



# Model for a Purpose

**Scoping an Architecture Model Using the ASDP Digital Transformation Contract Language**

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# The Problem Statement

- Open a program SOW and the first line states:

1. Digital Enterprise / Acquisition and Sustainment Data Package (ASDP)

The Contractor shall use Digital Engineering (DE) tools and processes to design, develop, test, verify, validate, and certify the system as described in the (*Enter System Name*) Specification / Requirements Model / Government Reference Architecture (*Note: Select the language appropriate (Specification, Requirements Model, or GRA) for the type of requirements and maturity of the contractor's DE*



Acquisition and Sustainment Data Package  
Digital Transformation Contract Language

Version 1.1  
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- Where does it all go?

DE = Architecture Model



or

DE = Digital Engineering Environment



# The Solution: Model For a Purpose

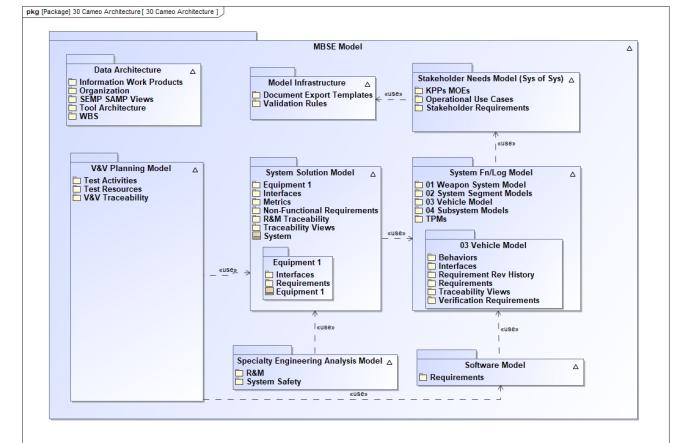
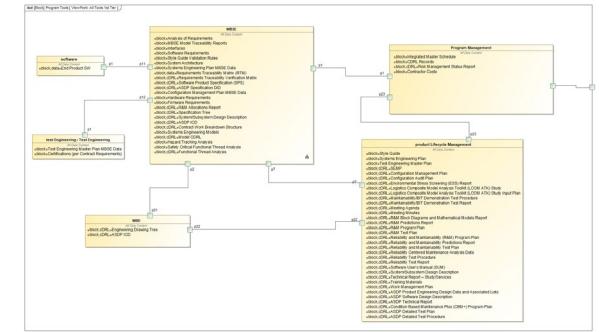
- Prior to architecting a system, architect the architecture's data
  - Understand why you need the architecture's data
  - Identify what data is needed and how the System Architecture fits within the DE Environment

**Data Architecture:** Identifies the data products required by the contract, location of those products within the Digital Environment, inputs and outputs of the System Architecture model, work products produced from the System Architecture, and Systems Engineering analyses to be performed within the System Architecture model.

- Define where the System Architecture data lives in the model

**Architecture Template:** Identifies the architectures to be produced, architectural elements to capture the data, the location of data in the model, and model infrastructure to execute the effort

- Execute to this scope



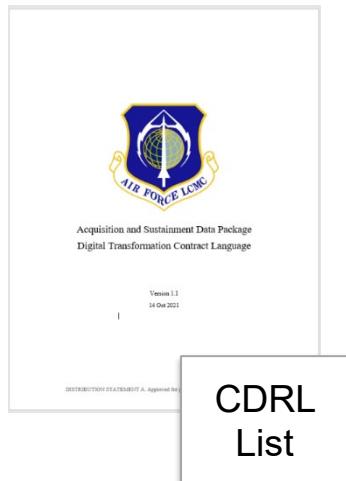
# The Approach

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# Identify Needs & Capture in Data Architecture Model

- Needs can come from a variety of places: SOW / CDRL, Industry Standards, Internal Processes
  - Example here uses ASDP Digital Transformation Contract Language



1.2. Model Based Systems Engineering (MBSE)  
The Contractor shall develop and maintain program-specific systems engineering models using System Modeling Language (SysML). The Contractor shall ensure the model is the Authoritative Source of Truth (ASoT) for the following data: Hardware analysis of requirements, system architecture design, analysis/failure modes effects criticality analysis, hazard analysis, contract requirements, integrity program compliance, safety critical functional thread (SCFTA) analysis and validation rule sets. The contractor shall ensure the MBSE model bi-directionally links requirements and data set as defined above. The model shall be able to be integrated into the government approved PDR, CDR, link, tie, and trace to the lowest component (*Note: the contractor shall have validation rule checks to ensure models produce the portions of the ASDP that are contained within the MBSE model, per the ASDP and other CDRLs/DIDs below.*)

The Contractor shall develop a style guide for use in the MBSE model that reflects the aspects of the associated the DOAM and ASDP and other CDRLs/DIDs.  
In addition, the contractor shall have validation rule checks to ensure models produce the portions of the ASDP that are contained within the MBSE model, per the ASDP and other CDRLs/DIDs below.

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# Identify Needs & Capture in Data Architecture Model

- Needs best captured as requirement objects with text

#	Name	Text
1	1.2. Model Based Systems Engineering	
2	1.2.1. Requirements and Verification	
17	1.2.3. Interface Management	
32	1.2.2. System Solution Architecture	
14	1.2.5. Reliability and Maintenance	
16	1.2.4. Risk/Risk Management	
32	1.2.Req.5	The Contractor shall design, incorporate and maintain a style guide for its MBSE model. The style guide shall have validation rule sets to enable automated Systems Engineering Technical Assessments, Audits, Milestones, Certifications, and Integrity Programs.
33	1.2.Req.11	In addition, the linked WBS and specification tree shall be linked, tied, and traced to System drawings from the highest level to correct subordinate levels within the drawing.
34	1.2.Req.7	In addition, the contractor shall have validation rule checks to ensure models produce the correct portions of the ASDP that are contained within the MBSE model, per the ASDP and associated CDRLs/DIDs below.
35	1.2.Req.2	The contractor shall ensure the MBSE model bi-directionally traces, links, and ties to requirements and data set as defined above.
36	1.2.Req.4	The Contractor shall ensure its MBSE model can be utilized in other MBSE tools to the extent practicable (e.g. Cameo to Rhapsody).
37	1.2.Req.0	The Contractor shall develop and maintain program-specific systems engineering models in System Modeling Language (SysML).
38	1.2.Req.10	This WBS shall have each element linked, tied, and traced to the corresponding Work Breakdown Structure (WBS) specifications from the highest level to the correct subordinate levels within the specification.
39	1.2.Req.6	The Contractor shall develop a style guide for use in the MBSE model that reflects the associated DOAM and ASDP and other CDRLs/DIDs.
		The WBS shall have contractor costs and development schedule linked, tied, and traced to the associated DOAM and ASDP and other CDRLs/DIDs.

