Lockheed Martin Aeronautics CMI Implementation on JSF

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About Lockheed Martin Aeronautics Company

- **Lockheed Martin Aeronautics Company builds the finest military aircraft in the world.**
  - ***C-130J***
  - ***C-27J***
  - ***T-50***
  - ***F-2***
  - ***F-16***
  - ***F-117***
  - ***F-22***

The company has been awarded the contract to build the multiservice, multimission Joint Strike Fighter of the future. The F-35

F-35 (JSF) Program

- **Provide the U.S. Air Force, Navy and Marine Corps, and the United Kingdom's Royal Navy and Royal Air Force with an affordable and stealthy tactical aircraft for the 21st century.**

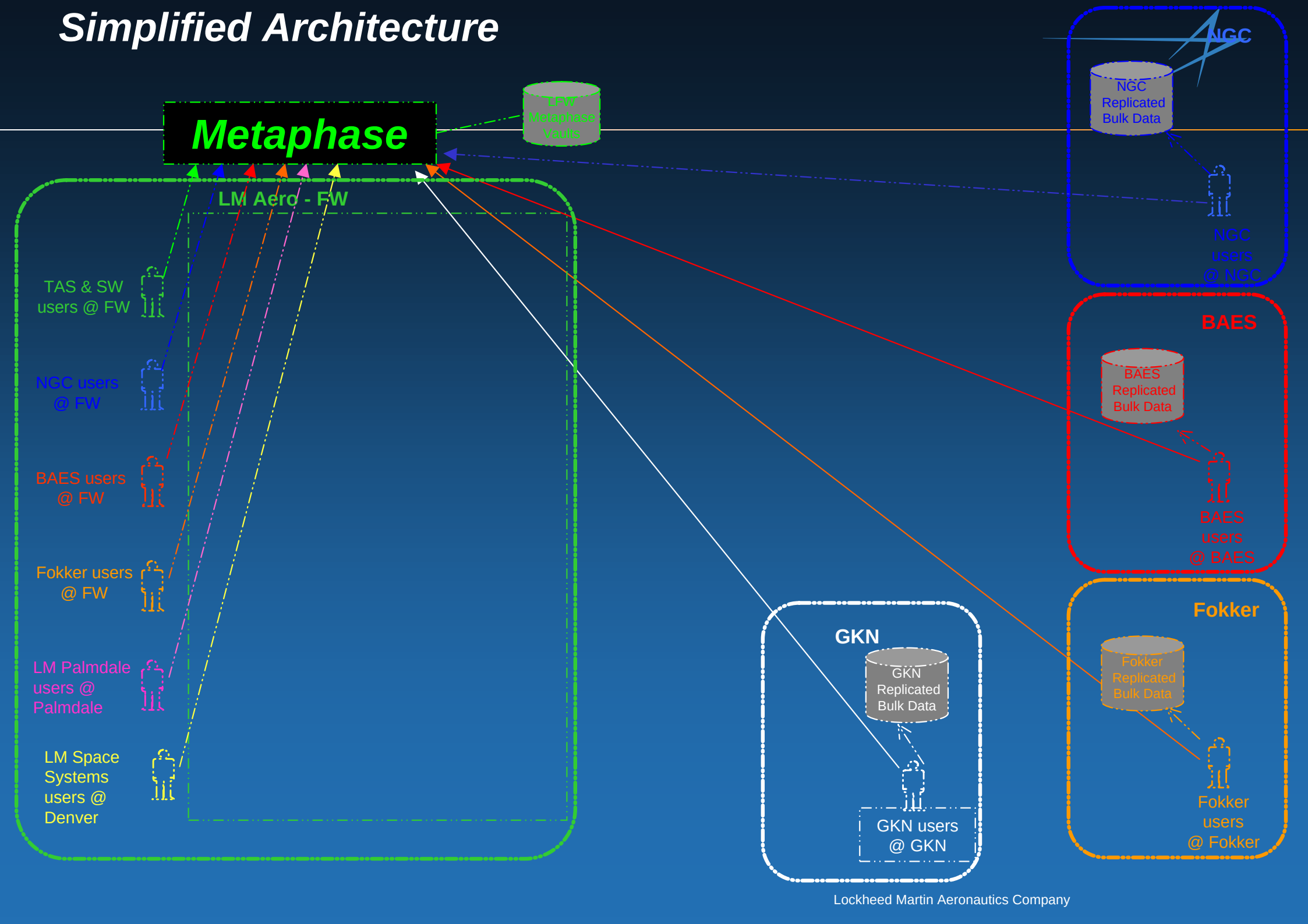
- **Establishes a common design with affordable variants that meet the individual requirements of each service.**

- **Each variant reflects a key focus on the most critical aspect of JSF: achieving affordability — while setting new standards for lethality, survivability and supportability.**

