

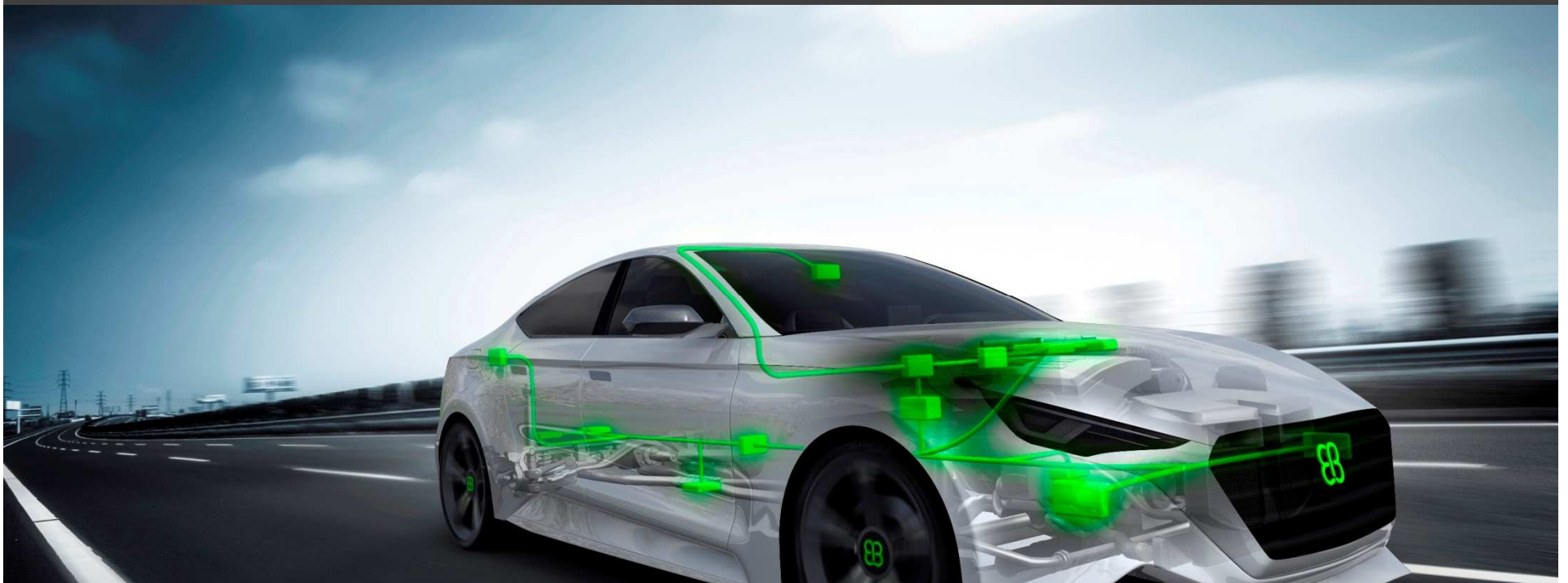
# Adaptive AUTOSAR: Infrastructure Software for Advanced Driver Assistance



Elektrobit

---

Chris Thibeault  
June 7, 2016



# Agenda for Adaptive Platform

---

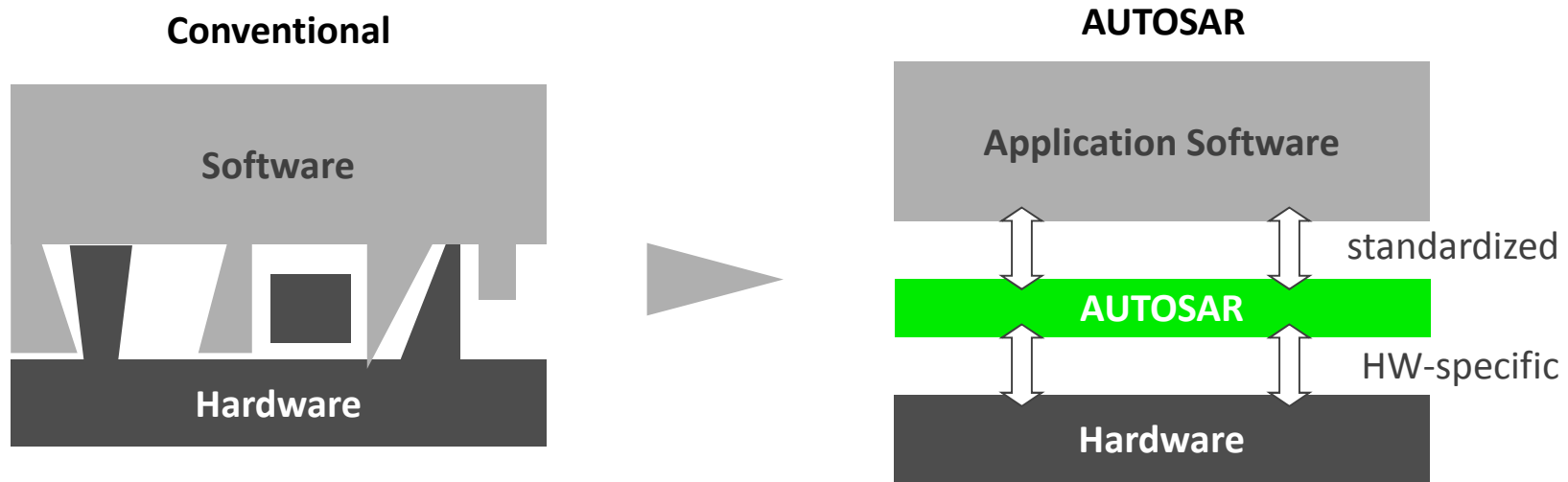
- Introduction
- Goals for the presentation
  - What is the Adaptive Platform?
  - Why do you need Adaptive Platform?
- Requirements for future vehicle infrastructure
- Changing architectures for vehicles and ECUs
- Basic principles and scope of Adaptive Platform
- EB's experience and plans
- Summary

