



TechTalk **SOFTWARE**

Agenda

4:35pm



Welcome

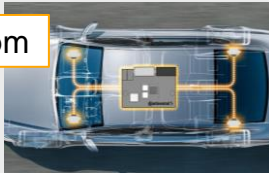
Kick-Off: Continental TechShow 2021
Vincent Charles, Head of Media Relations

4:40pm



Software as the key to assisted and automated driving.
Dr. Ismail Dagli, Senior Vice President R&D, Advanced Driver Assistance Systems

5:05pm



Function integration in end-to-end network solutions based on high-performance computer
Philipp Neubauer, Solution Manager Body HPC Platform

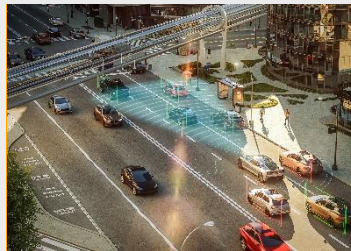
5:30pm



Driving innovation in the automotive industry: with the Continental Automotive Edge Platform (CAEdge) to new approaches in vehicle architectures and software.
Martin Schleicher, Head of Software Strategy, Holistic Engineering and Technologies

Closing

Next Technology Insights



Dr. Ismail Dagli

Senior Vice President R&D, Business Unit ADAS



“The future of Autonomous Driving will be determined by software – the transformation towards a software and data driven company is a strategic imperative.”

Continental's Autonomous Mobility Business

Leading Player with Track Record of Profitable Growth

> 100 mn

Units delivered

2017 – 2019

Radars

Cameras

Lidars

AD¹ Control Units

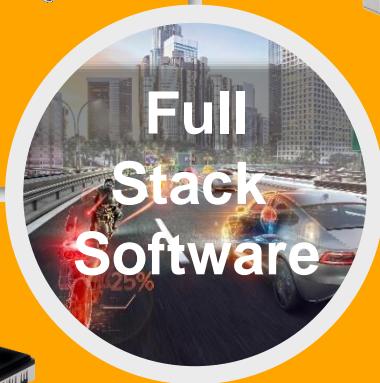
AD¹ Control Units



Cameras



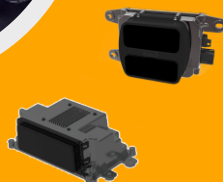
Full
Stack
Software



Radars



Lidars



25

OEMs

50

Brands

> 300

Models

¹ Assisted / Automated Driving

Continental's Portfolio for Automated Driving

Increasing Content and Complexity due to higher Automation Levels

Continental technology

in series

in series

from 2021

from 2021/22

Partly Automated Driving (SAE L2)

L2 "Performance"

"L2 Plus"

L2 "Premium"

Highly Automated Driving (HAD) (SAE L3)



HAD Ready



Software



Highway Assist
NCAP¹ 5 stars



Traffic Jam Companion
(hands-off ≤ 80 kph)



Highway Companion
(hands-off ≤ 130 kph)
L2 in extended
"Operational Design
Domain"