International Partnerships

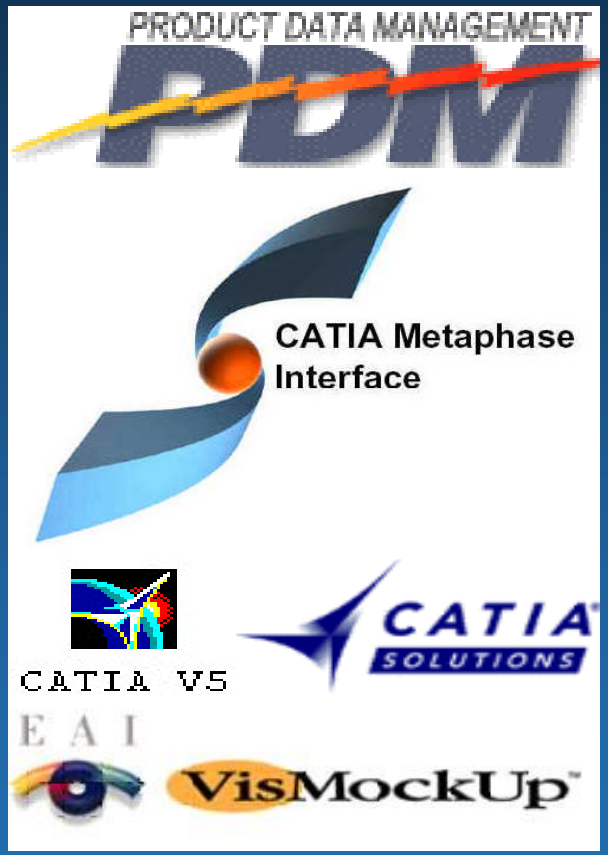
- Eight international partners
- International Traffic in Arms Regulations necessitates filtering data amongst partners
- Achieving a Global, Real Time, collaborative environment
  - *Centralized Database*
  - *Work group servers at Partner Sites*
  - *Replicated data filtered by ITAR policies*

