SAP PLM
Product Structure Management

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THE BEST RUN SAP

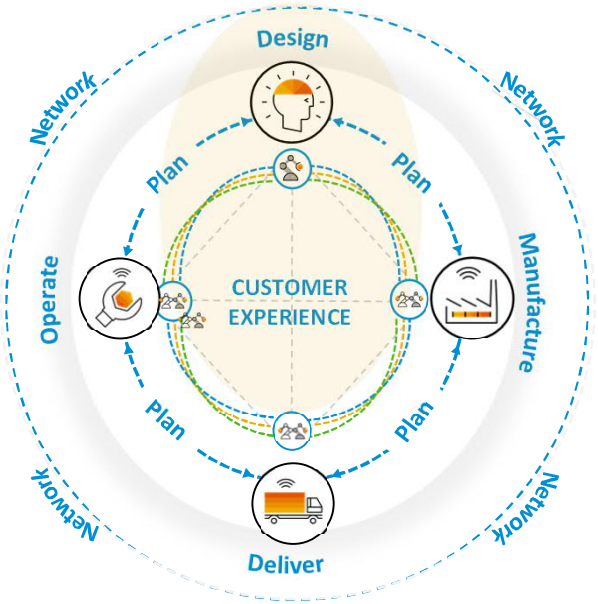
Designing to Customer Demand and Product Individualization

DESIGN to Operate

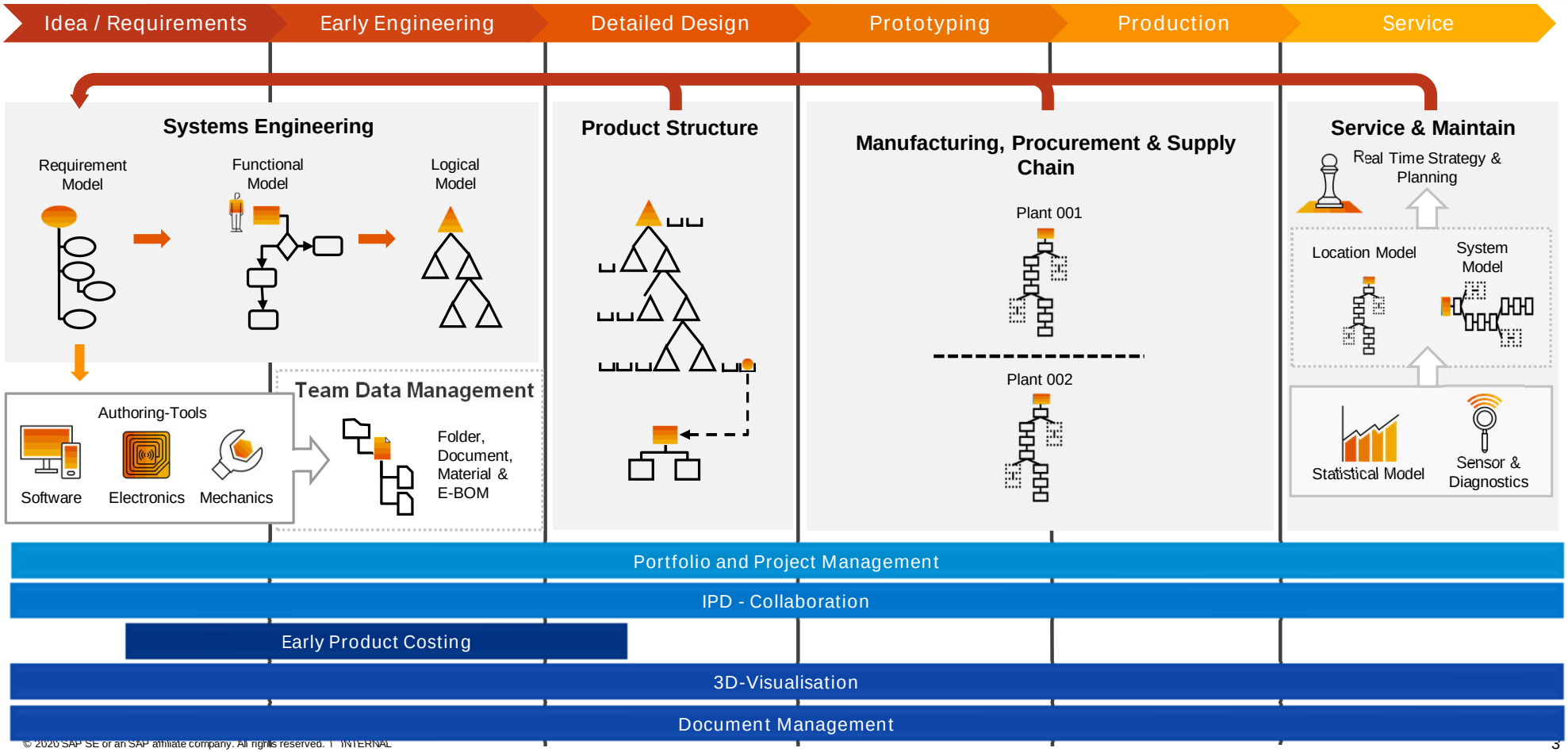
SAP Product Lifecycle Management enables faster and insight-driven decisions on product design to meet highly variable and individualized customer requirements.

Idea / Requirements | Systems Engineering | Detailed Design | Prototyping | Production | Operate

- **Idea & Requirements**
  Collect, filter and organize new requirements for the next generation product, through improvement requests & feedback from the market that helps you spot trends and focus on what matters
- **Systems Engineering**
  Set up project and assign tasks via a collaboration to calculate early product costs estimates and begin model-based systems engineering.
- **Detailed Design**
  Integrate CAD, mCAD, eCAD to ensure one product definition. At the same time ensure software compatibility and run product simulations.
- **Prototyping**
  Collaborate with suppliers and test & validate the product or system
- **Production**
  Convert engineering BOMs to manufacturing BOMs to begin product industrialization
- **Operate**
  Share spare parts and assets design data to the asset network



Design Business Process with SAP PLM



Requirements Management

User Story

The systems engineer has been asked to create/update the models for the intelligent valve according to the RFLP approach.