# What is **AUTOSAR**? AUTomotive Open System ARchitecture

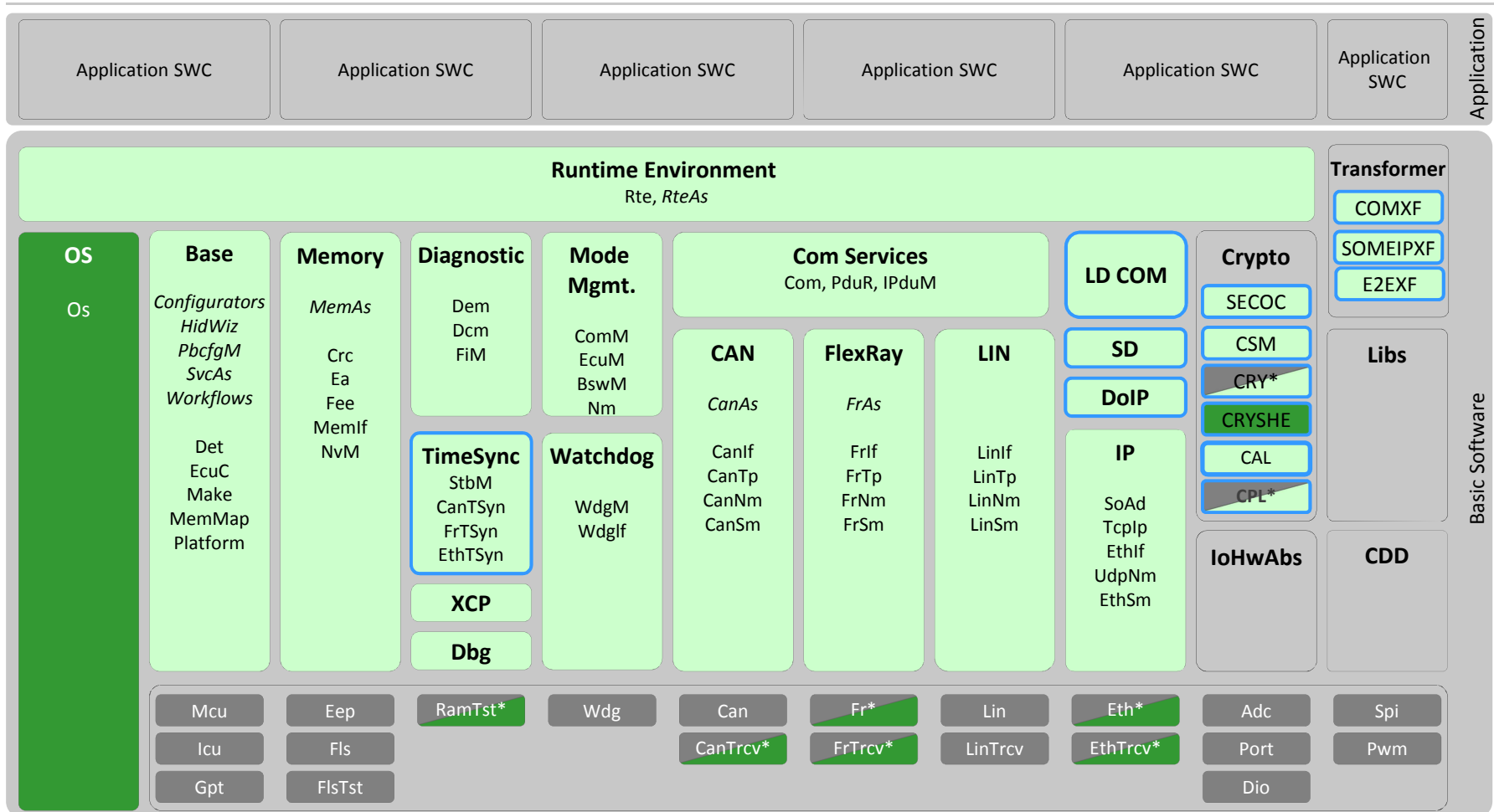
**AUTOSAR is a Software:** AUTOSAR is a software abstraction layer between the Application Code and the ECU Hardware, i.e. Microcontroller. THE AUTOSAR software is comprised of three basic components:

1. **Microcontroller Abstraction Layer (MCAL)**
2. **Basic Software (BSW)**
3. **Operating System (OS)**

