



# How to best accelerate from Assistance Systems Features to Automated Hub-2-Hub Transportation

Automotive World Webinar, 2022-03-29

# Presenters

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# Today's Agenda

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**1**

## **Introduction**

About AVL and ADAS/AD

**2**

## **Challenges and Solutions Overview**

Challenges and overview of solutions in transition to higher automation levels

**3**

## **AVL Engineering Solutions**

AVLs building blocks for highly efficient software development

**4**

## **Project Examples**

Project examples of automated applications with AVL software & controls implemented

# Facts and Figures



## Global Footprint

Represented in 26 countries

45 Affiliates divided over 93 locations

45 Global Tech and Engineering Centers (including Resident Offices)

1948

Founded

11,500

Employees Worldwide

10%

Of Turnover Invested in Inhouse R&D

70+

Years of Experience

65%

Engineers and Scientists

1,500

Granted Patents in Force

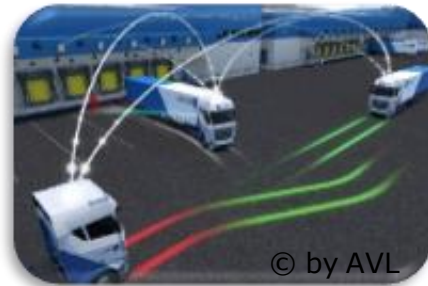
96%

Export Quota

# Automated Trucking Trend



ADAS



AD in confined Areas



Tele Operation

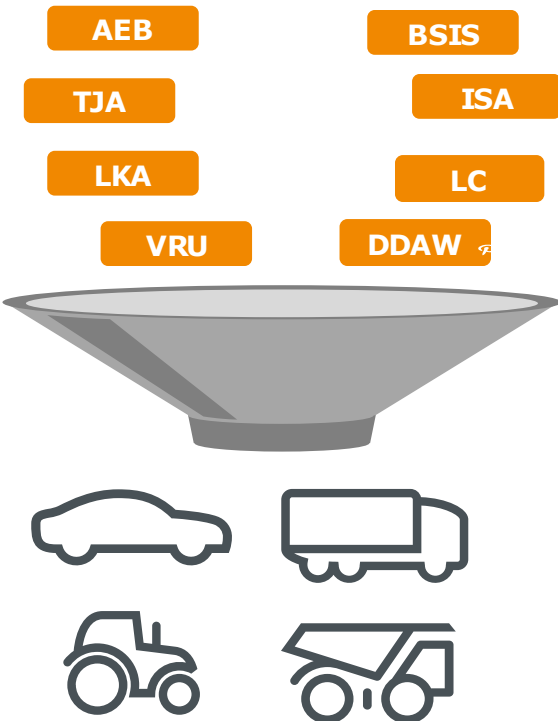
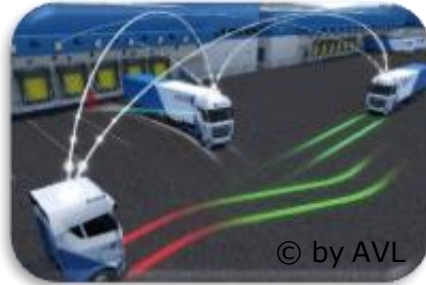


Automated H2H Transportation

Complexity and Time



# Applications / Features



# ADAS/AD Engineering Services Overview

## Webinar Focus



### FUNCTIONAL SYSTEM DESIGN

- System engineering of use cases, test cases & test plan, sensor specifications, traceability management
- Functional safety concept with hazard & risk analysis including quality analysis
- KPI performance targets definition, development of local market requirements



### TAILORED SOFTWARE & CONTROLS DEVELOPMENT

- Customer specific ADAS & AD features development
- Development platform for proof-of-concept, concept and series
- Controller hardware for ADAS & AD niche applications
- Functional safety (ISO26262), SOTIF (PAS 21448) and data security



### INTEGRATION, CALIBRATION, VERIFICATION & VALIDATION

- ADAS verification from simulated virtual lab to real road environments
- Function performance calibration & optimization incl. target fulfillment evaluation
- Validation active safety (NCAP, GSR), comfort features on proving ground and real-world fleet

