

Applying Method of ASAM Standard for SDV Dev. and V&V



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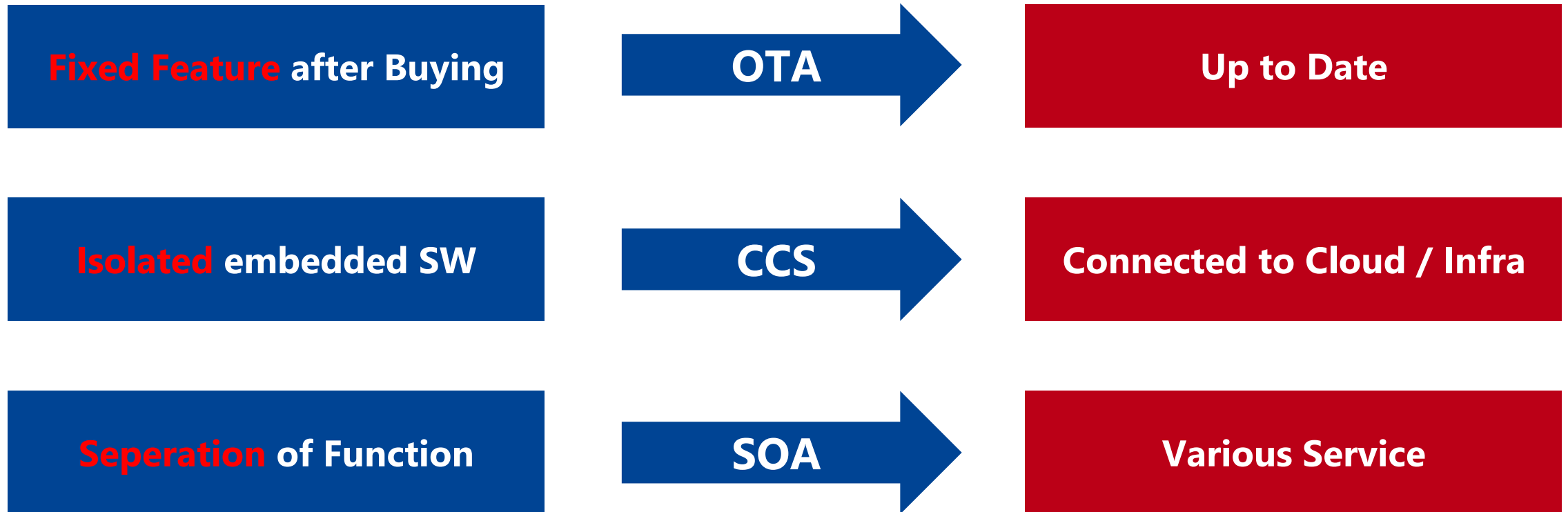
13th Sep. 2023



