# Interim SCIM and STEP Implementation

## 2008 System Technology Panel Project

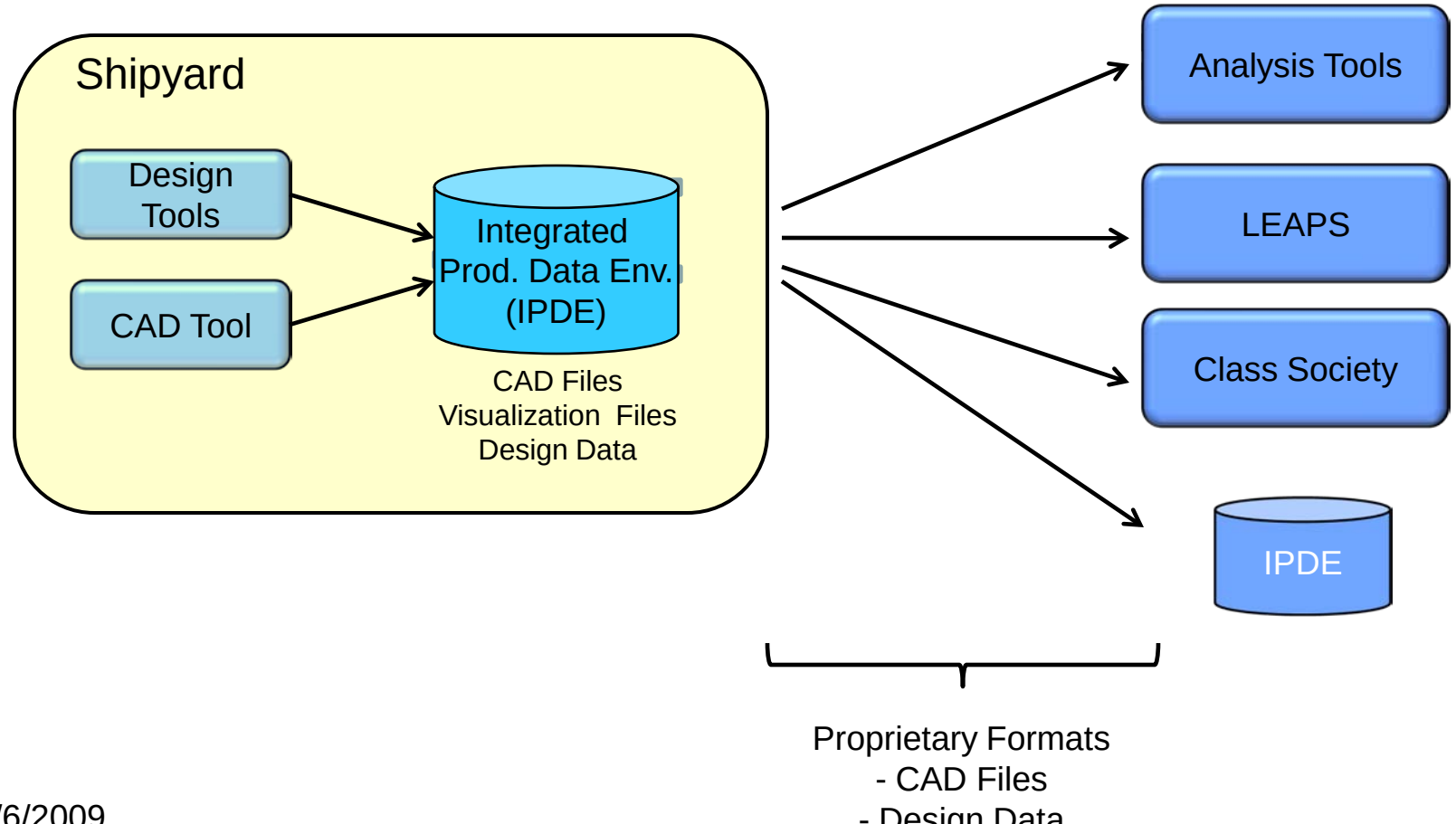
Ted Briggs, Intergraph
Mike Olson, Northrop Grumman
Ron Wood, Northrop Grumman
Pete Lazo, Product Data Services
Ben Kassel, NSWCCD