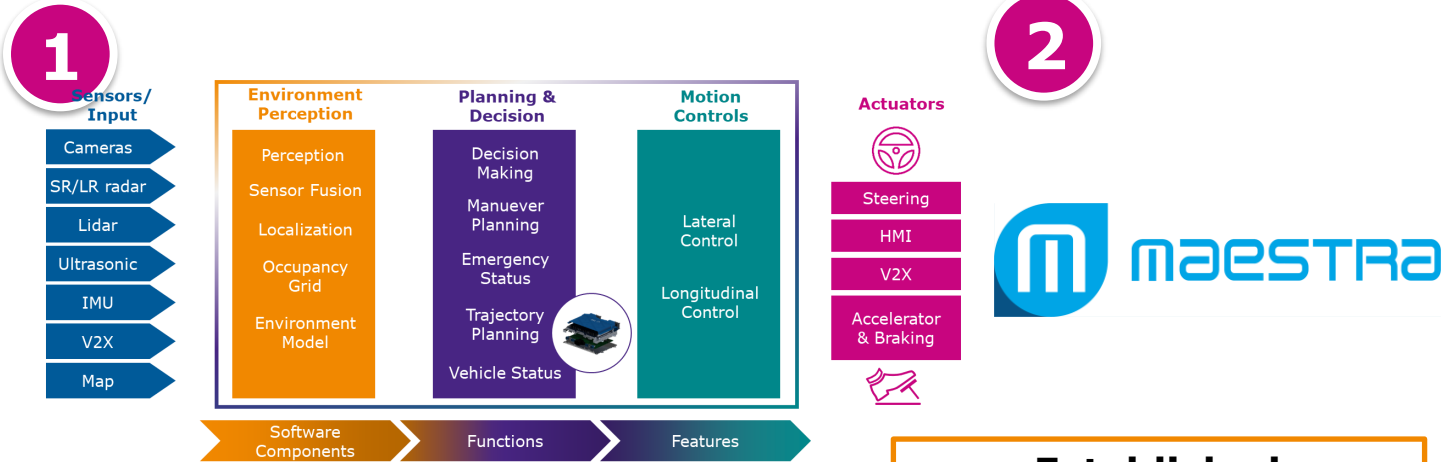


### Data Capturing, Management and Evaluation Data as a Service

- Specification and setup of Data Capturing environment
- Execution of data Capturing and Data Management
- Post processing of Data with evaluation by application of AVL tool chain

