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Contributions

1st – Comprehensive Digital Engineering Environment (DEE) Architecture Model

1st - F/A-18 Bunker Buster Desert Storm
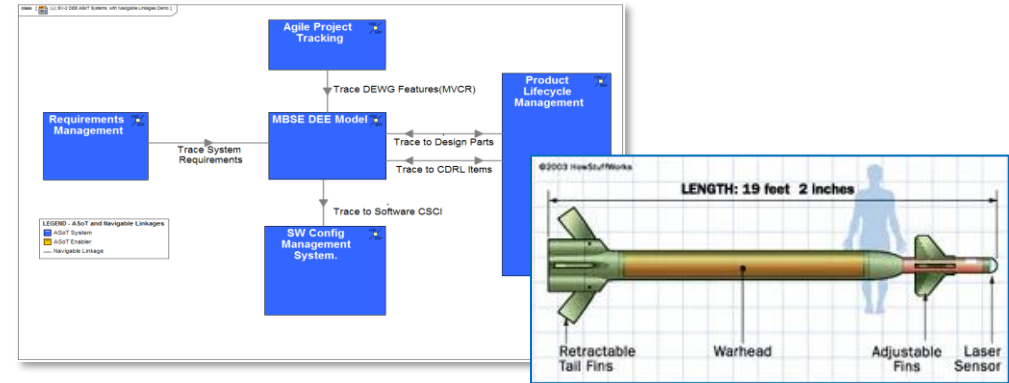
35th – Certified Software CMM Level 4 Org.

89A to 12C F/A-18 Operational Flight Program Avionics Upgrades
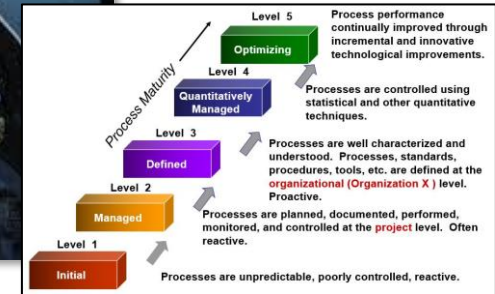
Work Experience

37 years - Software & System Engineering

Education & Certifications

- **UCLS Executive Leadership Program**

- **MIT MBSE, SAFe ARCH, 6-Sigma, Covey**

- **BS. Computer Science Clarke College**

- **Purpose –** What does the Digital Engineering Environment (DEE) produce and deliver?

- **Concept of Operations (ConOps) –** How do <u>users interact</u> with the DEE?

- **ASoTs –** Where is the <u>product configuration baseline</u> managed and controlled?

- **Data Model –** How is the <u>product baseline stored </u>in the ASoTs?

- **Digital Thread –** What is <u>linked together</u> to create the product baseline?

- **Summarize –** Lessons learned

MBSE diagrams are simplified to highlight topic of modeling digital threads

Purpose – What is the purpose of your Digital Engineering Environment?

- **Product Baseline –** drives system design, manufacturing, and sustainment

- **Contract Deliverables –** CDRLs drive definition of product baseline and digital thread

- **Digital Thread –** electronic threads created to support definition of product baseline

