Model for a Purpose

Scoping an Architecture Model Using the ASDP Digital Transformation Contract Language

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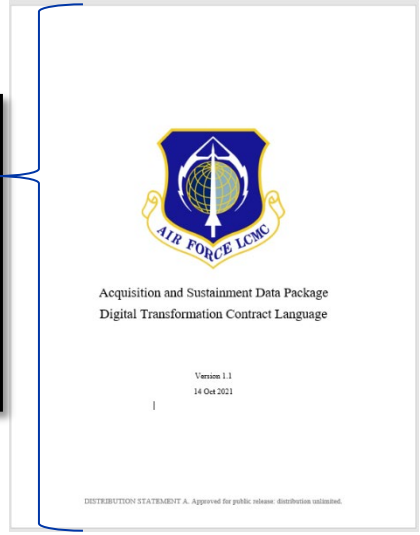
2022-11-03

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*



- **Where does it all go?**

DE = Architecture Model

CAMEO ENTERPRISE ARCHITECTURE
UPDM / DoDAF / MODAF / SysML / BPMN / SoaML

or

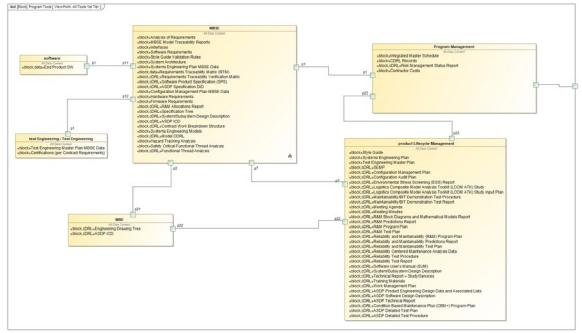
DE = Digital Engineering Environment

MATLAB
CAMEO ENTERPRISE ARCHITECTURE
UPDM / DoDAF / MODAF / SysML / BPMN / SoaML
TEAMCENTER
Mentor Graphics
+ dozens more

The Solution: Model For a Purpose

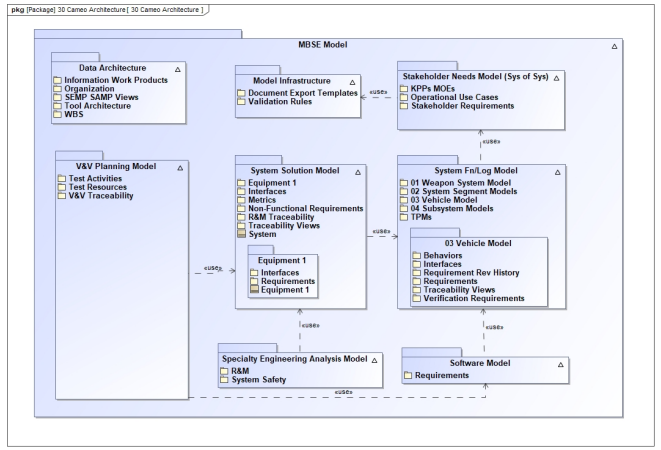
- **Prior to architecting a system, architect the architecture's data**
  - Understand why you need the architecture's data
  - Identify what data is needed and how the System Architecture fits within the DE Environment

> **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

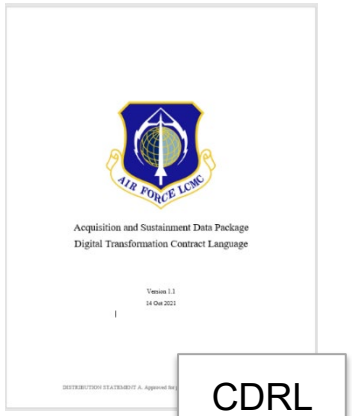


- **Execute to this scope**

The Approach

Identify Needs & Capture in Data Architecture Model

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



CDRL List

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: Hard
analysis of requirements, system architecture design,
analysis/failure modes effects criticality analysis, haz
contract requirements, integrity program compliance,
safety critical functional thread (SCFTA) analysis) a
The contractor shall ensure the MBSE model bi-direc
requirements and data set as defined above. The mod
able to be integrated-into the government approved P
link, tie, and trace to the lowest component *(Note: th*
accordance with the program's acquisition and susta
ensure its MBSE model can be utilized in other MBS
(e.g. Cameo to Rhapsody). The Contractor shall desig
for its MBSE model and the model shall have validation rule sets to enable automated Systems Engineering Technical Reviews and Audits, Milestones, Certifications, and Integrity Programs.

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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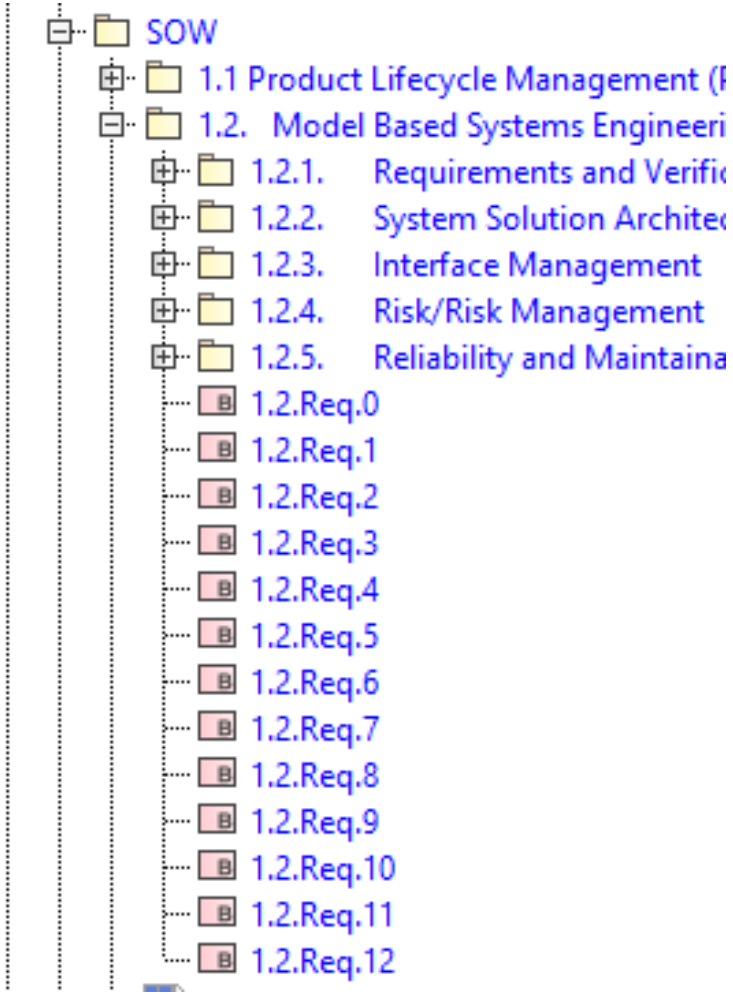
Identify Needs & Capture in Data Architecture Model

