



Extend Product Lineup using E-Mobility Platform

Vector Conference 2020

Agenda

► Overview

PREEvision Introduction

Model Based System Engineering

Product Line Management with Reuse Concept

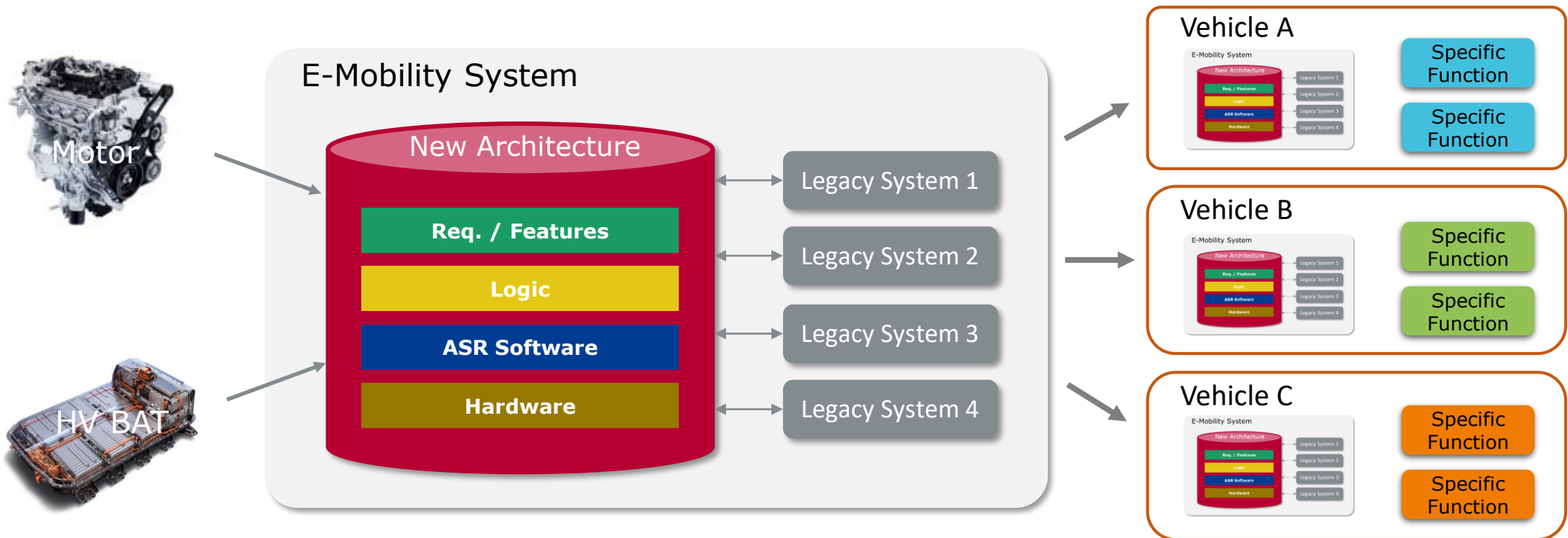
E-Mobility Architecture Design with Traceability and Consistency

System Requirement Specification Generation

Summary

E-Mobility Development Objectives

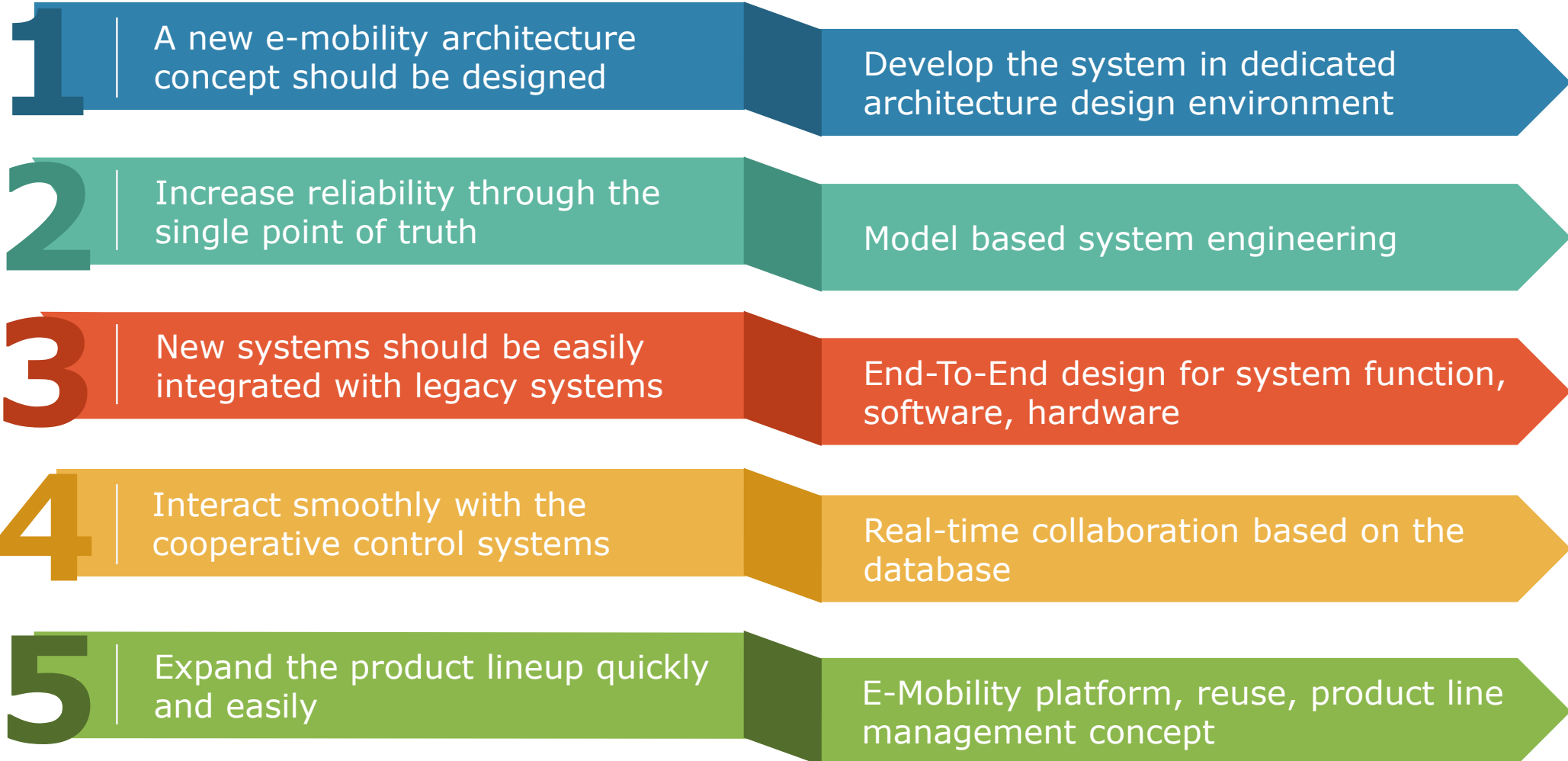
- ▶ Motors and inverters take over the roles of engine and transmission in the vehicle driveline
- ▶ As the number of power consuming devices increases, a high-voltage power supply system is required
- ▶ The new architecture of the electrification system must be reliably integrated with the legacy systems
- ▶ E-Mobility product lineup needs to be expanded quickly to meet customer demand



Challenges & Solutions

Challenges

Solutions



Agenda

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► **PREEvision Introduction**

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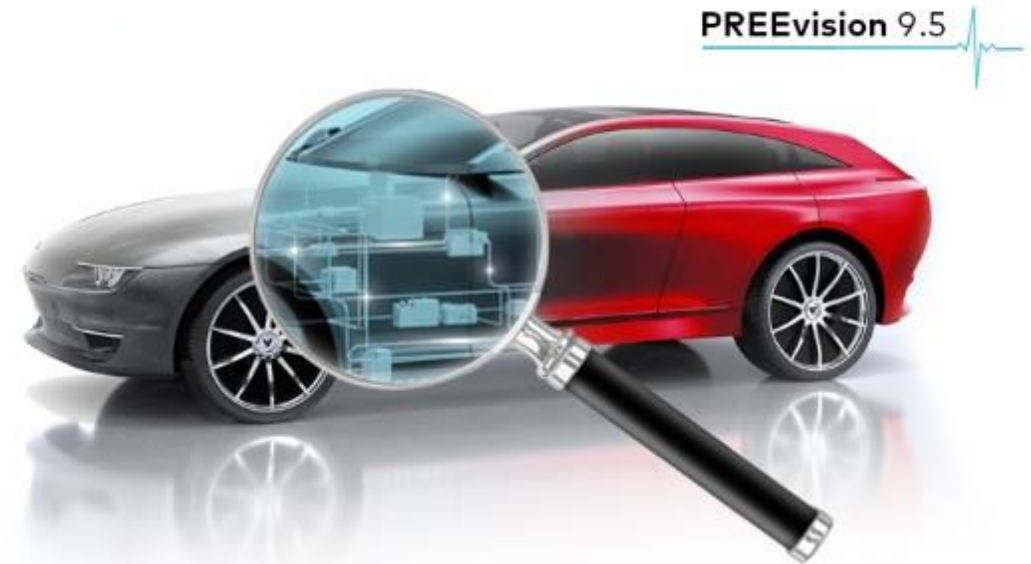
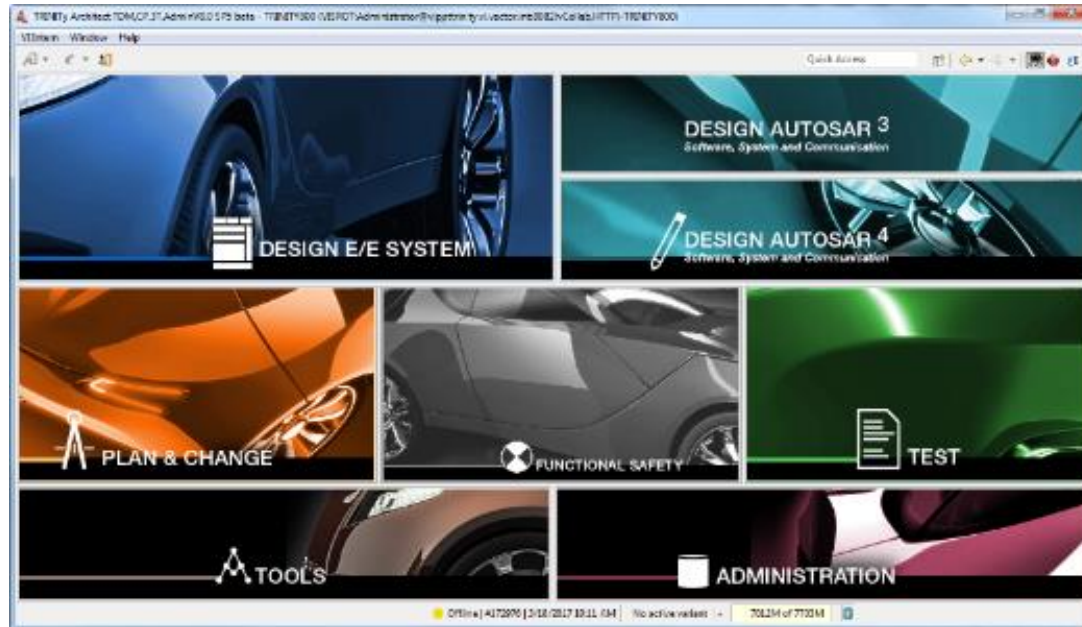
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Enabler for today's and tomorrow's E/E platforms