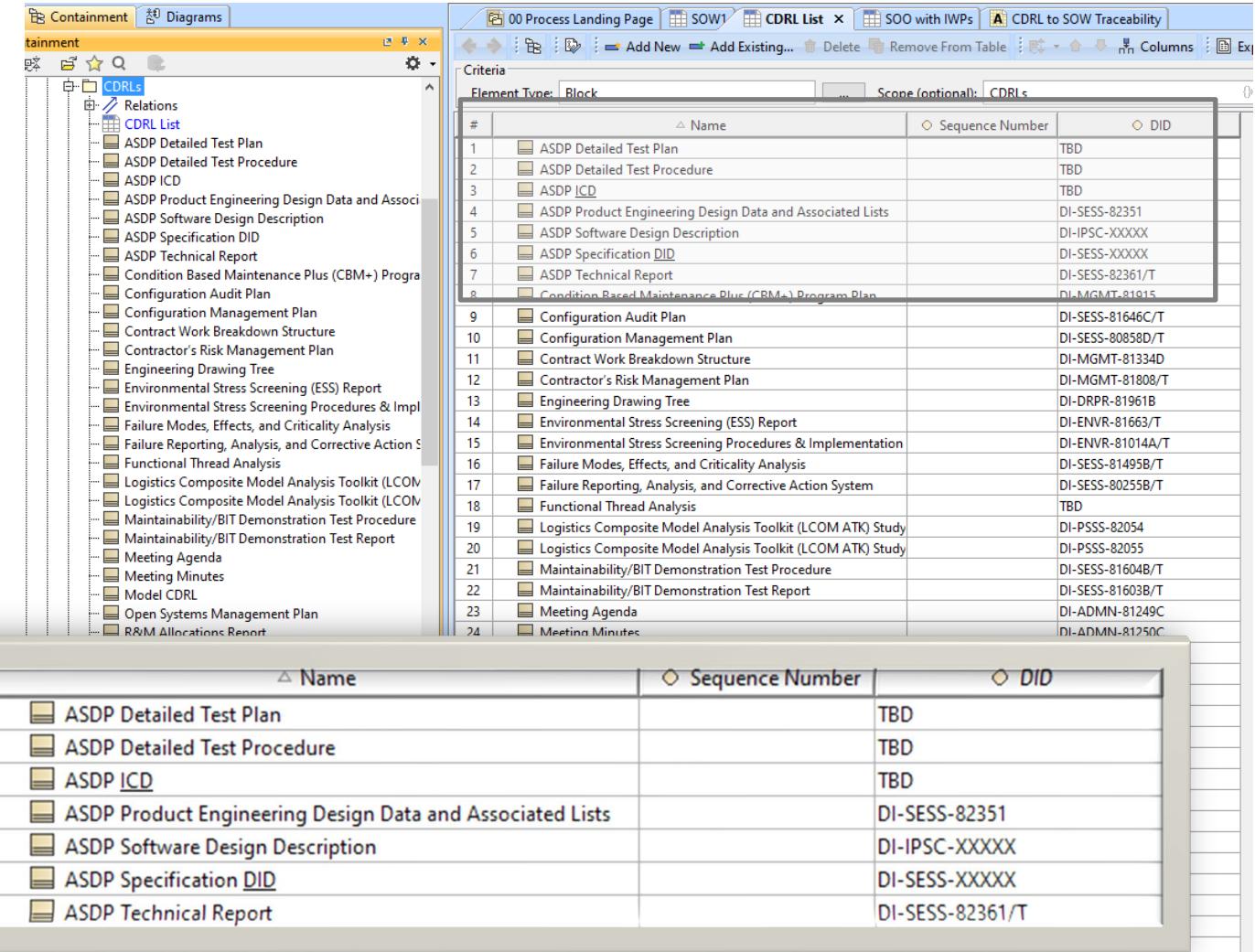
# Identify Information Work Products

- For each need, a block is created representing a data set that satisfies the need
  - Trace to Needs (Block to Req't)
- Uses tool features available
  - Allocation Matrices
  - Block Diagrams

## Information Work Product:

Data/work that satisfies a need. May be formatted data into a data product or reside naturally within a model.

## CDRLs in ASDP Contract Language



The screenshot shows a software application window titled "Containment" with tabs for "Containment" and "Diagrams". On the left, there is a tree view under the "CDRLs" node, listing various items such as "ASDP Detailed Test Plan", "ASDP Detailed Test Procedure", "ASDP ICD", and "ASDP Product Engineering Design Data and Associated Lists". To the right, there are two tables. The top table is titled "Criteria" and has columns for "#", "Name", "Sequence Number", and "DID". It lists 24 entries, each corresponding to one of the items in the tree view. The bottom table is also titled "Criteria" and has the same columns. It lists a subset of the items from the top table, specifically entries 1 through 7.

