
 Context Name:
 Shape Name:
 Shape Description:

Product | Version | Definition

Roles | Approval | Instances | Effectivity | Documents

Child Definition 1 of 4

Child Definition: nut-bolt-assembly~/NULL~design
 No. of Instances: 1
 Instance ID:
 Instance Security Classification:

Security Classification | Position

Position Data

	X	Y	Z
Orientation :	1.000000	0.000000	0.000000
	0.000000	1.000000	0.000000
	0.000000	0.000000	1.000000
Transformation :	27.500000	-40.000000	0.000000

Editable :

The PDMAXS dtd

- Communication between the STEP processor and the JAVA based GUI is via a simple XML dtd

- ```
<product>
. <product_id>EXAMPLE BOM</product_id>
. <product_name>EXAMPLE BOM</product_name>
. <product_version>
. <version>A</version>
. <description>EXAMPLE BOM</description>
. <source><not_known/></source>
. <product_definition>
. <description></description>
. <product_definition_id>5</product_definition_id>
. <child_definition>29</child_definition>
. <child_definition>255</child_definition>
. </product_definition>
. </product_version>
. </product>
```

# PLMXML to PDMAXS mapping (examples)

- `Product.name` => `product.name`
- `Product.product.Id` => `product.product_id`
- `ProductRevision.revision` => `product_version.version`
- `ProductRevision.name` => `product_version.description`
- `Occurrence.id` => `product_definition.id`
- `Occurrence.instance_refs` =>  
`product_definition.child_definition.child_id`
- `transform` => `child_definition.rotation` &&  
`child_definition.translation`

# PLMXML to PDMAXS mapping method

- In the original project plan for this process XML style sheets were expected to be used to map the data from PLMXML to the PDMAXS dtd format.
- During the implementation of the mapping the participants responsible for this stage of the process decided to use a programmatic method instead for the AEA pilot.

# PDMAXS to STEP Process

- In general the PDMAXS STEP processor is used as a part of a batch process.
- The JAVA GUI can be used to examine the data if required and to modify the CM Data if necessary.

- External Reference STEP processing.
- The STEP file contains document references to the component parts. The format of the file is defined e.g. unigraphics, CATIAV5, VDAFS.
- ExtreSTEP looks through the file for document references with specific formats.

# ExtreSTEP process

- The User supplies a control file stating what format files are to be translated, what translator should be used and what the format will become.
- ExtreSTEP searches the file for document references with the formats defined in the control file, runs the associated translator to create the new part file and replaces the file name and format appropriately.

# ExtreSTEP process schematic



STEP file

**DESCRIPTIVE\_REPRESENTATION\_ITEM.name =  
“data format”**

**DESCRIPTIVE\_REPRESENTATION\_ITEM.description =  
“UNIGRAPHICS”**

**APPLIED\_EXTERNAL\_IDENTIFICATION\_ASSIGNMENT.  
assigned\_id = “example-file.prt”**

**Run Translator as defined by user e.g. UGTOCATIAV5**

**UGTOCATIAV5 example-file.prt example-file.CATPart {options}**

**and change step data to ...**



STEP file2

**DESCRIPTIVE\_REPRESENTATION\_ITEM.description =  
“CATIAV5”**

**APPLIED\_EXTERNAL\_IDENTIFICATION\_ASSIGNMENT  
.assigned\_id = “example-file.CATPart”**

# JT Translator Developments

## CATIA V5 to JT

- The CATIA V5 to JT translator supports
  - Geometry
  - Product Structure
  - PMI
  - Weld Data
  - Electrical Data
  - Motion

# JT Translator Developments

## JT to CATIA V5

- The JT to CATIA V5 translator supports
  - Geometry
  - Product Structure
  - PMI - as graphical representation
  - Creation of CGR
  - Creation of “Quick CGR”

# JT Translator Developments

## Pro Engineer to JT

- The ProE to JT translator supports
  - Geometry
  - Product Structure

# JT Translator Developments

## JT to Pro Engineer

- The JT to ProE translator will support
  - Geometry
  - Product Structure

# JT Translator Developments

## Possible enhancements for 2006

- Support for XT Brep
- Support for persistent identifiers “Monikers”
- Translation of product structure as PLMXML file pointing to JT files

Thank You

**Thank You**

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