



# AUTOSAR Introduction

Part 1 - The AUTOSAR Partnership and Standardization



**BOSCH**

**Continental**



**PSA**  
GROUPE

**TOYOTA**

**VOLKSWAGEN**  
AKTIENGESELLSCHAFT



AUTomotive Open System ARchitecture



# AUTOSAR Mission

AUTOSAR is a global partnership of leading companies in the automotive and software industry to develop and establish the **standardized software framework** and **open E/E system architecture** for intelligent mobility.

# AUTOSAR Vision

AUTOSAR will be the **global established standard** for **software** and **methodology** enabling **open E/E system architectures** for future intelligent mobility supporting high levels of dependability, especially safety and security.

# AUTOSAR Partnership

Collaboration Model With Proven Track Record

AUTOSAR has succeeded in **bringing together main players** in automotive E/E system development **to form a powerful standard** that is successfully used all **around the world**.



# AUTOSAR Partnership

The Advantage of a Strong Community

31 international automotive OEM are AUTOSAR partners.

**21** are **under the 22 top-selling OEM** and covering **over 80%** of the **total market revenue** in 2019\*.

Together with other Tier1 and Suppliers, our partners are collaborating to shape Future Intelligent Mobility.



\*ref. to The 2019 Strategy&Digital Auto Report, strategy& - part of the PwC network

# AUTOSAR Partnership

## Types of Partnership



### Premium



### Development



### Associate



### Attendee



### Subscriber

	Premium	Development	Associate	Attendee	Subscriber
<b>Motivation</b>	Development and exploitation of AUTOSAR standards (size >100)	Development and exploitation of AUTOSAR standards (size < 100)	Exploitation of AUTOSAR standards	Development of AUTOSAR standards	Openness of AUTOSAR standards to eligible public
<b>Annual Fee</b>	21,000 Euro	6,000 Euro	15,000 Euro	Free	3,000 Euro
<b>Annual Contribution</b>	1.5 FTE	0.5 FTE	None	Individual agreement	None

# More Than 300 AUTOSAR Partners

## 9 Core Partners



## 63 Premium Partners



## 1 Strategic Partner

**DENSO**  
Crafting the Core

## 74 Development Partners



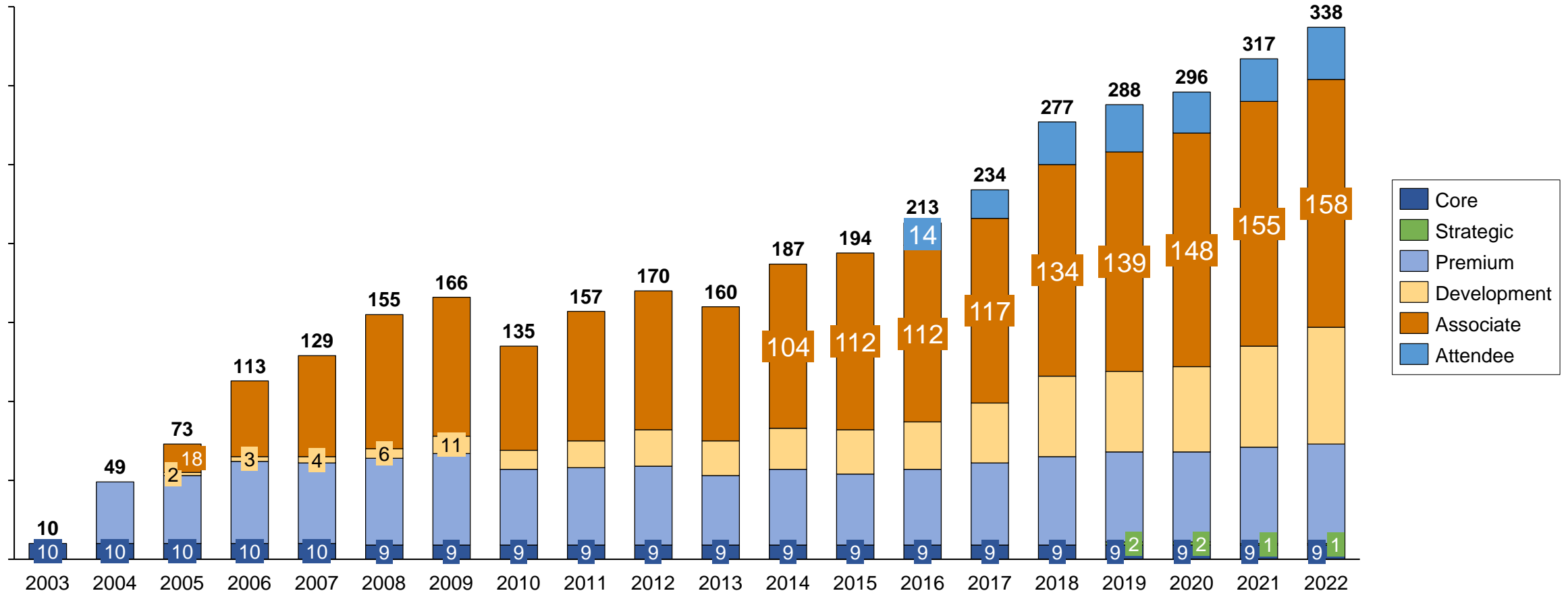
## + 158 Associate Partners

## + 33 Attendees



# AUTOSAR Partnership

Partner Development Since 2003



# AUTOSAR Partnership

## Global Distribution of AUTOSAR Partners

A light gray world map serves as a background for the partner distribution data. The map highlights the four regions: North America, Europe, Asia, and Africa. Each region's data is presented in a list next to its respective area on the map.

### 38 Partners in North America

- 2 Core Partner
- 6 Premium Partner
- 6 Development Partner
- 23 Associate Partner
- 1 Attendee

### 153 Partners in Europe

- 6 Core Partner
- 29 Premium Partner
- 38 Development Partner
- 55 Associate Partner
- 25 Attendee