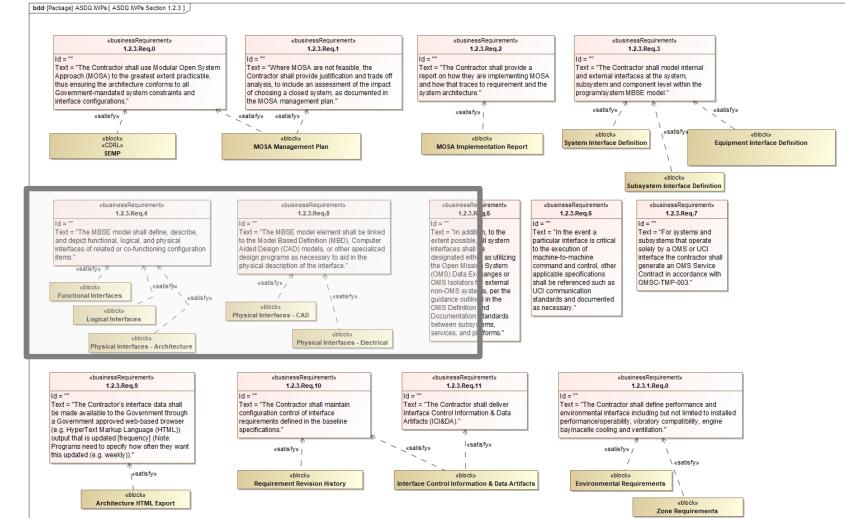
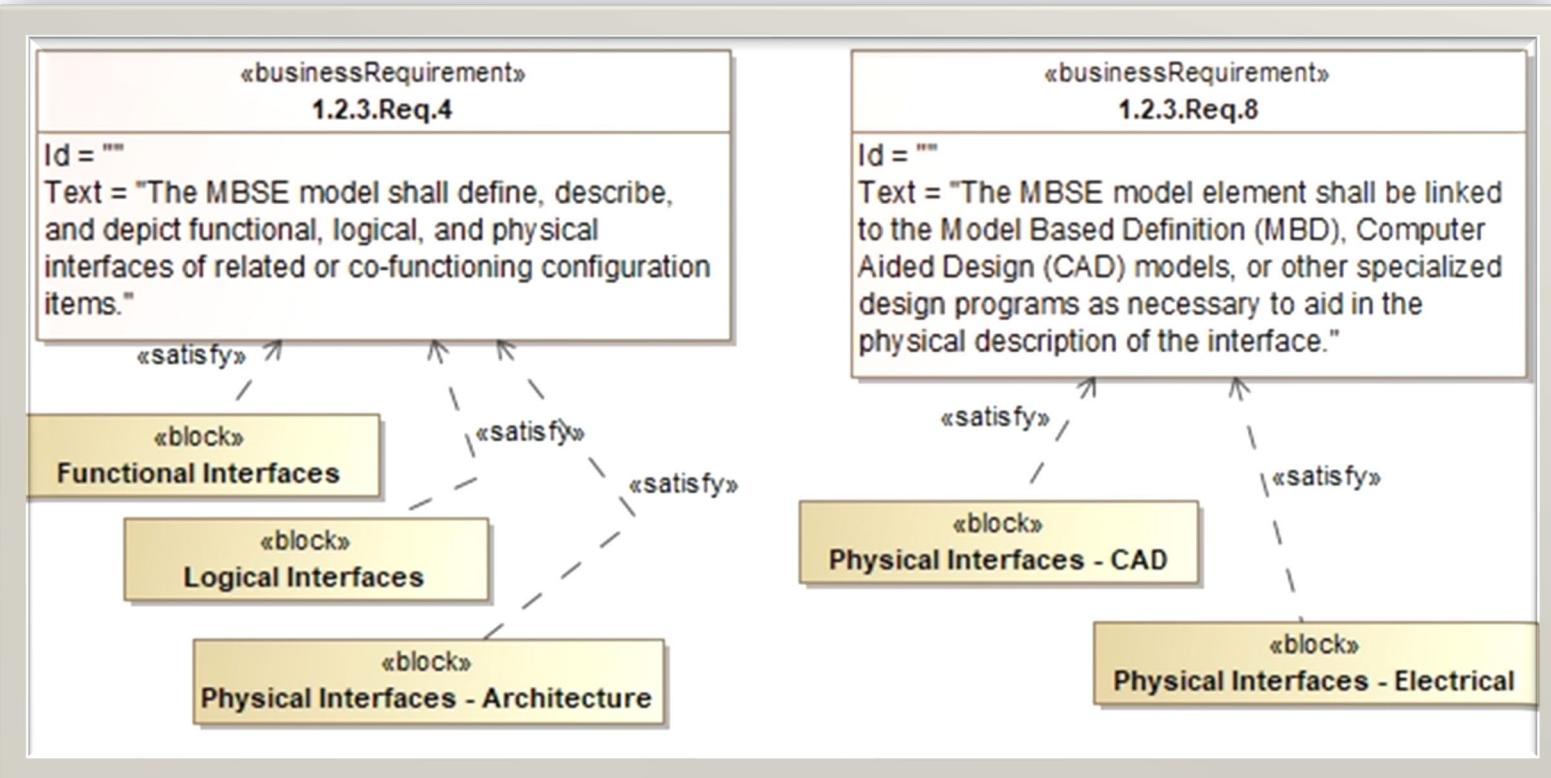
#	Name	Sequence Number	DID
1	ASDP Detailed Test Plan	TBD	
2	ASDP Detailed Test Procedure	TBD	
3	ASDP ICD	TBD	
4	ASDP Product Engineering Design Data and Associated Lists	DI-SESS-82351	
5	ASDP Software Design Description	DI-IPSC-XXXXX	
6	ASDP Specification DID	DI-SESS-XXXXX	
7	ASDP Technical Report	DI-SESS-82361/T	
8	Condition Based Maintenance Plus (CBM+) Program Plan	DI-MGMT-81015	
9	Configuration Audit Plan	DI-SESS-81646C/T	
10	Configuration Management Plan	DI-SESS-80858D/T	
11	Contract Work Breakdown Structure	DI-MGMT-81334D	
12	Contractor's Risk Management Plan	DI-MGMT-81808/T	
13	Engineering Drawing Tree	DI-DRPR-81961B	
14	Environmental Stress Screening (ESS) Report	DI-ENVR-81663/T	
15	Environmental Stress Screening Procedures & Implementation	DI-ENVR-81014A/T	
16	Failure Modes, Effects, and Criticality Analysis	DI-SESS-81495B/T	
17	Failure Reporting, Analysis, and Corrective Action System	DI-SESS-80255B/T	
18	Functional Thread Analysis	TBD	
19	Logistics Composite Model Analysis Toolkit (LCOM)	DI-PSSS-82054	
20	Logistics Composite Model Analysis Toolkit (LCOM ATK) Study	DI-PSSS-82055	
21	Maintainability/BIT Demonstration Test Procedure	DI-SESS-81604B/T	
22	Maintainability/BIT Demonstration Test Report	DI-SESS-81603B/T	
23	Meeting Agenda	DI-ADMN-81249C	
24	Meeting Minutes	DI-ADMN-81250C	

Name	Sequence Number	DID
ASDP Detailed Test Plan		TBD
ASDP Detailed Test Procedure		TBD
ASDP ICD		TBD
ASDP Product Engineering Design Data and Associated Lists		DI-SESS-82351
ASDP Software Design Description		DI-IPSC-XXXXX
ASDP Specification DID		DI-SESS-XXXXX
ASDP Technical Report		DI-SESS-82361/T

