AUTOSAR Introduction

The vision, the partnership and current features in a nutshell

Presenter
Occasion (Meeting, Conference, etc.)

20 Jan 2020  Location @ Host
Agenda

- Introduction of the AUTOSAR Partnership
- Challenges in the automotive industry
- Architecture and recent features
- Smart solutions based on AUTOSAR
- Processes and quality
- Outlook
Agenda

- Introduction of the AUTOSAR Partnership
- Challenges in the automotive industry
- Architecture and recent features
- Smart solutions based on AUTOSAR
- Processes and quality
- Outlook
is a worldwide development partnership of car manufacturers, suppliers and other companies from the electronics, semiconductor and software industry.
AUTOSAR Vision

AUTOSAR aims to improve complexity management of integrated E/E architectures through increased reuse and exchangeability of SW modules between OEMs and suppliers.

**Exchangeability**

between suppliers’ solutions

- **Supplier A**
  - Chassis
  - Safety
  - Body/Comfort

- **Supplier B**
  - Chassis
  - Safety
  - Telematics

- **Supplier C**
  - Body/Comfort
  - Powertrain
  - Telematics

**Exchangeability**

between manufacturers’ applications

- **Platform f.1, f.2, f.n**
- **Platform e.1, e.2, e.n**
- **Platform d.1, d.2, d.n**

**Exchangeability**

between vehicle platforms

- **Platform b.1, b.2, b.n**
- **Platform c.1, c.2, c.n**
Aims and benefits of using AUTOSAR

AUTOSAR aims to standardize the software architecture of Electronic Control Units (ECUs). AUTOSAR paves the way for innovative electronic systems that further improve performance, safety and environmental friendliness.

Yesterday

| Software | Hardware |

AUTOSAR

- Hardware and software – widely independent of each other.
- Development can be decoupled by horizontal layers, reducing development time and costs.
- Reuse of software enhances quality and efficiency
Exploitation of the standard provides significant benefits

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

An industry standard is established.

OEM

Supplier

Tool provider

New market entrant
Exploitation of the standard provides significant benefits

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

An industry standard is established.
Exploitation of the standard provides significant benefits

- Interface with development processes
- Embed tools into an overall tool environment

An industry standard is established.
Exploitation of the standard provides significant benefits

An industry standard is established.

- Enable new business models by means of standardized interfaces
- Easily understand how automotive software is developed
The 280 AUTOSAR Partners

<table>
<thead>
<tr>
<th>2 Strategic Partners</th>
<th>9 Core Partners</th>
<th>58 Premium Partners</th>
<th>49 Development Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMW Group</td>
<td></td>
<td>VOLVO, HONDA, TATA</td>
<td>General OEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOTORS, RENAULT,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HYUNDAI, NISSAN</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Great Wall</td>
<td></td>
</tr>
<tr>
<td>BOSCH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAIMLER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOYOTA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOLKSWAGEN AG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 Attendees</td>
<td>58 Premium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Jan 2020</td>
<td>Partners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTOSAR Introduction</td>
<td>Tools and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>134 Associate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partners</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28 Attendees</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
History and current state – Total: 280

![Bar chart showing the history and current state of AUTOSAR partners from 2003 to 2019. The chart includes Attendees, Associate Partner, Development Partner, Premium Partner, Strategic Partner, and Core Partner categories. The data is presented in a stacked bar format, with each year showing the cumulative number of partners in each category. The chart visually represents the growth and distribution of partners over the years.]
Geographical distribution of partners

<table>
<thead>
<tr>
<th>Region</th>
<th>Total</th>
<th>Core</th>
<th>Strategic</th>
<th>Premium</th>
<th>Development</th>
<th>Associate</th>
<th>Attendee</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>30</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Europe</td>
<td>141</td>
<td>6</td>
<td>0</td>
<td>28</td>
<td>30</td>
<td>50</td>
<td>27</td>
</tr>
<tr>
<td>Asia</td>
<td>107</td>
<td>1</td>
<td>2</td>
<td>24</td>
<td>14</td>
<td>65</td>
<td>1</td>
</tr>
<tr>
<td>Africa</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

