



AUTOSAR

AUTOSAR Introduction

Part 1 - The AUTOSAR Partnership and Standardization



BOSCH Continental



STELLANTIS

TOYOTA VOLKSWAGEN GROUP

Agenda

Part 1

- ▶ The AUTOSAR Partnership
 - Organization
 - Basic Principles
- ▶ The AUTOSAR Standardization

Part 2

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

AUT20THSAR

ANNIVERSARY 2003 - 2023

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

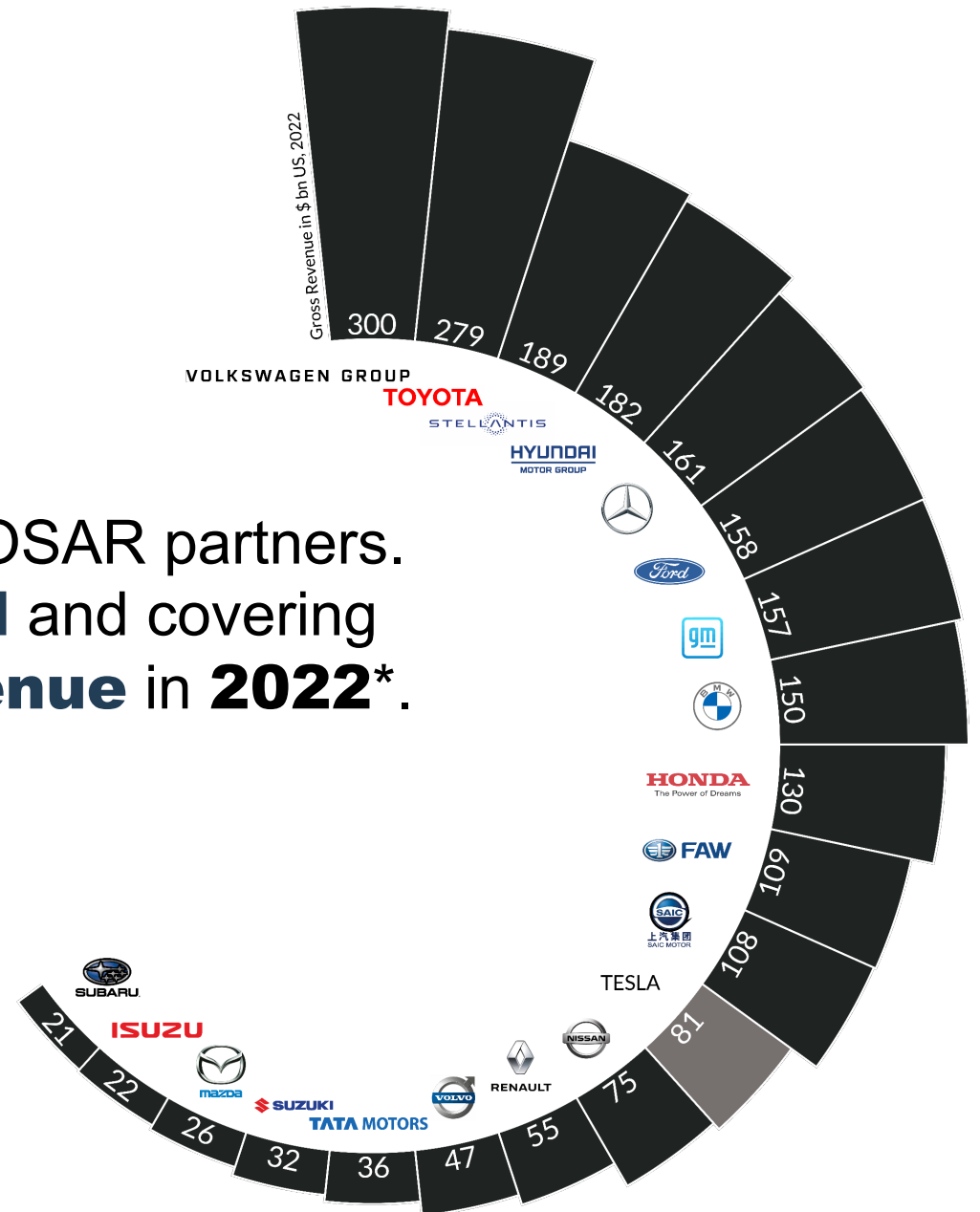
AUTOSAR has succeeded in **bringing together main players** in automotive E/E system development **to form a powerful standard** that is successfully used all **around the world.**

AUTOSAR Partnership

The Advantage of a Strong Community

31 international automotive OEM are AUTOSAR partners.
19 are **under the 20 top-selling OEM** and covering
around 80% of the **total market revenue** in **2022***.

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



*ref. to G2: 51 Automotive Industry Statistics to Highlight Latest Trends

AUTOSAR Partnership

Types of Partnership



Premium Plus



Premium



Development



Associate



Attendee

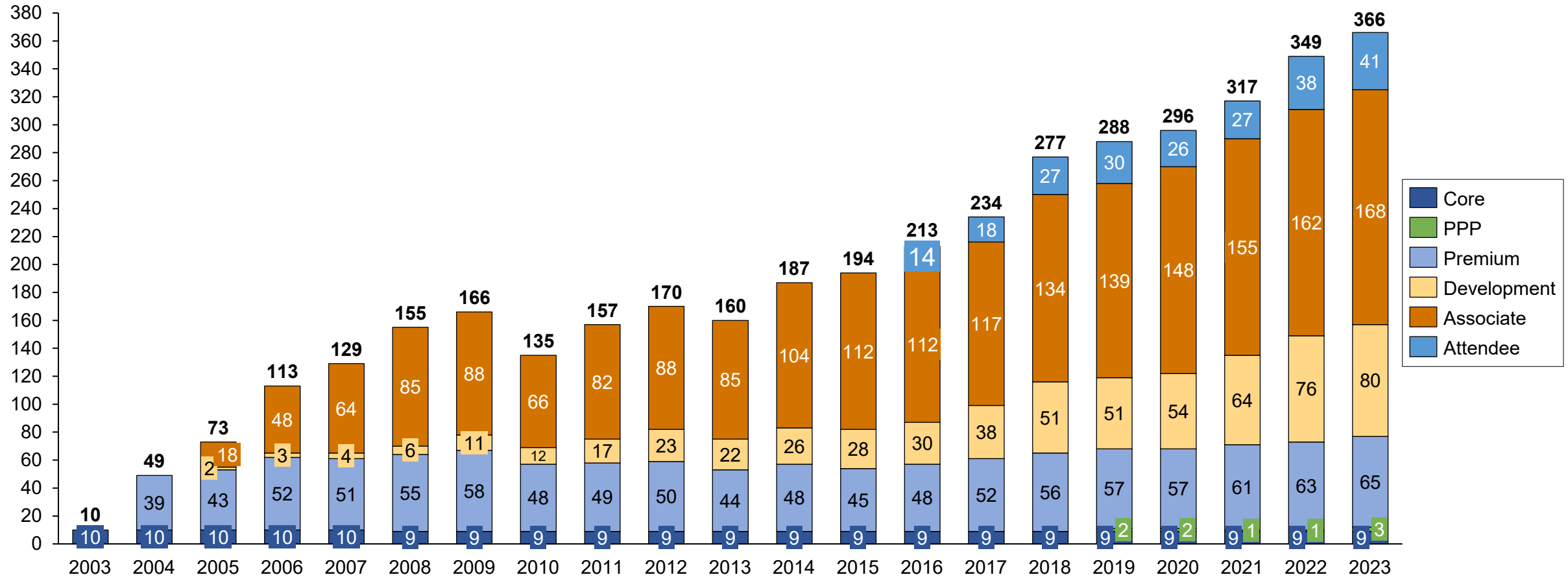


Subscriber

	Premium Plus	Premium	Development	Associate	Attendee	Subscriber
Motivation	Leading innovations and project development in AUTOSAR standards	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
Annual Fee	90,000 Euro	31,000 Euro	10,000 Euro	21,000 Euro	Free	3,000 Euro
Annual Contribution	5 FTE + 1 FTE (Project Leader)	1.5 FTE	0.5 FTE	None	Individual agreement	None