-> See next slide for an example



# EB tresos AutoCore 7 based on AUTOSAR 4.0.3 & RfCs 4.1.x / 4.2



New	ACG	OEM	Assistant
	ACM	3rd Party	*EB / 3rd Party

# Current car infrastructure

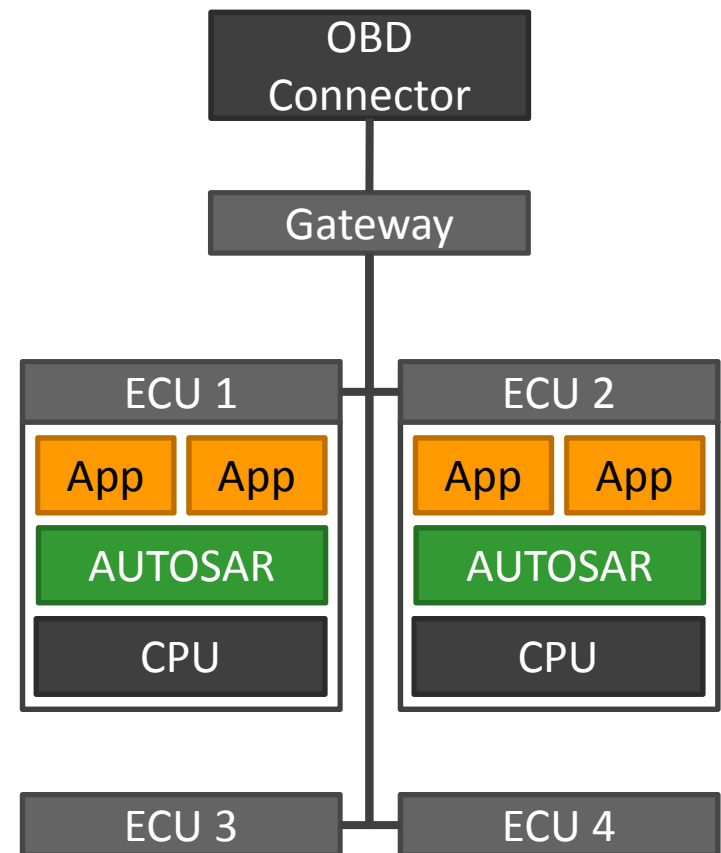
- Basic software mostly based on AUTOSAR Classic or comparable system

Pro:

- Efficient on small microcontrollers
- Well suited for time-critical, safe and secure applications

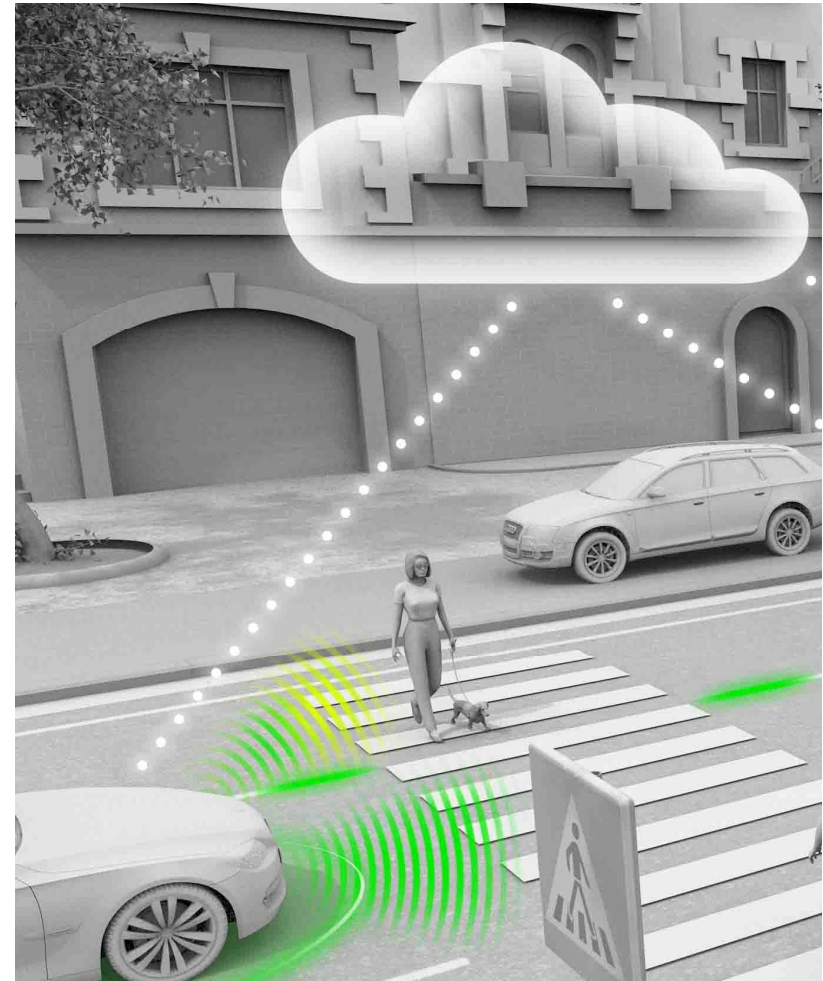
Con:

- Only proprietary solutions for fail-over and redundant functionality
- Fixed, inflexible communication mechanisms



# Requirements for a future car infrastructure

- Main drivers
  - Automated/Autonomous Driving
  - Car-2-X applications
    - Cloud based services
- Requirements
  - High computing power
  - High data rates
  - High availability, fail-operational systems
  - Updates over the air

