Design Automation Group

# PDMLink/ProjectLink Uniqueness Solution

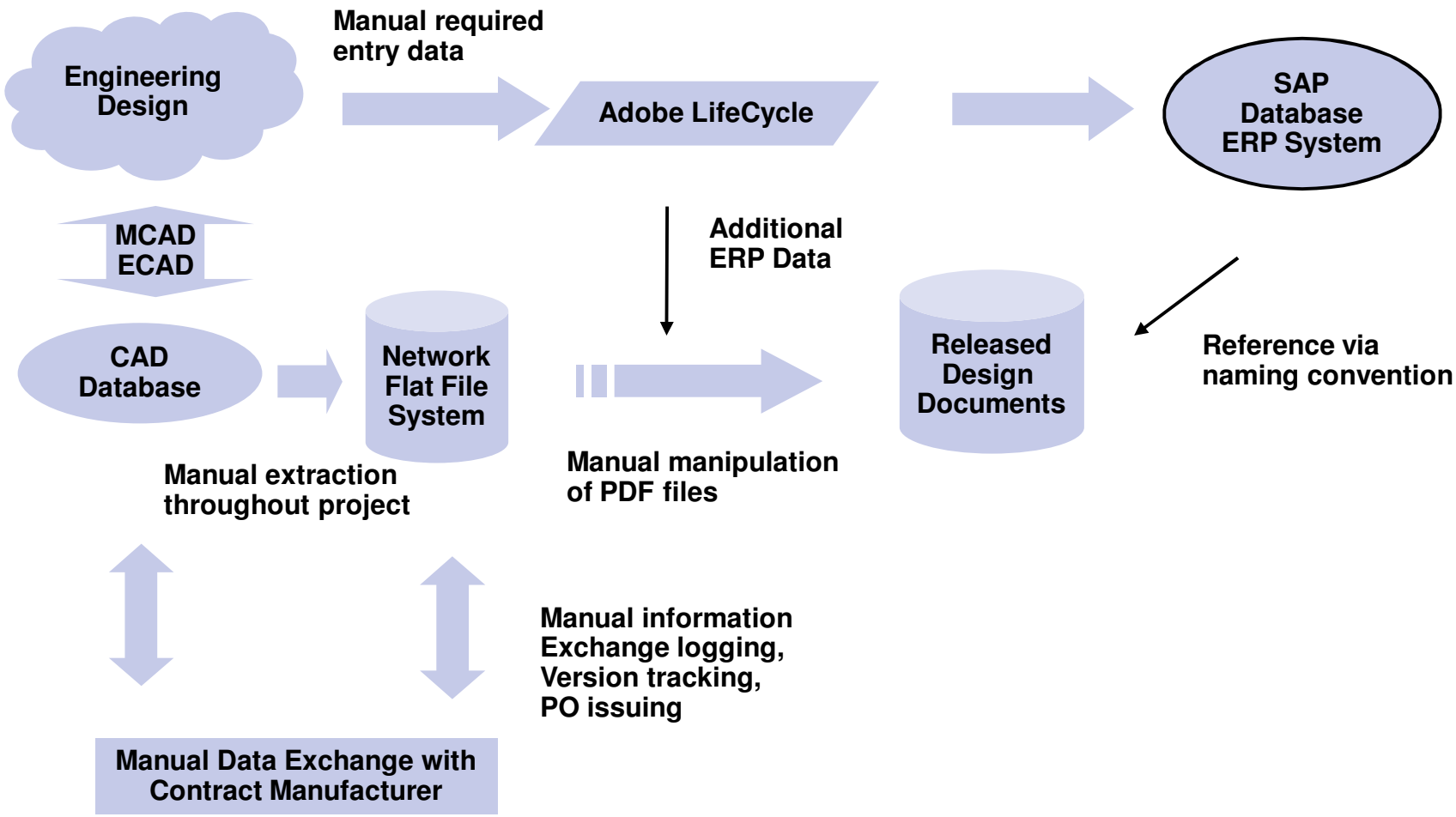
Focused on WTPart, WTDocument and EPMDocument