Association for Standardization of
Automation and Measuring Systems

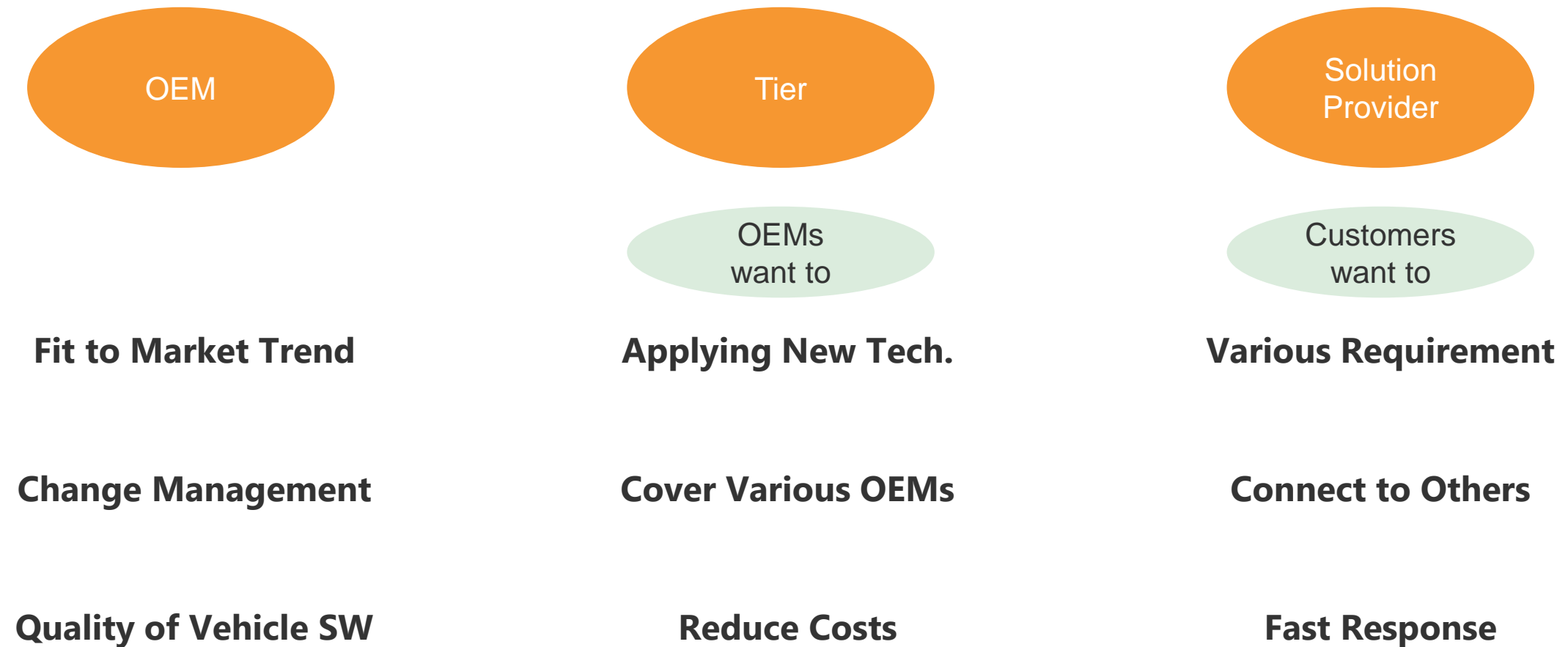
Software Defined Vehicle

Change of Vehicle SW Characteristics



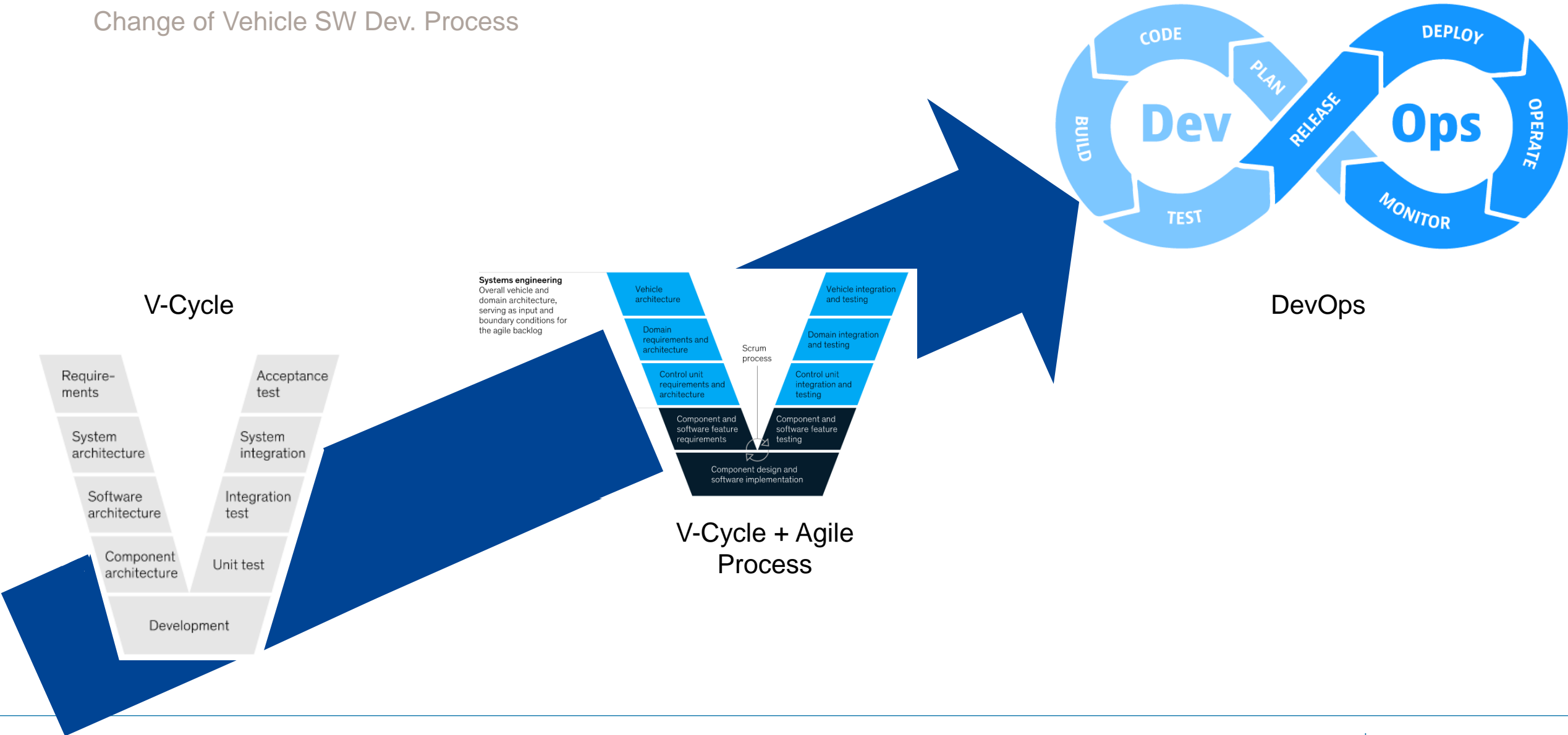
