AUTOSAR Introduction

Part 1 - The AUTOSAR Partnership and Standardization

BMW BOSCH Continental Mercedes-Benz Ford gm STELLANTIS TOYOTA VW

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**.

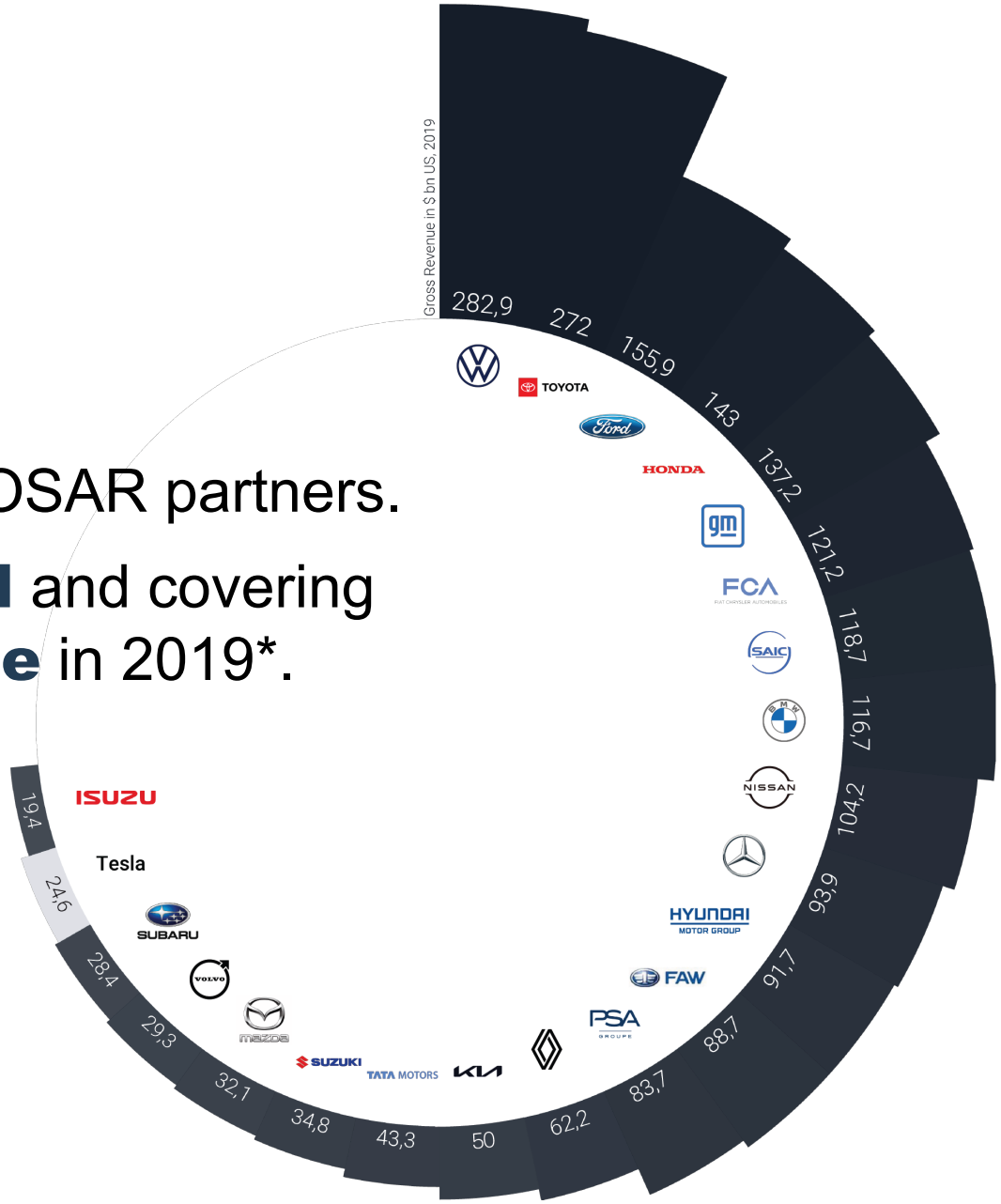
AUTOSAR Partnership

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 Plus**	 **Premium**	 **Development**	 **Associate**	 **Attendee**	 **Subscriber**
Motivation	Market leaders to drive innovations 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	21,000 Euro	6,000 Euro	15,000 Euro	Free	3,000 Euro
Annual Contribution	5 FTE + 1 FTE (Project Leader)	1.5 FTE	0.5 FTE	None	Individual agreement	None

More Than 300 AUTOSAR Partners

9 Core Partners

BMW · BOSCH · Continental · Mercedes-Benz · Ford · GM · PSA GROUPE · TOYOTA · VOLKSWAGEN AKTIENGESELLSCHAFT

65 Premium Partners

ALTEN · APTIV · APTJ · arm · Baidu 百度 · BlackBerry · CNCIC · Capgemini · cea · DASSAULT SYSTEMES · Deloitte. · DESAY SV automotive · dSPACE · EB Elektrobit · eSOL · ETAS · Fraunhofer · Great Wall · Green Hills SOFTWARE · HCL · HELLA · HONDA The Power of Dreams · Volvo · ZF · Infineon · intel · itk ENGINEERING · intron 英恒 · CETC 普华基础软件 · JTEKT · KPIT · L&T Technology Services · LG Life's Good · LUXOFT · MathWorks · MITSUBISHI ELECTRIC Changes for the Better · NEC · Neusoft REACH · NISSAN · NXP · Panasonic · RENAULT · RENESAS · SCSK · SIEMENS · sodius · ST · SUMITOMO ELECTRIC · TATA CONSULTANCY SERVICES Experience certainty. · TATA ELXSI · TATA MOTORS · thyssenkrupp · tieto EVRY · Valeo · Tech Mahindra · veoneer · VOLVO

3 Premium Partners Plus

HUAWEI · DENSO Crafting the Core · VECTOR

79 Development Partners

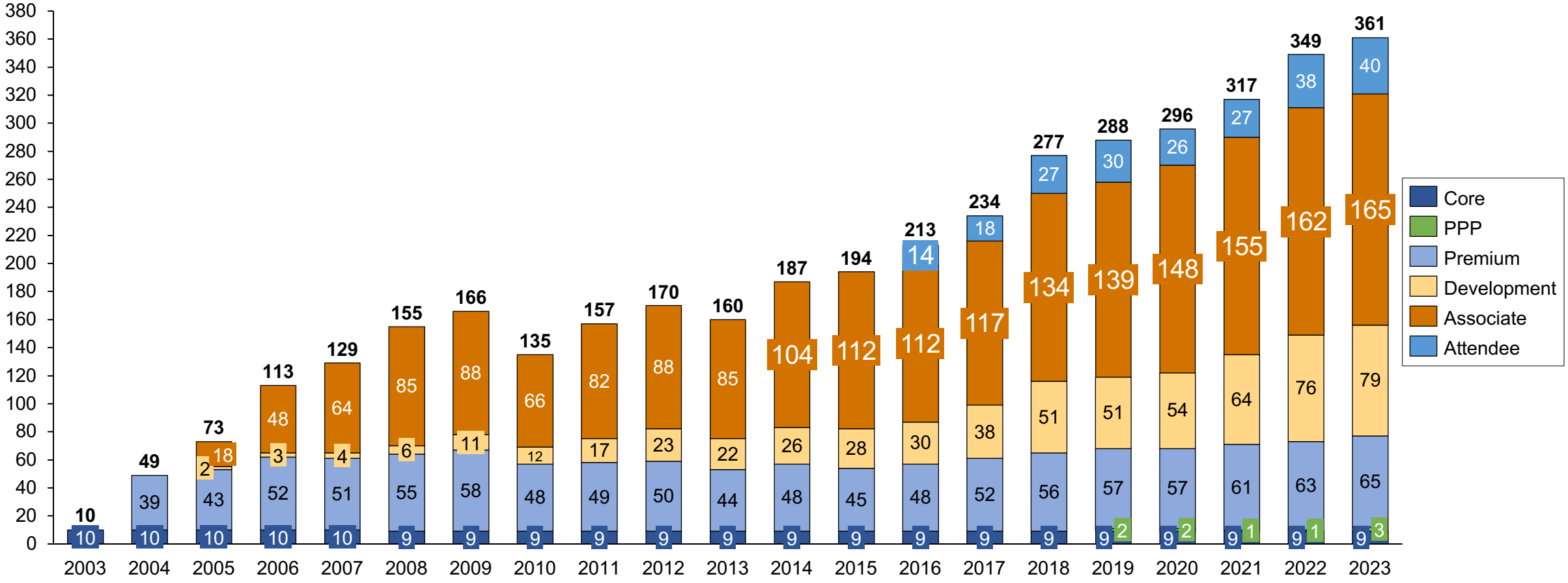
ABUP 艾拉比 · Airbiquity · AirPlug · avelabs · AVIN SYSTEMS · BASELABS Data Fusion Results · basicworx · beyless · BNS · b-plus · C2A · clarinox · easycore · eJad · emmtrix Technologies · ESR LABS · EVIDENCE · evo · excelfore · FPT Software · Freetech · GAIO TECHNOLOGY · HANECS · INCHRON THINK REAL-TIME · IncQuerylabs · INTREPID CONTROL SYSTEMS · IP Camp · iSYSTEM · ixia · KRONO-SAFE · LAUTERBACH DEVELOPMENT TOOLS · MATRICKZ · SEMIDRIVE 芯驰科技 · NCES · nordsys · OPENSYNERGY · pls · PopcornSAR · PRQA Programming Research · rti · RTst · RUETZ SYSTEM SOLUTIONS · SAFERIDE · HINGE · optimize! softing · SYSGO EMBEDDING INNOVATIONS · TECHNO-WELLE · tracetronic · TTTech · VALIDAS · VAULT MICRO · VEROLT · UNIKIE · 博云 BoCloud · 映驰科技 Enjoy Move · Acsia