Simplified Architecture

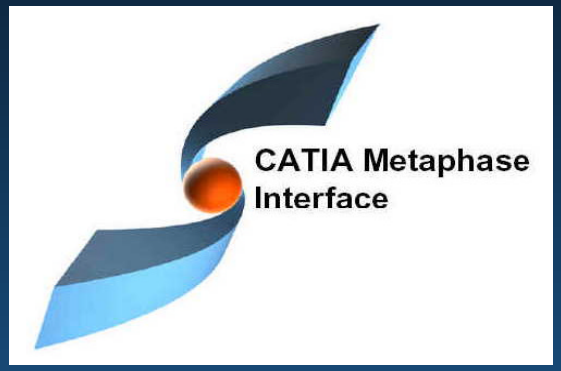


The JSF Design Tool Set

- Collaboration Foundation
- CMI
- CATIA V4
- CATIA V5
- VisMockup



The JSF CMI Mission



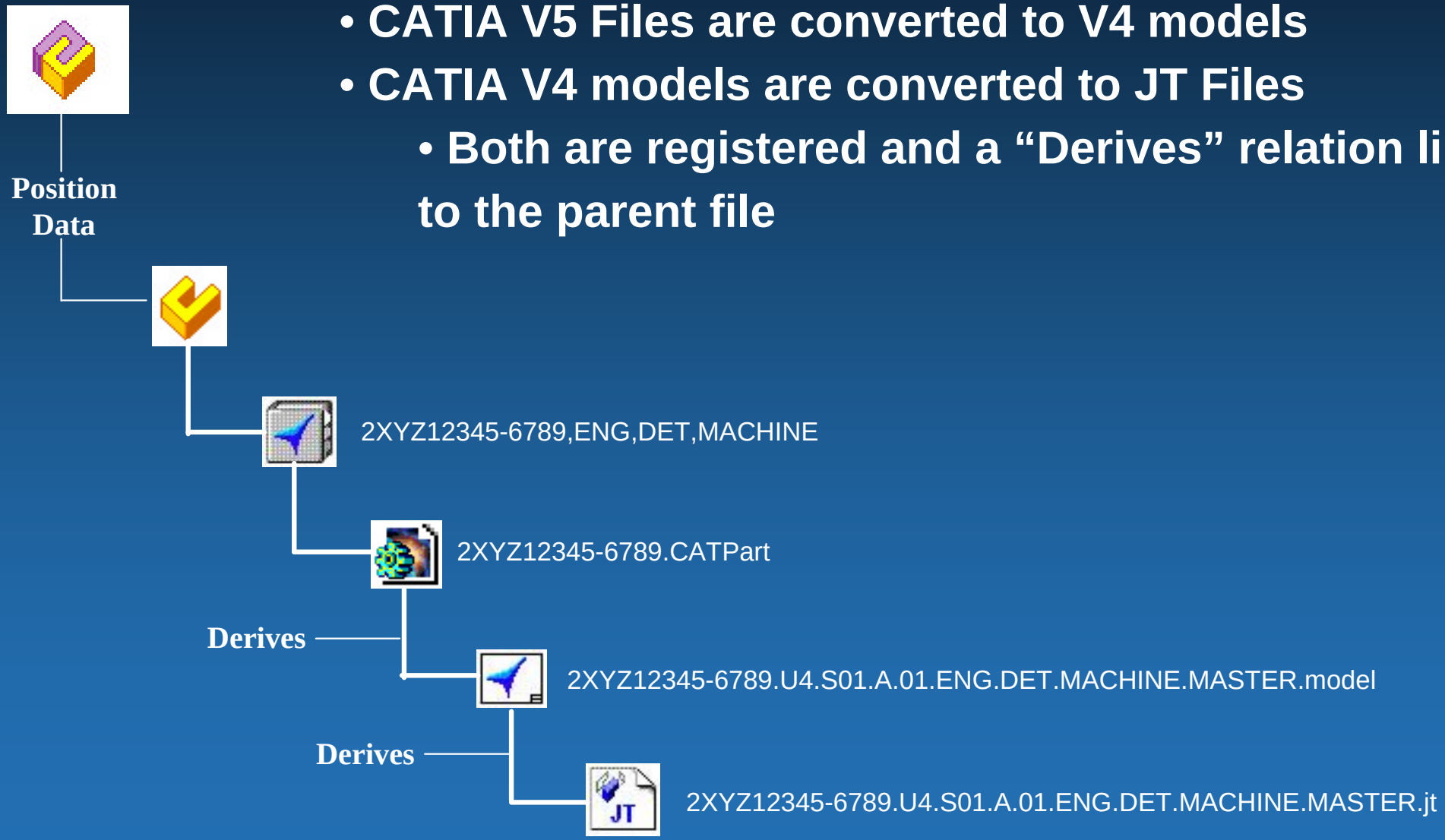
- **Provide an integration with PDM that supports …**
  - ***A real time, collaborative environment***
  - ***With global access***
  - ***For multiple CAD applications***
  - ***That is filtered by ITAR***

Meeting the CMI Objectives

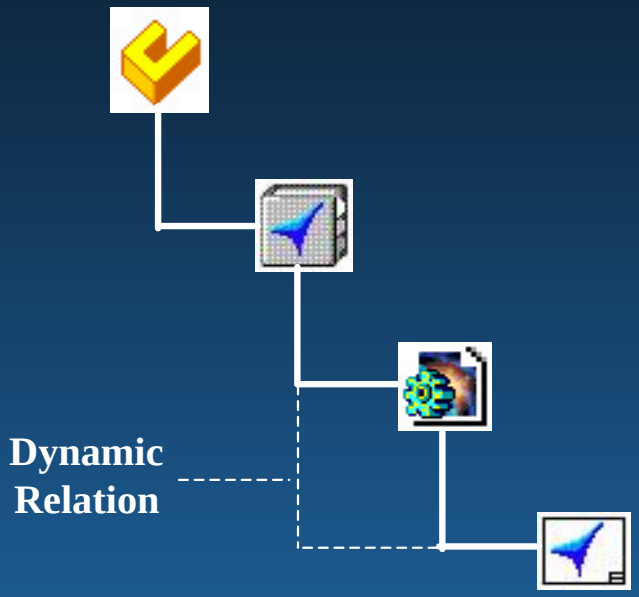
- **Access to Collaboration Foundation across the JSF network provides the bedrock for global collaboration**
  - ***Bulk Data Replication improves time of delivery for data***
  - ***Rules based on ITAR govern data access and replication***
- **CMI inherently complies with Collaboration Foundation data access and delivery functions**
  - ***In addition, CCSserv targets CMI performance improvements in our global environment***
- **Customizations address achieving collaboration across multiple CAD applications**