# Identify Information Work Products

## IWPs for Contract Section 1.2.3



# Identify Tools and Applications

- A tool architecture is created via a BDD to define the types of tools needed on the program

**Tool:** A device used... to perform a task<sup>(1)</sup>; The means by which a model is created by a modeler<sup>(2)</sup>; a generic form of an application

- The selected application suite is then assigned to the needed tools

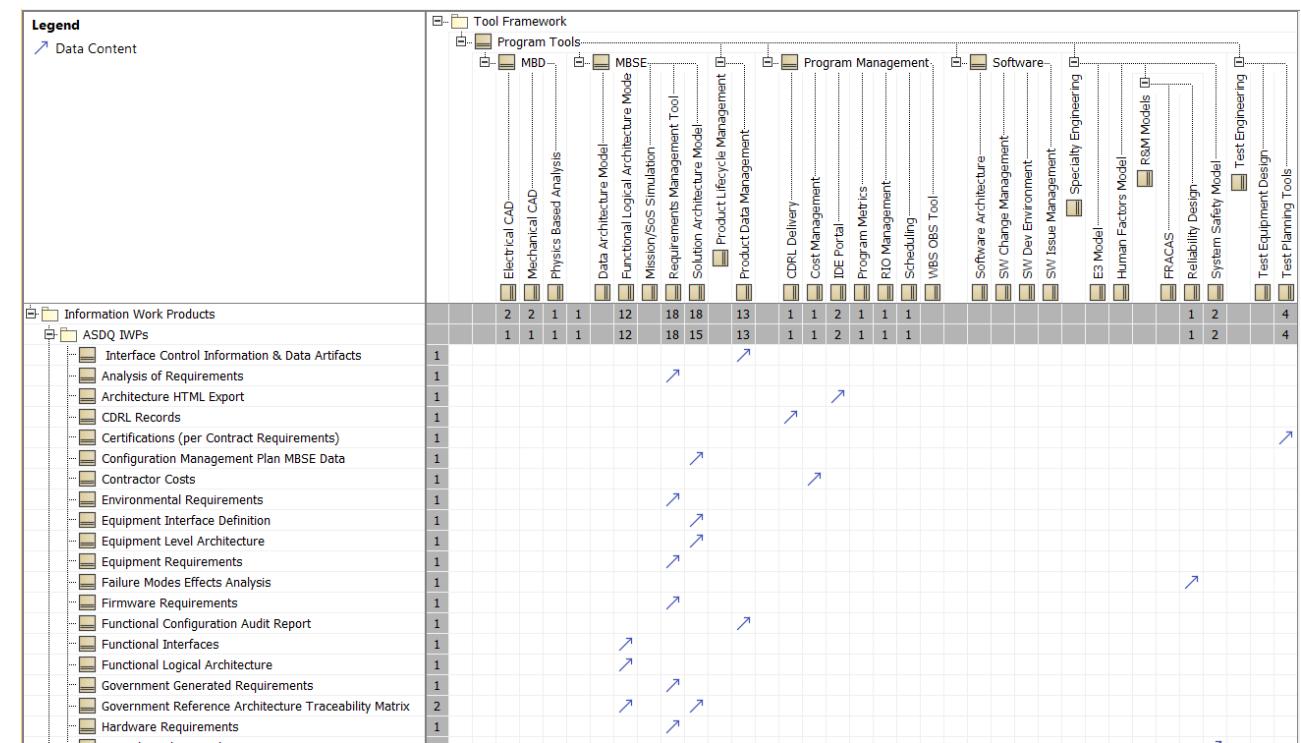
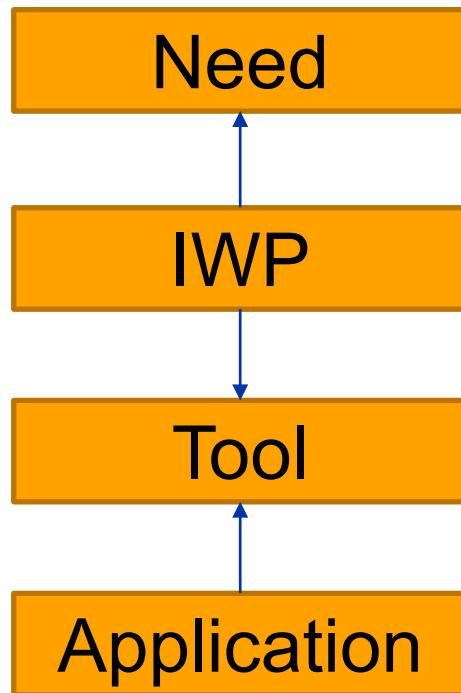
- Differentiating tools from applications adds rigidity to data architecture while applications change

**Application:** The specific software selected to serve as the modeling tool

#	Name	Assigned Application
1	Program Tools	
2	Program Management	
3	Program Metrics	Sharepoint
4	Scheduling	MS Project
5	CDRL Delivery	DOD Safe
6	RIO Management	Boeing Risk Management System
7	Cost Management	
8	IDE Portal	Sharepoint
9	WBS OBS Tool	Cameo Enterprise Architecture
0	MBD	
1	Mechanical CAD	N-X
2	Electrical CAD	Capital Systems Architect
3	Physics Based Analysis	MATLAB
4	MBSE	
5	Mission/SoS Simulation	AFSIM
6	Functional Logical Architecture Model	Cameo Enterprise Architecture
7	Solution Architecture Model	Cameo Enterprise Architecture
8	Data Architecture Model	Cameo Enterprise Architecture
9	Requirements Management Tool	Cameo Enterprise Architecture
10	Specialty Engineering	
11	R&M Models	
12	FRACAS	FRACAS Database
13	Reliability Design	Cameo Enterprise Architecture
14	System Safety Model	Cameo Enterprise Architecture