+ 165 Associate Partners

+ 40 Attendees

AUTOSAR Partnership

Partner Development Since 2003



AUTOSAR Partnership

Global Distribution of AUTOSAR Partners

40 Partners in North America

- 2 Core Partner
- 8 Premium Partner
- 6 Development Partner
- 21 Associate Partner
- 3 Attendee

156 Partners in Europe

- 6 Core Partner
- 1 Premium Partner Plus
- 28 Premium Partner
- 37 Development Partner
- 55 Associate Partner
- 29 Attendee

162 Partners in Asia

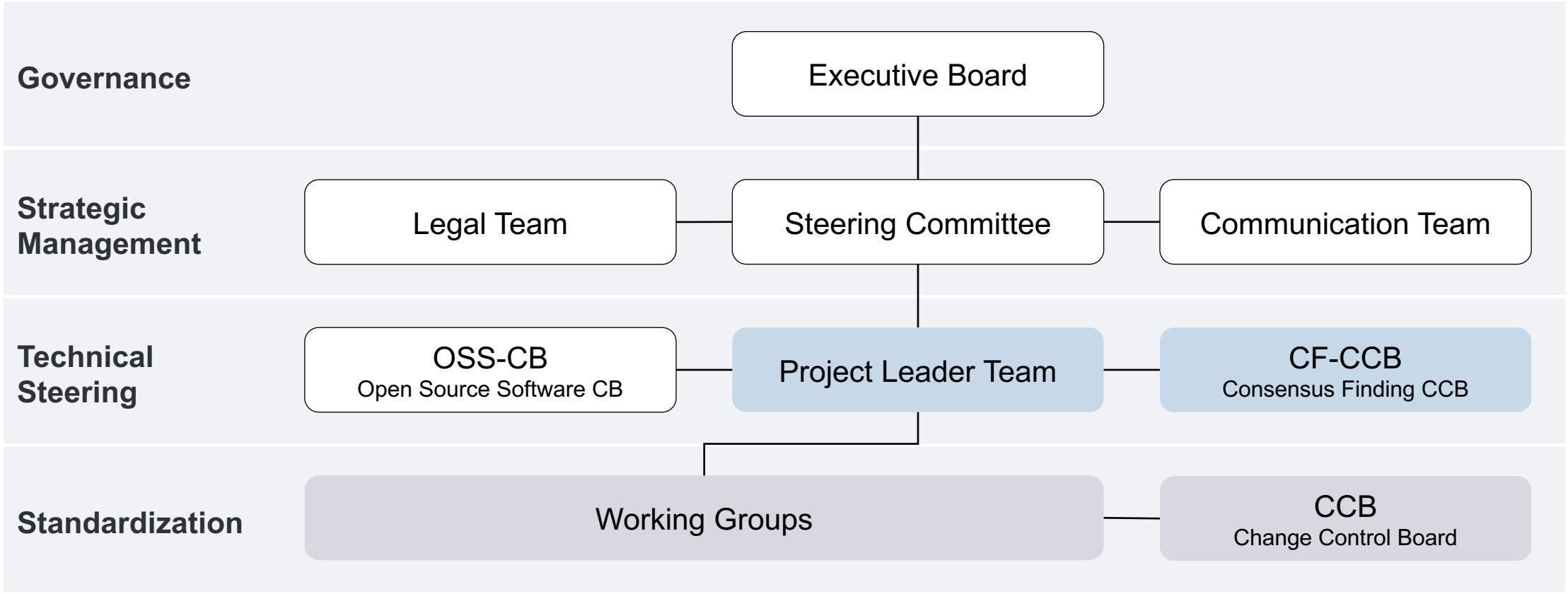
- 1 Core Partner
- 2 Premium Partner Plus
- 29 Premium Partner
- 34 Development Partner
- 89 Associate Partner
- 7 Attendee

3 Partners in Africa

- 2 Development Partner
- 1 Attendee

AUTOSAR Organization

Official Roles



AUTOSAR Organization

Support Functions

AUTOSAR Internal Affairs Officer (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

