Continental
The Future in Motion


TechShow
2021
TRANSFORMATION IN
PRODUCTS

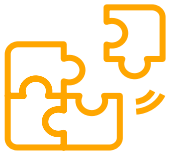
Content

IoT Ecosystem Architecture Transformation

Changing Stakeholder Requirements

Addressing Stakeholder Needs

- Continuous Evolution (Digital Lifecycle)
- V2X & Cloud Integration
- Time2Market
- Integration of 3rd party SW
- Safety, Security & Privacy



Impact to Architecture

- Decoupling Hardware from Software & Services
- Compute Centralization
- Separate I/O from Compute
- Cloud / IoT Integration
- Platform & Interface Standardization

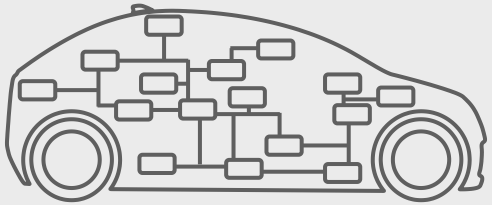
Drivers, Differentiators & Portfolio

- Driven by customer experience
- Software as main differentiator, innovation driver & asset
- Ability to provide solutions and integrate across IoT stack
- Scalable platforms and re-usable building blocks

IoT Ecosystem Architecture Transformation

Complexity & Functional **Growth** with Current Approach **Reaching its Limits**

Up2now

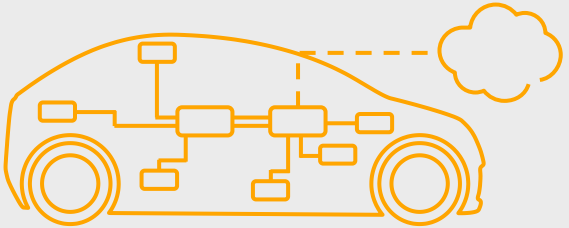


Patchwork architecture

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

User expectation: pleasure, safety and convenience

Going forward



Function-defined architecture

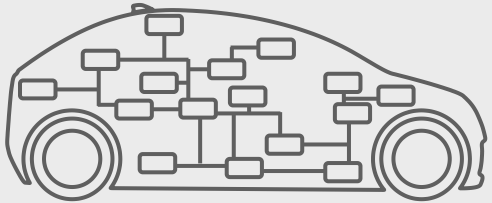
- Few High-Performance Computers and Zone Control,
  significant computing power
- Functions defined by SW (HW abstraction)
- ~50% reduction of wires
- Always connected

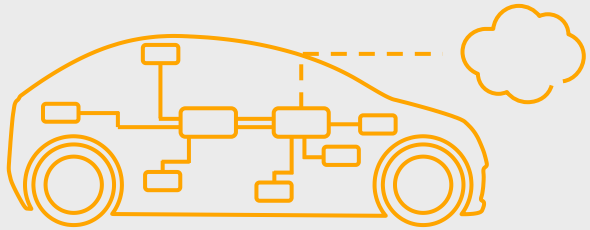
User expectation: smart IoT device

IoT Ecosystem Architecture Transformation

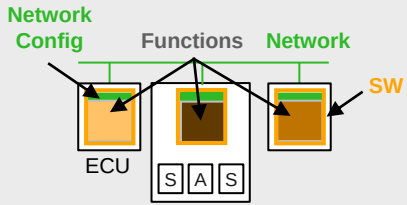
Scalable Compute Platforms – Enabler for **Smart IoT Mobility**