OV-2 – DEE Customer and Supplier Exchanges
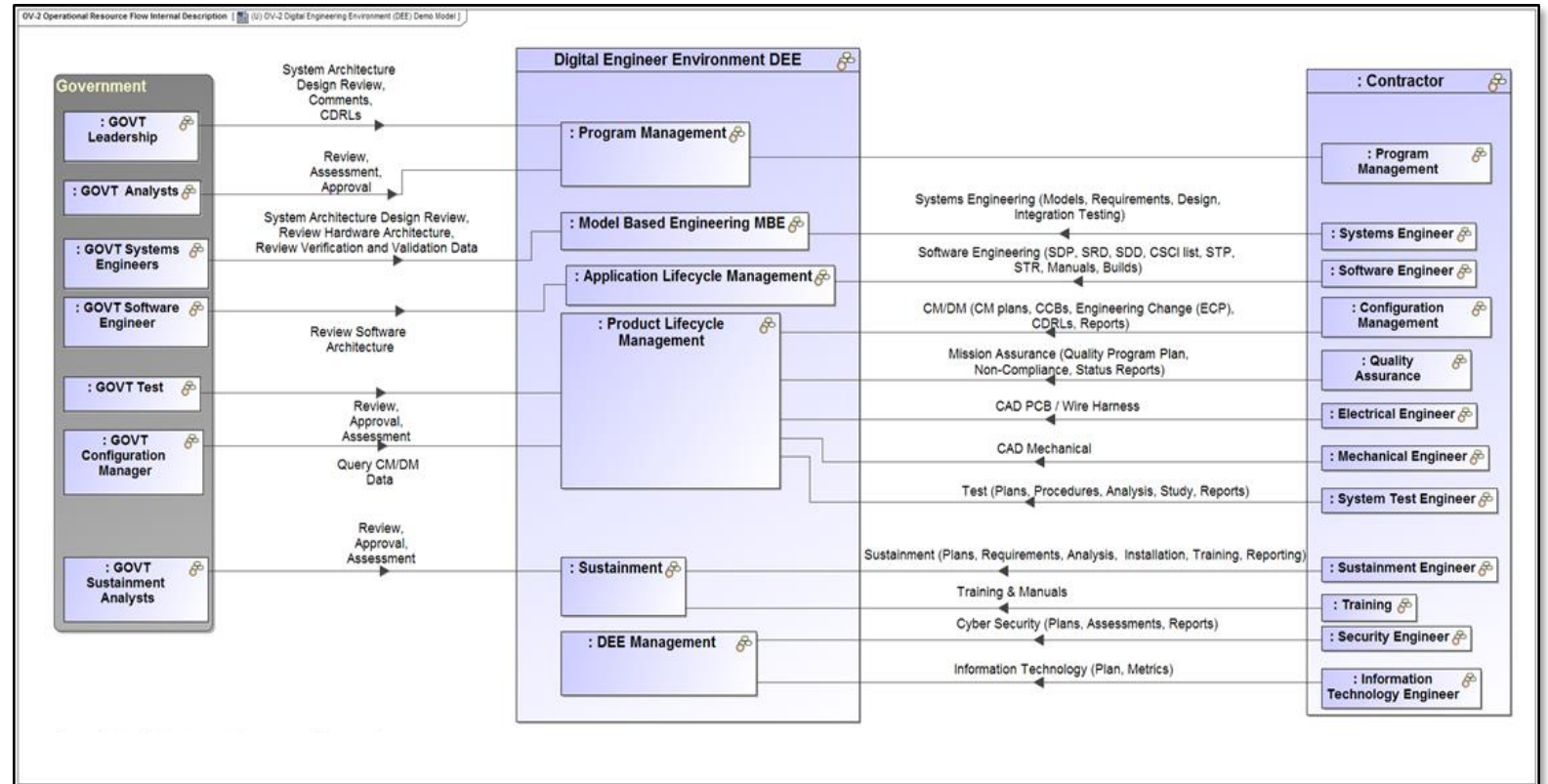
Government CDRLs helped define the product baseline and deliverables reviewed

Use Case - CDRL Review Process

- **Use Cases – critical to understanding the creation, update, and maintenance of product baseline**