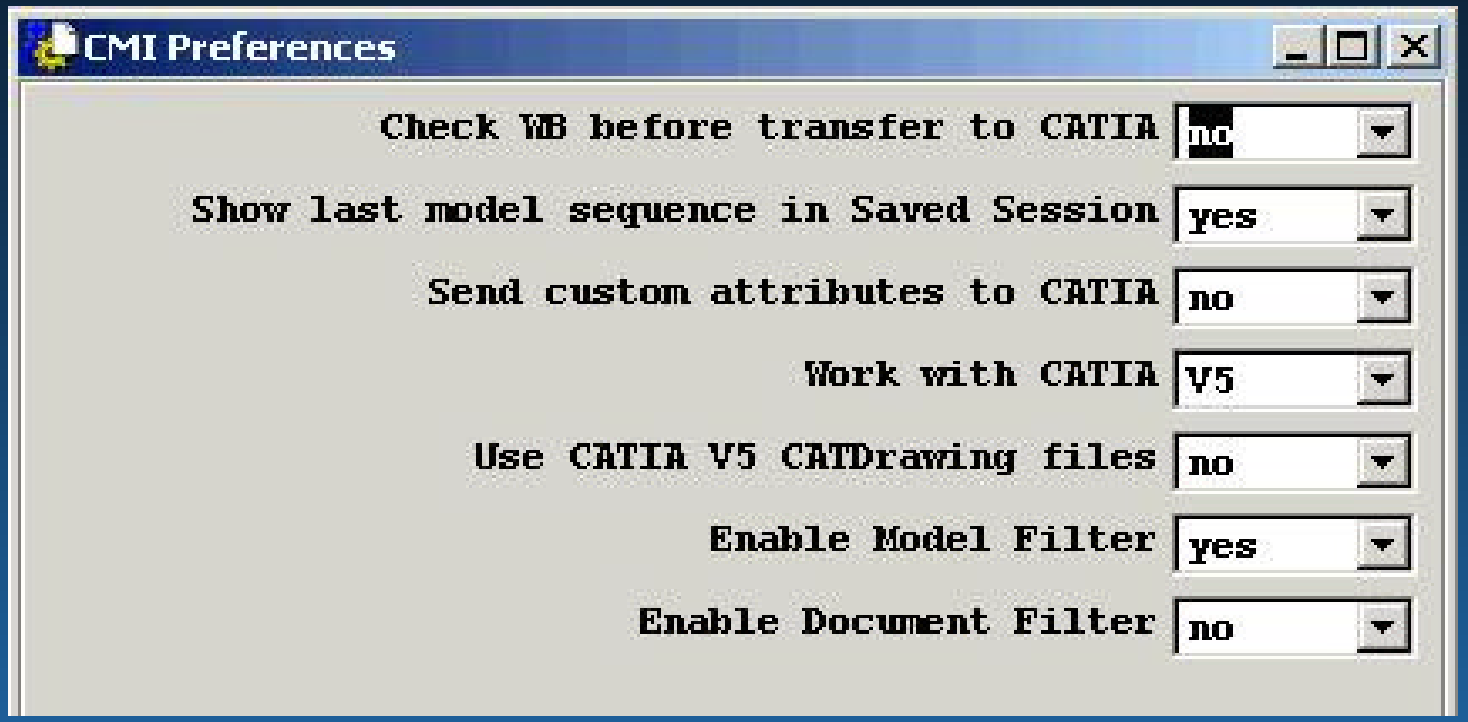
Customizations that Support a multi-CAD CMI

- CATIA V5 Files are converted to V4 models
- CATIA V4 models are converted to JT Files
  - Both are registered and a “Derives” relation links to the parent file



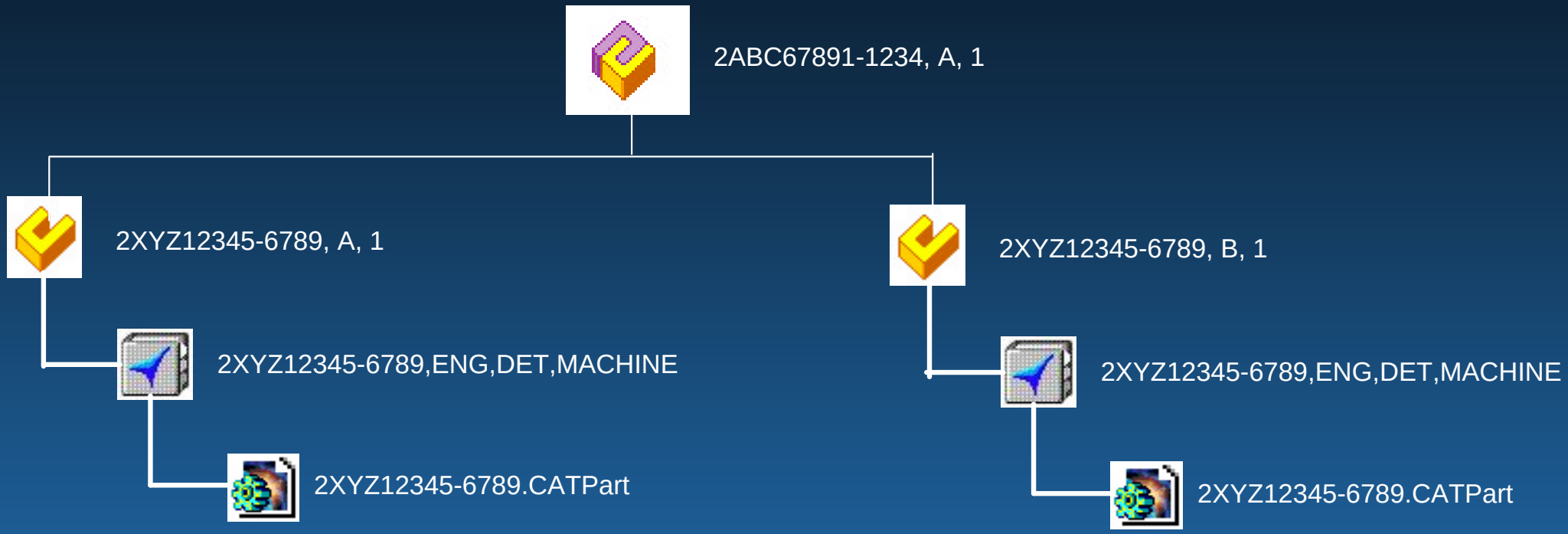
Customizations that Support a multi-CAD CMI