### 144 Partners in Asia

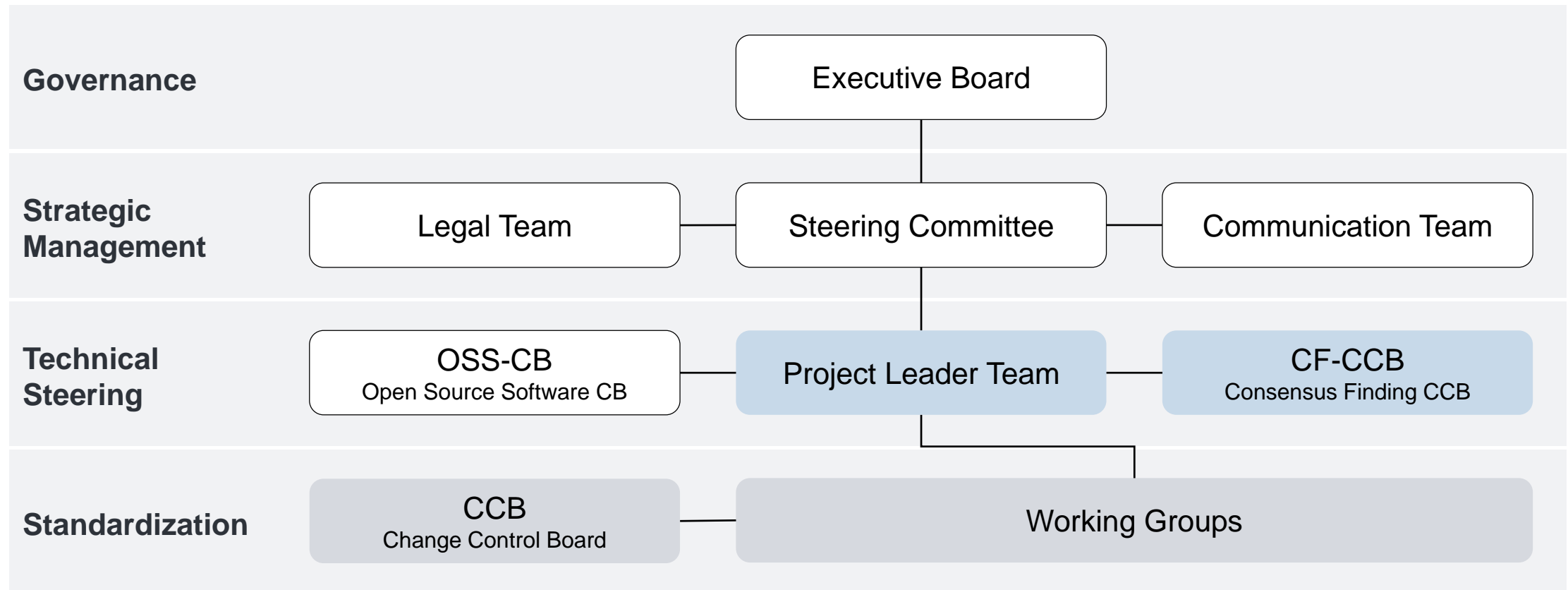
- 1 Core Partner
- 1 Strategic Partner
- 28 Premium Partner
- 28 Development Partner
- 80 Associate Partner
- 6 Attendee

### 3 Partners in Africa

- 2 Development Partner
- 1 Attendee

# AUTOSAR Organization

## Official Roles



☐ Core Partner    ☒ Core, Strategic Partner    ☒ Core, Strategic, Premium, Development Partner



# AUTOSAR Organization

## Support Functions

AUTOSAR Spokesperson and Internal Affairs Officer (IAO)