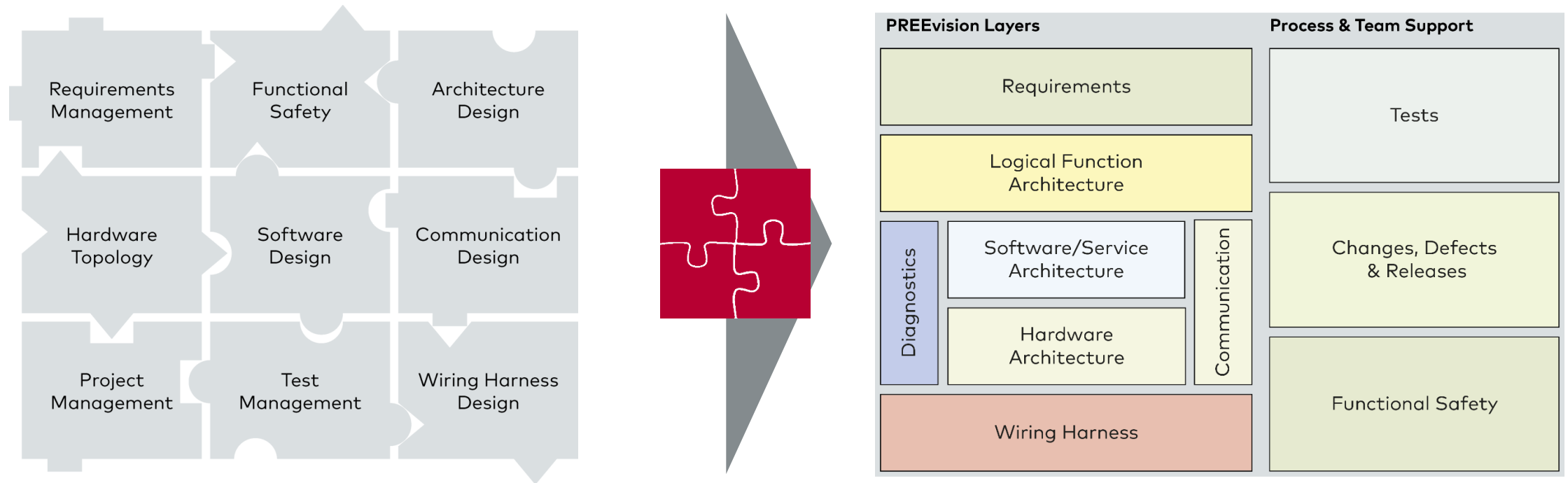


Digital engineering platform for automotive E/E systems engineering

- > ONE platform for the design, management and documentation of complete E/E systems
- > Integrated product line and variant management support
- > Support of AUTOSAR (Classic and Adaptive) methodology
- > Design of safety-relevant systems... and more!

Single-Point-of-Truth

- Documents have reached their limit – now it is time to put your data at the heart of everything you do!



Tool Landscape Approach (Best in Class)

Document oriented development

Various independent **data silos**

File based collaboration

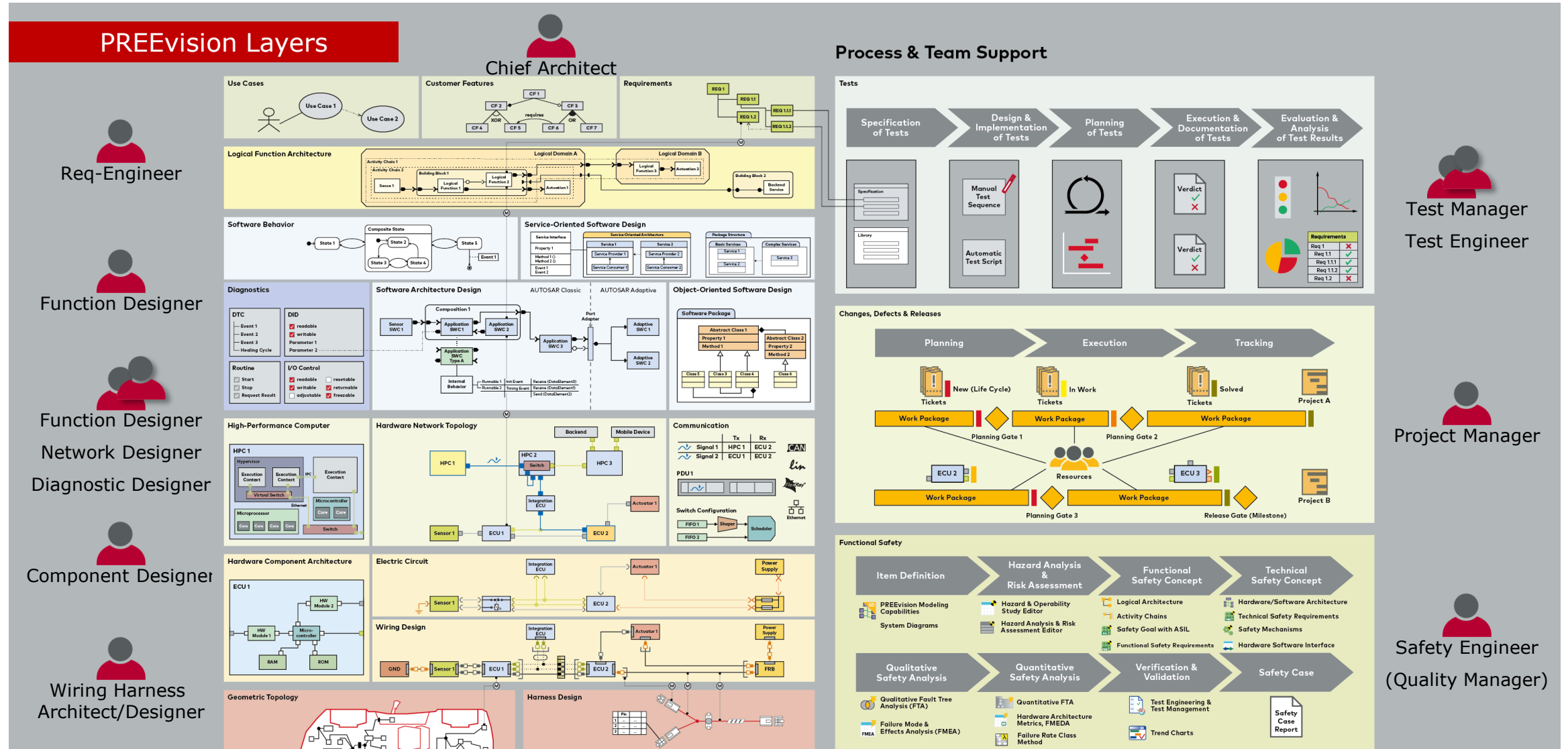
Integrated Tool Approach

PREEvision **E/E Engineering** Environment

Data based collaboration

Central **backbone** as "Single Point of Truth"

The PREEvision Layer Model



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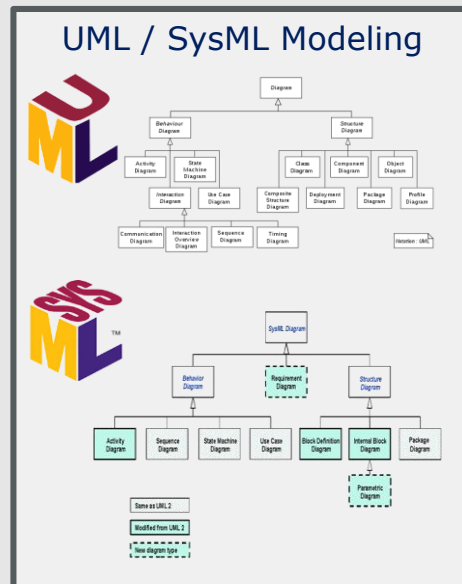
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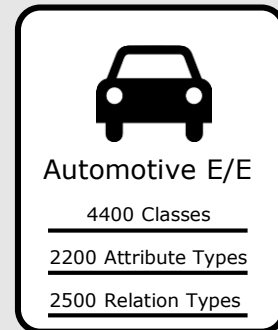
Two major Concepts