AUTOSAR Partnership

Partner Development Since 2003



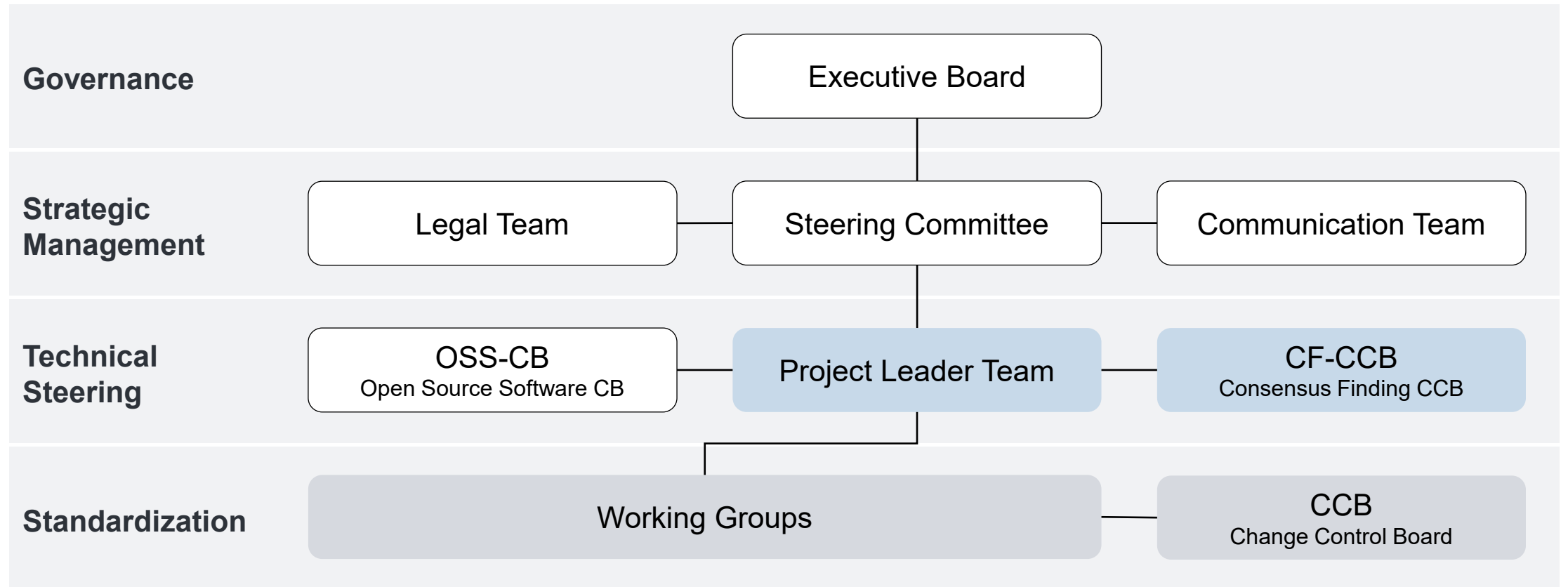
AUTOSAR Partnership

Global Distribution of AUTOSAR Partners



AUTOSAR Organization

Official Roles



☐ Core Partner ☒ Core Partner, Premium Partner Plus ☒ Core Partner, Premium Partner Plus, Premium Partner, Development Partner