### Business Administration

- Partner and User Management
- Finance
- Meeting Management

### Communication Support

- Marketing

### Technical Management

- Standards
- Software Development Engineering

### Deliverable Management

- Change Management
- Quality Assurance
- Release Management

Legal Support

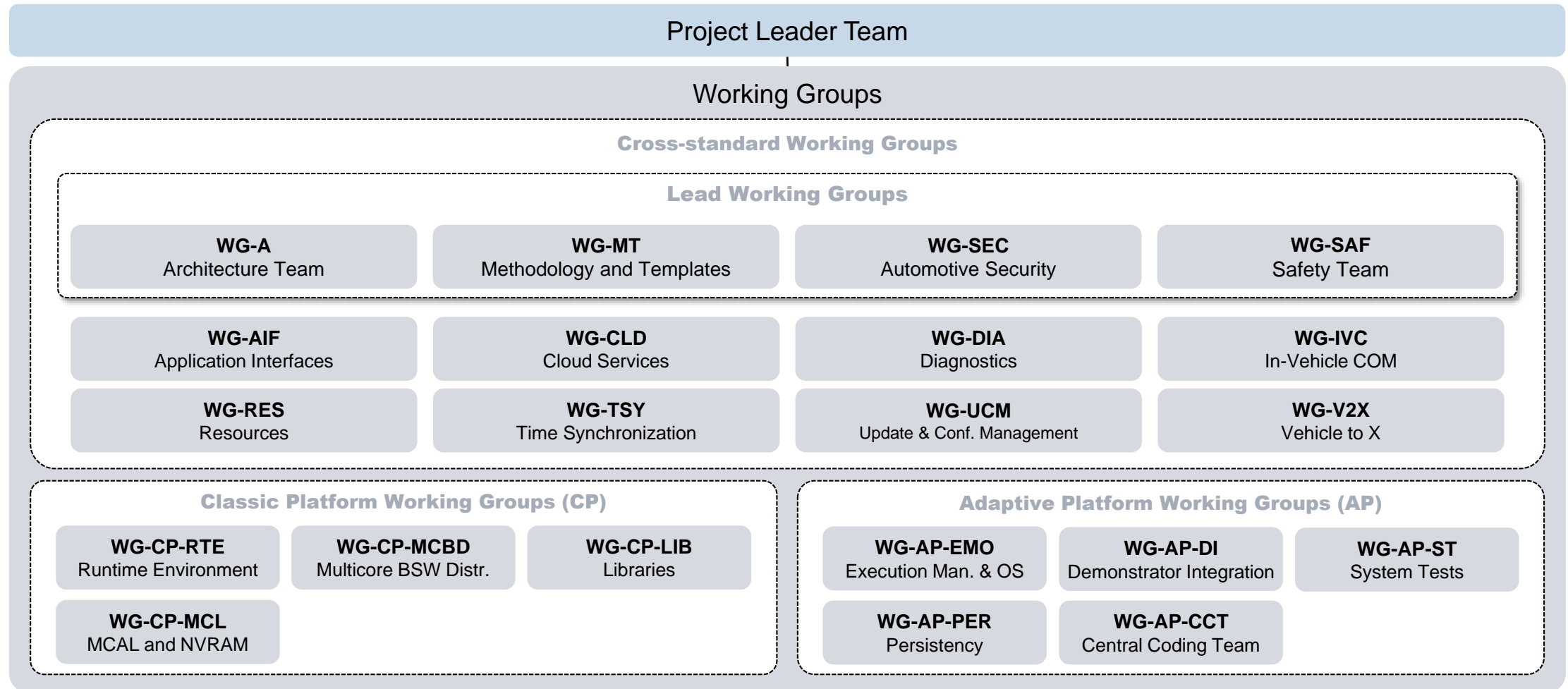
Requirements Management

Quality and Process Management

Technical Office and IT Infrastructure

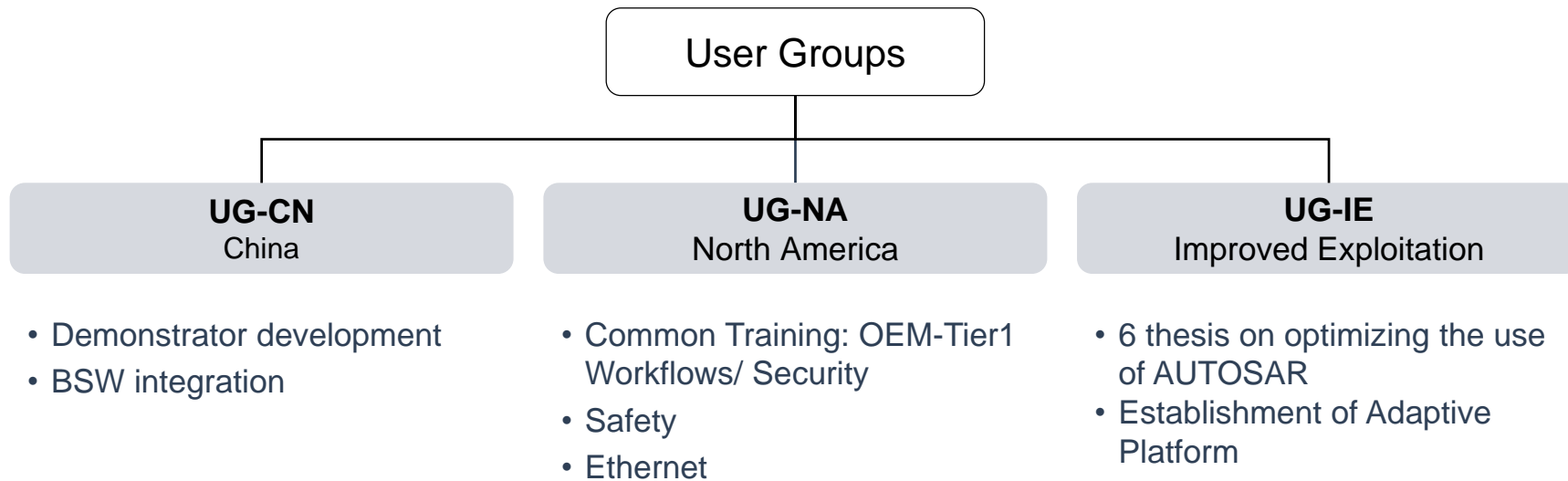
# AUTOSAR Organization

## Overview of Working Groups



# AUTOSAR Organization

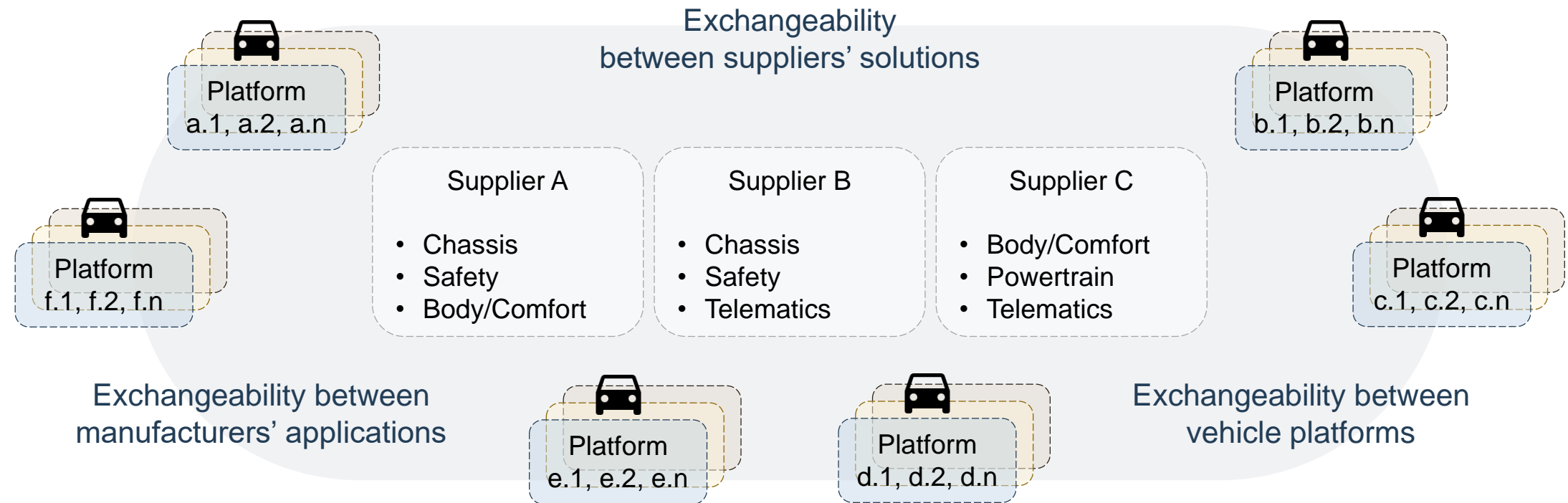
## User Group Structure





# AUTOSAR Basic Principles

## Benefits of a Software Framework

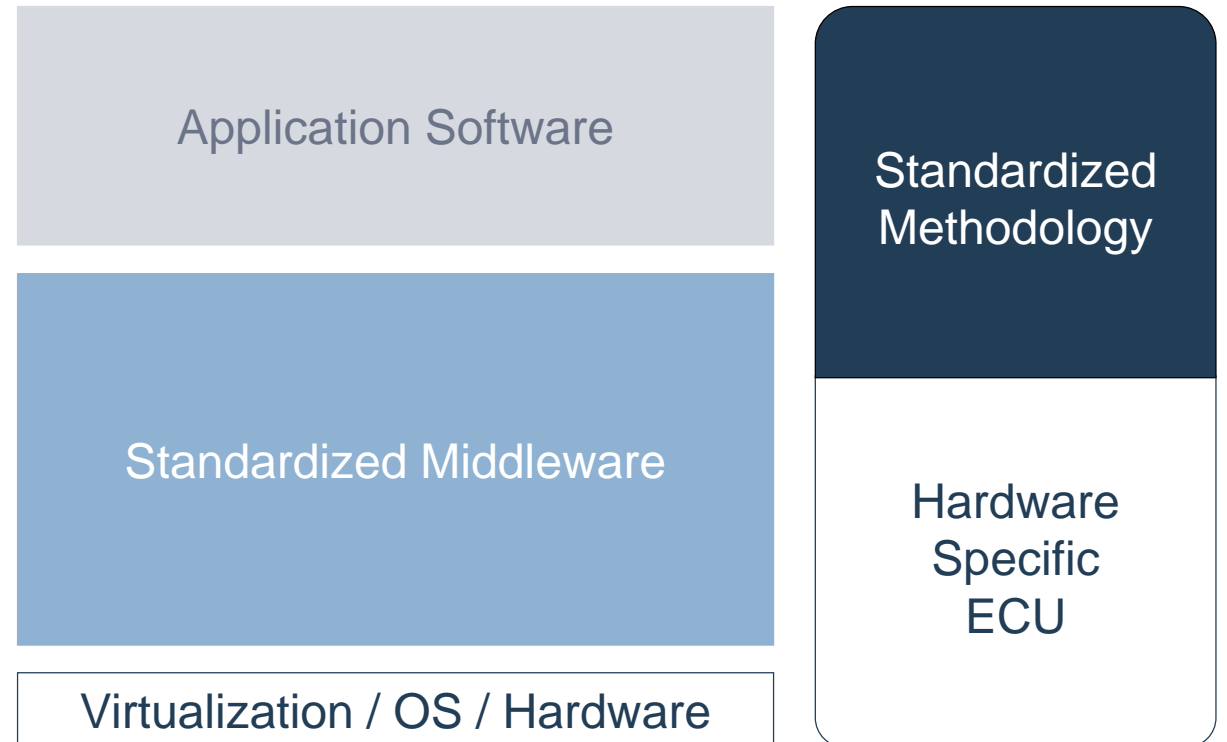
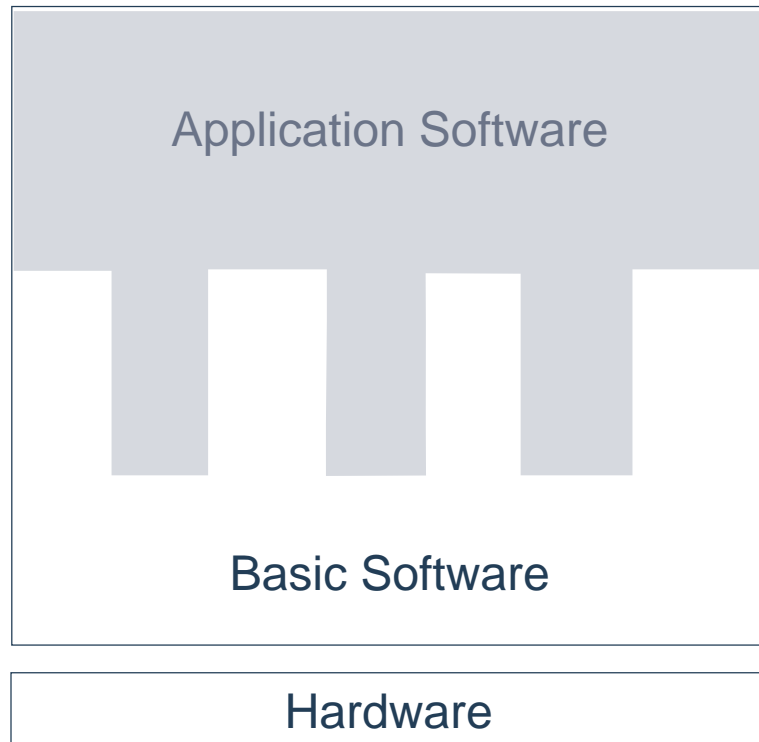