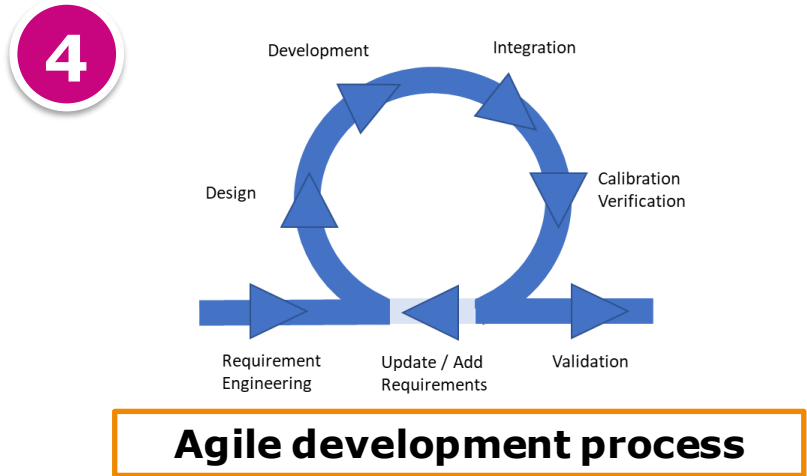
Accelerating a safe autonomous future

# Building Blocks for Efficient Controls Development



**Modular SW architecture**

**Established development platform**



**3**

ISO 26262

CMMI

SPICE

AUTOMOTIVE SPICE®

**Development according to Standards**

**5**

**Scalable ECU**



**ADAS**



**AD in confined areas**



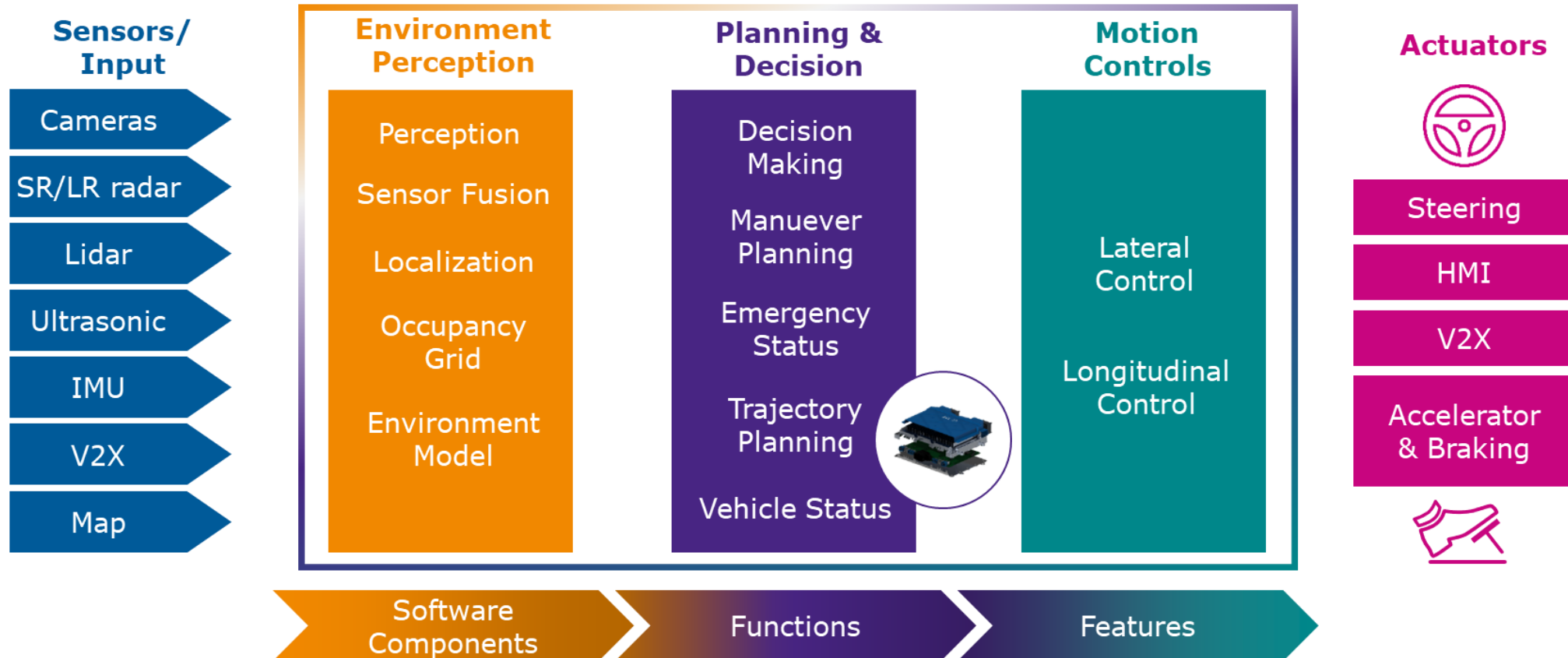