AUTOSAR Organization

Support Functions

AUTOSAR Internal Affairs Office (IAO), Spokesperson and Regional Spokespersons

Business Administration

- Partner and User Management
- Finance
- Meeting Management

Communication Support

- Marketing

Technical Management

- Standards
- Software Development Engineering and Integration

Deliverable Management

- Change Management
- Quality Assurance
- Release Management

Legal Support

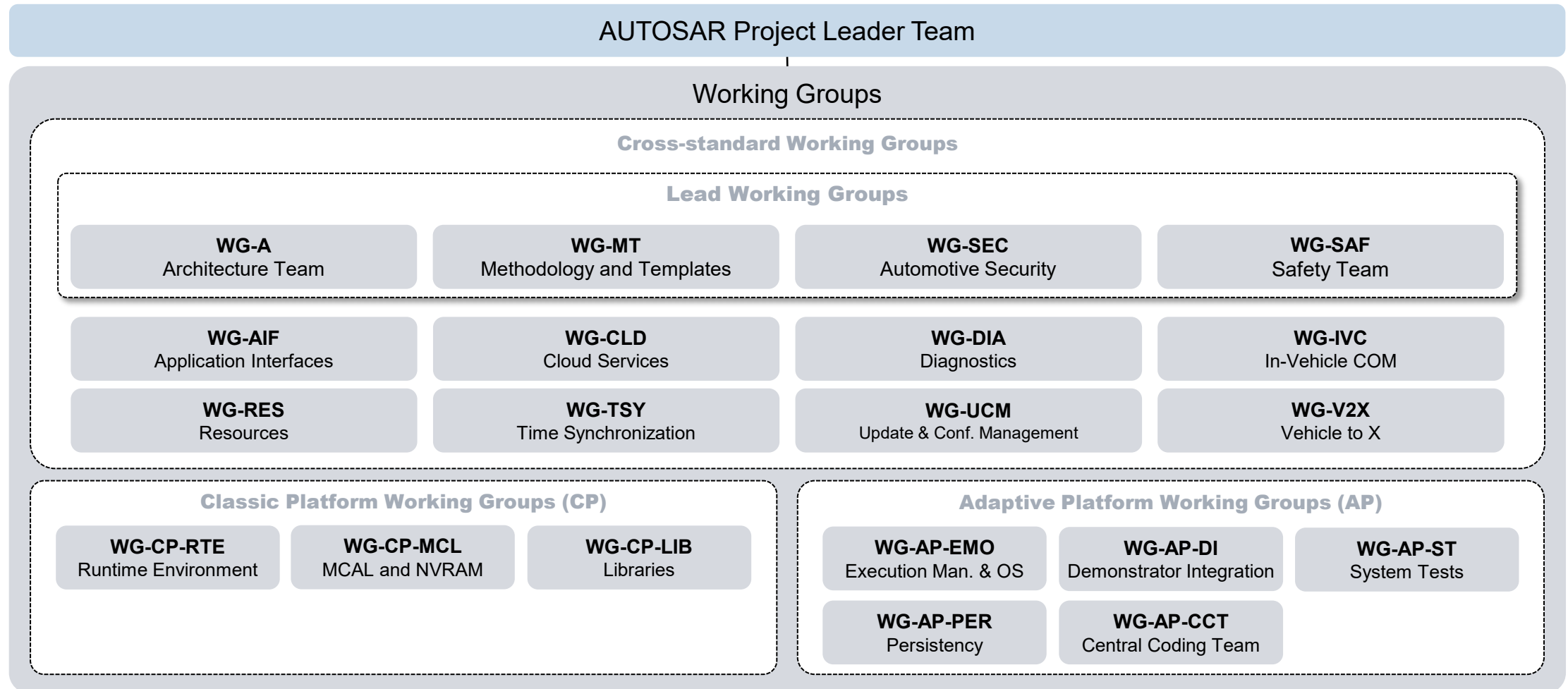
Requirements Management

Quality and Process Management

Technical Office and IT Infrastructure

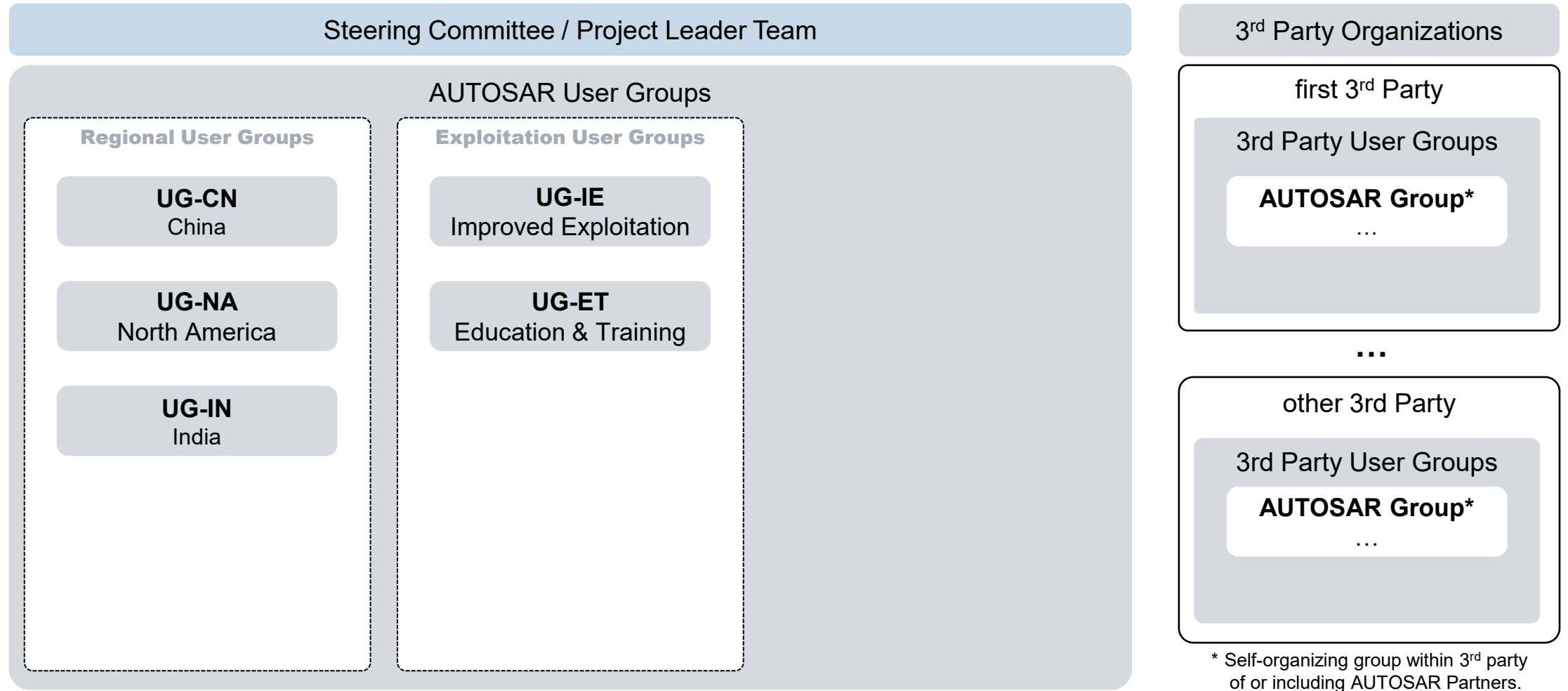
AUTOSAR Organization

Overview of Working Groups



AUTOSAR Organization

User Group Structure



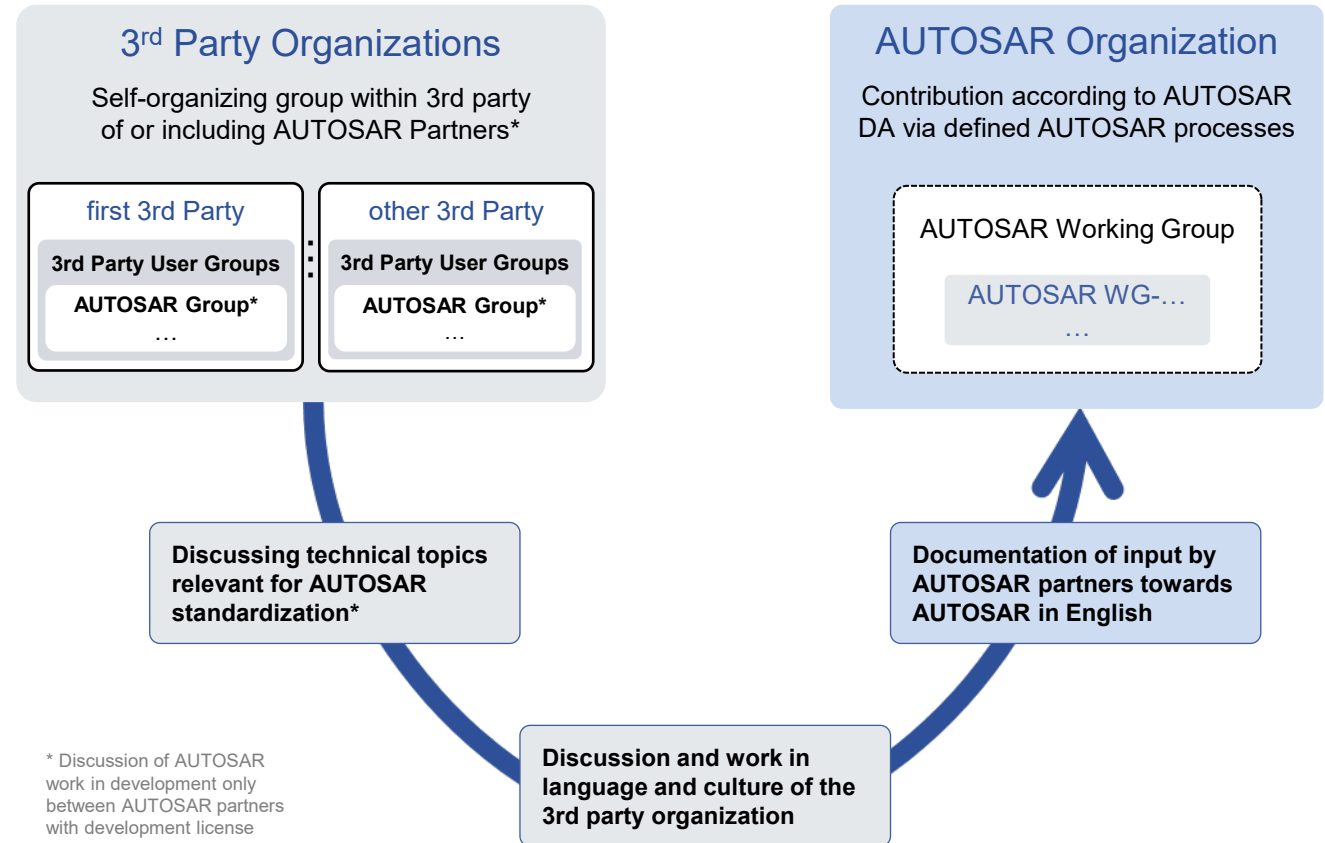
AUTOSAR Organization

3rd Party Group – Contribution of 3rd Party Technical Interests

Example Collaboration Model:

3rd parties technical interests are elaborated in 3rd party organizations

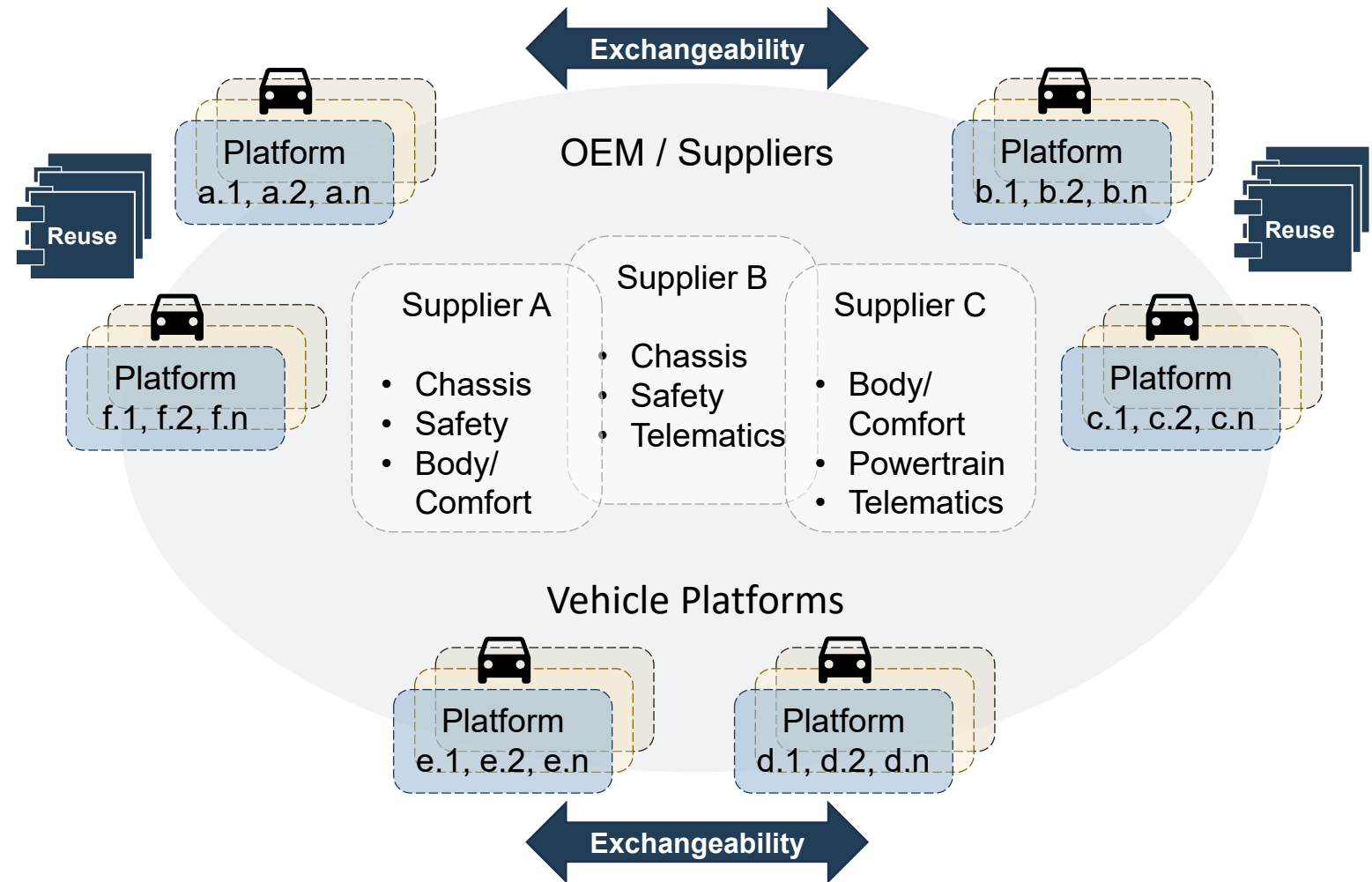
Interested 3rd party organizations establish internal groups to interface to AUTOSAR.



AUTOSAR Basic Principles

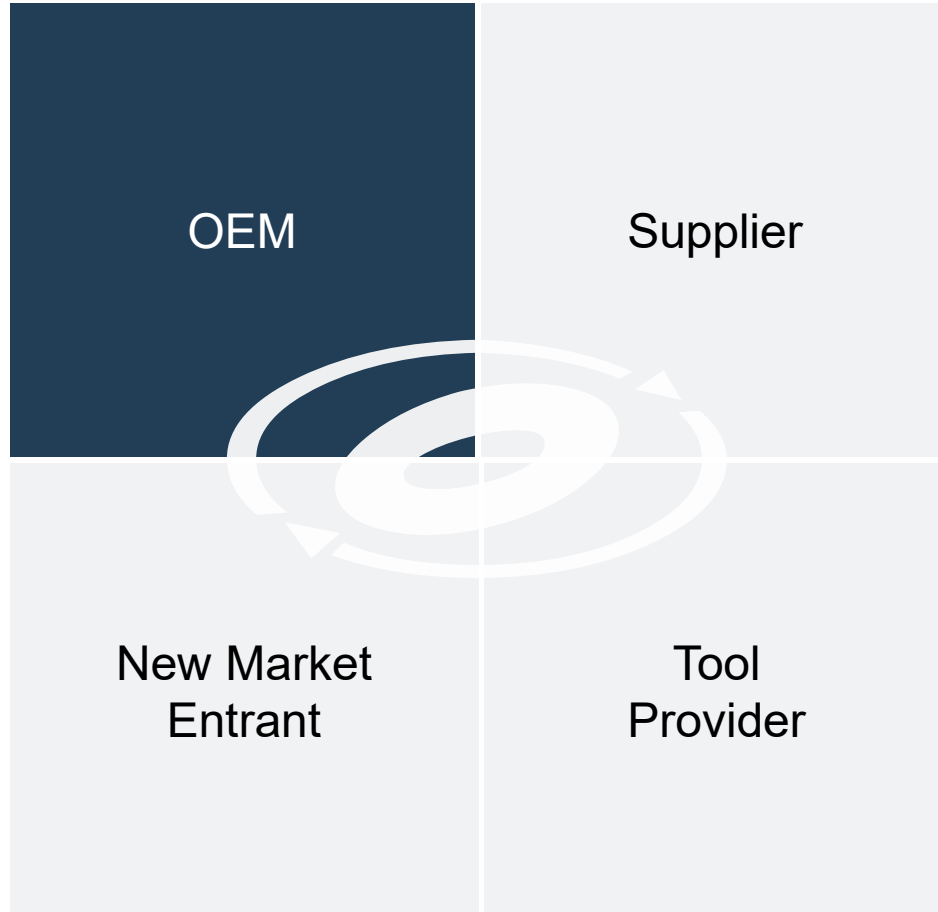
Benefits of a Software Framework

The standardized AUTOSAR software framework ensures an advanced complexity management for integrated E/E architectures through increased **reuse** and **exchangeability of software modules** within and between OEMs and suppliers.