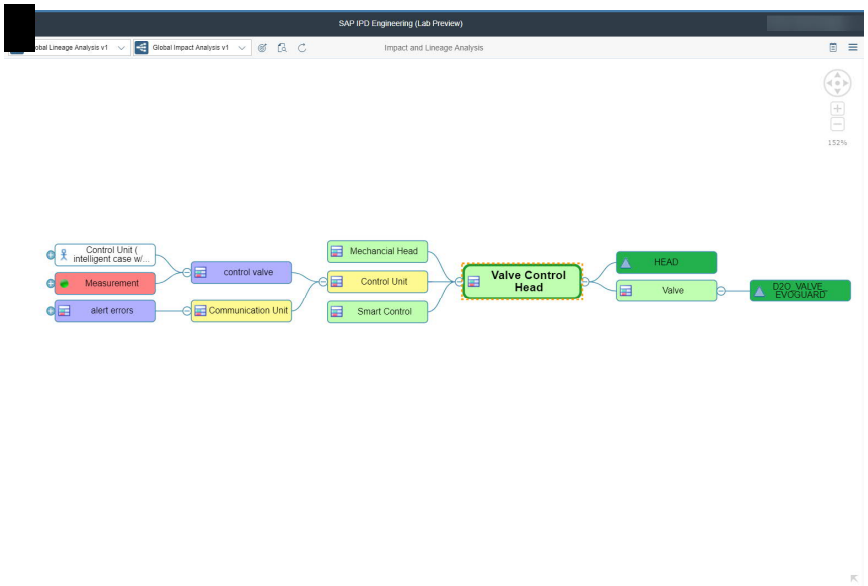
Highlight

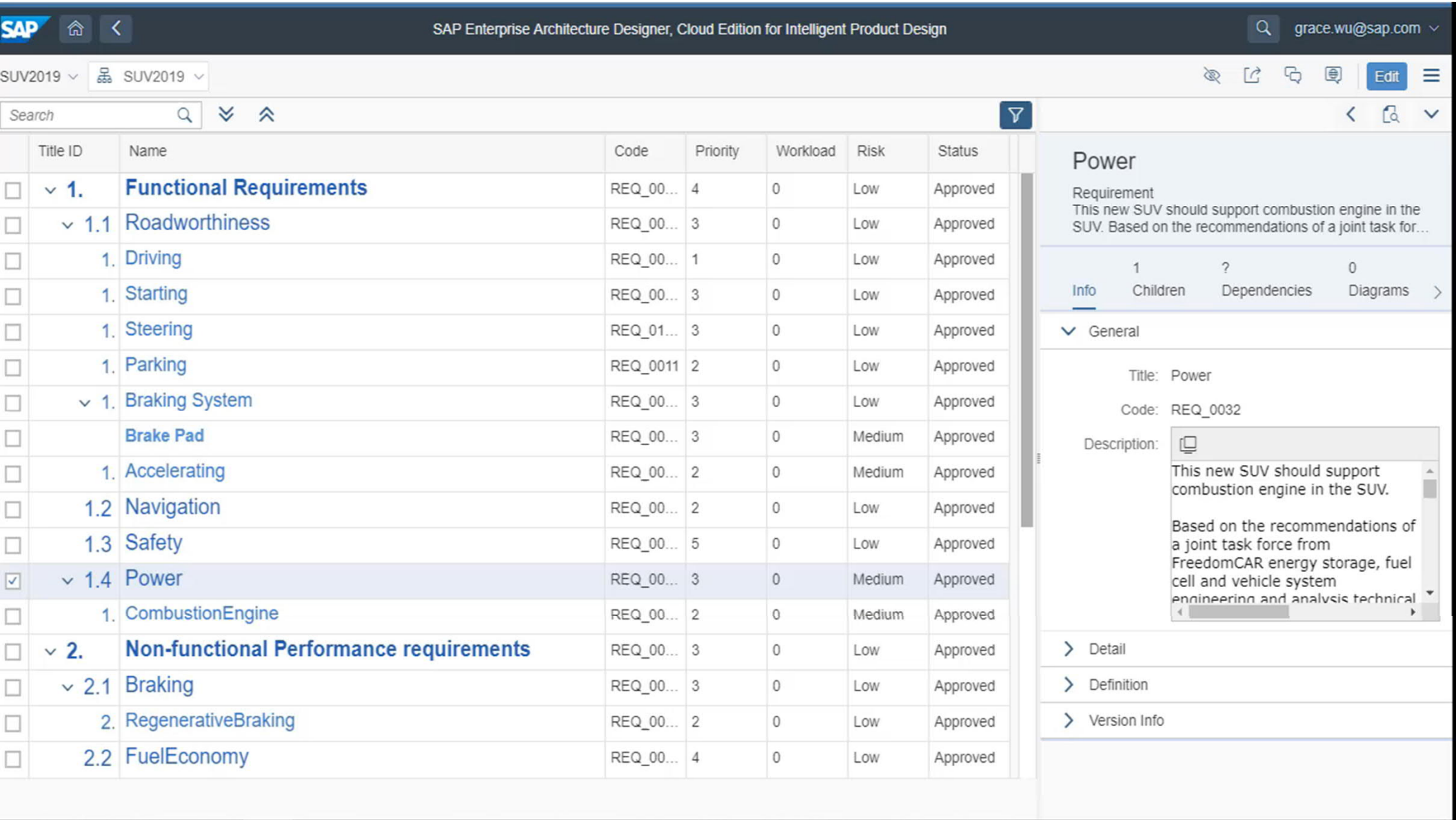
- Impact and Lineage Analysis
- Model-based Systems Engineering using SysML diagrams
- Requirements Management using Machine Learning
- Handover to Product Designers for detailed design