- **User Roles – model user interaction with DEE ASoT Systems**

- **Use Cases – are critical to analyzing, documenting, and agreeing on how users will interact with the DEE**
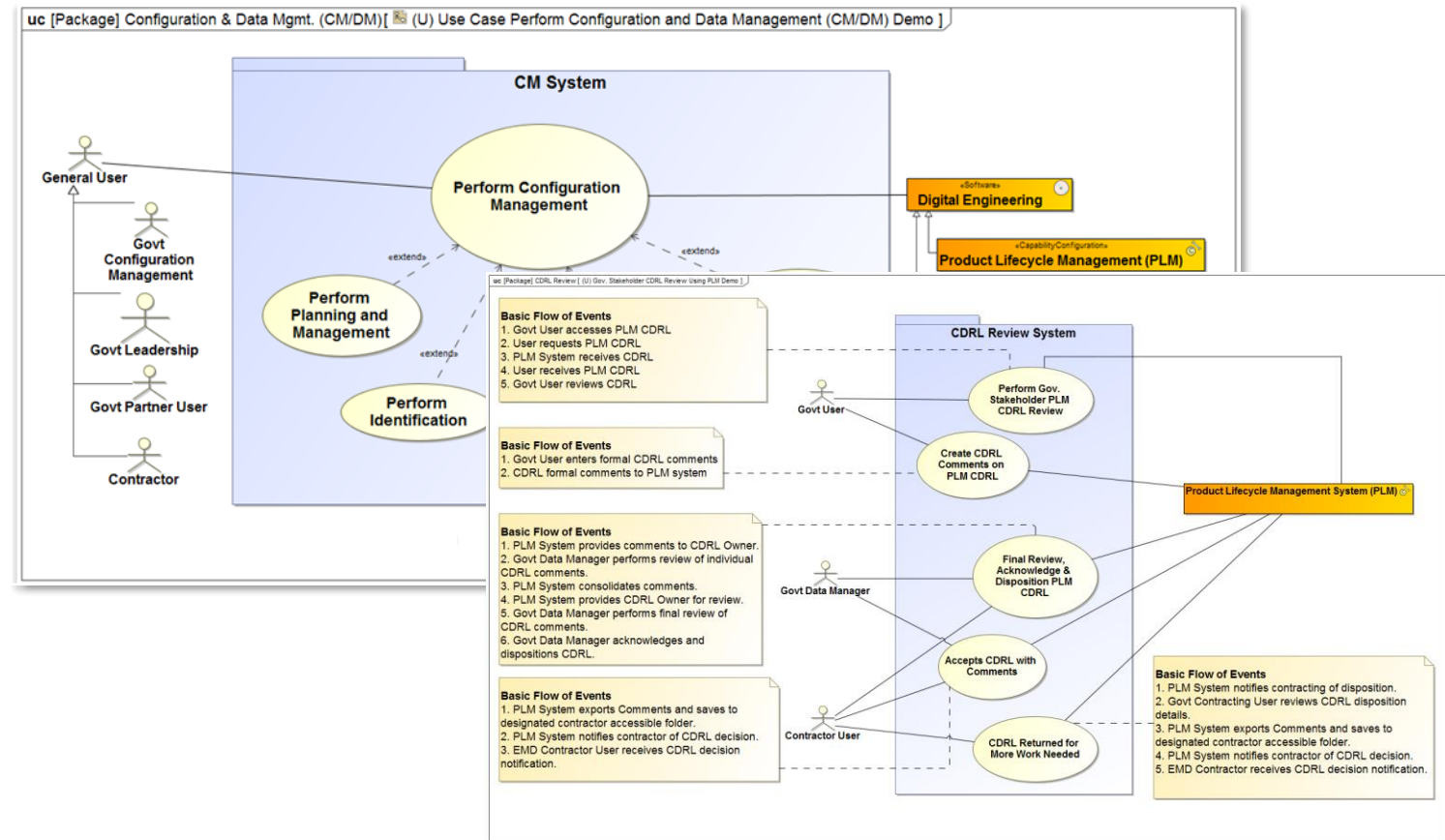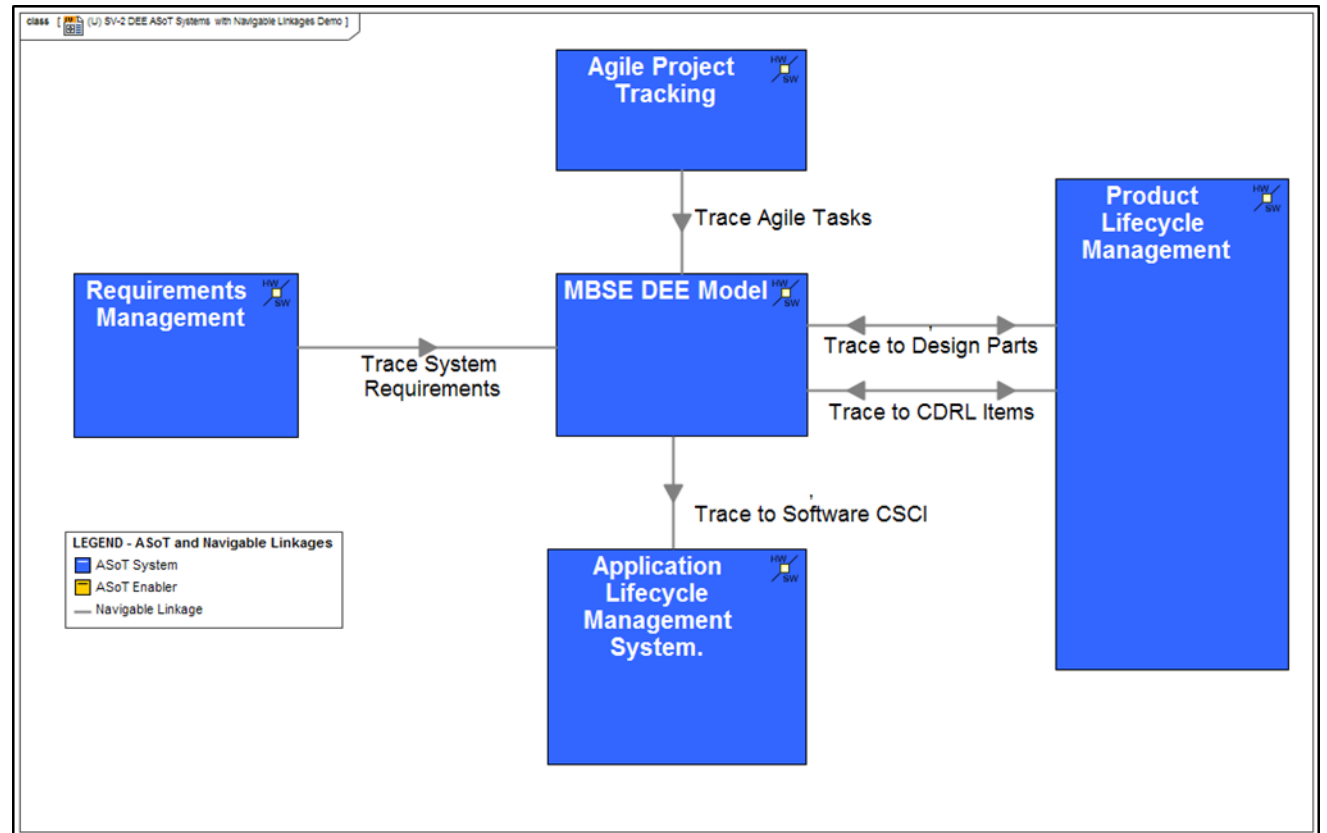
Explore user interaction with DEE to perform critical processes

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SV-2 – ASoT Systems and Navigable Linkage Diagram

- **ASoT –** What Authoritative Sources of Truth (ASoT) Systems exist in the DEE?