Data Model

SysML Modeling with Automotive Profile

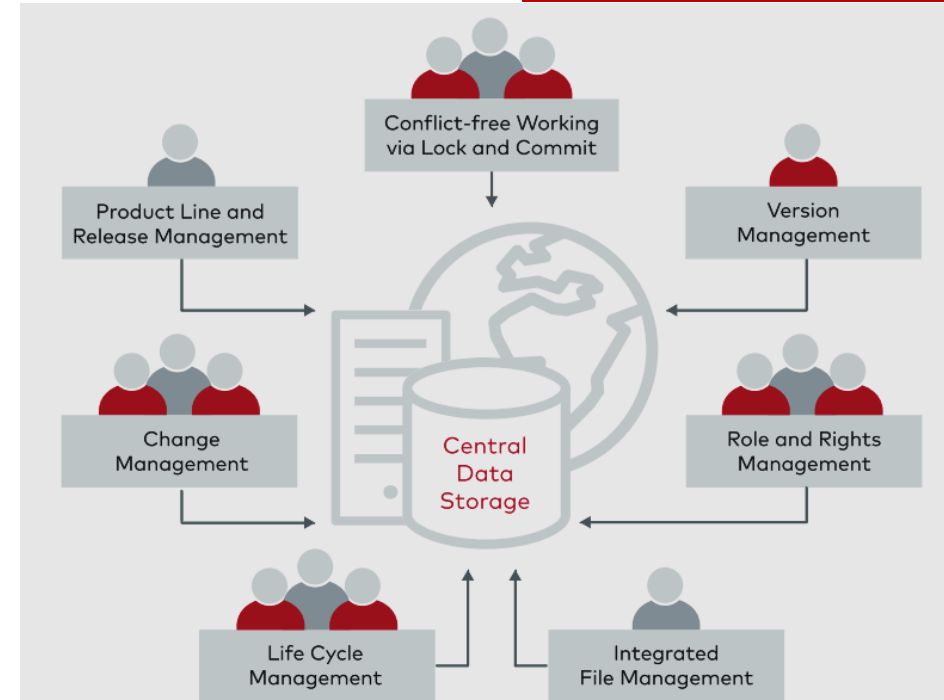


Automotive Meta Model



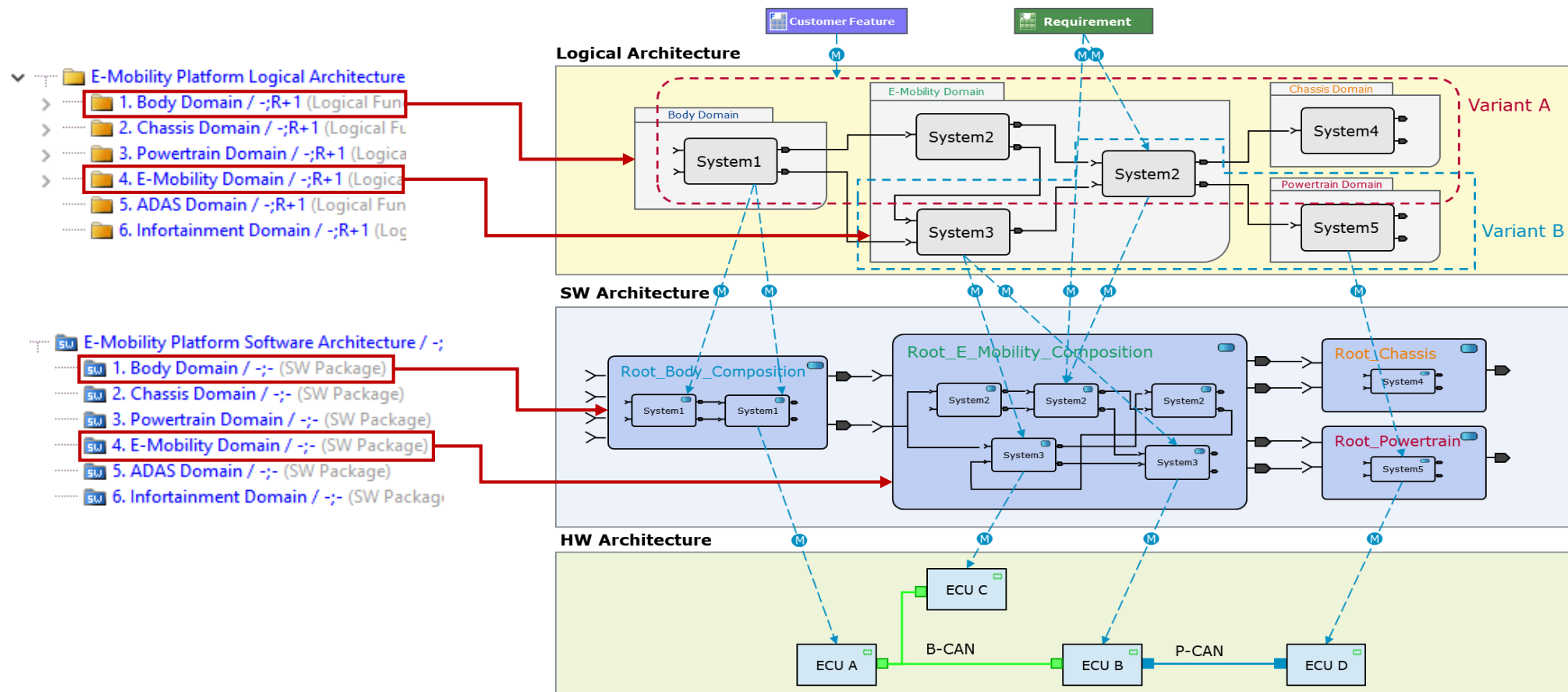
- ▶ Meta model is the de-facto **automotive industry standard**, developed with global OEMs and suppliers
- ▶ Support of the entire development process in a single **MBSE** tool

Collaboration Platform



- ▶ Powerful database for **real-time collaboration** including change-, release- and configuration management

- ▶ End-to-end design from system requirements to function, software, hardware
- ▶ Relationships and dependencies can be visualized beyond the controller to the domain



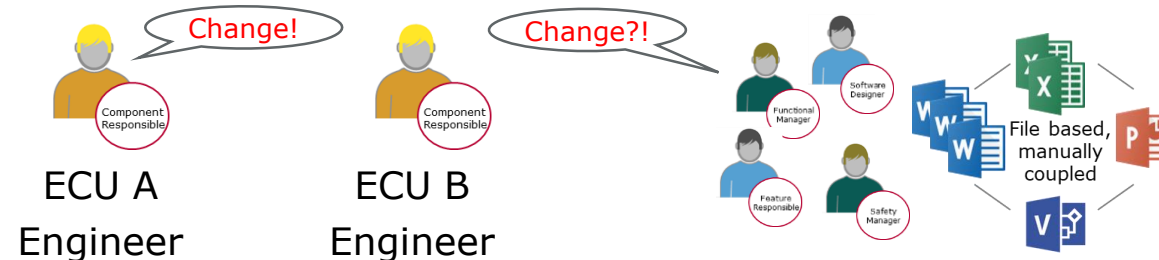
Traceability and Consistency

Design Change Scenario

- ▶ ECU A provides signal to ECU B
- ▶ ECU A interface to ECU B shall change
- ▶ Change control board needs to decide on change

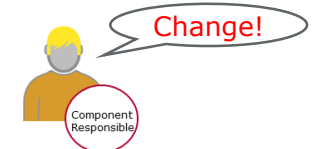
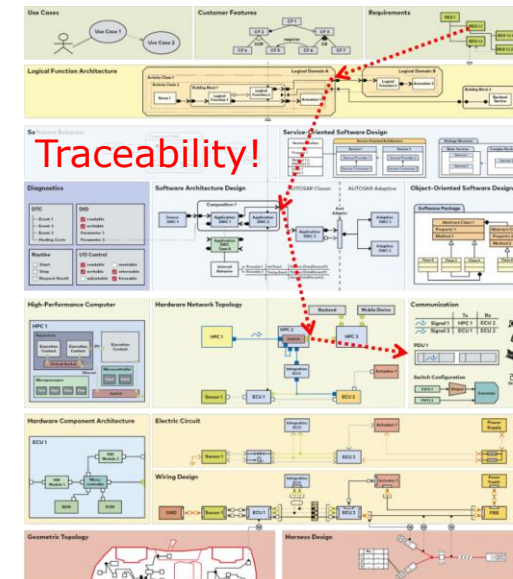
Document-based impact analysis

- ▶ High **coordination** and **communication** effort with related SW, COM, HW engineers
- ▶ High effort to **manually trace** dependencies in documents
- ▶ Application of change may impact other artifact / system



PREvision Impact Analysis

- ▶ ECU A engineer follows IF change
 - > Efficient & systematic trace to SW, HW and COM
 - > Automatic consistency checks
- ▶ Efficient **model-driven change analysis**
- ▶ CCB decision is documented and change applied



ECU A Engineer



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► **Product Line Management with Reuse Concept**

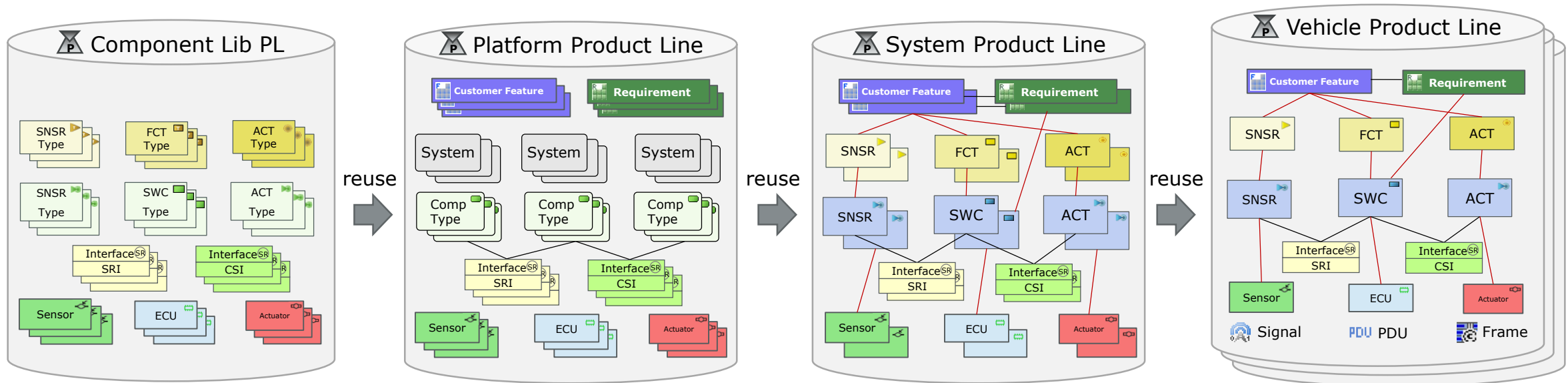
E-Mobility Architecture Design with Traceability and Consistency