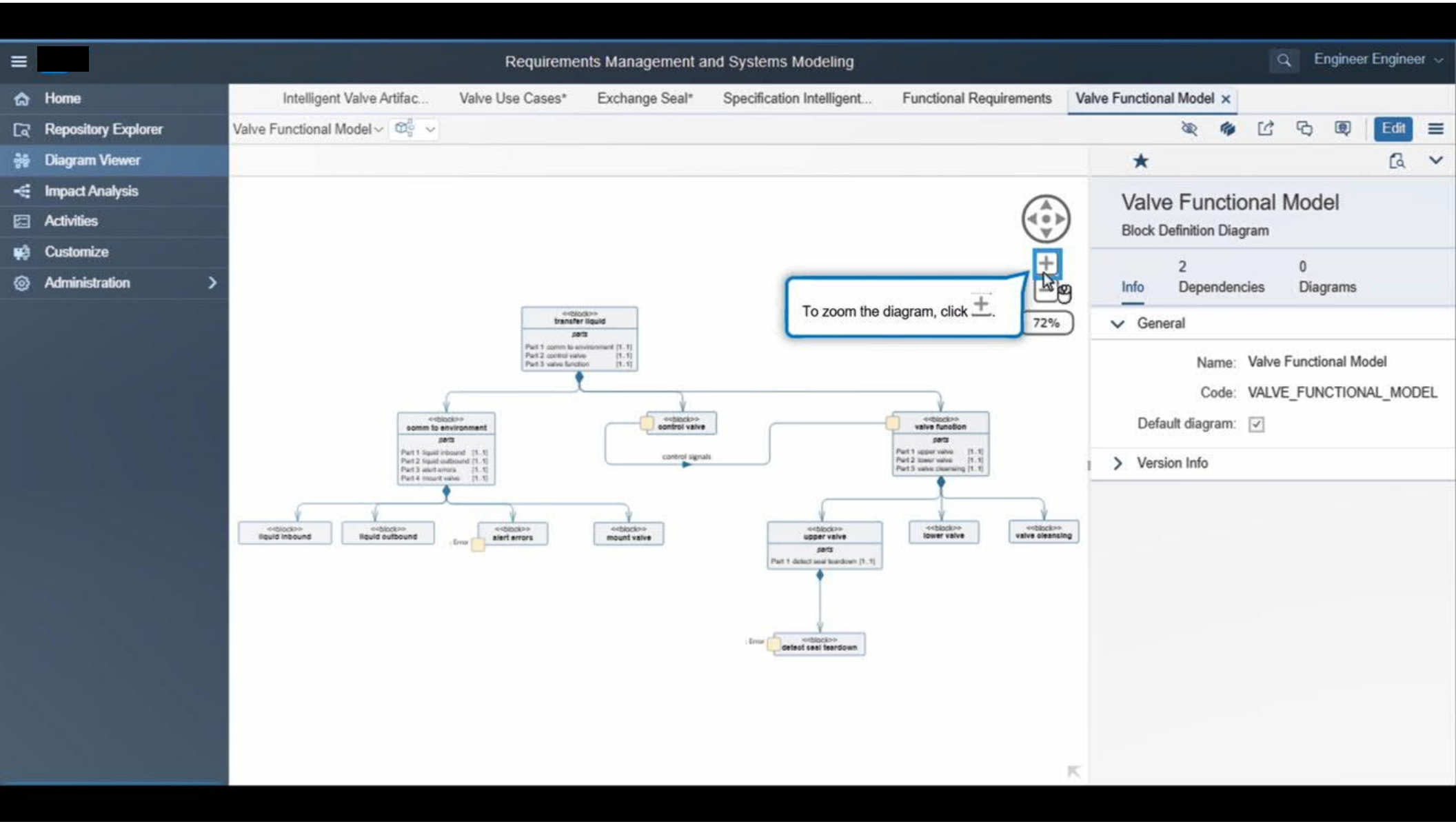
Benefits

- Graphical Traceability of connections and dependencies between internal and external objects
- Unique and integrated methodology for requirements engineering and management,
- Functional and logical design, as well as physical design in different domains for the multi-disciplinary development process based on a Systems Engineering approach early in the design process.

... Classifies new requirements through Machine Learning




SAP Enterprise Architecture Designer, Cloud Edition for Intelligent Product Design
grace.wu@sap.com
SUV2019
SUV2019
Edit
Search
Title ID
Name
Code
Priority
Workload
Risk
Status
1. Functional Requirements REQ_00... 4 0 Low Approved
1.1 Roadworthiness REQ_00... 3 0 Low Approved
1. Driving REQ_00... 1 0 Low Approved
1. Starting REQ_00... 3 0 Low Approved
1. Steering REQ_01... 3 0 Low Approved
1. Parking REQ_0011 2 0 Low Approved
1. Braking System REQ_00... 3 0 Low Approved
Brake Pad REQ_00... 3 0 Medium Approved
1. Accelerating REQ_00... 2 0 Medium Approved
1.2 Navigation REQ_00... 2 0 Low Approved
1.3 Safety REQ_00... 5 0 Low Approved
1.4 Power REQ_00... 3 0 Medium Approved
1. CombustionEngine REQ_00... 2 0 Medium Approved
2. Non-functional Performance requirements REQ_00... 3 0 Low Approved
2.1 Braking REQ_00... 3 0 Low Approved
2. RegenerativeBraking REQ_00... 2 0 Low Approved
2.2 FuelEconomy REQ_00... 4 0 Low Approved
Power
Requirement
This new SUV should support combustion engine in the SUV. Based on the recommendations of a joint task for...
Info
1 Children
? Dependencies
0 Diagrams
General
Title: Power
Code: REQ_0032
Description:
This new SUV should support combustion engine in the SUV.
Based on the recommendations of a joint task force from FreedomCAR energy storage, fuel cell and vehicle system
Detail
Definition
Version Info