- **ASoT Governance –** collectively identify, audit, maintain, and manage ASoT systems
- **Product Baseline –** Need to know what data in ASoT system forms the product baseline
- **Digital Linkages between ASoTs –** Identify critical digital threads that form product baseline internal and external to ASoTs

- **ASoT Systems –** manage and control the product baseline for the program.

Clearly define and model ASoT systems used in the DEE

Data Models – How is the product baseline stored in ASoT systems?

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- **Data Models –** Describes how the product baseline is stored in ASoT Systems

- **Conceptual –** Depicts how the customer and supplier exchange product information

- **Logical –** Depicts which supplier roles produce what product information

- **Physical –** Depicts how the product information is storage in the native ASoT Metadata

- **Common Data Model –** forms a common language to create, retrieve, search, and modify digital information in the DEE

DIV-1 - Conceptual Data Model

DIV-2 Logical Data Model

DIV-3 Physical Data Model

Example - JIRA Schema
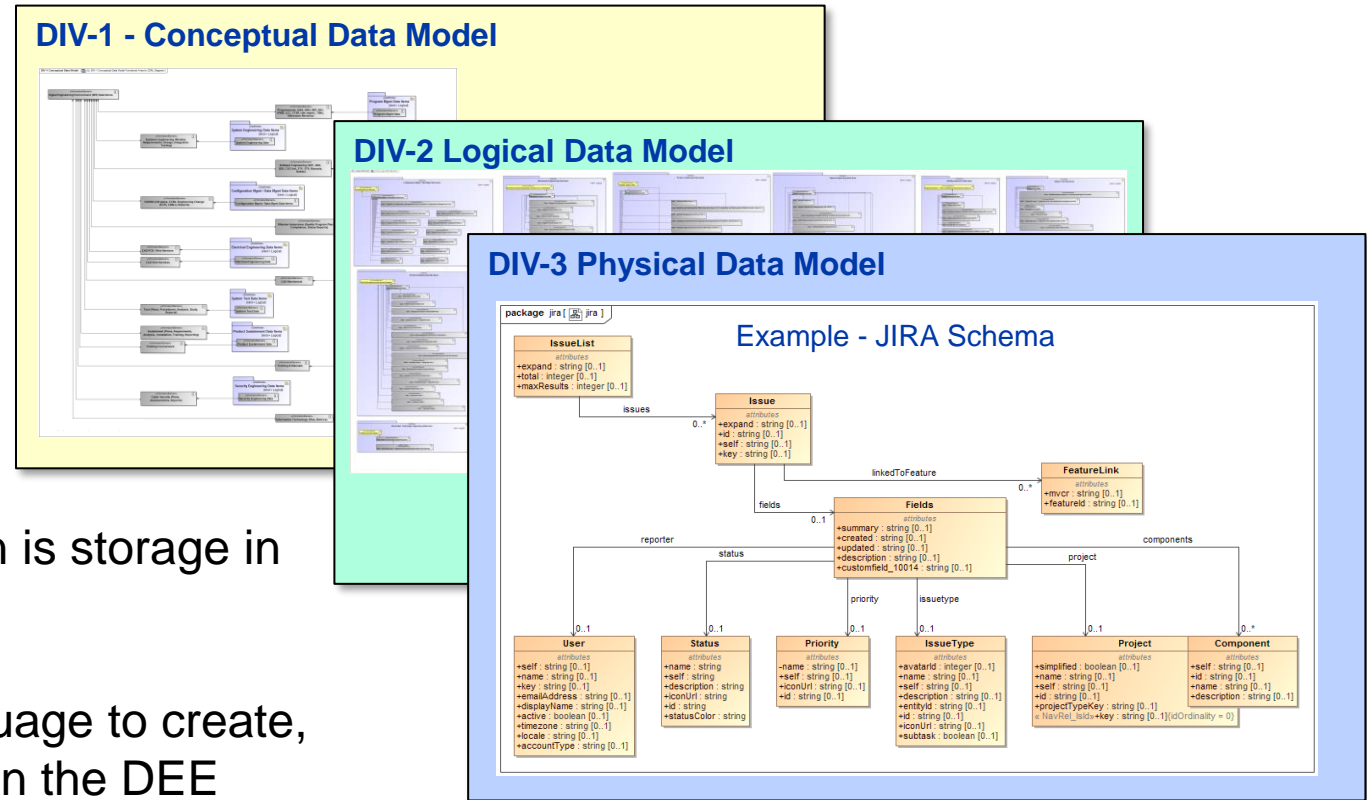
- Clearly define and model the data model (Conceptual, Logical, Physical)
  - Common Data Model - Automate discovery and generation

Digital Thread Models – What digital threads exist between ASoT Systems?