# Overview

- Problem / vision
- NPDI and SCIM
- Project
- Technical Approach
- Next Steps

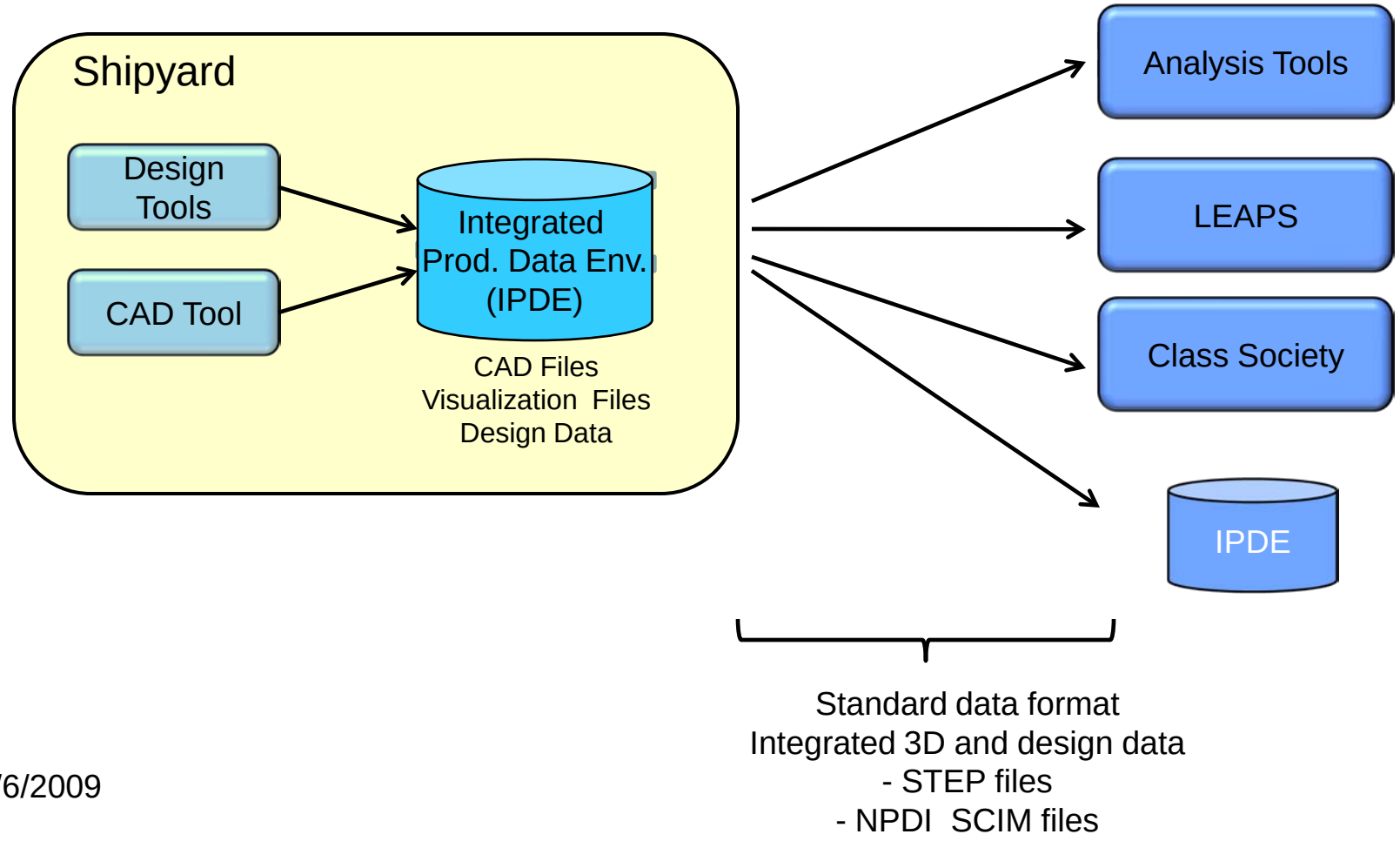
# Problem Today

- Exchanging 3D geometry linked with ship design data

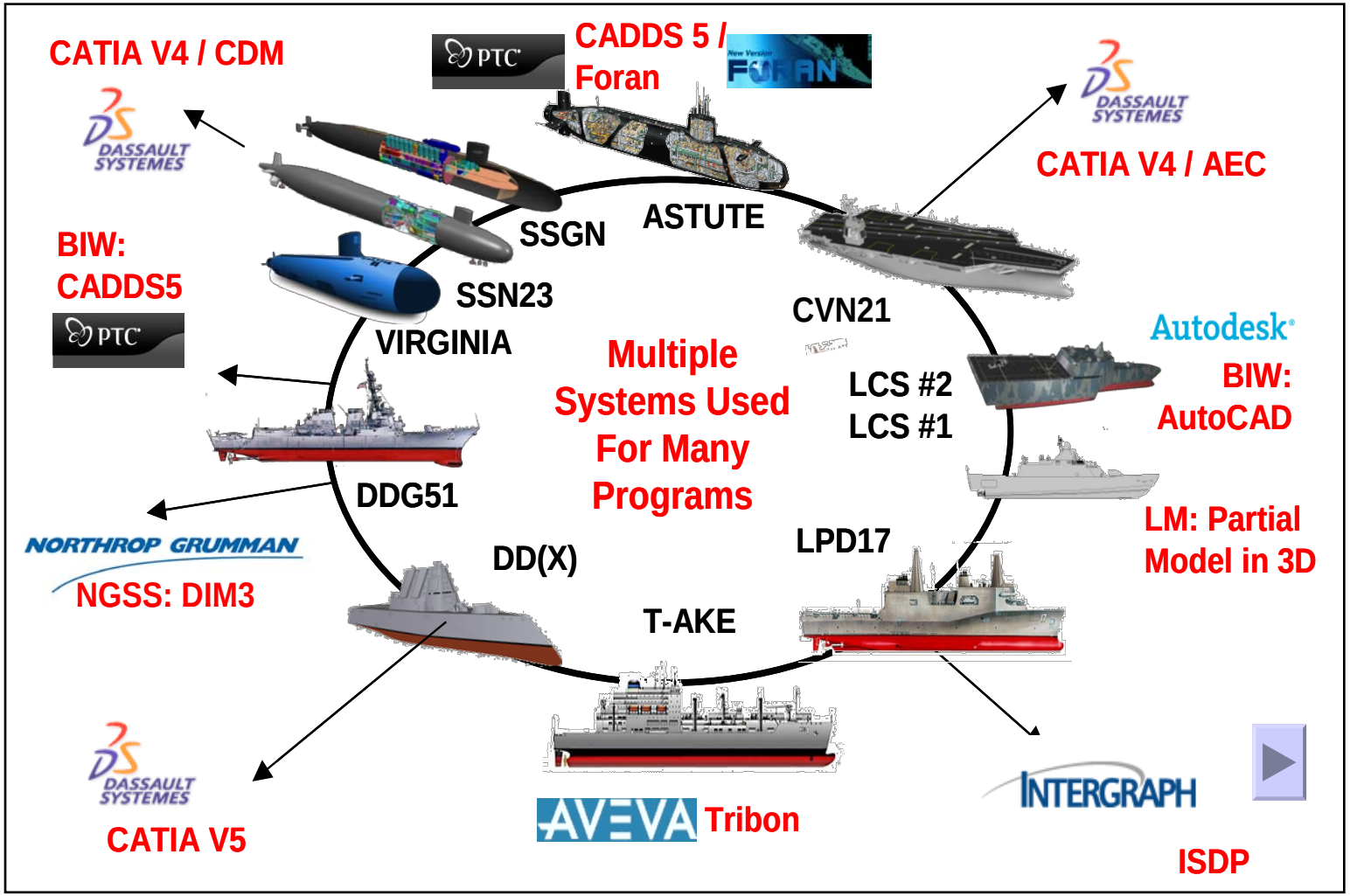


# Vision

- Exchanging 3D geometry linked with ship design data



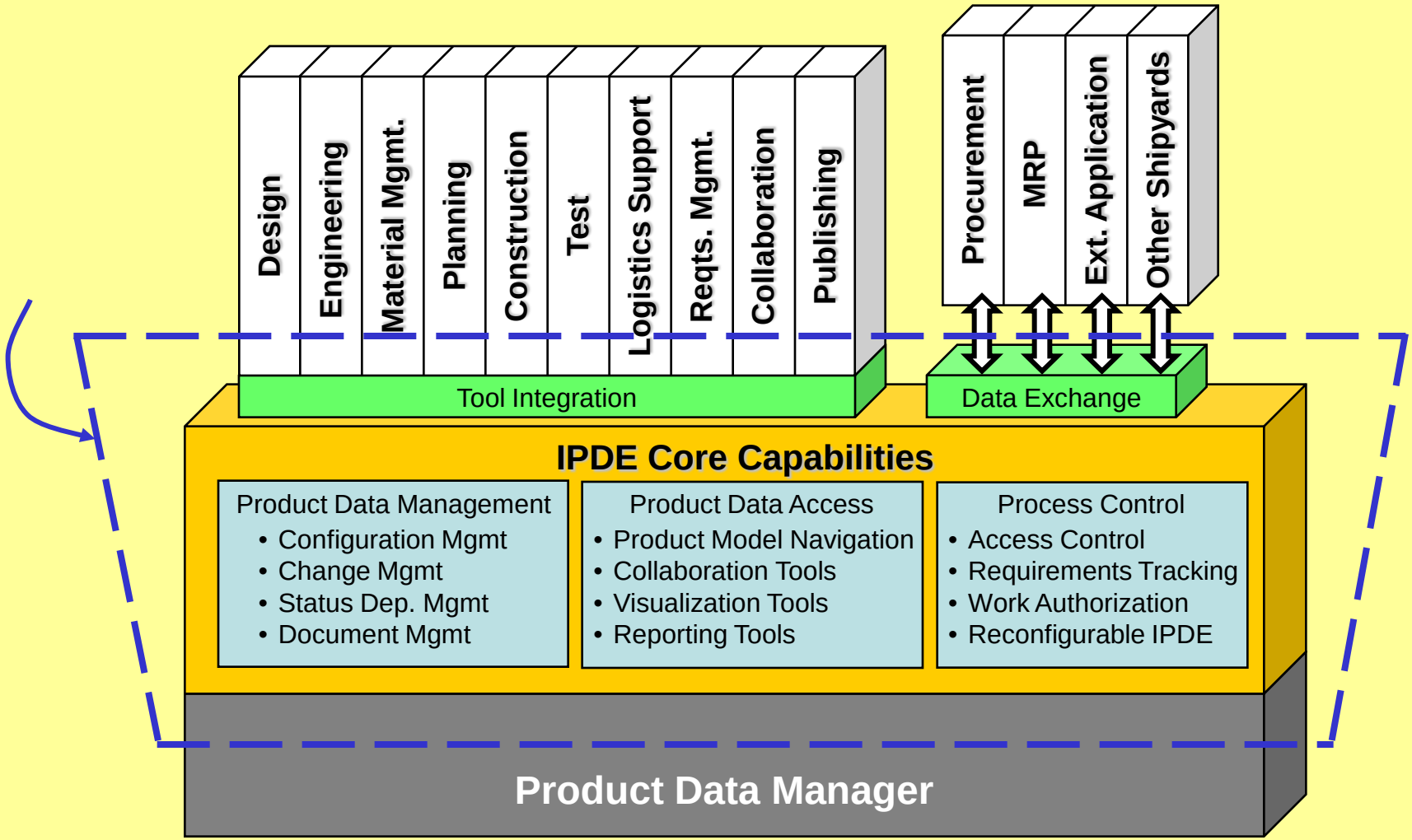
# Current Programs



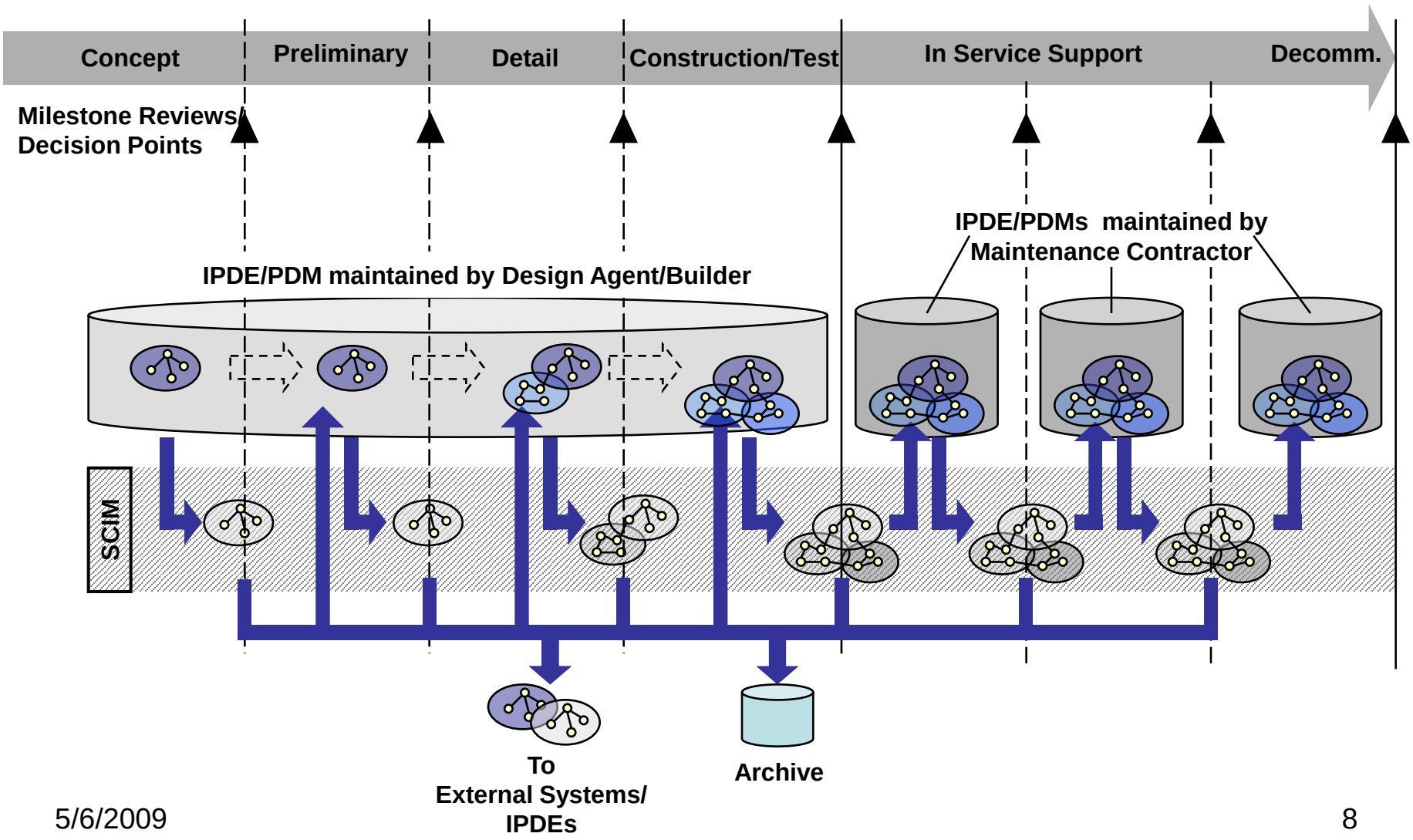
# NPDI & SCIM

- **NPDI (Navy Product Data Initiative)**
  - **To specify the requirements for and drive the implementation of product data systems based on an open architecture having suitable functionality and enterprise-wide interoperability to support affordable Navy ship design, construction and service life support**