Requirements Management and Systems Modeling
Engineer Engineer
Home
Repository Explorer
Diagram Viewer
Impact Analysis
Activities
Customize
Administration
Intelligent Valve Artifac...
Valve Use Cases*
Exchange Seal*
Specification Intelligent...
Functional Requirements
Valve Functional Model
Valve Functional Model
Edit
To zoom the diagram, click .
72%
transfer liquid
parts
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control valve
valve function
control signals
liquid inbound
liquid outbound
alert errors
mount valve
upper valve
lower valve
valve cleansing
detect seal teardown
Valve Functional Model
Block Definition Diagram
Info
2
Dependencies
0
Diagrams
General
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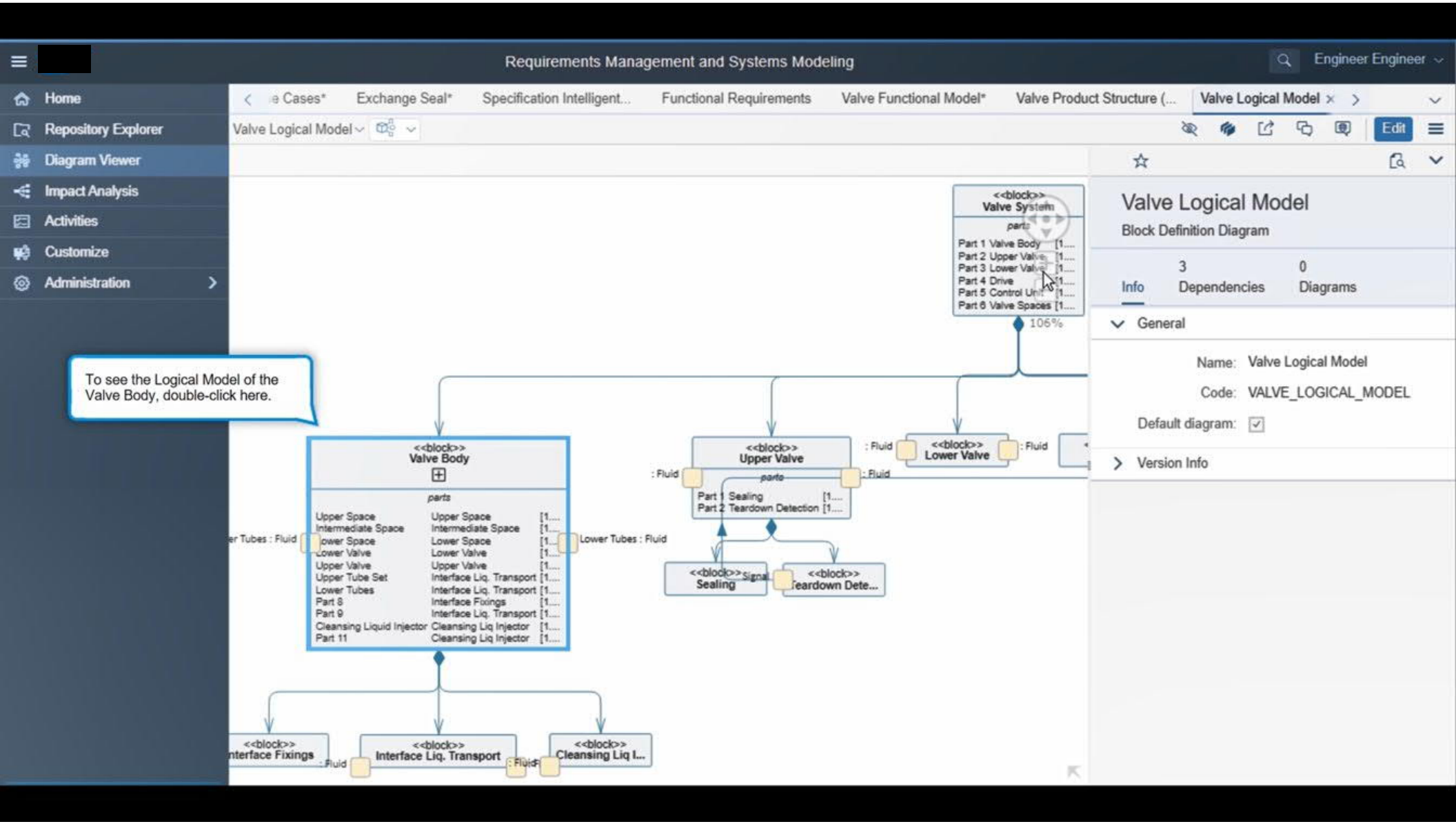
Code: VALVE_FUNCTIONAL_MODEL
Default diagram:
Version Info


Requirements Management and Systems Modeling
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Cases*
Exchange Seal*
Specification Intelligent...
Functional Requirements
Valve Functional Model*
Valve Product Structure (...
Valve Logical Model
Valve Logical Model
Edit
To see the Logical Model of the Valve Body, double-click here.
<<block>>
Valve System
parts
Part 1 Valve Body
Part 2 Upper Valve
Part 3 Lower Valve
Part 4 Drive
Part 5 Control Unit
Part 6 Valve Spaces
106%
<<block>>
Valve Body
parts
Upper Space
Intermediate Space
Lower Space
Lower Valve
Upper Valve
Upper Tube Set
Lower Tubes
Part 8
Part 9
Cleansing Liquid Injector
Part 11
Interface Liq. Transport
Interface Fixings
Cleansing Liq Injector
Lower Tubes : Fluid
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Upper Valve
parts
Part 1 Sealing
Part 2 Teardown Detection
: Fluid
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Lower Valve
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Sealing
Signal
<<block>>
Teardown Dete...
<<block>>
Interface Fixings
<<block>>
Interface Liq. Transport
<<block>>
Cleansing Liq I...
Valve Logical Model
Block Definition Diagram
Info
3
Dependencies
0
Diagrams
General
Name: Valve Logical Model
Code: VALVE_LOGICAL_MODEL
Default diagram:
Version Info

Engineering Product Structure

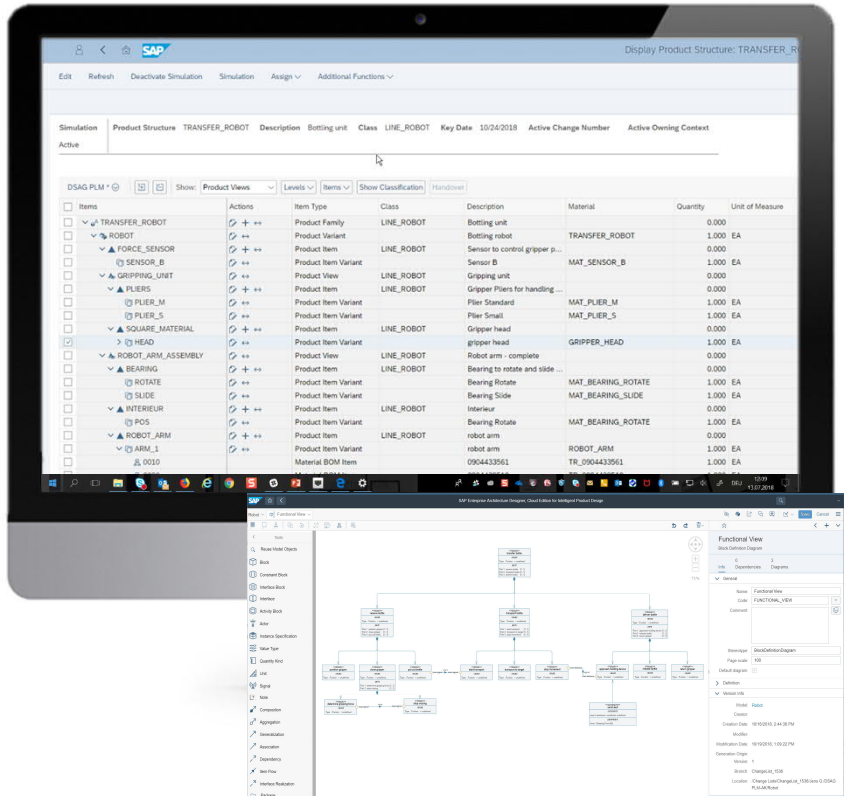
Idea / Requirements | Early Engineering | Detailed Design | Prototyping | Production | Service

Create a multilevel structure for a configurable product in an early design phase

Brings different disciplines together such as mechanics, E/E & Software

As Backbone integrated into Systems Engineering, where the systems engineer is owning the functional (BDD Block Definition Diagrams) or logical models definition.