North America: 30
- Core: 2
- Strategic: 0
- Premium: 6
- Development: 3
- Associate: 19
- Attendee: 0

Europe: 141
- Core: 6
- Strategic: 0
- Premium: 28
- Development: 30
- Associate: 50
- Attendee: 27

Asia: 107
- Core: 1
- Strategic: 2
- Premium: 24
- Development: 14
- Associate: 65
- Attendee: 1

Africa: 2
- Core: 0
- Strategic: 0
- Premium: 0
- Development: 2
- Associate: 0
- Attendee: 0
AUTOSAR Organization

Project Organization

Executive Board

Steering Committee

Legal Team

Project Leader Team

Communication Team

Support Functions

Project Management
- Technical Management
- Quality Management

Specification Management
- Change Management
- Release Management
- Quality Assurance

Engineering
- Technical Office
- SW Development Engineering

Communication Support

Administration

Legend

Core Partner

Core and Strategic Partner

Core, Strategic, Premium and Development Partner

All partners including Associate Partners

Subcontractor

OSS-CB
Open Source CB

CF-CCB
Consensus Finding CCB

CCB
Change Control Board

Working Groups

User Groups

Legend

Executive Board

Steering Committee

Technical Office

Consensus Finding CCB

Change Control Board

Working Groups

User Groups

Open Source CB

Technical Management

Quality Management

Change Management

Release Management

Quality Assurance

Technical Office

SW Development Engineering

Legend

Core Partner

Core and Strategic Partner

Core, Strategic, Premium and Development Partner

All partners including Associate Partners

Subcontractor
Working Group organization

Cross-standard Working Groups (FO, CP, AP)

- **WG-A**
  - Architecture Team
  - WG-ICV: In-Vehicle COM
  - WG-AIF: Application Interfaces
  - WG-VAL: Validation

- **WG-MT**
  - Methodology and Templates
  - WG-V2X: Vehicle to X

- **WG-SEC**
  - Automotive Security
  - WG-DIA: Diagnostics
  - WG-RES: Resources
  - WG-UCM: Update & Conf. Management

- **WG-SAF**
  - Functional Safety

Classic Platform Working Groups (CP)

- **WG-CP-RTE**
  - Runtime Environment
- **WG-CP-MCBD**
  - Multicore BSW Distr.
- **WG-CP-LIB**
  - Libraries
- **WG-CP-MCL**
  - MCAL and NVRAM

Adaptive Platform Working Groups (AP)

- **WG-AP-EMO**
  - Execution Man. & OS
- **WG-AP-DI**
  - Demonstrator Integration
- **WG-AP-CLD**
  - Cloud Services
- **WG-AP-PER**
  - Persistency
- **WG-AP-CCT**
  - Central Coding Team

Legend:
- Lead Working Group
- Working Group
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