- **Needs best captured as requirement objects with text**



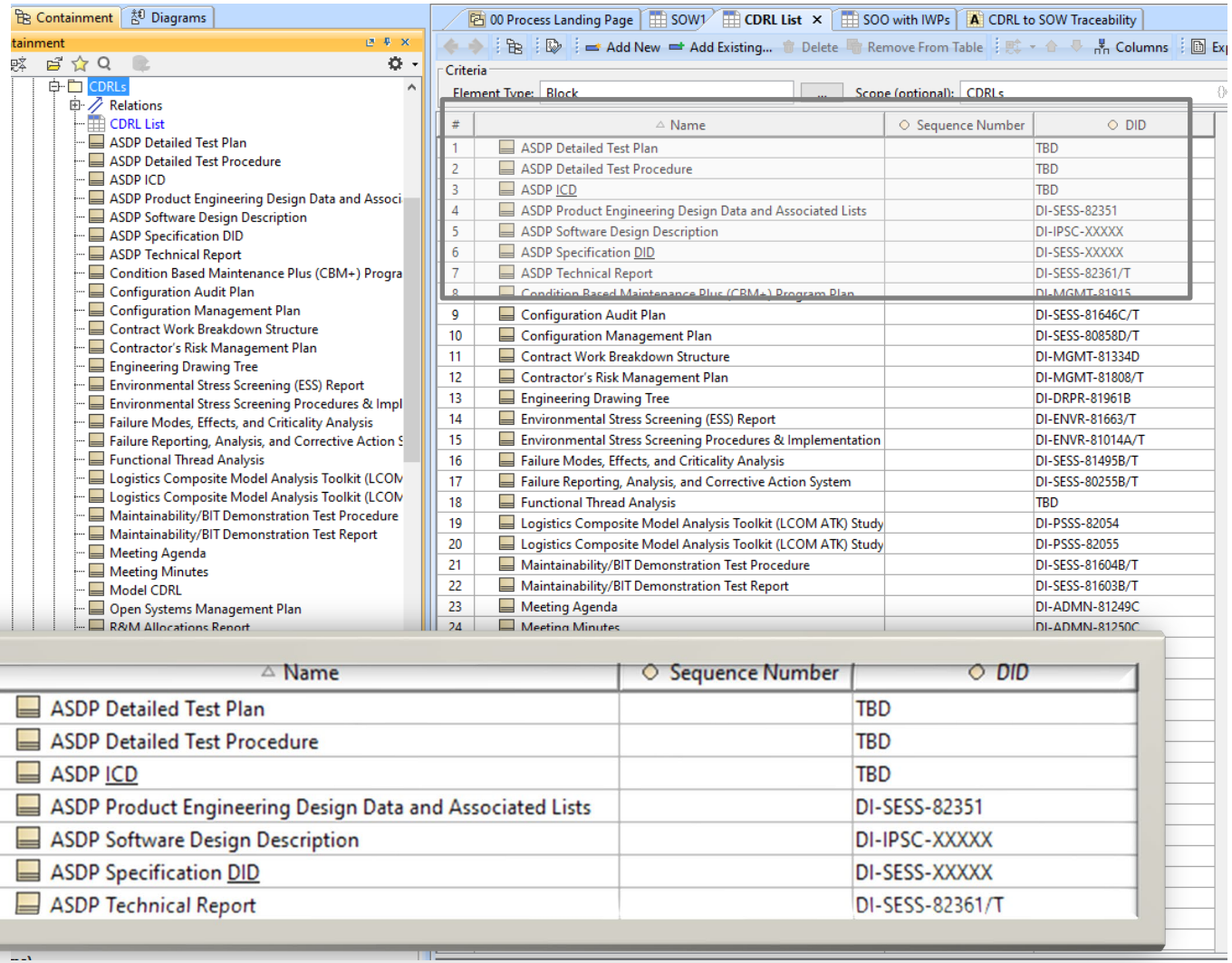
#	Name	Text
1	1.2. Model Based Systems Eng	
2	1.2.1. Requirements and V	
17	1.2.3. Interface Managem	
32	1.2.2. System Solution Ar	
44	1.2.5. Reliability and Main	
16	1.2.4. Risk/Risk Managem	
32	1.2.Req.5	The Contractor shall design, incorporate and maintain a style guide for its MBSE mo model shall have validation rule sets to enable automated Systems Engineering Tech and 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 drav
34	1.2.Req.7	In addition, the contractor shall have validation rule checks to ensure models produ portions of the ASDP that are contained within the MBSE model, per the ASDP and 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 th extent practicable (e.g. Cameo to Rhapsody).
37	1.2.Req.0	The Contractor shall develop and maintain program-specific systems engineering m System Modeling Language (SysML).
38	1.2.Req.10	This WBS shall have each element linked, tied, and traced to the corresponding Wea specifications from the highest level to the correct subordinate levels within the spe
39	1.2.Req.6	The Contractor shall develop a style guide for use in the MBSE model that reflects th the associated the DOAM and ASDP and other CDRLs/DIDs.
		The WBS shall have contractor costs and development schedule linked, tied, and tra