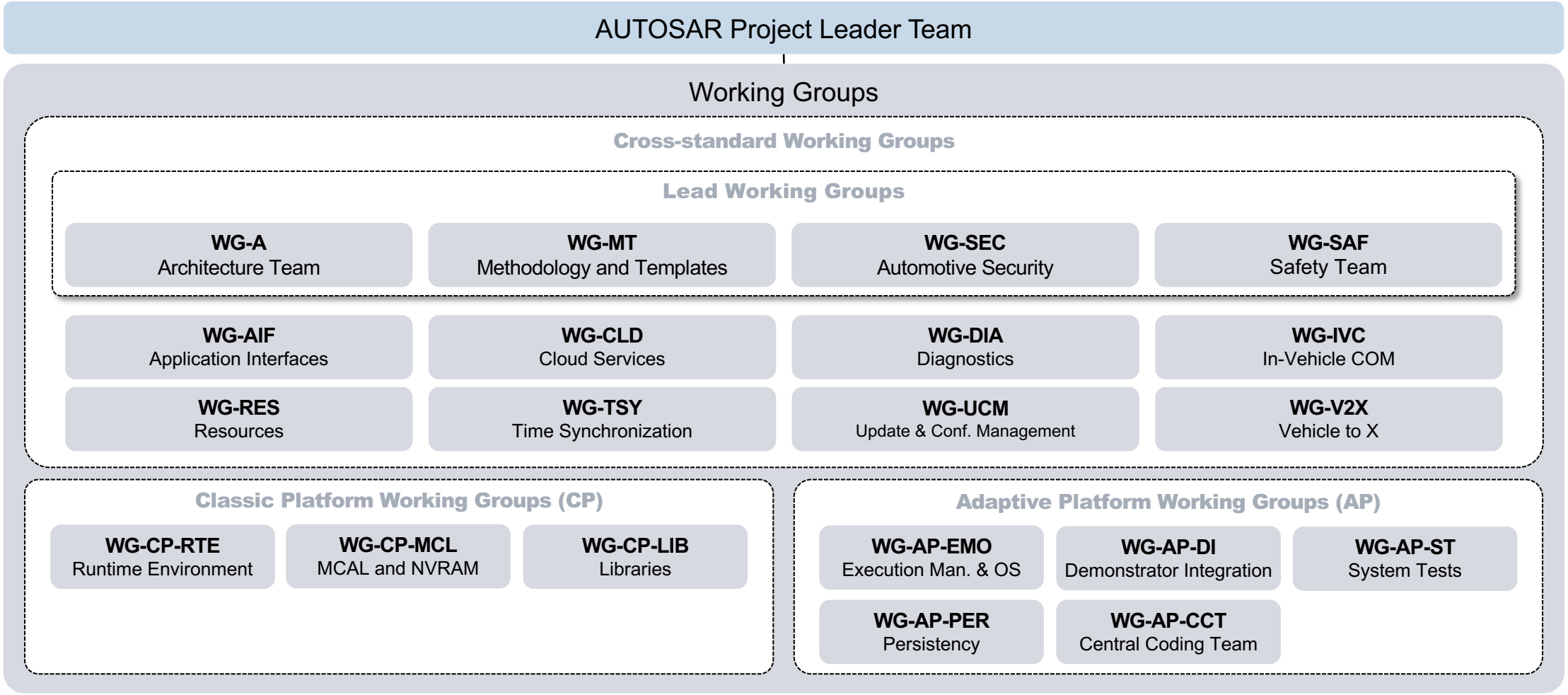
Requirements Management

Quality and Process Management

Technical Office and IT Infrastructure

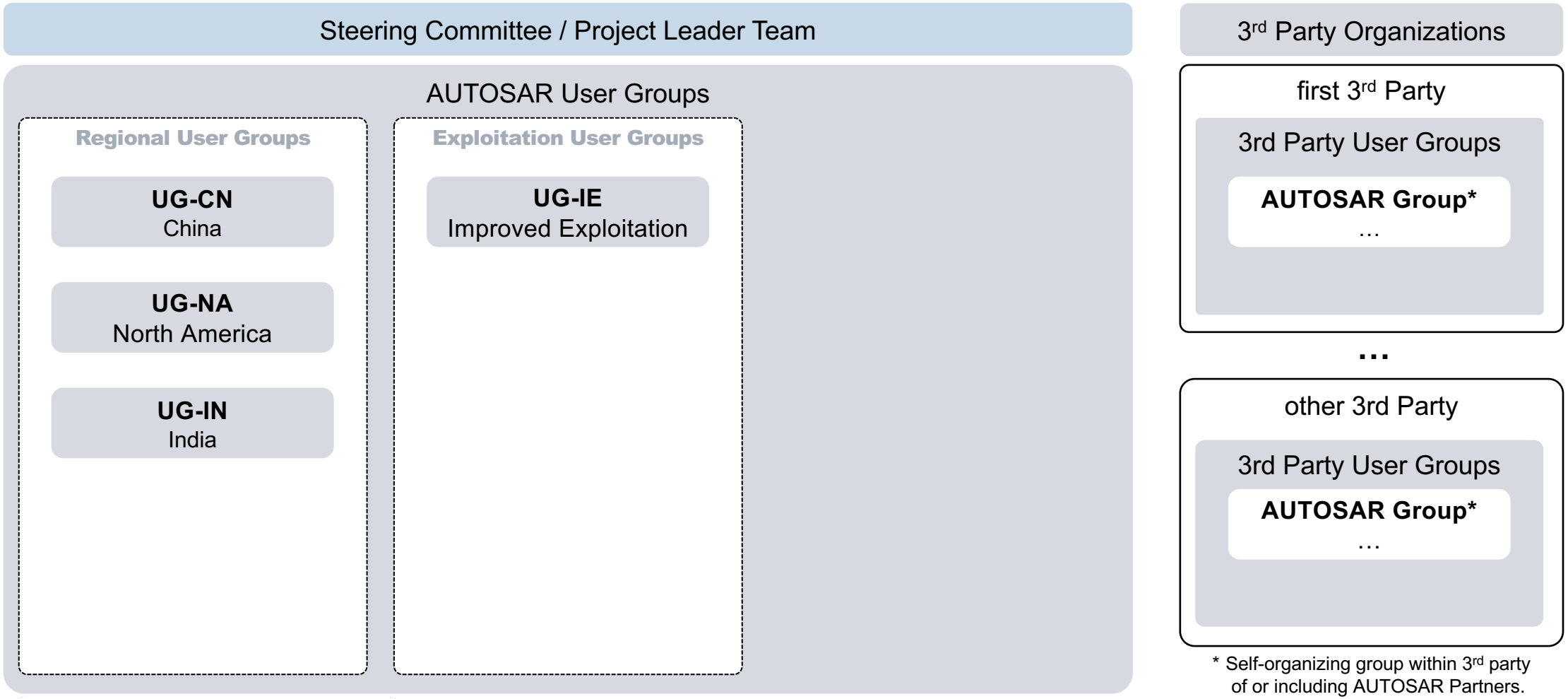
AUTOSAR Organization

Overview of Working Groups



AUTOSAR Organization

User Group Structure



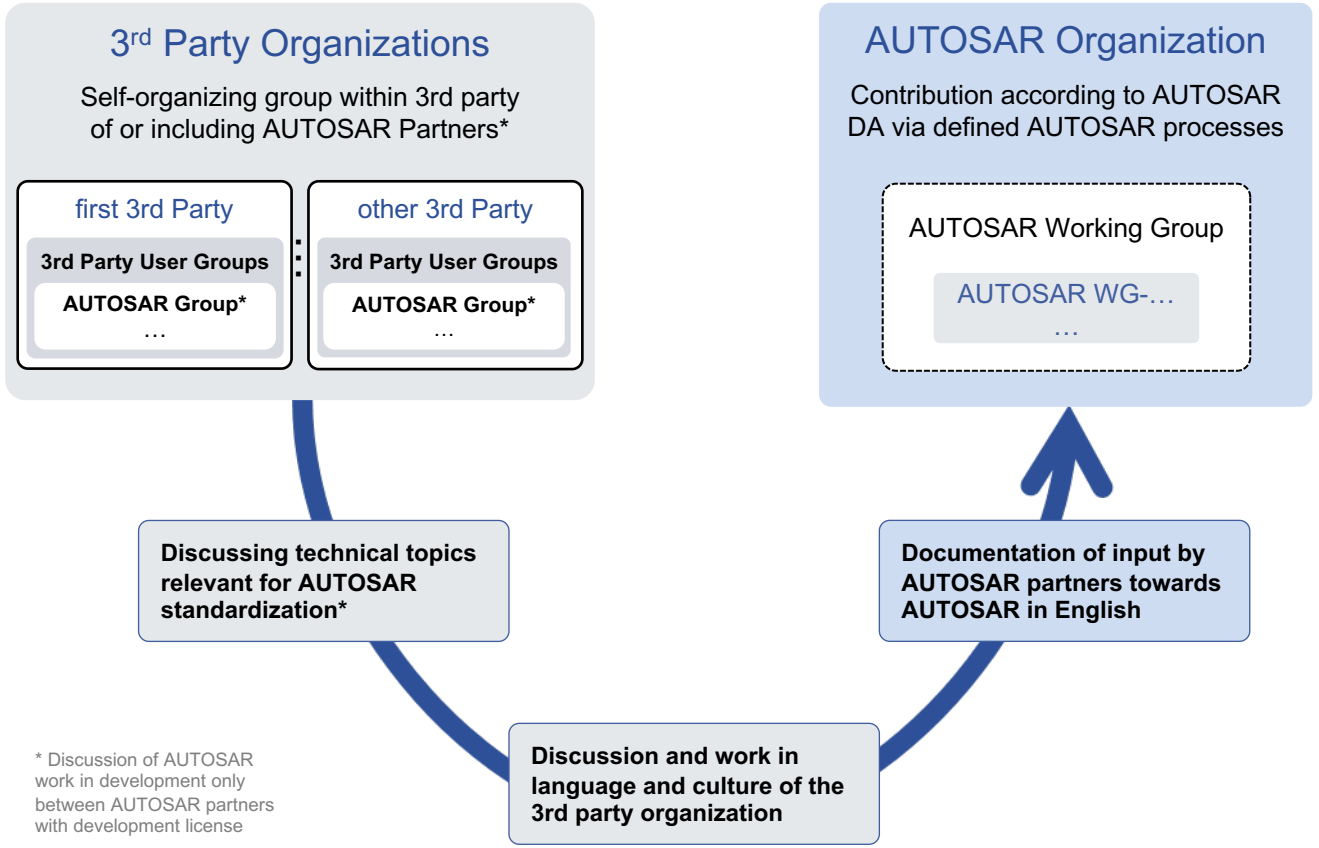
AUTOSAR Organization

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

Example Collaboration Model:

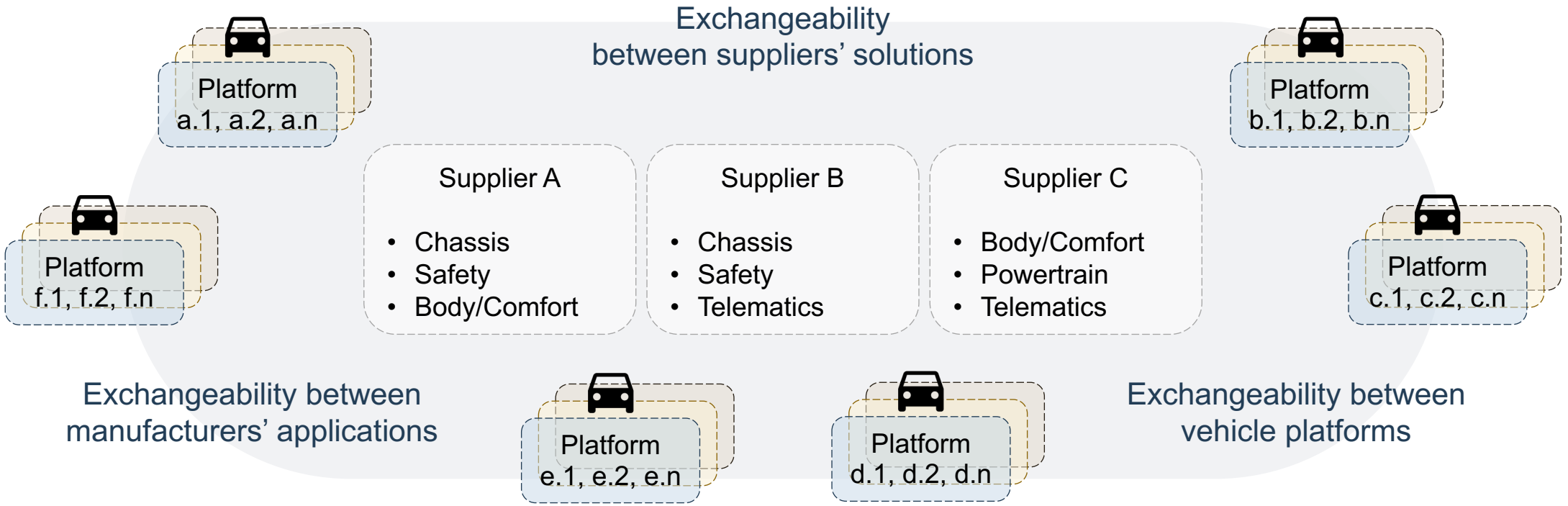
3rd parties technical interests are elaborated in 3rd party organizations

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



AUTOSAR Basic Principles

Benefits of a Software Framework

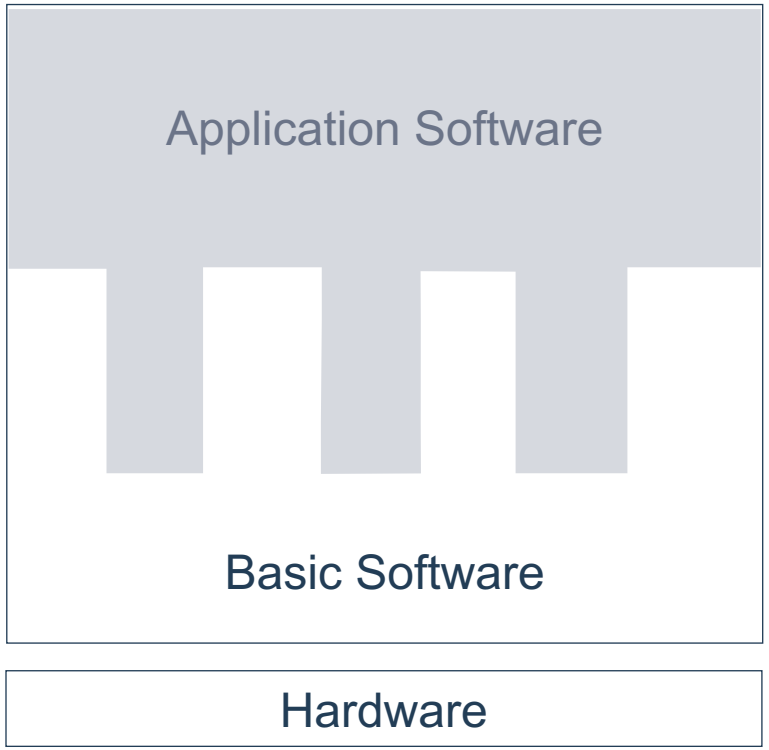


The **AUTOSAR Software Framework** promotes software module reuse and exchangeability.