System Requirement Specification Generation

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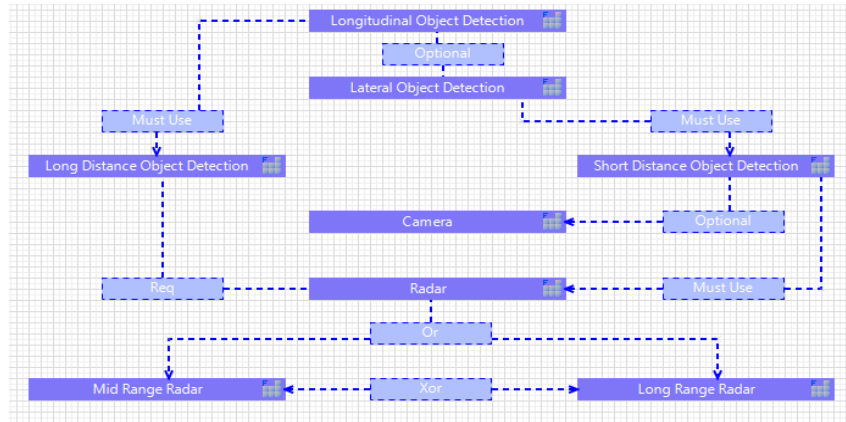
From Platform to Vehicle

- ▶ Component Library Product Line : Component and type for standardization and reuse
- ▶ Platform Product Line : Modularization of the core technology of the E-Mobility system for reuse
- ▶ System Product Line : System configuration and data flow design including system variant
- ▶ Vehicle Product Line : Specific vehicle system function, software, hardware, communication for mass production



- | | | | |
|----------------------------|------------------------------------|-----------------------------------|--------------------------------------|
| ▶ Function block | ▶ Feature & Requirement | ▶ System specific feature & req. | ▶ Tailored vehicle feature & req. |
| ▶ SW component type | ▶ Core technology function (Logic) | ▶ System specific function | ▶ Tailored vehicle specific function |
| ▶ HW component | ▶ Core technology SW module | ▶ System SW architecture | ▶ Tailored vehicle SW architecture |
| ▶ Interface with data type | ▶ Core HW/Network topology | ▶ System HW architecture | ▶ Tailored vehicle HW architecture |
| | ▶ Reused interface with data type | ▶ Reused interface with data type | ▶ Vehicle specific communication |

Variant Management

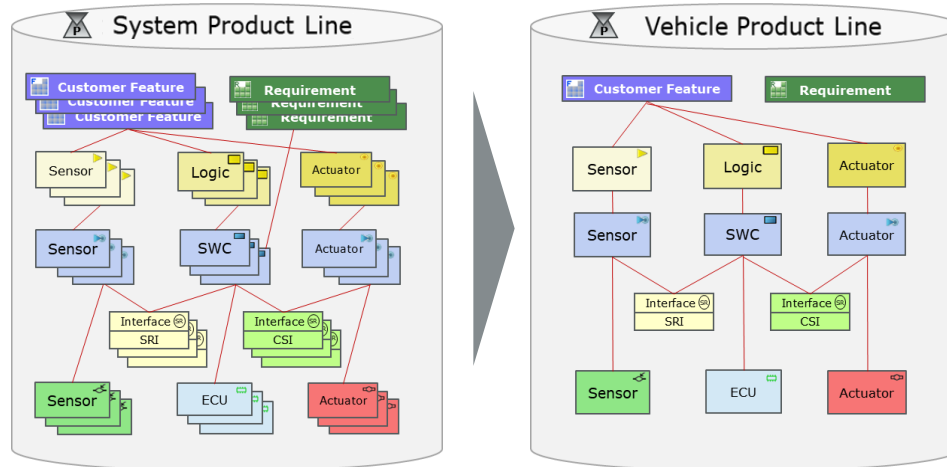


- Create Customer Feature relations using Variant Diagram

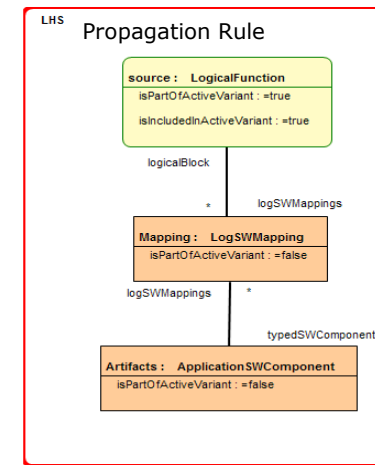
Equipment Template 2 / -;0 (Equipment Template) - /Feature Selection/Variants/Product Line Management

I...	Set/Customer Feature	Vehicle 2.1 (Alternative)	Vehicle 2.2 (Alternative)
<input checked="" type="checkbox"/>	Vehicle 2 / -;0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Engine / -;0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Gasoline / -;0	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Diesel / -;0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Transmission / -;0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Automatic / -;0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Automated Manual / -;0	<input type="checkbox"/>	<input type="checkbox"/>

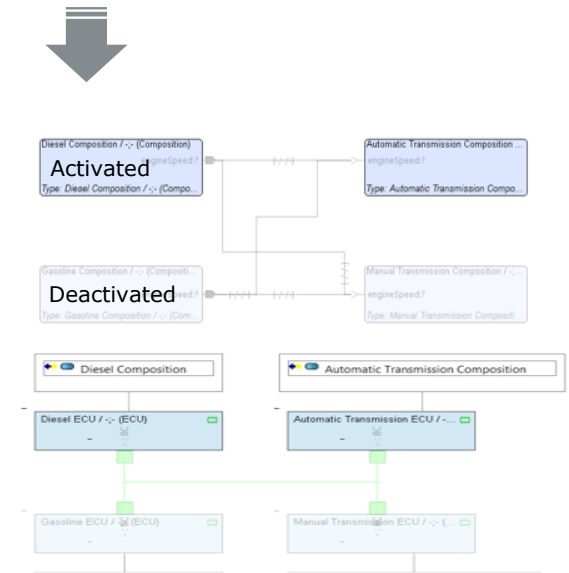
- Configure Alternatives by selecting Customer Features using variant templates



- Derive a new product line to create a vehicle-specific system using the propagated artifacts



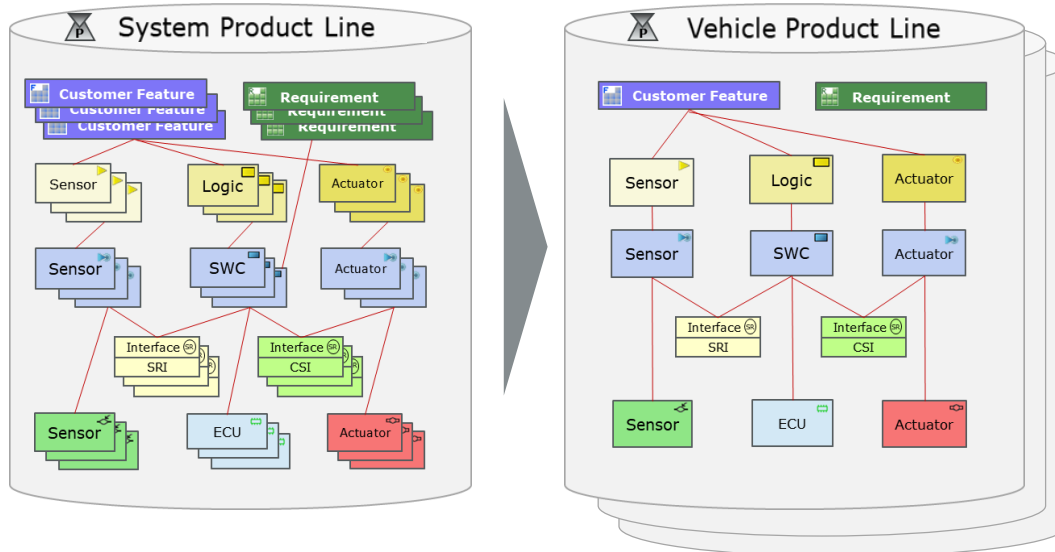
- Propagate artifacts that are mapped to the Customer Features into an Architecture Variant container using Propagation Rule



Product Line Derivation Method

- ▶ PREEvision supports three product line derivation methods (Clone & own / Reuse / Asset)
- ▶ Each of the three methods has a different mechanism

How to transfer the data from platform to system and system to individual vehicle product line?



1. Copy (Clone & own)

Relation is broken



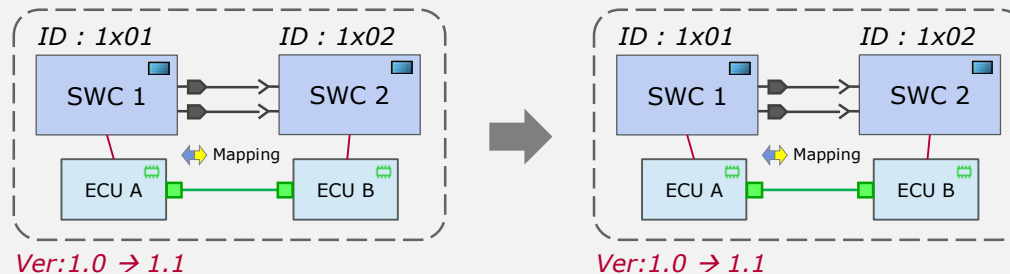
2. Reuse

Synchronized



3. Asset

Synchronized Set

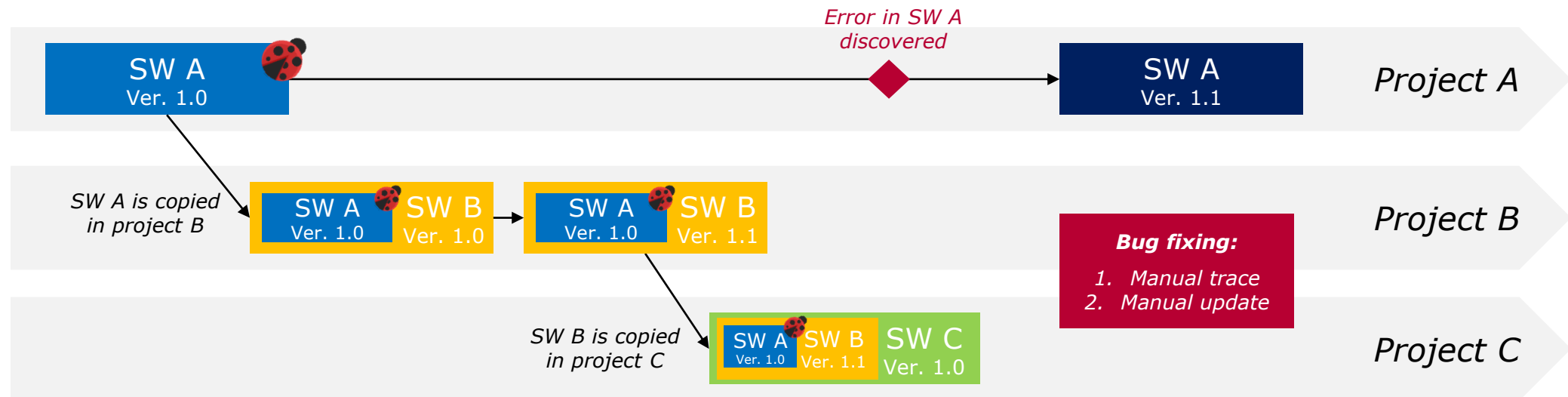


Clone & own approach

Reuse is nothing new to the automotive industry

- ▶ Goal: Taking advantage of commonality shared across vehicle families
- ▶ Typical approach: Clone & own approach