Cruising Chauffeur
Traffic Jam Chauffeur

AD High
Performance
Computer

optional

1

1

2

Radars

1 – 5

5 – 7

5 – 7

7

Cameras

1 – 2

6

6

9

Lidars

optional

≥ 2

Content per vehicle

L2

> 2x L2

> 4x L2

> 10x L2

¹ New Car Assessment Programme

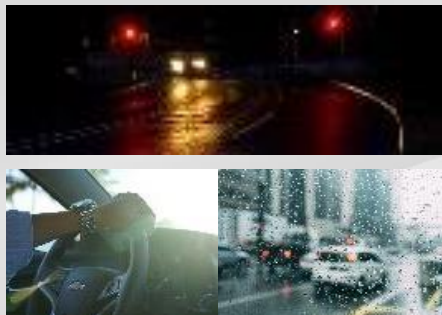
Radar – Fundamental for ADAS and AD

4D Imaging Radar Securing Technology Leadership

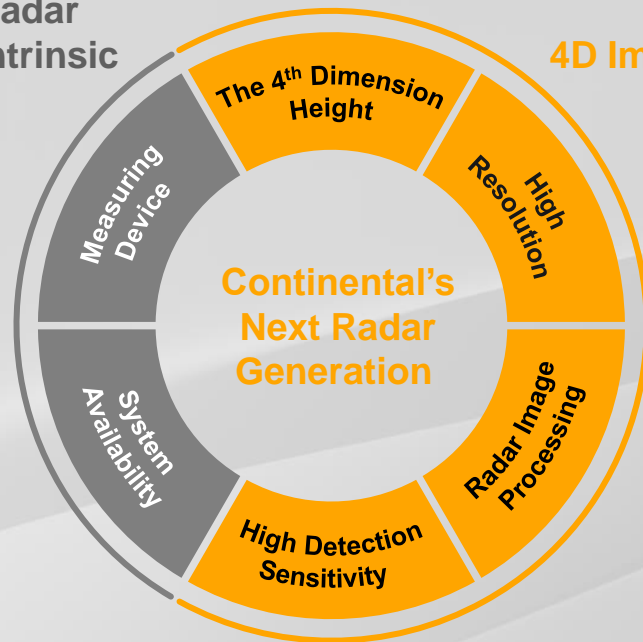
Precise distance and speed in real-time



Adverse weather conditions



Radar
intrinsic



NEW!
4D Imaging
Radar



Underridable
elevated objects



Non overridable
ground obstacles



Road boundaries



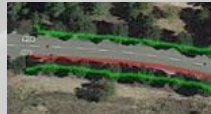
Debris/potholes



Complex/dense traffic



Landmarks



Success

Expected first to market

SOP: 2021



SOP: 2024

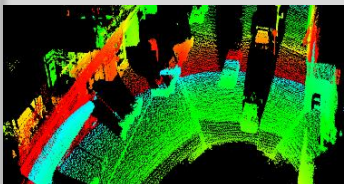


AI is Key for Sensor Fusion and Scene Interpretation

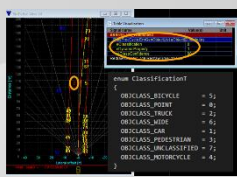
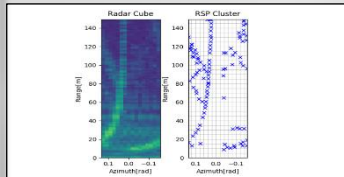
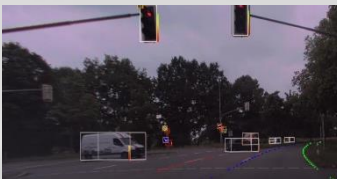
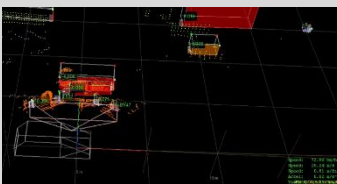
SENSE

Perception

Detection



Tracking & Env. Modeling



LiDAR



Point Cloud

Camera



Pixels

Radar



Point Cloud

Features

Features

Cluster

Objects

Objects

Objects

Fusion & Comprehensive Environment Modeling

PLAN

ACT

High Level Fusion

Detection

Tracking & Env. Modeling

Fusion / CEM

Mid Level Fusion

Detection

Fusion / CEM

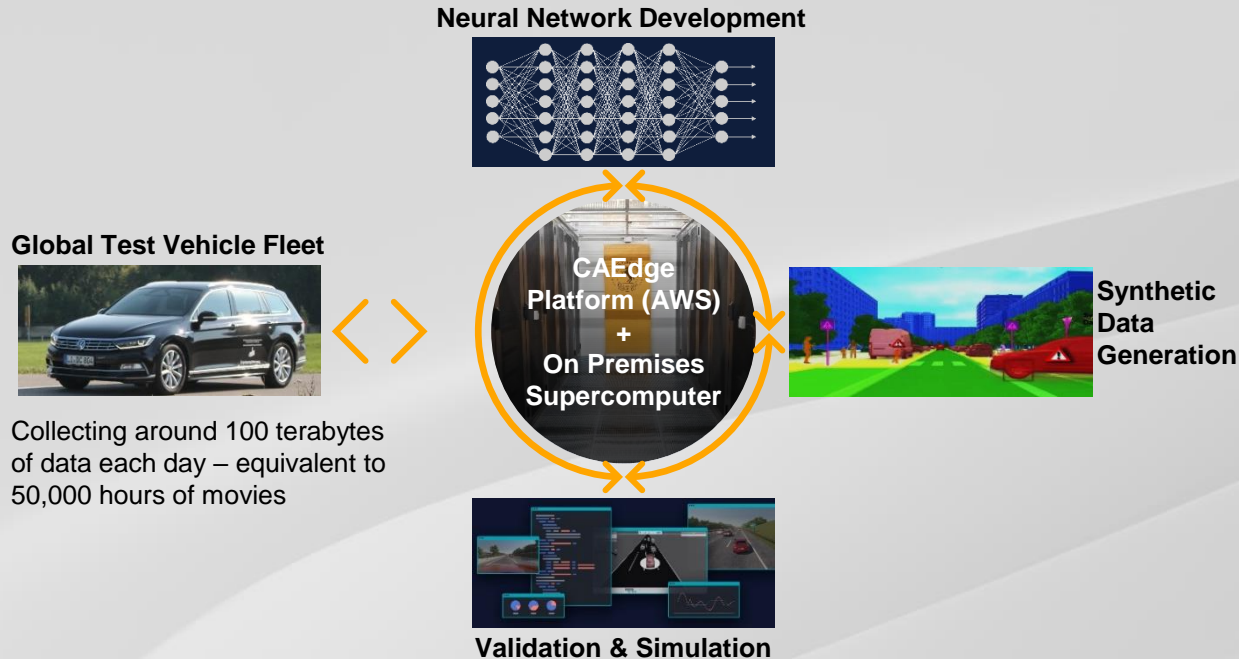
Low Level Fusion

Fusion / CEM

We Are Ready for the Challenges of the Future

AI and Simulation for the Next Era of AD Technologies

The Vital Importance of Data Quality & Efficient Data Management



AI Competence Center



- Core development of AI technologies
- Roll-out to product development teams

Software Stack and Hardware Platform Solutions

Modular & Scalable to Manage High Complexity

Full Stack Capability

Driving and Parking Functions



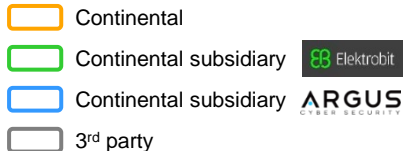
Perception



Operating System and Middleware



Software components from



High Performance Computer (AD HPC)

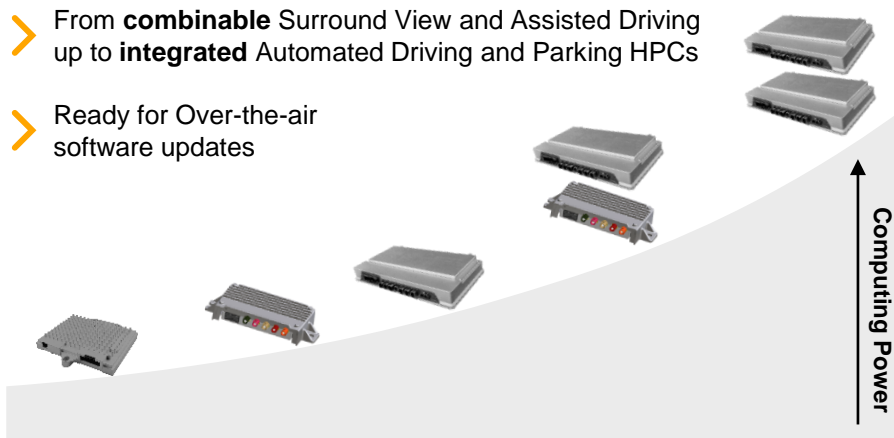
Partly Automated Driving (SAE L2)

"L2 Plus"
Performance Premium

Highly Automated Driving (SAE L3)

Fully Automated Driving (SAE L4)

- > From **combinable** Surround View and Assisted Driving up to **integrated** Automated Driving and Parking HPCs
- > Ready for Over-the-air software updates



Success

SOP: 2022 L2+



SOP: 2022/23 L2



Questions?