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

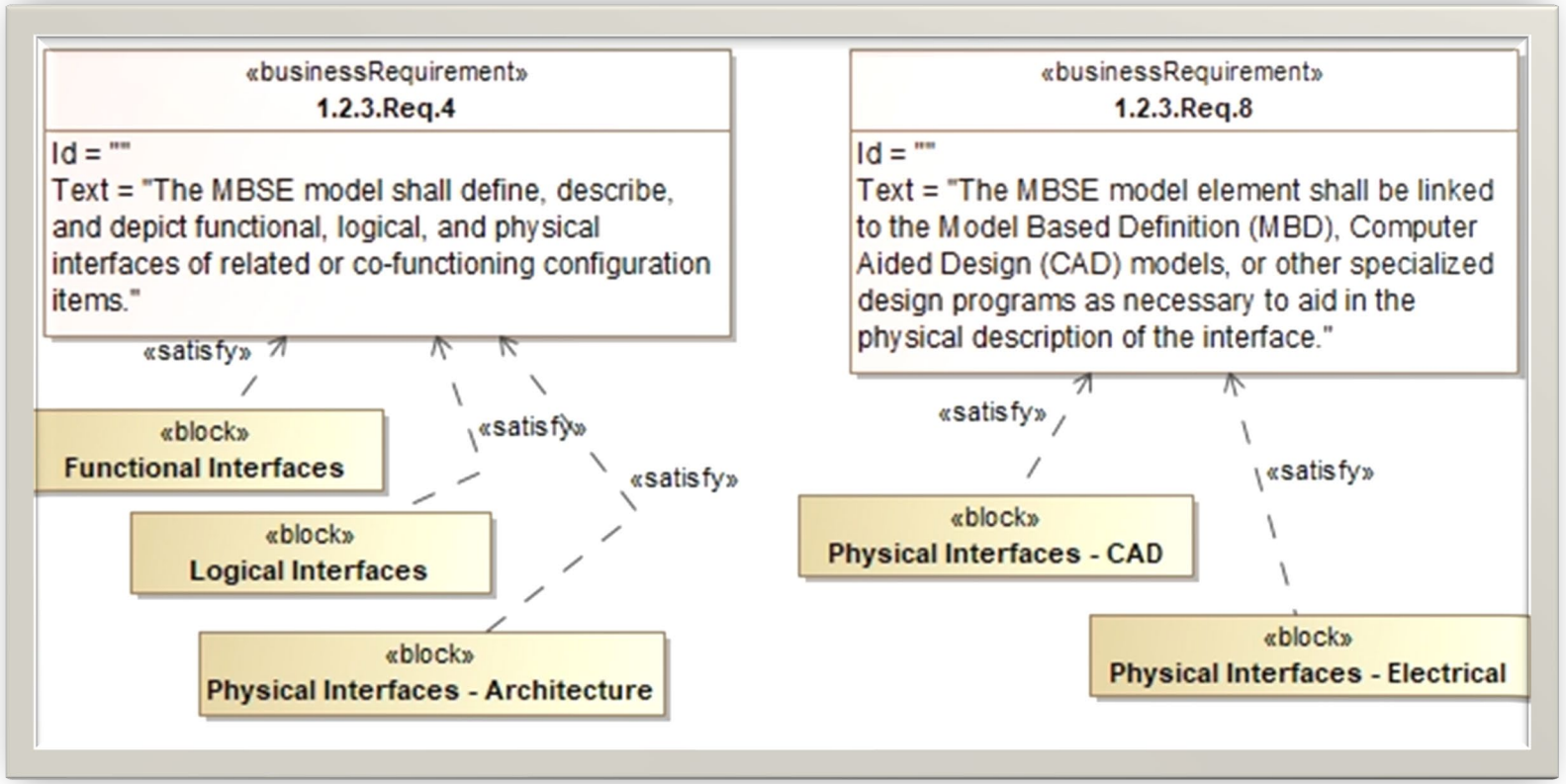
Information Work Product:
Data/work that satisfies a need. May be formatted data into a data product or reside naturally within a model.

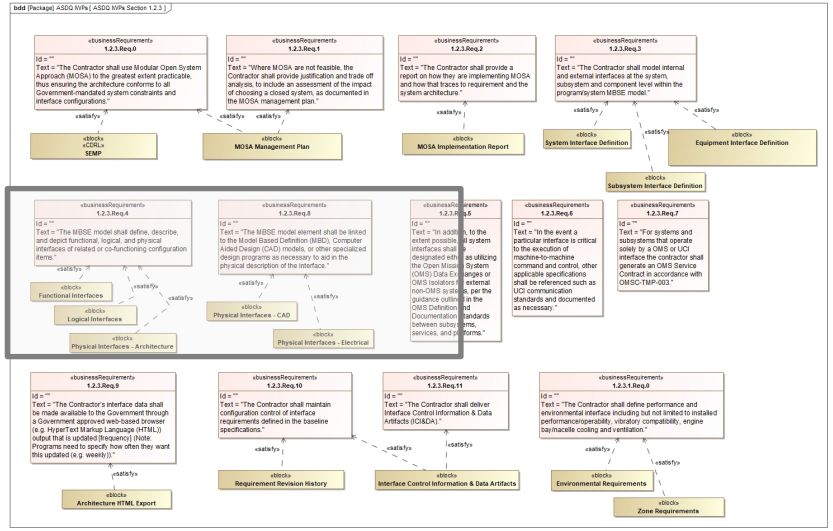
CDRLs in ASDP Contract Language



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(1); The means by which a model is created by a modeler(2); a generic form of an application

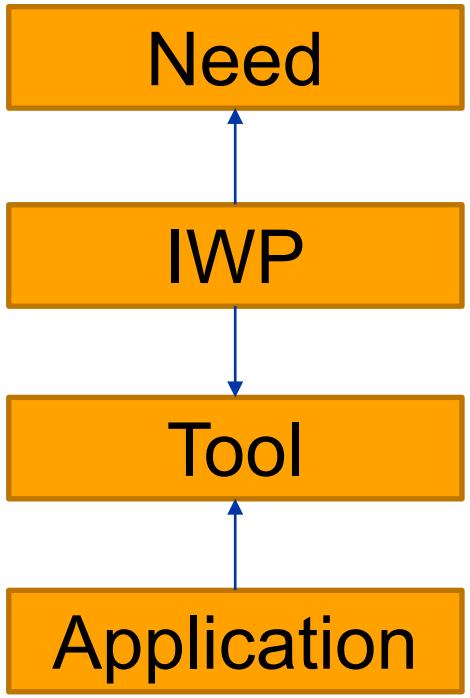
- **The selected application suite is then assigned to the needed tools**
  - Differentiating tools from applications adds rigidity to data architecture while applications change