The **AUTOSAR Software Framework** promotes software module reuse and exchangeability.

# AUTOSAR Basic Principles

Proprietary vs. AUTOSAR Middleware Approach

## Proprietary Solution

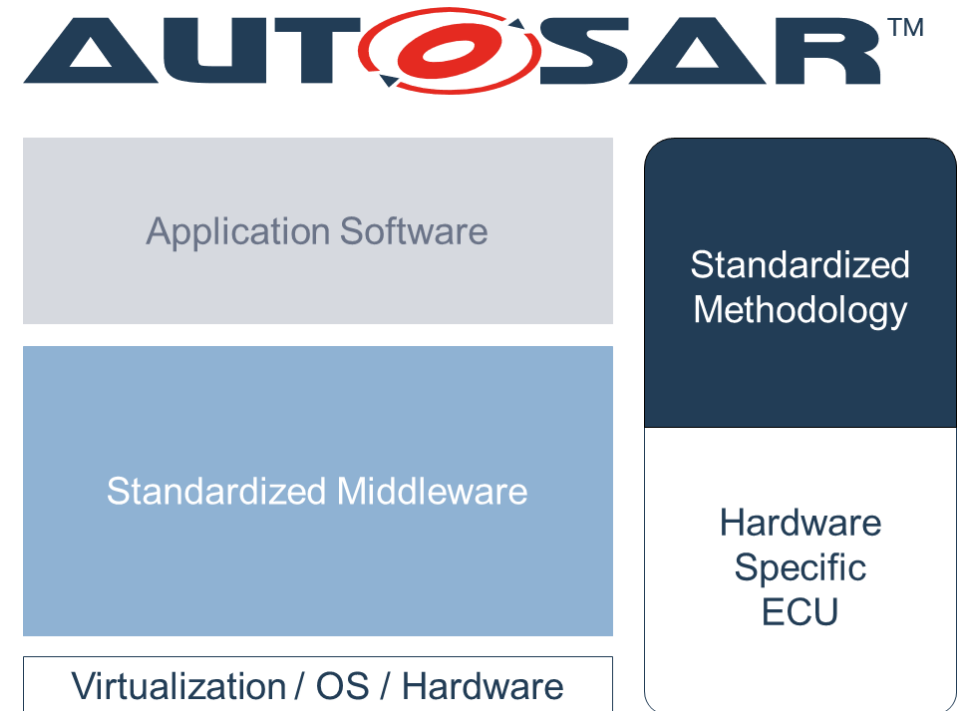


# AUTOSAR Basic Principles

## Benefits of the AUTOSAR Middleware Approach

AUTOSAR paves the way for innovative electronic systems with **improved performance, safety and security**.

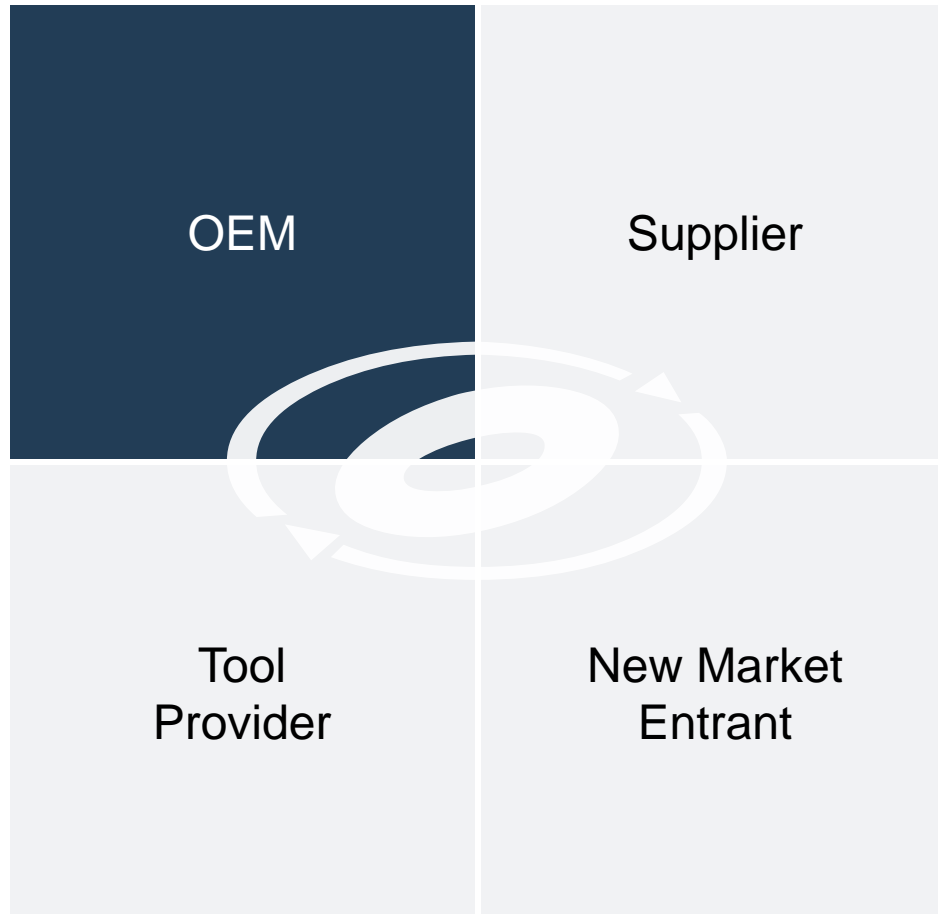
- **Hardware** and **software** widely **independent** of each other
- **Decouplable development** (by abstraction) through horizontal layers; therefore, **reduced** development **time** and **costs**
- **Enhanced quality** and **efficiency** through software reuse