Up2now → **Going forward**

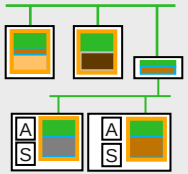




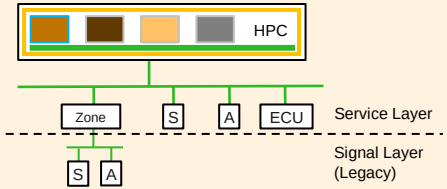
Distributed



Domain-Centralized



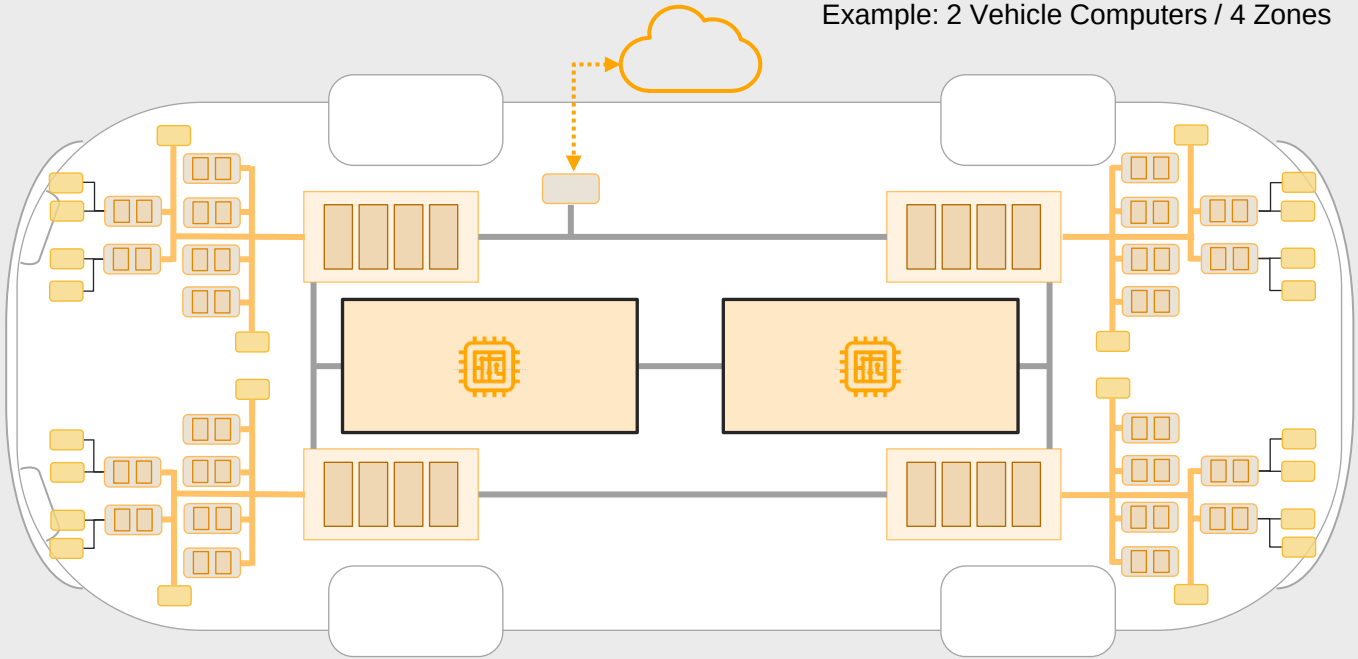
Scalable Compute Platform



ADAS Safety & Motion Cockpit Body

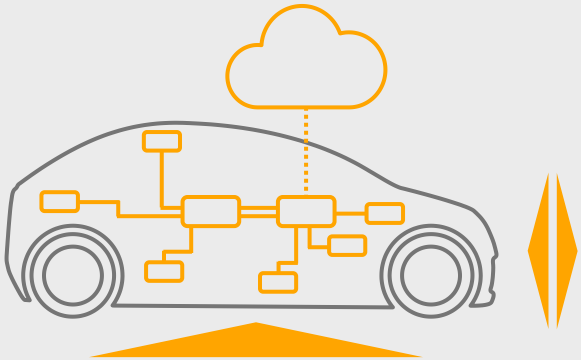
IoT Ecosystem Architecture Transformation

Server / Zone Architecture, Networking & Connectivity

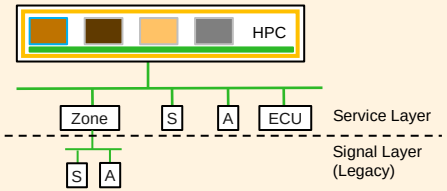


IoT Ecosystem Architecture Transformation

Our **Full-Stack IoT Platform** Architecture Solution



Scalable Compute Platform



Vehicle Infrastructure

Note: Size of the boxes does not reflect the size or complexity of the software.