- **CMI Preferences drive CATIA-Workbench expansions**
  - ***Work with V5 displays V5 files***
  - ***Work with V4 displays "derived" V4 model***

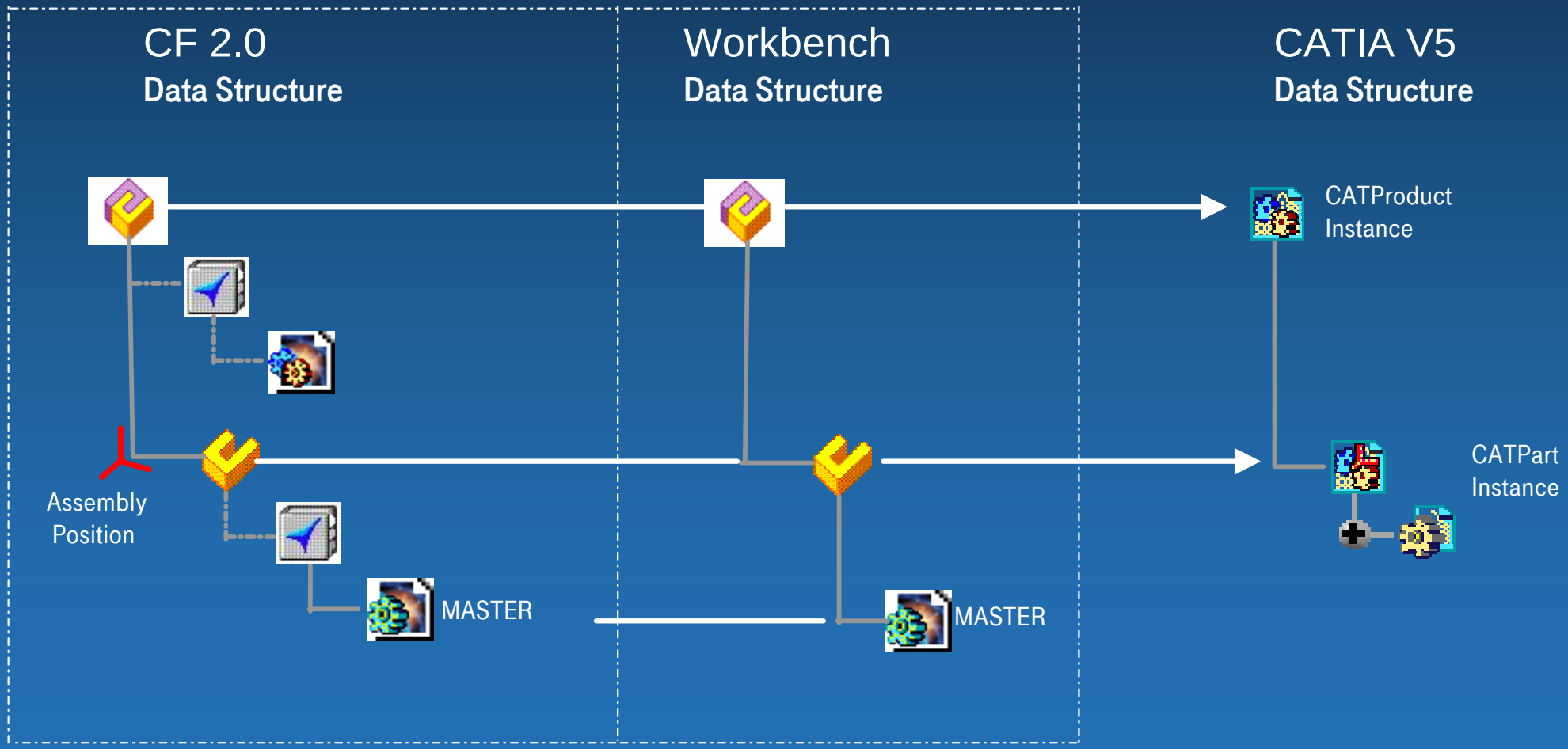
Integrating CATIA V5 into JSF



- **Design process vs. CATIA V5 File System behavior**
  - ***CATIA V5 expects a verbatim file name***
  - ***Design process expects Revisions to subordinate parts to be independent from its next assembly***
    - To avoid “Broken Links” CATIA V5 file names are “*PartNumber-DashNumber.FileExtension*”