Backbone for whole engineering department & provides a **foundation of reuse information** needed in downstream processes**,** including digital twin



Engineering Product Structure – Template Management

Idea / Requirements | Early Engineering | Detailed Design | Prototyping | Production | Service

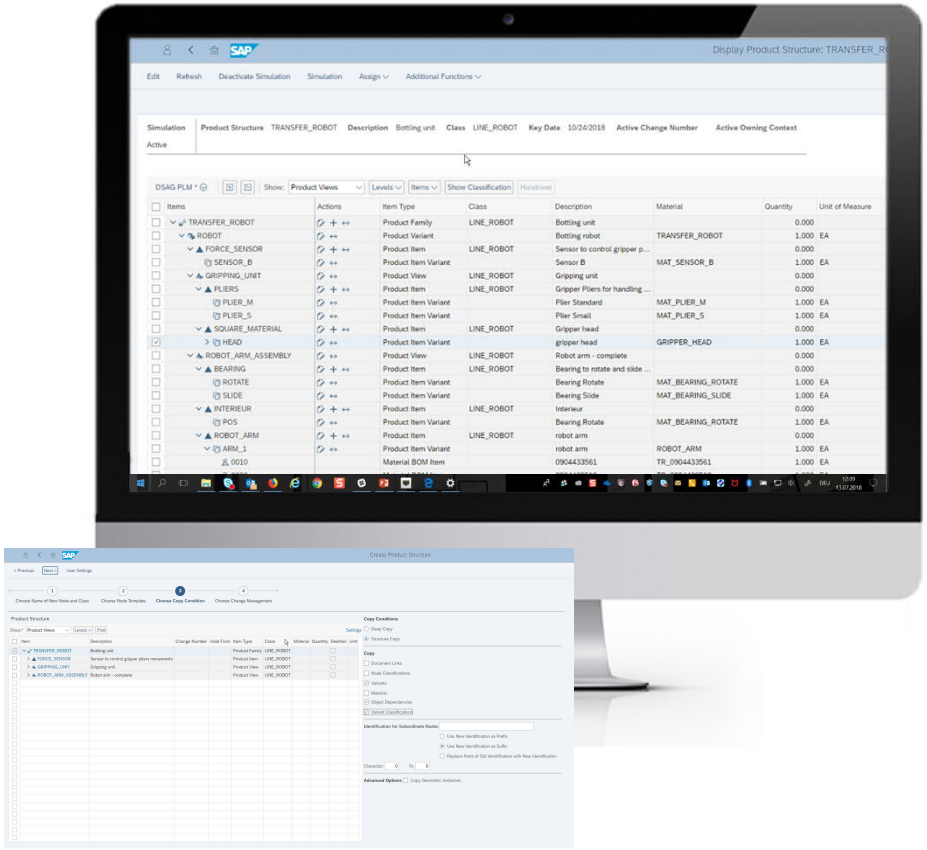
Templates (150%) could be used as design library owning already characteristics/rules

Create a multilevel structure/new Product Family in early design phase copying templates

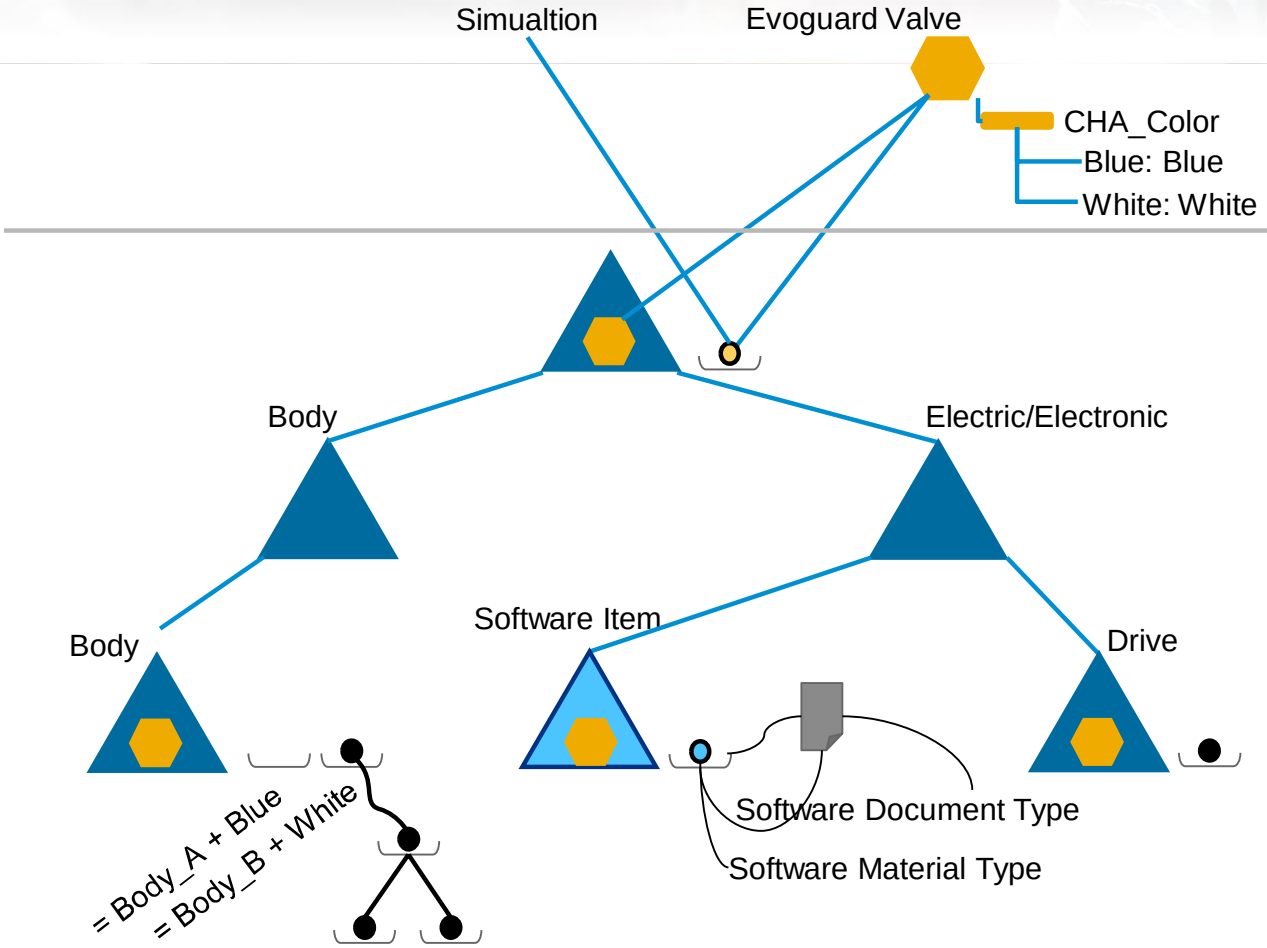
Rework new Product Family and reduce from 150%-100% only. Start Re-Use planning process.

