AUTOSAR Introduction

Part 1 - The AUTOSAR Partnership and Standardization
Agenda

Part 1
► The AUTOSAR Partnership
  • Vision and Mission
  • Introduction
  • Organization
  • Basic Principles
► The AUTOSAR Standardization

Part 2
► Architecture and Features
► Smart Solutions Based on AUTOSAR
► Processes and Quality
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

<table>
<thead>
<tr>
<th>Premium</th>
<th>Development</th>
<th>Associate</th>
<th>Attendee</th>
<th>Subscriber</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motivation</strong></td>
<td>Development and exploitation of AUTOSAR standards (size &gt;100)</td>
<td>Development and exploitation of AUTOSAR standards (size &lt; 100)</td>
<td>Exploitation of AUTOSAR standards</td>
<td>Development of AUTOSAR standards</td>
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<tr>
<td><strong>Annual Fee</strong></td>
<td>21,000 Euro</td>
<td>6,000 Euro</td>
<td>15,000 Euro</td>
<td>Free</td>
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<td><strong>Annual Contribution</strong></td>
<td>1.5 FTE</td>
<td>0.5 FTE</td>
<td>None</td>
<td>Individual agreement</td>
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</table>
More Than 300 AUTOSAR Partners

9 Core Partners

- BMW Group
- Bosch
- Continental
- Daimler
- Ford
- GM
- PSA
- Toyota
- Volkswagen

60 Premium Partners

60 Development Partners

1 Strategic Partner

+ 148 Associate Partners

+ 27 Attendees
AUTOSAR Partnership
Partner Development Since 2003
AUTOSAR Partnership

Global Distribution of AUTOSAR Partners

38 Partners in North America
- 2 Core Partner
- 5 Premium Partner
- 5 Development Partner
- 26 Associate Partner

142 Partners in Europe
- 6 Core Partner
- 27 Premium Partner
- 32 Development Partner
- 54 Associate Partner
- 23 Attendee

122 Partners in Asia
- 1 Core Partner
- 1 Strategic Partner
- 28 Premium Partner
- 20 Development Partner
- 68 Associate Partner
- 4 Attendee

2 Partners in Africa
- 2 Development Partner

1 Partner in Australia
- 1 Development Partner
AUTOSAR Organization

Official Roles

Governance
- Executive Board

Strategic Management
- Legal Team
- Steering Committee
- Communication Team

Technical Steering
- OSS-CB
  - Open Source Software CB
- Project Leader Team
- CF-CCB
  - Consensus Finding CCB

Standardization
- CCB
  - Change Control Board
- Working Groups

Core Partner
Core, Strategic Partner
Core, Strategic, Premium, Development Partner
## AUTOSAR Organization

### Support Functions

<table>
<thead>
<tr>
<th>AUTOSAR Spokesperson and Internal Affairs Officer (IAO)</th>
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<tbody>
<tr>
<td><strong>Business Administration</strong></td>
</tr>
<tr>
<td>• Partner and User Management</td>
</tr>
<tr>
<td>• Finance</td>
</tr>
<tr>
<td>• Meeting Management</td>
</tr>
<tr>
<td><strong>Communication Support</strong></td>
</tr>
<tr>
<td>• Marketing</td>
</tr>
<tr>
<td><strong>Technical Management</strong></td>
</tr>
<tr>
<td>• Standards</td>
</tr>
<tr>
<td>• Software Development Engineering</td>
</tr>
<tr>
<td><strong>Deliverable Management</strong></td>
</tr>
<tr>
<td>• Change Management</td>
</tr>
<tr>
<td>• Quality Assurance</td>
</tr>
<tr>
<td>• Release Management</td>
</tr>
</tbody>
</table>

### Legal Support

### Requirements Management

### Quality and Process Management

### Technical Office and IT Infrastructure
AUTOSAR Organization

Overview of Working Groups

Project Leader Team

Working Groups

Cross-standard Working Groups

Lead Working Groups

Classic Platform Working Groups (CP)

Adaptive Platform Working Groups (AP)

WG-AI F
Application Interfaces

WG-RES
Resources

WG-IVC
In-Vehicle COM

WG-A
Architecture Team

WG-TSY
Time Synchronization

WG-U C M
Update & Conf. Management

WG-AP-EMO
Execution Man. & OS

WG-AP-MCL
MCAL and NVRAM

WG-MT
Methodology and Templates

WG-CLD
Cloud Services

WG-DIA
Diagnostics

WG-AP-DI
Demonstrator Integration

WG-CP-RTE
Runtime Environment

WG-CP-MCBD
Multicore BSW Distr.