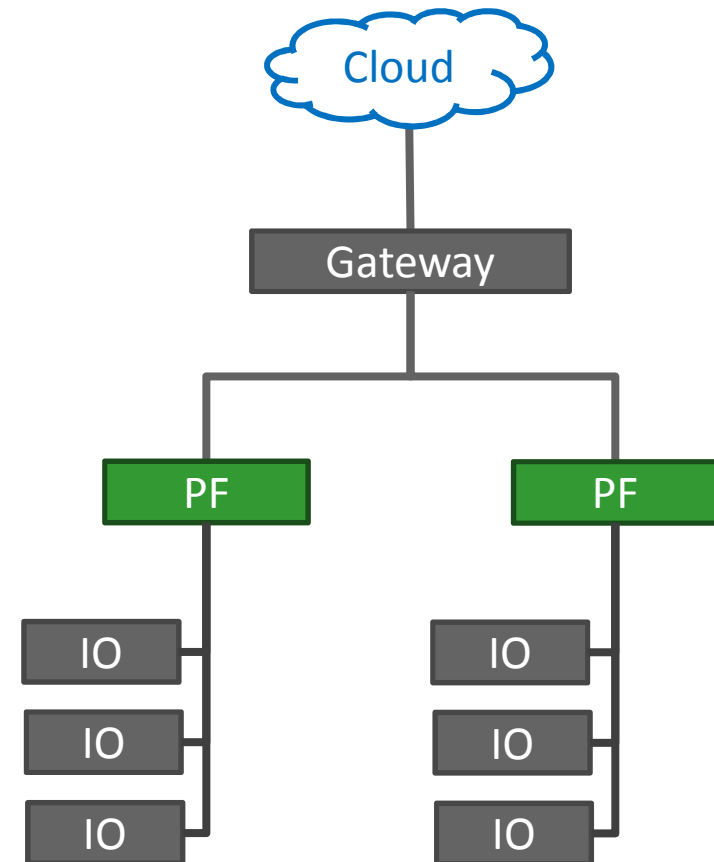


# Requirements for a future car infrastructure

Requirements	Technical Solution
High computing power	High <b>Performance Controllers</b> and GPUs
High data rates	Ethernet (1 GigE, 10 GigE)
High availability, fail-operational systems	Redundancy Concept Service oriented architecture (SOA)
Update over the air	Usage of file systems Reliable security mechanisms Service oriented architecture (SOA)

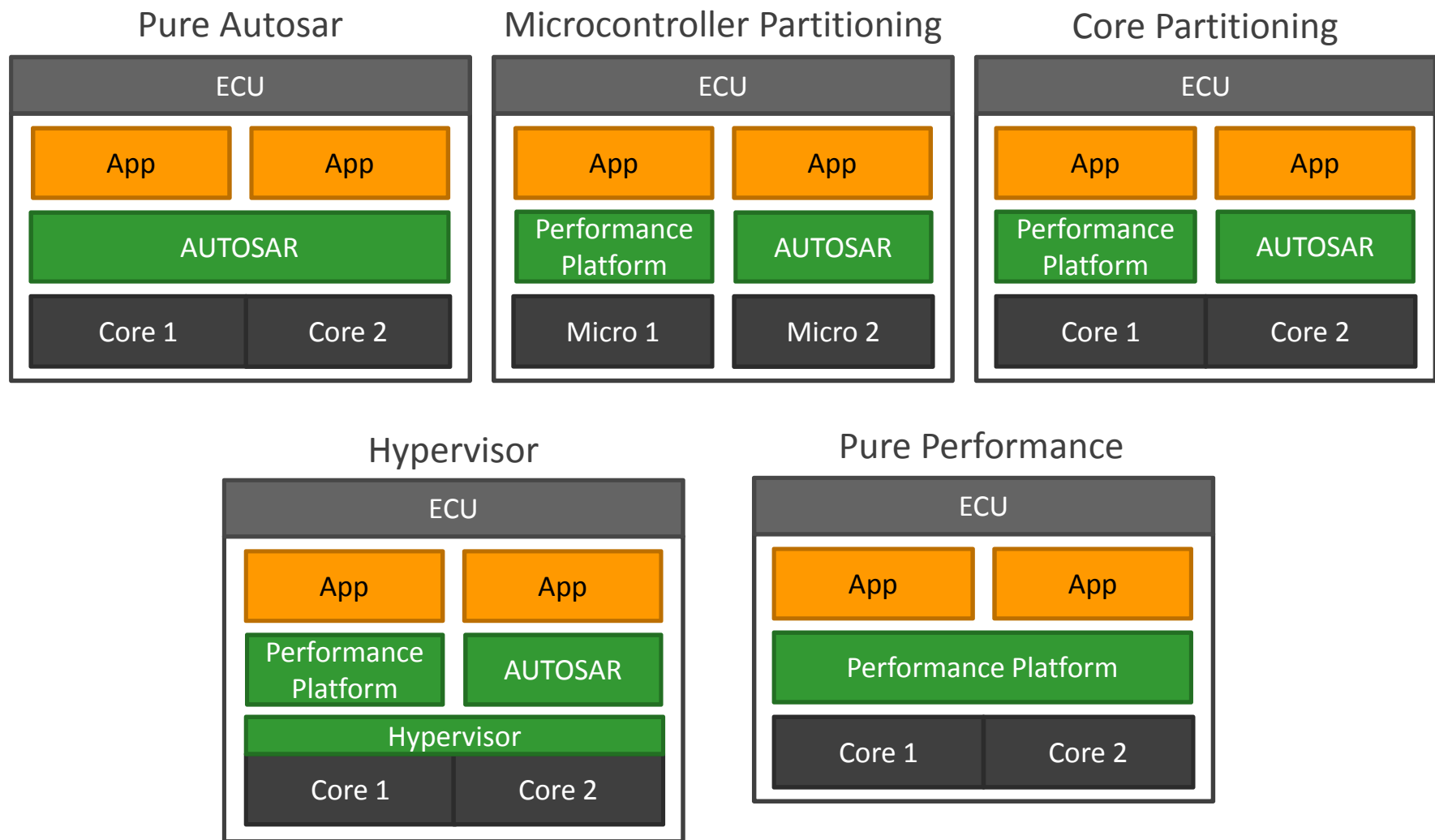
# Future architecture of a car infrastructure