Philipp Neubauer

Solution Manager Body HPC Platform, Business Area VNI Central Engineering



„Autonomous and intelligent mobility requires a revolution of vehicle electronics. New architectures go beyond the vehicle: from the sensor to the cloud.“

End-to-end network solutions are based on Body High Performance Computers for a reliable low-latency connectivity.“

More than 50% of New Cars will be Connected in 2021

Market Trend: Digital Transformation Revolutionizing E/E Architecture



Automated Driving



Alternative Drive



Cloud Services



IoT



Software Defined Cars



Shared Mobility

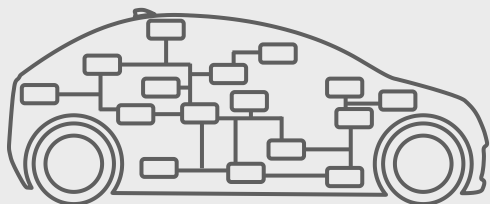


* E/E = electrical / electronic, IoT = Internet of Things

Leading the Way towards Software-defined Vehicles

Complexity & Functional Growth with Current Approach Reaching its Limits

Up2now

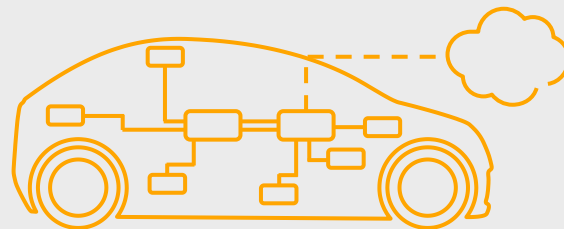


Patchwork Architecture

- › Up to ~100 ECUs, limited compute power
- › Functionality isolated in ECUs
- › Lots of wires
- › Limited cloud-based functionality

User Expectation: Pleasure, Safety & Comfort

Going forward



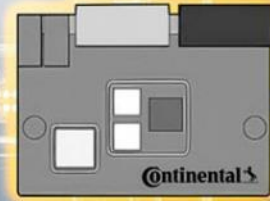
Function-defined Architecture

- › Few HPCs & Zones, significant compute power (more processor cores)
- › Functions defined by SW (HW abstraction)
- › ~50% reduction of wires
- › Always connected

User Expectation: Smart IoT device



What is a
HPC?



Definition of Body HPC

Cornerstone of Modern Vehicle Architectures



Data & Communication Hub

- › Central data and service management for cloud/IoT services
- › Data routing



Integration Platform

- › Software & services integration of multiple vendors
- › X-domain functions integration (up to ASIL-D)



Over-the-Air Master

- › OTA update and upgrade of functions and firmware
- › OTA software distribution cross vehicle E/E architecture



Cyber Security Master

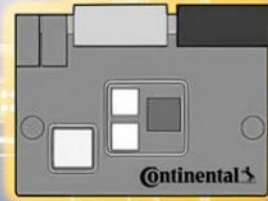
- › Adaptive firewall
- › Secure access & data storage