20 Jan 2020
# Groups, Boards and Task Forces

<table>
<thead>
<tr>
<th>Group</th>
<th>Type</th>
<th>Initiated by</th>
<th>Main Tasks</th>
<th>Coaching</th>
<th>Contact person</th>
<th>Reporting to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead WG</td>
<td>Permanent</td>
<td>PL Team</td>
<td>- Technical supervision of WGs and concept groups &lt;br&gt;- Harmonization of technical content &lt;br&gt;- Assignment of concepts to WGs</td>
<td>PL Coach</td>
<td>WG Speaker</td>
<td>PL Team</td>
</tr>
<tr>
<td>WG</td>
<td>Permanent</td>
<td>PL Team</td>
<td>- Expert statements&lt;br&gt;- Responsibility for documents and code development &lt;br&gt;- Assessment of concepts</td>
<td>PL Coach</td>
<td>WG Speaker</td>
<td>PL Team</td>
</tr>
<tr>
<td>Subgroup</td>
<td>Permanent</td>
<td>WG</td>
<td>WG substructure for a dedicated branch of WG content</td>
<td>-</td>
<td>Subgroup Speaker</td>
<td>WG</td>
</tr>
<tr>
<td>Control Board</td>
<td>Permanent</td>
<td>PL Team</td>
<td>Controlling task within AUTOSAR processes (e.g. CM, QM, SDE or RM) such as CCB, CF-CBB and OSS-CB</td>
<td>PL Team</td>
<td>CM, QM or RM</td>
<td>CM, QM or RM</td>
</tr>
<tr>
<td>Concept Group</td>
<td>On demand</td>
<td>CP/SP/PP/DP</td>
<td>Creation and processing of a concept or a set of concepts according to concept process &lt;br&gt;Responsibility for concept validation</td>
<td>-</td>
<td>Concept Owner(s)</td>
<td>Lead WG, WG, PL Team; cf. concept handling process</td>
</tr>
<tr>
<td>Task Force</td>
<td>On demand</td>
<td>WG or PL Team</td>
<td>Dedicated task with defined due date</td>
<td>-</td>
<td>TF Speaker</td>
<td>WG or PL Team</td>
</tr>
<tr>
<td>UG</td>
<td>On demand</td>
<td>PP/DP/AP</td>
<td>Creation of documents or implementations based on existing releases</td>
<td>PL or SC Team</td>
<td>UG Speaker</td>
<td>PL-Team</td>
</tr>
</tbody>
</table>
Agenda

› Introduction of the AUTOSAR Partnership
› Challenges in the automotive industry
› Architecture and recent features
› Smart solutions based on AUTOSAR
› Processes and quality
› Outlook
Challenges – selected main drivers

- Highly automated driving
Challenges – selected main drivers

- Car-2-X applications
- Internet of Things and cloud services
Challenges – selected main drivers

- Increasing data rates
Challenges – selected main drivers

- New processor technologies
Challenges – selected main drivers

> Trust
Challenges – Driving changes in E/E Architectures

New types of in vehicle computers are required to fulfill the needs of:

- **performance**,  
- **flexibility** and  
- **connectivity**

But:

- **backwards compatibility** with existing solutions,  
- fulfillment of increasing requirements for **safety** and **security**

is a **must** as well.
AUTOSAR’s answer to the upcoming challenges

<table>
<thead>
<tr>
<th>Real time Requirements</th>
<th>High, in the range of micro-sec</th>
<th>Mid, in the range of milli-sec</th>
<th>Low, in the range of sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Criticality</td>
<td>High, up to ASIL-D</td>
<td>High, at least ASIL-B</td>
<td>Low, QM</td>
</tr>
<tr>
<td>Computing power</td>
<td>Low, ~ 1000 DMIPs</td>
<td>High, &gt; 20.000 DMIPs</td>
<td>High, ~ 10.000 DMIPs</td>
</tr>
</tbody>
</table>
AUTOAR Adaptive Platform

The 3 Pillars of the Adaptive Platform …

I – Safe & Secure

- Safe & Secure
- External communication
  - DTLS
- In-vehicle communication
  - SecOC
  - IPsec
- Failure handling
- Safe data storage
- Process-sys separation
- Exception-less APIs
- Resource budgeting

II – Connected

- Service-Oriented Communication
  - SOME/IP
  - ComM
  - REST

III – Dynamic & Updateable

- Cloud
- Adaptive Application
  - UCM
  - ExM
- Software Package
  - Executable
  - Manifest

… are the prerequisite for ADAS applications
Strengthen and Extend Pillars of AUTOSAR

AUTOSAR USP

Strengthen Safety & Security
➔ Support standard failure and attack scenarios
➔ Extend test and verification
➔ Improve processes

Strengthen connectivity
➔ Extend standard cloud services
➔ Think about AUTOSAR App store
➔ Enable connectivity to smart phones and zone ECUs

Develop flexible updates during life time
➔ Improve modularity e.g. define cluster interfaces
➔ Provide means for system description
Agenda

- Introduction of the AUTOSAR Partnership
- Challenges in the automotive industry
- Architecture and recent features
- Smart solutions based on AUTOSAR
- Processes and quality
- Outlook
AUTOSAR in a Vehicle Network

Common Bus Interface Specification
AUTOSAR Foundation
Common Features

The Foundation **assures compatibility** of the different AUTOSAR standards and therefore **contains** all **common artifacts** such as ...
AUTOSAR Foundation
The Methodology, derived out of the Meta Model, ...