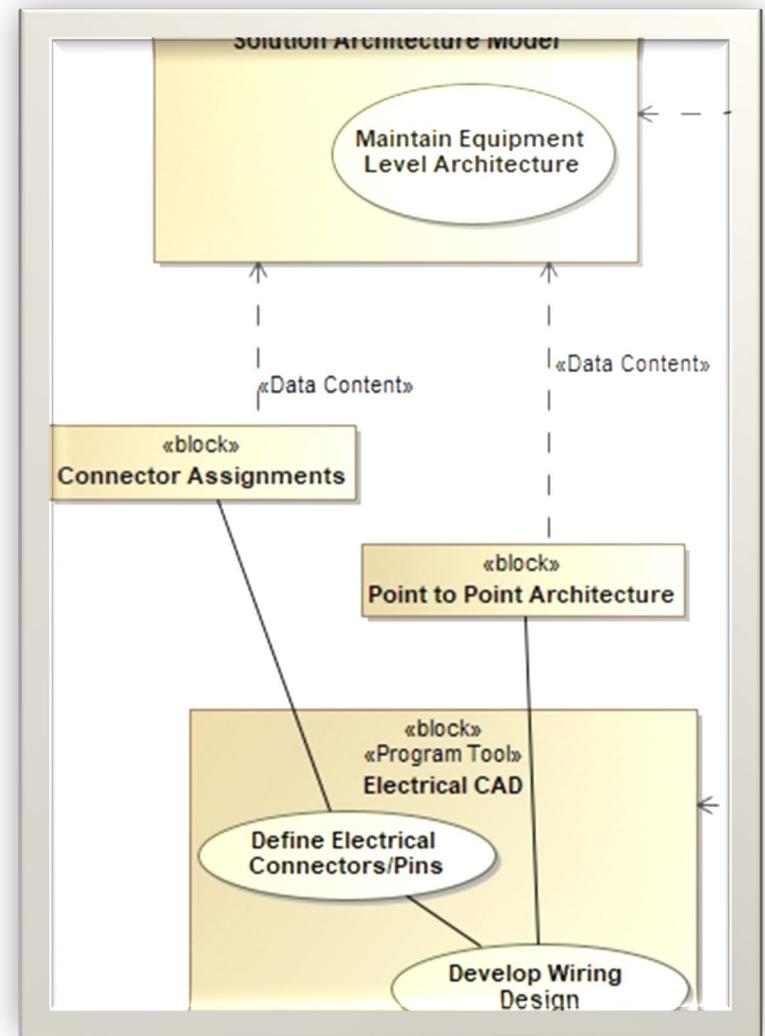
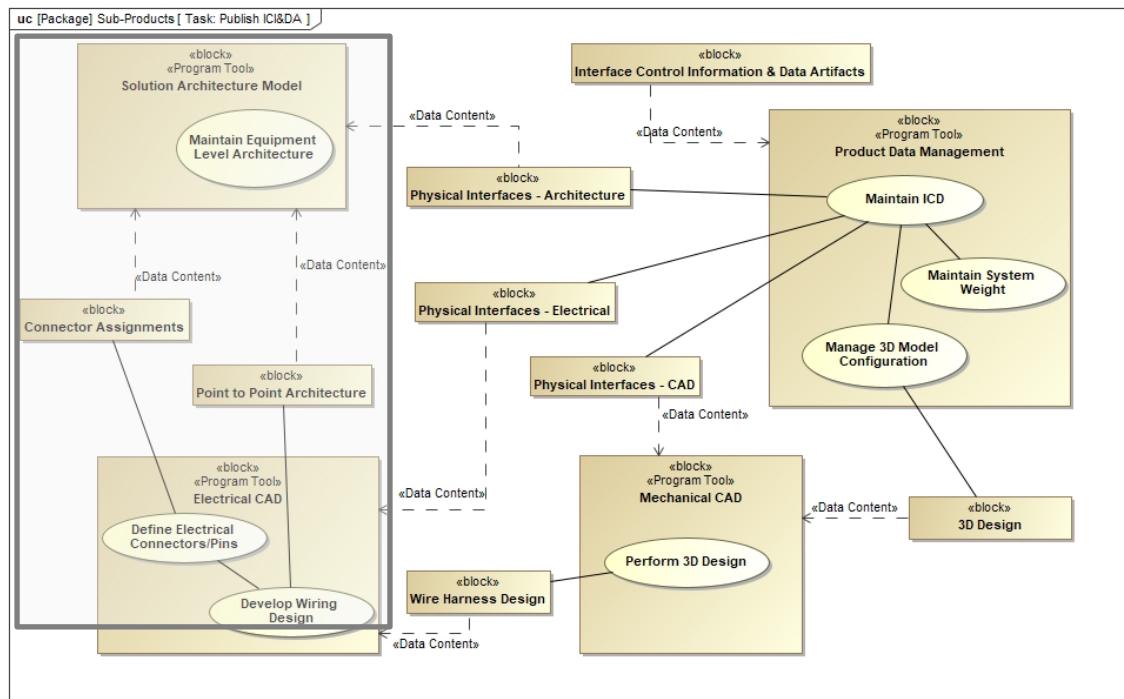
# Allocate Information Products to Tools

- Allocating an IWP to a tool assigns it to the application that will contain the data