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- **Example (Part):** Modeling digital thread between MBSE product model(Element) and PLM(Part)

- **Use Case –** The customer needs to review MBSE product model and related PLM(Part) Information

- **Structure** – Modeling structure of a digital thread between (MBSE(Element) and PLM(Part)

- **Data Model –** Physical attributes to be linked between MBSE product(Element) and PLM(Part) metadata fields
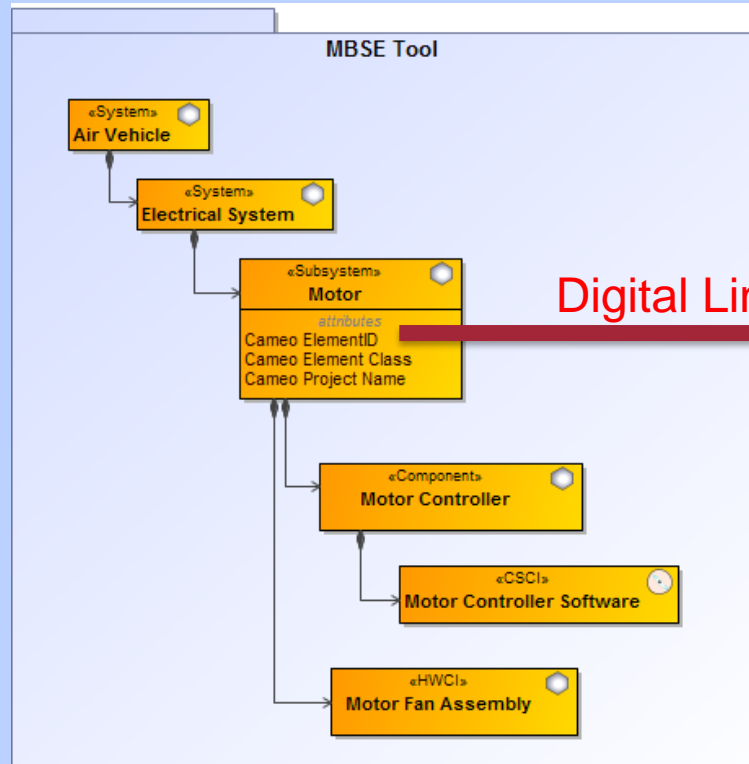
User Case – Customer review of Cameo Model and PLM Part
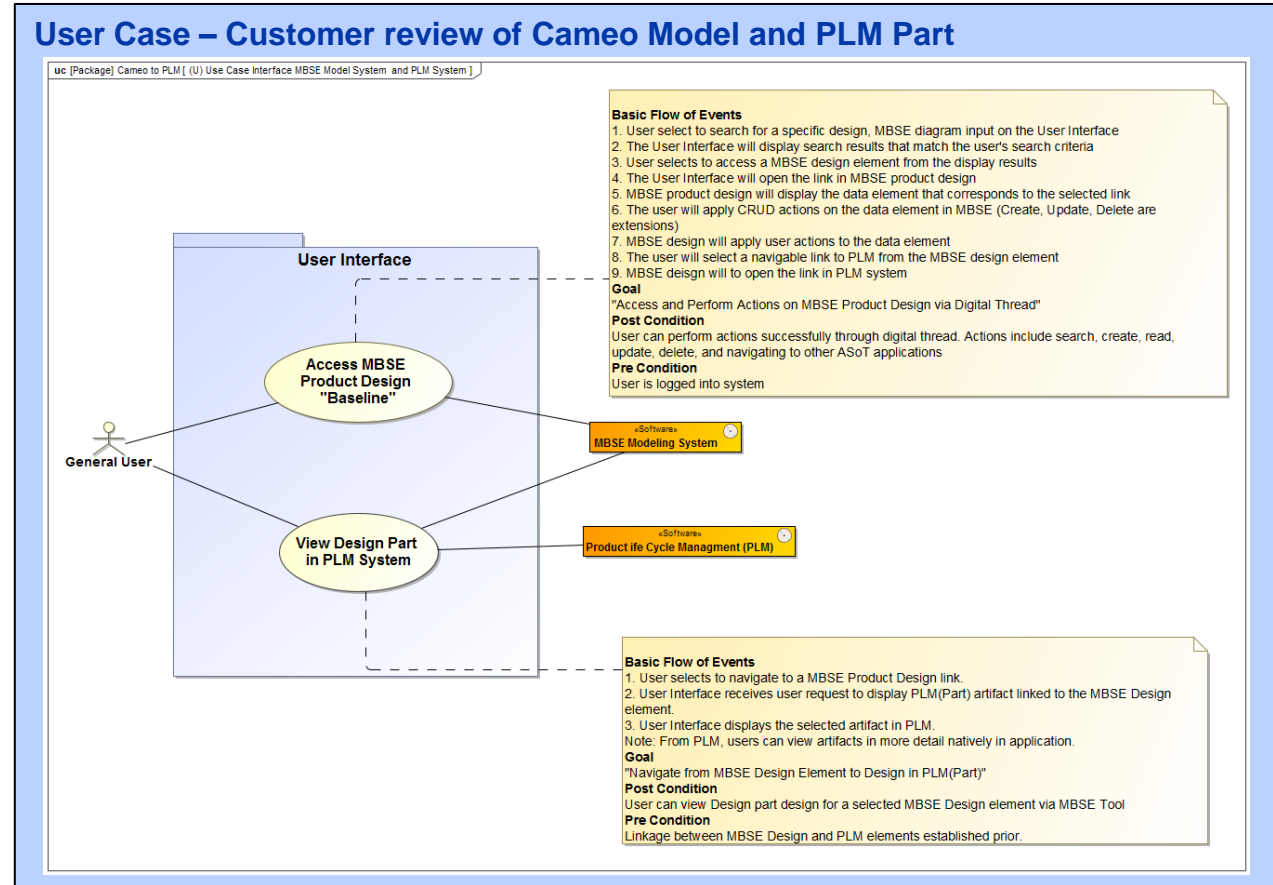
Use Cases - help analyzed, documented, and agree on customer needs