... provides means to describe the AUTOSAR architecture with all its interfaces
... defines exchange formats and description templates (e.g. manifest) to enable
- a seamless integration of the complete vehicle E/E architecture,
- the automatized configuration of the µC- and µP-software stacks and
- the seamless integration of application software
... supports means to ensure safety and security of the system
... provides templates to document the standard
The layered architecture of the classic platform basically supports

- Hardware abstraction
- Scheduling of runnables and tasks (OS)
- Communication between applications on the same hardware and over the network
- Diagnosis and diagnostic services
- Safety- and
- Security Services
AUTOSAR Classic Platform
Layered Software Architecture (2/2)
AUTOSAR Adaptive Platform
Logical view

Legend

- **SERVICE**
  - Non-PF Service
- **SERVICE**
  - Func. Cluster
- **API**
  - Func. Cluster

User Applications

<table>
<thead>
<tr>
<th>Adaptive Application</th>
<th>Adaptive Application</th>
<th>Adaptive Application</th>
<th>Adaptive Application</th>
<th>ASW::XYZ Non-PF Service</th>
<th>ASW::XYZ Non-PF Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>ara::com</td>
<td>ara::rest</td>
<td>ara::time</td>
<td>ara::crypto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication Mgmt.</td>
<td>RESTful</td>
<td>Time Synchronization</td>
<td>Cryptography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOME/IP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ara::core</td>
<td>ara::exec</td>
<td>ara::iam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Types</td>
<td>Execution Mgmt.</td>
<td>Identity Access Mgmt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POSIX / C++ STL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ara::adi service</td>
<td>ara::diag service</td>
<td>ara::s2s service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automated Driving</td>
<td>Diagnostics</td>
<td>Signal to Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td></td>
<td>Mapping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ara::ucm service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Update and Configuration Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- **IPC** (local)
- DDS
- POSIX / C++ STL
- Operating System

AUTOSAR Runtime for Adaptive Applications (ARA)

(Virtual) Machine / Container / Hardware
AUTOSAR AP and CP Features

Release R18-10
26 Nov
2018
Q4

Release R19-03
29 Mar
2019
Q1

Stabilization

Release R19-11
29 Nov
2020
Q3

Demo Release R19-11
27 Mar

Release R20-11
27 Nov
2020
Q4
Agenda

› Introduction of the AUTOSAR Partnership
› Challenges in the automotive industry
› Architecture and recent features
› Smart solutions based on AUTOSAR
› Processes and quality
› Outlook
Software Architecture – AUTOSAR Defined Interfaces
Use Case ‘Front Light Management’: Exchange Type of Front Light

Integrator

SwitchEvent
  check_switch ()

Switch_event (event)

Supplier B

LightRequest
  switch event (event)

request_light (type, mode)

AUTOSAR Interface

OEM

Front-Light Manager
  request_light (type, mode)

get_keyposition()

set_light (type, mode)

set_dboard(type, mode)

AUTOSAR Interface

Supplier A

Headlight
  set_light (type, mode)

set_current (…)

AUTOSAR Interface

Silicon Vendor A

Complex Drivers

AUTOSAR Interface

ECU-Hardware

Standardized Interface

Operator System

Standardized Interface

Std. AUTOSAR Interface

Services

Std. Interface

Std. AUTOSAR Interface

Communication

Std. Interface

AUTOSAR Interface

ECU Abstraction

Std. Interface

Microcontroller Abstraction

DIO

PWM

CAN Driver

AUTOSAR Interface

AUTOSAR RTE

AUTOSAR Interface

AUTOSAR Interface

AUTOSAR Interface

AUTOSAR Interface

20 Jan 2020

AUTOSAR Introduction | 20 Jan 2020 | 49 of 64
Software Architecture – AUTOSAR Defined Interfaces