# Identify Sub-Products

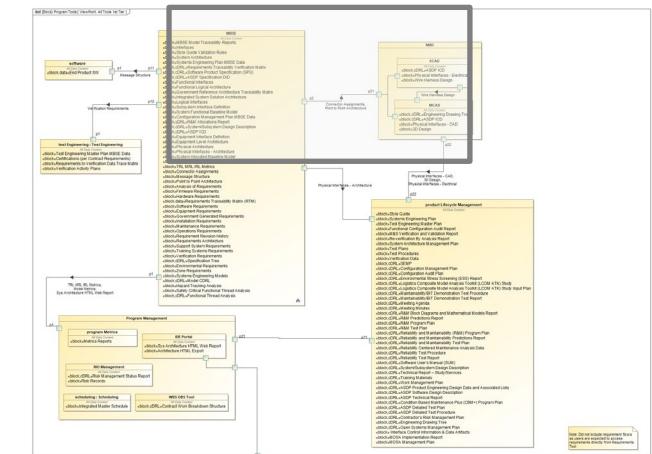
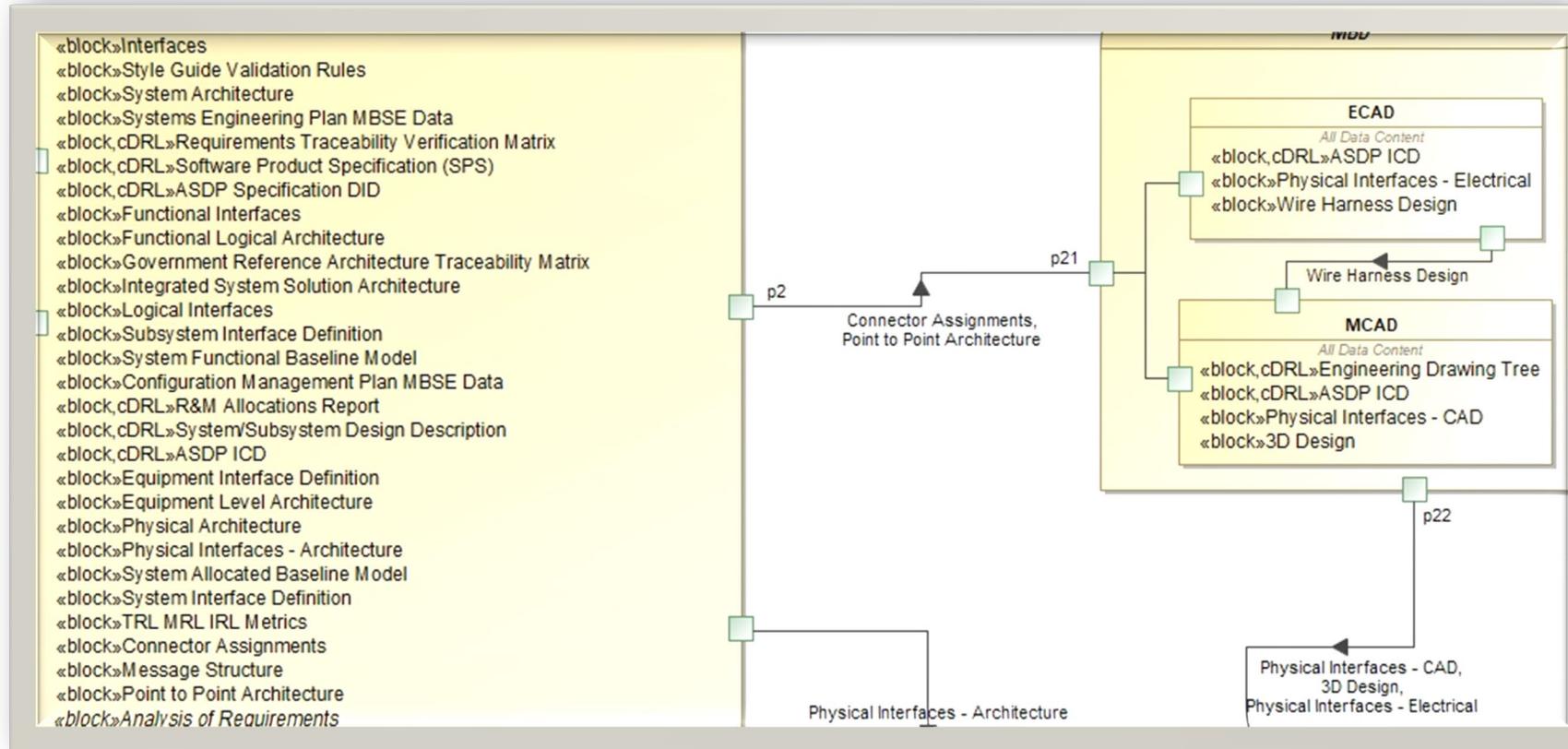
- Not all data resides with the required data product
  - Data products combine data from multiple tools
  - Data in one tool enables data in another data to be developed
  - Sub-products capture data necessary to produce required IWPs



# Identify Inputs and Outputs of Tools / Applications

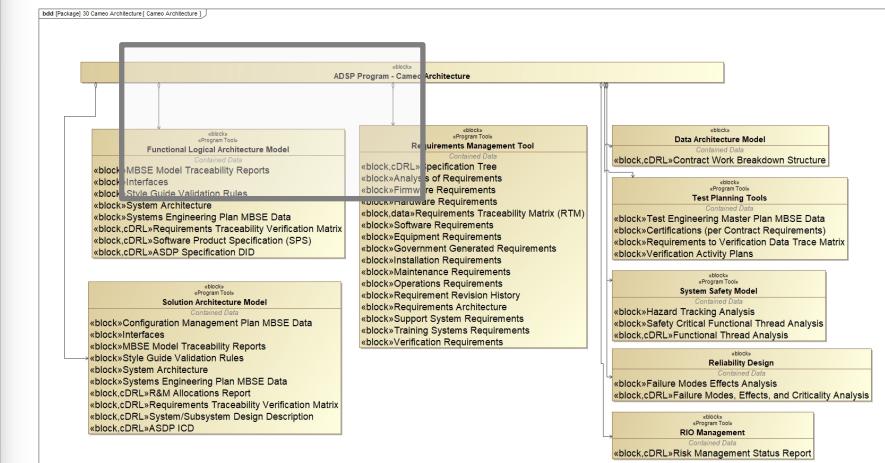
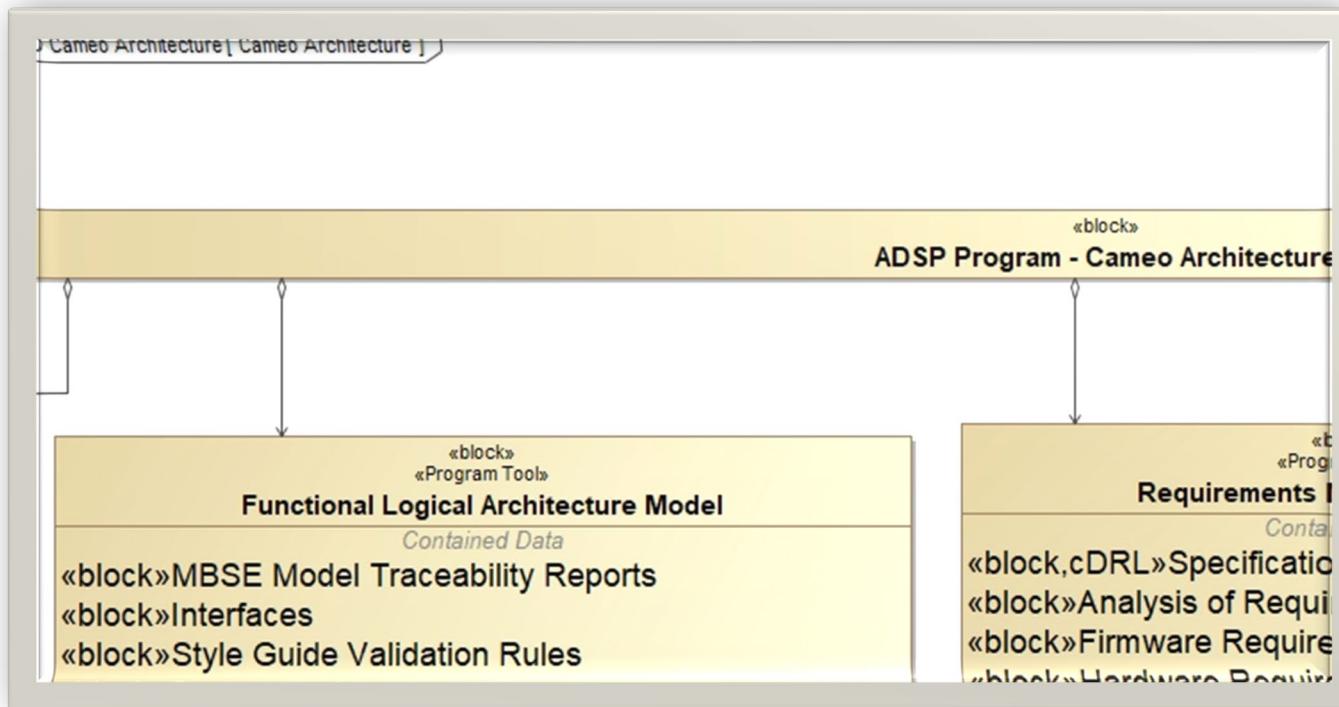
## ▪ Bounds the model