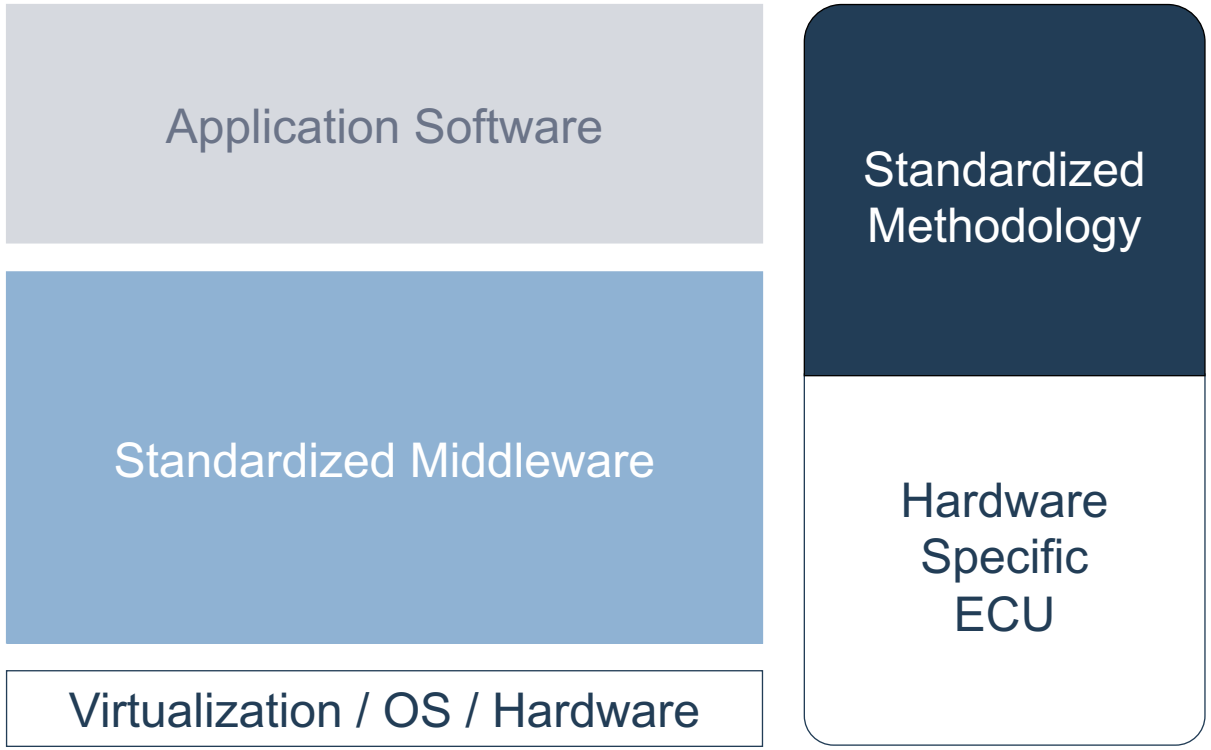
AUTOSAR Basic Principles

Proprietary vs. AUTOSAR Middleware Approach

Proprietary Solution



AUTOSAR™

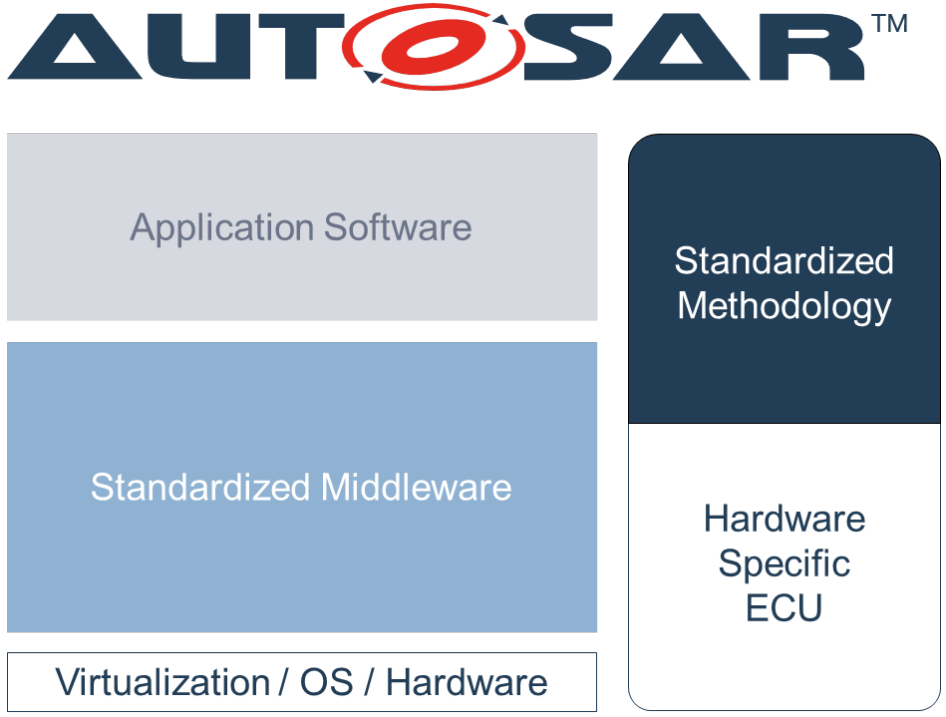


AUTOSAR Basic Principles

Benefits of the AUTOSAR Middleware Approach

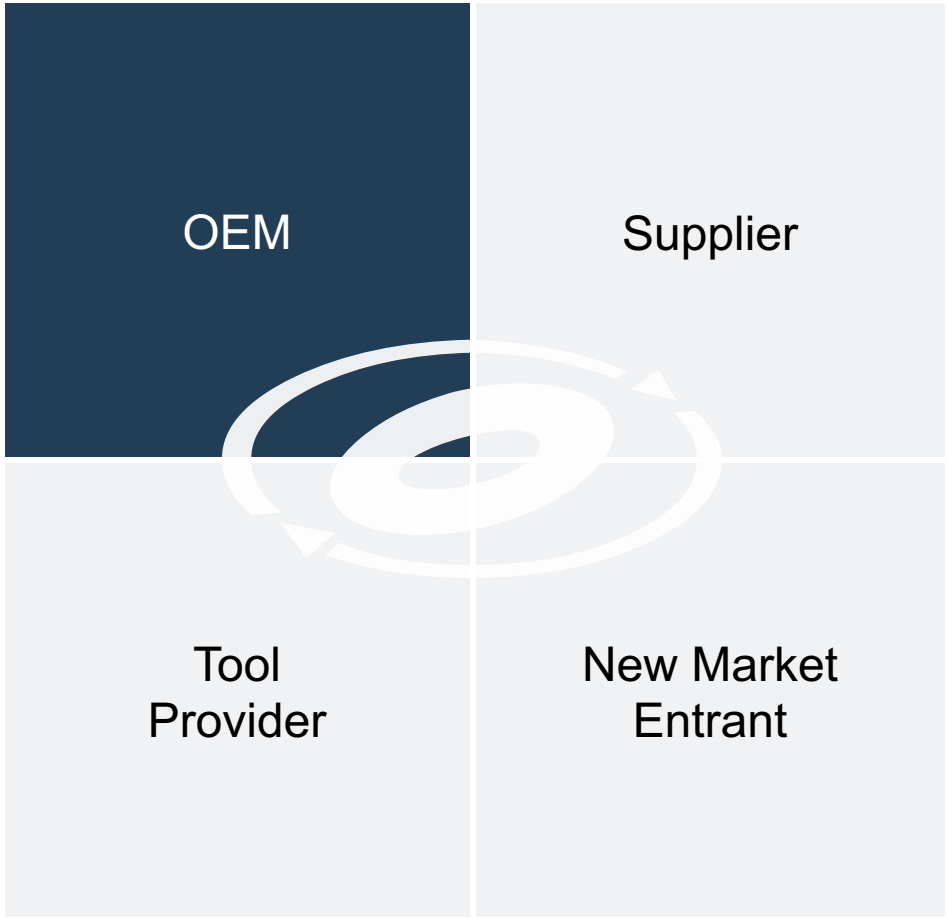
AUTOSAR paves the way for innovative electronic systems with **improved performance, safety and security**.

- **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

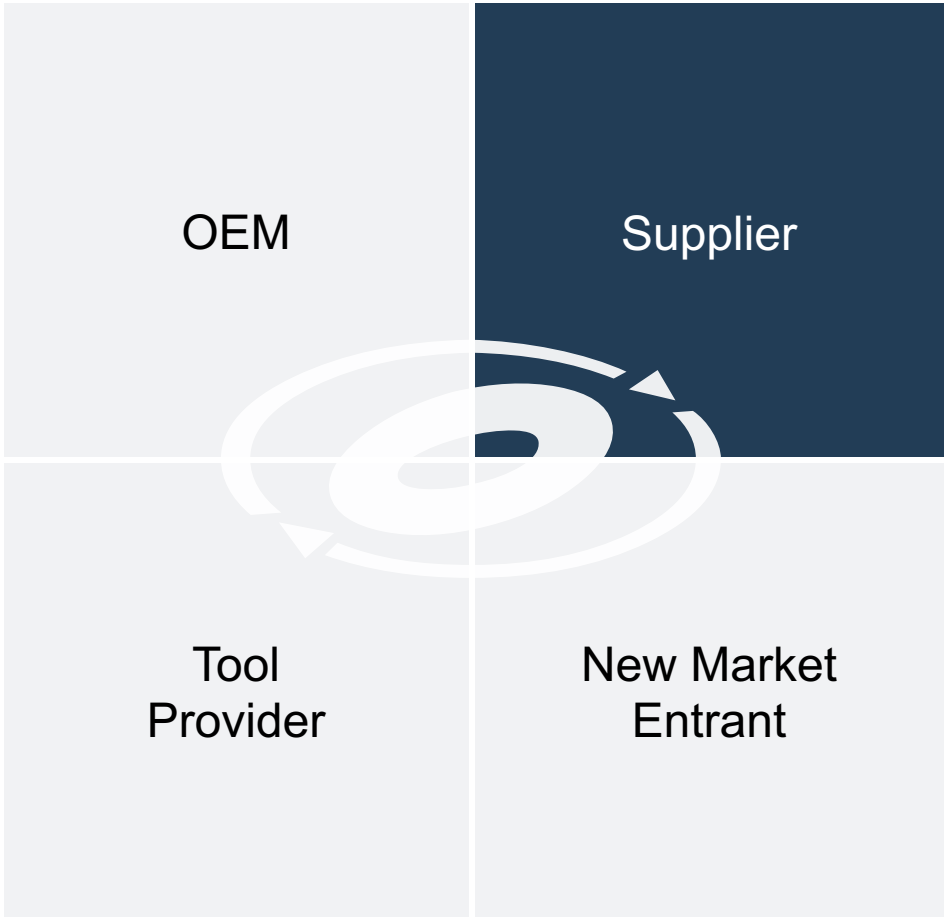
Benefits of Exploiting the Standard (1)