Use Case ‘Front Light Management’: Exchange Type of Front Light

- SwitchEvent
  - check_switch()
- LightRequest
  - switch_event(event)
  - request_light(type, mode)
- Front-Light Manager
  - request_light(type, mode)
  - get_keyposition()
  - set_light(type, mode)
  - set_dboard(type, mode)
- Xenonlight
  - set_light(type, mode)
  - set_current(…)

Integrator
- SwitchEvent
  - check_switch()
- Switch_event(event)

Supplier B
- LightRequest
  - switch_event(event)
  - request_light(type, mode)

OEM
- Front-Light Manager
  - request_light(type, mode)
  - get_keyposition()
  - set_light(type, mode)
  - set_dboard(type, mode)

Supplier A
- Xenonlight
  - set_light(type, mode)
  - set_current(…)

AUTOSAR PTF

- Standardized Interface
- Std. AUTOSAR Interface
  - Services
  - Std. Interface
- Standardized Interface
  - Communication
  - Std. Interface
- AUTOSAR Interface
  - ECU Abstraction
  - Std. Interface

Integrator
- Operating System
- Standardized Interface

Silicon Vendor A
- DIO
- CAN Driver

Microcontroller Abstraction
- ECU-Hardware
### Distribution ECUs

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SwitchEvent</strong></td>
<td><strong>LightRequest</strong></td>
<td><strong>Front-Light Manager</strong></td>
</tr>
<tr>
<td>switch_event(event)</td>
<td>request_light(type, mode)</td>
<td>request_light(type, mode)</td>
</tr>
<tr>
<td><strong>AUTOSAR Int.</strong></td>
<td><strong>AUTOSAR Interface</strong></td>
<td><strong>AUTOSAR Interface</strong></td>
</tr>
<tr>
<td></td>
<td>set_light(type, mode)</td>
<td>set_light(type, mode)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>set_current(…)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>AUTOSAR Interface</strong></td>
</tr>
</tbody>
</table>
Distribution on ECUs – ‘Front-Light Management’

- **SwitchEvent**: check_switch()
- **LightRequest**: switch_event(event)
- **Front-Light Manager**: request_light(type, mode)
- **Xenonlight**: set_light(type, mode)

**AUTOSAR Interface**

**CAN Bus**

**ECU**

**AUTOSAR RTE**

**Microcontroller Abstraction**

**ECU Abstraction**

**CAN Driver**

**DIO**

**PWM**

**STD Interface**

**Services**

**Communication**

**Front-Light Manager**

get_keyposition()

request_light(type, mode)

set_light(type, mode)

**SwitchEvent**

check_switch()

switch_event(event)

**Xenonlight**

set_light(type, mode)

set_current(...)

**AUTOSAR Int.**
AUTOSAR Platform Application
Continuous improvement cycle for ADAS systems

On Board
- Scene Understanding
- Sensor Fusion
- Perception

Mission and Trajectory Planning
- Mission and Trajectory Planning
- Secure data exchange on top of DDS
  
Off Board
- Labeling of trained data
- Evolution by training
- Simulation and sign-off

Secure data exchange on top of DDS
SOME/IP or REST

ara:adi

ara:com

Plan Execution, Motion Control
AUTOSAR Platform Application

User Applications

- ar::com Communication Mgmt.
- ar::rest RESTful
- ar::time Time Synchronization
- ar::per Persistence
- ar::plm Platform Health Mgmt.
- ar::exe Execution Mgmt.
- ar::iam Identity Access Mgmt.
- ar::log Logging & Tracing
- ar::crypto Cryptography
- ar::s2s Service Mapping
- ar::snc Service Networking
- ar::cm Service Management
- ar::adi Service Automated Driving Interfaces
- ara::state State Management
- ara::diag Diagnostics
- ara::adi Automated Driving Interfaces

(Virtual) Machine / Container / Hardware

- >> Run Execution Manager
  ...
  ...
  ...
  ara::exec > start { Vehicle Manager }
  The operation completed successfully
  ara::exec > start { HMI }
  The operation completed successfully
  ara::exec > start { Distance Radar }
  The operation completed successfully
## User Applications