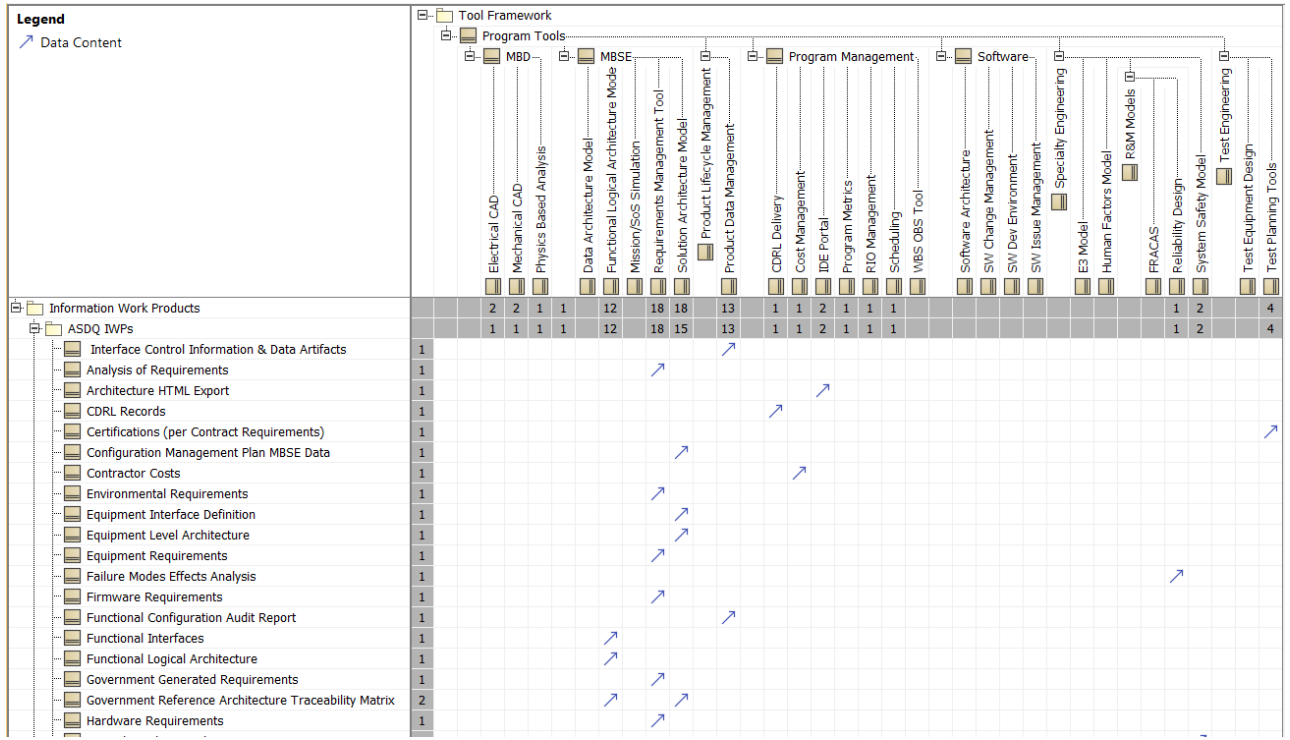
> **Application**: The specific software selected to serve as the modeling tool

#	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
10	MBD	
11	Mechanical CAD	N-X
12	Electrical CAD	Capital Systems Architect
13	Physics Based Analysis	MATLAB
14	MBSE	
15	Mission/SoS Simulation	AFSIM
16	Functional Logical Architecture Model	Cameo Enterprise Architecture
17	Solution Architecture Model	Cameo Enterprise Architecture
18	Data Architecture Model	Cameo Enterprise Architecture
19	Requirements Management Tool	Cameo Enterprise Architecture
20	Specialty Engineering	
21	R&M Models	
22	FRACAS	FRACAS Database
23	Reliability Design	Cameo Enterprise Architecture
24	System Safety Model	Cameo Enterprise Architecture

Allocate Information Products to Tools

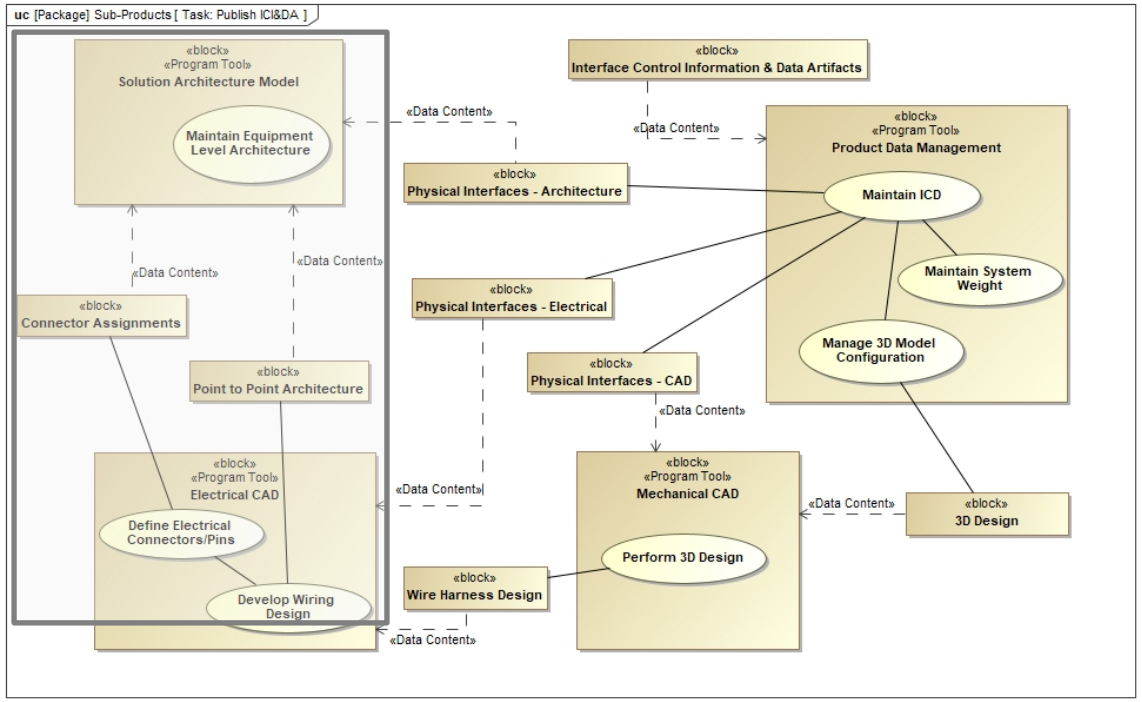
- **Allocating an IWP to a tool assigns it to the application that will contain the data**