Create new variants, derive targets (cost, weight) from requirements & assign specifications.

Manage rules/characteristics for new variants. “start/release” new Design – top down approach



Basic Product Variant Structure Definitions



Product Class (Type 300)
Characteristics
Configurable Material (KMAT)
and Configuration Profile

Product Family

Product Variant

Product View (Main Modules)

Product Item
(Function/Modules)

Product Item Variants

Software/Component

Assemblies

Common example of Product Item & Product Variant

Class / Vehicle Family AB

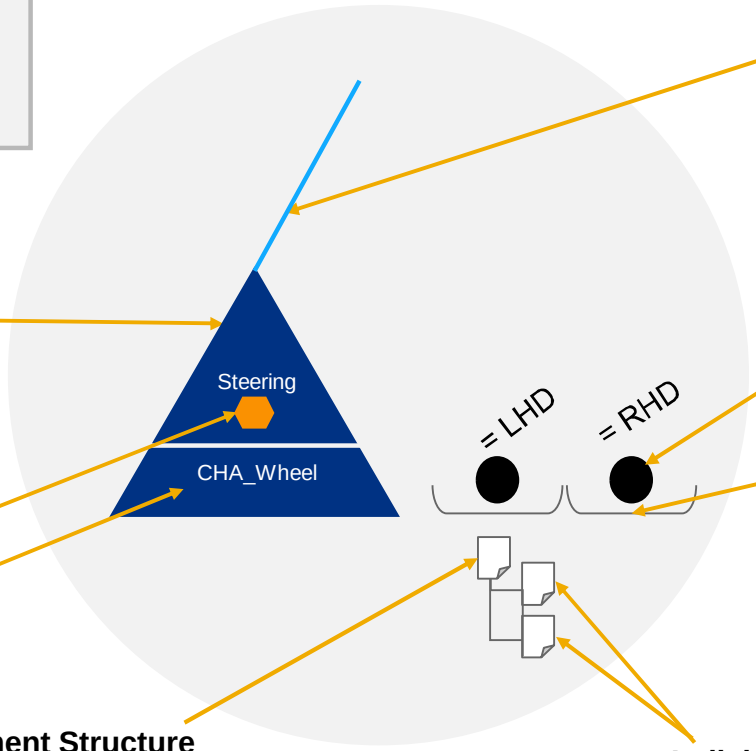
Characteristic CHA_Wheel

LHD: Left Hand Drive

RHD: Right Hand Drive

Relationships
- Hierarchical Structure

Product Item
- Represents function or component
- Assigned documents
- Classification
- Additional attributes



Material

Product Item Variant
- Represents technical solution
- Document
- Object dependencies
- Change number
- Classification
- Additional attributes

Product Class
- Characteristics

Document Structure

Individual Documents

Design & Authoring Tool Integration via ECTR

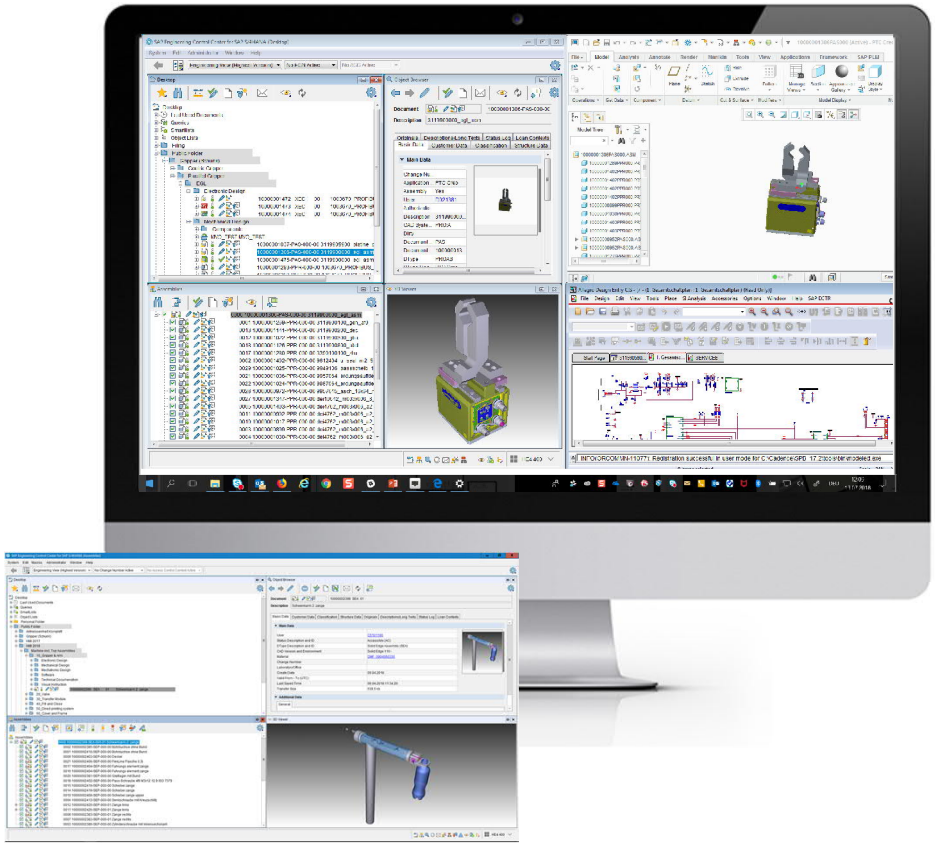
Idea / Requirements | Early Engineering | Detailed Design | Prototyping | Production | Service