Windchill® @ COM DEV

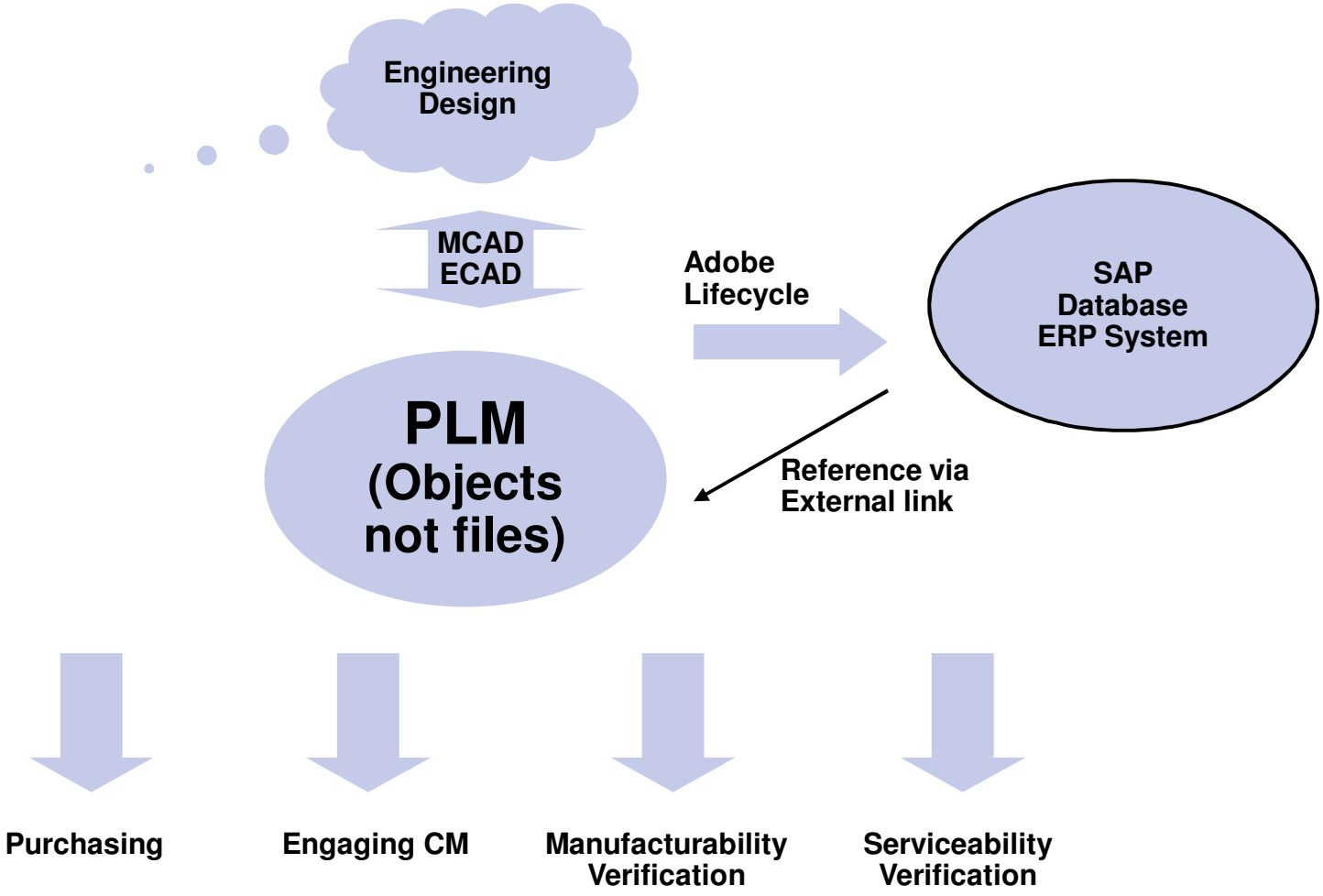
# Objective

**A “to be” vision of a complete business system encapsulating ERP and PLM systems in COM DEV.**

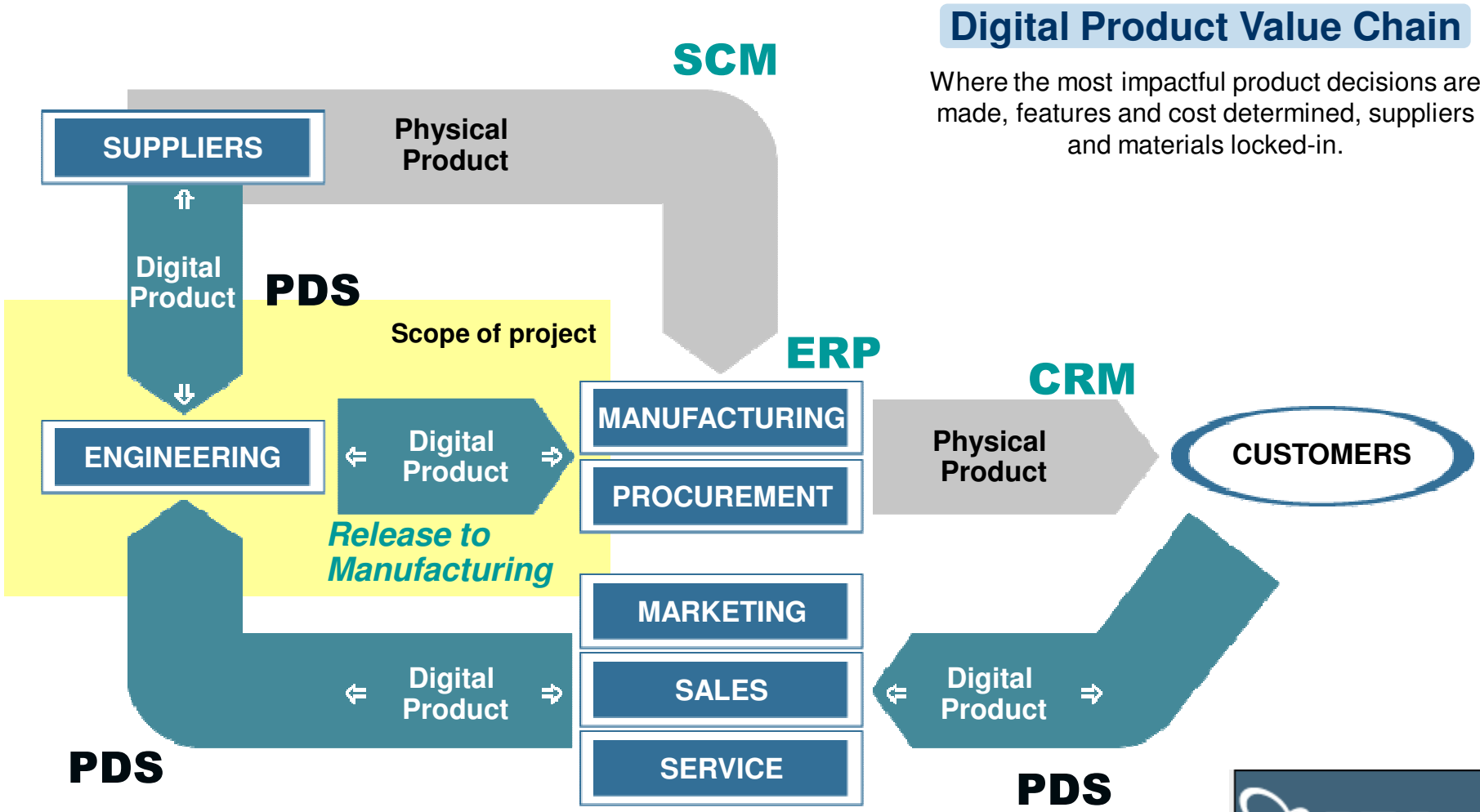
# Current Process



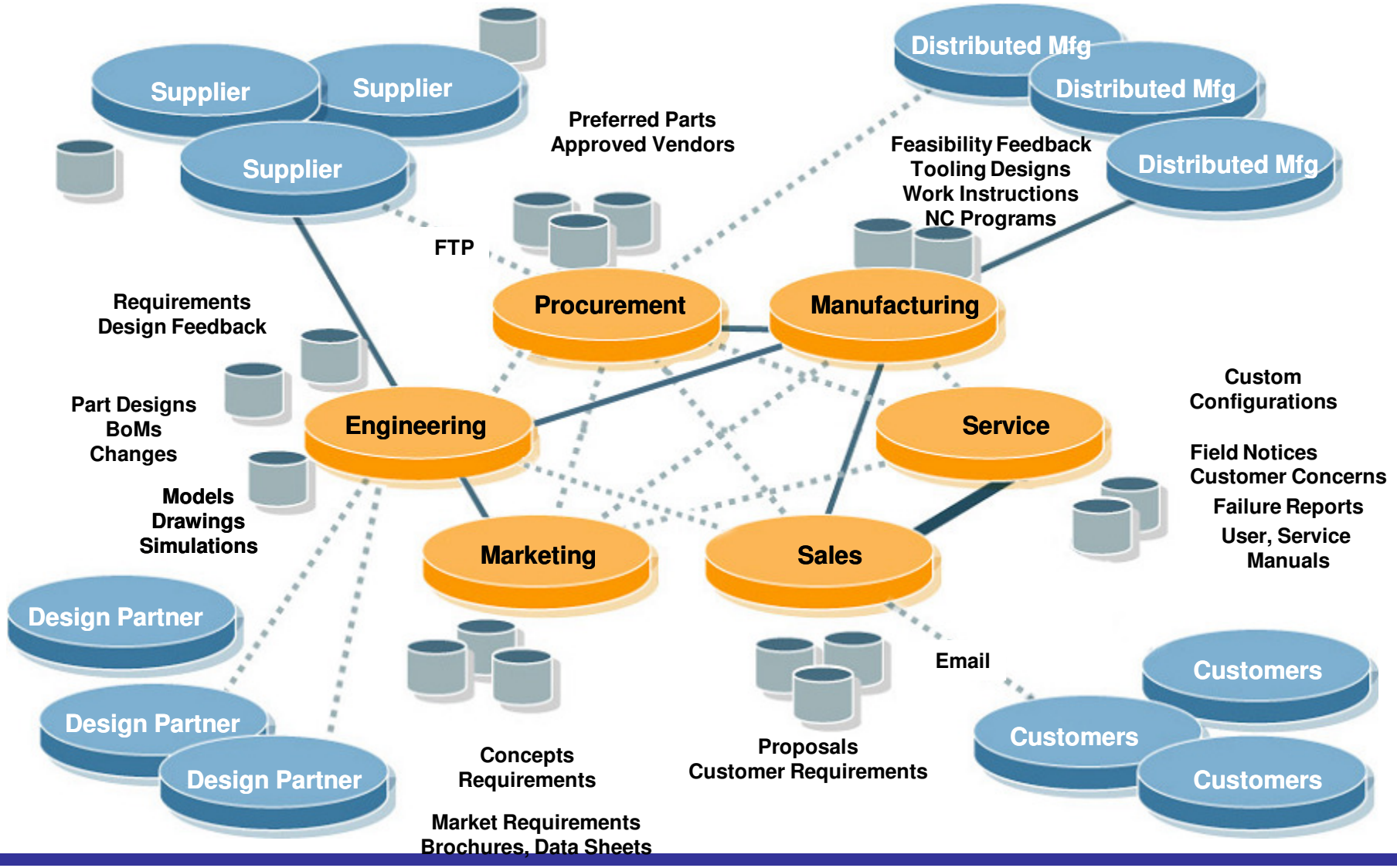
# Process After Stage 2 with PLM



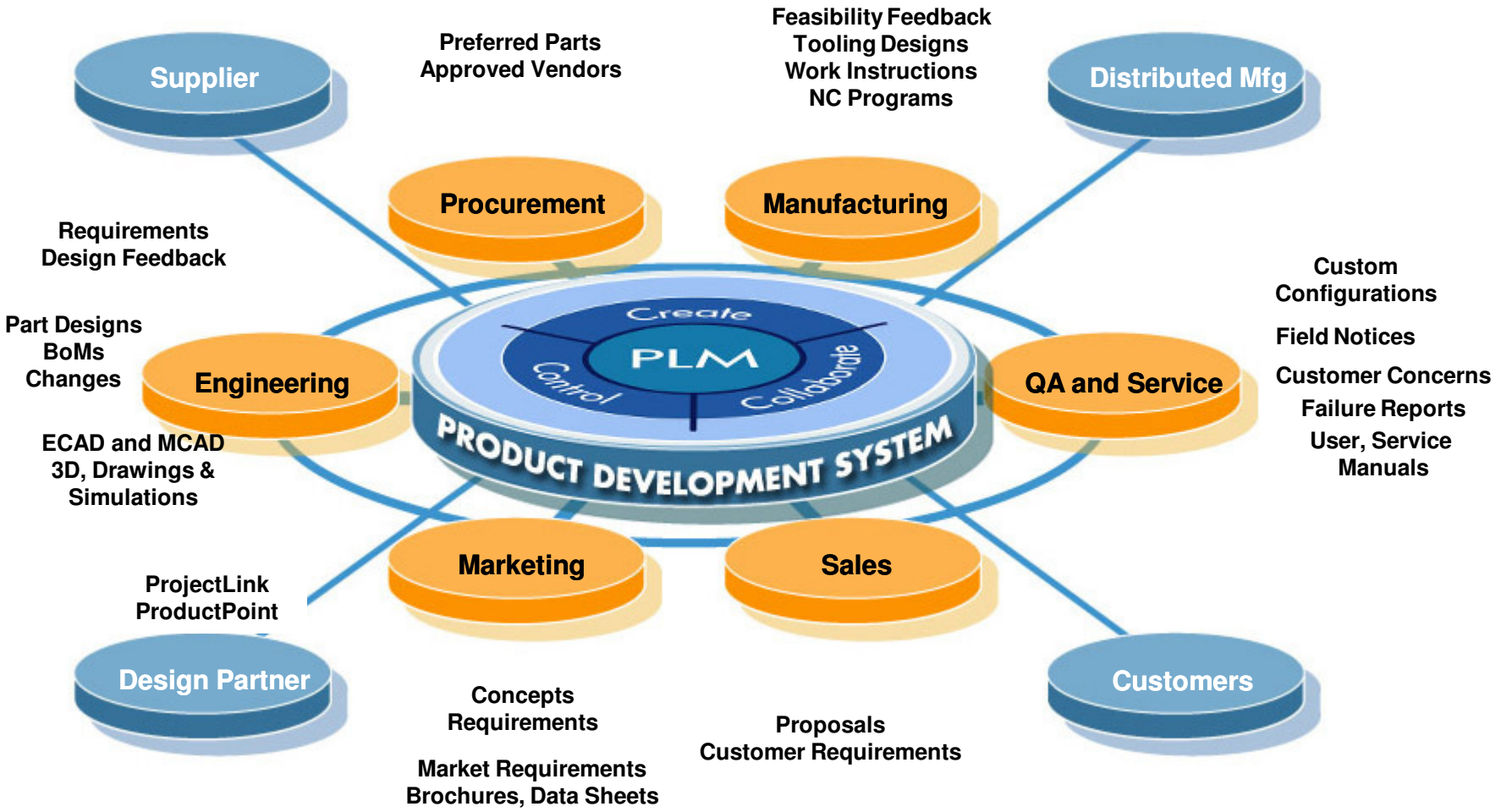
# Completely in Sync with PTC Vision



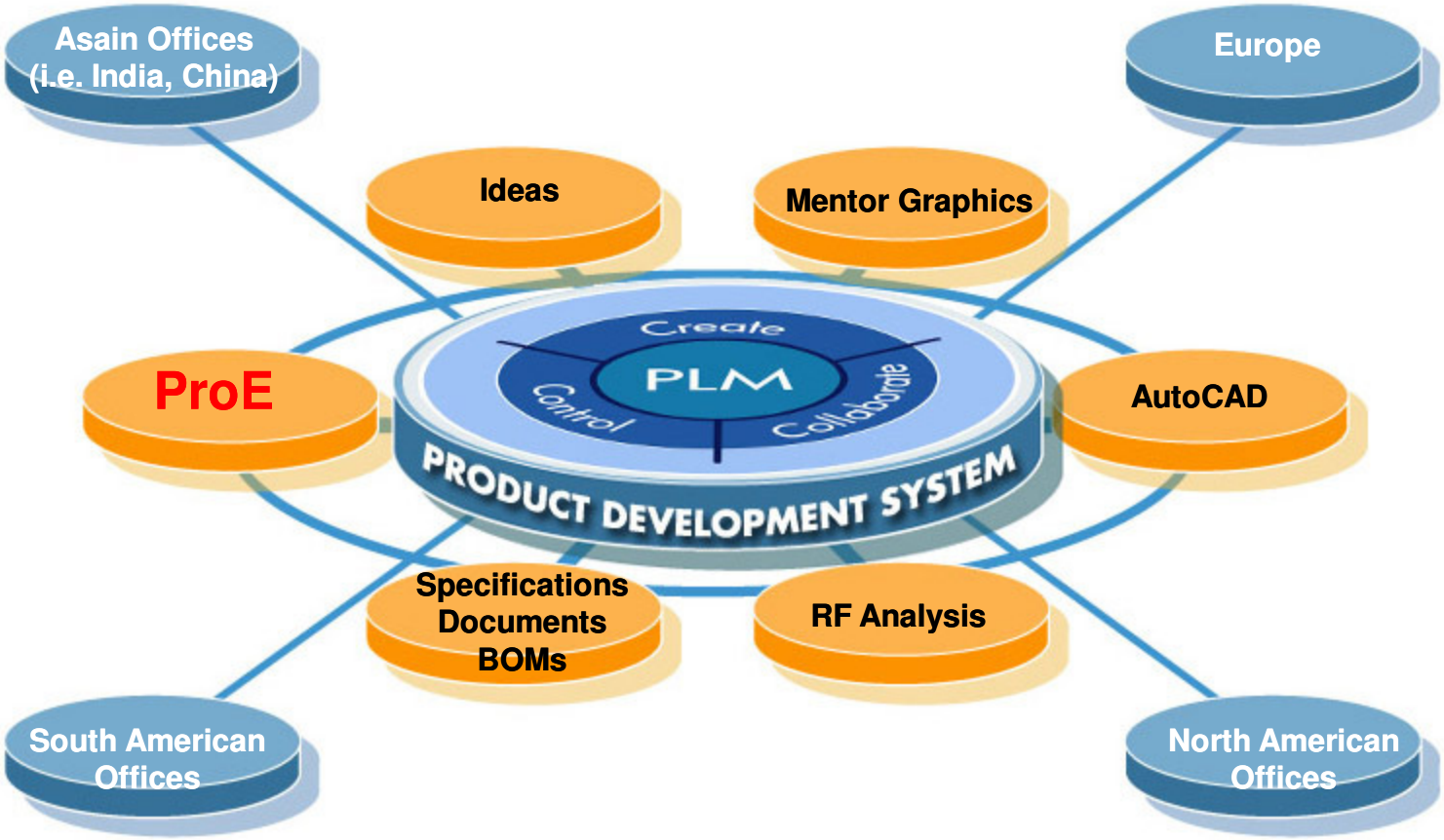
# Product Development Today



# Optimized Product Development System



# Optimized Engineering Application Focused



# Standard Global Business Practice

- **In an organization, the number is unique to identify a part.**
- **Types Documents that describe the part can be numbered identical to the part number.**
- **Documents of the same type have a unique number.**

# Duplication between Project and PDMLink

- Duplication is due to the fact that ProjectLink and PDMLink started and can be sold as separate systems. The duplication was allowed to make migration of the solutions easier. But it does not follow the business enterprise solution.
- All Com Dev IP Part information is properly numbered and checked into the common PDMLink. There cannot be duplication of Part Numbers.
- ProjectLink is used as a collaboration sharing portal for external ODMs for intellectual property. ODMs can create designs to be approved and checked back into/"SEND TO PDM" the common PDMLink.
- Depending on CAD authoring application and author, CAD files are numbered according to the Part Number
- With various CAD authoring applications of Ideas, ProE and Mentor, the files are numbered according to the Part Number
- There can only be one unique number per CAD/DOC type that corresponds to COMDEV Part.