Example: Clone & own and bug fixing over time



Biggest disadvantage of a Clone & own approach:

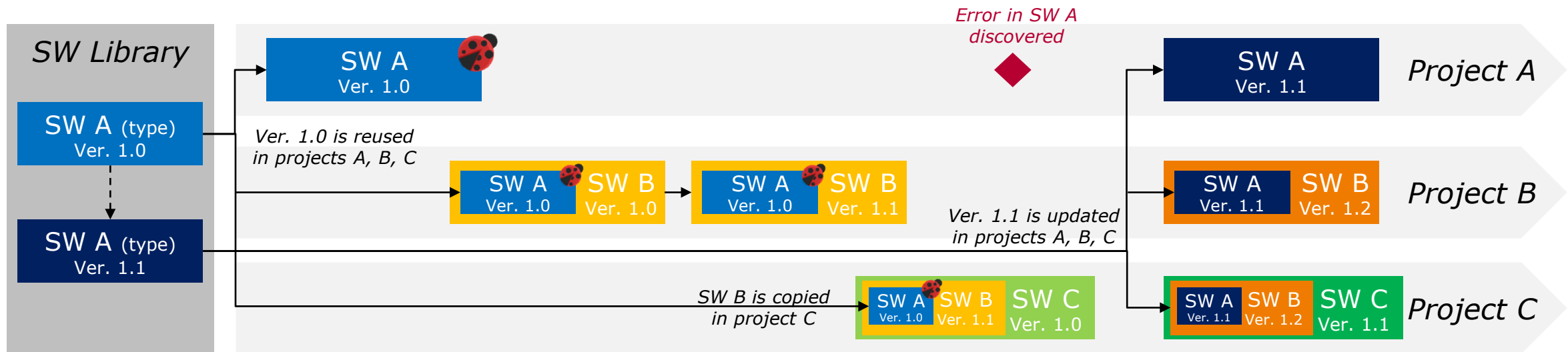
- ▶ Changes need to be updated manually over multiple projects!
- ▶ **High effort** and **error prone!**

Library-based reuse approach

Library-based standardization and reuse

- ▶ Library: Management of reusable components
- ▶ Projects: Instantiation and **update** of library components

Example: Library-based SW with reuse in projects and bug fixing over time



Biggest advantage of a library-based approach:

- ▶ Type – Instance Concept: **No copies, but reuses!**
- ▶ New revisions can be updated to projects very efficiently!

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System Requirement Specification Generation

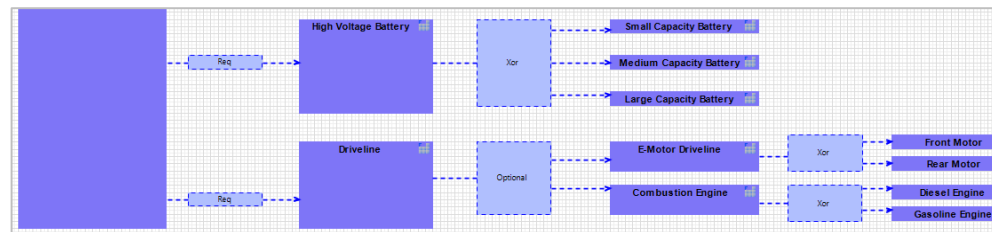
Summary

Customer Feature and Requirement Design

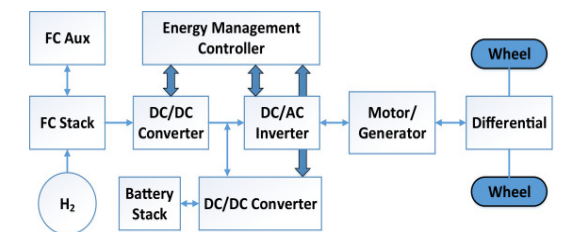
- ▶ E-Mobility Platform Feature List is created by separating common and variation point of each system
- ▶ Through Feature Condition Diagram, user can select effective feature combination and reduce human Error
- ▶ System Requirement List describes the technical requirements or the regulations of the system

Name	Description
E-Mobility System (Variant Diagram)	
4.1 E-Mobility Platform / -> (Customer Feature)	E-Mobility Platform
4.1.1 Electric Power Source / -> (Customer Feature)	Electric Power Source
4.1.1.1 External Charge / -> (Customer Feature)	Charging function from external power
4.1.1.1.1 Boosting Charge / -> (Customer Feature)	Rapid charging function through quick charging terminal(~380V)
4.1.1.1.2 Slow Charge / -> (Customer Feature)	Charging function from general household voltage terminals(220V~)
4.1.1.2 Fuel Cell Stack / -> (Customer Feature)	Fuel Cell Stack
4.1.1.2.1 Capacity / -> (Customer Feature)	The capacity of the fuel cell stack is expressed in kW, and when it is 60kW, it is referred to as a large capacity
4.1.1.2.1.1 80 kW / -> (Customer Feature)	Fuel Cell Stack with 80kW capacity
4.1.1.2.1.2 100 kW / -> (Customer Feature)	Fuel Cell Stack with 100kW capacity
4.1.1.2.2 Feature / -> (Customer Feature)	System Feature
4.1.1.2.2.1 H2 Supply / -> (Customer Feature)	Hydrogen supply function
4.1.1.2.2.2 FC temperature Control / -> (Customer Feature)	Fuel cell temperature status check function
4.1.1.2.2.3 O2 Supply / -> (Customer Feature)	Oxygen flow and quantity measurement function
4.1.1.2.2.4 Cooling Control / -> (Customer Feature)	Cooling cell stack function
4.1.1.2.2.5 H2 Tank Management / -> (Customer Feature)	Condition and leak of hydrogen tank check function
4.1.1.2.2.6 Battery Management / -> (Customer Feature)	Battery status and voltage and current status measurement Function
4.1.1.2.2.7 FC Stack Protection / -> (Customer Feature)	Fuel Cell Stack protection from high temperature
4.1.1.2.2.8 TQ Generation and Regulation / -> (Customer Feature)	Motor torque and regenerative braking control Function
4.1.1.2.2.9 Power Distribution / -> (Customer Feature)	Power distribution for high voltage
4.1.1.2.2.10 FC Monitoring / -> (Customer Feature)	Cell Stack monitoring function
4.1.2 High Voltage Battery / -> (Customer Feature)	High Voltage Battery
4.1.2.1 Small Capacity Battery / -> (Customer Feature)	Generally, Small Capacity Battery is used for fuel cell electric vehicle, and its capacity is around 1kWh.
4.1.2.2 Medium Capacity Battery / -> (Customer Feature)	Generally, Medium Capacity Battery is used for Hybrid electric vehicle, and the capacity is more than 1kWh.
4.1.2.3 Large Capacity Battery / -> (Customer Feature)	Large Capacity Battery
4.1.2.3.1 60 kWh / -> (Customer Feature)	1st Grade of large capacity battery. 60 kWh means power generation for hour in the battery cell.
4.1.2.3.2 80 kWh / -> (Customer Feature)	Large Capacity Battery is for long range distance driving. In general Electric Vehicle choices these battery

<E-Mobility Platform Feature List>



<Feature Condition Diagram>

LEVEL	ID	Hierar...	Text	Description
20-3	REQ_41534		4.1.2.2 System Structure	
21-4	REQ_41559		--- HW Structure	The structure of FCEV system is divided into FC Stack part, Inverter and Converter part and Motor/ Generation part as shown below. 
22-3	REQ_41535		4.1.2.3 System Feature	
23-4	CF_01		4.1.2.3.1 H2 Supply	
24-5	CF_01_001		--- H2 Supply Target Pressure Calculation	H2 Supply Target Pressure Calculation <ul style="list-style-type: none"> H2 Supply acquires object information and sends it to the FCEV system as input. H2 Tank is divided into Variant according to Range, and the range and type to ranges are different. In general, Target Pressure is calculated by FCU for acknowledging exact pressure calculation
25-5	CF_01_002		--- H2 Supply Pressure Fluctuation Control	H2 Supply Pressure Fluctuation Control <ul style="list-style-type: none"> H2 Supply Pressure Fluctuation Control can detect the fluctuation of H2 Tank. Final Fluctuation Value determining control mode.
26-5	REQ_41563		--- Current Calculation	Current Calculation <ul style="list-style-type: none"> Current Calculation is the most accurate means to detect current in min/max range. Current Calculation is divided into Mono camera and Stereo camera. Detection angle and resolution vary depending on the variant.
27-5	CF_01_001		--- H2 Purge Control	H2 Purge Control