AUTOSAR Basic Principles

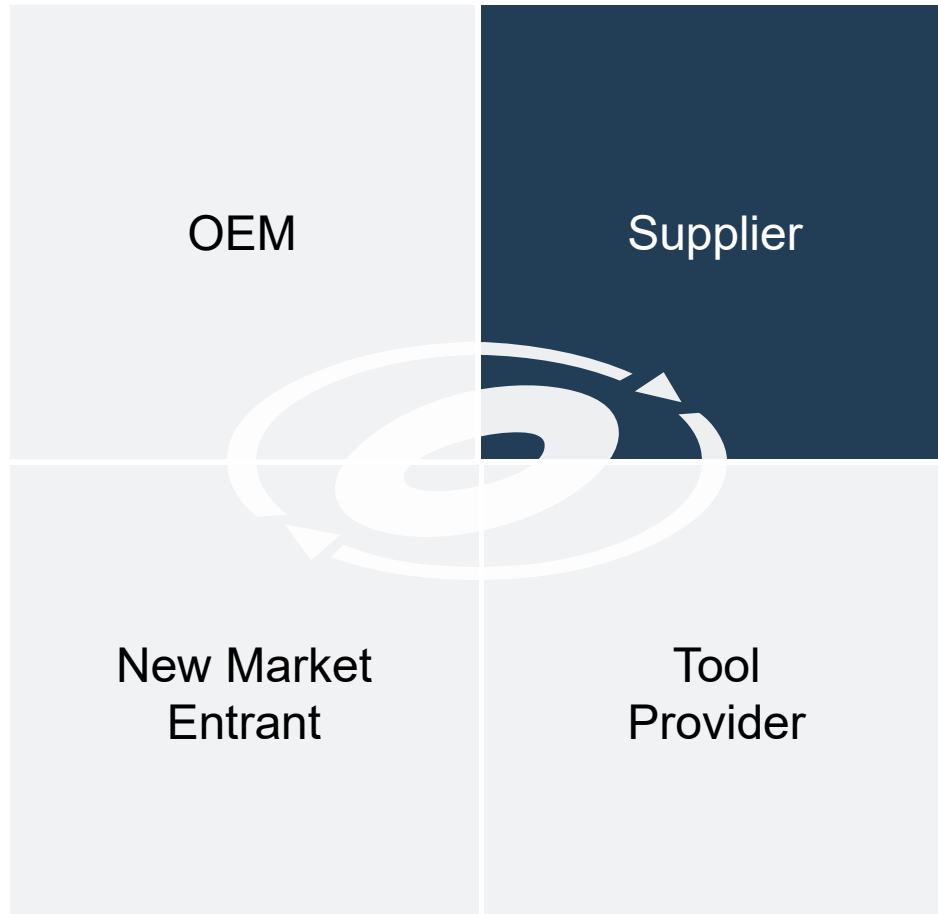
Benefits of Applying the AUTOSAR SW Framework (1)



- Supports **distributed development** among suppliers
- Standardizes **non-competitive SW**
- Allows competition on innovation with increased **design flexibility**
- **Simplifies** software and system **integration**
- **Reduces** overall software **costs**
- Supports **SW update and upgrades over the air**

AUTOSAR Basic Principles

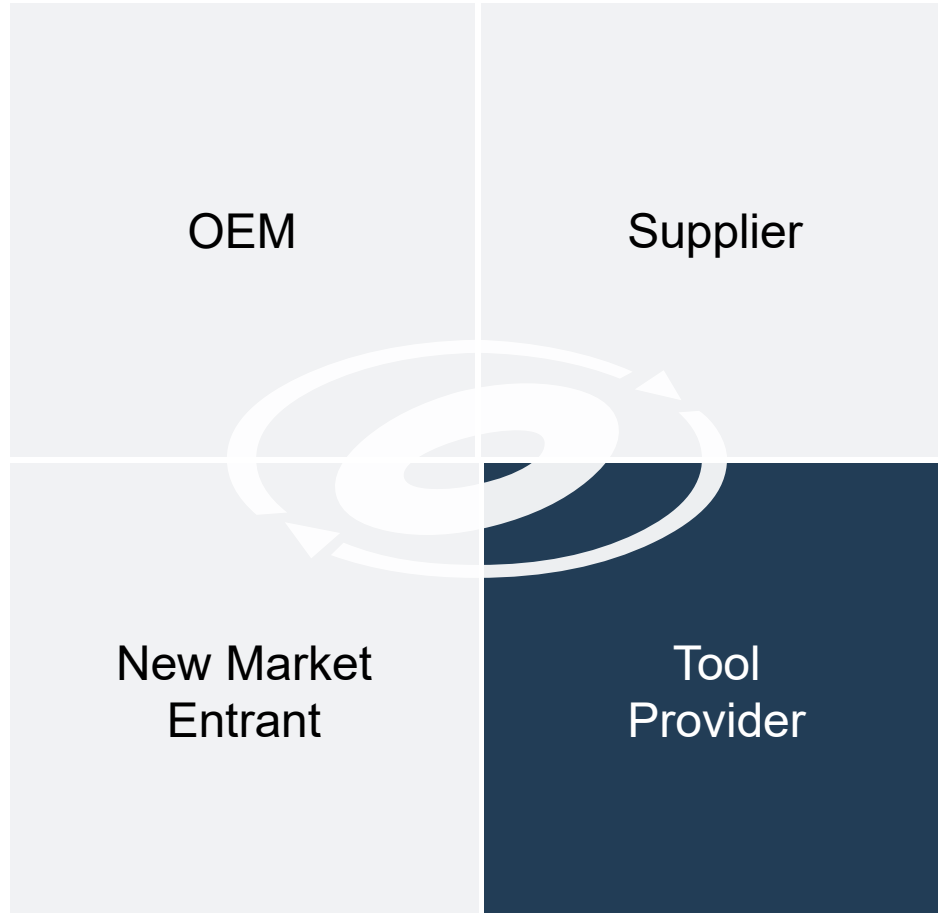
Benefits of Applying the AUTOSAR SW Framework (2)



- Enhances efficient **variant handling**
- **Reuses software** modules across OEMs
- Increases efficiency of **application development**

AUTOSAR Basic Principles

Benefits of Applying the AUTOSAR SW Framework (3)



- Supports a clearly **structured development process** based on a metamodel with templates and virtualization
- Can support **modern development processes**
- **Embeds tools** into an overall tool environment

AUTOSAR Basic Principles

Benefits of Applying the AUTOSAR SW Framework (4)