- Ensures the architecture contains the right level of depth
- MBSE / Architecture centric view is expected



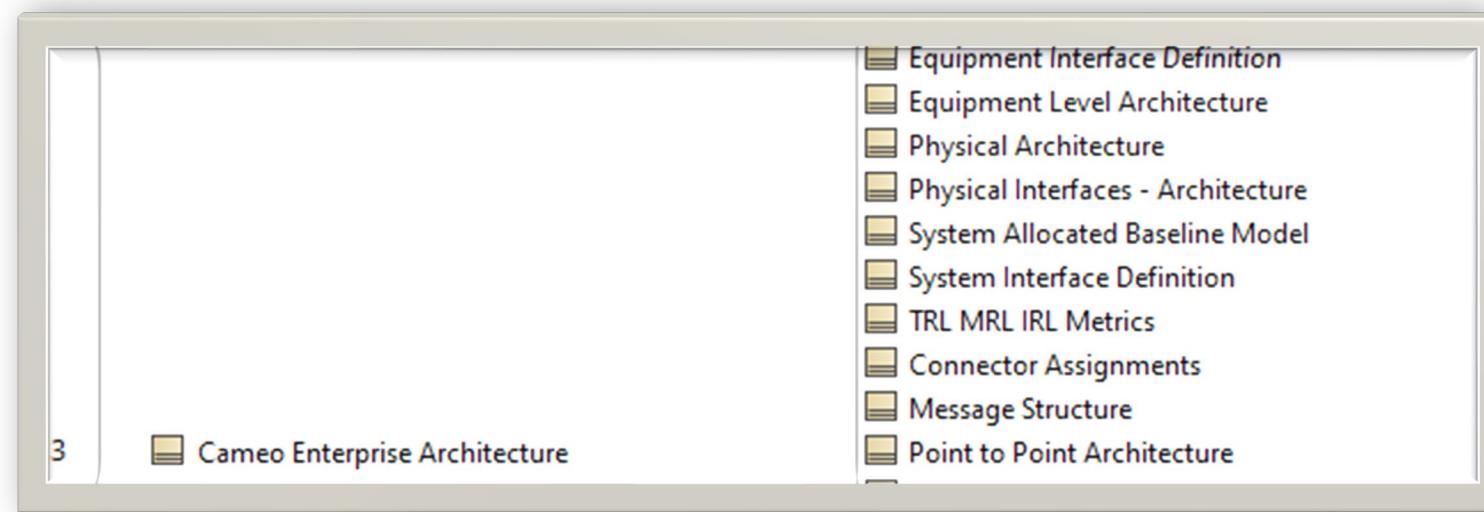
# Define Location Within Architecture Template

- Tools/data assigned to Cameo aggregated into an Cameo data view
  - Some are non-architecture tools where required or logical (e.g. program OBS WBS)