Digital Thread Models – How do I create a digital thread between Model(Element) and PLM(Part) ?
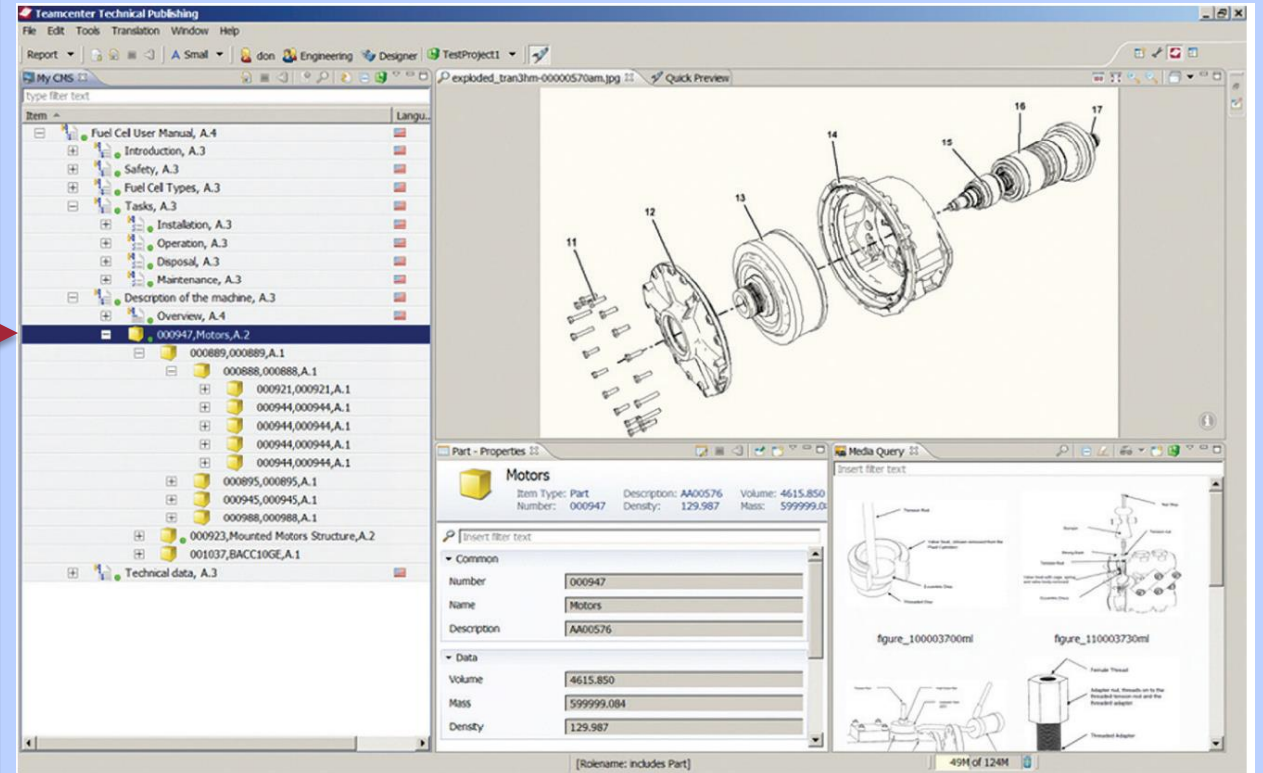
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MBSE Product Design Model

PLM Technical Publishing Solutions Example

Digital Linkage (Trace)

*Reference – Teamcenter Technical Publishing Solutions © 2017 Siemens Product Lifecycle Management Software Inc.*

Digital Thread requires detailed knowledge of ASoT system metadata

Modeling Digital Thread:

- **Product Linkage** – determine if the linkage is critical to the product baseline.