DevOps Workbench

aws

Toolchain | CI / CD* | SW Distribution | Collaboration | Monitoring | Analytics

Scalable Compute Platform

Functions / Applications

Body | Cockpit | ADAS/ AD | Safety/ Motion

Automotive SW Platform

Platform Services

Middleware | Edge Enabler | Simulation & Validation Services

Core SW / OS

Continental HPC Platform

SoC | SoM | HPC

Cloud

aws

Digital Twin | Predictive Maintenance

Cloud Services

Data Center

Cloud / On Premise

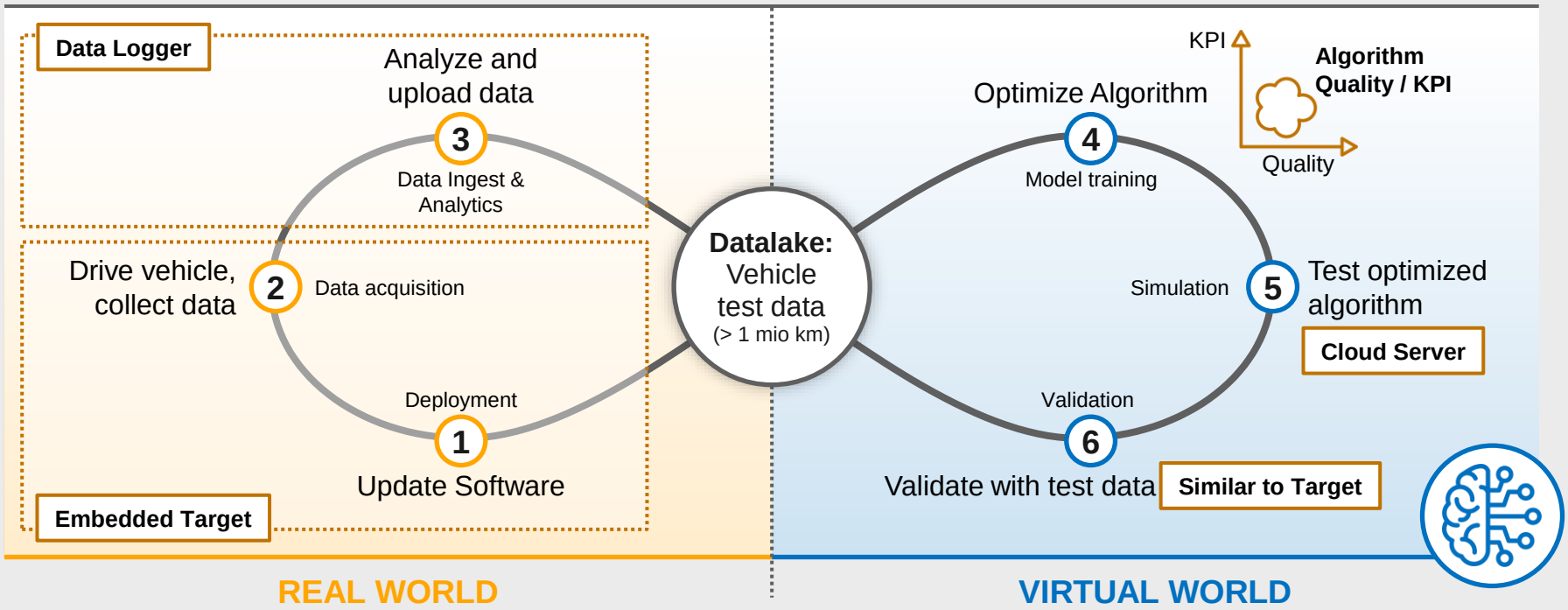
Vehicle Infrastructure

Sensors | Zones / ECUs | Actuators

* µP / SoC / SoM: Micro-Processor / System on Chip / System on Module ; CI / CD: Continuous Integration / Continuous Deployment