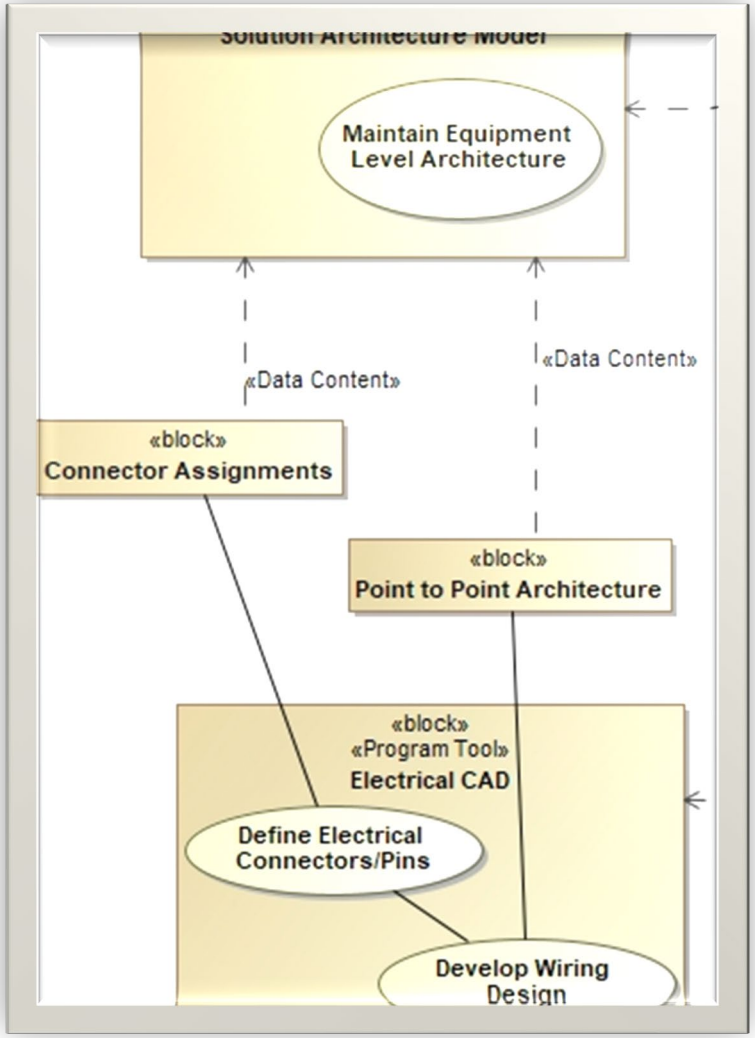




Identify Sub-Products

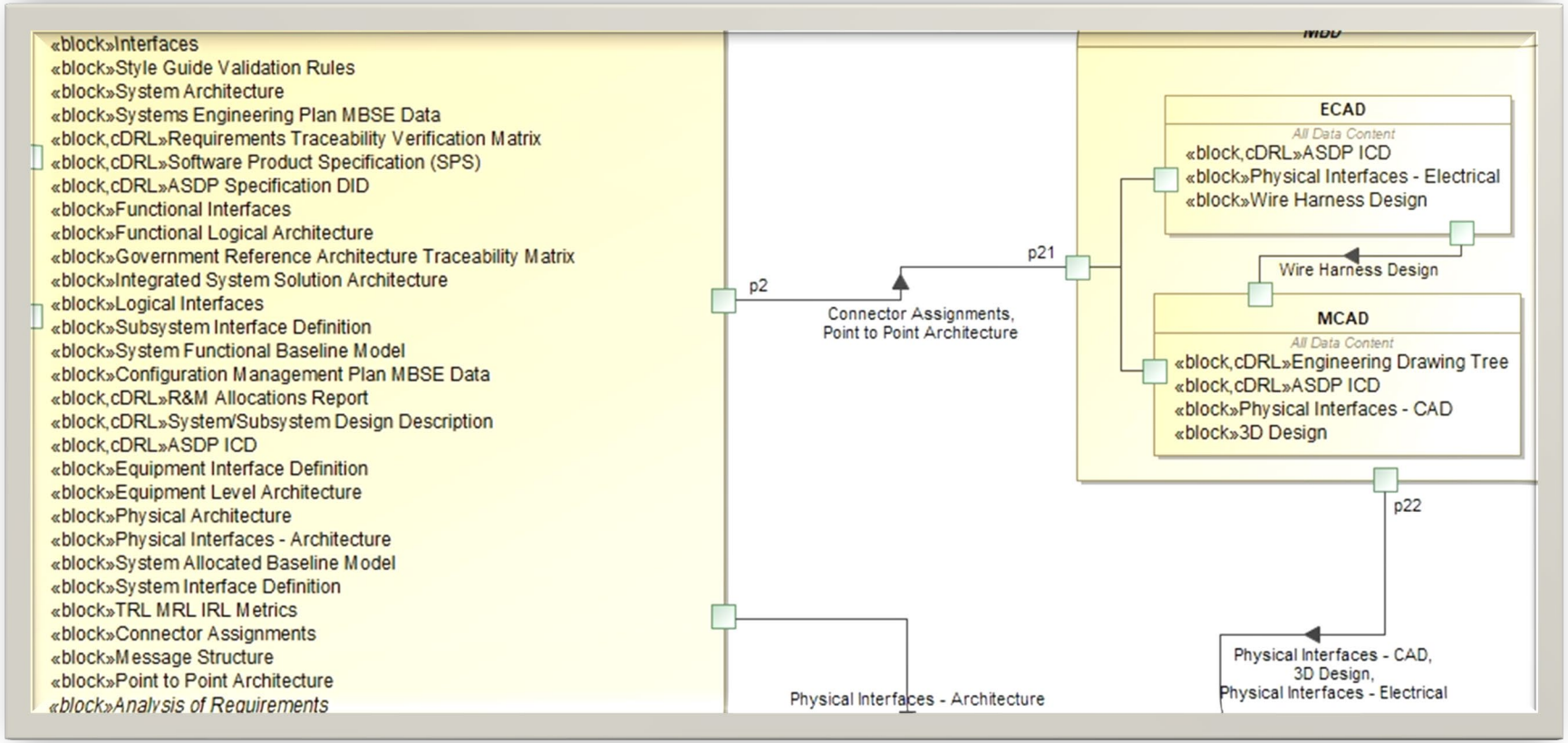
- **Not all data resides with the required data product**
  - Data products combine data from multiple tools
  - Data in one tool enables data in another data to be developed
  - Sub-products capture data necessary to produce required IWPs