*IoT = Internet of Things, E/E= electrical/electronic, OTA = over-the-air

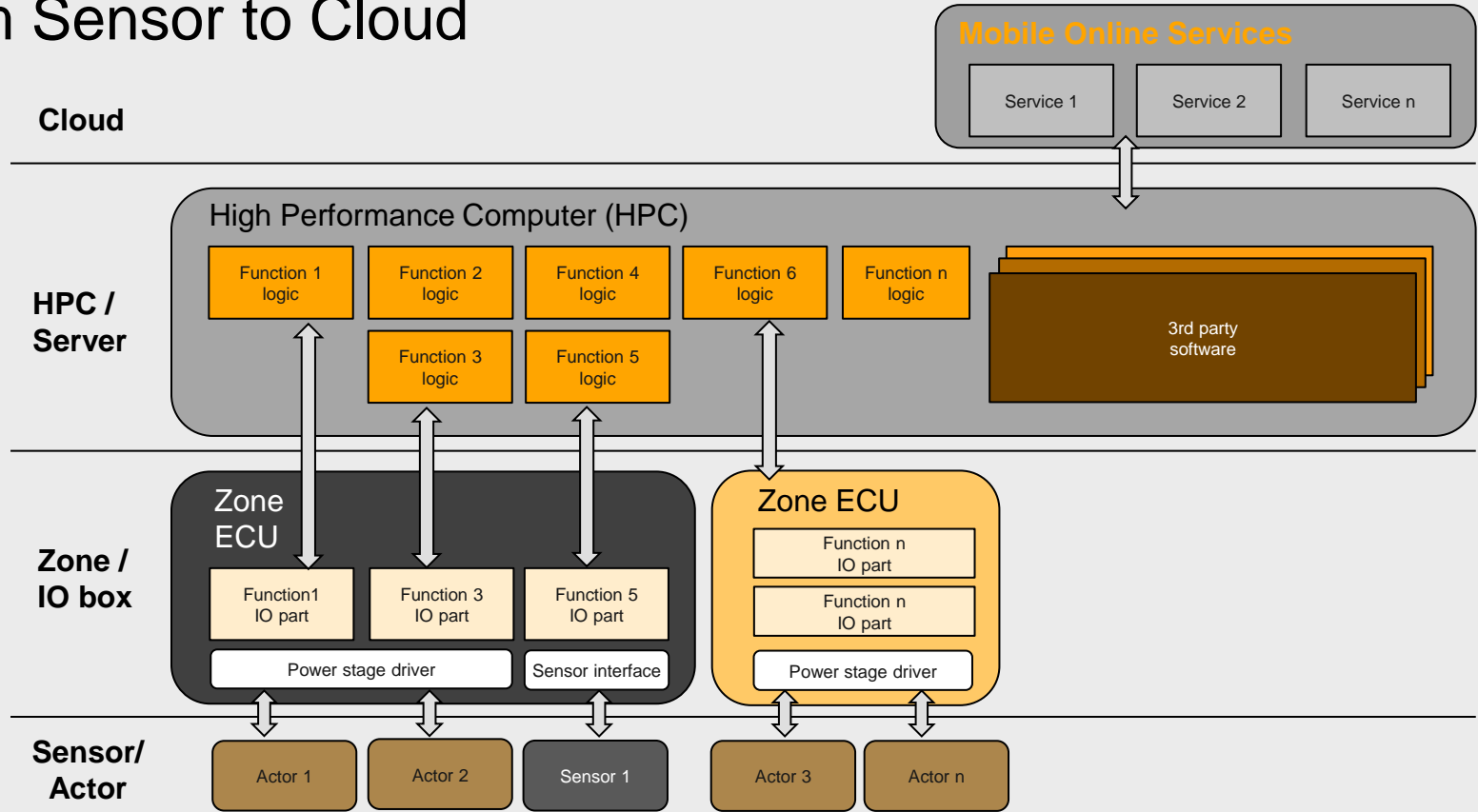


How to
integrate?