Accelerate product development by **integrating diverse CAD authoring tools on one platform**

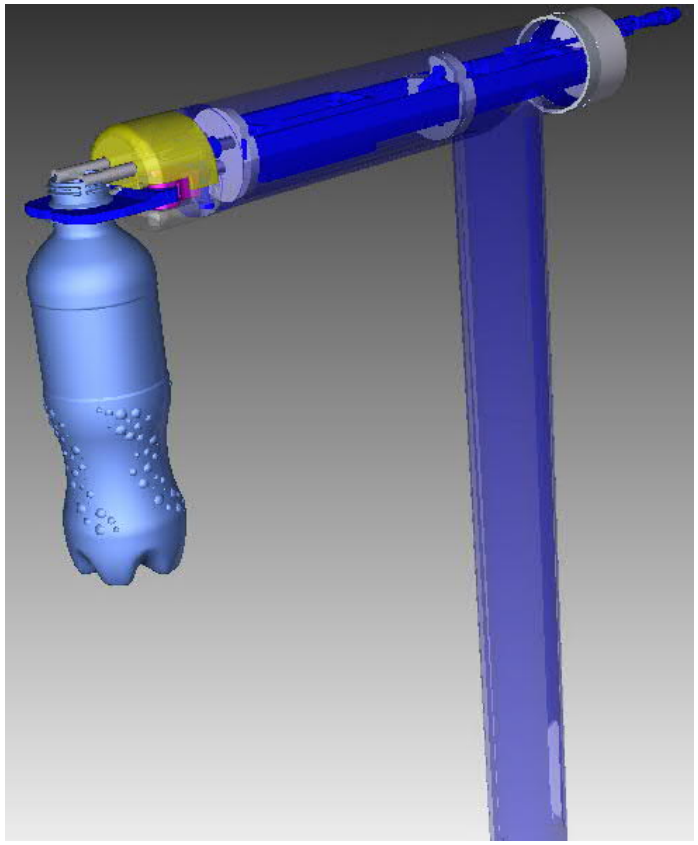
Support multi-disciplinary product development by **integrating mechanical, electrical/electronic, & software structures** into **one** product definition

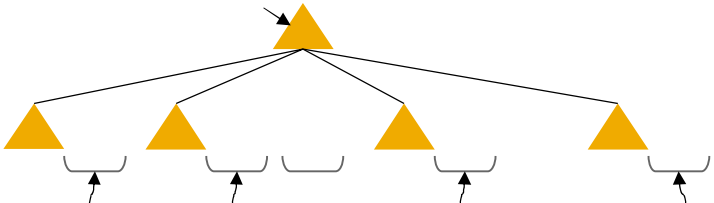
Synchronize product metadata, structures, access, and documentation across the enterprise to encourage data reuse

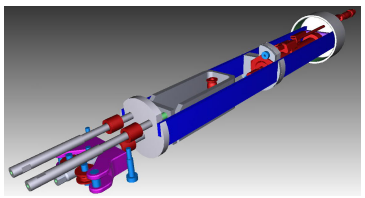
Provide the **foundation** for realizing the **digital twin** by capturing **the multi discipline design data** early on in the product development process

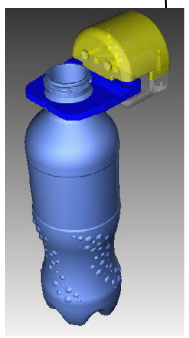


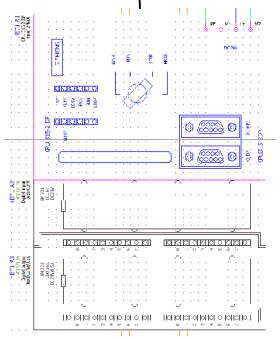
Top down - Functional/Physical Structure / Bottom up – Components, Assemblies











Product Development and Configuration – Software Management

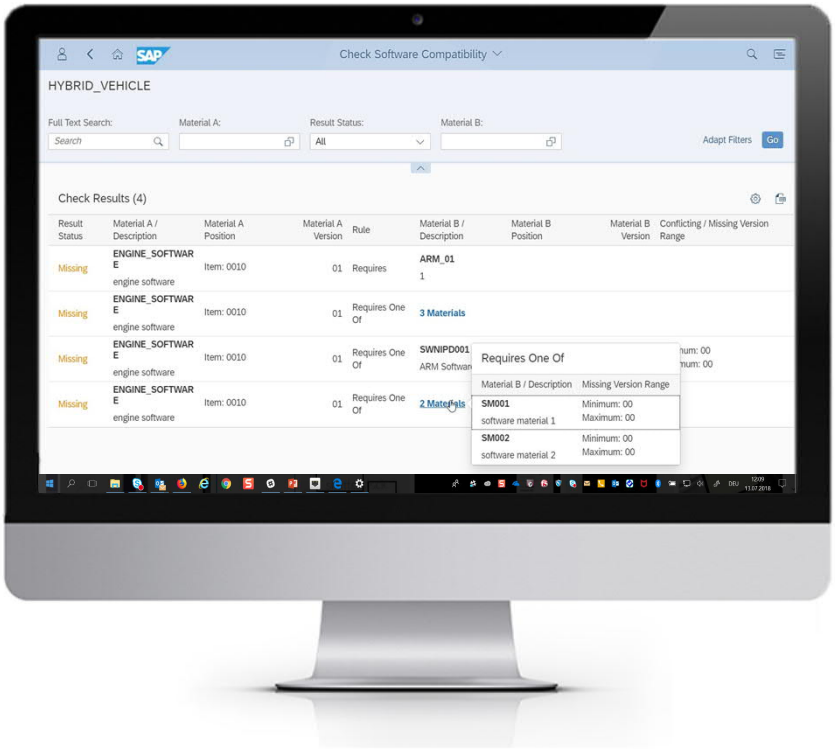
Idea / Requirements | Early Engineering | Detailed Design | Prototyping | Production | Service