  - **Initial version of the IPDE Specification has been written and delivered to the Navy for review and comment**
- **SCIM (Ship Common Information Model)**
  - **SCIM will codify the models developed and prototyped by the ISE Project under NSRP over the past nine years**
  - **It will be a separate document from the IPDE Specification being produced by the NPDI Project, but it will be referenced by that IPDE Specification**
  - **Full version of the SCIM has not yet been completed**
    - **Six of fifteen proposed chapters have been developed**
    - **One of the remaining chapters deals with Product Life Cycle Support and will be based on the results of the ISE-6 Project**

# NPDI Scope


Integrated Product Development Environment (IPDE)
Design
Engineering
Material Mgmt.
Planning
Construction
Test
Logistics Support
Reqts. Mgmt.
Collaboration
Publishing
Procurement
MRP
Ext. Application
Other Shipyards
Tool Integration
Data Exchange
IPDE Core Capabilities
Product Data Management
• Configuration Mgmt
• Change Mgmt
• Status Dep. Mgmt
• Document Mgmt
Product Data Access
• Product Model Navigation
• Collaboration Tools
• Visualization Tools
• Reporting Tools
Process Control
• Access Control
• Requirements Tracking
• Work Authorization
• Reconfigurable IPDE
Product Data Manager

# NPDI SCIM


Concept
Preliminary
Detail
Construction/Test
In Service Support
Decomm.
Milestone Reviews/
Decision Points