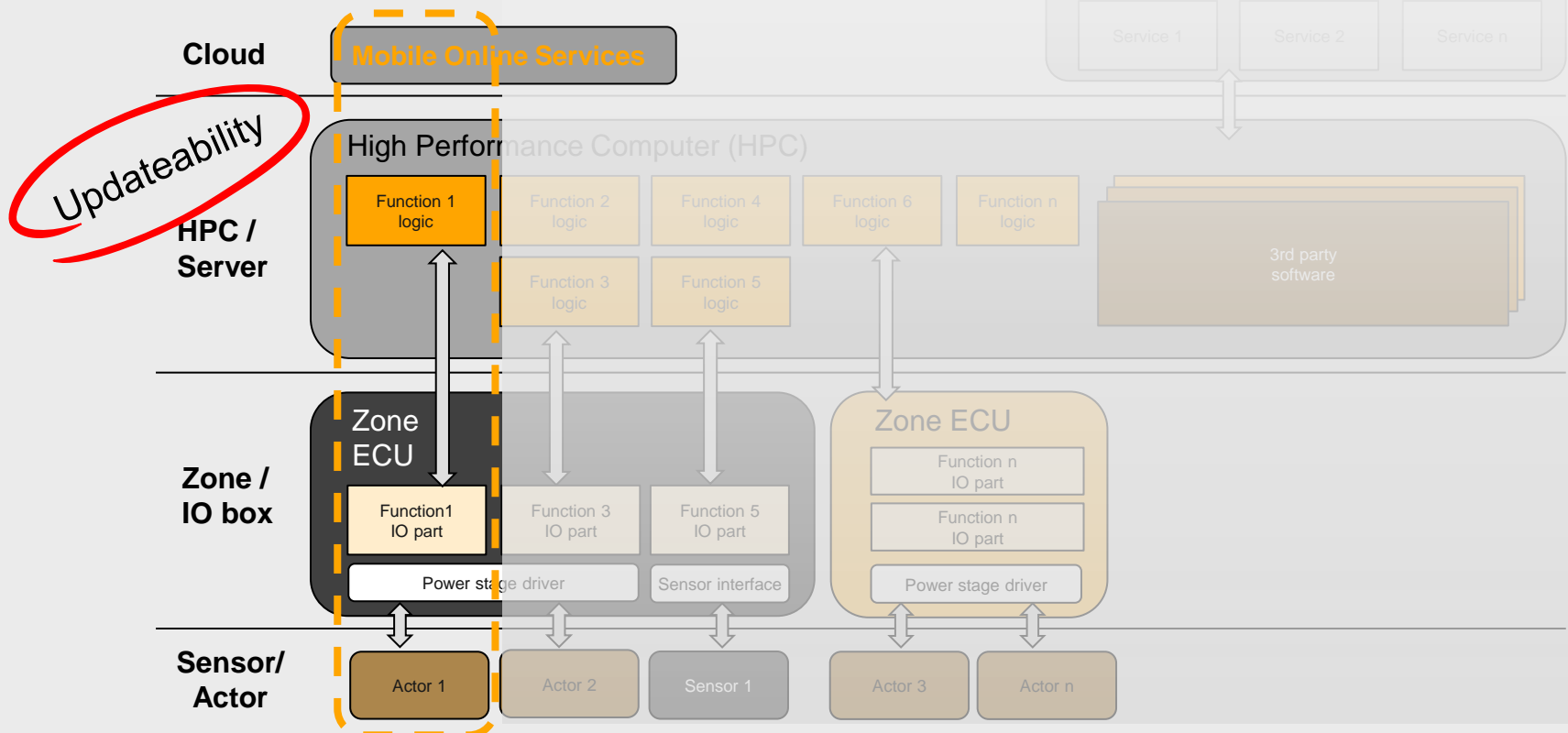
Server Based Vehicle Architecture

from Sensor to Cloud



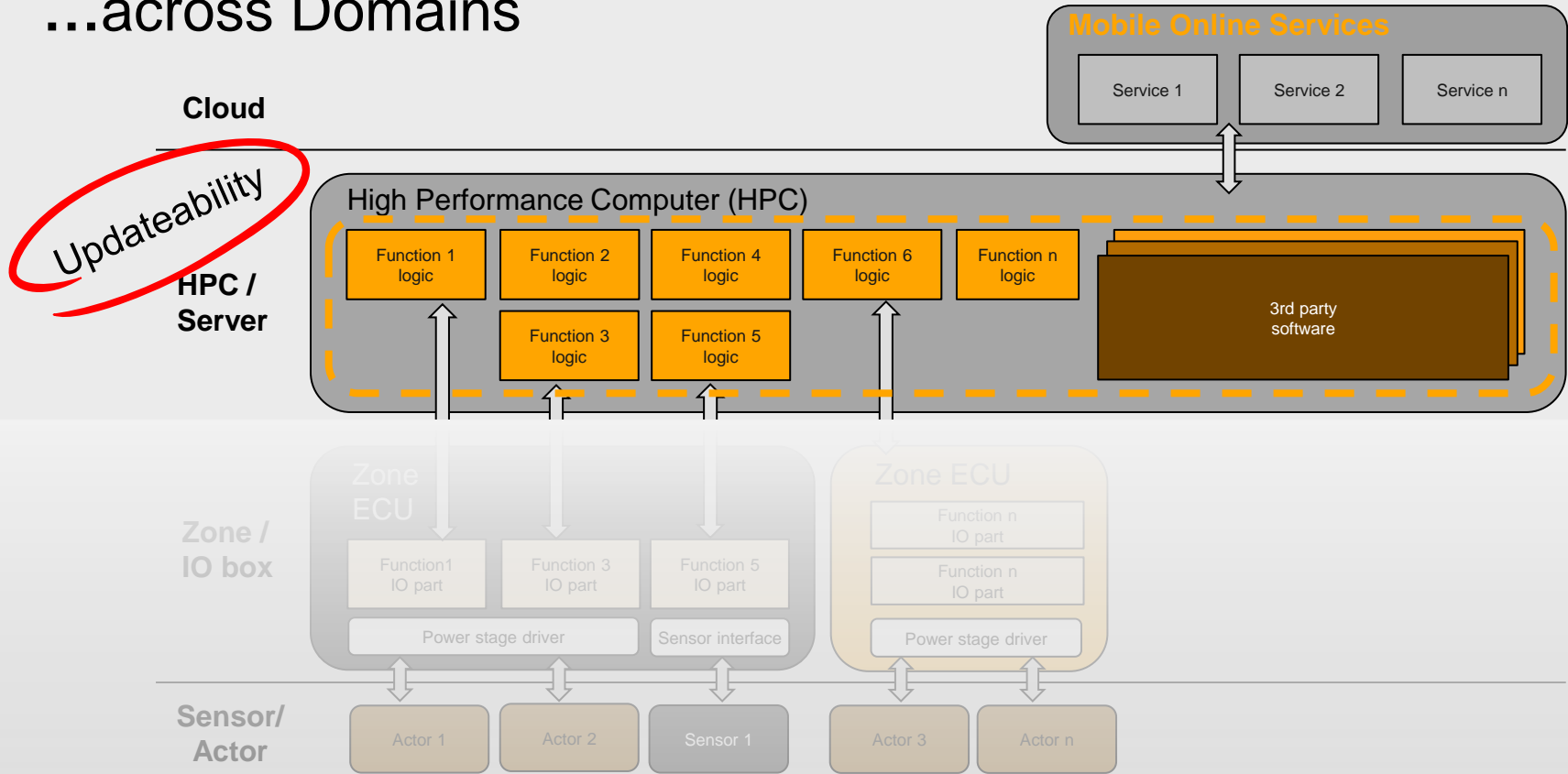
Vertical Integration

...from Sensor to Cloud



Horizontal Integration Combines Functions

...across Domains



Continental Cooperation Portal

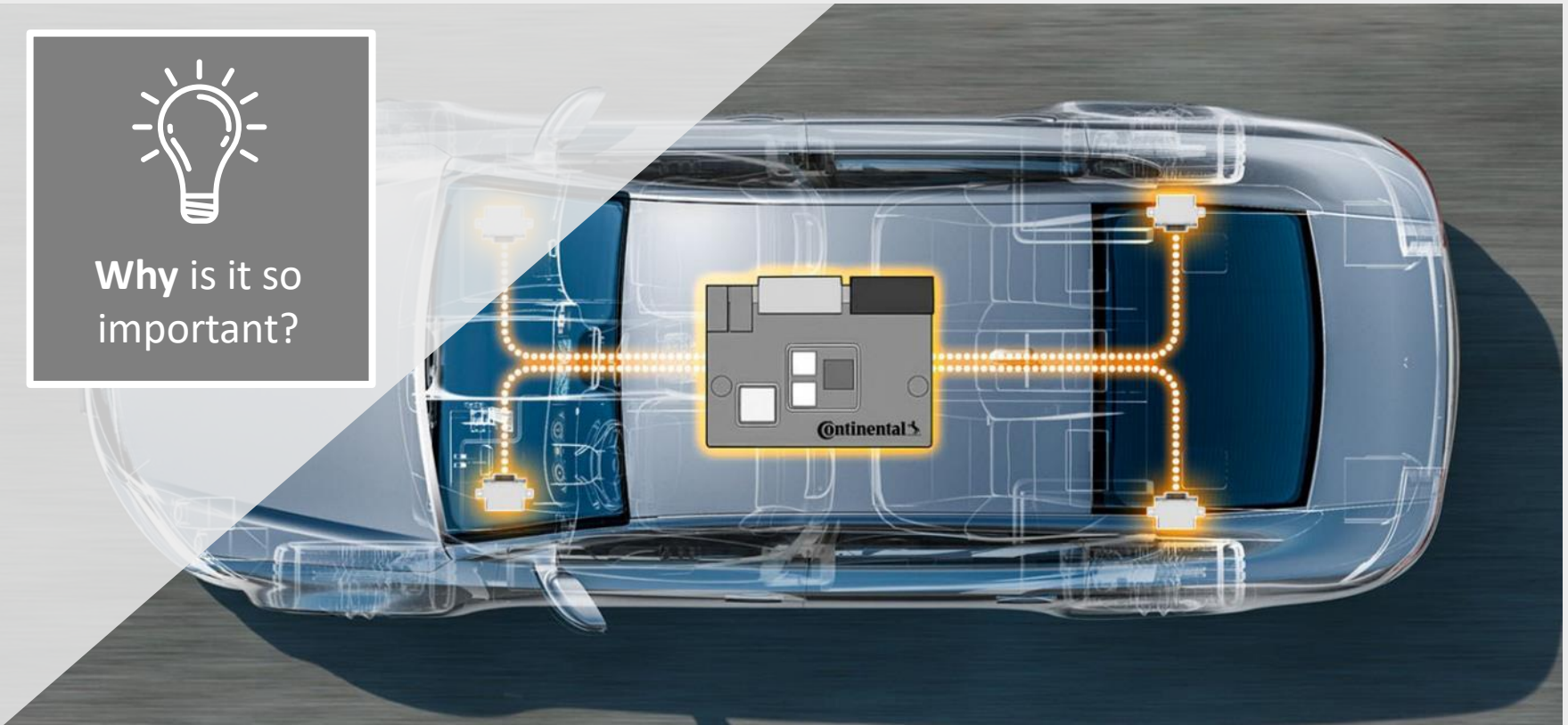
Automated Software Delivery and Integration Process