WG-AP-PER
Persistency

WG-CP-LIB
Libraries

WG-AP-CCT
Central Coding Team

WG-SEC
Automotive Security

WG-AP-ST
System Tests

WG-AP-CCT
Central Coding Team

WG-AI F
Application Interfaces

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WG-AP-MCL
MCAL and NVRAM

WG-MT
Methodology and Templates

WG-CLD
Cloud Services

WG-DIA
Diagnostics

WG-AP-DI
Demonstrator Integration

WG-CP-RTE
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Automotive Security

WG-AP-ST
System Tests
AUTOSAR Organization

User Group Structure

User Groups

UG-CN
China
- Demonstrator development
- BSW integration

UG-NA
North America
- Common Training: OEM-Tier1 Workflows/ Security
- Safety
- Ethernet

UG-IE
Improved Exploitation
- 6 thesis on optimizing the use of AUTOSAR
- Establishment of Adaptive Platform
The AUTOSAR Software Framework promotes software module reuse and exchangeability.
AUTOSAR Basic Principles

Proprietary vs. AUTOSAR Middleware Approach

Proprietary Solution

Application Software

Basic Software

Hardware

AUTOSAR Middleware

Application Software

Standardized Middleware

Virtualization / OS / Hardware

Standardized Methodology

Hardware Specific ECU
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)

<table>
<thead>
<tr>
<th>OEM</th>
<th>Supplier</th>
</tr>
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<tbody>
<tr>
<td>Tool Provider</td>
<td>New Market Entrant</td>
</tr>
</tbody>
</table>

- 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

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

- Domain/Vehicle Controller
- Deeply Embedded ECUs
- Obsolete ECUs
- Integration Process
- Intelligent Actuators/Sensors

- Distributed ECUs
- Centralization
- Integration
- Domain Fusion

- 1970 Mechanics
- 1980 Electric Support
- 1990 Infotainment
- 2000 Linked Networks
- 2010 90% of All E/E-Driven Innovations
- 2020 Vehicle-Backend Connection
- 2025 Zone Architecture

Vehicle Computer
Zone Architecture
AUTOSAR Software Framework

Deliverables

<table>
<thead>
<tr>
<th>Acceptance Test</th>
<th>Application Interfaces</th>
<th>Sensor Interfaces</th>
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</thead>
<tbody>
<tr>
<td>Classic Platform</td>
<td>Adaptive Platform</td>
<td></td>
</tr>
<tr>
<td>Foundation</td>
<td></td>
<td></td>
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</table>

- Released as an own standard
- Released as part of the standard it is extending
- A extends B
- A is planned to extend B
- Specification available
- Demonstrator Code available
AUTOSAR Software Framework

The AUTOSAR Platforms

**Classic Platform**
- **Real Time Requirements**: High, in the range of micro-seconds
- **Safety Criticality**: High, up to ASIL-D
- **Computing Power**: Low, ~ 1000 DMIPs

**Adaptive Platform**
- **Real Time Requirements**: Mid, in the range of milli-seconds
- **Safety Criticality**: High, at least ASIL-B
- **Computing Power**: High, > 20,000 DMIPs

**Collaboration**
- **E.g. Infotainment**
- **Microsoft Windows, Android, Linux, Automotive Grade Linux, GENIVI, Robot Operating System (ROS)**
- **Real Time Requirements**: Low, in the range of seconds
- **Safety Criticality**: Low, QM
- **Computing Power**: High, ~ 10,000 DMIPs
AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications

1. Save and Secure
2. Connected
3. Dynamic and Updateable
AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications (1)

1. Save and Secure
   - External Communication: **DTLS**
   - In-Vehicle Communication: **SecOC • IPsec**

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

3. Dynamic and Updateable
AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications (2)

1. Save and Secure

2. Connected

3. Dynamic and Updateable

GENIVI

SOME/IP

Adaptive Application

ara::com

ara::rest

DDS

Robot Operating System (ROS)

REST

Automotive Grade Linux

V2X
AUTOSAR Adaptive Platform

Three Pillars for ADAS Applications (3)

1. Save 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
   - 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 μControllers
   - 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
   - High quality due to widespread implementations

2. Efficiency
   - Established distributed development processes with standardized methods and templates

3. Field Proven

4. Performance
AUTOSAR Classic Platform

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

1. Functional Safety
   - Hard real time capabilities
   - Event triggered applications

2. Efficiency
   - Flexible through supporting a wide range of protocols and networks
   - Scalable by configuration

3. Field Proven

4. Performance
Thank you for your attention

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

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