IPDE/PDM maintained by Design Agent/Builder
IPDE/PDMs maintained by
Maintenance Contractor
SCIM
To
External Systems/
IPDEs
Archive

# Project

- Purpose
  - To determine the feasibility of using existing AP214 translators with NPDI SCIM data to improve the exchange of early and detail design data, and perform an initial validation of the SCIM.

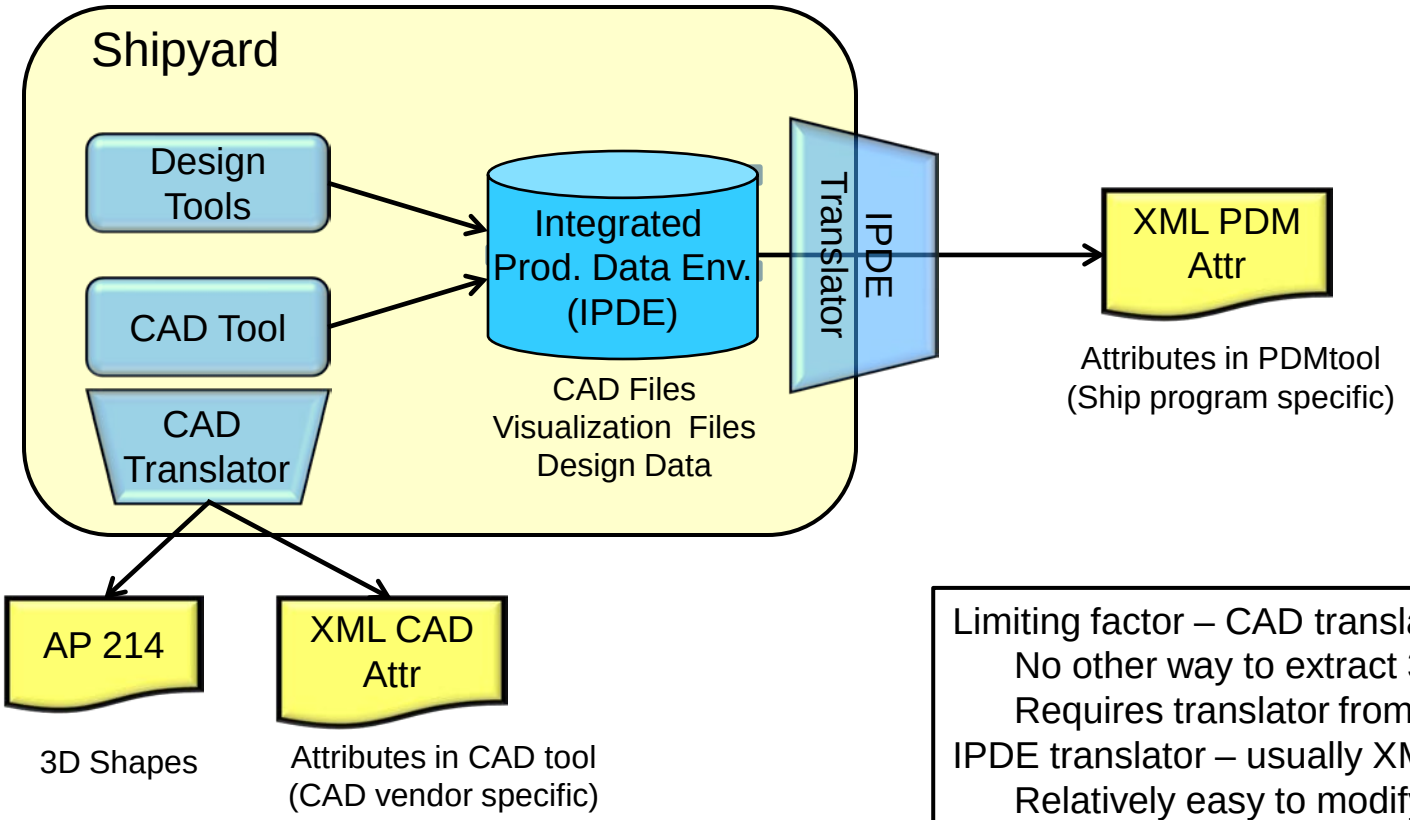
- Benefits
  - Develop an effective interim solution
    - Develop recommendations for existing ship programs
    - Demonstrate feasibility of using NPDI SCIM to exchange design data for DDG-1000 program and Navy LEAPS repository.
  - Lay groundwork for adoption of SCIM
    - Initial validation of NPDI SCIM
    - Generate SCIM test cases