# Step 1 – User Down Time

- Applying this solution must take place on mirrored development, test and then production in that order when users are notified not to use the system.
- Prior to implementing on Production, it is advised to perform rigorous testing on development and test after implementing the solution

# Step 2a – Finding Duplicates

- **Duplication between Project and PDMLink allowed for WTParts, WTDocuments and EPMDocuments**
  - **Allowed to create, modify, approve and revise duplicate items in either ProjectLink and PDMLink**

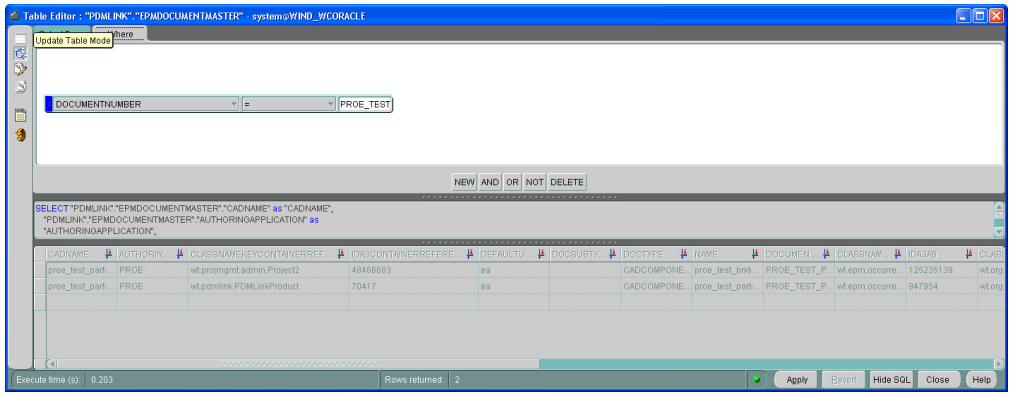
```
SQL> SELECT WTKEY FROM WTPARTMASTERKEY GROUP BY WTKEY HAVING COUNT(*) > 1;
SQL> SELECT WTKEY FROM WTDOCUMENTMASTERKEY GROUP BY WTKEY HAVING COUNT(*) > 1;
SQL> SELECT WTKEY FROM EPMDOCUMENTMASTERKEY GROUP BY WTKEY HAVING COUNT(*) > 1;
```

or

```
SQL> SELECT WTPARTNUMBER FROM WTPARTMASTER GROUP BY WTPARTNUMBER HAVING COUNT(*) > 1;
SQL> SELECT WTDOCUMENTNUMBER FROM WTDOCUMENTMASTER GROUP BY WTDOCUMENTUMBER HAVING
COUNT(*) > 1;
SQL> SELECT DOCUMENTNUMBER FROM EPMDOCUMENTMASTER GROUP BY DOCUMENTNUMBER HAVING
COUNT(*) > 1;
```

# Step 2b – Finding Duplicates via Oracle

```
SELECT "EPMDOCUMENTMASTER"."CADNAME" as "CADNAME", "EPMDOCUMENTMASTER"."AUTHORINGAPPLICATION" as "AUTHORINGAPPLICATION",
  "EPMDOCUMENTMASTER"."CLASSNAMEKEYCONTAINERREFEREN"  as "CLASSNAMEKEYCONTAINERREFEREN",
  "EPMDOCUMENTMASTER"."IDA3CONTAINERREFERENCE" as "IDA3CONTAINERREFERENCE", "EPMDOCUMENTMASTER"."DEFAULTUNIT" as "DEFAULTUNIT",
  "EPMDOCUMENTMASTER"."DOCSUBTYPE" as "DOCSUBTYPE", "EPMDOCUMENTMASTER"."DOCTYPE" as "DOCTYPE", "EPMDOCUMENTMASTER"."NAME" as "NAME",
   "EPMDOCUMENTMASTER"."DOCUMENTNUMBER" as "DOCUMENTNUMBER", "EPMDOCUMENTMASTER"."CLASSNAMEKEYA6" as "CLASSNAMEKEYA6",
   "EPMDOCUMENTMASTER"."IDA3A6" as "IDA3A6", "EPMDOCUMENTMASTER"."CLASSNAMEKEYORGANIZATIONREFE“ as "CLASSNAMEKEYORGANIZATIONREFE",
  "EPMDOCUMENTMASTER"."IDA3ORGANIZATIONREFERENCE" as "IDA3ORGANIZATIONREFERENCE", "EPMDOCUMENTMASTER"."OWNERAPPLICATION" as
  "OWNERAPPLICATION", "EPMDOCUMENTMASTER"."SERIES" as "SERIES", "EPMDOCUMENTMASTER"."CREATESTAMPA2" as "CREATESTAMPA2",
  "EPMDOCUMENTMASTER"."MARKFORDELETEA2" as "MARKFORDELETEA2",  "EPMDOCUMENTMASTER"."MODIFYSTAMPA2" as  "MODIFYSTAMPA2",
  "EPMDOCUMENTMASTER"."CLASSNAMEA2A2" as "CLASSNAMEA2A2", "EPMDOCUMENTMASTER"."IDA2A2" as
  "IDA2A2", "EPMDOCUMENTMASTER"."UPDATECOUNTA2" as "UPDATECOUNTA2", "EPMDOCUMENTMASTER"."UPDATESTAMPA2" as "UPDATESTAMPA2",
  "EPMDOCUMENTMASTER"."BRANCHIDA2TYPEDEFINITIONREFE“  as "BRANCHIDA2TYPEDEFINITIONREFE", “EPMDOCUMENTMASTER"."IDA2TYPEDEFINITIONREFERENCE"
   as "IDA2TYPEDEFINITIONREFERENCE"  FROM "EPMDOCUMENTMASTER“    WHERE ( "DOCUMENTNUMBER" = ‘ENTER NUMBER HERE' )
```



# Step 3a – Renumbering Duplicates

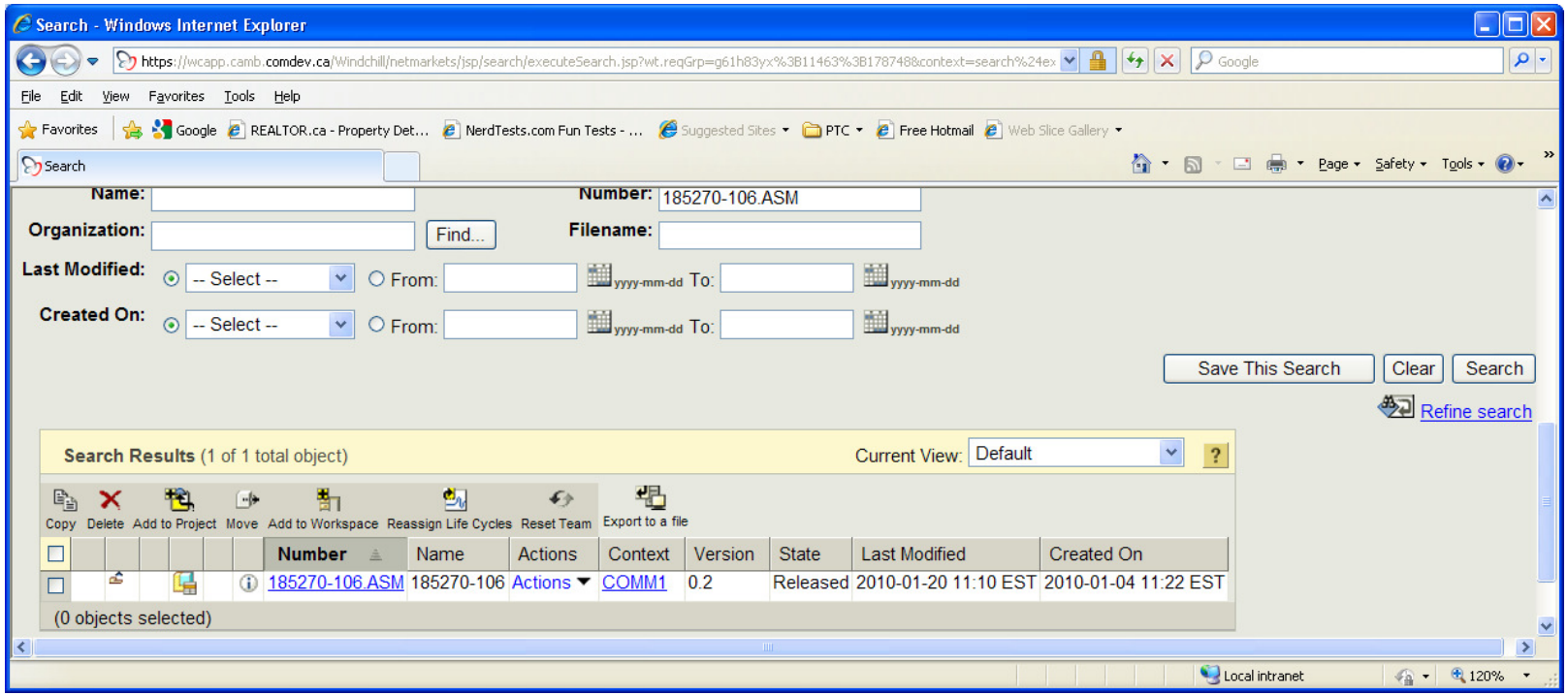
- A decision is made to renumber the object in either ProjectLink or PDMLink using UI of Windchill
- At site level using Windchill Search, search for the number and select Rename in the Actions link.
- Enter a new number and filename then select OK
  - Most cases, I would renumber and change the filename of the ProjectLink objects to:

| | | |
|---|---|---|
| Number: | 1234567 | → 1234567_projectname |
| Filename: | 1234567.prt | → 1234567_projectname.prt |

- Rerun the SQLs in step 1 to confirm that you did not renumber or change the file name that exist in another project.

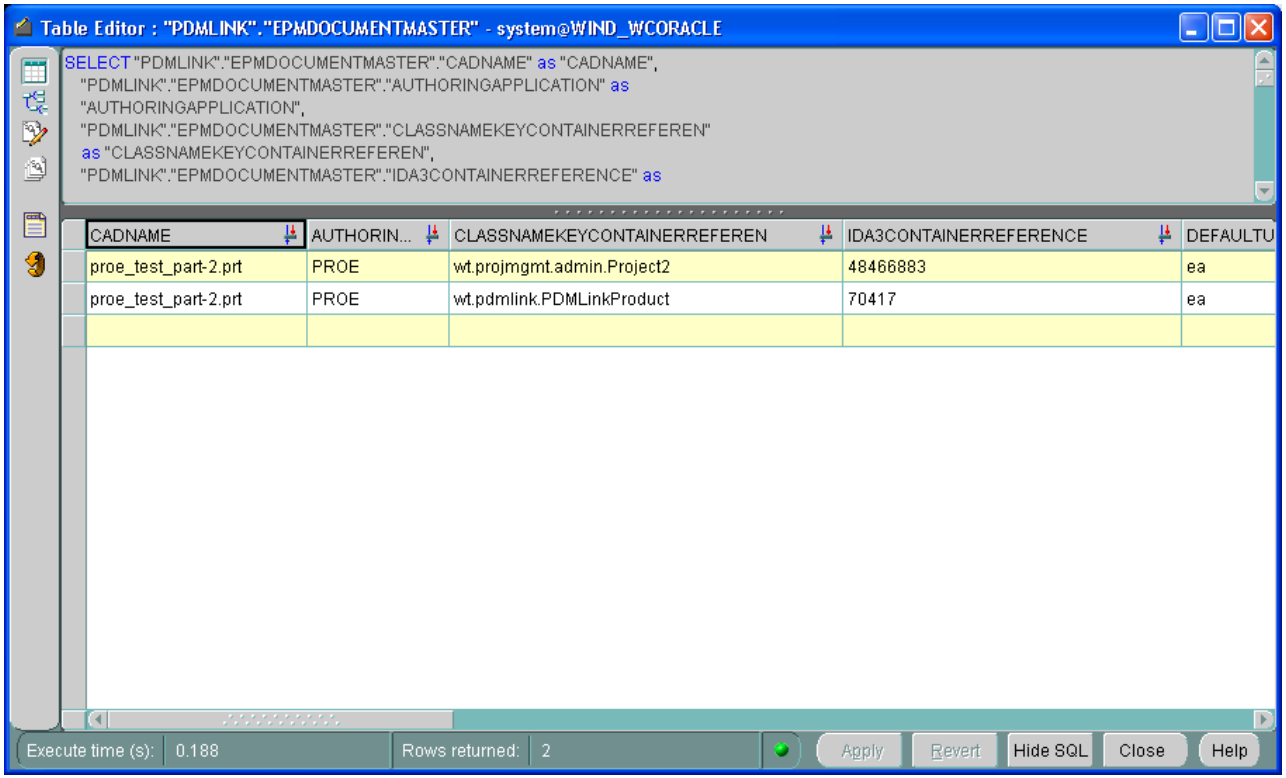
# Step 3b – Renumbering Duplicates in Oracle