- Split up ECUs in low performance IO Controller and high performance controller
- Establish a service oriented architecture (SOA)
- **Performance Controller**
  - High computation power
  - Widespread, POSIX-like Operating System (e.g. Linux)
- **IO Controller**
  - Provide Sensor and Actuator Services
  - Deeply embedded, real-time Operating System (e.g. AUTOSAR)

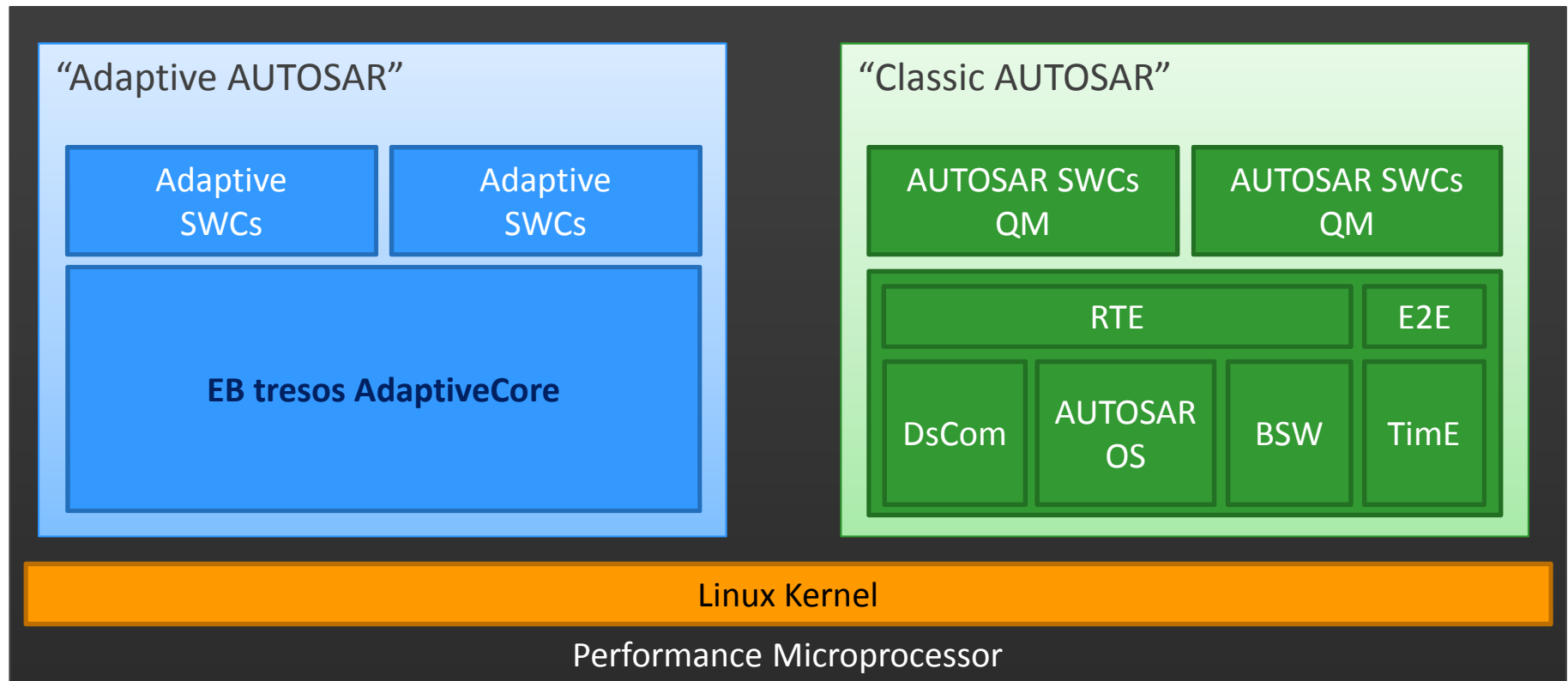




# ECU Hardware Architecture for Performance Controllers



# Architecture of the Adaptive Platform



# Adaptive Platform – Basic Principles

---

- Posix-like OS (e.g. Linux)
  - Well known standard
  - Provides Filesystem, dynamic processes, for example.
  - High potential for reuse of Software for other domains (military, industrial, automation, aerospace,...)
  
- Service Oriented Architecture (SOA)
  - Register services in an ECU
  - Publish services to other ECUs (SOME/IP)
  - Concepts are oriented on CommonAPI from GENIVI.