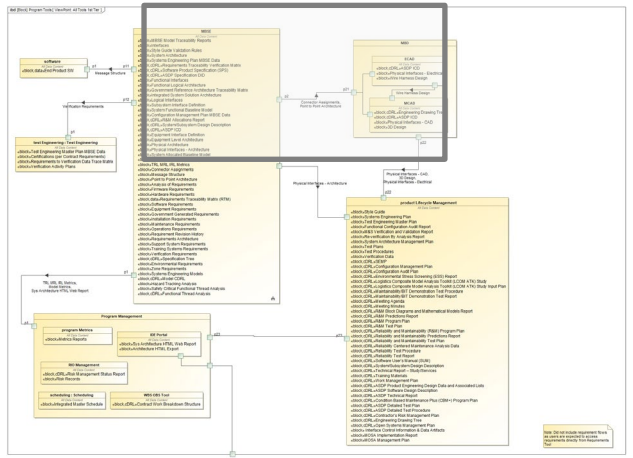




Identify Inputs and Outputs of Tools / Applications

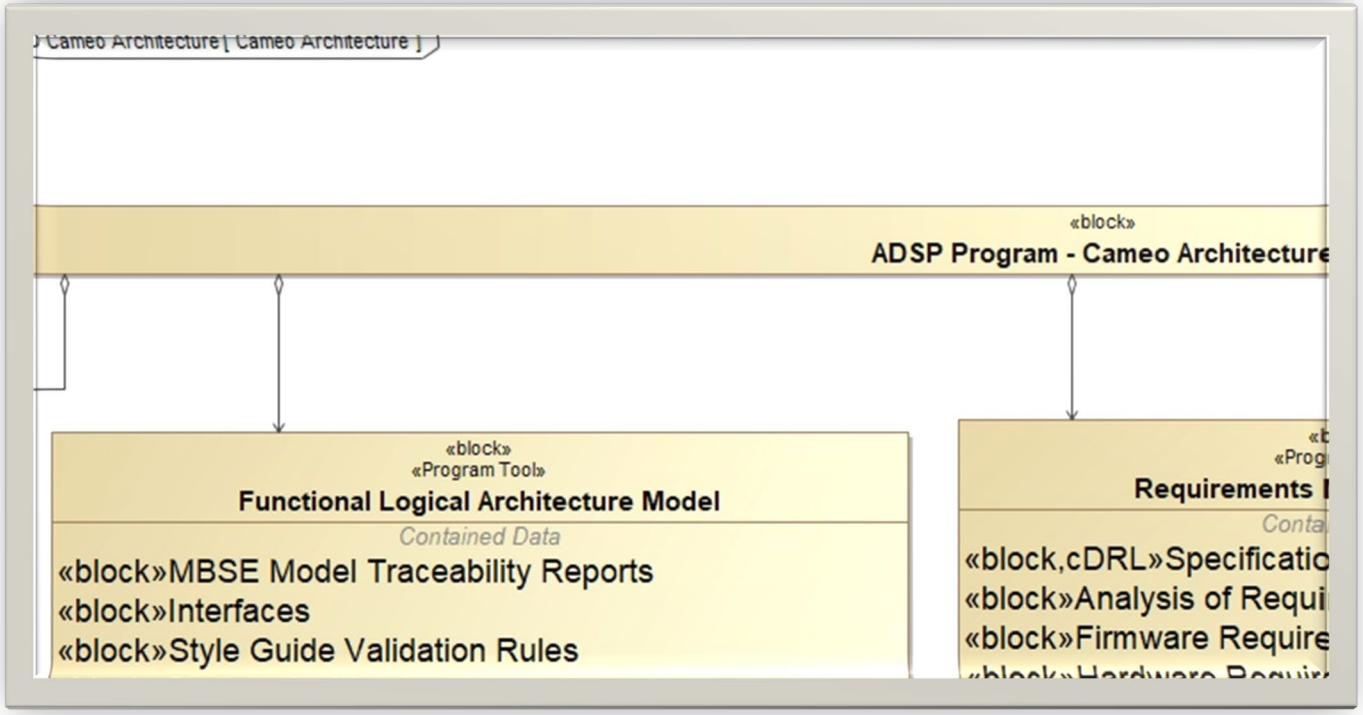
- **Bounds the model**
  - Ensures the architecture contains the right level of depth
  - MBSE / Architecture centric view is expected