# Project

- Execution
  - Phase 1
    - Initial evaluation of SCIM information models
    - Develop linkage between AP 214 and SCIM file
    - Ship and Molded Form test cases
  - Phase 2
    - Structural test cases
    - Piping test cases
- Deliverables
  - Test Cases
  - SPS paper – technical approach
  - Final Report – includes SCIM recommendations

# Current Situation

- Exchanging 3D geometry linked with ship design data




Limiting factor – CAD translator
- No other way to extract 3D data
- Requires translator from vendor's

IPDE translator – usually XML based
- Relatively easy to modify

# CAD Translator Example - ISDP

**STEP AP 214 File**

#1012=PRODUCT(':1440232005.m:1412:170347:40:',':1440232005.m:usr:avlpd609005_00','equipment',(#1002));
#1013=PRODUCT_RELATED_PRODUCT_CATEGORY('item','',(#1012));
#1014=PRODUCT_DEFINITION_FORMATION_WITH_SPECIFIED_SOURCE(':1440232005.m:1412:170347:40:','equipment',#1012,.NOT_KNOWN.);
#1015=PRODUCT_DEFINITION('','equipment',#1014,#1003);
#1016=PRODUCT_DEFINITION_SHAPE(':1440232005.m:usr:avlpd609005_00','equipment',#1015);

**XML Attribute File**

<ss_om_eqp comp_path="**:1440232005.m:usr:avlpd609005_00**"
comp_tagx="**:1440232005.m:1412:170347:40:**" symbology="**300:2:1:0:**"
class_name="**VDequipment**" rep="**4**" macro_name="**avlpd609005**" macro_lib="**avlpdmech03**">
<ss_om_collector eqp_family="**avtank01**" eqp_partno="**1CC97-LP-V-51401-18**" eqp_partrev="**000**"
p_macro="**avlpd609005**" nomenclature="**Receiver, Storage**" mac_name="**avlpd609005**" />
<ss_om_collector eqp_number="**RAC-TK1**" eqp_descr="**AC_UNIT_REFRIG_TANK**" unit_number="**1440**"
compt_number="**5-33-0-Q**" sirobid="**NULL**" mark_user="**double 0**" sirid="**81290-0001-1**"
system_name="**RAC**" zone_number="**1440**" />
<ss_om_cs matrix="**doubles 16 0 -1 0 -39750 1 0 0 4200 0 0 1 7964.4 0 0 0 1**" />
</ss_om_eqp>