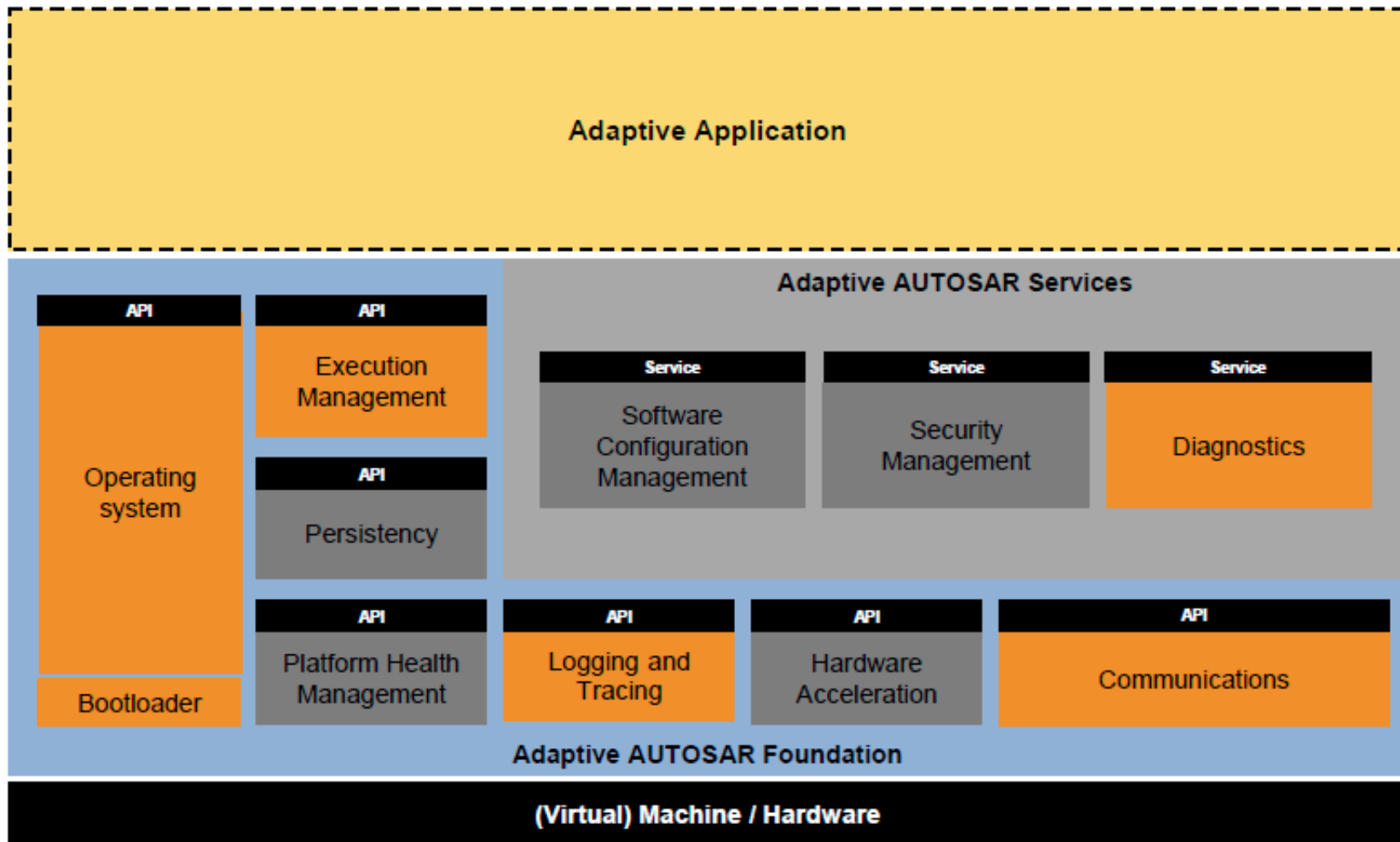
# Scope of Adaptive Platform<sup>1</sup>