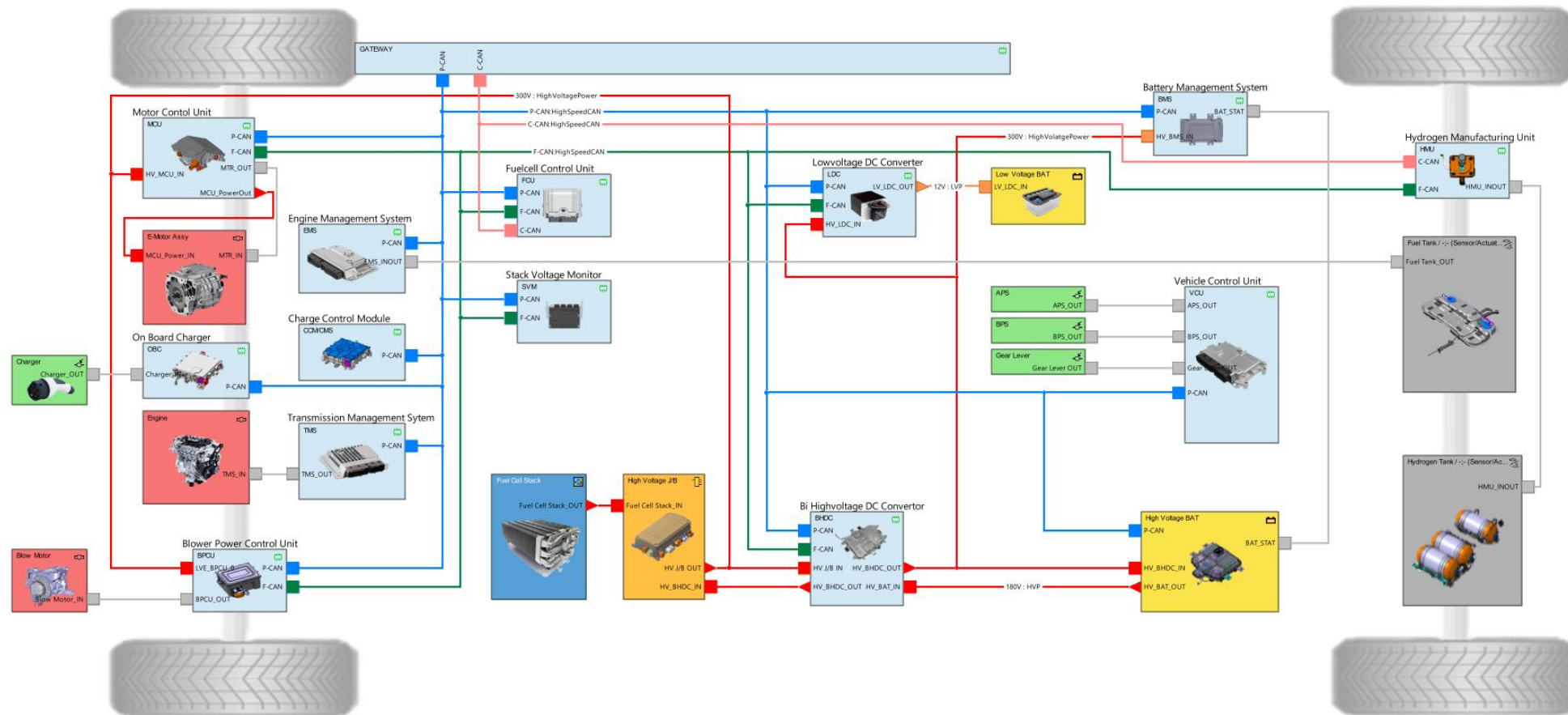
<System Requirement List>

- ▶ Software Architecture defines system functions and interfaces at the technical implementation level
- ▶ Software components are instantiated and reused based on the types of E-platform library
- ▶ Each software component or composition is mapped to the ECU to be implemented



Hardware Architecture and Network Topology Design

- ▶ In hardware architecture, communication and hardwire connections between sensors, ECUs, and actuators are described
- ▶ Network topology describes high voltage power distribution lines, converters and batteries of E-Mobility system
- ▶ The connection between cooperative ECUs are describes on the topology to enable hardware End-to-End design

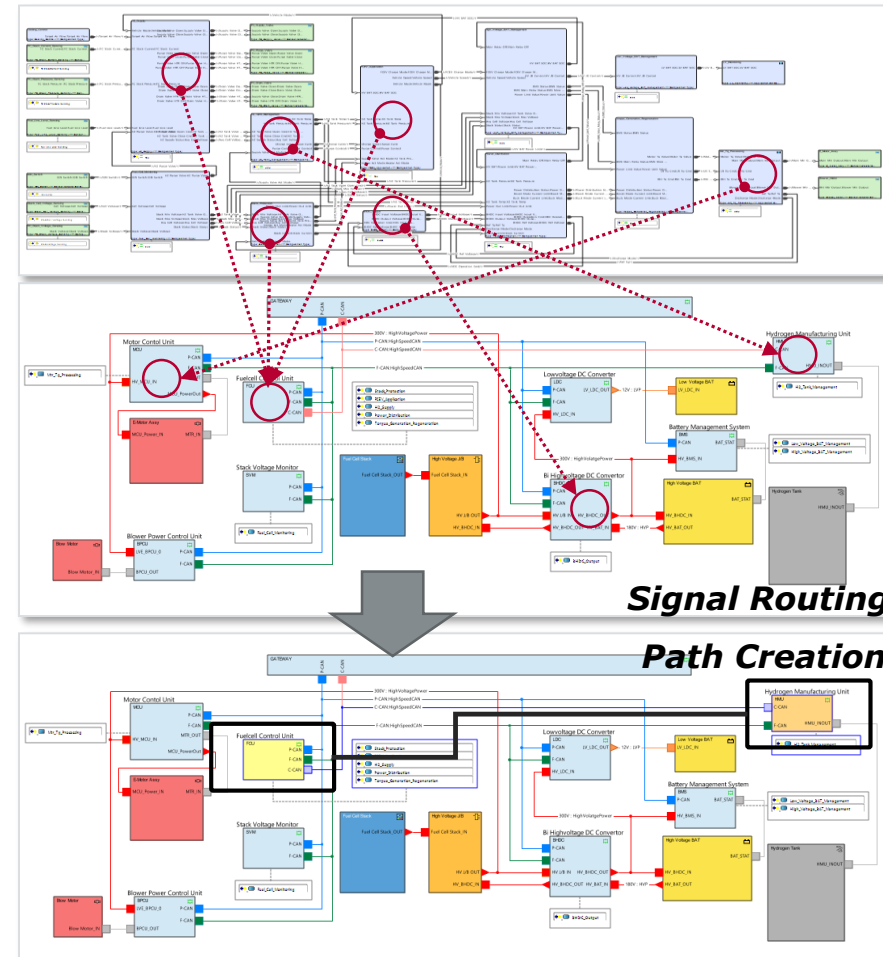


E-Mobility Architecture Design with Traceability and Consistency

Communication Design



Signal Assignment to Frame(Message)



***Model View (v)**

- Power Distribution Connection13 / -> (Power Distribution)
- Power Distribution Connection14 / -> (Power Distribution)
- Power Distribution Connection15 / -> (Power Distribution)
- Schematic Connections
- Schematic Layer / -> (Schematic Package)
- Wiring Harness Package / -> (Wiring Harness Package)
- FCEV System Communication / -> (Communication Package)
- Communication Package / -> (Communication Package)
- Layout Package / -> (Layout Package)
- Frame / -> (Layout Package)
- Frame Layout Table / -> (Frame Layout Table)
- FCU_H2SupplyCmd / -> (CAN Frame)
- PDU / -> (Layout Package)
- Signal / -> (Layout Package)
- Avg_Cell_Voltage_H2_Supply_Status-H2_Supply_Status [32]
- H2_Purge_Valve_H2_Purge_Valve-H2_Purge_Valve [32]
- Stack_Min_Voltage_H2_Tank_Valve_Open_Cmd-H2_Tank_Valve_Open_Cmd [32]
- Network_Management_Package / -> (Network Management Package)
- Transport_Layer_Package / -> (Transport Layer Package)
- Transformer_Configuration_Package / -> (Transformer Configuration Package)
- FCEV System Diagnostics / -> (Diagnostics)
- Mappings / -> (Mappings)
- Analysis / -> (Analysis)
- FCEV Hazard Analysis / -> (Safety Analysis)
- Halla FCEV System / -> (Hazard Analysis Package)

***Layout Package::Signal Definition Editor**

Mapping State	Count
UnMapped Signals	0
UnAssigned Signals	0
Signals never sent	0
Signals never received	0
Signals total	9

System Signal	Bit Length	Base Type	Base Type Encoding	Computation Method	Unit	Offset	Min	Max	Factor	Raw Initial Value	Physical
FadeInTiming_FadingMode	4	slnt4	Unkonwn (UNKOWN)								
FadeOutTiming_FadingMode	4	slnt4	Unkonwn (UNKOWN)								
Fading_ControlCmdFront	4	slnt4	Unkonwn (UNKOWN)								
Fading_ControlCmdRear	4	slnt4	Unkonwn (UNKOWN)								
FadingState_FrontFadingState	4	slnt4	Unkonwn (UNKOWN)								
FadingState_RearFadingState	4	slnt4	Unkonwn (UNKOWN)								
OnOffOnDoorOpen_InsideLig...	2	slnt2	Unkonwn (UNKOWN)								
OpenClosed_DoorStatus	1	Bool	Unkonwn (UNKOWN)								
SDS_DD_State	1	Bool	Unkonwn (UNKOWN)								

***Layout Package::Signal Editor (Packaging and Routing)**

Signals	SPA	PDU	PFA	Frames	Frame Tx	PDU Tx	SignalTx	Routing of STx
FadeInTiming_FadingMode [4] / ...	0A [0]	IPDU ...	PDU [0]	FadingMode / ->0 (CAN Fram	FadingMode	FadeInTiming_FadingM	FadeInTiming_FadingM	Roof / ->0 (R
FadeOutTiming_FadingMode [4] / ...	0A [1]	IPDU ...	PDU [0]	FadingMode / ->0 (CAN Fram	FadingMode	FadeInTiming_FadingM	FadeInTiming_FadingM	Body / ->0 (R
Fading_ControlCmdFront [4] / -> ...	0A [0]	IPDU ...	PDU [0]	FadingControl / ->0 (CAN F	FadingControl	FadingControl	FadingControl	Roof / ->0 (R

ESP::System Signal Mapping Editor (ECU Based)

ECU	Mapped SW Component	Port	Data Element	System Signal Mapping	Signal / Signal Group	Transmittable Signal
ESP	FrontLeft	FLPPVehicleSpeed:WheelSpeed	WheelSpeed	COM:System Signal Mapping96	WheelSpeed_FLPPVehicleSpeed	WheelSpeed_FLPPVehicleSpeed
	RearLeft	RLPPVehicleSpeed:WheelSpeed	WheelSpeed	COM:System Signal Mapping97	WheelSpeed_RLPPVehicleSpeed	WheelSpeed_RLPPVehicleSpeed
	FrontRight	FRPPVehicleSpeed:WheelSpeed	WheelSpeed	COM:System Signal Mapping95	WheelSpeed_FRPPVehicleSpeed	WheelSpeed_FRPPVehicleSpeed
	RearRight	RRPPVehicleSpeed:WheelSpeed	WheelSpeed	COM:System Signal Mapping98	WheelSpeed_RRPPVehicleSpeed	WheelSpeed_RRPPVehicleSpeed