# CAD Translator Example - CATIA

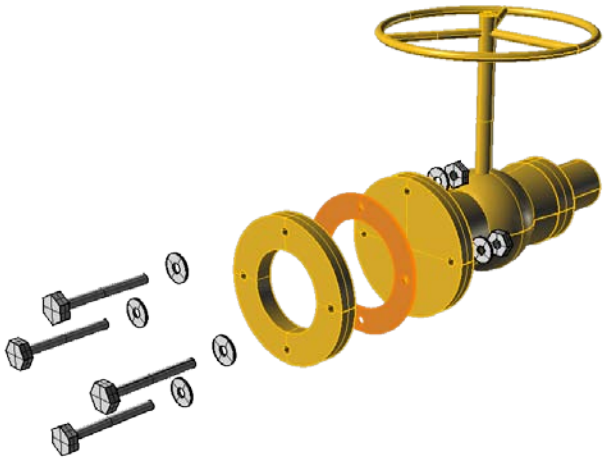
**STEP AP 214 File**

```
#13=PRODUCT_DEFINITION('BR549501XXXDG00000','
',#6,#3) ;
#6=PRODUCT_DEFINITION_FORMATION_WITH_SPECIFIE
D_SOURCE(','',#5,.NOT_KNOWN.) ;
#3=PRODUCT_DEFINITION_CONTEXT('part definition',#1,' ')
;
#1=APPLICATION_CONTEXT('automotive design') ;
#5=PRODUCT('BR549501XXXDG00000','','',(#2)) ;
#2=PRODUCT_CONTEXT(' ',#1,'mechanical') ;
#8=PRODUCT_RELATED_PRODUCT_CATEGORY('part',$,(#
25,#39482)) ;
#39465=NEXT_ASSEMBLY_USAGE_OCCURRENCE('B0000
27','B000027','',#13,#27,' ') ;
#27=PRODUCT_DEFINITION('PLANT_AC_500_TON','
',#26,#3) ;
#26=PRODUCT_DEFINITION_FORMATION_WITH_SPECIFI
ED_SOURCE('Added maint space for condenser and chiller
tubes removal',' ',#25,.NOT_KNOWN.) ;
#25=PRODUCT('PLANT_AC_500_TON','','ENGINEERING
DIAGRAM FOR AC PLANT, RAFT AND HARD MOUNTED
EQUIPMENT',(#2)) ;
#44957=NEXT_ASSEMBLY_USAGE_OCCURRENCE('B0000
94','B000094','',#13,#39484,' ') ;
#39484=PRODUCT_DEFINITION('EVAC_ASSY_500T_
AC_PLANT',' ',#39483,#3) ;
#39483=PRODUCT_DEFINITION_FORMATION_WITH_SPEC
IFIED_SOURCE(','',#39482,.NOT_KNOWN.) ;
#39482=PRODUCT('EVAC_ASSY_500T_
AC_PLANT','','DEVELOPED FROM: YORK INTERNATIONAL;
DWG NO. 376-92108-000, REV
C.\X2\0009\X0\CONNECTIONS PER ANSI B16.22 AND MIL-
V-24478',(#2)) ;
```

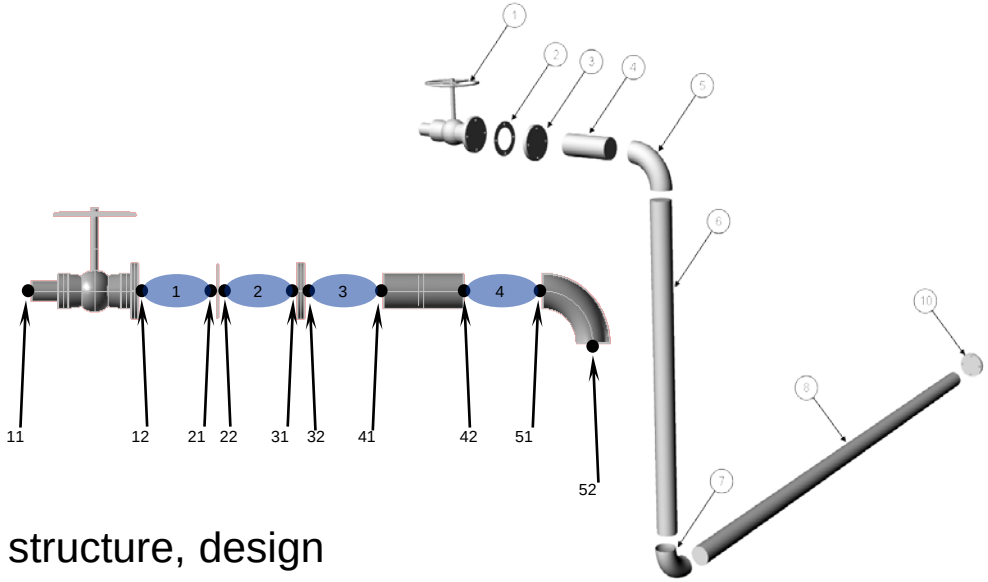
**XML Atribute File**

```
<RootProduct SP="4" CATIA="B18" CATSync="3.3.2"
RevItem="-1" Version="---"
PartNumber="BR549501XXXDG00000"
Effectivity="[Engineering Effectivity] (R(1 - oo))"
InstanceName="BR549501XXXDG00000"
XMLCreationDate="Thursday 30 October 2008 11:32:16">
- <Product PartNumber="PLANT_AC_500_TON"
InstanceName="B000027">
- <AttributeList>
  <Attribute Name="MelID" Value="001" />
  <Attribute Name="NCN" Value="4120-DA0-760895" />
  <Attribute Name="BIWCatalogNumber" Value="000001" />
  <Attribute Name="System" Value="NULL" />
  <Attribute Name="CompartmentNumber" Value="x-xx-x-x" />
  <Attribute Name="CompartmentFunctionNumber"
Value="5016" />
  <Attribute Name="DamageControlClassification"
Value="NULL" />
  <Attribute Name="NavyComponentNumber" Value="NULL" />
  <Attribute Name="Service" Value="NA" />
  <Attribute Name="DiagramNumber" Value="001" />
  <Attribute Name="DrawingNumber" Value="001" />
  <Attribute Name="PieceNumber" Value="C0002" />
  <Attribute Name="FindNumber" Value="AC PLANT NO. 4" />
  <Attribute Name="ARFC" Value="RFS-BW-000" />
  <Attribute Name="Remarks" Value="NULL" />
  <Attribute Name="NormalValvePosition" Value="NA" />
  <Attribute Name="MountingMethod" Value="NA" />
  <Attribute Name="Tightness" Value="NA" />
…….
  </AttributeList>
  </Product>
```