- › **System integration** key competency for future generations of vehicles
- › CCP offers **customizable collaboration environment** for software projects
- › Automated software validation and integration **increase quality and efficiency**

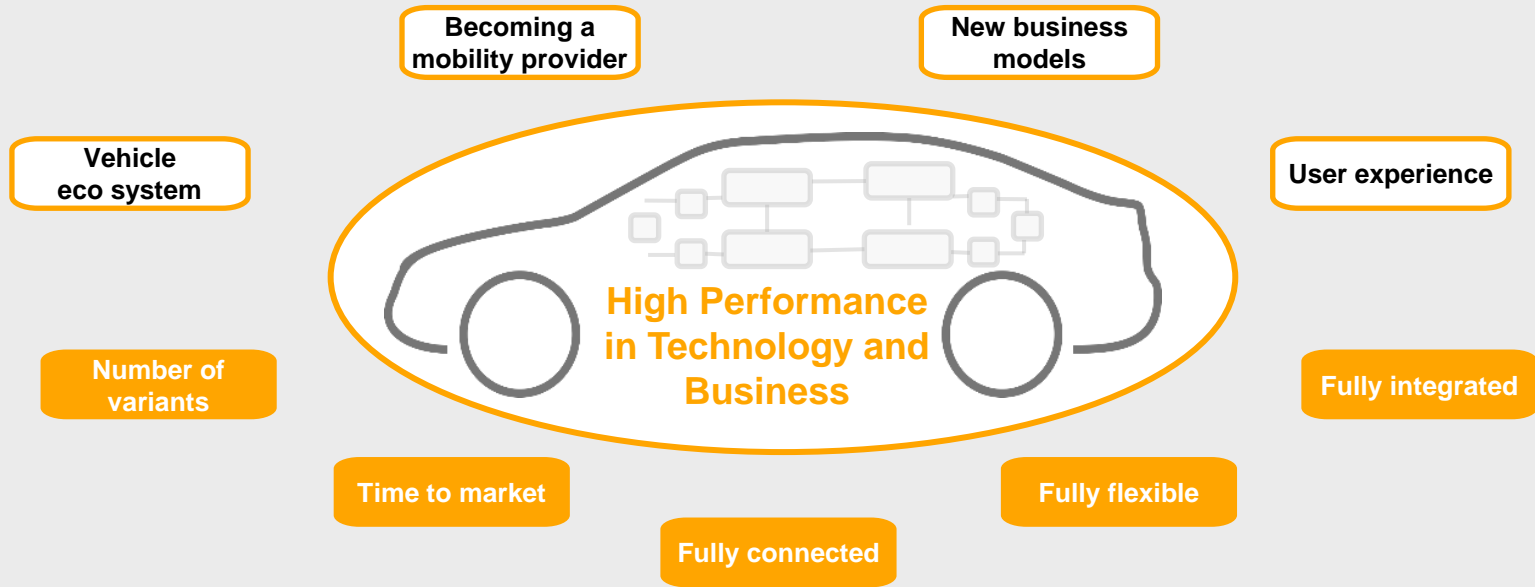


Why is it so important?



Market perception on HPC: The benefits and needs

We Create a Real Benefit for Our Customers with HPC



Questions?



Martin Schleicher

Head of Software Strategy, Holistic Engineering and Technologies



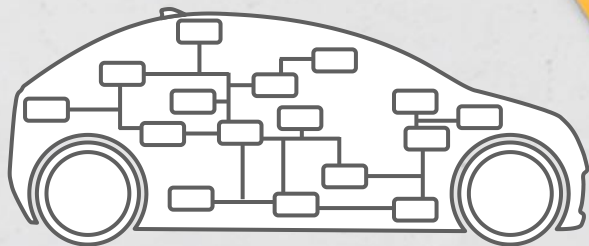
„The Software-defined vehicle enables new collaboration and business models.

End users can get new software functions and updates over the complete lifecycle of a car.