# AUTOSAR Basic Principles

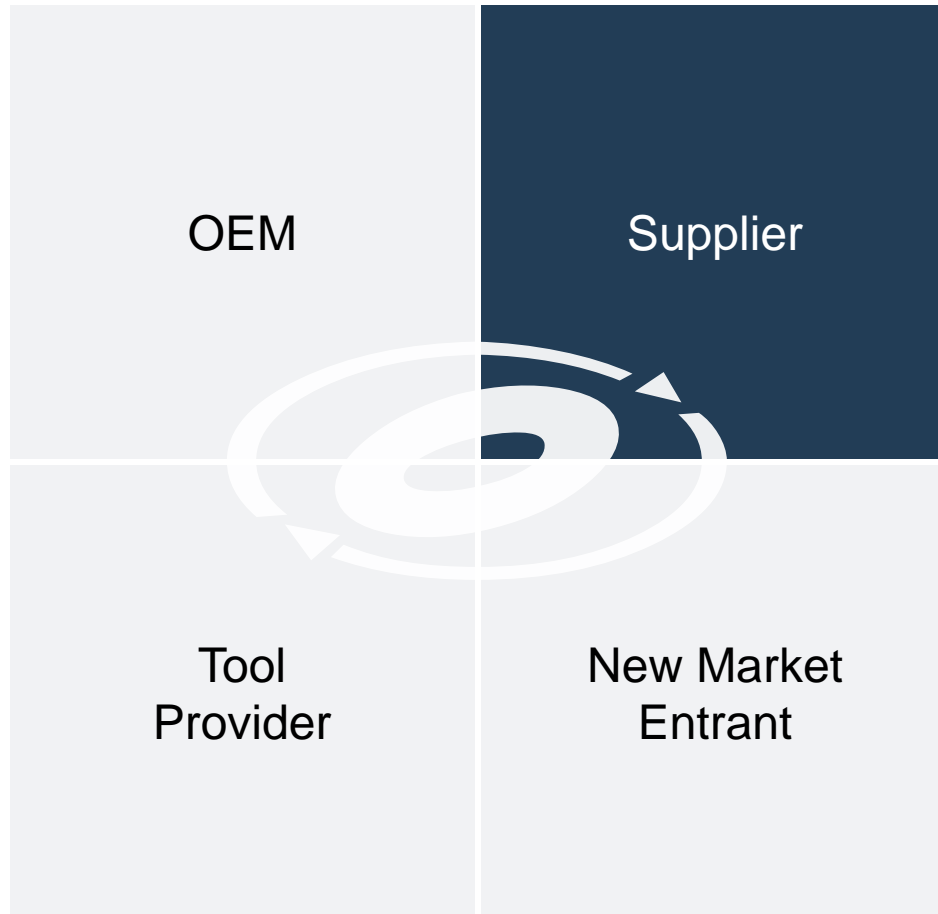
## Benefits of Exploiting the Standard (1)



- Establish **distributed development** among suppliers
- Compete on innovative functions with increased **design flexibility**
- **Simplify** software and system integration
- **Reduce** overall software development costs

# AUTOSAR Basic Principles

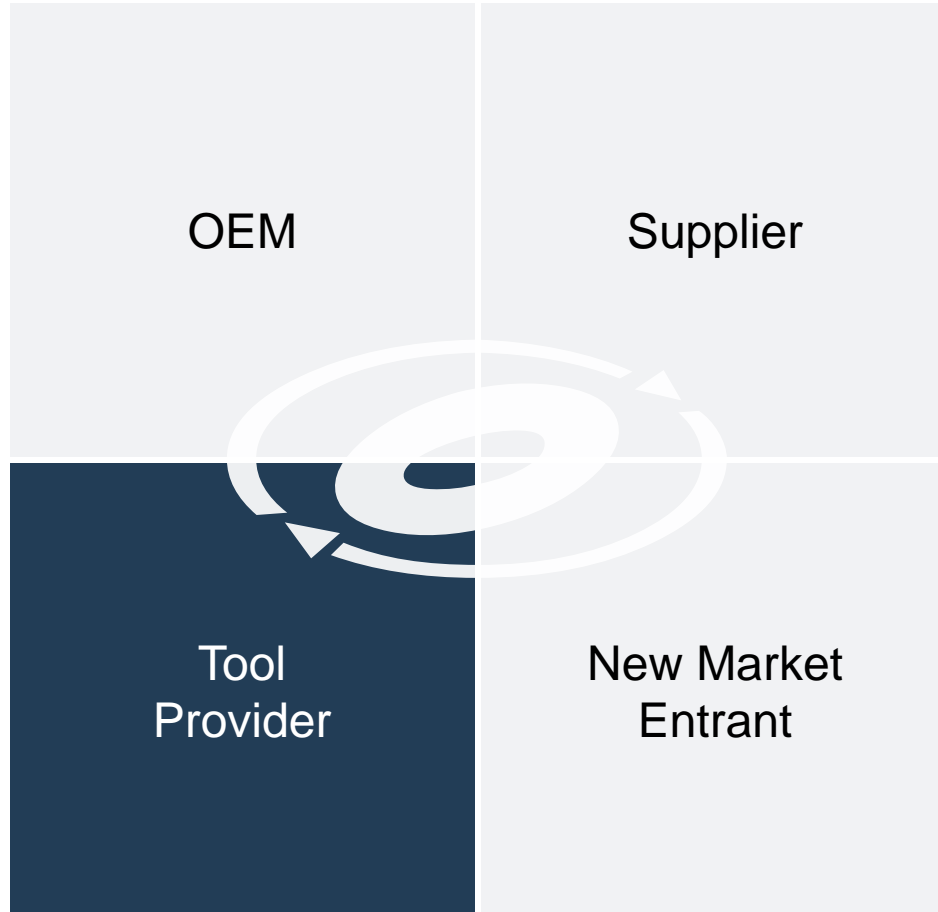
## Benefits of Exploiting the Standard (2)



- Enhance efficient **variant handling**
- **Reuse software** modules across OEMs
- Increase efficiency of **application development**
- **Invent** new business models