- There are cases where the duplicate is in a Project Workspace. Thus using the search in Windchil will only show one result.  In Oracle you can find the duplicate record in the EPMDOCUMENTMASTER table



# Step 3b – Finding Duplicates Context in Oracle

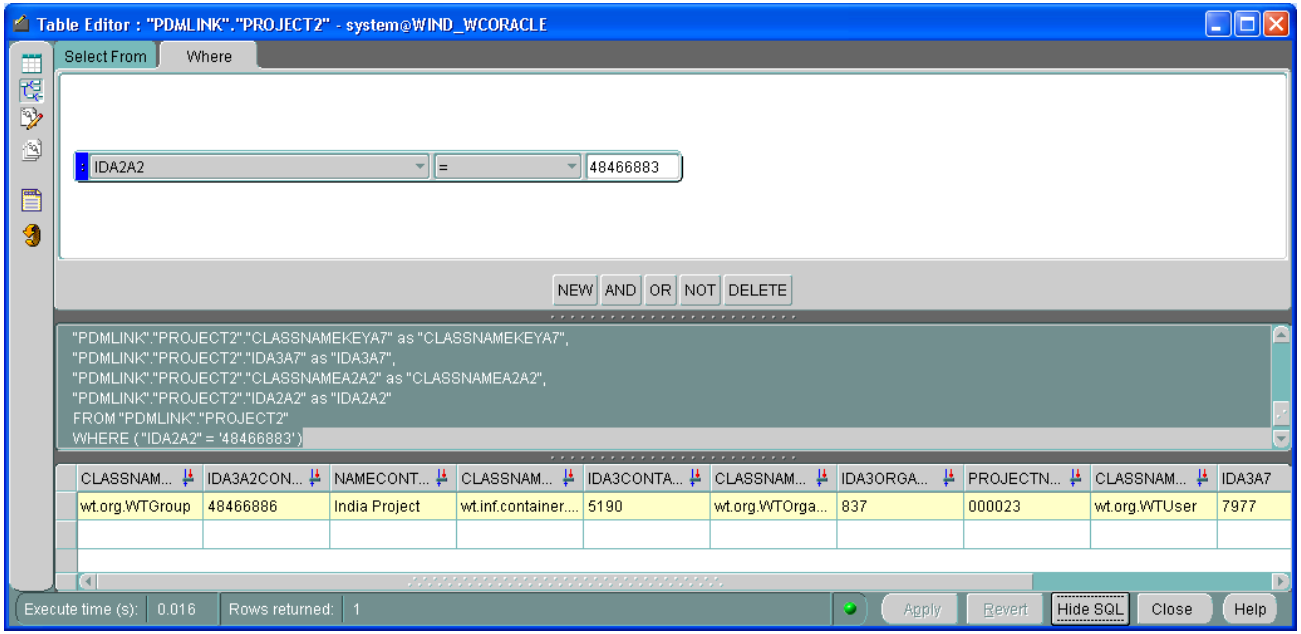
- The “EPMDOCUMENTMASTER”.”IDA3CONTAINERREFERENCE” is the reference value of PROJECT2.IDA2A2, PDMLINKPRODUCT.IDA2A2 and WTLIBRARY.IDA2A2



# Step 3c – Finding the Duplicates Context in Oracle

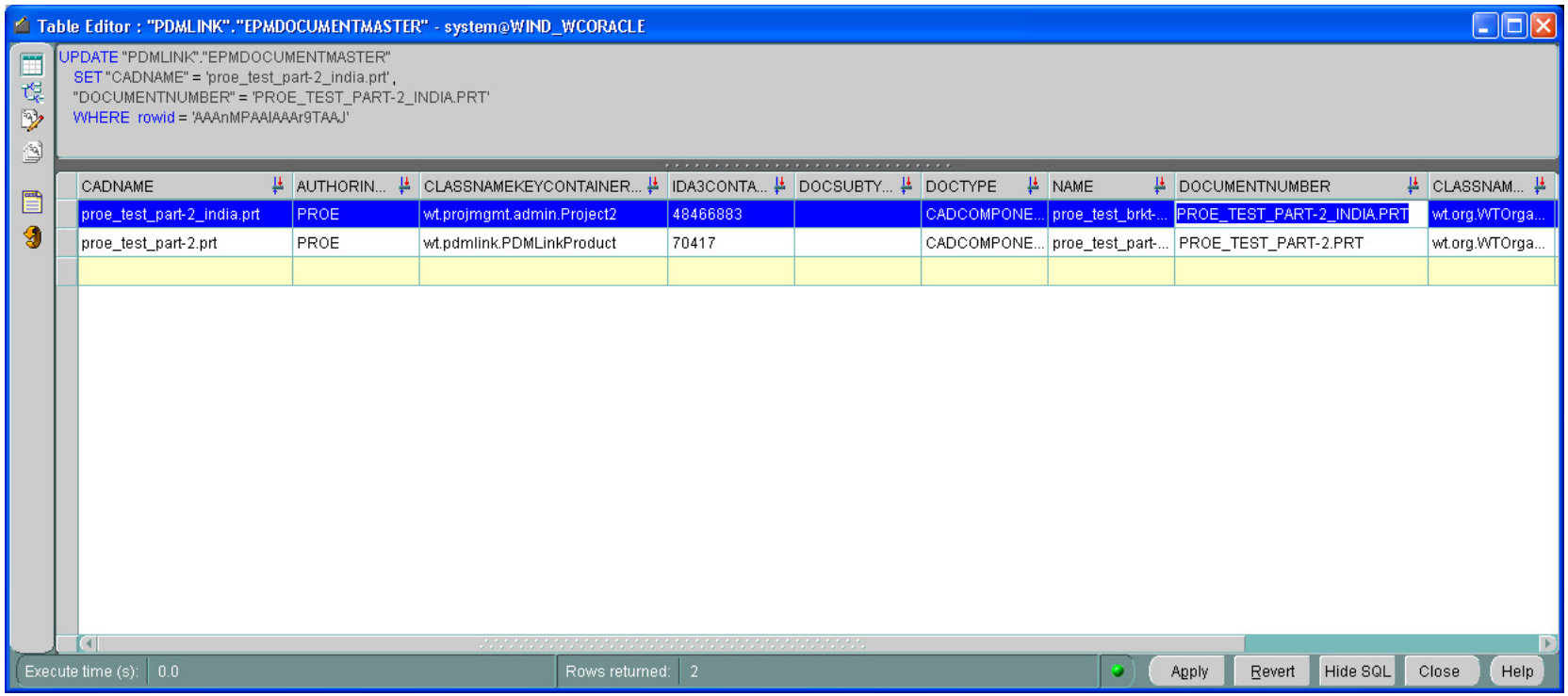
- In this case, a search was performed in Project2 table:

SELECT "PROJECT2"."CLASSNAMEKEYA2CONTAINERINFO" as "CLASSNAMEKEYA2CONTAINERINFO", "PROJECT2"."IDA3A2CONTAINERINFO" as "IDA3A2CONTAINERINFO", "PROJECT2"."NAMECONTAINERINFO" as "NAMECONTAINERINFO", "PROJECT2"."CLASSNAMEKEYCONTAINERREFEREN" as "CLASSNAMEKEYCONTAINERREFEREN", "PROJECT2"."IDA3CONTAINERREFERENCE" as "IDA3CONTAINERREFERENCE", "PROJECT2"."CLASSNAMEKEYORGANIZATIONREFE" as "CLASSNAMEKEYORGANIZATIONREFE", "PROJECT2"."IDA3ORGANIZATIONREFERENCE" as "IDA3ORGANIZATIONREFERENCE", "PROJECT2"."PROJECTNUMBER" as "PROJECTNUMBER", "PROJECT2"."CLASSNAMEKEYA7" as "CLASSNAMEKEYA7", "PROJECT2"."IDA3A7" as "IDA3A7", "PROJECT2"."CLASSNAMEA2A2" as "CLASSNAMEA2A2", "PROJECT2"."IDA2A2" as "IDA2A2“ FROM "PROJECT2“ WHERE ( "IDA2A2" = '**48466883**' )



# Step 3d – Renumbering Duplicates in Oracle

- In this case, the object EPMDOCUMENTMASTER.CADNAME and EPMDOCUMENTMASTER.DOCUMENTNUMBER were reset to *_india*:



## Step 4 – Adding More Doctypes to Sychronize with File Extensions

- **Depending on your CAD tool, you may need to add more doctypes**

## Step 5 – Current Oracle Unique Indexes in Windchill

- **Currently uniqueness is based on**
  - **For WTPART**

    **WTPARTMASTERKEY$UNIQUE ON WTPARTMASTERKEY Table**

    **WTKEY, IDA3ORAGANIZATIONREFERENCE, IDA3NAMESPACEREFERENCE**
  - **For WTDOCUMENT**

    **WTDOCUMENTMASTERKEY$UNIQUE ON WTDOCUMENTMASTERKEY Table**

    **WTKEY, IDA3ORAGANIZATIONREFERENCE, IDA3NAMESPACEREFERENCE**
  - **For EPMDOCUMENT**

    **EPMDOCUMENTMASTERKEY$UNIQUE ON EPMDOCUMENTMASTERKEY Table**

    **WTKEY, IDA3ORAGANIZATIONREFERENCE, IDA3NAMESPACEREFERENCE**

# Step 5 – New Oracle Unique Indexes to Enforce Uniqueness in PLM

- In SQLPLUS logged in as the Windchill oracle user, run the following command to drop and recreate the new unique indexes*

SQL> drop index WTPartMasterKey$UNIQUE;
SQL> drop index WTDocumentMasterKey$UNIQUE;
SQL> drop index EPMDocumentMasterKey$UNIQUE;

SQL> CREATE UNIQUE INDEX WTPartMasterKey$UNIQUE ON WTPartMasterKey(wtkey,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );

SQL> CREATE UNIQUE INDEX WTDocumentMasterKey$UNIQUE ON WTDocumentMasterKey(wtkey,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );

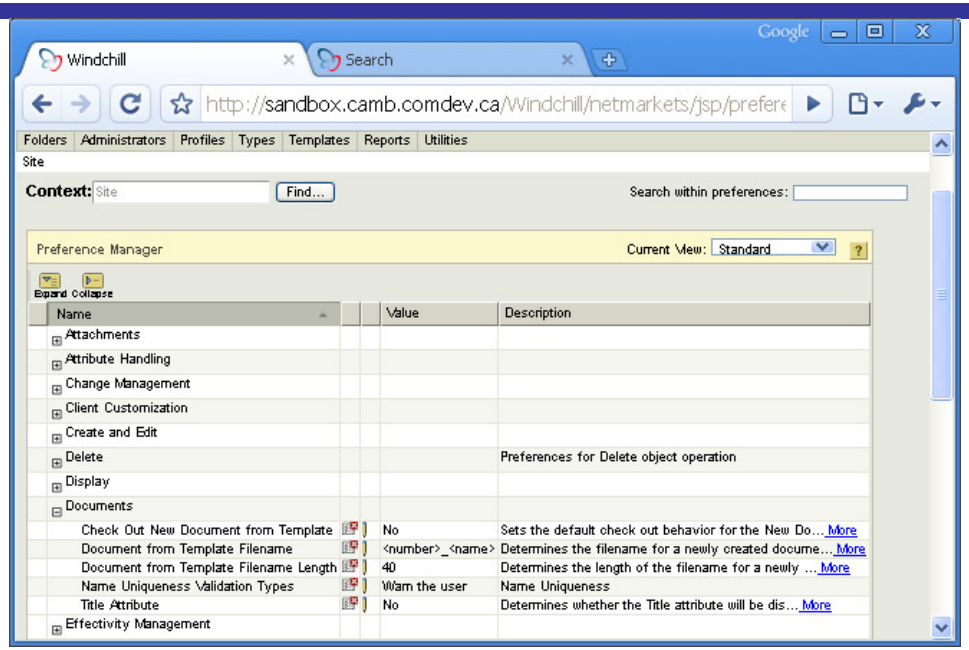
Or SQL> CREATE UNIQUE INDEX WTDocumentMaster$UNIQUE ON WTDocumentMaster(WTdocumentnumber,doctype,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );