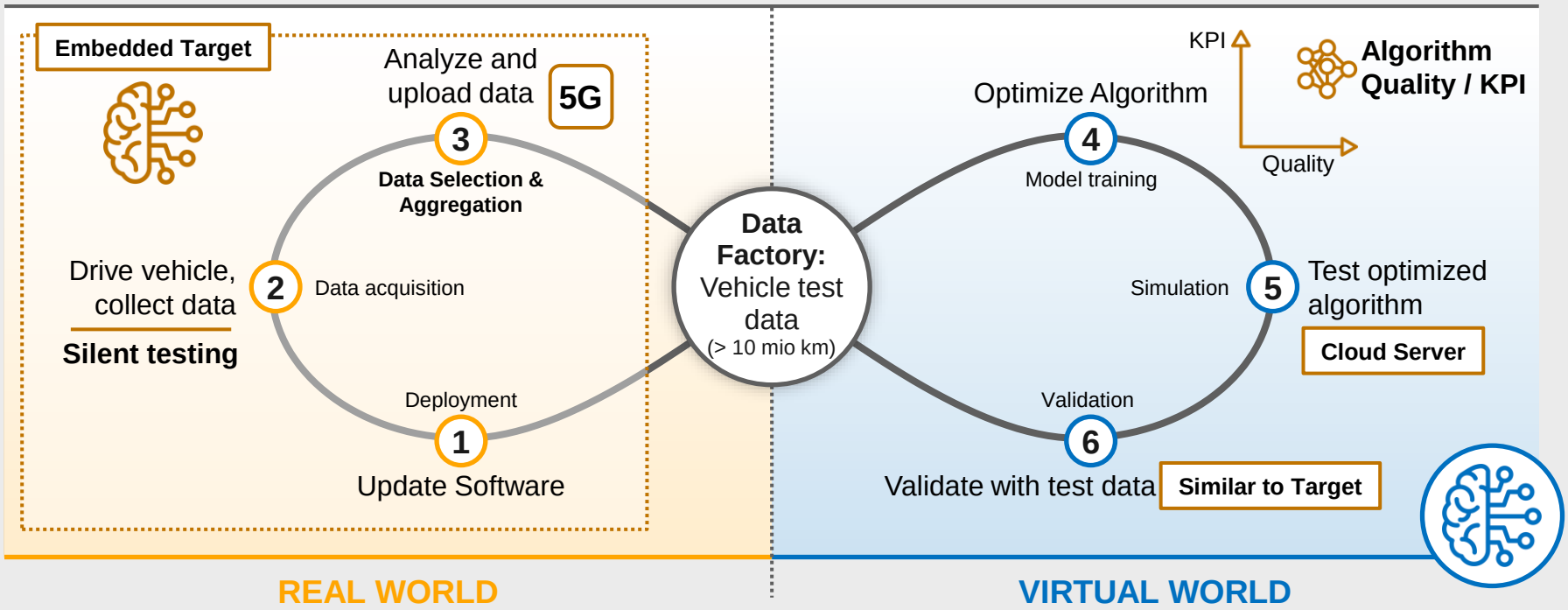
IoT Ecosystem Architecture Transformation

Use Case: **Validation of ADAS/AD** Functions (Field Op. Test)



IoT Ecosystem Architecture Transformation

Evolution Towards **Data Driven Ecosystem**



IoT Ecosystem Architecture Transformation

Development Kits – Enabling Efficient Product Development

- **Harmonize** development and integration of distributed services & applications
- **Provide** a platform solution, clear interfaces & development environment
- **Enable** seamless development of service-oriented IoT ecosystem architectures