<table>
<thead>
<tr>
<th>Communication Mgmt.</th>
<th>Time Synchronization</th>
<th>State Management</th>
<th>Diagnostics</th>
<th>Automated Driving Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>ara::com RESTful</td>
<td>ara::time</td>
<td>ara::state</td>
<td>ara::diag</td>
<td>ara::adi service</td>
</tr>
<tr>
<td>ara::per Persistence</td>
<td>ara::plm</td>
<td>ara::automated</td>
<td>ara::adi</td>
<td>Management</td>
</tr>
<tr>
<td>ara::core Core Types</td>
<td>ara::exec Execution Mgmt.</td>
<td>ara::signal</td>
<td>ara::adi</td>
<td>Management</td>
</tr>
<tr>
<td>ara::exec exec</td>
<td>ara::lam Identity Access Mgmt.</td>
<td>ara::log</td>
<td>ara::adi</td>
<td>Management</td>
</tr>
<tr>
<td>ara::cos crypto</td>
<td>ara::uam</td>
<td>ara::log</td>
<td>ara::adi</td>
<td>Management</td>
</tr>
</tbody>
</table>

### Vehicle Manager
- **ARA**: per > install new application software from ara::ucm service
- **ARA**: per > deploy persistent data to

### HMI
- **ARA**: state
- **ARA**: signal

### Distance Radar
- **ARA**: state
- **ARA**: signal

### ACC
- **ARA**: state
- **ARA**: signal

---

## (Virtual) Machine / Container / Hardware

### Run Persistency
- **ARA**: per > install new application software
- **ARA**: per > deploy persistent data to

## Key-Value Database
- Vehicle Manager
- HMI
- Distance Radar
- ACC

---

**AUTOSAR Introduction** | 20 Jan 2020 | 56 of 64
The operation completed successfully

```
ara::exec > start { Vehicle Manager }
ara::exec > start { HMI }
ara::exec > start { Distance Radar }
ara::exec > start { ACC }
```

**User Applications**

<table>
<thead>
<tr>
<th>ara::com</th>
<th>ara::rest</th>
<th>ara::time</th>
<th>ara::pm</th>
<th>ara::sl</th>
<th>ara::diag</th>
<th>ara::adi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Mgmt.</td>
<td>RESTful</td>
<td>Time Synchronization</td>
<td>Platform Health Mgmt.</td>
<td>Persistence</td>
<td>State Management</td>
<td>Automated Driving Interfaces</td>
</tr>
<tr>
<td>ara::per</td>
<td>ara::iam</td>
<td>ara::log</td>
<td>ara:::sl2</td>
<td>ara:::slm</td>
<td>ara:::slm2</td>
<td>ara:::slm3</td>
</tr>
<tr>
<td>Core Types</td>
<td>Identity Access Mgmt.</td>
<td>Logging &amp; Tracing</td>
<td>Service Mapping</td>
<td>Service Networking</td>
<td>Management</td>
<td>Interfaces</td>
</tr>
</tbody>
</table>