# Geometry vs Product Structure

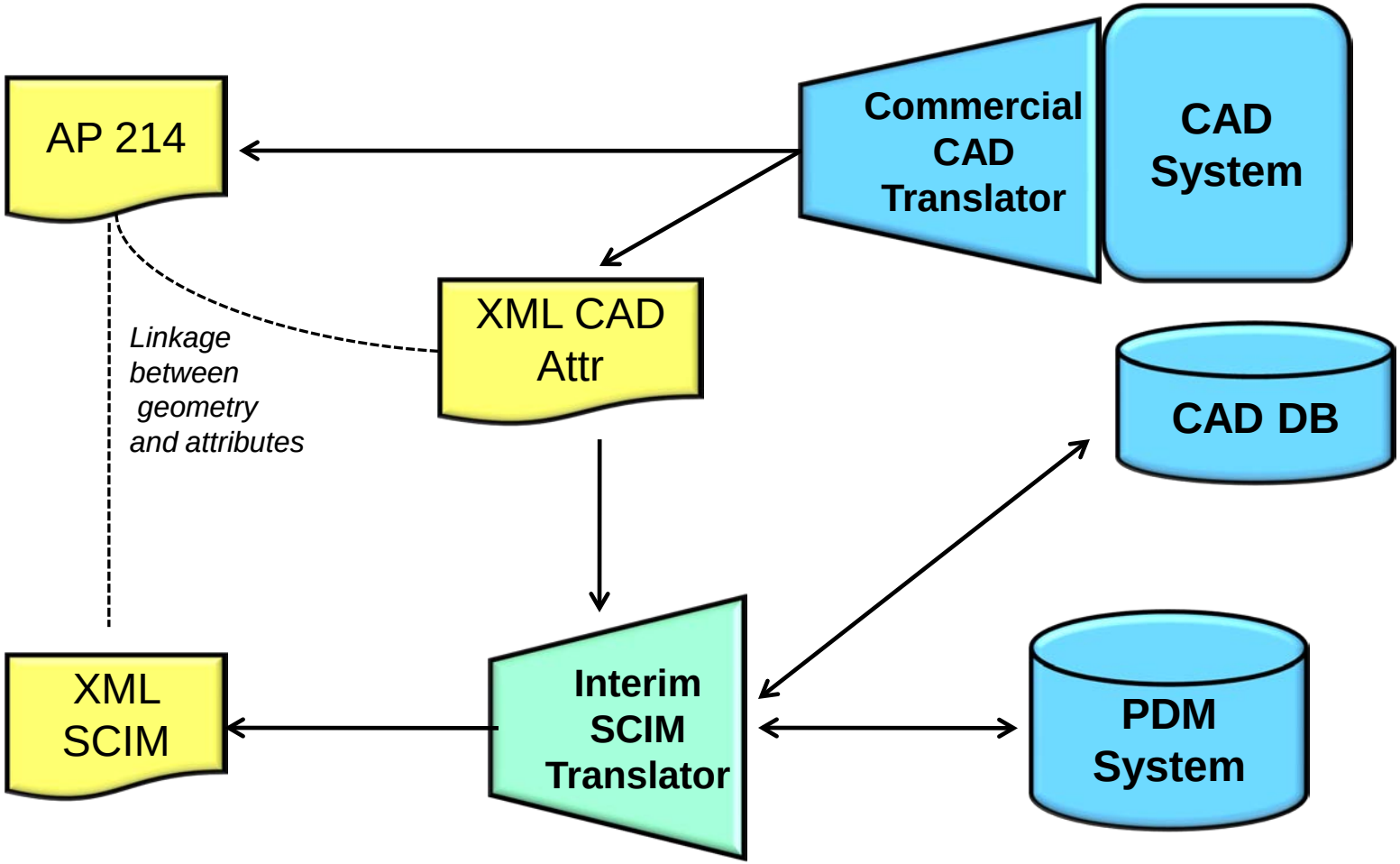


AP203 or AP214 to define shape.
Explicit geometry.




SCIM defines product structure, design parameters, and the relationships between objects.

# Interim SCIM Approach




Transform proprietary XML data into SCIM format, adding additional PDM data

# Technical Approach

- All geometry in AP 214 file
  - Externally referenced from SCIM file
  - Modify SCIM schema to add external refernce
- All product structure in SCIM
  - Ignore AP 214 assembly structure
- Create product structure based on information in CAD database and/or PDM system

# Work Remaining

- TWR hull test case in progress
  - Discussed tomorrow in team meeting
- Continue to investigate SCIM model
  - Presented as separate specification vice integrated schema
  - Separate schemas
- Develop additional Phase 1 test cases
- Develop Phase 2 test cases