- 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

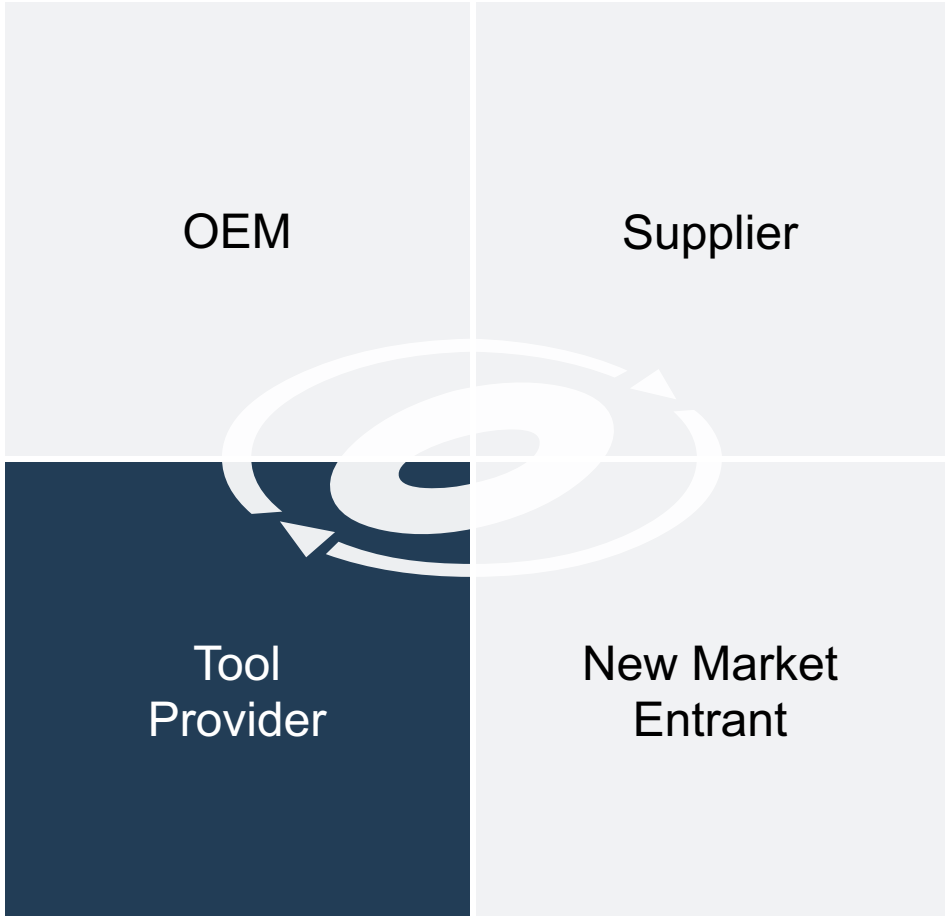
Benefits of Exploiting the Standard (2)



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

AUTOSAR Basic Principles

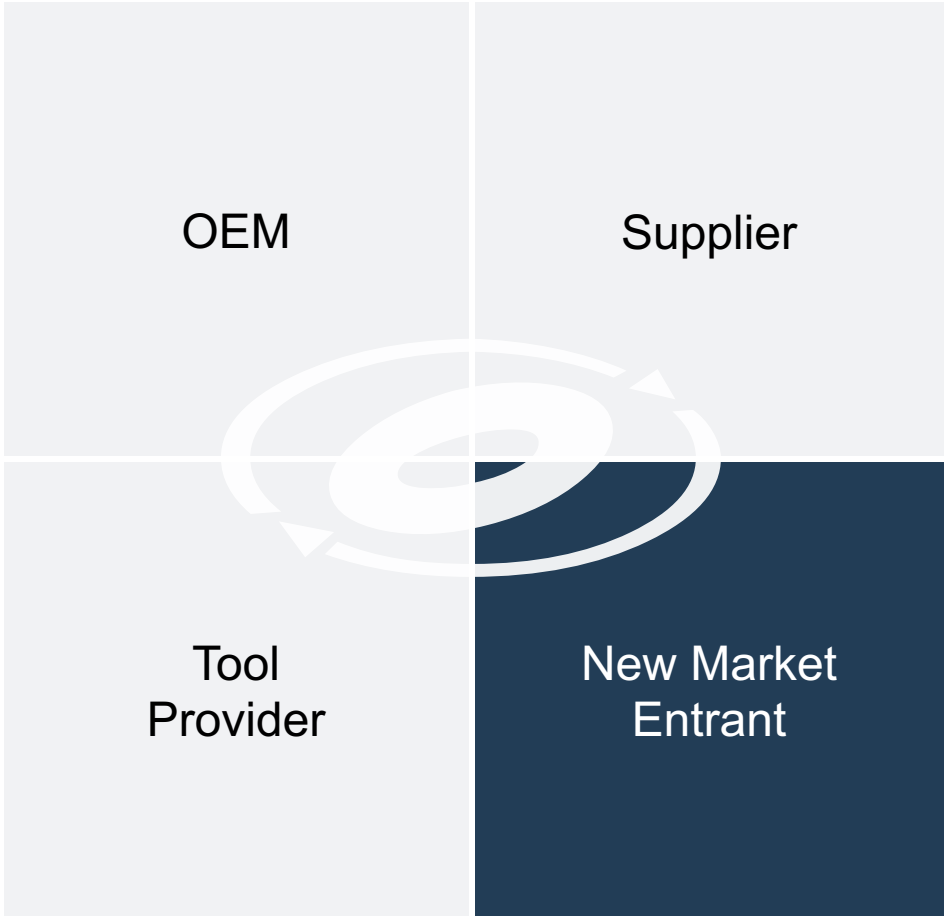
Benefits of Exploiting the Standard (3)



- 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

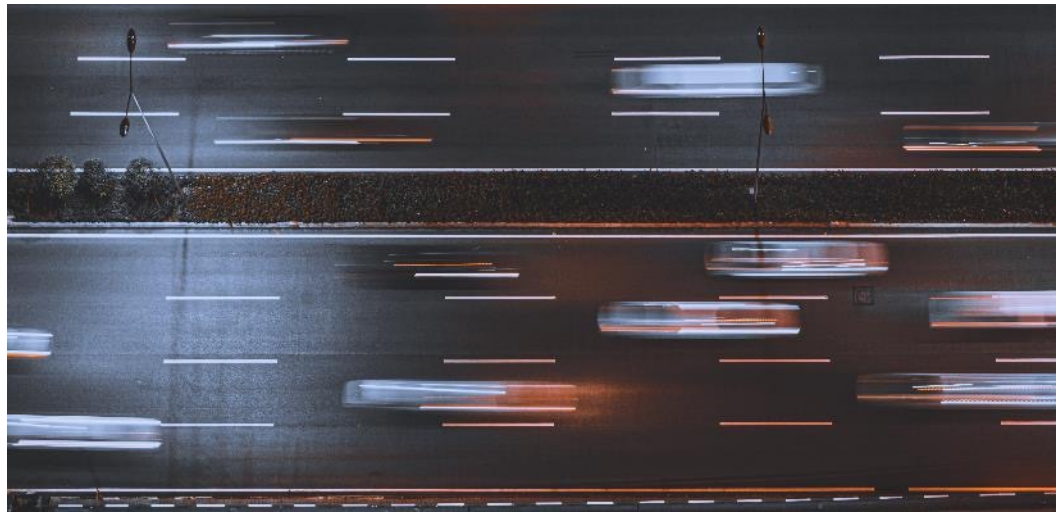
- Reliability
- Availability
- Maintainability
- Safety
- Security