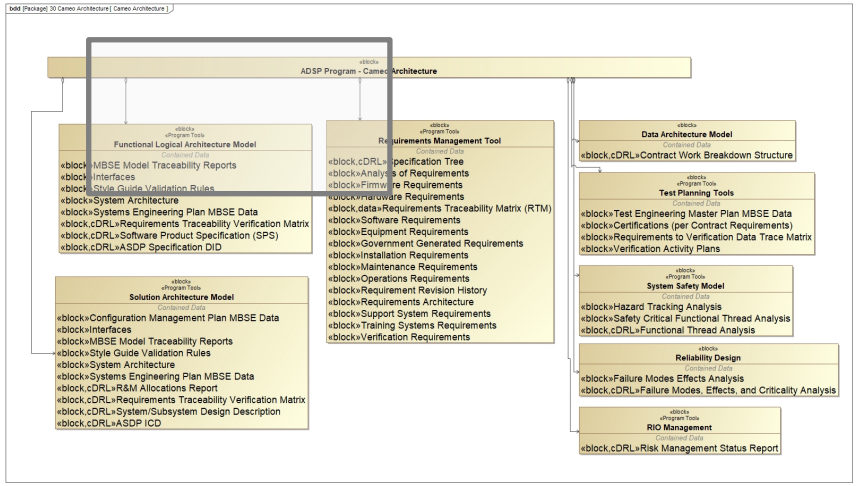




Define Location Within Architecture Template

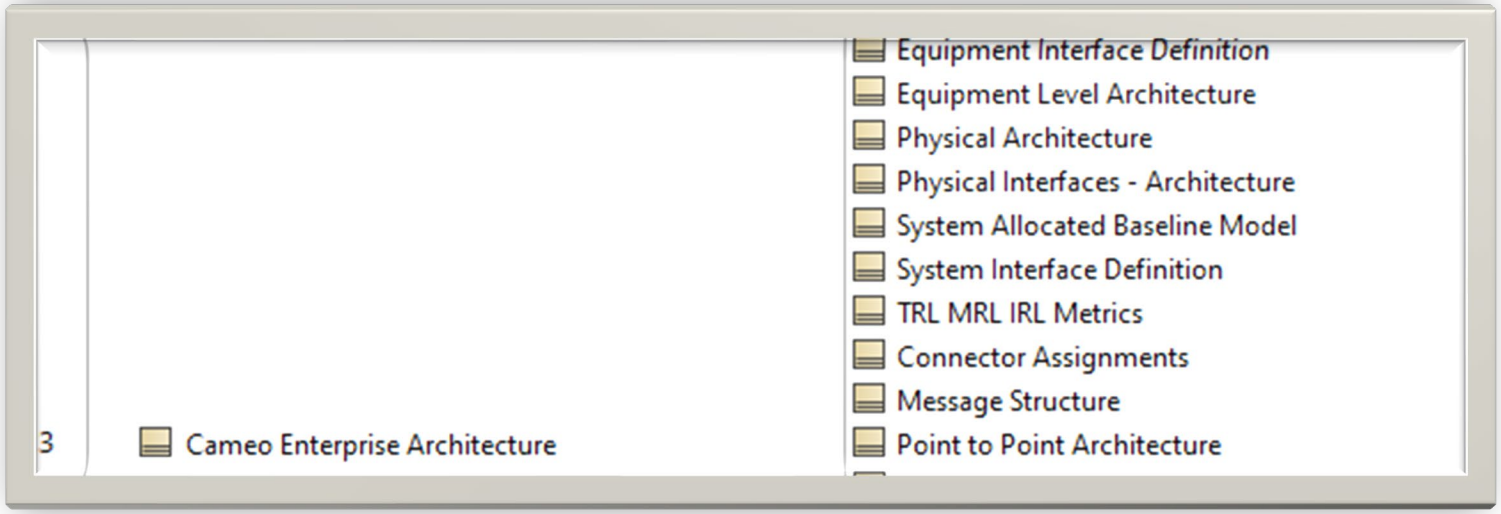
- **Tools/data assigned to Cameo aggregated into an Cameo data view**
  - Some are non-architecture tools where required or logical (e.g. program OBS WBS)