SCP = Scalable Compute Platform; ZCU = Zone Control Unit

IoT Ecosystem Architecture Transformation

Software: We Cover **Entire Spectrum** of Customer Needs

60%

Non-differentiating software

Customer needs:
Economies of scale for most competitive cost position

40%

Differentiating software

Customer needs:
Economies of scope to provide best support/expertise

Continental offers best-in-class **software and systems excellence** based on:

- Competence
- Technology
- Workflow
- Collaboration

Based on estimation of Continental

IoT Ecosystem Architecture Transformation

Software Stacks for Present and Future Architectures

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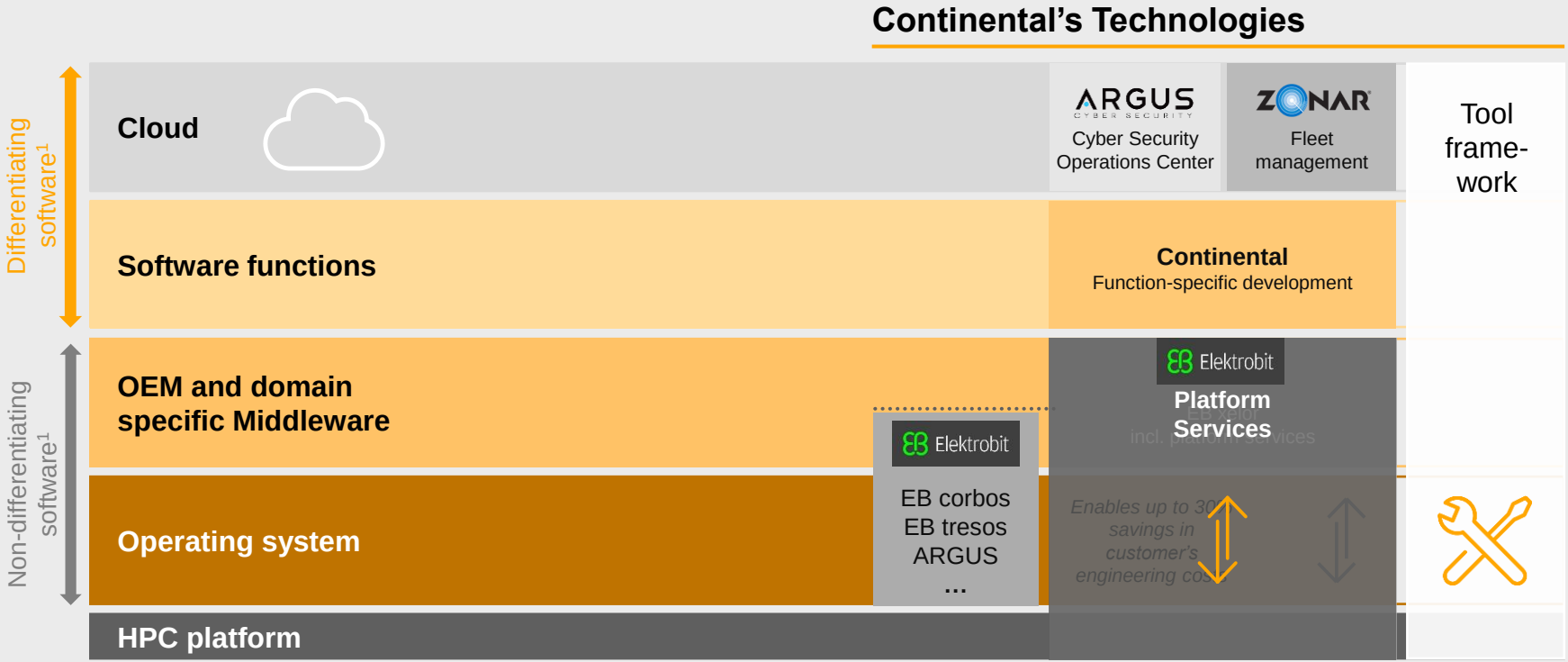
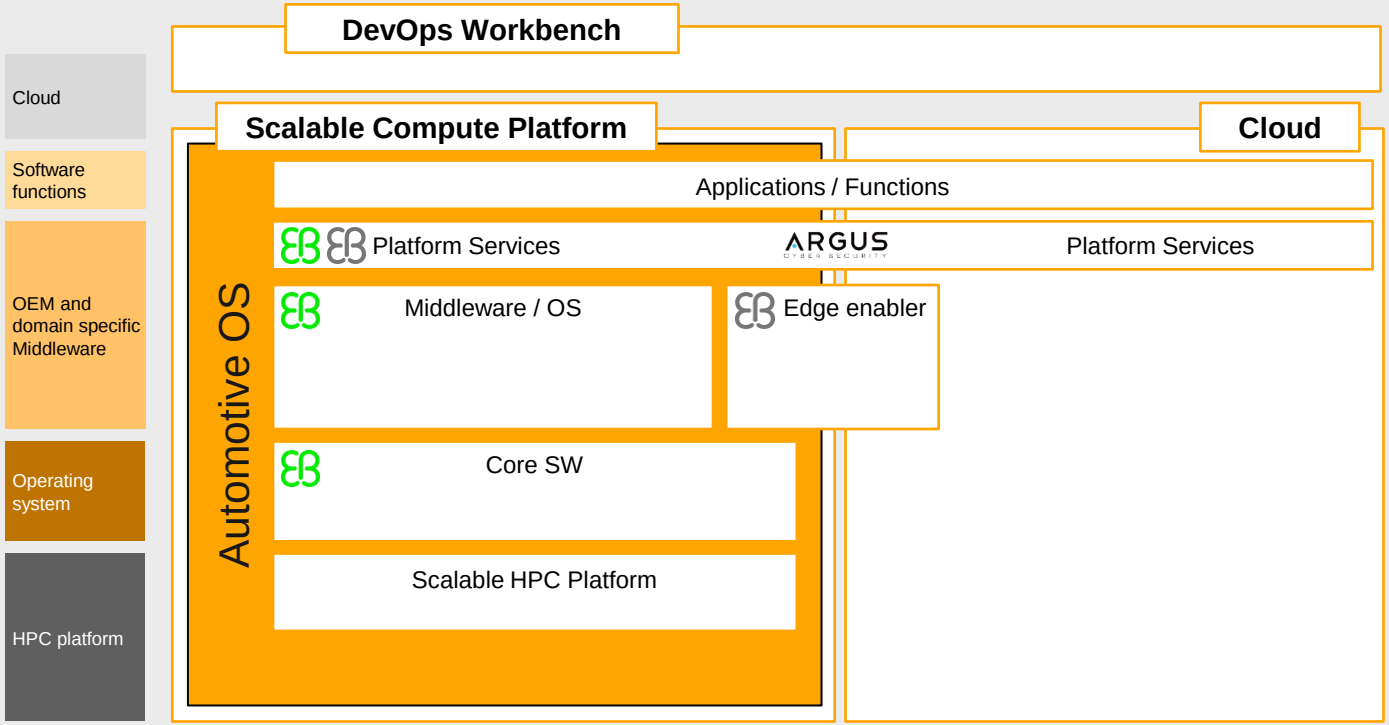