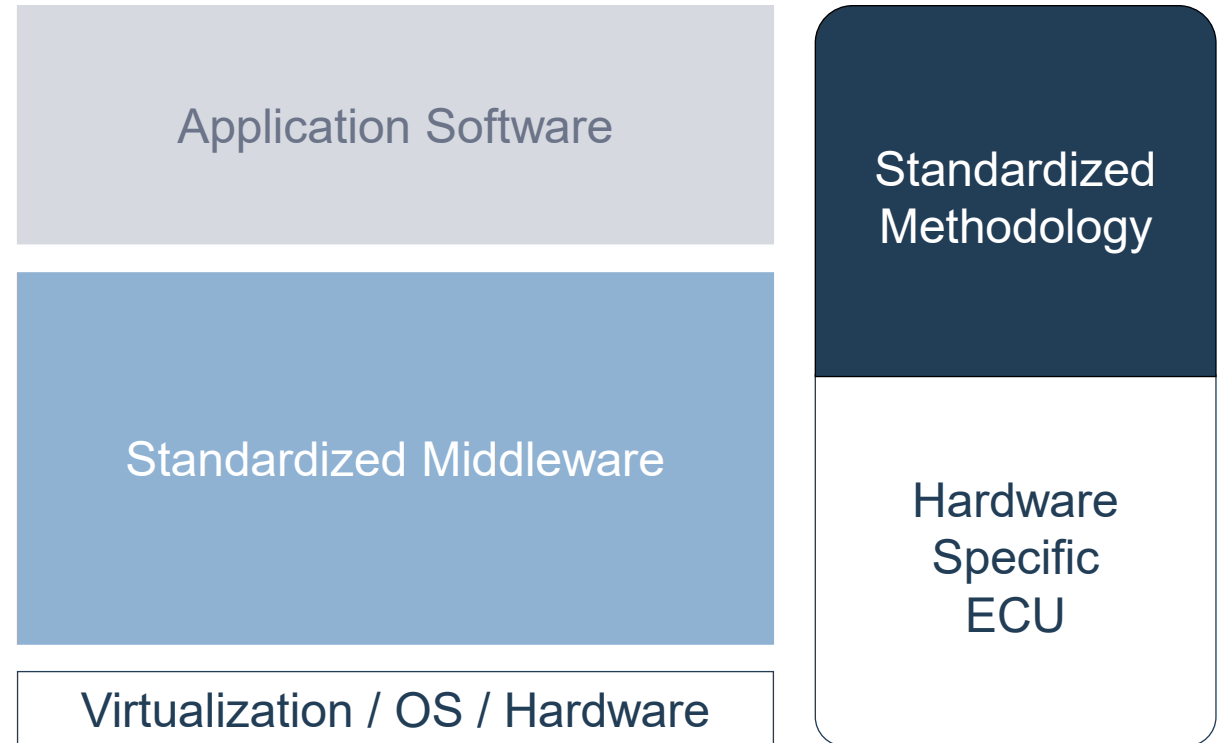
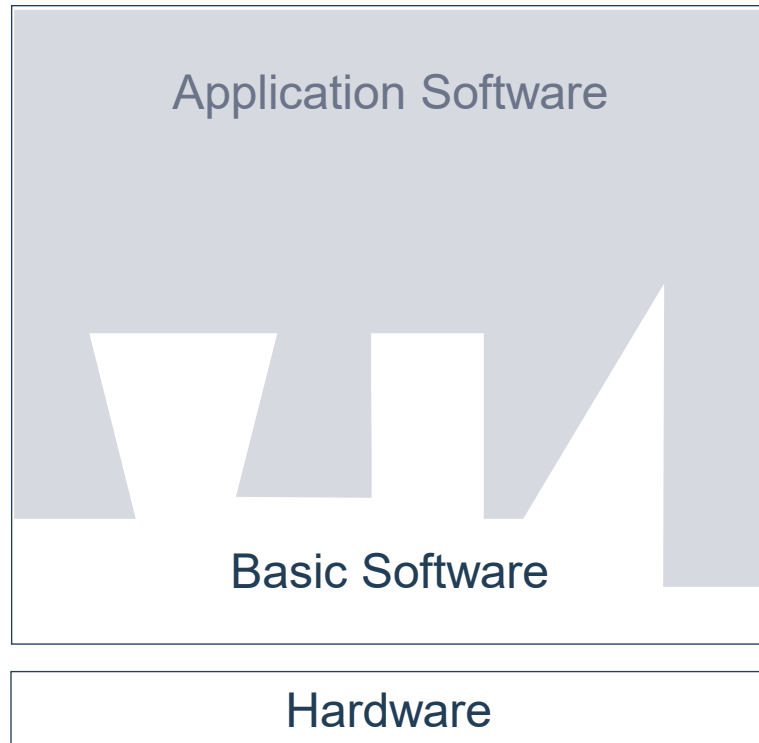


- Enables **exploitation models** through standardized interfaces
- **Could become vendor** for SW stacks
- Has access to **comprehensive documentation** of specs and methodology
- **Can contribute to market** for training courses and engineering support
- Has access to **training material**

AUTOSAR Basic Principles

Proprietary vs. AUTOSAR Middleware Approach

Proprietary Solution

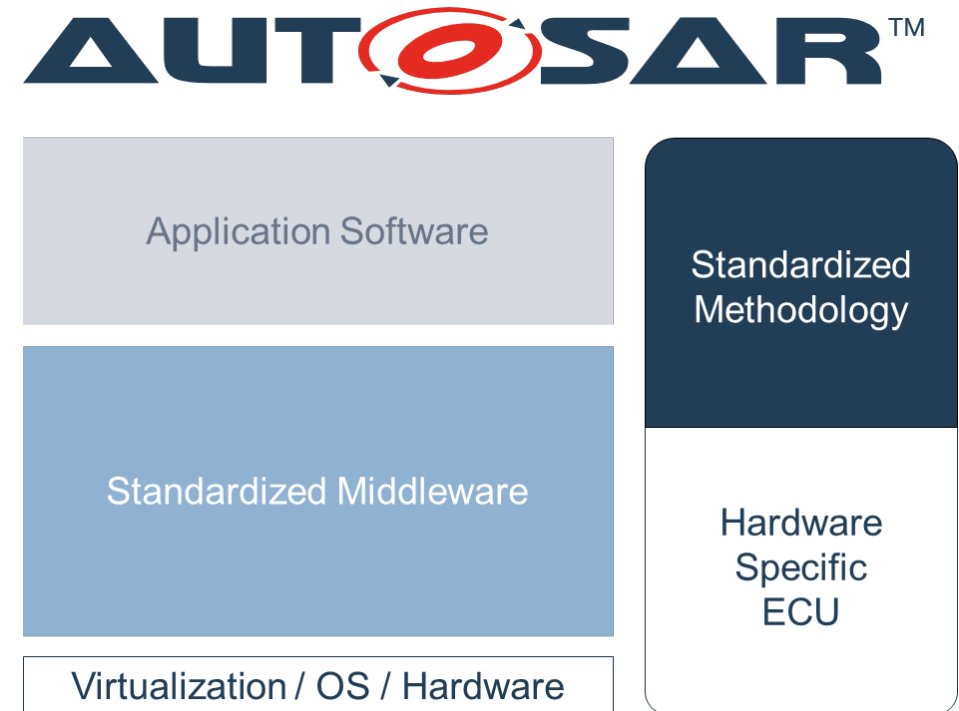


AUTOSAR Basic Principles

Benefits of the AUTOSAR Middleware Approach

AUTOSAR provides a holistic ecosystem for innovative electronic systems with high **performance, safety and security** requirements.

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



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 Software Defined Vehicles

Connected, Automated, Shared, and Electrified driving



Highly Automated Driving
with Dependability

- Safety
- Security
- Reliability, Availability and Maintainability



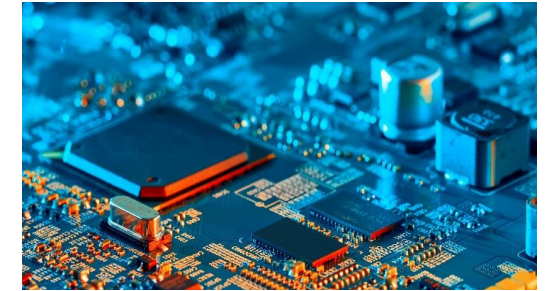
V2X, Internet of Things,
Cloud-Based Services

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



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!

