COVESA and AUTOSAR Collaboration – Overview

Enabling Continuous Innovation

Michael Niklas-Höret, AUTOSAR Steering Committee
April 25th 2023

COVESA All Members Meeting
Porto
AUTOSAR Development Cooperation
A Global Community based on Responsibility and Trust

31 international automotive OEM are AUTOSAR partners in constantly growing community. **21 are under the 22 top-selling OEM** and covering **over 80%** of the **total market revenue** in 2019*. 

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

„If a company develops alone it will be one proprietary solution, if it is shared and used by several partners it becomes technology, and with broad standardization it becomes state of the art and alleviates certification.“

Günter Reichart, AUTOSAR Spokesperson
Driving changes in E/E architecture

- **1970**: Mechanics
- **1980**: Electric Support
- **1990**: Infotainment
- **2000**: Linked Networks
- **2010**: 90% of All E/E-Driven Innovations
- **2020**: Major E/E-driven Innovations
  - Vehicle-Backend Connection
  - Service-oriented Architectures
  - Time-Sensitive Networking
- **2025**: Zone Architecture
  - Vehicle Computer
  - Domain Fusion
  - Integration
  - Distributed ECUs
  - Centralization

**Software-Defined Vehicle**
- **2030**: Development processes
  - DSLs
  - DevOps
  - Cloud / edge computing
  - Vehicle-Backend Integration
  - Vehicle OS & API
  - Big Data
  - Central HPC

**Complexity increase**
Software Defined Vehicle

A View to Major Building Blocks*

*Example view without being complete
Big Picture

(main players only)

Each organization must find its role, position and interfaces in this development cycle.
Automotive Development Ecosystem (1/2)

Trusted Collaboration on Software Defined Vehicle*

**Objective:** Develop and establish standardized SW framework and open E/E system architecture for intelligent mobility

**Objective:** Open Standards from Pegasus, Service Oriented Vehicle Diagnostics

**Objective:** Open standards for 3D graphics, Virtual and Augmented Reality, Parallel Computing, Machine Learning, and Vision Processing

**Objective:** Cloud-native architecture enhanced for mixed-criticality automotive applications; building on technologies which define standard boot and security requirements for Arm architecture

**Objective:** Open technology platform for the SW defined vehicle of the future; focused on accelerating innovation of automotive-grade in-car software stacks using open source and open specifications

**Objective:** Gaia-X European data infrastructure for Hyperscaler Catena-X traceability in supply chain

**Objective:** CNCF is the open source, vendor-neutral hub of cloud native computing, hosting projects like Kubernetes and Prometheus to make cloud native universal and sustainable.

*Example view without being complete*
Facade

Automotive Development Ecosystem (2/2)

Trusted Collaboration on Software Defined Vehicle*

**COVESAs (former GENIVI)**

Objective: Connected vehicle systems including in-vehicle, at-edge and in-cloud services, interfaces and data exchange. Extension of W3C Common Vehicle Interface Initiative (CVII)

**AUTOSAR & COVESAs Collaboration**

Objective:

- Exchange of vehicle data, described by COVESAs Vehicle Signal Specification (VSS), between the cloud and AUTOSARs platforms for in-vehicle communication.

- COVESAs will focus on vehicle data and services as well as cloud interaction

- AUTOSAR will offer an open interface for the overall system architecture and the in-vehicle network

The collaboration will start with a Vehicle API concept being discussed by both organizations.

A joint proof of concept demonstration showing

- a seamless integration of communication

- exchange of data

- access of services between cloud and in-vehicle ECUs.

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DevOps Workbench

Toolchain

CI / CD

SW Distribution

Collaboration

Monitoring

Analytics

Compute Platform

Functions / Applications

Toolchain API

Cloud

Digital Twin

Predictive Maintenance

Vehicle API

Platform Services

Edge Enabler

Simulation & Validation Services

Data Center

Cloud / On Premise

Vehicle Infrastructure

Sensors

Zones / ECUs

Actuators

Vehicle Domains

Core SW / OS

Platform Services

Cloud Services

*Example view without being complete

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COVESAs All Members Meeting 2023

25/04/2023

8
## Outputs – Intended Specifications

<table>
<thead>
<tr>
<th>Component/Topic</th>
<th>Details/Expectations</th>
</tr>
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<tbody>
<tr>
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<td>A document specifying a transport agnostic API, level of detail similar to VISS Core spec. Expected to be more lightweight than VISS.</td>
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<tr>
<td>Vehicle API Transport Specification MQTT</td>
<td>A document specifying how to use Vehicle API using MQTT. The level of detail similar to VISS Transport spec.</td>
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<td>Network adapter interface of the External Connection Handler, including its behavior</td>
<td>A document specifying the interface for the network adapter(s) and how the ECH is managing the adapters.</td>
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<td>Vehicle API Data Mapper and VSS Binding Configuration Specification</td>
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## Outputs – Intended Implementations