V2X, Internet of Things, Cloud-Based Services

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

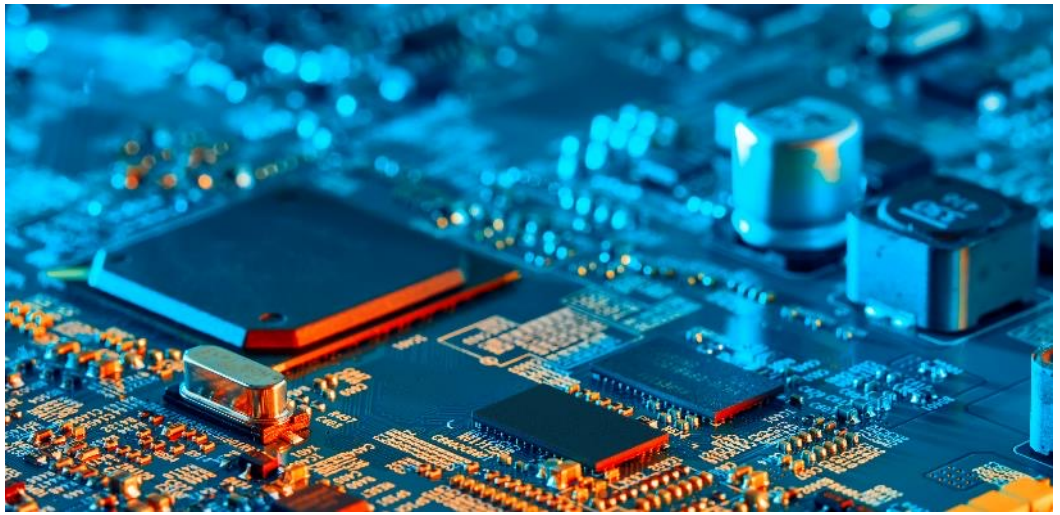
Challenges in the Mobility Sector

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

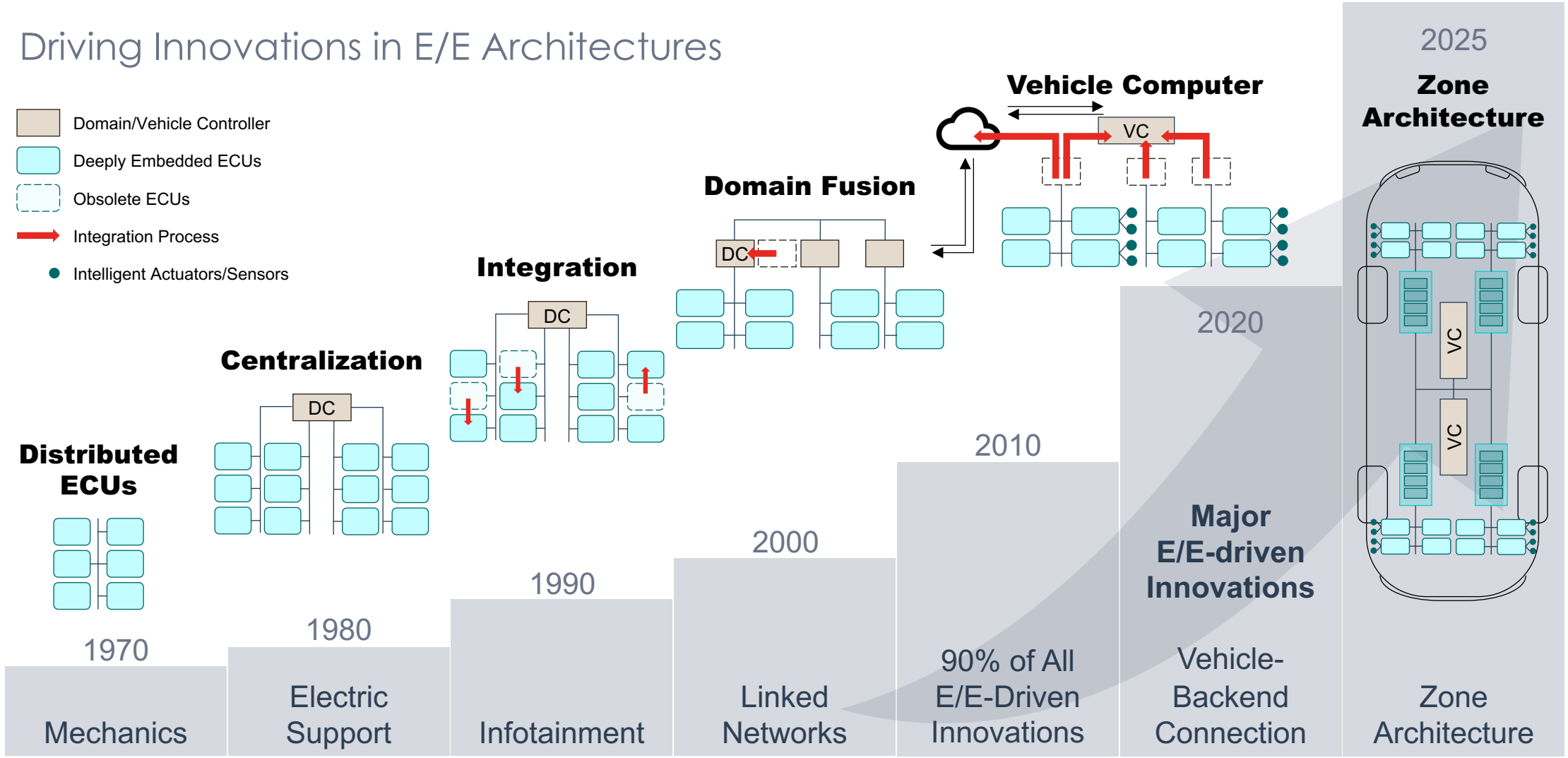
Highly Automated Driving - It‘s all About Trust!

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.

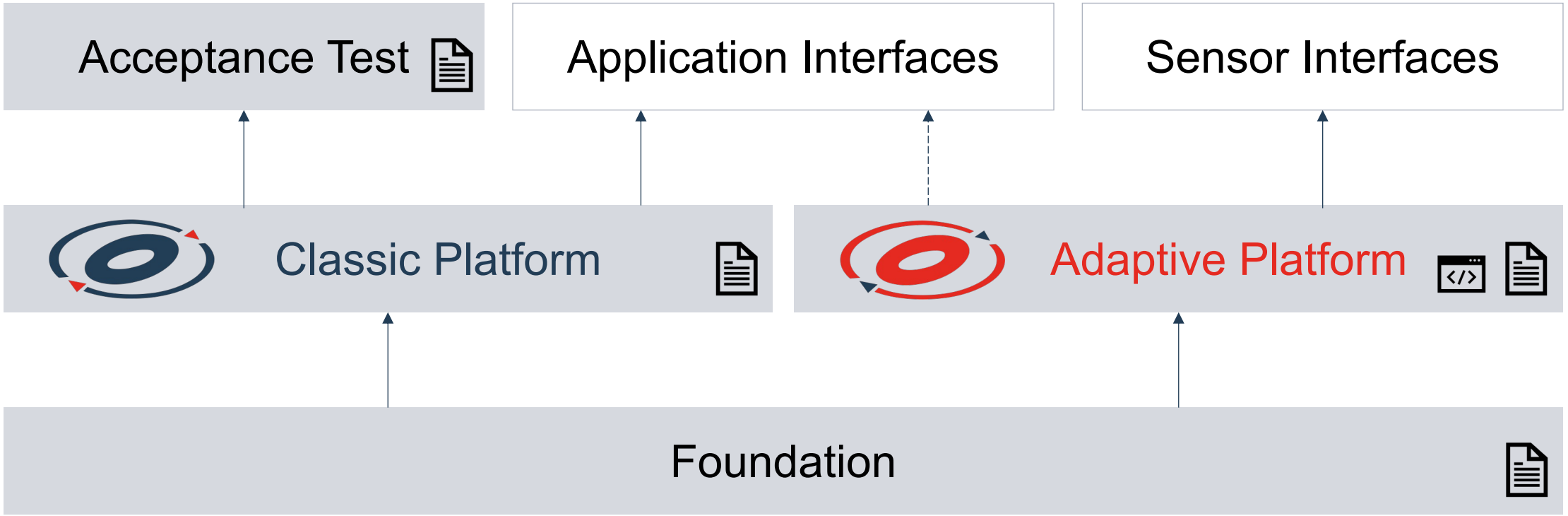
Challenges in the Mobility Sector

Driving Innovations in E/E Architectures



AUTOSAR Software Framework

Deliverables



AUTOSAR Software Framework

The AUTOSAR Platforms

	Classic Platform	Adaptive Platform	Collaboration E.g. Infotainment
			Microsoft Windows, Android, Linux, Automotive Grade Linux, GENIVI, Robot Operating System (ROS)
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

AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications (1)

1. Safe and Secure

2. Connected

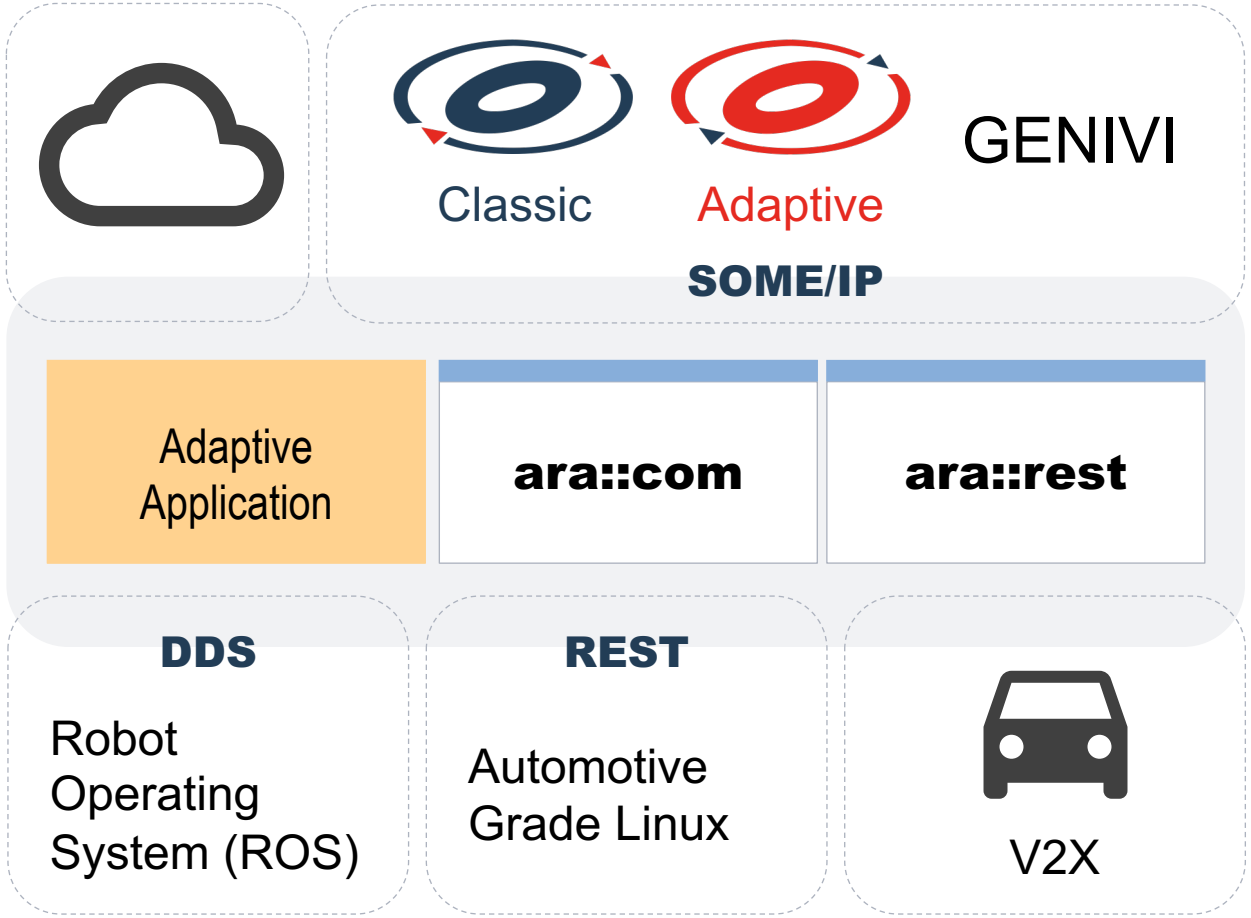
3. Dynamic and Updateable

- External Communication:
  DTLS
- In-Vehicle Communication:
  SecOC ● IPsec
- 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)

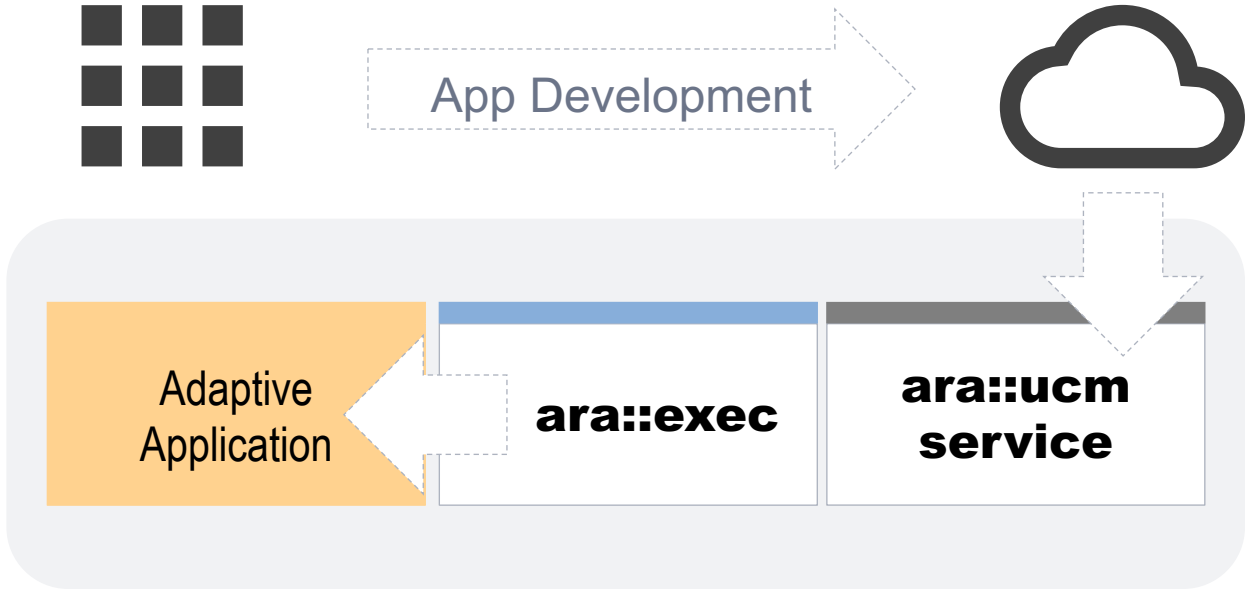
1. Safe and Secure
2. Connected
3. Dynamic and Updateable



AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications (3)

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



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

2. Efficiency

3. Field Proven

4. Performance

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

AUTOSAR Classic Platform

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

1. Functional Safety

2. Efficiency

3. Field Proven

4. Performance

- AUTOSAR stacks from different vendors
- Cost effective by supporting a wide range of µControllers
- Flexible due to CDD

AUTOSAR Classic Platform

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

1. Functional Safety

2. Efficiency

3. Field Proven

4. Performance

- Mature by many years of application
- High quality due to widespread implementations
- Established distributed development processes with standardized methods and templates

AUTOSAR Classic Platform

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

1. Functional Safety

2. Efficiency

3. Field Proven

4. Performance

- Hard real time capabilities
- Event triggered applications
- Flexible through supporting a wide range of protocols and networks
- Scalable by configuration

AUTOSAR™

Thank you
for your attention

If you'd like to become a partner, contact us at:

+49 89 23 88 57 410
admin@autosar.org
http://autosar.org

Bremer Str. 11
80807 Munich
Germany

BMW BOSCH Continental Mercedes-Benz Ford gm STELLANTIS TOYOTA VW