# AUTOSAR Basic Principles

## Benefits of Exploiting the Standard (3)

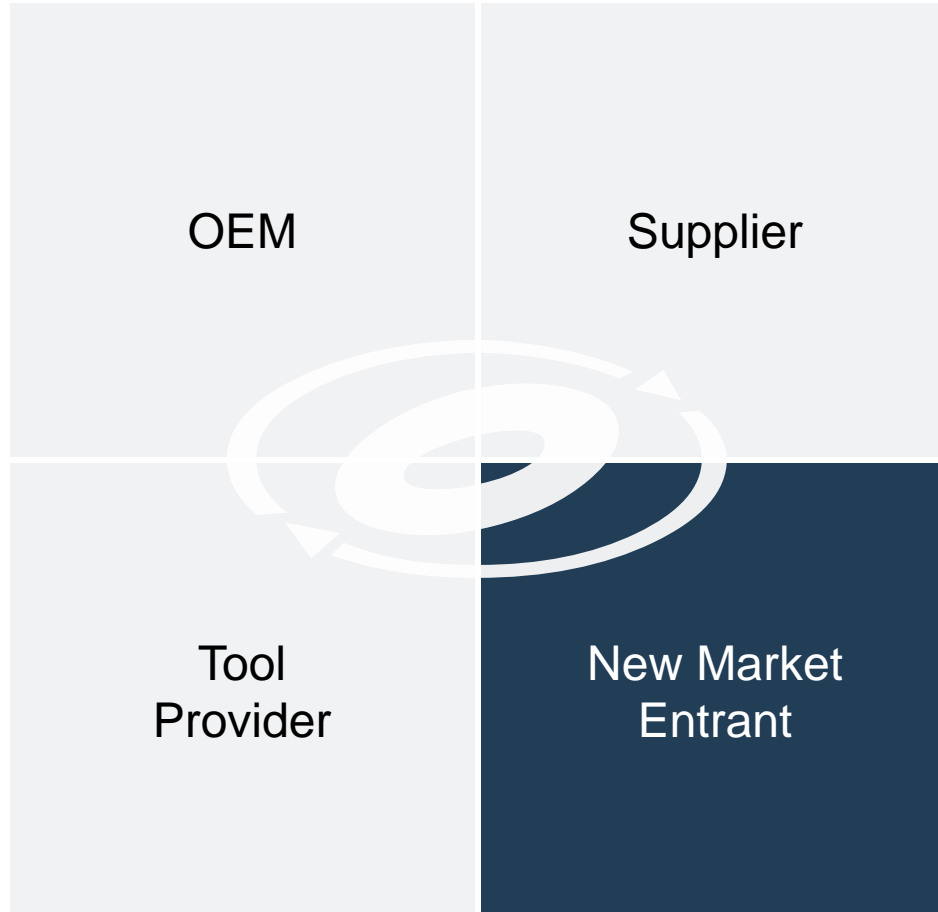


- Have an **interface** with development processes
- **Embed tools** into an overall tool environment



# AUTOSAR Basic Principles

## Benefits of Exploiting the Standard (4)



- Enable **new business models** through standardized interfaces
- **Understand easily** how automotive software is developed

# Agenda

## Part 1

- ▶ The AUTOSAR Partnership
- ▶ The AUTOSAR Standardization
  - Challenges in the Mobility Sector
  - The Software Framework

## Part 2

- ▶ Architecture and Features
- ▶ Smart Solutions Based on AUTOSAR
- ▶ Processes and Quality

# Challenges in the Mobility Sector

## Selected Main Drivers for Standardization



### Highly Automated Driving with Dependability

- Reliability
- Availability
- Maintainability
- Safety
- Security



### V2X, Internet of Things, Cloud-Based Services

- Security
- QoS
- Over the Air (OTA) Update/Upgrade

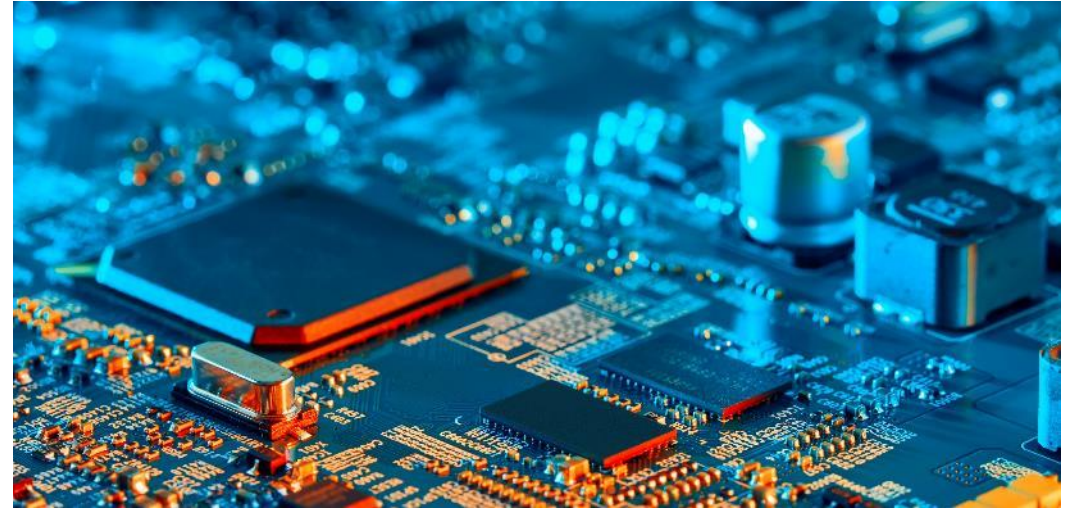
# Challenges in the Mobility Sector

## Selected Main Drivers for Standardization



### Increasing Data Rates and Volume

- Automotive Ethernet
- 5G



### New Automotive Processor Technologies

- Centralized multi-core processors



# Challenges in the Mobility Sector

Highly Automated Driving - It's all About Trust!

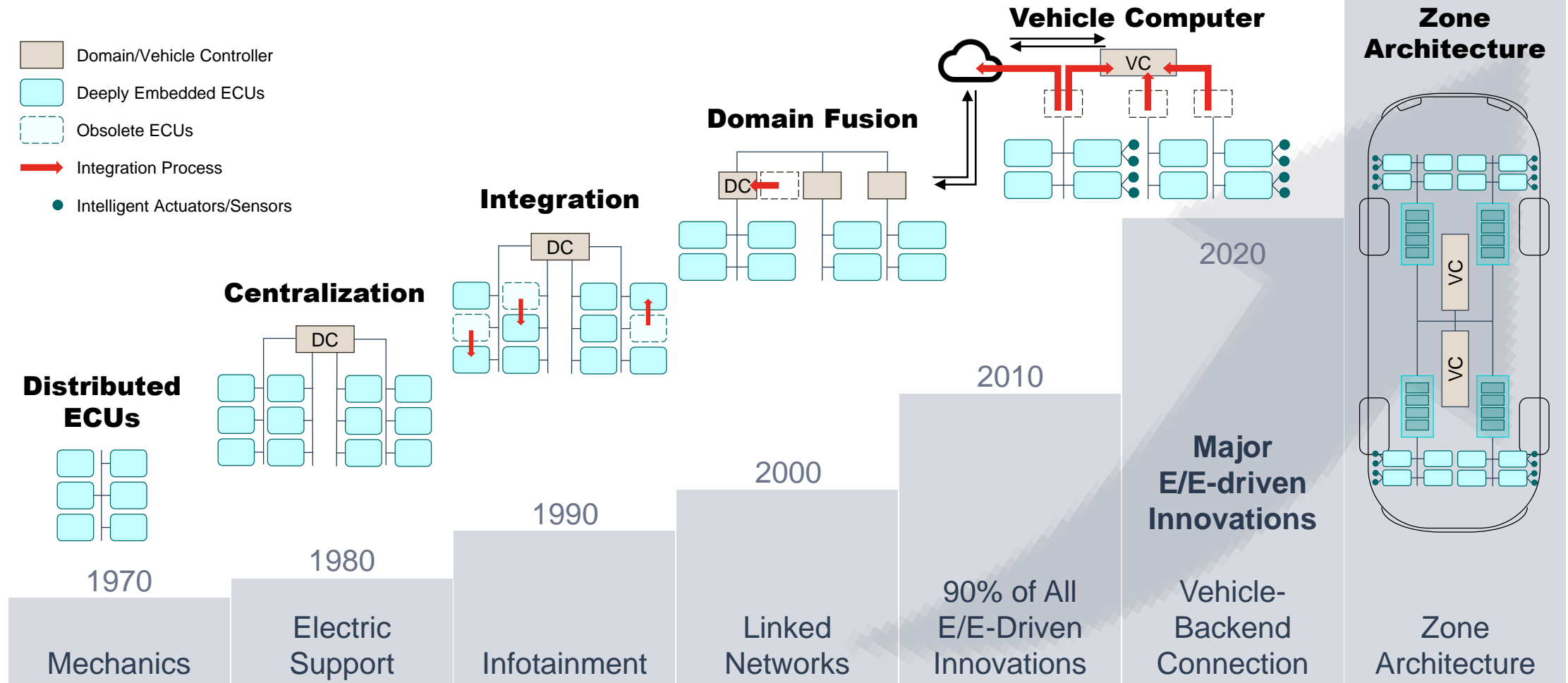
High dependability will require

- a balance between **safety** and **availability** through redundancy and degradation concepts.
- **protection against** common cause or common mode **failures** through physical and software diversity.
- comprehensive system **monitoring** and **diagnosis**.
- high **system reliability**.
- Over The Air (**OTA**) serviceability.
- **certifiable** development processes.