**Tele operation**



**Automated H2H transportation**

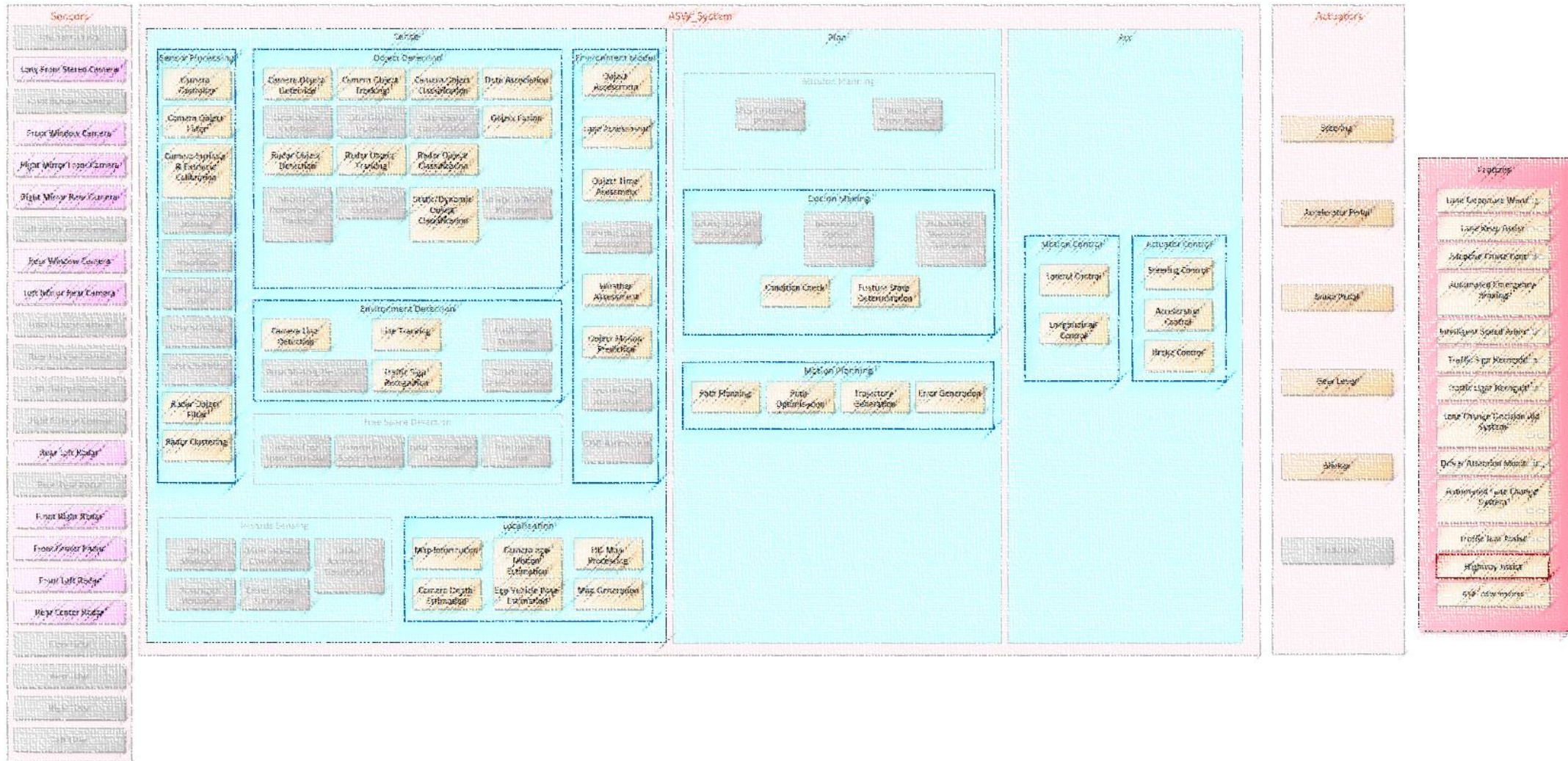


# Modular Software & Controls Architecture



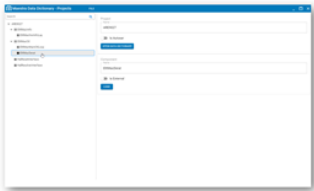
The modular approach enables **integration and reuse of software** from different suppliers (AVL, customer or 3rd party)