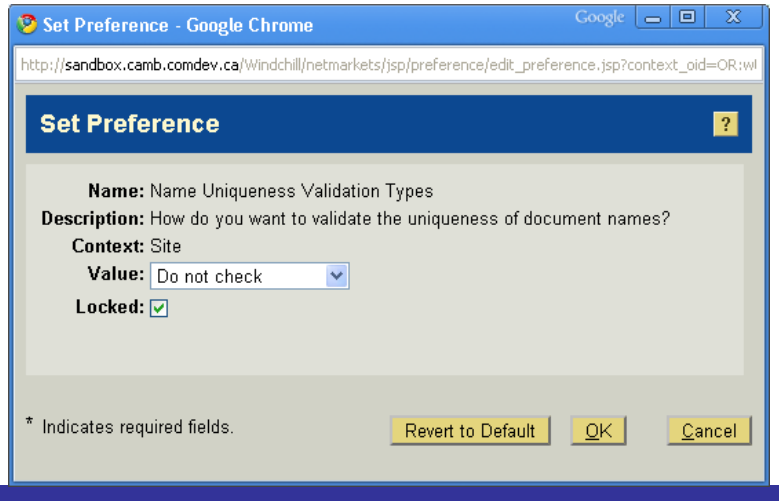
SQL> CREATE UNIQUE INDEX EPMDocumentMaster$UNIQUE ON EPMDocumentMaster(documentnumber,doctype,authoringapplication,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );

SQL> CREATE UNIQUE INDEX EPMDocumentMasterFile$UNIQUE ON EPMDocumentMaster(cadname,authoringapplication,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );

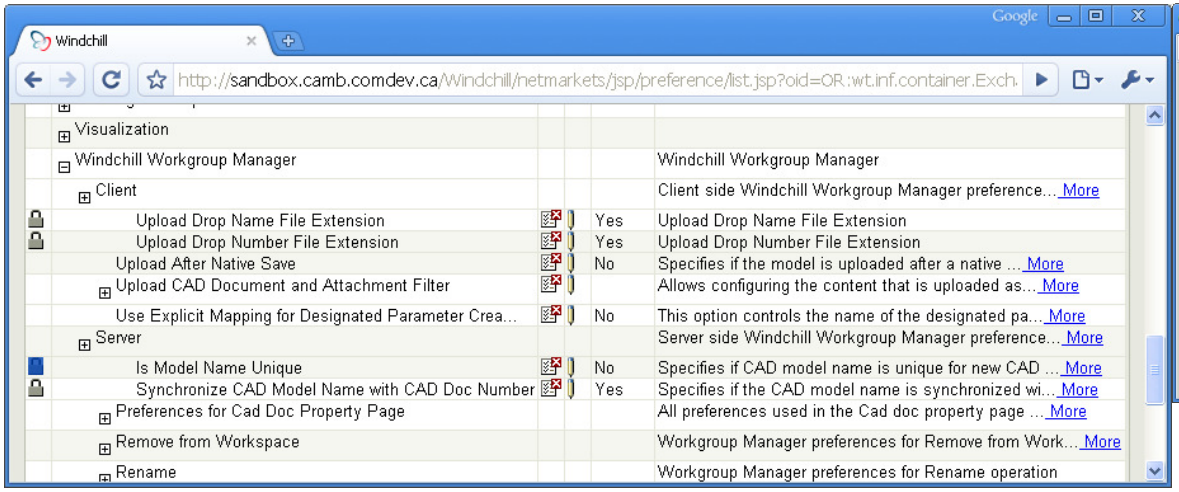
# Step 6 – Updating Site Preferences

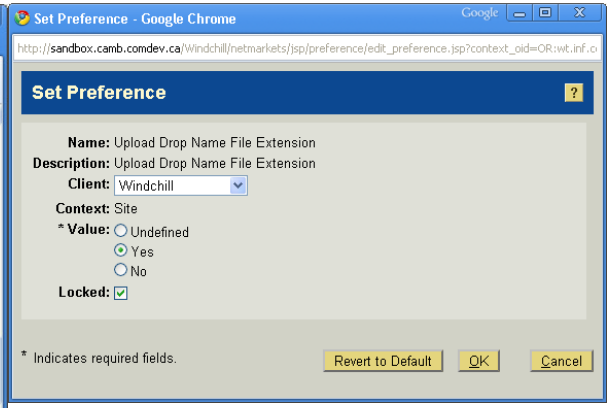
- **Documents**

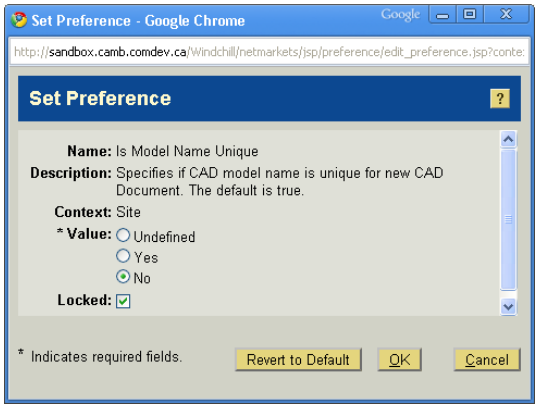


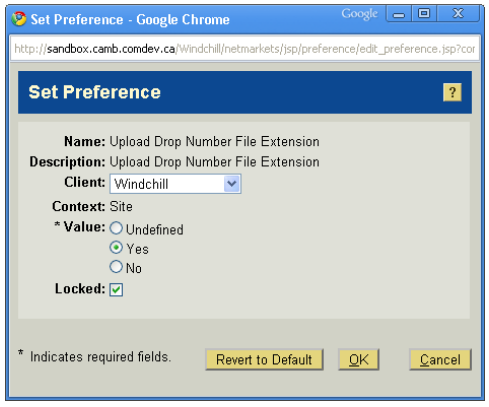



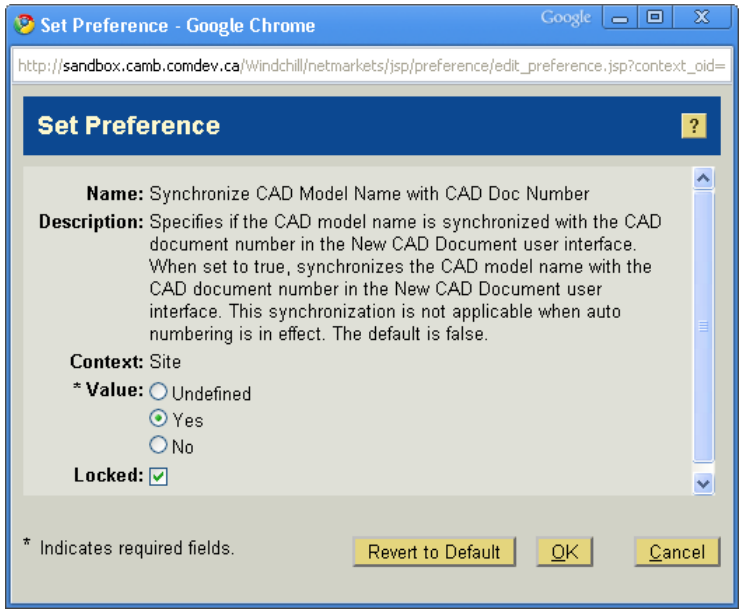
# Step 6 – Updating Site Preferences - Windchill Workgroup Manager