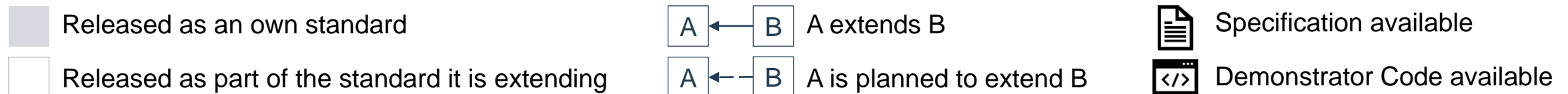
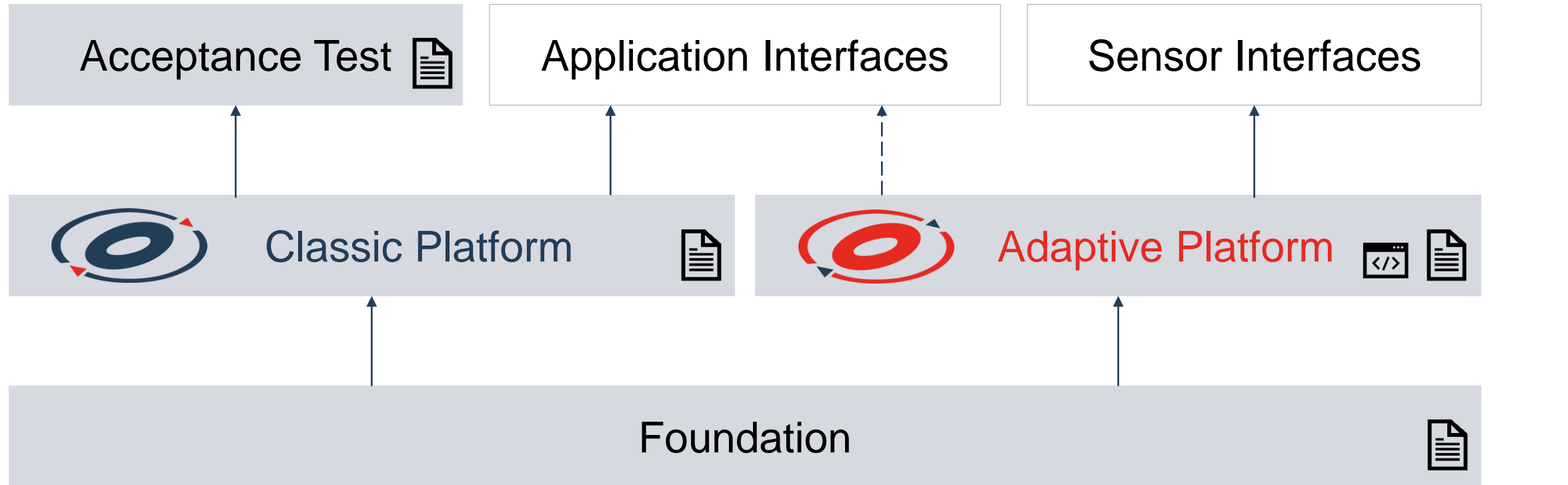
# Challenges in the Mobility Sector

## Driving Innovations in E/E Architectures





# AUTOSAR Software Framework

## Deliverables



# AUTOSAR Software Framework

## The AUTOSAR Platforms

	Classic Platform	Adaptive Platform	Collaboration E.g. Infotainment
			
Real Time Requirements	<b>High</b> , in the range of micro-seconds	<b>Mid</b> , in the range of milli-seconds	<b>Low</b> , in the range of seconds
Safety Criticality	<b>High</b> , up to ASIL-D	<b>High</b> , at least ASIL-B	<b>Low</b> , QM
Computing Power	<b>Low</b> , ~ 1000 DMIPs	<b>High</b> , > 20.000 DMIPs	<b>High</b> , ~ 10.000 DMIPs

# AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications



1. Safe and Secure



2. Connected



3. Dynamic and  
Updateable

# AUTOSAR Adaptive Platform

## Three Pillars for ADAS Applications (1)



### 1. Safe and Secure

- External Communication:  
**DTLS**



### 2. Connected

- In-Vehicle Communication:  
**SecOC • IPsec**






### 3. Dynamic and Updateable

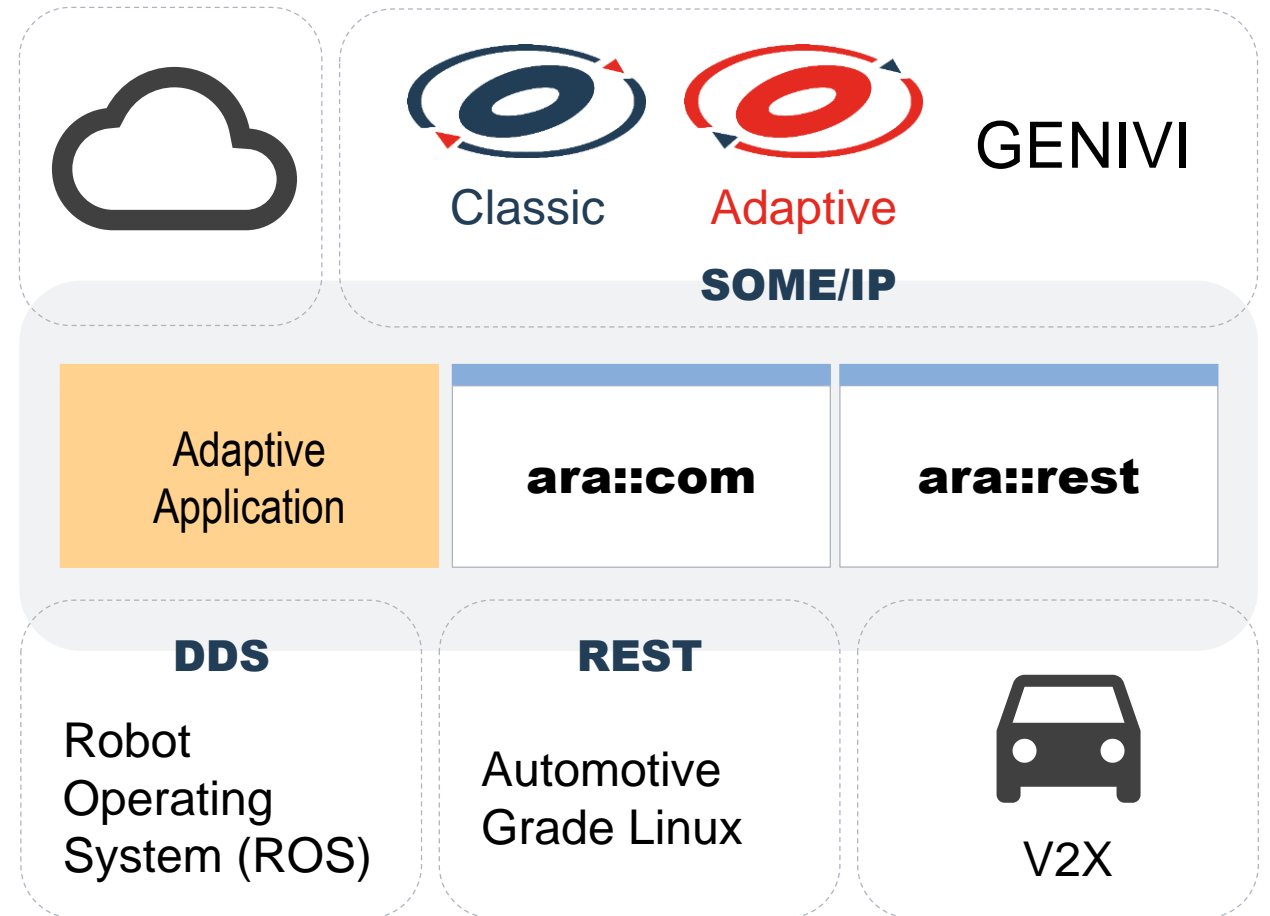
- Platform  
**Process Separation • Process-Sys Separation • Safe Data Storage • Supervision • Failure Handling • Resource Budgeting • E2E for SOA • Exceptionless APIs • IAM • Crypto**