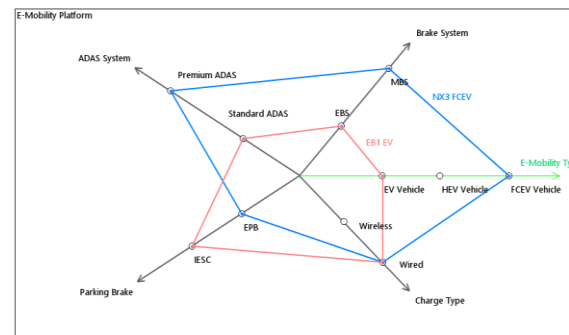
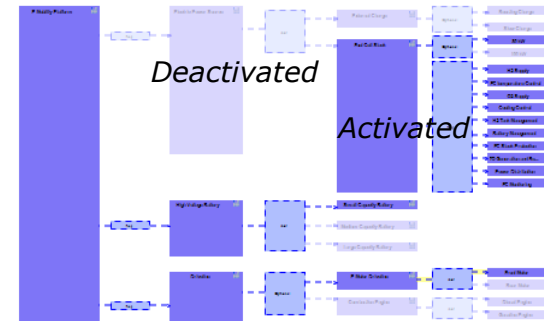
Architecture Variant Design

- ▶ Customer feature selection enables deployment from E-Mobility Platform to each EV, HEV, and FCEV System Product Line
- ▶ Corresponding artifacts mapped to the selected feature can be activated or deactivated through variant activation
- ▶ This can be applied not only to the system but also to the entire vehicle, and the engineer in charge of each vehicle system can continue the detailed design within the deployed product line

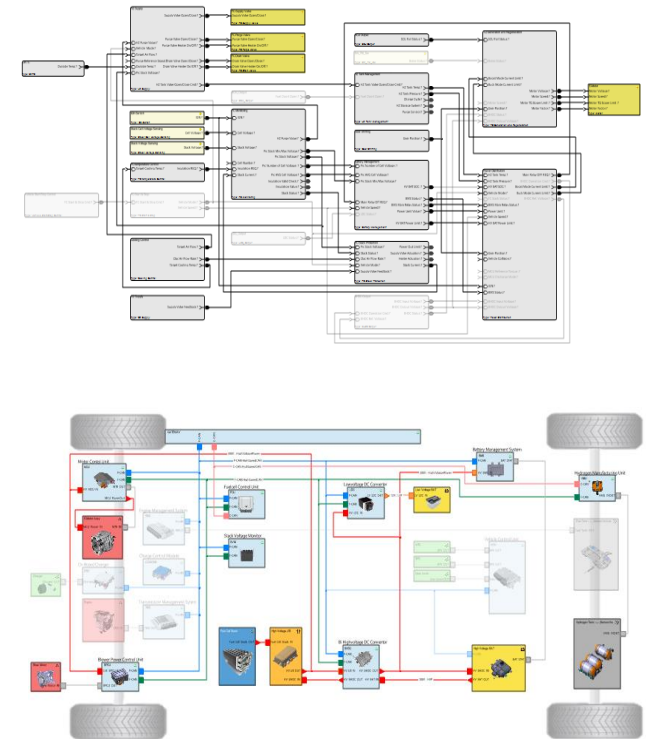
E-Mobility Type / -:- (Equipment Template) - /Variant Package/Product Line Management/1. E-Mobility Platform Product Line/20_E-Mobility

Set/Customer Feature	EV Vehicle / -:-	HEV Vehicle / -:-	FCEV Vehicle / -:-
4.1 E-Mobility Platform / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1 Electric Power Source / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.1 External Charge / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.1.1 Boosting Charge / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.1.2 Slow Charge / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2 Fuel Cell Stack / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.1 Capacity / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.1.1 80 kW / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.1.2 100 kW / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2 Feature / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.1 H2 Supply / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.2 FC temperature Control / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.3 O2 Supply / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.4 Cooling Control / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.5 H2 Tank Management / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.6 Battery Management / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.7 FC Stack Protection / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.8 TQ Generation and Regenerati...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.9 Power Distribution / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.1.2.2.10 FC Monitoring / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.2 High Voltage Battery / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.2.1 Small Capacity Battery / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.2.2 Medium Capacity Battery / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.2.3 Large Capacity Battery / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.2.3.1 60 kWh / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.2.3.2 80 kWh / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3 Driveline / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3.1 E-Motor Driveline / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3.1.1 Front Motor / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3.1.2 Rear Motor / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3.2 Combustion Engine / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3.2.1 Diesel Engine / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4.1.3.2.2 Gasoline Engine / -:-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Feature Selection



Activate and deactivate artifacts



PREEvision Tool Demo

The screenshot displays the PREEvision Architect software interface, which is used for E-Mobility architecture design. The interface is divided into several panes:

- Model View (-):** A tree view on the left showing the project structure, including product line packages and resources.
- E-Mobility System::E-Mobility Platform Customer Feature:** A table listing features and their descriptions.

Name	Description
4.1.1.1.2 Slow Charge / -	Charging function from general household voltage
4.1.1.2 Fuel Cell Stack / -	Fuel Cell Stack
4.1.1.2.1 Capacity / -	The capacity of the fuel cell stack is expressed in
4.1.1.2.1.1 80 kW / -	Fuel Cell Stack with 80kW capacity
4.1.1.2.1.2 100 kW / -	Fuel Cell Stack with 100kW capacity
4.1.1.2.2 Feature / -	System Feature
- E-Mobility System::E-Mobility System Requirement:** A table listing requirements and their descriptions.

Name	Description
H2 Purge Control - CF_01_001 / -	H2 Purge Control
Condensate Drain Control - CF_01_002 / -	Condensate Drain Control
Valve Actuation - REQ_41563 / -	Valve Actuation
Heater Actuation - CF_01_001 / -	H2 Supply Target Pressure
Definition (must)28 - REQ_41562 / -	Supplying H2 represents the physical
4.1.2.3.2 O2 Supply - CF_02_001 / -	O2 Supply
- E-Mobility Logical Architecture (150%):** A block diagram showing the logical architecture of the E-Mobility system.
- FCEV System Logical Architecture (120%):** A block diagram showing the logical architecture of the FCEV system.
- FCEV_System_Software:** A block diagram showing the software architecture of the FCEV system.
- E-Mobility System:** A block diagram showing the overall system architecture.
- E-Platform Network Topology:** A block diagram showing the network topology of the E-Platform.
- FCEV Network Topology:** A block diagram showing the network topology of the FCEV system.
- FCEV:** A block diagram showing the FCEV system architecture.
- Property View:** A table showing the properties of the selected element.

Agenda

Overview

PREEvision Introduction

Model Based System Engineering

Product Line Management with Reuse Concept

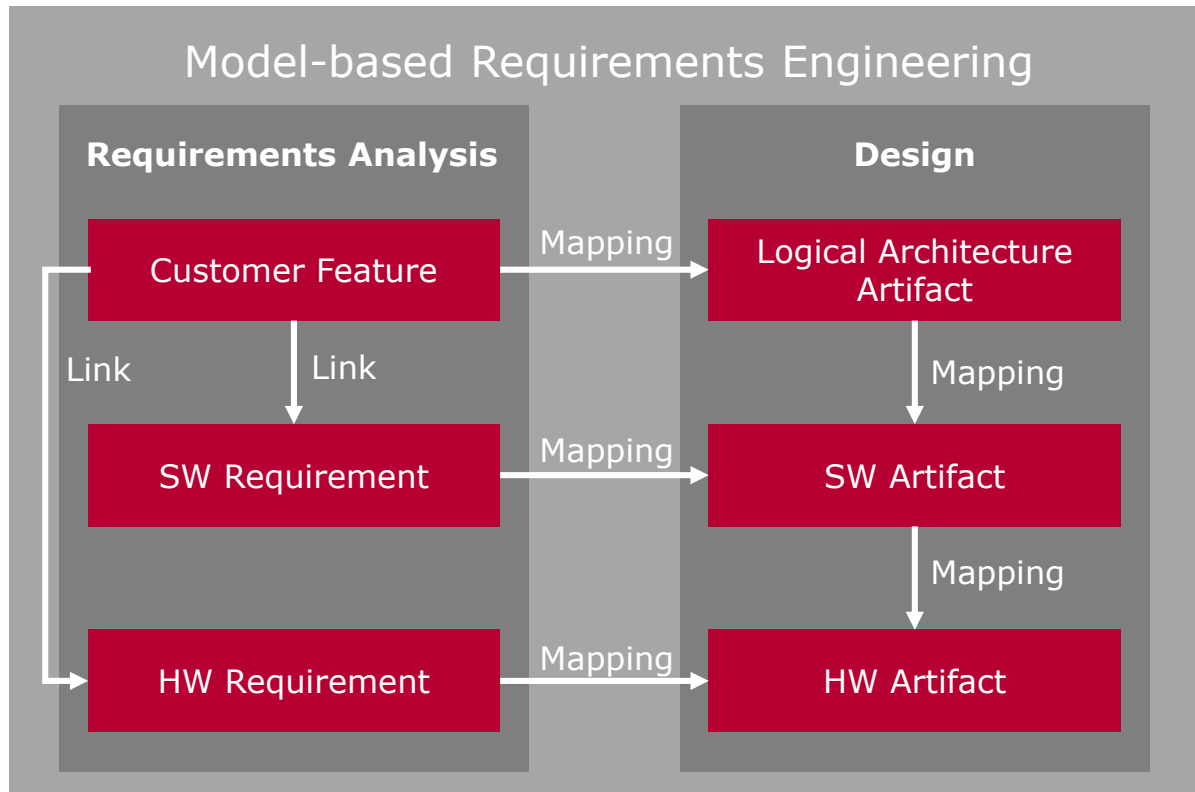
E-Mobility Architecture Design with Traceability and Consistency