---

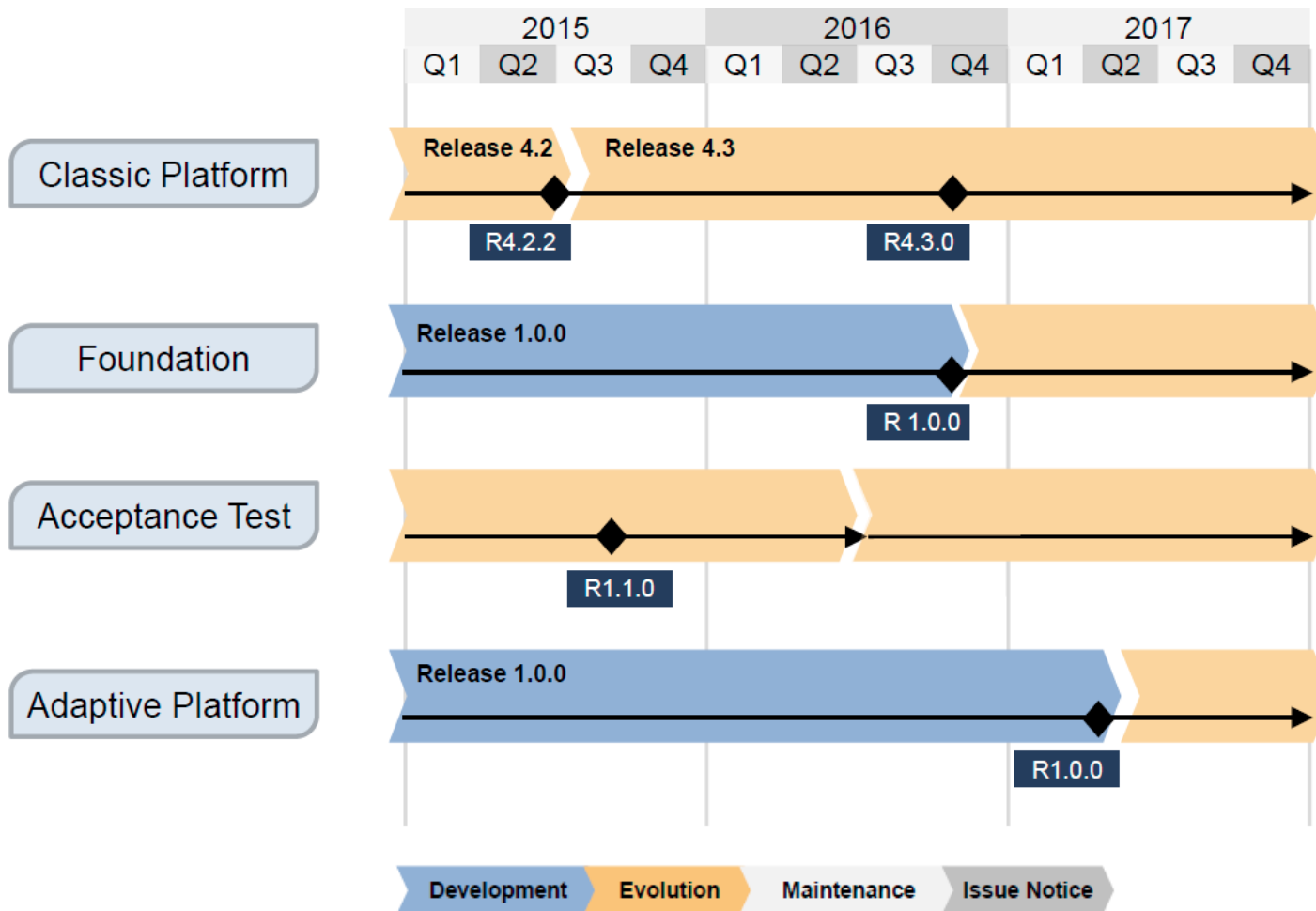
- Adaptive OS services
  - POSIX
  - Scheduling and Triggering
  - Execution Manager
- Platform Services
  - Security
  - Persistence
  - Diagnostic Manager
  - Time Services
  - Parameter API
  - Diagnostic Log & Trace
- Communication Services
  - New Middleware – ARA
  - SOME/IP
  - TCP/IP over Ethernet
- Classic AUTOSAR
  - Compatibility layer for AUTOSAR 4.x SWCs
  - Communication via SOME/IP
- Methodology
  - Extension of existing ARXML scheme