Customizations that Support CMI/V5

- **CMI Component Data Model**
  - ***Maps PDM Parts to CATIA V5 Files***
    - Assembly maps to a CATProduct
    - Component maps to a CATPart



Customizations that Support CMI/V5

- **Strict mapping rules require validations for relations**
  - ***A CATProduct cannot be related to a Component***

- **CMI Create function that leads the user through the creation and registration of CATIA V5 files, Documents and Parts and then, creates the proper relations**

- **Assembly Relations**
  - ***x2AsmPoQ between an Assembly and a multi-use Part***
  - ***g2AsmPos between an Assembly and a single use Part***
  - ***g2AsmPos between an Assembly for Standard Parts***
    - Transformations within the CATProduct locate the Standard Part geometry

- **CATIA V5 Synchronize Function**
  - ***New files enter into the custom CMI Create function and appropriate assembly relation is created***
  - ***Quantity Decrements and additions are updated***

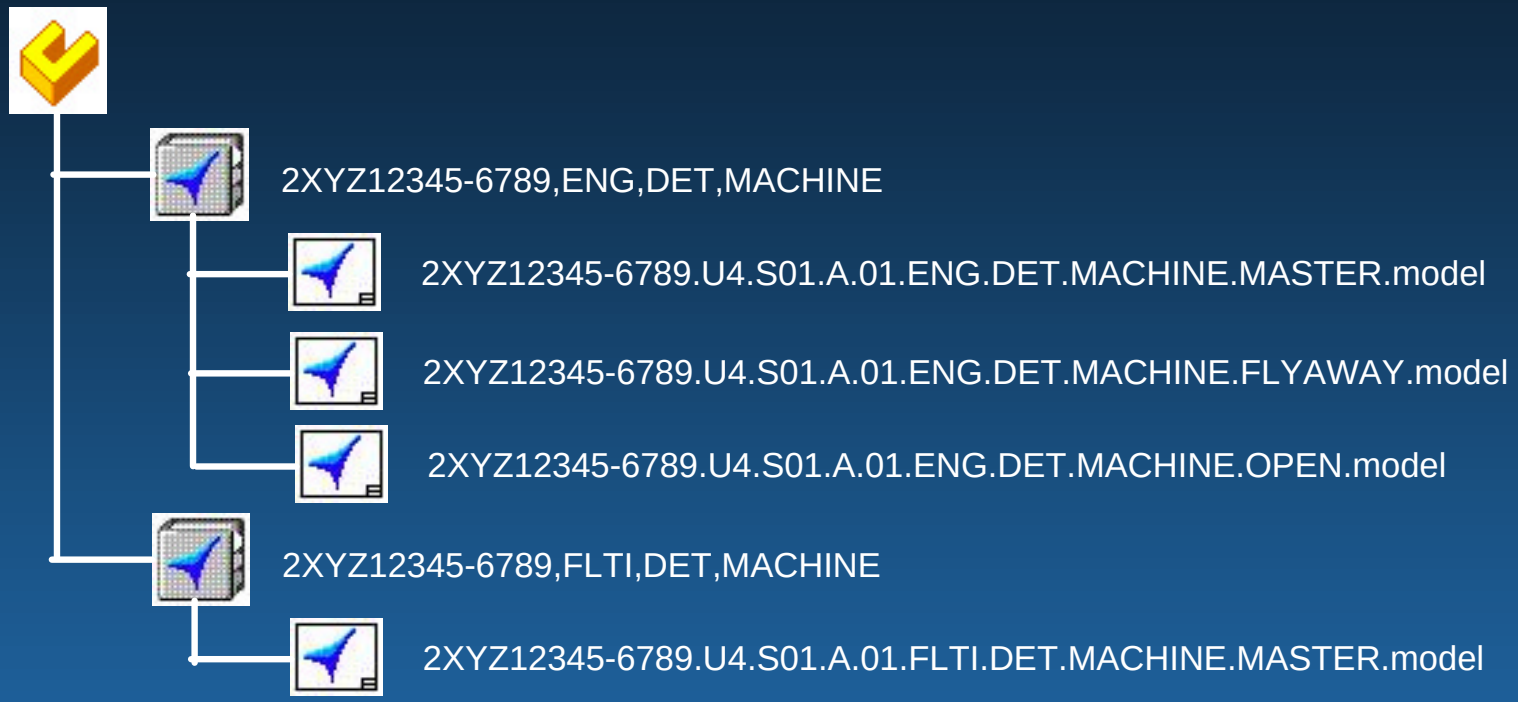
Some CATIA V5 Integration Challenges