► **Report Generation**

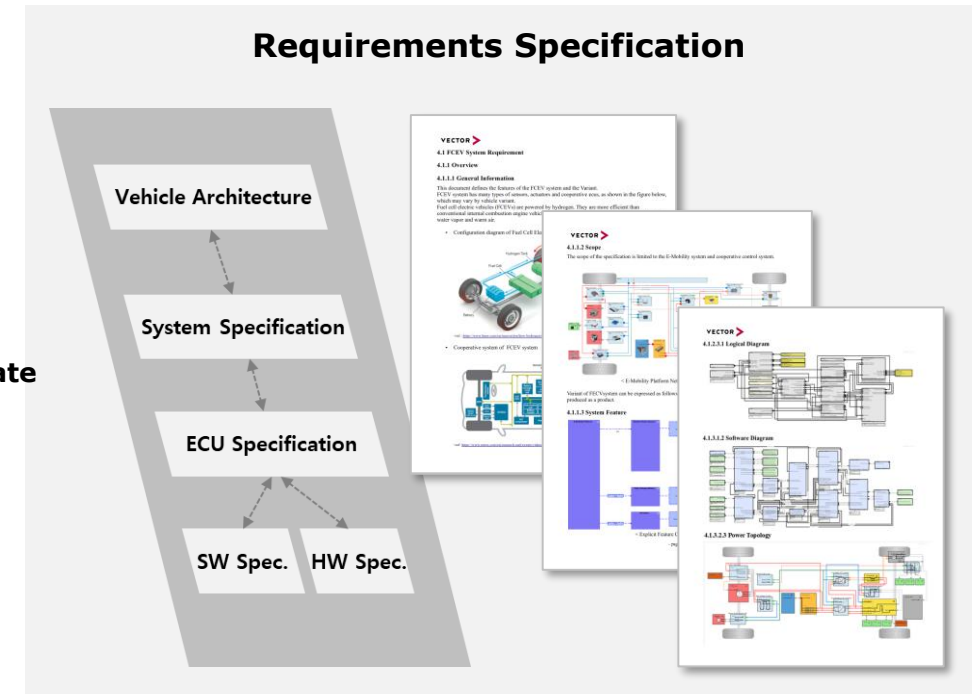
Summary

Requirement Specification

- ▶ PREEvision supports an integrated requirements-engineering and management
- ▶ This allows a bidirectional traceability starting from requirements, going over design artifacts and up to test data
- ▶ Users can apply the company's own document template

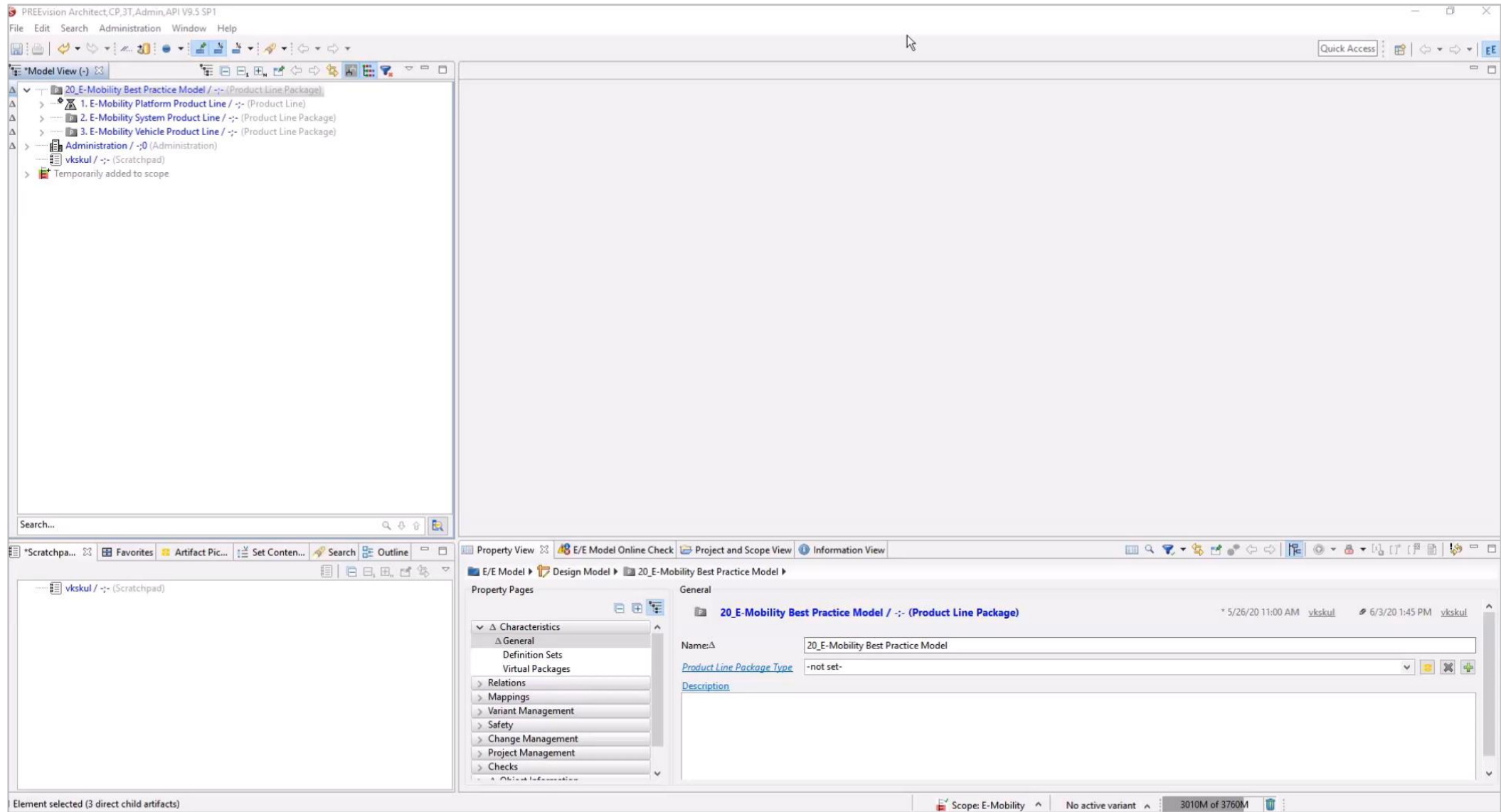


Generate



Report Generation

Video Tutorial



Agenda

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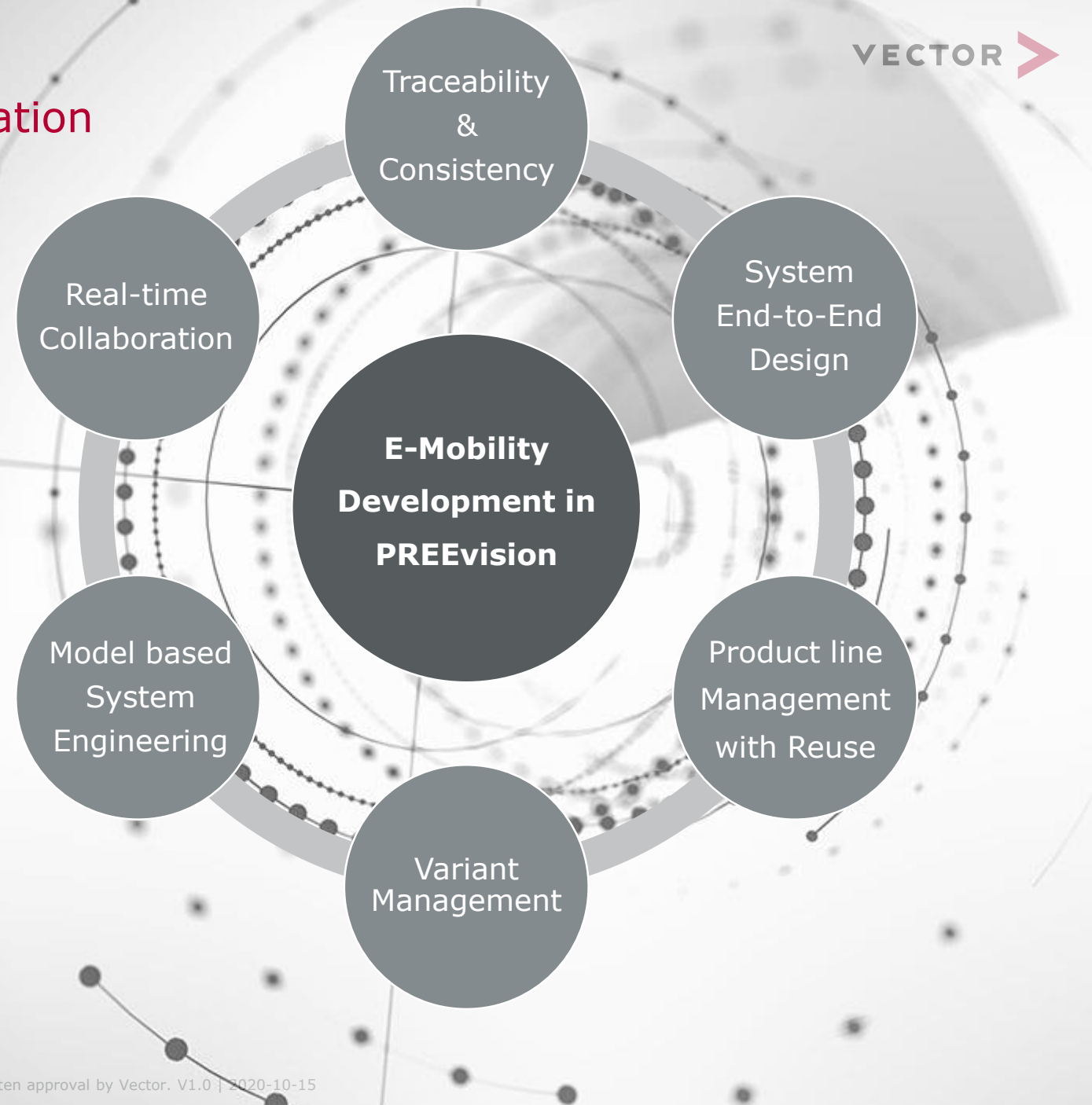
Report Generation

► **Summary**

Summary

Efficient and reliable product derivation

- ▶ Using the model-based design tool, it is possible to develop the E-Mobility system from requirements to test
- ▶ The product lineup can be extended in an efficient way by reusing the platform
- ▶ It is possible to collaborate in real time with the developer of the cooperative control system based on the database server
- ▶ Change management and version control for all data sets can be performed using assets
- ▶ Since full traceability and consistency can be secured, a reliable and robust system can be designed



PREEvision – This is Model-Based E/E Engineering

www.vector.com/preevision

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