# Modular Architecture Examples



# AVL MAESTRA<sup>®</sup> – Integrated Development and Test Platform

## Software architectural design



## Model Development Detailed Design

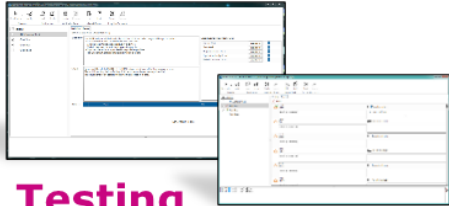


Development

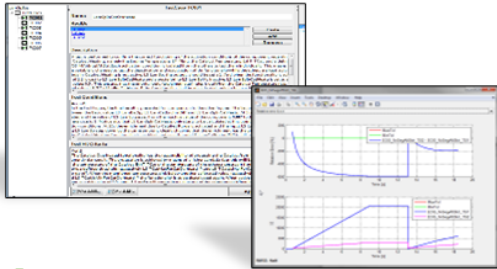


Verification

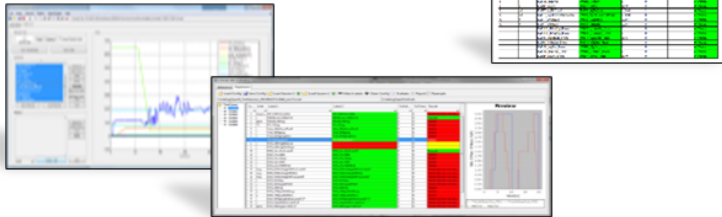
## Virtual System Testing



## SiL / PiL Testing



## MiL Testing

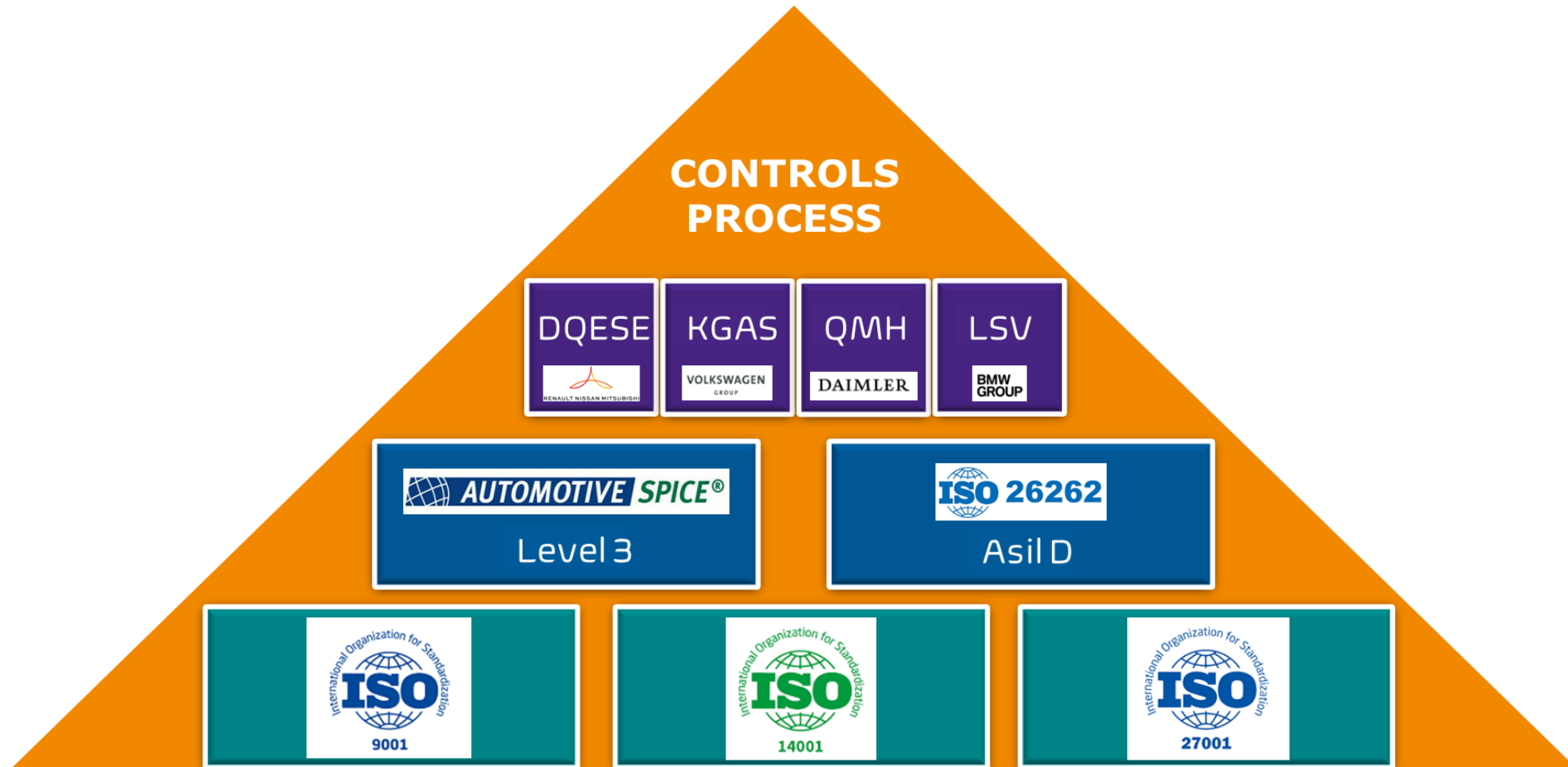


## Code Generation





# AVL Controls Development Process Compliance

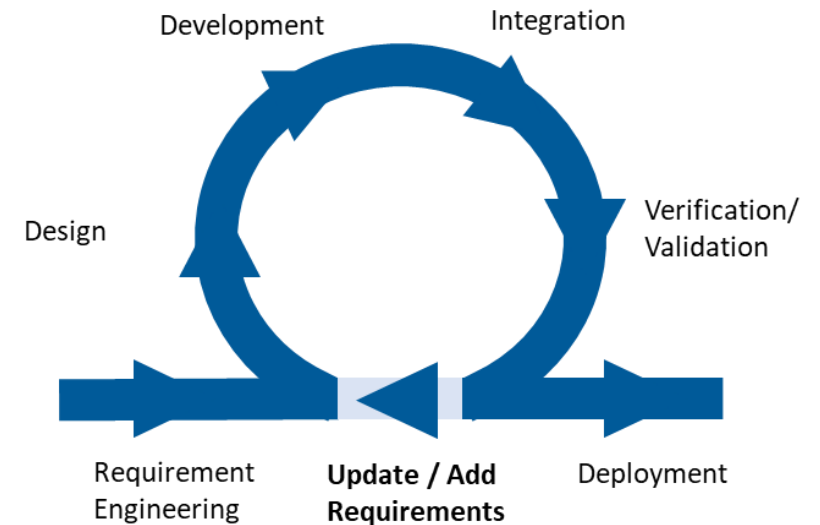