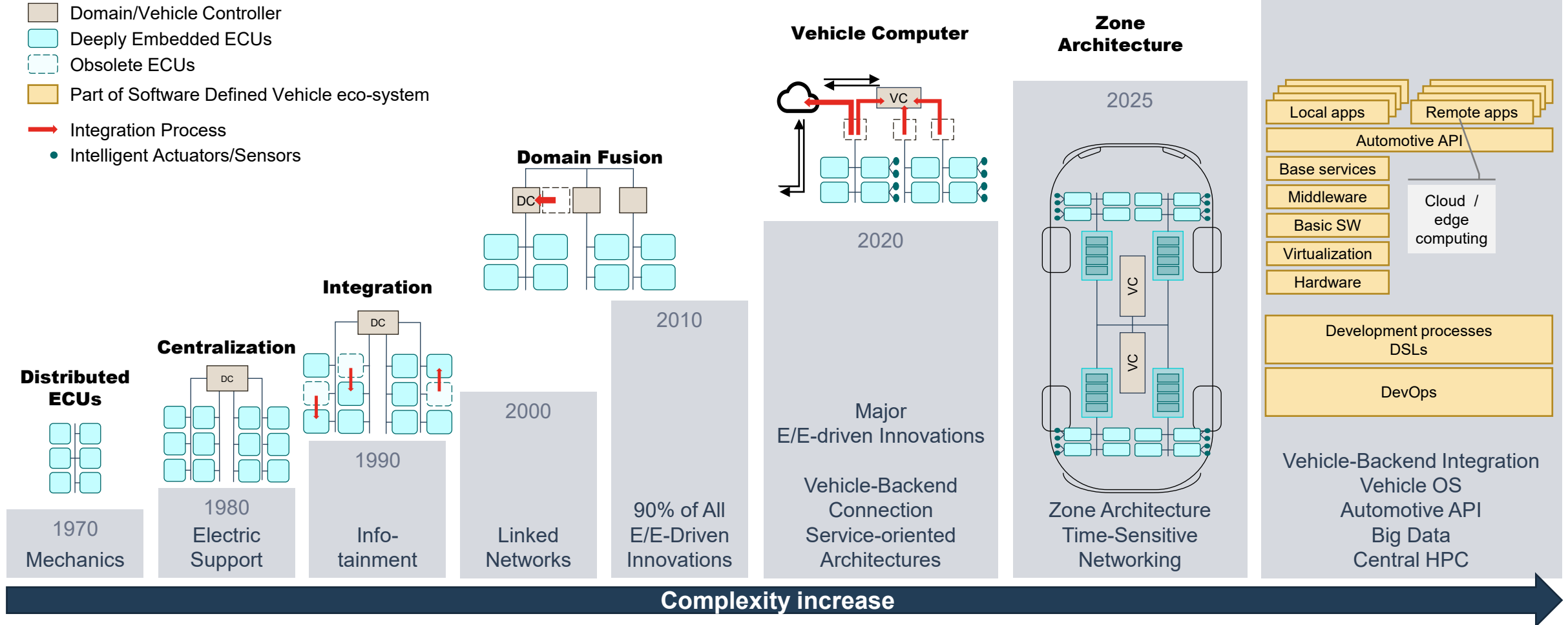
High dependability will require

- 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

- Domain/Vehicle Controller
- Deeply Embedded ECUs
- Obsolete ECUs
- Part of Software Defined Vehicle eco-system
- Integration Process
- Intelligent Actuators/Sensors



The AUTOSAR Opening Strategy

A Set of Measures to Meet the Challenges

- ✓ Regional Representations
- ✓ 3rd Party Collaboration
- ✓ Premium Partner Plus
- ✓ Derived Applications
- ✓ Easier Access to a limited scope of AUTOSAR Work
- Automotive API
- AUTOSAR Open Framework

Derived Applications

- Mobility infrastructure
- Agricultural machinery
- Maritime Shipping
- Railway
- Urban Mobility
- Industrial Automation
- Building Automation
- Household appliance
- Medical technology

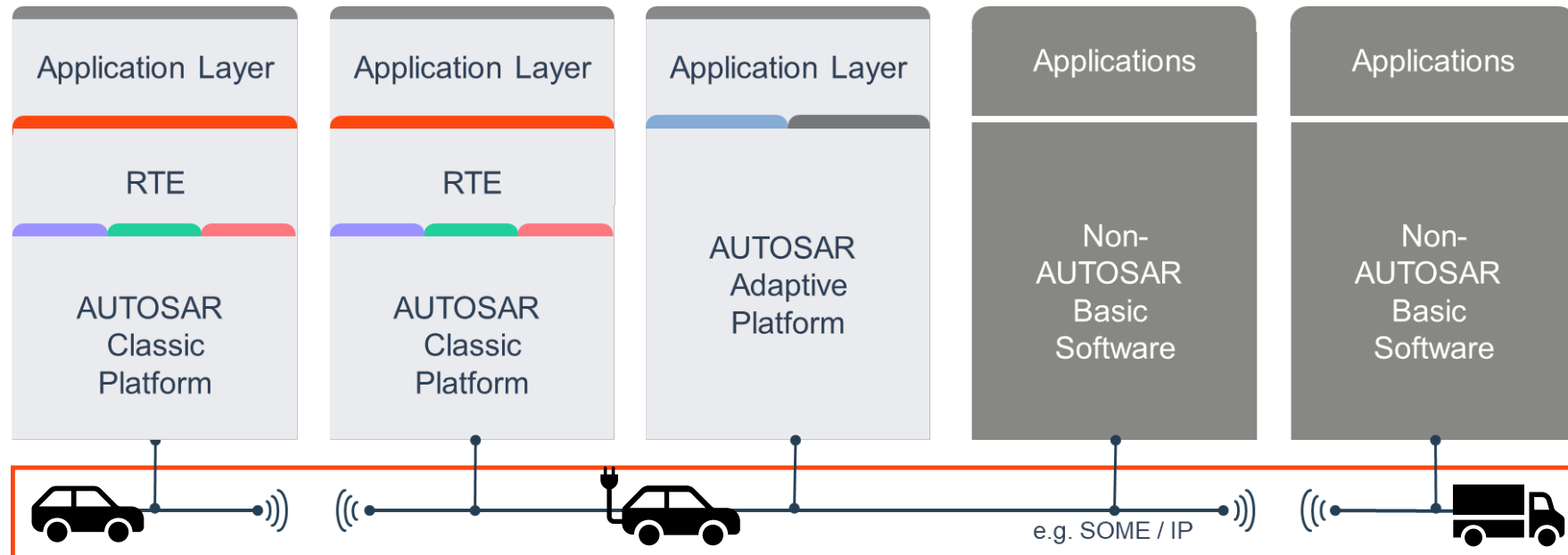


The AUTOSAR Opening Strategy

Easier Access to Provide AUTOSAR Compatible Components or Products

The new “Associate Partner” variant “Light”

- For free.
- Exploitation rights for very limited scope of AUTOSAR standards.



The AUTOSAR Opening Strategy

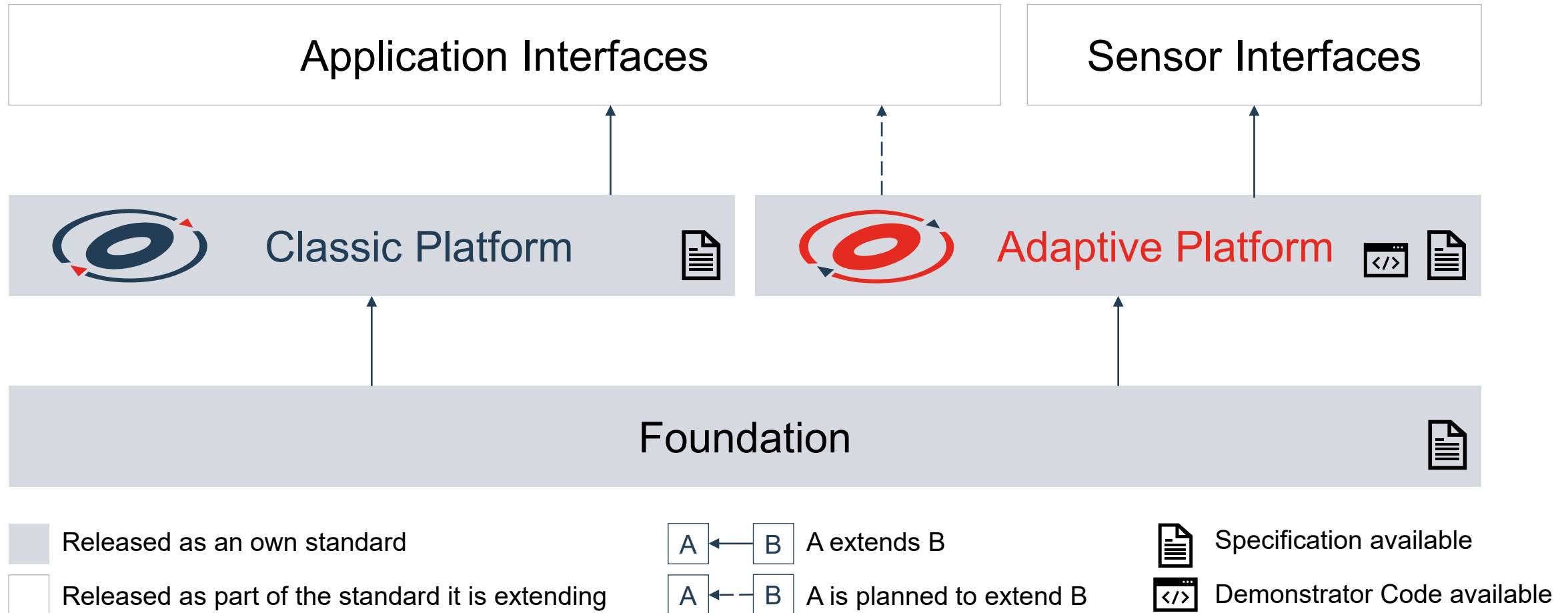
Foster Collaboration for Software Defined Vehicles (SDV)

The planned AUTOSAR Open Framework (AOF)

- to enable open collaboration in the SDV ecosystem **considering the overarching purpose of AUTOSAR.**
- to **foster an ecosystem** of complementary standards, software implementations, and capabilities
- to allow new activities **beyond the limits** of the AUTOSAR Development Cooperation.
- is **open for interested parties** from the automotive and related industries to develop joint solutions.