[1] Differentiating and non-differentiating software from an OEM point of view

IoT Ecosystem Architecture Transformation

Explore our End-to-End Managed HW & SW Platform Architecture



productization

in development

IoT Ecosystem Architecture Transformation

Expand SW-Platform with Focus on Reuse and Scalability

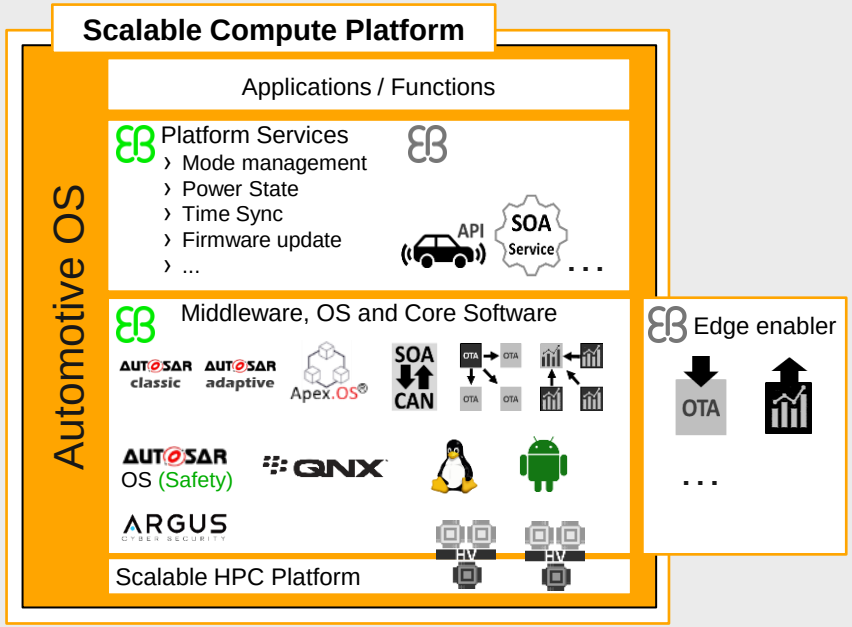
Cloud

Software functions

OEM and domain specific Middleware

Operating system

HPC platform



productization

in development

IoT Ecosystem Architecture Transformation

Same Building Blocks Tailored for Different ECU Classes

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Cloud

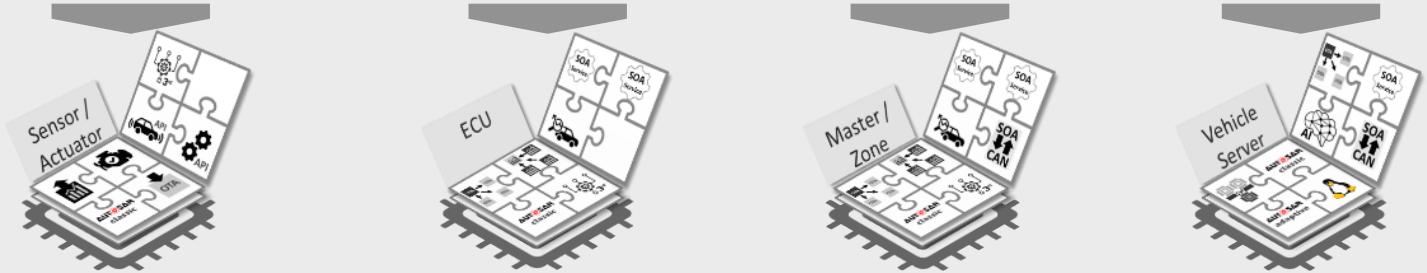
Software functions

Same re-usable building blocks

HPC platform

Autosar Classic	Autosar adaptive	Hypervisor	Safe Linux/ Linux	Android	Apex.os	Signal to Service	OTA Master	OTA Slave	Analytics Master	Analytics Slave	Diagnostic Master	Diagnostic Slave	Abstract Sensor	Abstract Actuator	High Level Service	Cyber Security	AI/ML

Continuous Integration / Continuous Delivery / Continuous Testing



IoT Ecosystem Architecture Transformation

Summary

Transformation is happening… **Now**!

- **Stakeholder** requirements and **expectations** are **shifting**
- **Complexity** & functional growth with current approach **reaching** its **limits**
- Traditional **domain barriers & silos dissolve**

Continental Automotive Edge Platform

- **Master the transformation** with a **holistic** approach
- Enabler of **Data Driven Ecosystem**
- **Platform approach** to optimize re-use, time-2-market and cost
- **Development kits** to support quick-start and “fail & learn fast”

Focus: Software

- We cover the entire spectrum, focusing on **re-use** and **scalability**
- **Standardized interfaces** to enable abstraction from Hardware
- **Building blocks** allowing application on multiple ECU types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THANK YOU!