# Agile Development Process - The $\Omega$ -Approach

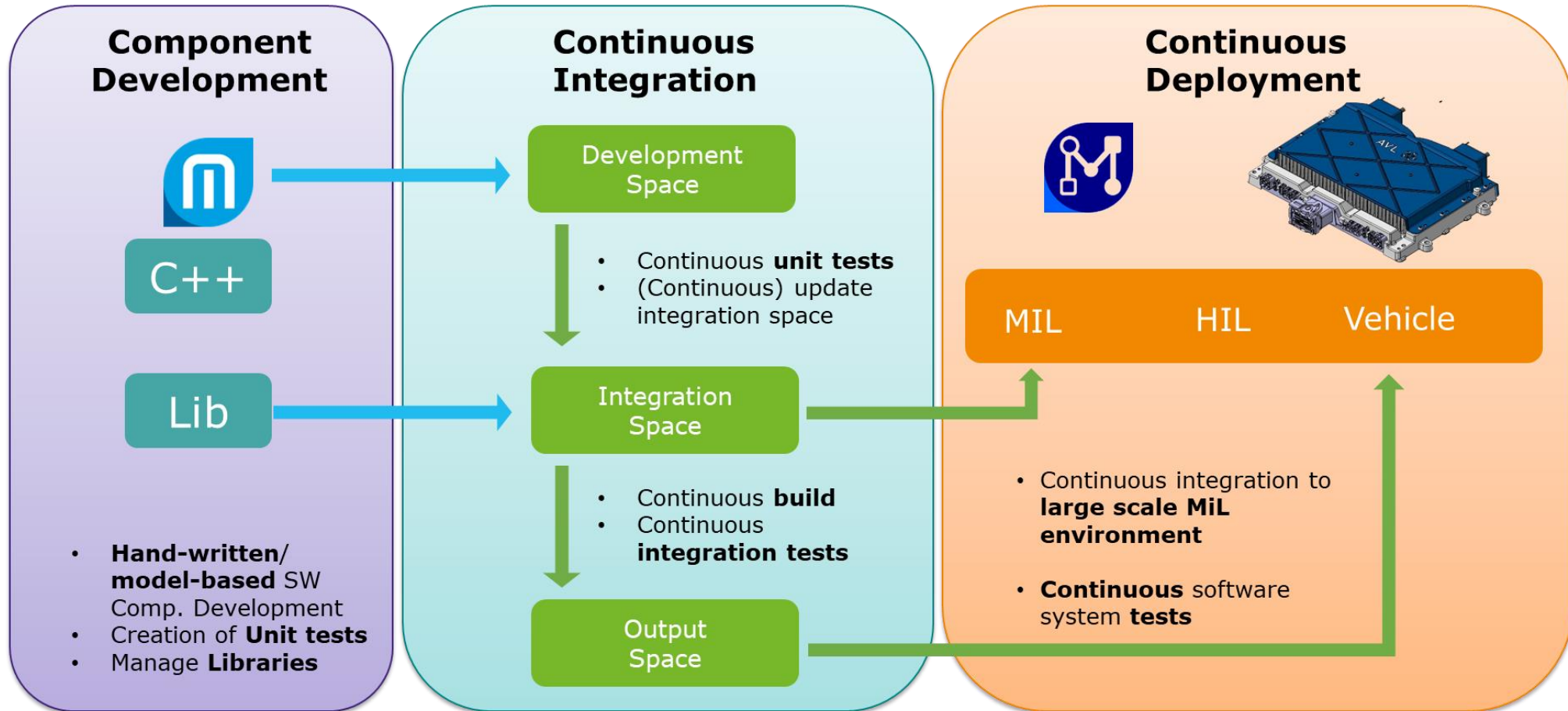
## Key Elements:

- **Short Development Cycles**
- **Early (virtual) Calibration and Verification** in suitable Environments (MiL – HiL - Vehicle)
- **Add / Update Requirements after each iteration** according to test feedback and sprint planning
- **Seamless tool support** for Continuous Integration / Continuous Deployment (CI/CD)
- **Big Data** and **Test Management Support** for Test Scenarios, Test Data and KPIs