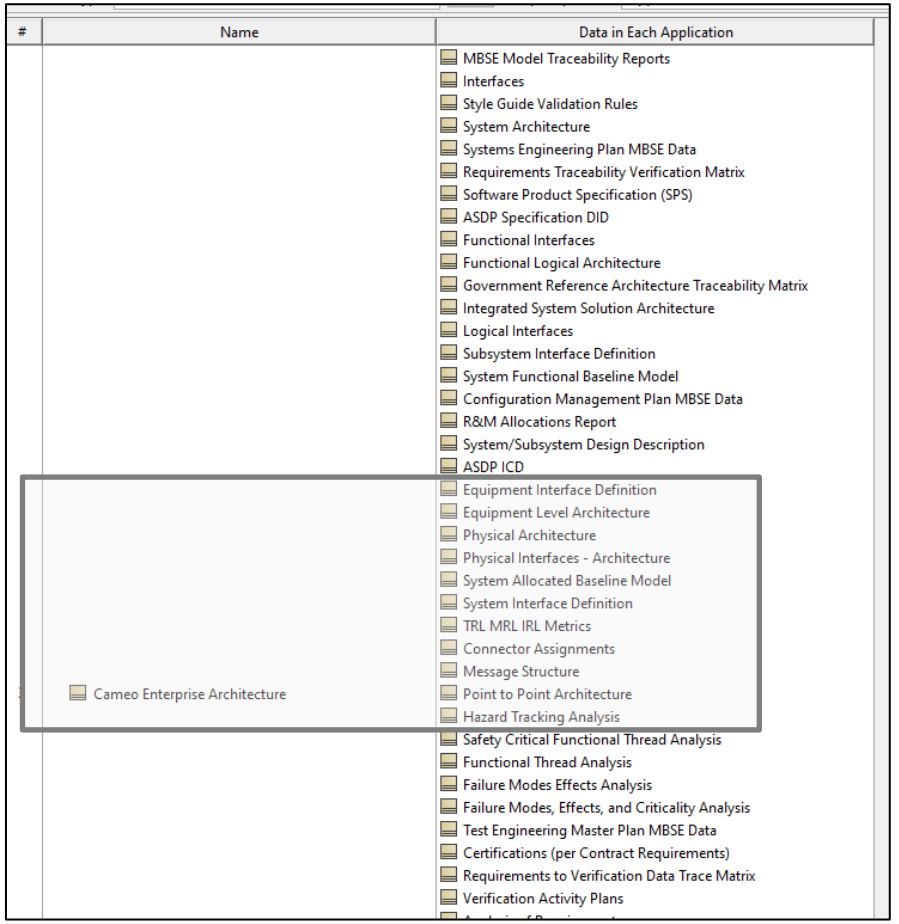




Define Location Within Architecture Template

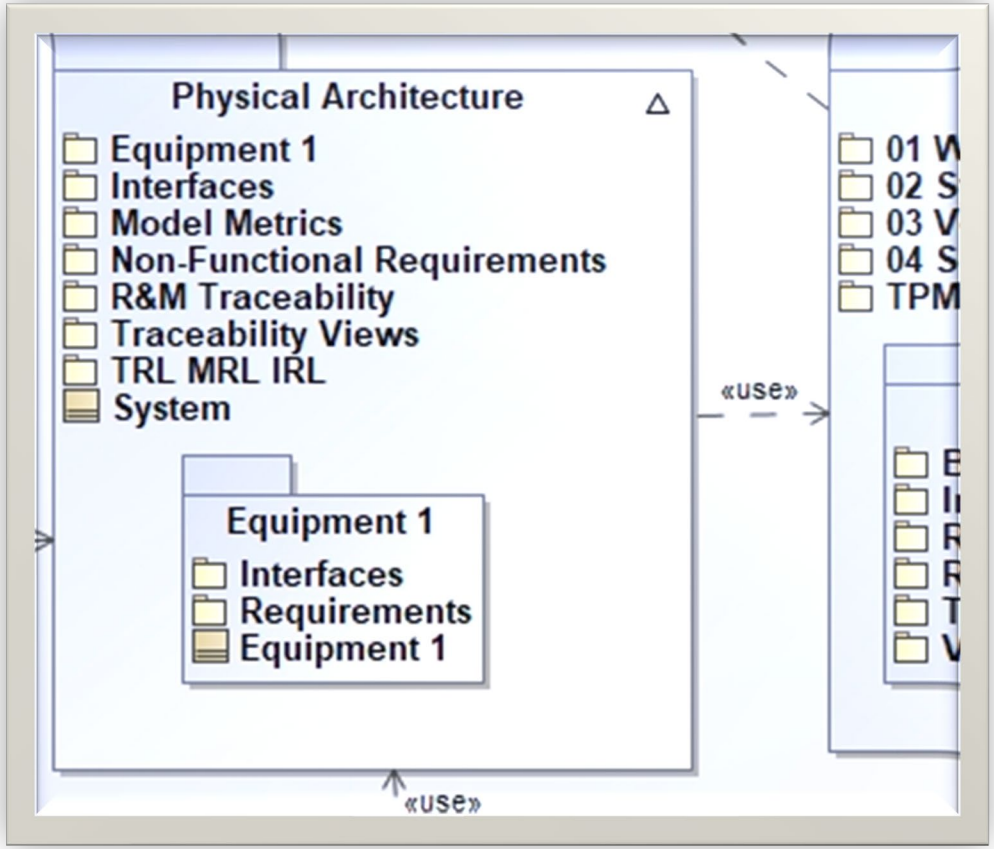
- **Model analysis then easily captures all data within each application**

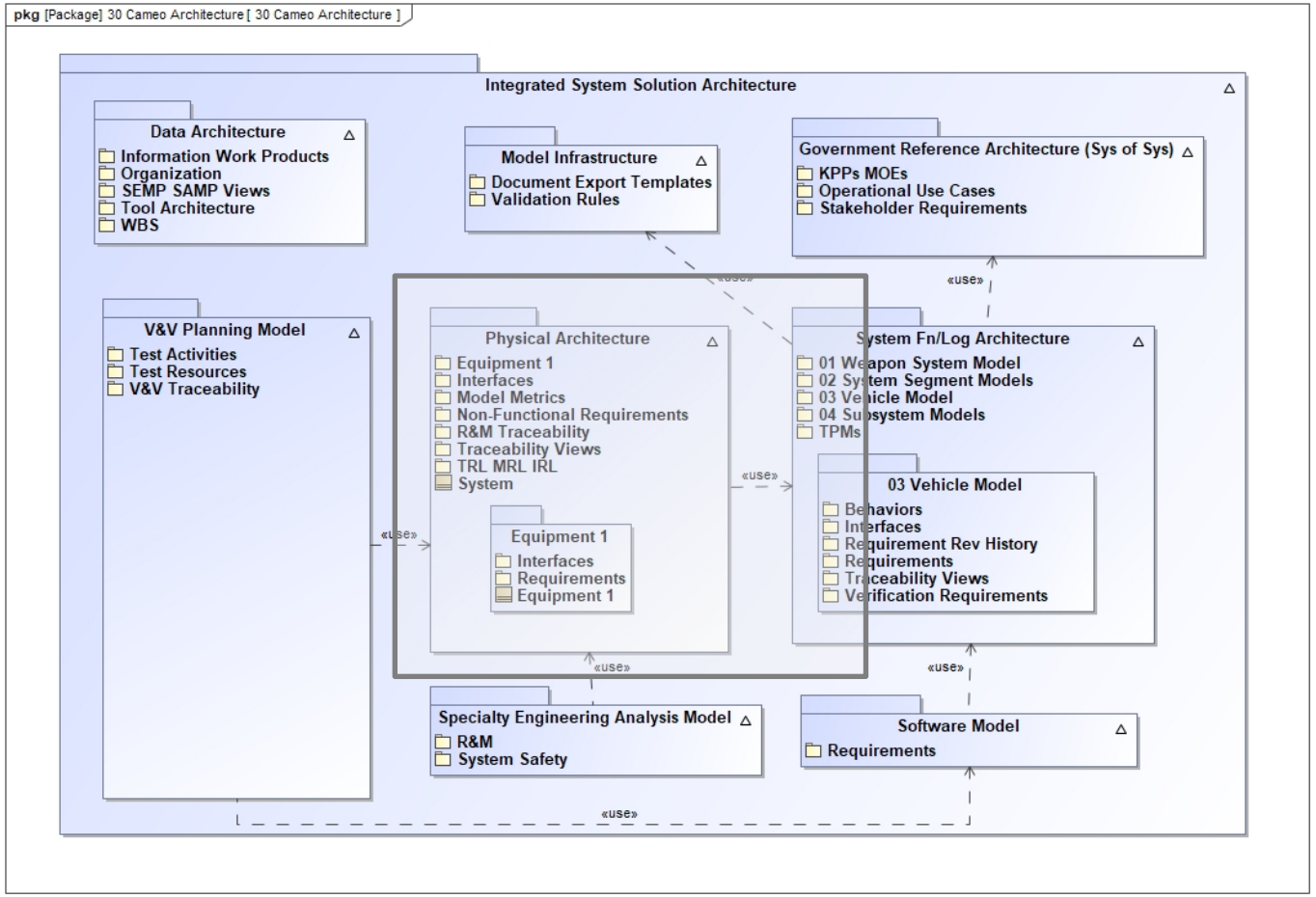




Define Location Within Architecture Template

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





Execute to This Scope

- **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