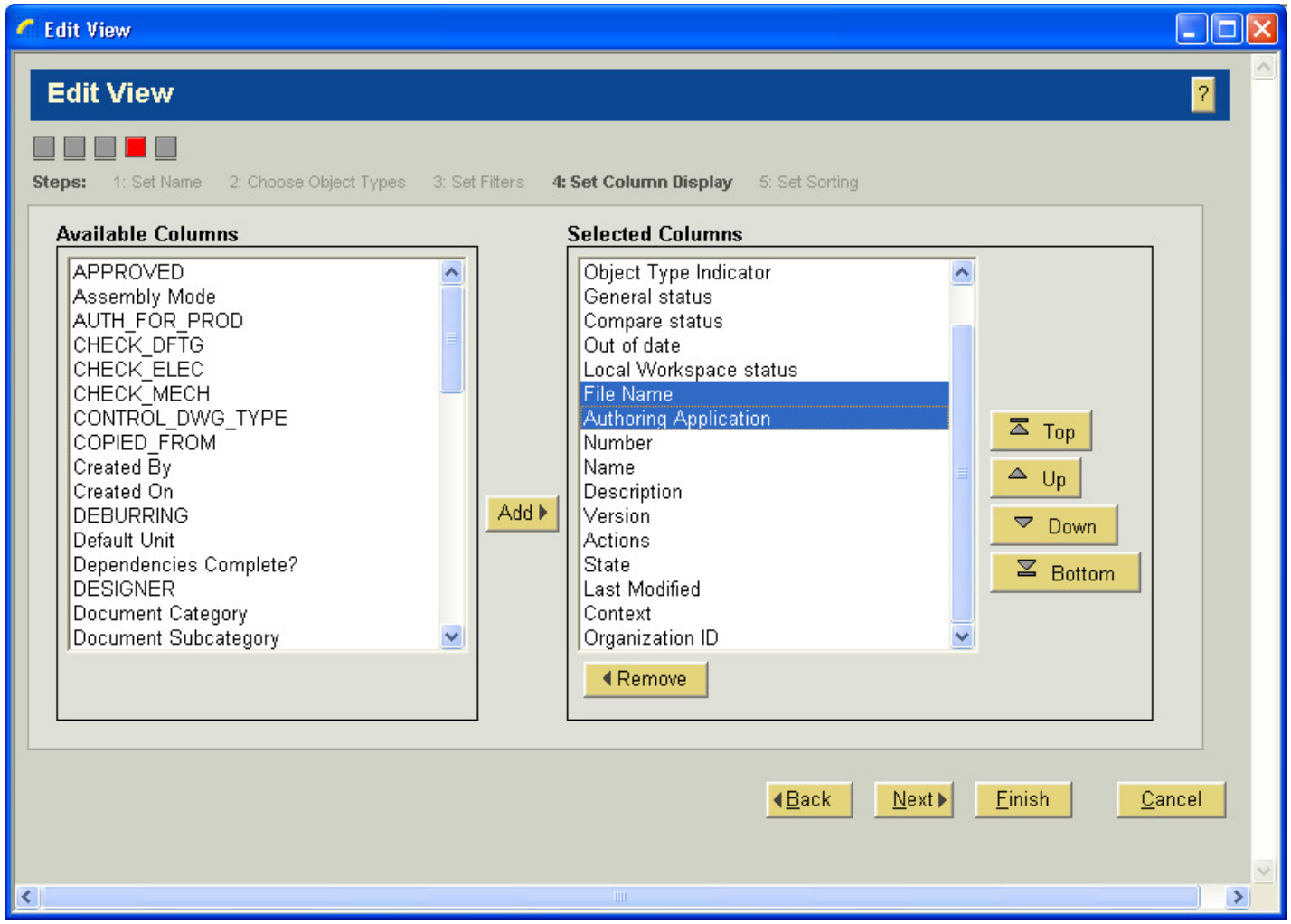



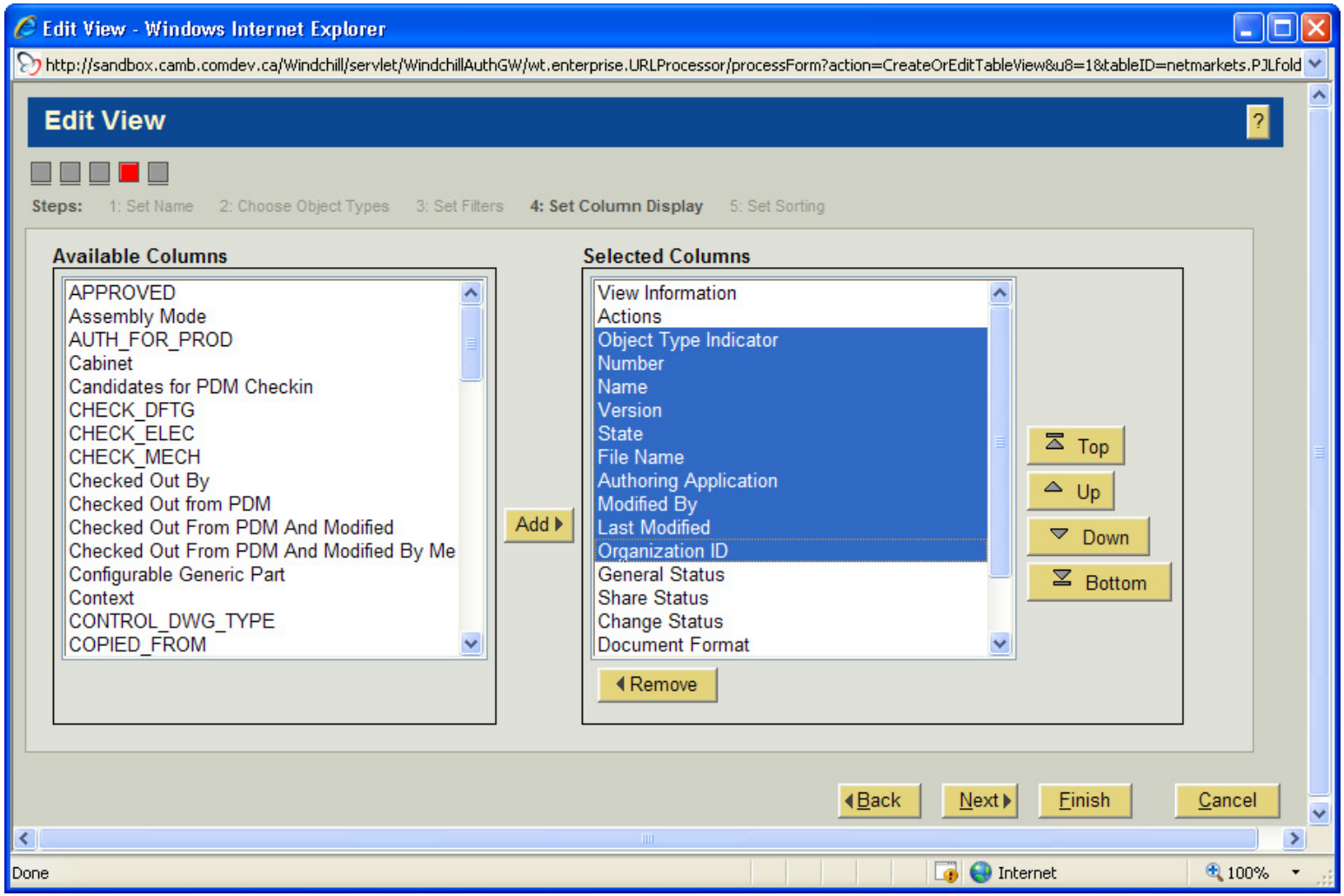



# Step 7 – Updating Table Views in Windchill Workgroup Manager



# Step 7 – Updating Table Folder Views in Contexts (Products, Projects & Libraries)



## Step 8 – Additional Steps. Must do if this solution is applied prior to Upgrade

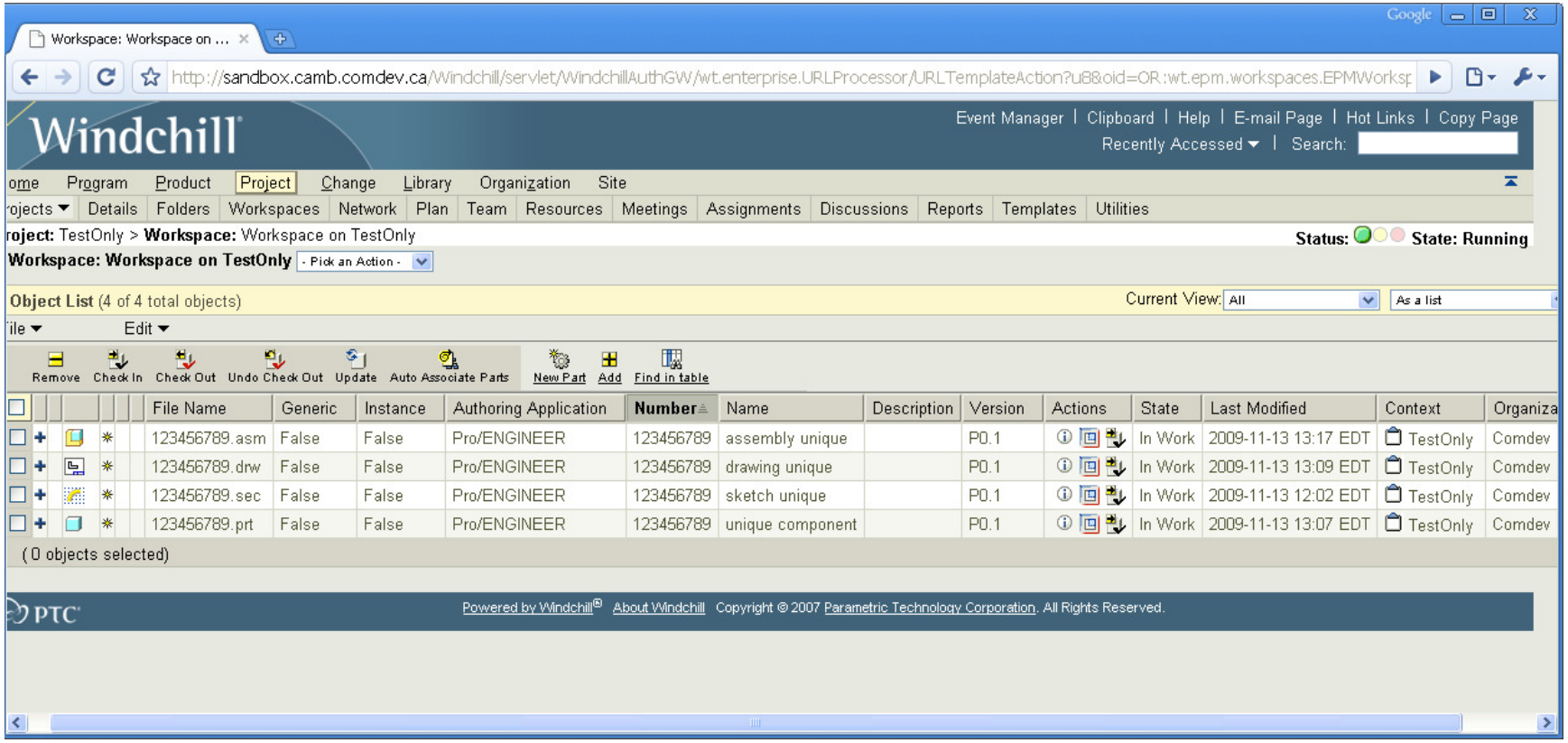
- **In Pro/E WGM, it performs file name uniqueness in a API which is not necessary and redundant because it is already performed at the database level. This must be removed or disabled via PTC support or customization.**
- ***During upgrades, prior to Adding Constraints stage in the upgrade, the $WT_HOME/Upgrade/Upgrade/UpgradePhases/AddConstraints/UniqueWork.sql must be modified to accommodate the new unique indexes.**

- **CREATE UNIQUE INDEX EPMDOCUMENTMASTERKEY$UNIQ0 ON EPMDocumentMasterKey(wtkey,idA3organizationReference,idA3namespaceReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 )**
- **CREATE UNIQUE INDEX WTDOCUMENTMASTERKEY$UNIQ0 ON WTDocumentMasterKey(wtkey,idA3organizationReference,idA3namespaceReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 )**
- **CREATE UNIQUE INDEX WTPARTMASTERKEY$UNIQ0 ON WTPartMasterKey(wtkey,idA3organizationReference,idA3namespaceReference) TABLESPACE INDX STORAGE ( INITIAL 1m NEXT 1m PCTINCREASE 0 )**
- **Changed to:**
- CREATE UNIQUE INDEX EPMDocumentMaster$UNIQUE ON EPMDocumentMaster(documentnumber,doctype,authoringapplication,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );
- /
- CREATE UNIQUE INDEX EPMDocumentMasterFile$UNIQUE ON EPMDocumentMaster(cadname,authoringapplication,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );
- CREATE UNIQUE INDEX WTDocumentMasterKey$UNIQUE ON WTDocumentMasterKey(wtkey,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );
- CREATE UNIQUE INDEX WTPartMasterKey$UNIQUE ON WTPartMasterKey(wtkey,idA3organizationReference) TABLESPACE INDX STORAGE ( INITIAL 20k NEXT 20k PCTINCREASE 0 );

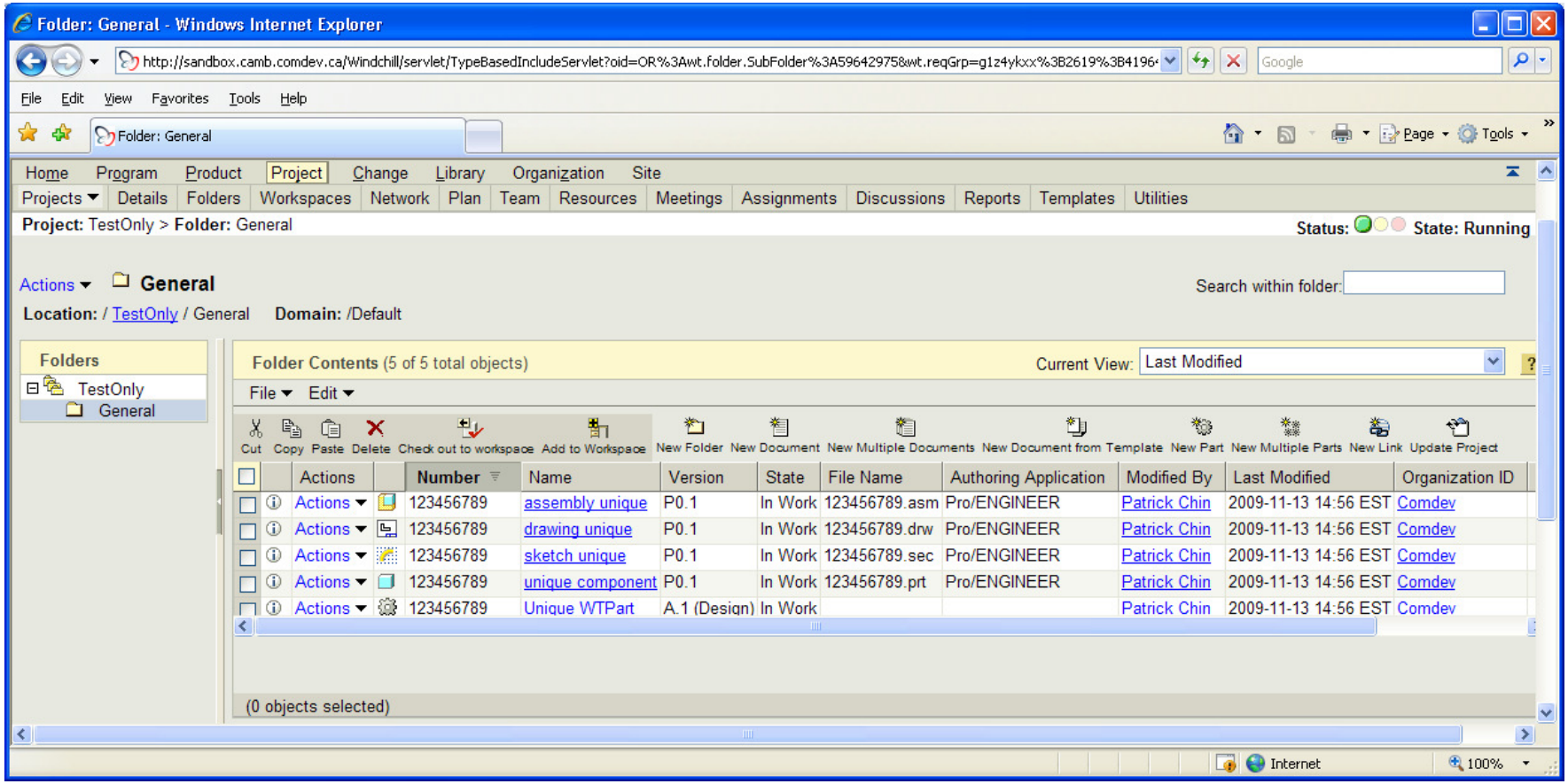
# Result of this Solution

- WTPart
  - Only 1 unique WTPart can exist per organization
- WTDocument
  - Only 1 unique WTDocument can exist per organization
- EPMDocuments
  - Are uniquely managed according to number, type, authoring application and organization
  - EPM file names are also uniquely managed according to filenames, authoring application and organization (i.e. Pro/INTRALINK behavior)
- Thus:
  - Auto Association of CAD to Part will be based on synchronizing CAD and WTPart number only. If there is no respective Part number, there will not be an auto creation of Parts
  - Number generation is manual for WTDocuments and EPMDocuments if there is a requirement to synchronize WTPart number