# AUTOSAR Adaptive Platform




## Three Pillars for ADAS Applications (2)

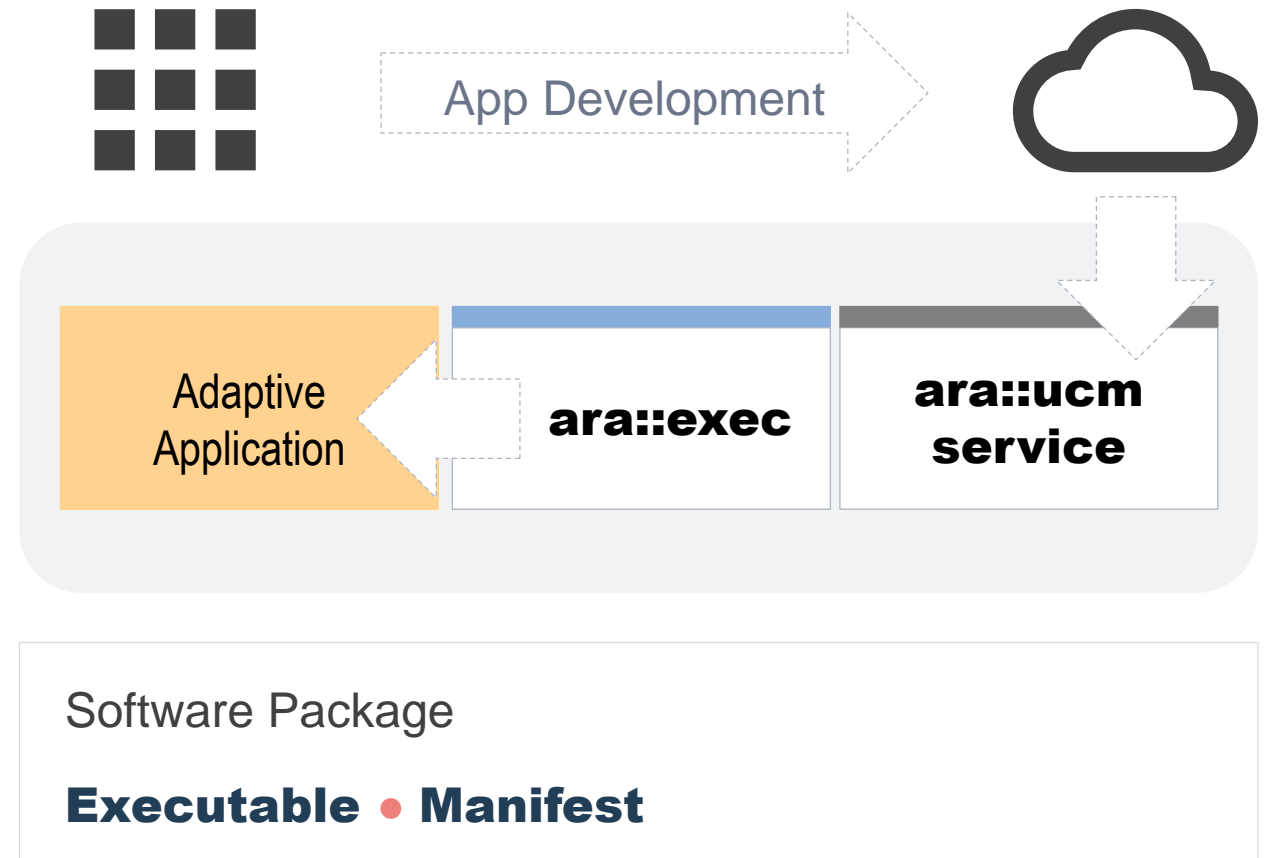
-  1. Safe and Secure
-  2. Connected
-  3. Dynamic and Updateable



# AUTOSAR Adaptive Platform

## Three Pillars for ADAS Applications (3)

-  1. Safe and Secure
-  2. Connected
-  3. Dynamic and Updateable



# AUTOSAR Classic Platform

Four Pillars Form the Standard Solution for Today's Automobiles



1. Functional Safety



2. Efficiency



3. Field Proven



4. Performance

# AUTOSAR Classic Platform

Four Pillars Form the Standard Solution for Today's Automobiles (1)



## 1. Functional Safety

- Mature safety features (e.g. watchdog, E2E communication protection, etc.)
- Scalable from QM up to ASIL D



## 2. Efficiency



## 3. Field Proven



## 4. Performance

# AUTOSAR Classic Platform

Four Pillars Form the Standard Solution for Today's Automobiles (2)



## 1. Functional Safety

- AUTOSAR stacks from different vendors



## 2. Efficiency

- Cost effective by supporting a wide range of  $\mu$ Controllers



## 3. Field Proven

- Flexible due to CDD



## 4. Performance



# AUTOSAR Classic Platform

Four Pillars Form the Standard Solution for Today's Automobiles (3)



## 1. Functional Safety

- Mature by many years of application



## 2. Efficiency

- High quality due to widespread implementations



## 3. Field Proven

- Established distributed development processes with standardized methods and templates



## 4. Performance

# AUTOSAR Classic Platform

Four Pillars Form the Standard Solution for Today's Automobiles (4)



## 1. Functional Safety

- Hard real time capabilities



## 2. Efficiency

- Event triggered applications



## 3. Field Proven

- Flexible through supporting a wide range of protocols and networks



## 4. Performance

- Scalable by configuration



Thank you  
for your attention

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