The Continental Automotive Edge platform is our basis to accelerate software development and attain safety, security and reliability.“

LEADING THE WAY TOWARDS SOFTWARE-DEFINED VEHICLES

Up2now

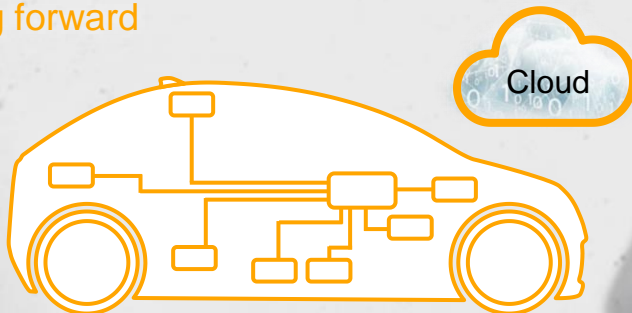


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User Expectation: Pleasure, Safety & Comfort

Going forward



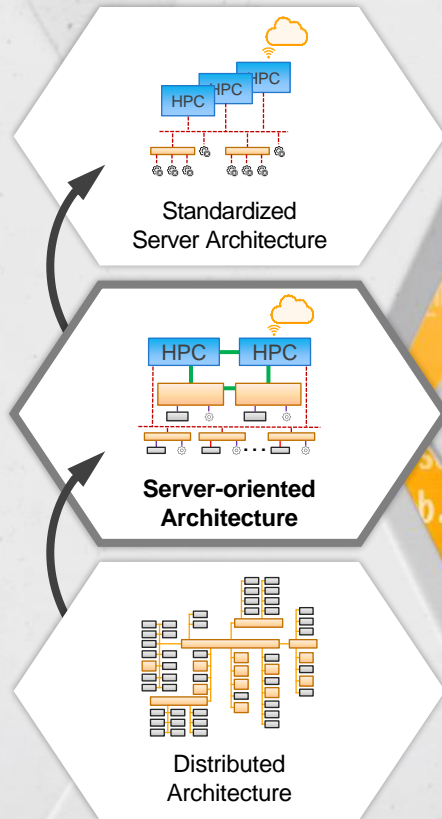
Function-defined Architecture

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User Expectation: Smart IoT device

Complexity & functional growth with current approach reaching its limits

VEHICLE ARCHITECTURE



- Decoupling Hardware from Software
- Functional building-blocks – Convergence of Domains
- Agile Development → Improve Time to Market
- Update & Upgrade → Digital Lifecycle Mgmt

Compute Centralization

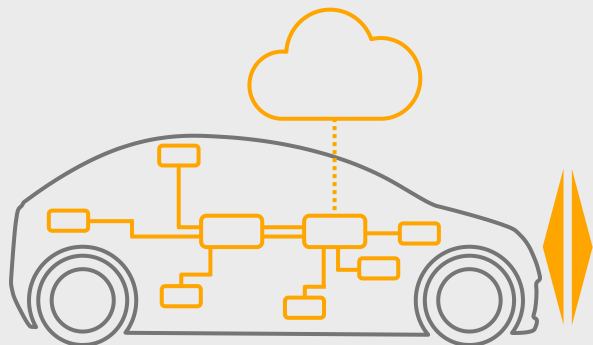
Zonal I/O approach

- Manage complexity (less ECUs)
- Enable 'Plug&Play' & Re-Use
- Optimize power & signal management
- Reduce total vehicle system cost

MIGRATION FOR IMPLEMENTATION

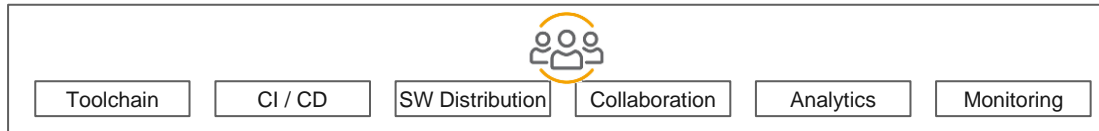
Continental Automotive Edge Platform (CAEdge)

Overview



Only CAEdge platform elements from Continental, Elektrobit and AWS are shown here. Software from OEMs and 3rd parties is not included. The size of the boxes does not reflect the size or complexity of the software.