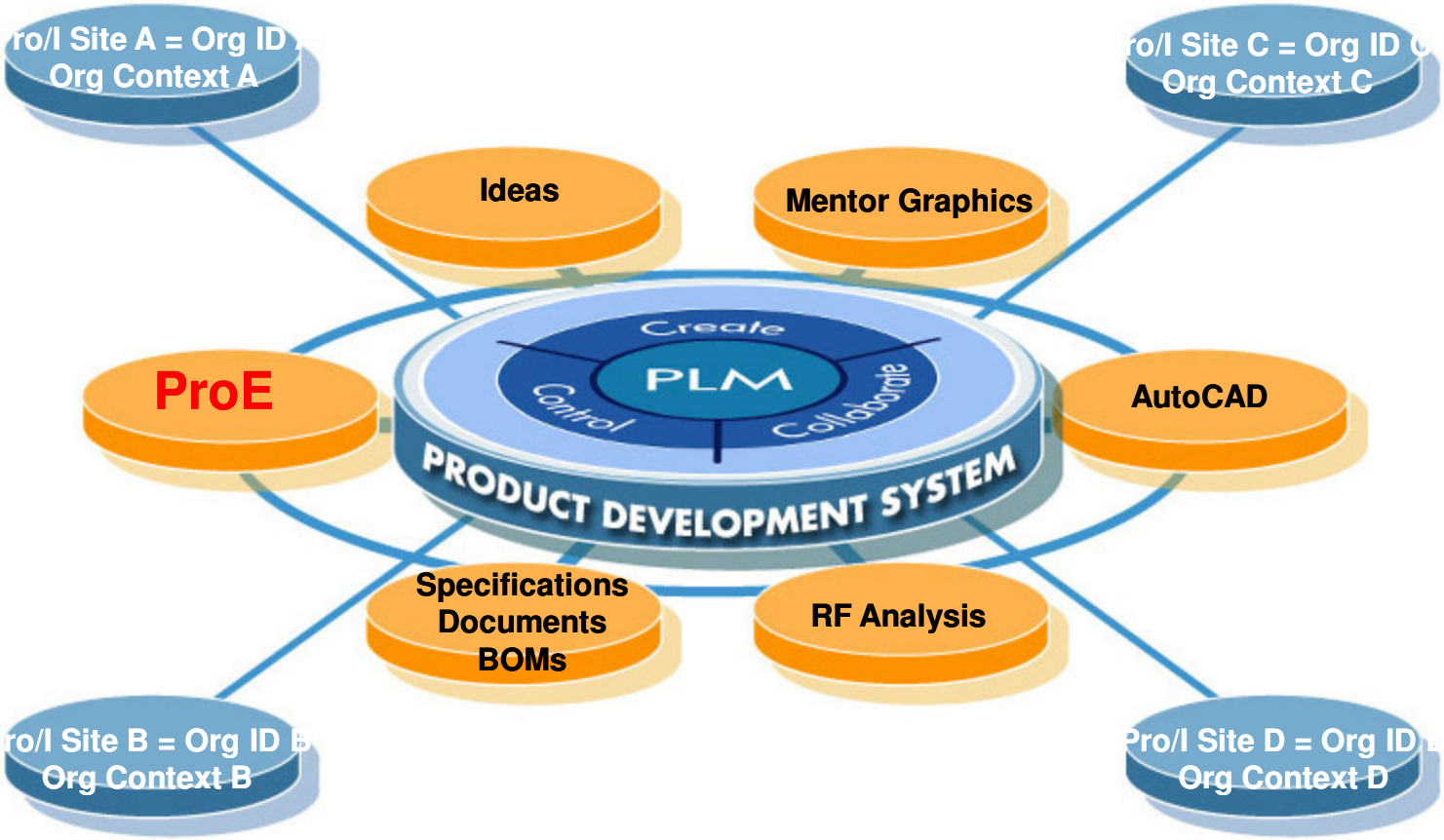
# Result of this Solution – Workspace View



# Result of this Solution – Context Folder View



# Pro/INTRALINK Migrations



# Appendix A – OOTB EPM Management in PLM

All Pro/E separate CAD types, such as assemblies, parts, drawings, sections, layouts, etc, are managed in one unique EPM CAD document object. Most common practice have the same number for various types. Due to PTC Pro/I practices and methodology, the uniqueness was the file name with extension. Pro/I was a file management tool.

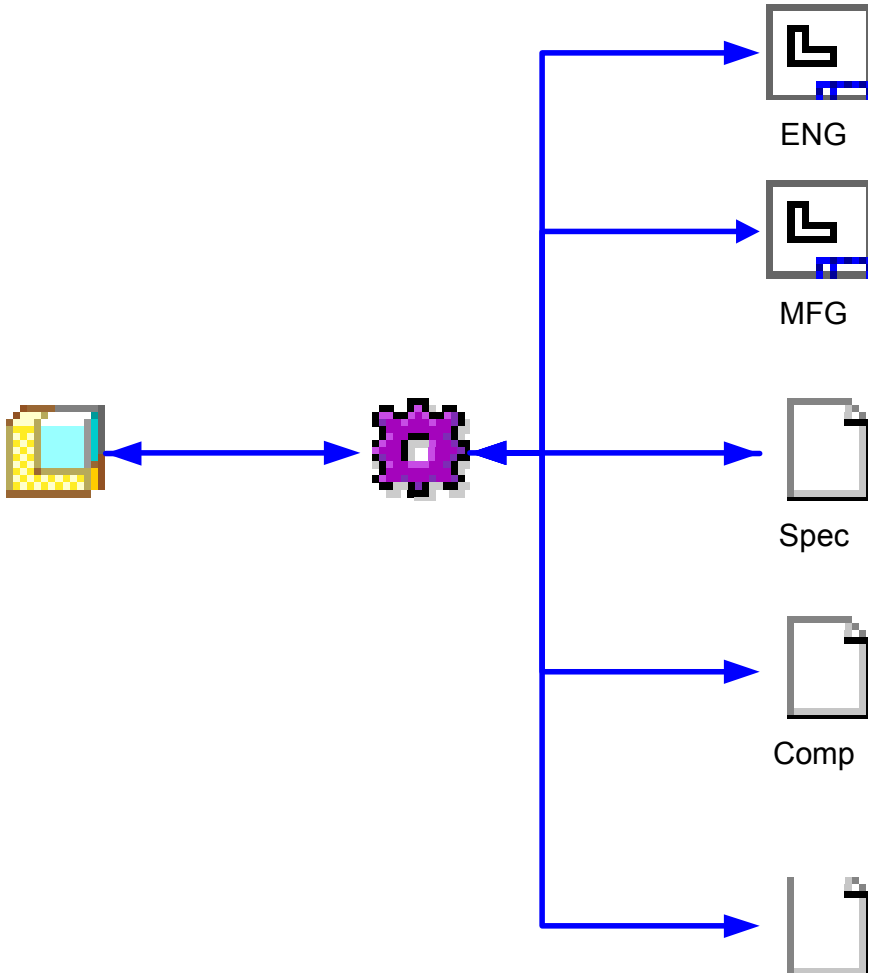
| | |
|---|---|
| Pro/E SECTION | |
| Pro/E PART | |
| Pro/E ASSEMBLY | |
| Pro/E MANUFACTURING | |
| Pro/E DRAWING | EPM DOCUMENT |
| Pro/E LAYOUT | |
| Pro/E MARKUP | |
| Pro/E DIAGRAM | |
| Pro/E Other file types | |

# Appendix A – OOTB EPM Management in PLM

Furthermore, Windchill allows multiple CAD and Arbortext but they all still are managed by a single EPM document type. Most companies use the same number if copied from one CAD tool to another for collaboration and sharing of IP. Thus, conflicts will occur if the CAD tools use the same number and file name with extension. As a result, OOTB does not following standard practices of both business and CAD tools.

| | |
|---|---|
| Multiple Pro/E file types<br>Multiple ACAD types<br>Multiple CATIA types<br>Multiple CATIAV5 types<br>Multiple SOLIDWORKS types<br>Multiple UG types<br>Multiple Ideas types<br>Multiple ARBORTEXT content types<br>Multiple CADENCE CAD types<br>Multiple CCD CAD types<br>Multiple INVENTOR CAD types<br>Multiple ME10 CAD types<br>Multiple HELIX CAD types<br>Multiple ORCAD CAD types<br>Multiple MENTORB, D and E CAD types<br>Multiple CADDS5 types<br>Multiple CADSTAR types<br>Multiple VISULA CAD types<br>Other CAD types | EPM<br>DOCUMENT |

# Relationship between Reference Documents and Components



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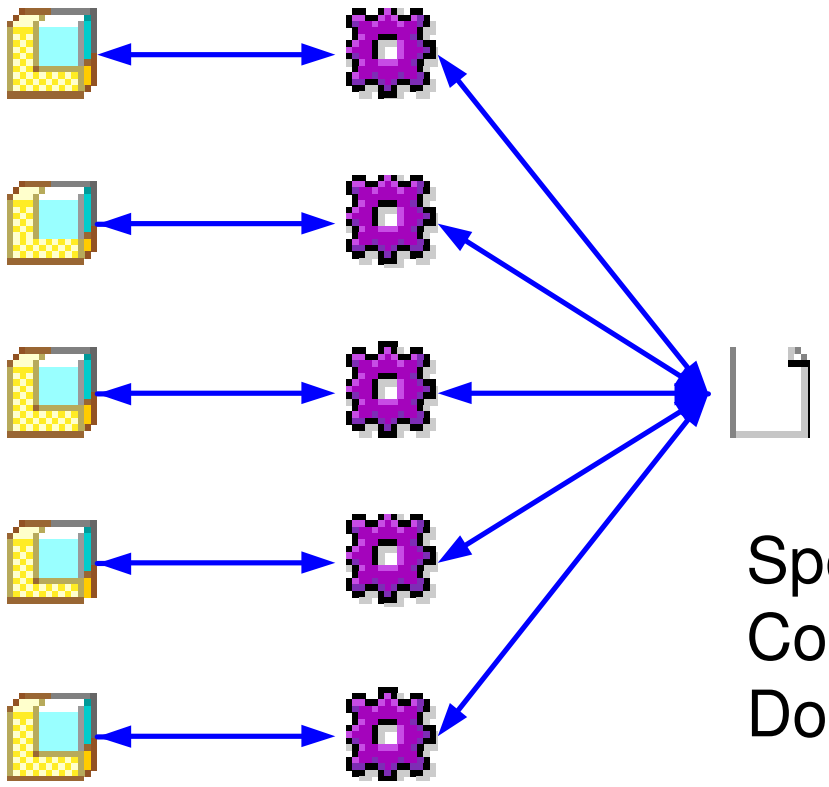