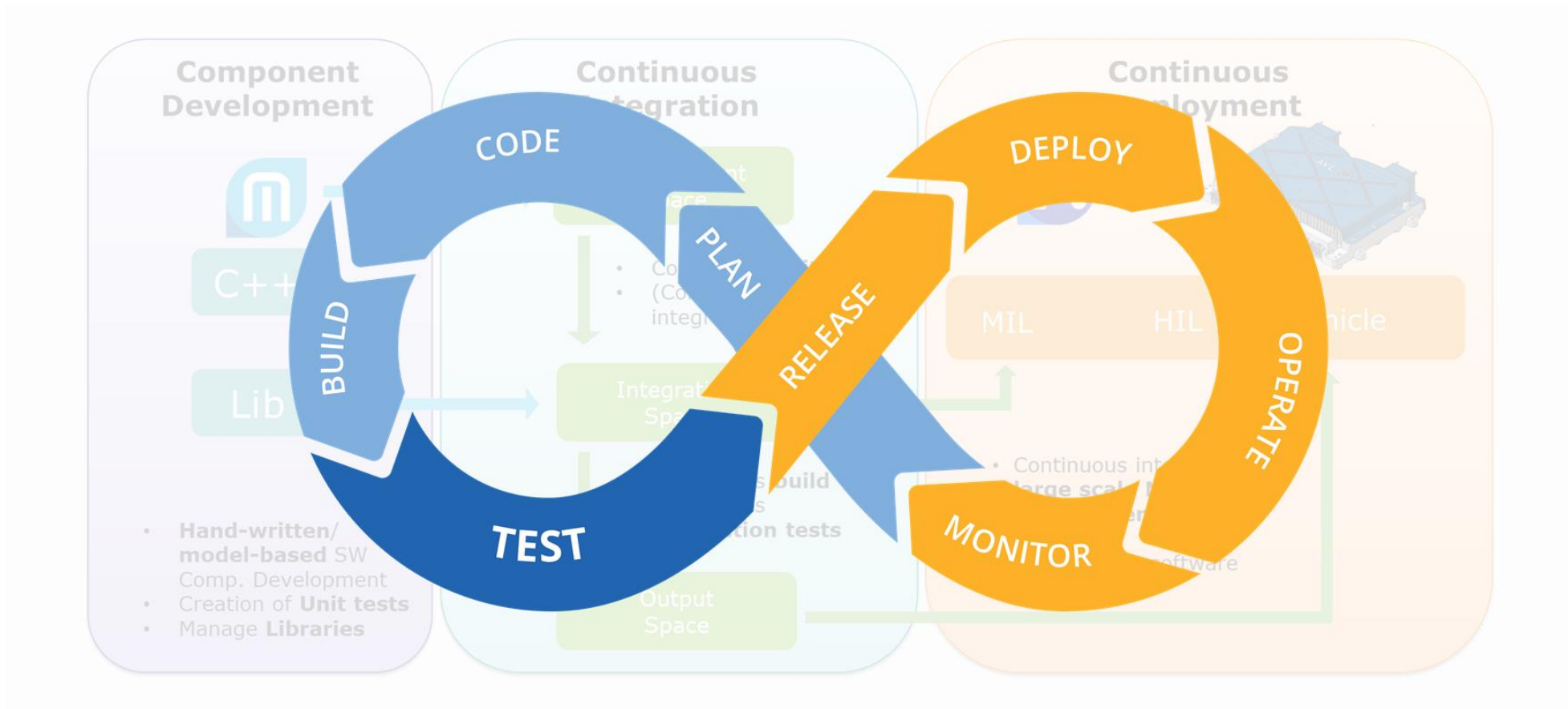


**The OMEGA-approach – time and cost effective ADAS/AD development process**

# Development Methodology – CI / CD

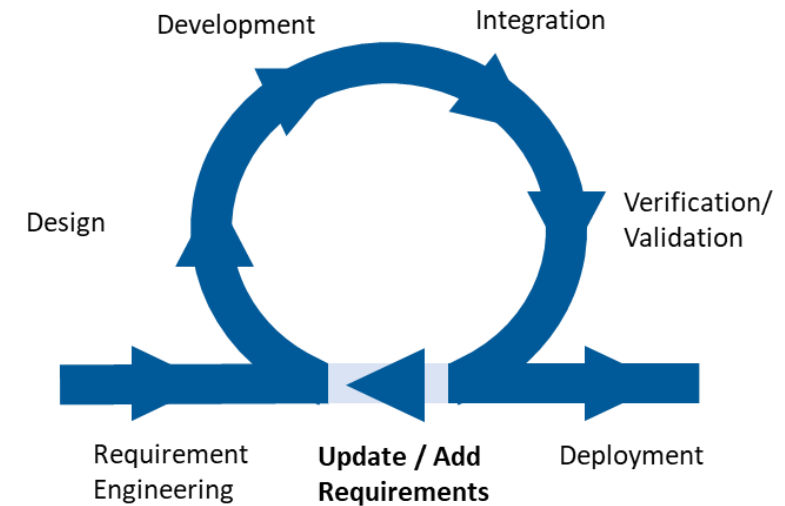


# Development Methodology – CI / CD



# Virtual Verification and Validation for Embedded SW

- **Development Cycles becoming shorter**
  - Verify the design in **early stages**
  - Provide **fast design updates**
- **Test effort needs to be reduced**
  - Physical tests are expensive (Test-Bed, Vehicle,...)
  - Platform for **new testing paradigm required** (e.g., test automatization, AI-based testing,...)
- **Requirements are often incomplete in early stages**
  - Early Testing is mandatory to **assure completeness and correctness** of requirements (Safety SOTIF Standard)





# Virtual Verification and Validation for Embedded SW

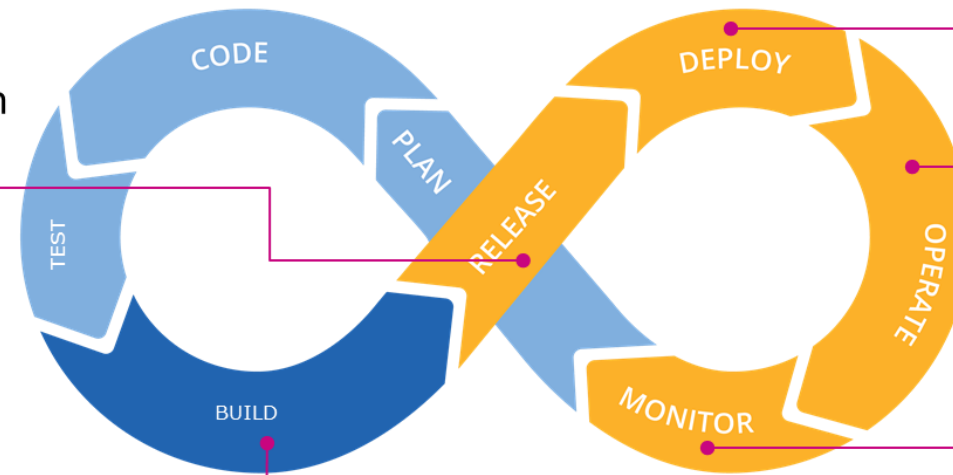
**Maestra** provides a **seamless connection** between **modeling and simulation**