- **CATProducts do not store geometry**
  - ***CMI Black Box function provides for an Assembly CATPart***
    - CMI 8.5 to resolve Revision behavior
    - Concern with Create behavior
- **Specification Tree nodes that are Non-BOM related**
  - ***CATIA V5 Components***
  - ***Reference Geometry***
  - ***Tubing Logical Line CATProducts***
    - Concern with introductions by new CATIA V5 Revisions
- **Unforeseen limitations**
  - ***CATProduct storage limitation of FTA data***
  - ***Large assembly interaction stresses hardware***
    - Concern with Alternative construction methods

Customizations of interest

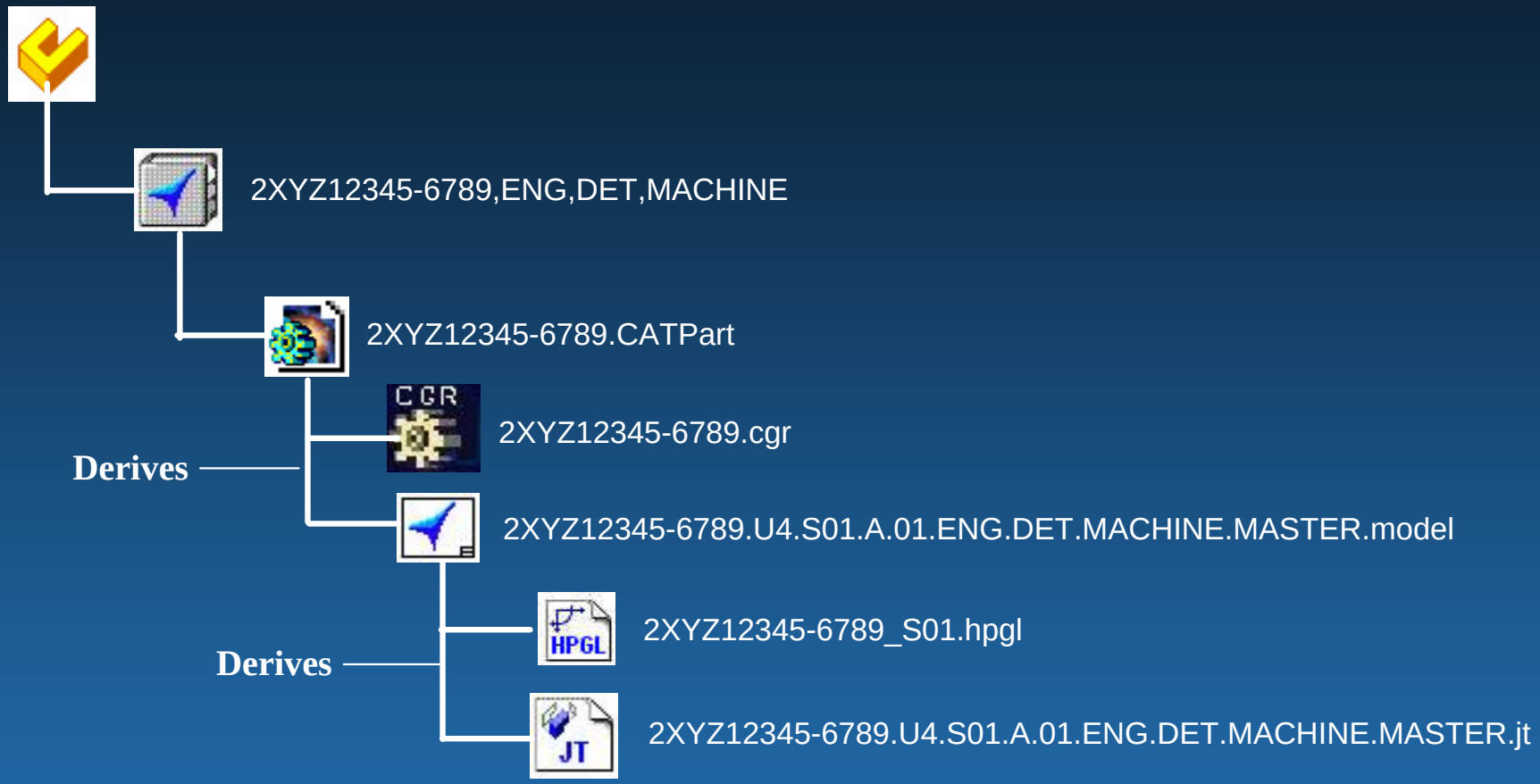
- **In Place**
  - ***Discipline and Alternative Representation Filters***
- **Next Release**
  - ***“Derives” relation for all Conversions***
  - ***Local Caching***
  - ***CMI Synchronize differentiates Non-BOM Spec Tree nodes***
- **Specification Phase**
  - ***V4 Synchronize***
  - ***CATIA-Workbench Merge***
  - ***Relation for Reference parts***
  - ***Reduced Sub-Assembly***
- **Under Consideration**
  - ***PDM Connector***