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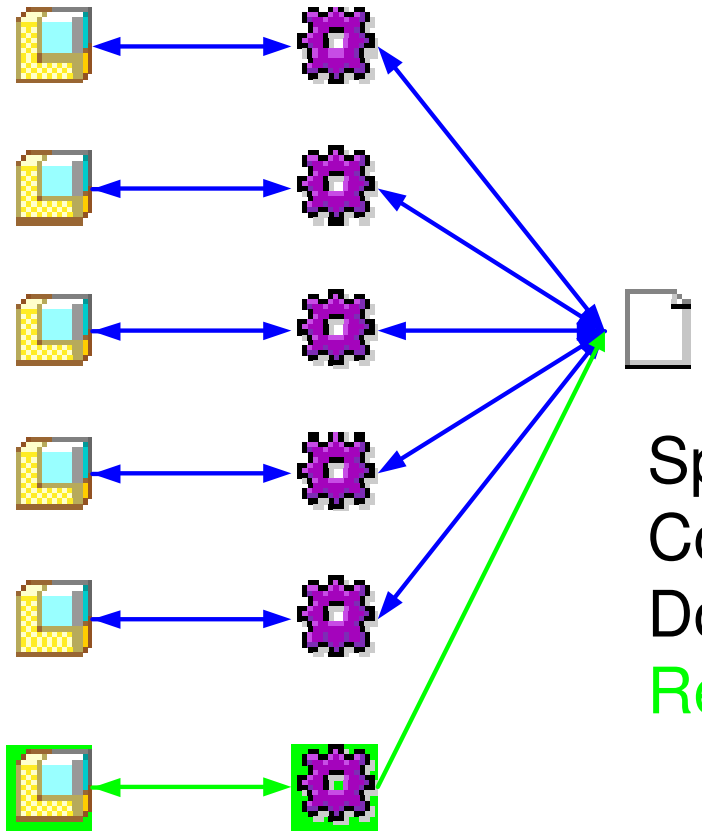
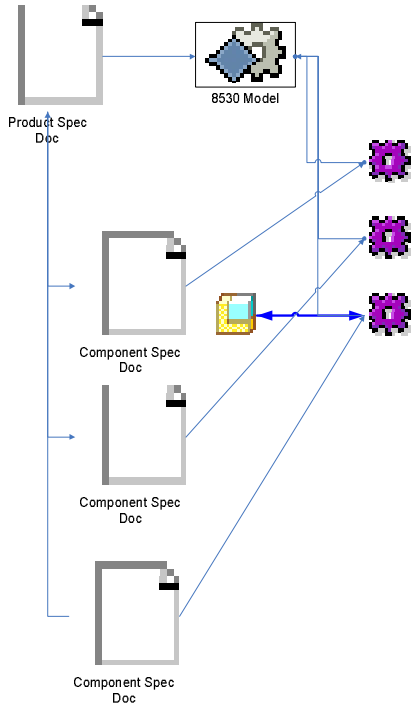


Specification or Compliance Documents are Revised

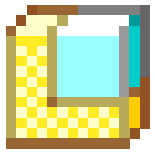
New Component in Series

# Product Spec and Component Spec

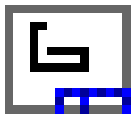


# “As Process” CAD Methodology

**PDF**



**CAD Model**
**Name: 1234568-001.asm**
**File Name: 1234568-001.asm**

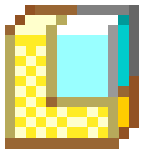


**Drawing (Optional)**
**Number: 1234568-001**
**Version: A.1**
**Baan #: 1234568-001**
**Name: Housing**
**Attributes**

- **Description**
- **Nylon**
- **Black**
- **Smooth Textured**

# New Methodology Compliance

**Fit or Form Change after Release**

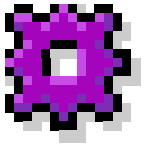


**CAD Model**

**Number: 1234568**

**Name: Housing**

**File Name: 1234568.asm**



**Part Representation**

**Number: 1234568**

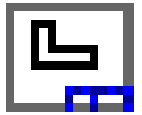
**Version: 1.1**

**Baan #: 1234568-001**

**Name: Housing**

**Attributes**

- **Description**
- **Teflon (temperatures)**
- **Black**
- **Smooth Textured**



**Drawing (Optional)**

**Number: 1234568-001**

**Version: A.1**

**Baan #: 1234568-001**

**Name: Housing**

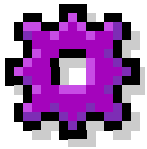
**Attributes**

- **Description**
- **Nylon**
- **Black**
- **Smooth Textured**

# PLM CAD Methodology

**To be proposed to the Design Automation and executive teams of standardizing engineering and manufacturing for part, ProE CAD model and drawing methodology based on best industry practices.**

# Standardized Component Part, CAD Model and Drawing Nomenclature Methodology



**Part Representation**

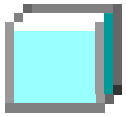
**Number: #######**

**Version: -.I (- no revision)**

**Name: 60 characters**

**Physical Attributes Only**

- **Material**
- **Finish**
- **Colour**
- **Dimensions**



**Component CAD Model**

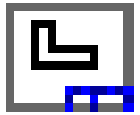
**Number: #######**

**Version: A.I (A is Alfa)**

**Name: 60 characters**

**File Name: #######.prt**

**(number + ext)**



**Component CAD Drawing (Optional)**

**Number: #######**

**Version: A.I (A is Alfa)**

**Name: 60 characters**

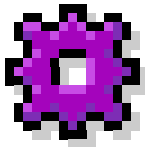
**File Name: #######.drw**

**(number + ext)**

**Attributes:**

- **Material**
- **Finish**
- **Colour**
- **RoHS**

# Standardized Assembly Part, CAD and Drawing Nomenclature Methodology



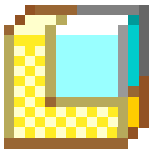
**Assembly Part Representation**

**Number: #######**

**Version: A.3 (Alpha revision sequence for assemblies)**

**Name: ASSY HOUSING**

**BOMs:**



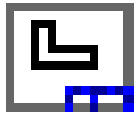
**CAD Assembly Model**

**Number: #######**

**Version: A.1**

**Name: ASSY HOUSING**

**File Name: #######.asm**



**CAD Drawing**

**Number: #######**

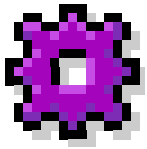
**Version: A.1**

**Name: ASSY HOUSING**

**File Name: #######.drw**

# Example of a Standardized Component Part, CAD Model and Drawing

**Initial Release**



**Part Representation**

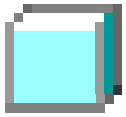
**Number: 184786**

**Version: -.I (- no revision)**

**Name: COMPONENT TITLE**

**Physical Attributes Only**

- **Material**
- **Finish**
- **Colour**
- **Dimensions**



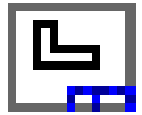
**Component CAD Model**

**Number: 184786**

**Version: A.I (A is Alfa)**

**Name: COMPONENT TITLE**

**File Name: 184786.prt (number + ext)**



**Component CAD Drawing (Optional)**

**Number: 184786**

**Version: A.I (A is Alfa)**

**Name: COMPONENT TITLE**

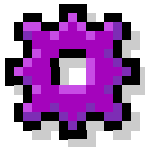
**File Name: 184786.drw (number + ext)**

**Attributes:**

- **Material**
- **Finish**
- **Colour**
- **RoHS**

# Example of a Standardized Component Part, CAD Model and Drawing

**Drawing Text Change (No Fit, Form & Function Change) after Release**



**Part Representation**

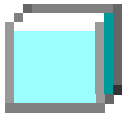
**Number: 184786**

**Version: -.I (- no revision)**

**Name: COMPONENT TITLE**

**Physical Attributes Only**

- **Material**
- **Finish**
- **Colour**
- **Dimensions**



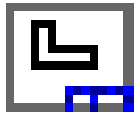
**Component CAD Model**

**Number: 184786**

**Version: A.I (A is Alfa)**

**Name: COMPONENT TITLE**

**File Name: 184786.prt (number + ext)**



**Component CAD Drawing**

**Number: 184786**

**Version: B.I (A is Alfa)**

**Name: COMPONENT TITLE**

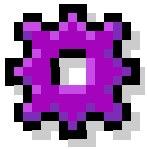
**File Name: 184786.drw (number + ext)**

**Attributes:**

- **Material**
- **Finish**
- **Colour**
- **RoHS**

# Example of a Standardized Component Part, CAD Model and Drawing

**Fit or Form Change after Release**



**Part Representation**

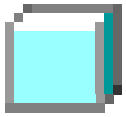
**Number: new number**

**Version: -.I (- no revision)**

**Name: COMPONENT TITLE**

**Physical Attributes Only**

- **Material**
- **Finish**
- **Colour**
- **Dimensions**



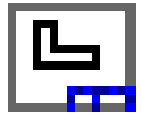
**Component CAD Model**

**Number: new number**

**Version: A.I (A is Alfa)**

**Name: COMPONENT TITLE**

**File Name: new number.prt (number + ext)**



**Component CAD Drawing (Optional)**

**Number: new number**

**Version: A.I (A is Alfa)**

**Name: COMPONENT TITLE**

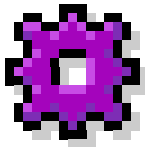
**File Name: new number.drw (number + ext)**

**Attributes:**

- **Material**
- **Finish**
- **Colour**
- **RoHS**

# Standardized Assembly Part, CAD and Drawing Nomenclature Methodology

**Initial Release**



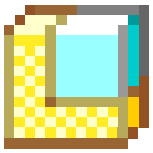
**Assembly Part Representation**

**Number: 136814-101**

**Version: A.3 (Alpha revision sequence for assemblies)**

**Name:** COMPONENT TITLE

**BOMs:**



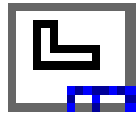
**CAD Assembly Model**

**Number: 136814-101**

**Version: A.1**

**Name:** COMPONENT TITLE

**File Name: 136814-101.asm**



**CAD Drawing**

**Number: 136814-101**

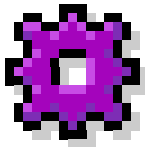
**Version: A.1**

**Name:** COMPONENT TITLE

**File Name: 136814-101.drw**

# Standardized Assembly Part, CAD and Drawing Nomenclature Methodology

**Drawing Text Change (No Fit, Form & Function Change) after Release**



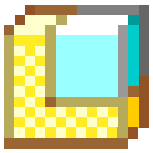
**Assembly Part Representation**

**Number: 136814-101**

**Version: A.3 (Alpha revision sequence for assemblies)**

**Name:** COMPONENT TITLE

**BOMs:**



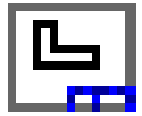
**CAD Assembly Model**

**Number: 136814-101**

**Version: A.1**

**Name:** COMPONENT TITLE

**File Name: 136814-101.asm**



**CAD Drawing**

**Number: 136814-101**

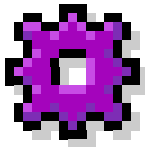
**Version: B.1**

**Name:** COMPONENT TITLE

**File Name: 136814-101.drw**

# Standardized Assembly Part, CAD and Drawing Nomenclature Methodology

**Component change resulting in a new assembly number**



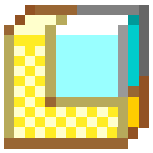
**Assembly Part Representation**

**Number:** new number

**Version:** A.3 (Alpha revision sequence for assemblies)

**Name:** COMPONENT TITLE

**BOMs:**



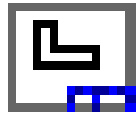
**CAD Assembly Model**

**Number:** new number

**Version:** A.1

**Name:** COMPONENT TITLE

**File Name:** new number.asm



**CAD Drawing**

**Number:** new number

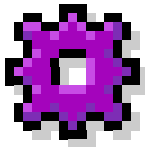
**Version:** A.1

**Name:** COMPONENT TITLE

**File Name:** new number.drw

# Standardized Assembly Part, CAD and Drawing Nomenclature Methodology

**Resulting change in next higher assembly revision**



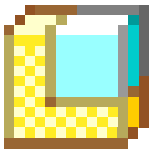
**Assembly Part Representation**

**Number:** ########

**Version:** B.3 (Alpha revision sequence for assemblies)

**Name:** COMPONENT TITLE

**BOMs:**



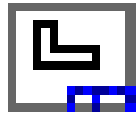
**CAD Assembly Model**

**Number:** ########

**Version:** B.1

**Name:** COMPONENT TITLE

**File Name:** ########.asm



**CAD Drawing**

**Number:** ########

**Version:** B.1

**Name:** COMPONENT TITLE

**File Name:** ########.drw

## Advantages of Standardized Methodology with PLM

- **Visible standard changes in the organization with fit, form and function**
- **Alignment with current bin numbering in MFG**
- **PLM can provide better controls to enforce this methodology with workaround in different PLM libraries and subfolders**