## Create virtual ECU

Compile software system incl. necessary BSW functions to an executable vECU

## Virtual Integration

Automatically integrate components to a virtual software system



## Deployment

Deploy the application in the simulation environment

## Execute virtual ECU

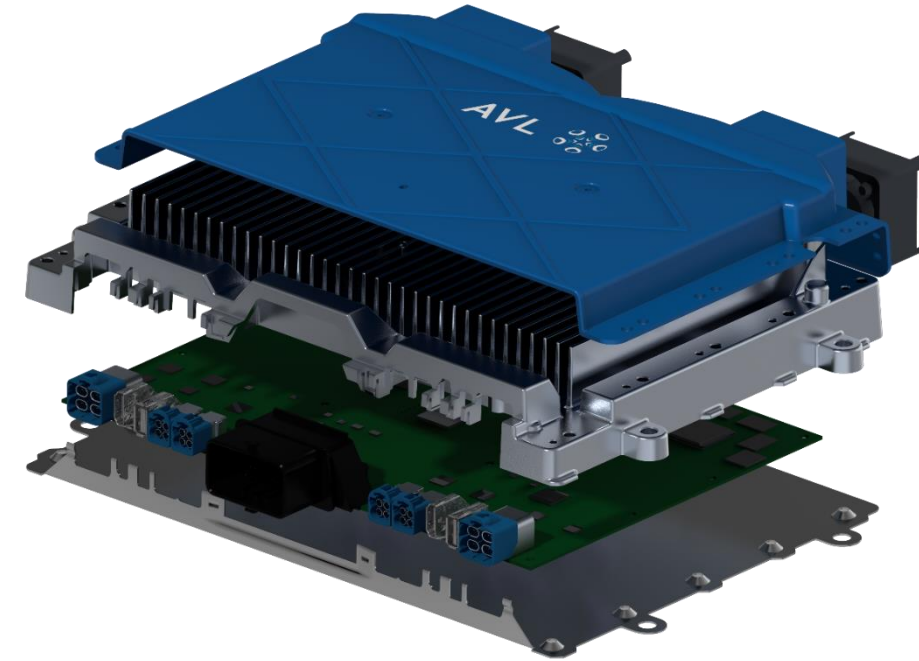
Run the application in the simulation environment

## Monitor the behavior

Evaluate the results

# ADAS/AD Controller Platform "Ajunic"

- **High Performance** controller platform
- **One development partner** for Software, Hardware, System, AI Toolchain and Validation
- **Scalable performance for different levels of automation**
- **Automotive full redundant according to ISO 26262 ASIL D including cybersecurity**
- **Rapid Prototyping using embedded target hardware**

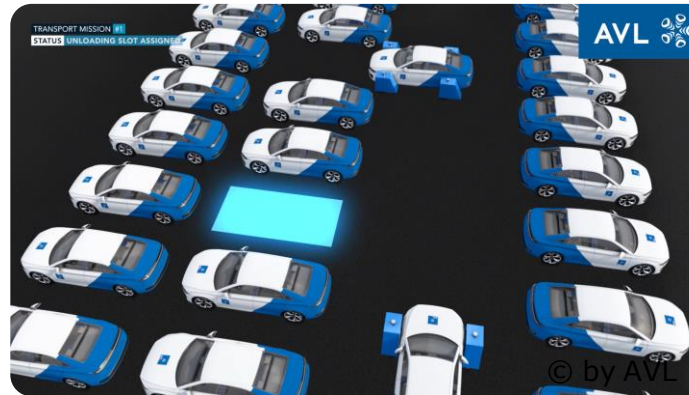


# Project Examples

## Fuso SensorCollect



## Automated Vehicle Carrier



## Platooning Demonstrator



## Use case/benefit

*Partial operator substitution enabled by automated driving while loading (forward and reverse)*

*Full driver substitution by full automation of process  
Automated task assignment  
– loading – driving -  
unloading*

*Driver assistance /part automation of driving task and fuel consumption reduction*

# Summary



- 1 Efficiency**  
**Modulare Software-architecture for highest re-use and consequently development efficiency**
- 2 Traceability**  
**Development platform MAESTRA<sup>®</sup> for ensuring full traceability of the taken development steps**
- 3 Flexibility**  
**Agile development process for best flexibility i.e. simple adaption to new or changed requirements.**
- 4 Quality**  
**Automotive standard compliant development capability ensures highest product quality**
- 5 Scalability**  
**Scalable controller platform for universal application**





# Q&A Session

# Contact

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