- **ASoT Linkage –** Identify the physical data attributes which will be linked.

- **Define type of linkage** – SysML level associations *(Association, Generalization, Satisfy, Derive, Trace, Verify, Refine)*

- **Automation –** Determine ability to automate digital linkage

bdd – Digital Thread – Connect ASoT elements together to create product baseline
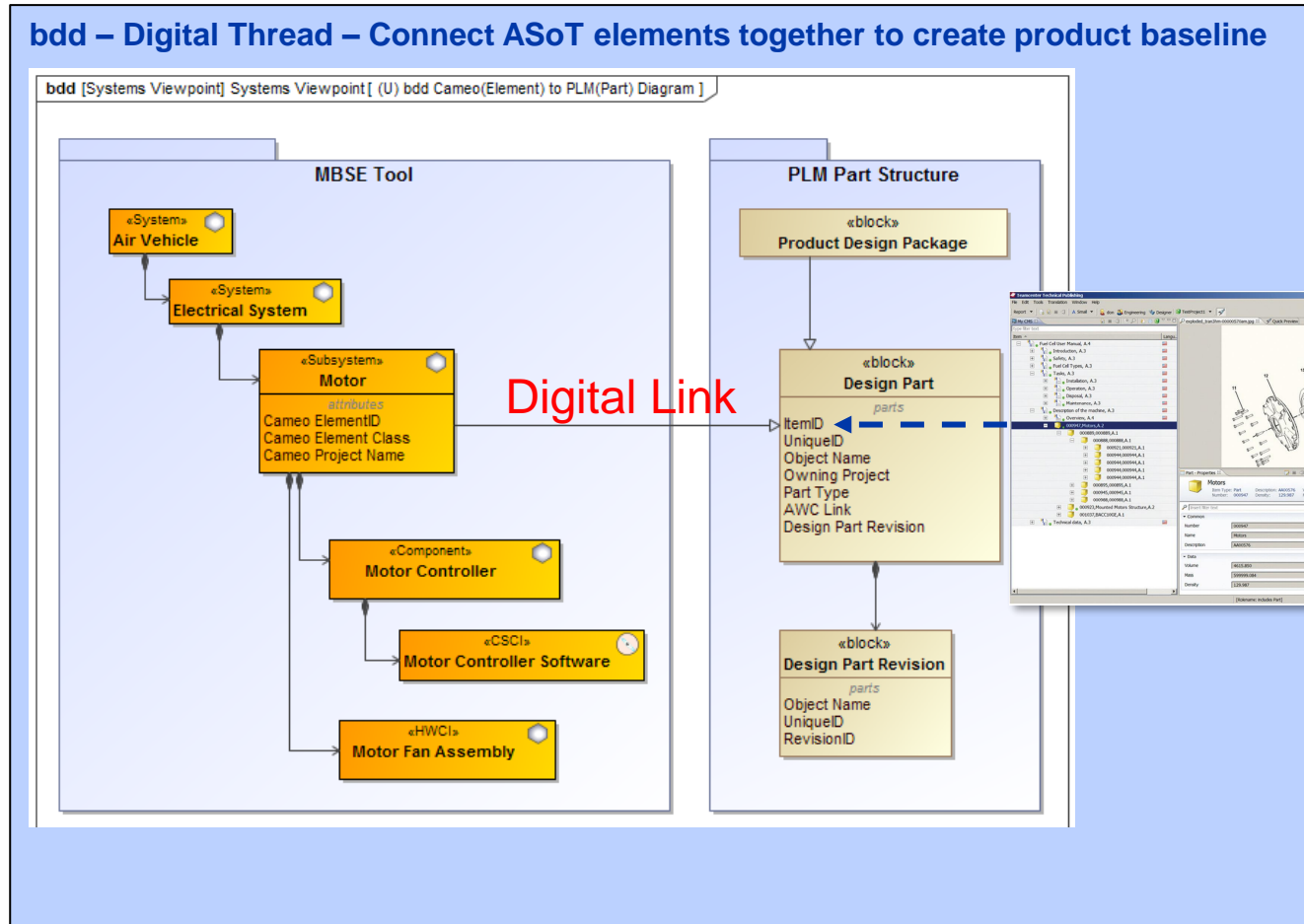
ASoT Systems data models are complex to navigate with multiple trees and branches

Digital Thread Models – How do I create a digital thread between Model(Element) and PLM(CDRL) ?