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<tr>
<td><strong>Linux VSS Application and Vehicle API</strong>&lt;br&gt;Client/Binder Reference Implementation</td>
<td>Necessary components for Linux to be able to communicate read/write/subscribe requests towards AUTOSAR using the Vehicle API MQTT transport layer.</td>
</tr>
<tr>
<td><strong>ECH MQTT Network Adapter</strong></td>
<td>To be used by Vehicle API MQTT client (ref. above).</td>
</tr>
<tr>
<td><strong>AUTOSAR External Connection Handler (ECH)</strong>&lt;br&gt;Reference Implementation</td>
<td>Full support of Vehicle API.</td>
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<td><strong>Vehicle API mapping tool chain Reference Implementation</strong></td>
<td>Results in the generation of Data Mapper based on configuration that describes the mapping between selected VSS signals and selected real/simulated sensors/actuators.</td>
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<tr>
<td><strong>Simulator/Emulator</strong></td>
<td>A component that can be installed in Linux and simulates the Vehicle API Southbound interface for the selected transport protocol.</td>
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AUTOSAR Opening Strategy

Compatibility & Interoperability – State of Planning

Recent decisions in AUTOSAR supporting the collaboration:

- AUTOSAR can start new development in dedicated open projects governed by Open Source best practices like:
  - Open project charter document
  - Open project specific licenses (e.g. MPL v. 2 and Creative Commons CC-BY-SA 4.0)
  - state of the art CLA enables AUTOSAR Partners, COVESA Partners and non AUTOSAR and COVESA Partners to contribute

- New membership “Associate Partner Light” decided that is a membership with no partnership fee and allows exploitation of **specific AUTOSAR specification only**
  - Main purpose is to make the bus protocols more accessible
  - Further IP could be made available based on AUTOSAR decisions in this contract framework
AUTOSAR Members provide Knowledge about the released AUTOSAR IP

AUTOSAR (Work)
- AUTOSAR evaluates the necessary IP for a Vehicle API internally (Only AUTOSAR Partners)
- AUTOSAR defines how the necessary Interface IP can be made available (e.g. Associate Partner Light or other)
- AUTOSAR promotes the result of the cooperation with a joint COVESA-AUTOSAR branding
- AUTOSAR Partners realizes reference implementation which include Real-Life AUTOSAR (V)RTE based solutions

AUTOSAR/COVESA Vehicle API Project
- Open to everybody and governed by open source principles
- The WG develops based on open IP the specification for a Vehicle API
- The WG develops reference implementations for the Vehicle API Gateway and example Application.

AUTOSAR Partners feed back, cases where additional IP might be necessary

COVESOA Members bring in VSS Knowledge

COVESOA
- COVESOA handles Updates to the VSS specification necessary for the Vehicle API
- COVESOA promotes the result of the cooperation with a joint COVESOA-AUTOSAR branding
- COVESOA develops reference implementations.

AUTOSAR facilitates

3rd Parties may contribute/Adopt

AUTOSAR evaluated the necessary IP for a Vehicle API internally (Only AUTOSAR Partners)
Intended Outputs overview (draft assessment)

**Outputs – Intended Specifications**

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<td>Client/Reference Implementation</td>
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<td>Reference Implementation</td>
<td></td>
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<td>Stimulus/Emulator</td>
<td>A component that can be initialized, tested, and debugged for Vehicle API specific functional integration with the vehicle transport protocol.</td>
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**Work on Output can be started in Open Project**

**Work on Output needs further legal clarification in AUTOSAR**
AUTOSAR Opening Strategy

Derived Applications

- Mobility infrastructure
- Agricultural machinery
- Maritime Shipping
- Railway

Derived Applications

- Urban Mobility
- Industrial Automation
- Building Automation
- Household appliance
- Medical technology
AUTOSAR Outlook

AUTOSAR Release R22-11 – Overview

Classic Platform
- MACSec
- CAN XL
- V2X Support for China
- Secure Global Time Sync
- V2X in AUTOSAR
- DDS Support on CP
- Deterministic Communication with TSN

Adaptive Platform
- MACSec
- CAN XL
- Firewall
- Service Oriented Vehicle Diagnostics
- SOME/IP Harmonization

Code: Adaptive Platform Demonstrator
April 2023

Foundation
- Unified Timing and Tracing Approach
- CAN XL
- MACSec
- V2X in AUTOSAR
- Firewall
- Service Oriented Vehicle Diagnostics
- DDS Support on CP
- SOME/IP Harmonization

Single-Platform Concepts
Cross-Platform Concepts
Adaptive Platform Demonstrator: State of the Code

C/C++ Files

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<tr>
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<th>Files</th>
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C/C++ LoC

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<td>334.618</td>
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The COVESA/AUTOSAR Collaboration

✓ All legal prerequisites are defined for starting a joint Open Project on Vehicle API

✓ Strong strategic interest from both organizations to collaborate

Next Steps:

➢ Legal documents have to be finalized and signed

➢ Update the Charter Document for the joint Open Project Vehicle API

➢ Jointly work on the intended Output
Thank you!