CMI Customizations for Discipline and Representations



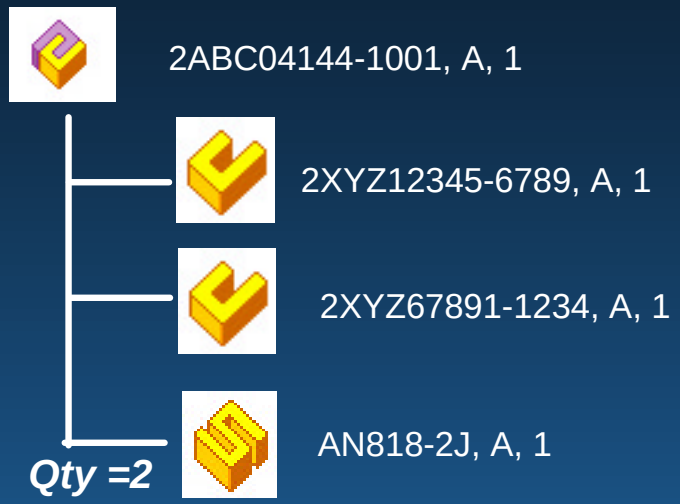
- **CMI Preferences drive CATIA-Workbench expansions**
  - ***Document Filter displays selected Disciplines***
  - ***Model Filter displays alternative representations of design***

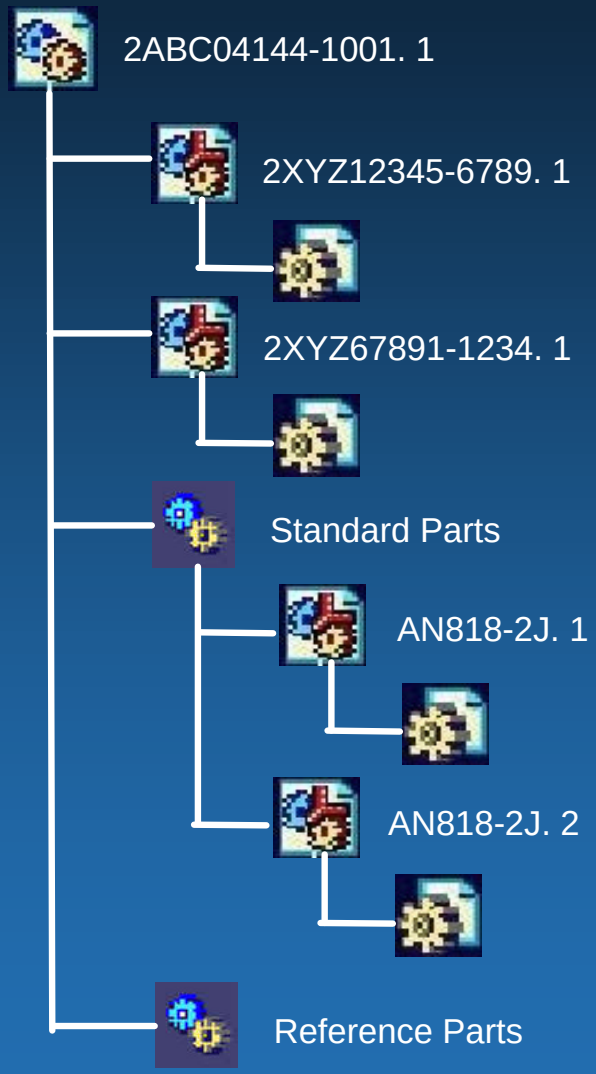
Derives Relation for Conversions



- **Derives relation allows for intelligent data movement**
  - ***Promotion to different Vaults***
  - ***Archiving***

CMI Synchronize Differentiates Non-BOM Spec Tree Nodes





- **Synchronize with Component Handling**
  - ***Config file drives behavior***
  - ***Process determines Non-BOM nodes***

Current Estimation of JSF CMI Integration

- **CMI 8.4 meets our functional goals for CATIA V4**
  - ***Focus is now on improving Design Task Efficiency***
- **CMI 8.5 meets a majority of our known goals for CATIA V5**
  - ***Focus is now on reconciling existing processes with CATIA V5 paradigm and determining data management needs***

The End

Mike Ballard
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George Russell

Thank you!

Questions?