Handle software as part of the **product model** that is integrated with mechanical & electronical parts

Manage constraints between software's & between software & hardware

Track software usage within the **complete product lifecycle** from engineering processes down to operation of product equipment

Ensure all software in BOM component are **compatible** with other **BOM components**



Enterprise Product Structure - Simulation

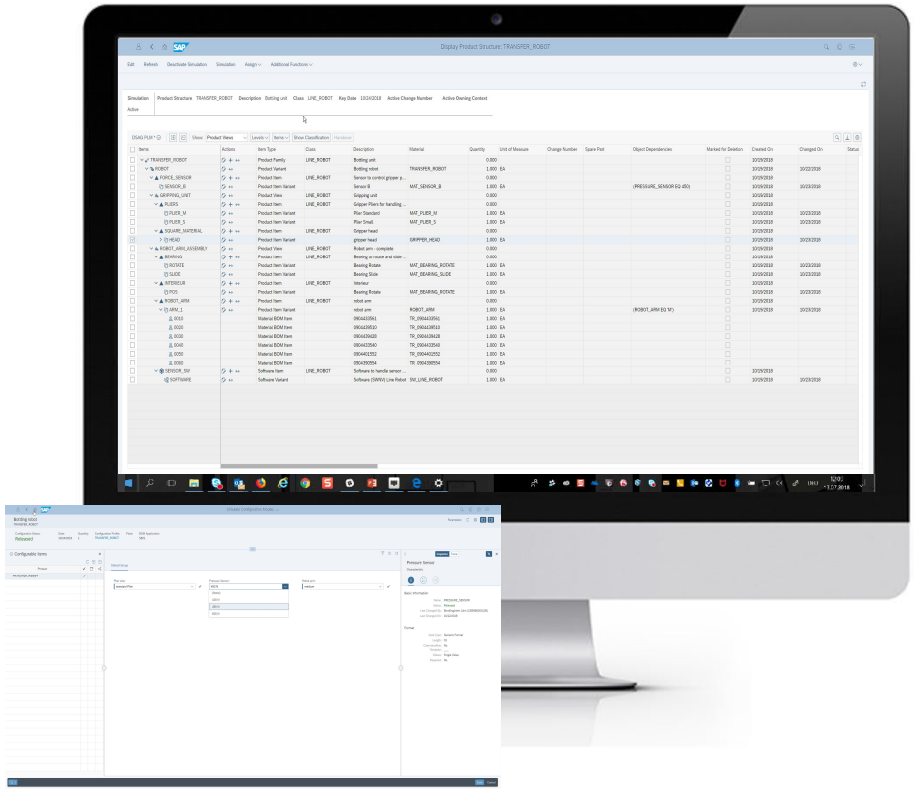
Idea / Requirements | Early Engineering | Detailed Design | Prototyping | Production | Service

Embedded Simulation with Advanced Variant Configuration Integration

Easy Simulation Management Application

Three different approaches: **Change Number, Simulation or Manual** Setting from where the valid from date is derived

Effortlessly simulate and **filter to your needs**



Non Visual Handover to Manufacturing with Enterprise Product Structure

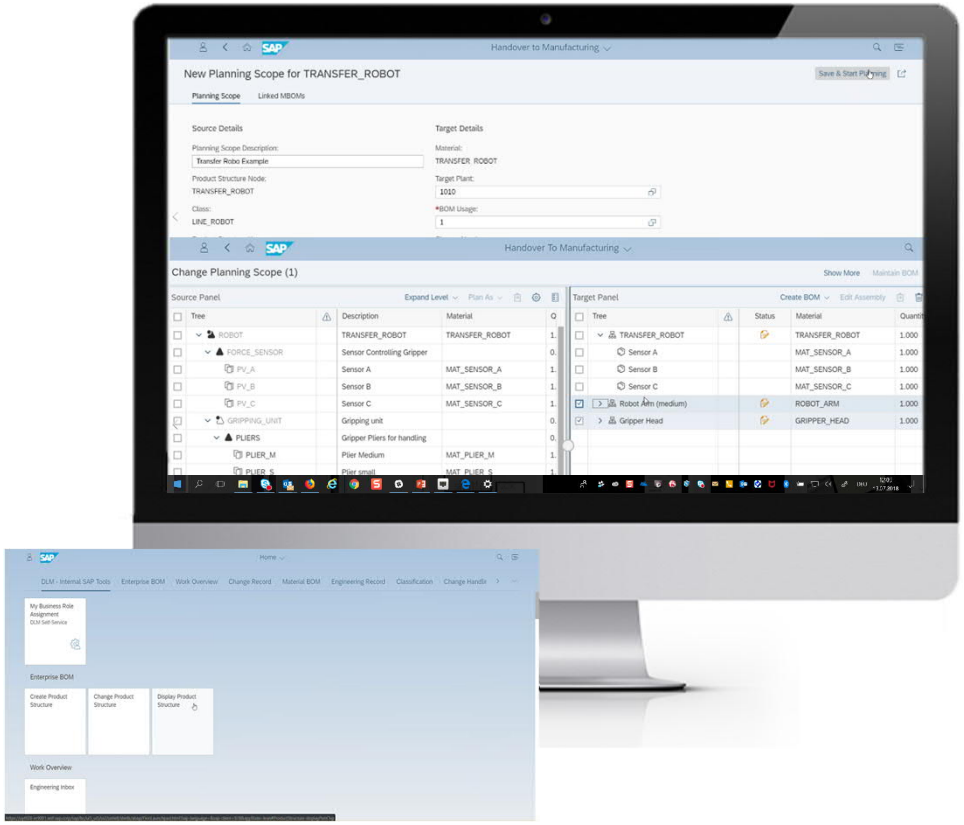
Idea / Requirements | Early Engineering | Detailed Design | Prototyping | Production | Service

Streamlined **handover process bringing together engineering and manufacturing** structures

Planning scope allows for **easy management of source & target information** on one interface

Includes planning features such as **“planned as designed”** which also allows **multilevel product structure explosion**

Completeness check also embedded



Thank you.

Contact information:

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