AUTOSAR Software Framework

Deliverables



AUTOSAR Software Framework

The AUTOSAR Platforms

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

AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications



1. Safe and Secure



2. Connected



3. Dynamic and Updateable

The mixed-critical automotive extension to POSIX

- Standard automotive connectivity
- Automotive-specific functional add-ons
- Functional Safety and Cyber Security
- E/E Architecture development
 - Top-down workflow for distributed development
 - Formal exchange formats

AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications (1)



1. Safe and Secure



2. Connected






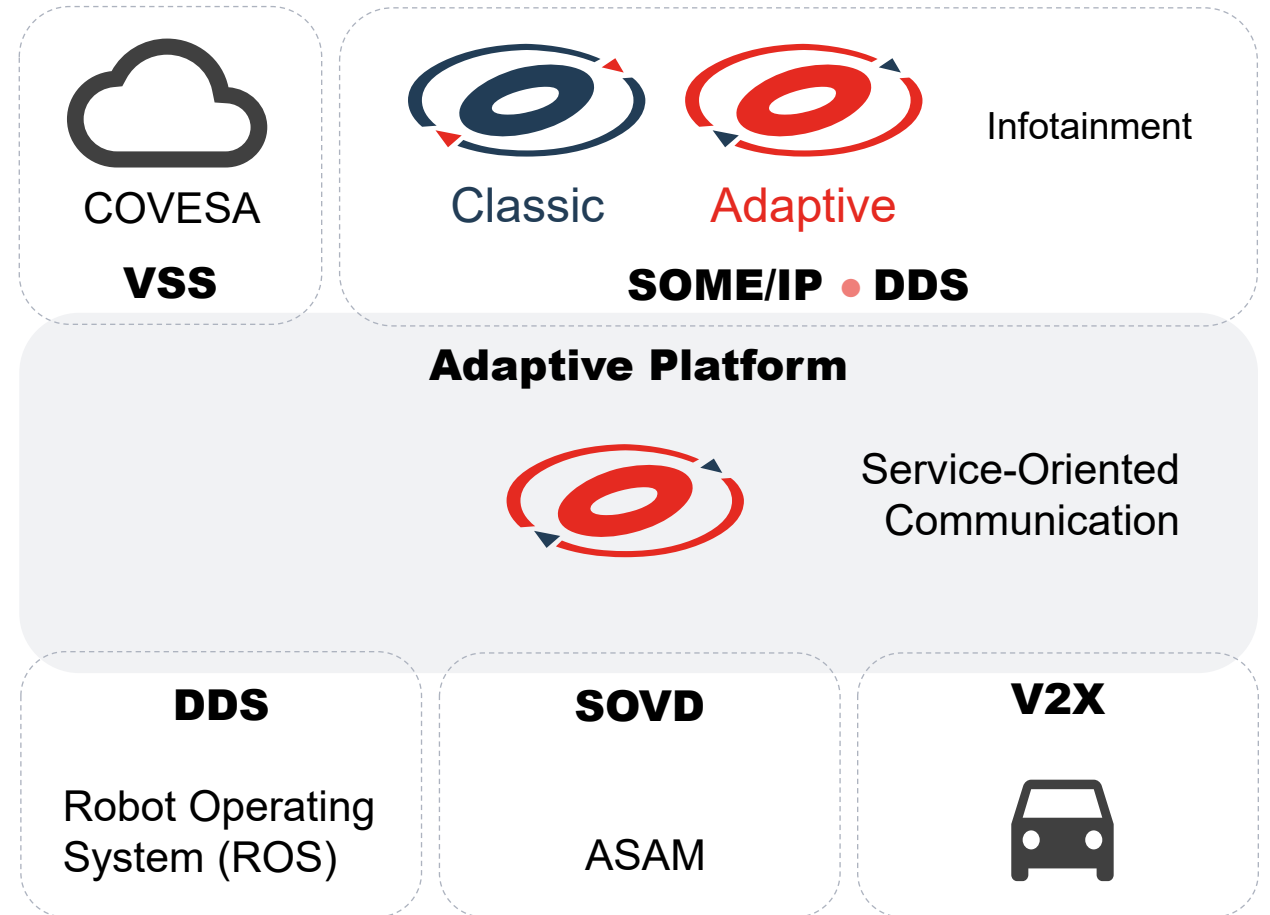
3. Dynamic and Updateable

- External Communication:
TLS • DTLS • IPsec
- In-Vehicle Communication:
SecOC • IPsec • MACsec
- Platform
Safe Data Storage • Supervision • Failure Handling • Resource Budgeting • E2E for SOA • Exceptionless APIs • Identity Access Management • Crypto • Firewall • Intrusion Detection System Management

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)



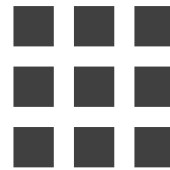
1. Safe and Secure



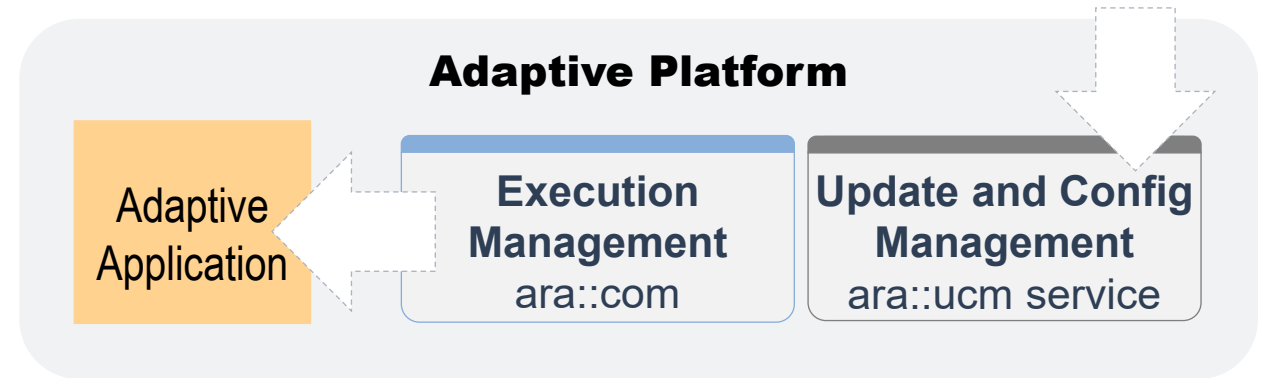
2. Connected



3. Dynamic and Updateable



App Development



Software Package

Executable • Manifest

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.)



2. Efficiency

- Scalable from QM up to ASIL D



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 μ Controllers
- Flexible due to CDD



3. Field Proven



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



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Thank you
for your attention



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