<sup>1</sup> Specification may be subject to change

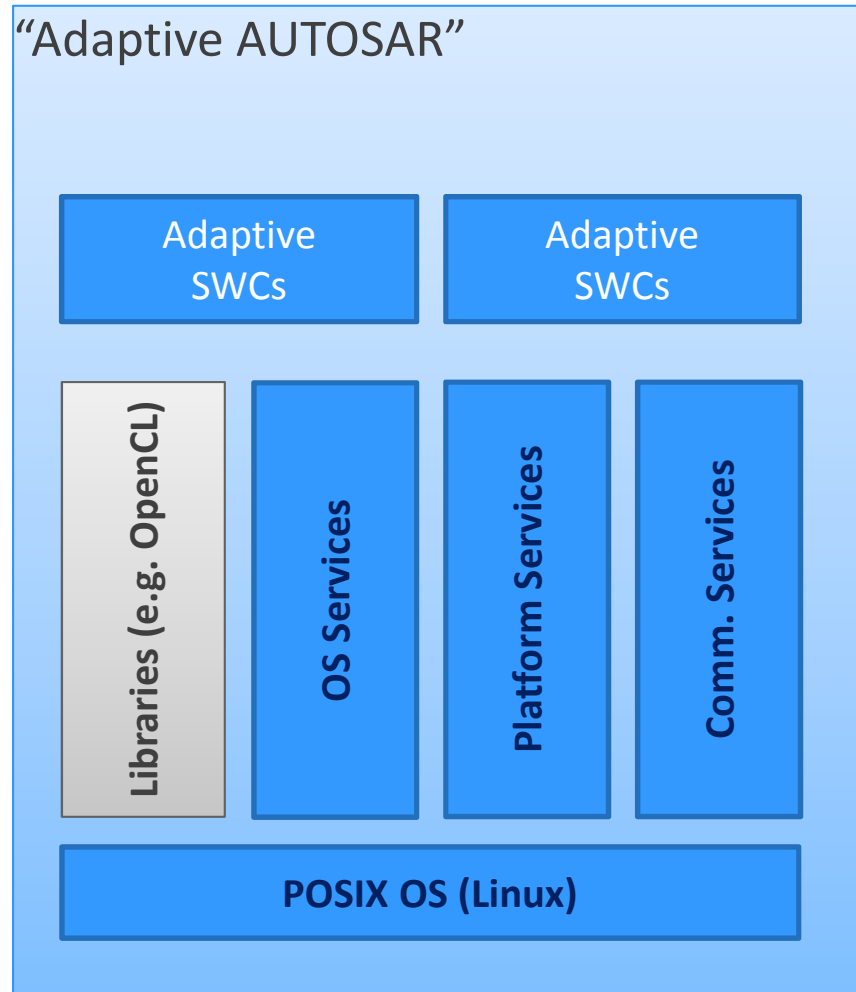
# Adaptive AUTOSAR Roadmap



# AUTOSAR Roadmap



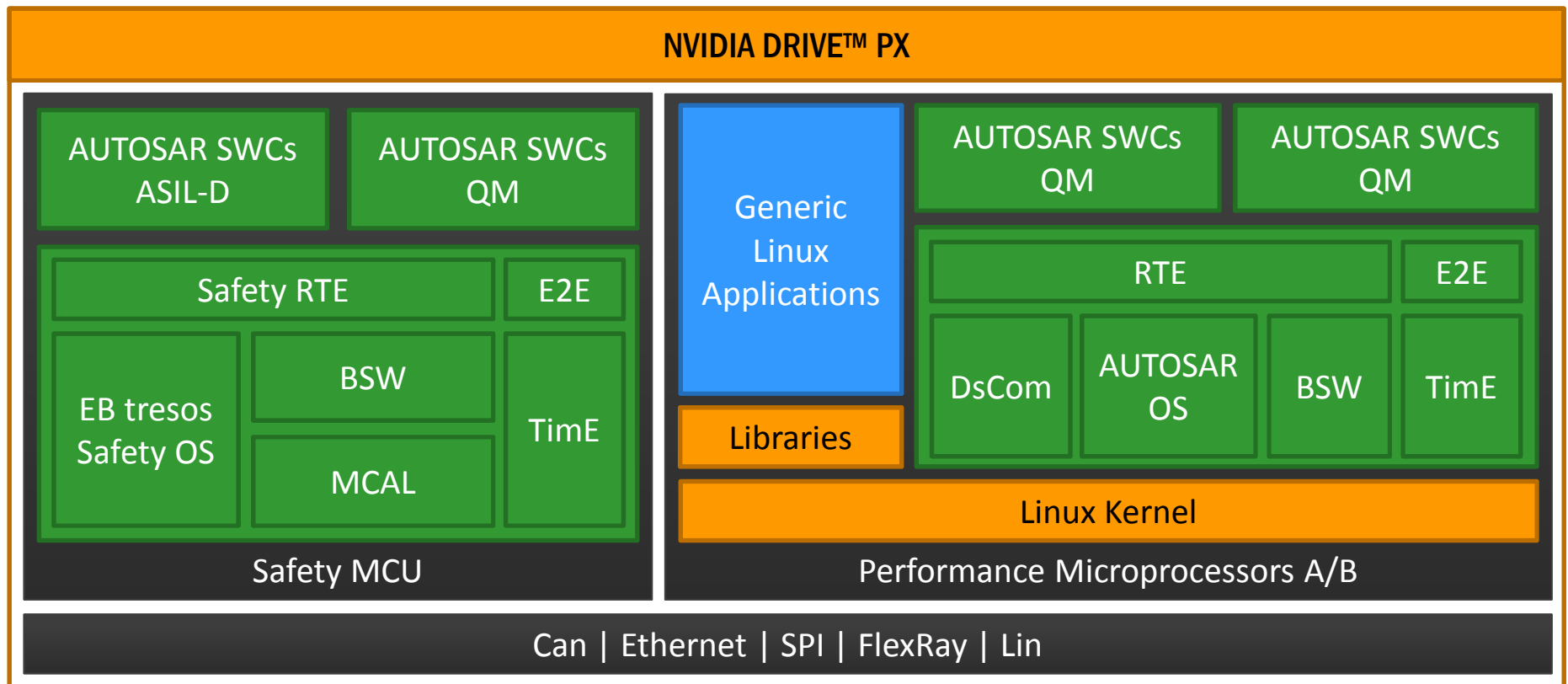
# EB tresos AdaptiveCore



- OS Services
  - Execution Manager
  - POSIX interface (PSE51)
- Platform Services
  - Diagnostics
  - Logging (DLT)
- Communication Services
  - Communication middleware (starting point: CommonAPI)
  - SOME/IP via Ethernet

# Starting Point for the Adaptive Platform at EB

## EB Platform for Autonomous Driving





## Summary for Adaptive Platform

---

- Adaptive Platform is not a replacement for Classic Platform.
- The Adaptive platform was created to tackle new requirements related to Automated/Autonomous Driving / Cloud interaction:
  - High Computing Power
  - High Communication Data Rates – Ethernet / IP Based
  - Fail-Operational / High Availability systems
  - Over the air updates
- The basic principles of Adaptive AUTOSAR are:
  - Usage of a Linux based OS (POSIX)
  - Service Oriented Communication
- And, of course, all this must be done Safely and Securely!

# Get in touch!



Contact us:

[Automotive.elektrobit.com](https://Automotive.elektrobit.com)

[Sales.automotive@elektrobit.com](mailto:Sales.automotive@elektrobit.com)