# Define Location Within Architecture Template

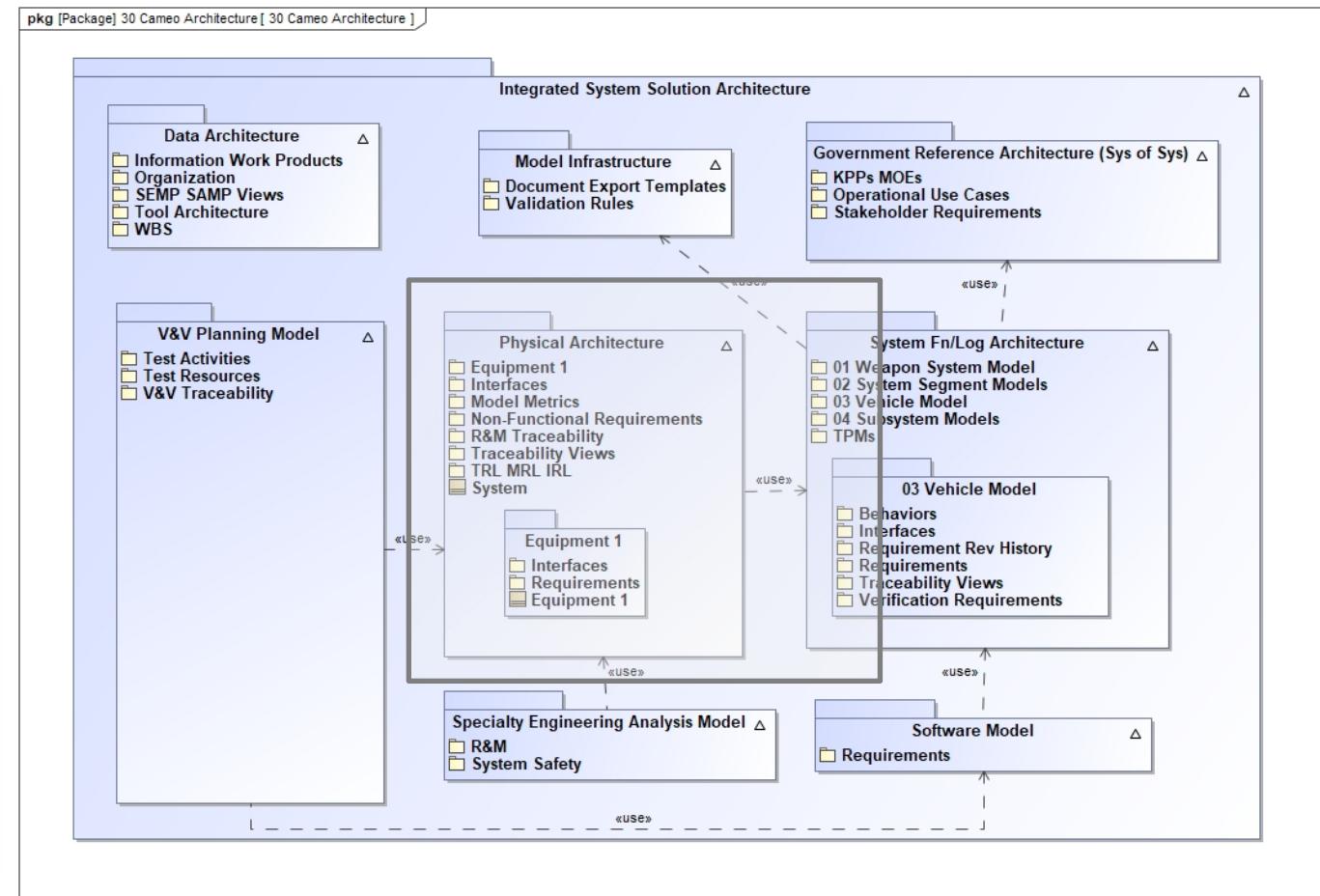
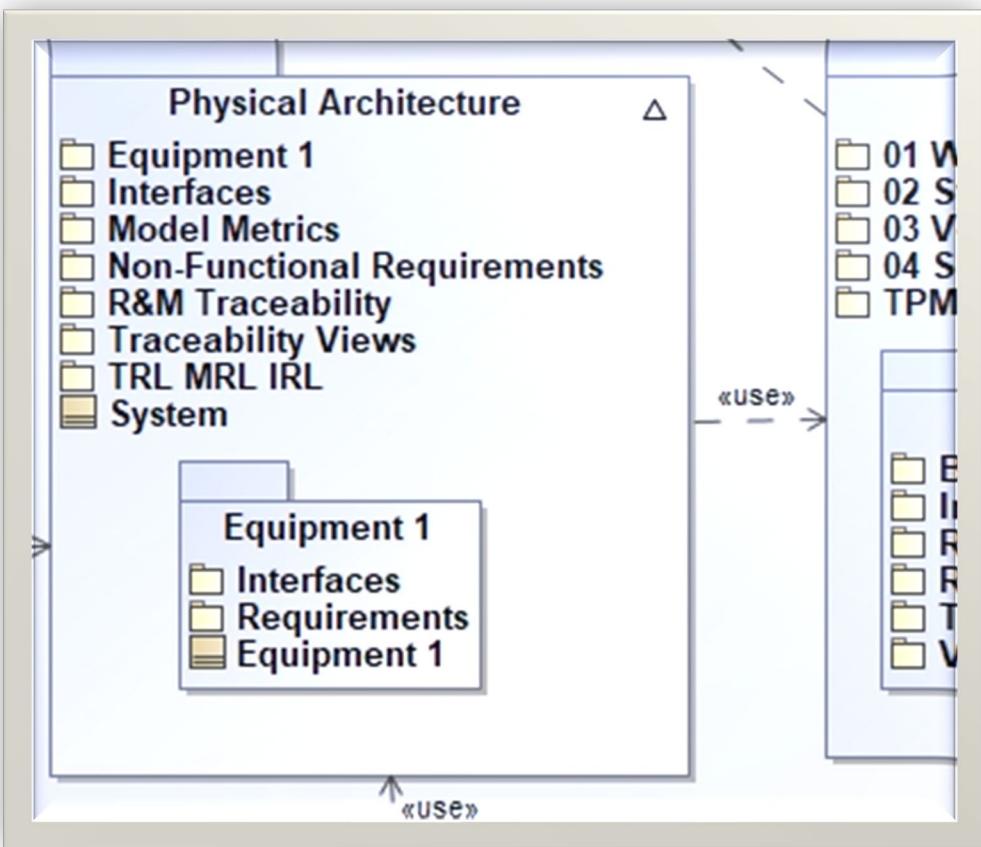
- Model analysis then easily captures all data within each application



#	Name	Data in Each Application
	Cameo Enterprise Architecture	<ul style="list-style-type: none"><li>MBSE Model Traceability Reports</li><li>Interfaces</li><li>Style Guide Validation Rules</li><li>System Architecture</li><li>Systems Engineering Plan MBSE Data</li><li>Requirements Traceability Verification Matrix</li><li>Software Product Specification (SPS)</li><li>ASDP Specification DID</li><li>Functional Interfaces</li><li>Functional Logical Architecture</li><li>Government Reference Architecture Traceability Matrix</li><li>Integrated System Solution Architecture</li><li>Logical Interfaces</li><li>Subsystem Interface Definition</li><li>System Functional Baseline Model</li><li>Configuration Management Plan MBSE Data</li><li>R&amp;M Allocations Report</li><li>System/Subsystem Design Description</li><li>ASDP ICD</li><li>Equipment Interface Definition</li><li>Equipment Level Architecture</li><li>Physical Architecture</li><li>Physical Interfaces - Architecture</li><li>System Allocated Baseline Model</li><li>System Interface Definition</li><li>TRL MRL IRL Metrics</li><li>Connector Assignments</li><li>Message Structure</li><li>Point to Point Architecture</li><li>Hazard Tracking Analysis</li><li>Safety Critical Functional Thread Analysis</li><li>Functional Thread Analysis</li><li>Failure Modes Effects Analysis</li><li>Failure Modes, Effects, and Criticality Analysis</li><li>Test Engineering Master Plan MBSE Data</li><li>Certifications (per Contract Requirements)</li><li>Requirements to Verification Data Trace Matrix</li><li>Verification Activity Plans</li></ul>

# Define Location Within Architecture Template

- The model template establishes a location in the Integrated System Solution Architecture for all required data



# Execute to This Scope

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- **Build the Architecture**
  - Provide template to teams and kick off System Architecture Development
- **Use Data Architecture to manage development**
  - Establish criteria for milestones
  - Trace Data Architecture to Template Architecture to prove compliance
- **Manage change to the Architecture scope**
  - Ensure new content requests are not already assigned to another part of DE
  - Obtain proper approval for increased model scope