- **Example (CDRL):** Modeling digital thread between MBSE product model and PLM CDRLs

- **Use Case –** The customer needs to review MBSE product model and related CDRLs

- **Structure** – Modeling structure of a digital thread between MBSE(element) and PLM(CDRL)

- **Data Model –** physical data model depicts MBSE product structure and PLM metadata fields of CDRL data items

bdd – Digital Thread – Connect MBSE Design to PLM(CDRL)
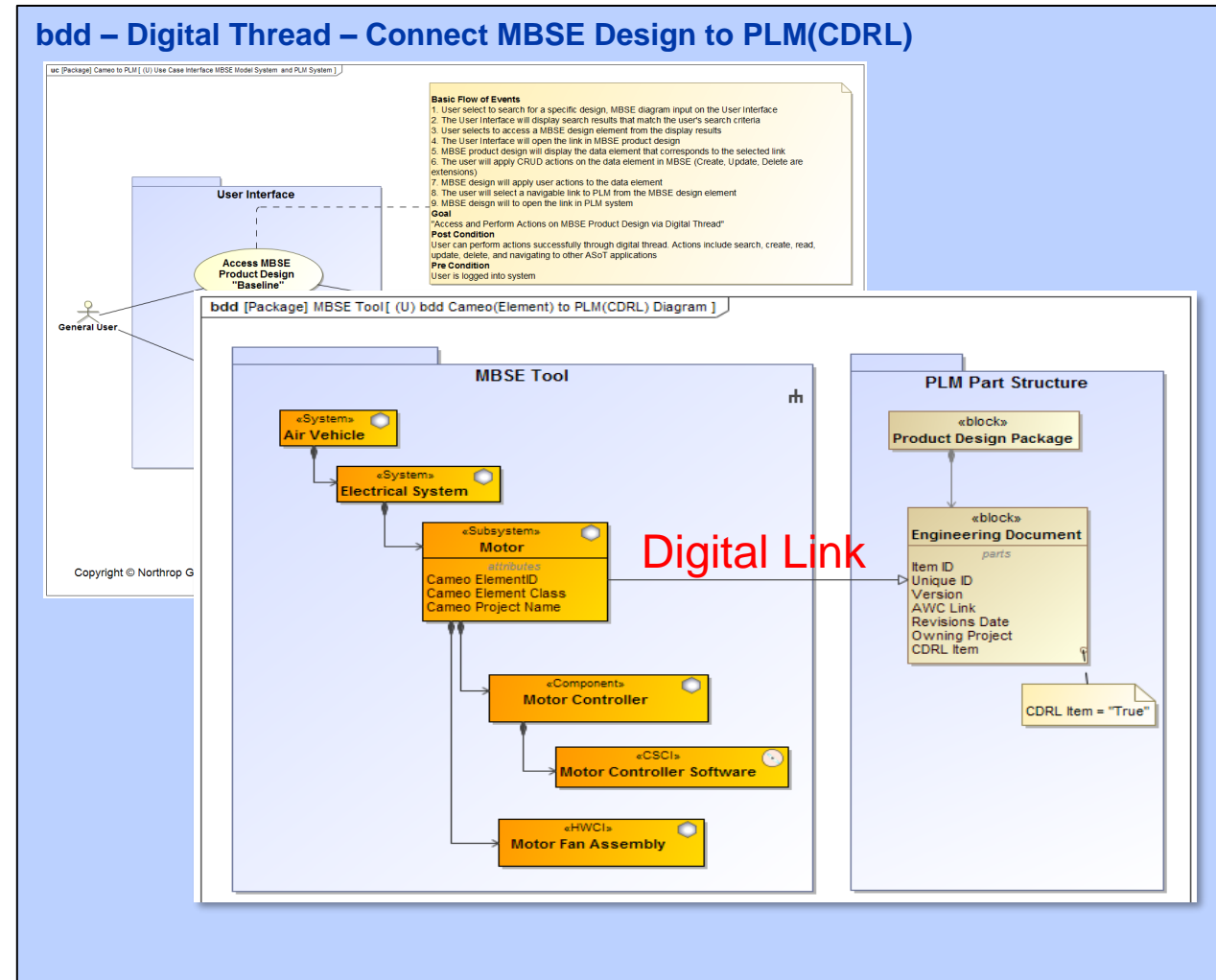
Summary

- **Purpose**
  - **Digital Thread** **–** Electronic threads created primarily to support definition of product baseline

- **Concept of Operations (ConOps)**
  - **Use Cases** **–** are critical to analyzing, document, and agreeing on how users will interact with the DEE.

- **ASoTs**
  - **ASoT Systems** **–** Manage and control the product baseline for the program.

- **Data Model**
  - **Data Models** **–** Clearly define and model ASoT System data (e.g. Conceptual, Logical, Physical)
  - **Common Data Model** **-** Automate discovery and generation of CDM

- **Digital Thread**
  - **Modeling Digital Threads** **-** 1) Define user needs, 2) Clarify ASoT data linkage, 3) Define type of link, 4) Determine ability to automate digital linkage

Questions?

Thank you for attending the presentation!

I hope you found some useful tips and examples for your MBSE projects