DevOps Workbench

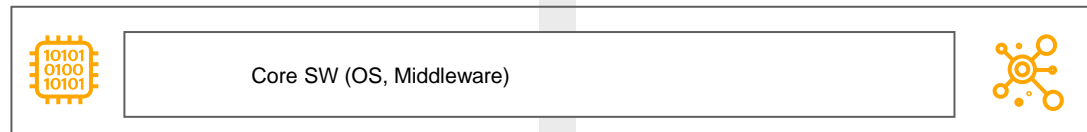


Vehicle Computers

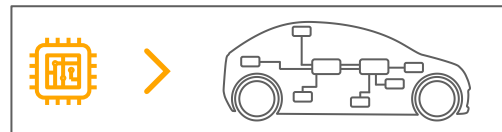
Functions / Applications



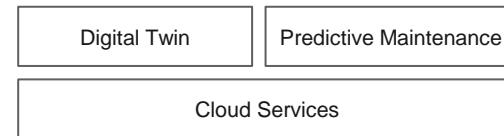
Automotive SW Platform



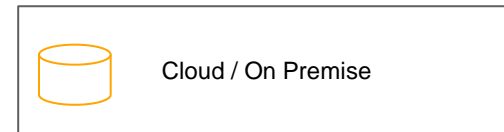
Continental HPC Platform



Cloud



Data Center



CAEdge will Come with Development Kits

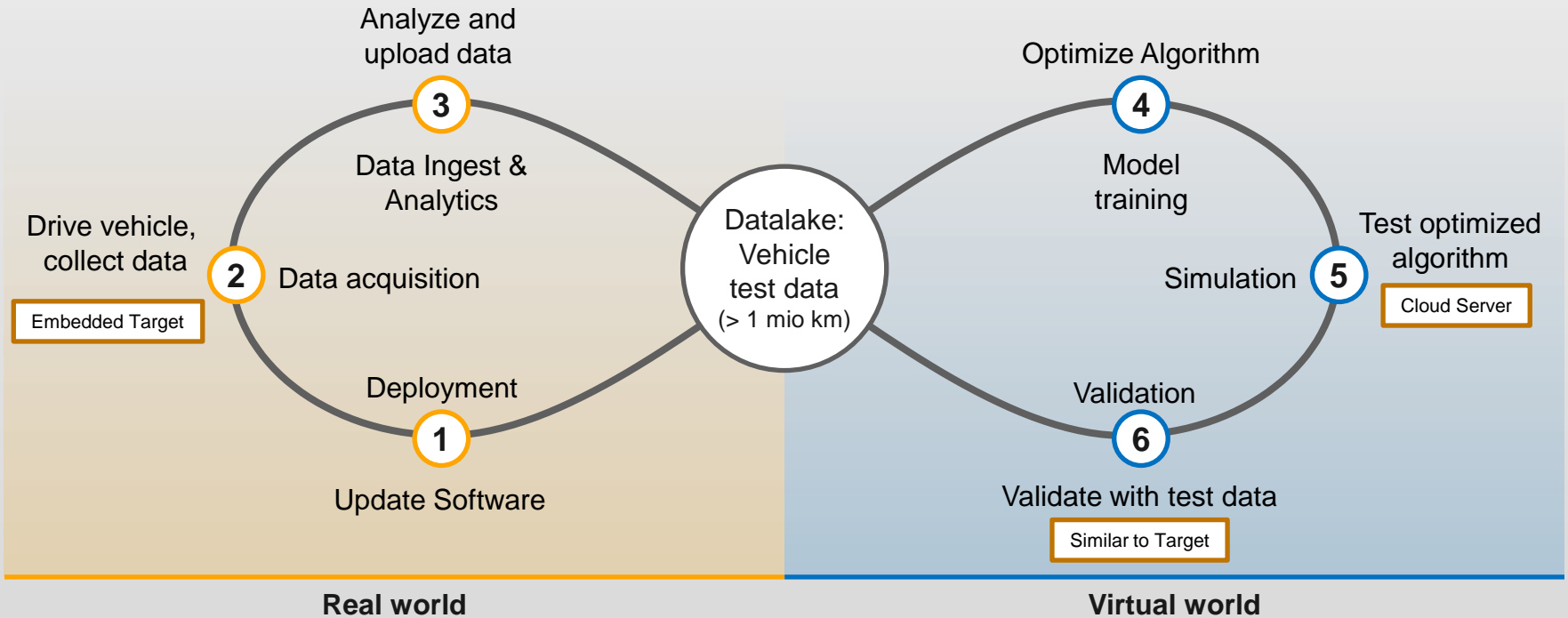
Enabling Efficient Software Development

- › Utilizing an automotive edge platform to harmonize the development and integration of distributed services and applications
- › Designing an on-board system infrastructure to enable the seamless introduction of a SW defined vehicle



Continental Automotive Edge Platform

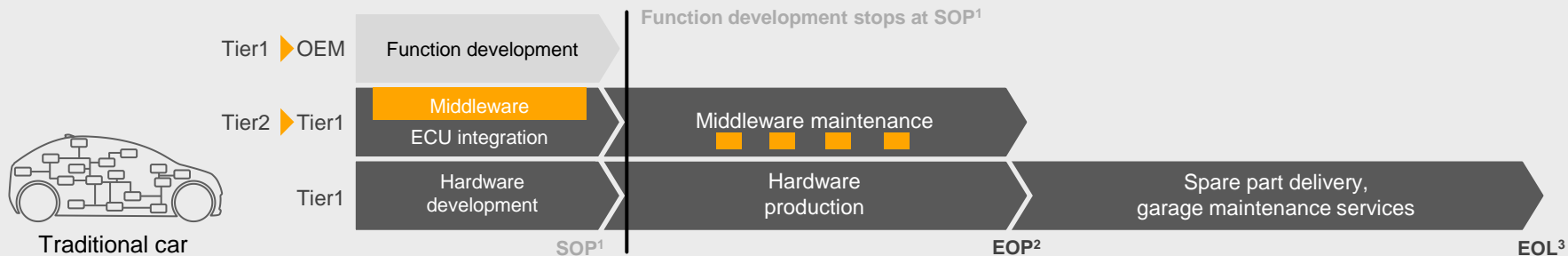
Use Case: Workflow for ADAS/AD Algorithm Development



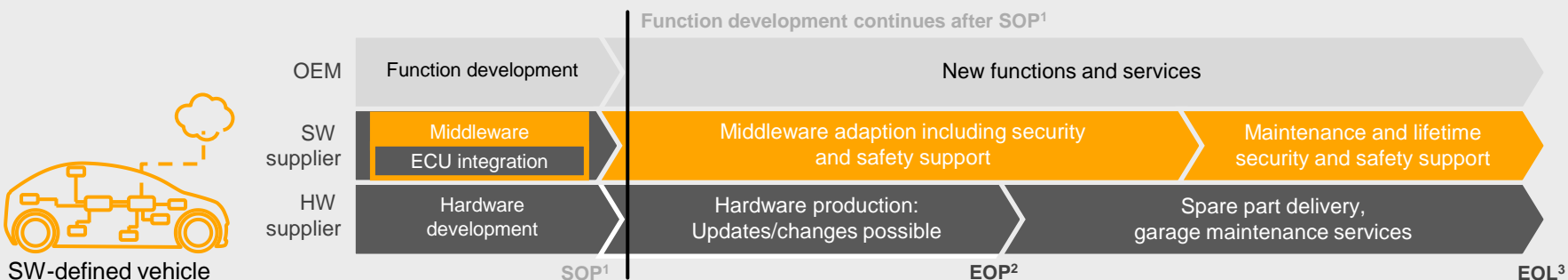
Leading the Way towards Software-defined Vehicles

Trust-based Collaboration Models Required

Hardware and function coupling – Software treated like hardware



Software-defined vehicle needs a software platform partner throughout vehicle lifecycle



¹ SOP: Start of production, ² EOP: End of production, ³ EOL: End of life

Questions?



Thank you!



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