**Virtual Machine / Container / Hardware**

- HMI
- Vehicle Manager
- ACC
- Distance Radar

>> Run Execution Manager
... ...
... ...
ara::exec > start { Vehicle Manager }
The operation completed successfully
ara::exec > start { HMI }
The operation completed successfully
ara::exec > start { Distance Radar }
The operation completed successfully
ara::exec > start { ACC }
The operation completed successfully
<table>
<thead>
<tr>
<th>AUTOSAR Runtime for Adaptive Applications (ARA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle Manager</strong></td>
</tr>
<tr>
<td><strong>HMI</strong></td>
</tr>
<tr>
<td><strong>Distance Radar</strong></td>
</tr>
<tr>
<td><strong>ACC</strong></td>
</tr>
<tr>
<td>ara::com Communication Mgmt.</td>
</tr>
<tr>
<td>ara::rest RESTful</td>
</tr>
<tr>
<td>ara::time Time Synchronization</td>
</tr>
<tr>
<td>ara::per Persistency</td>
</tr>
<tr>
<td>ara::phm Platform Health Mgmt.</td>
</tr>
<tr>
<td>ara::core Core Types</td>
</tr>
<tr>
<td>ara::exec Execution Mgmt.</td>
</tr>
<tr>
<td>ara::lam Identity Access Mgmt.</td>
</tr>
<tr>
<td>ara::log Logging &amp; Tracing</td>
</tr>
<tr>
<td>ara::crypto Cryptography</td>
</tr>
<tr>
<td>ara::state service State Management</td>
</tr>
<tr>
<td>ara::diag service Diagnostics</td>
</tr>
<tr>
<td>ara::adi service Automated Driving Interfaces</td>
</tr>
<tr>
<td>POSIX PSE51 / C++ STL Operating System</td>
</tr>
<tr>
<td>ara::s2s service Signal to Service Mapping</td>
</tr>
<tr>
<td>ara::nnm service Network Management</td>
</tr>
<tr>
<td>ara::ucm service Update and Configuration Management</td>
</tr>
</tbody>
</table>

**(Virtual) Machine / Container / Hardware**
### AUTOSAR Introduction

<table>
<thead>
<tr>
<th>Vehicle Manager</th>
<th>HMI</th>
<th>Distance Radar</th>
<th>ACC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication Mgmt.</strong></td>
<td><strong>RESTful</strong></td>
<td><strong>Time Synchronization</strong></td>
<td><strong>Platform Health Mgmt.</strong></td>
</tr>
<tr>
<td><strong>Core Types</strong></td>
<td><strong>Persistency</strong></td>
<td><strong>Identity Access Mgmt.</strong></td>
<td><strong>Logging &amp; Tracing</strong></td>
</tr>
<tr>
<td><strong>Execution Mgmt.</strong></td>
<td><strong>Identity Access Mgmt.</strong></td>
<td><strong>Logging &amp; Tracing</strong></td>
<td><strong>Cryptography</strong></td>
</tr>
</tbody>
</table>

**Operating System**
- POSIX PSE51 / C++ STL

**ARA Services**
- ara::state service (State Management)
- ara::diag service (Diagnostics)
- ara::adi service (Automated Driving Interfaces)
- ara::s2s service (Signal to Service Mapping)
- ara::cm service (Network Management)
- ara::ucm service (Update and Configuration Management)

**(Virtual) Machine / Container / Hardware**

---

**Image Description**
- A segment of a transparent car with internal components visible.
- Interior display showing vehicle information.

---

**Footnote**
- 20 Jan 2020

---

**Previous Pages**
- 58 of 64

---

**Next Pages**
- 60 of 64
Agenda

- Introduction of the AUTOSAR Partnership
- Challenges in the automotive industry
- Architecture and recent features
- Smart solutions based on AUTOSAR
- Processes and quality
- Outlook
AUTOSAR Adaptive Platform development approach

**Specification**

**Identify needs & use-cases:**
1) Concepts
2) Features
3) Requirements

**Gain speed:**
1) Spec validation
2) Reduce room for spec interpretation
3) Training / dissemination of AP

**Implementation**

**Attracting environment for coders:**
- Appealing technology (C++, Yocto, Git, …)
- Modern use case (ADAS EBA)
- Handy documentation (Wiki)
- Peer programming sessions

**Demonstration**

**Gain trust:**
1) Advertises the progress
2) Highlights some specific features

**Show AUTOSAR interoperability**
- of classic and adaptive platforms
- but also with others

**Quality:**
- TF-ARC approval
- Cross team review
- Lifecycle: preliminary → draft → valid

Best tradeoff between commercial cooperation & compatibility between different vendors
Agenda

- Introduction of the AUTOSAR Partnership
- Challenges in the automotive industry
- Architecture and recent features
- Smart solutions based on AUTOSAR
- Processes and quality
- Outlook
Timeline to full automation

AUTOSAR – a faithful ADAS companion

Automated Driving

Level 5: full automation

Level 4: highly automated driving

Level 3: Conditional automation

New Features, planning in progress

2018 2019 2020 2021 2022 2023 2024 2025 2026