Software Defined Vehicle

Challenges



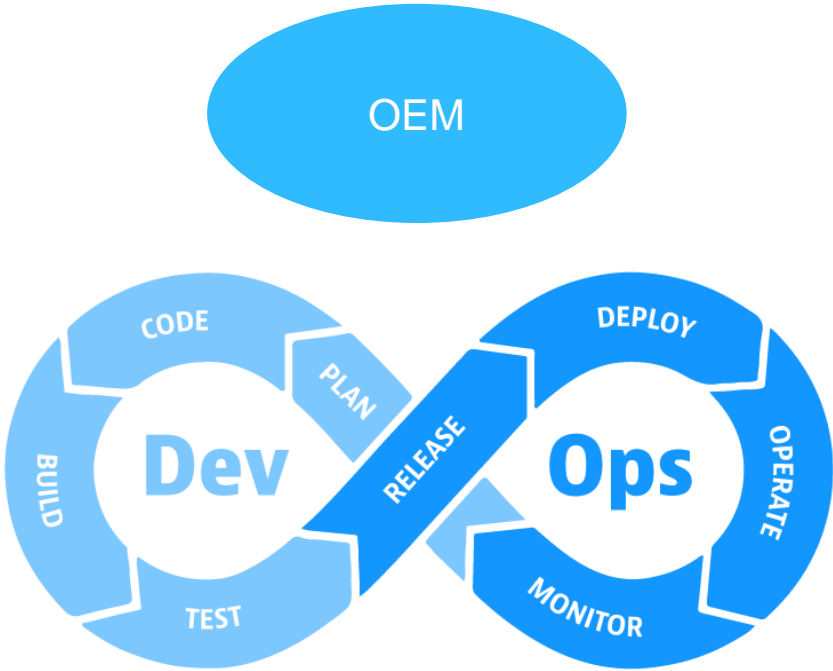
Software Defined Vehicle

Change of Vehicle SW Dev. Process

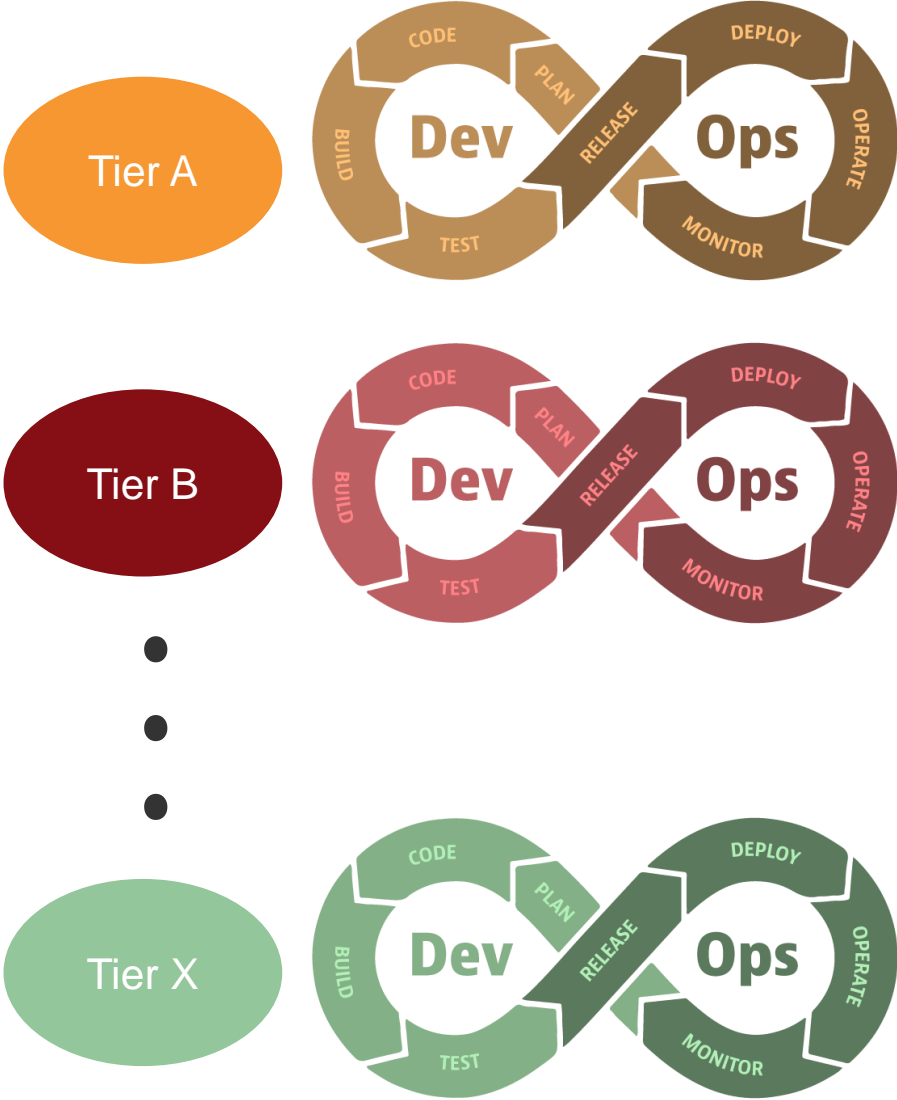


Software Defined Vehicle

DevOps is Perfect ?

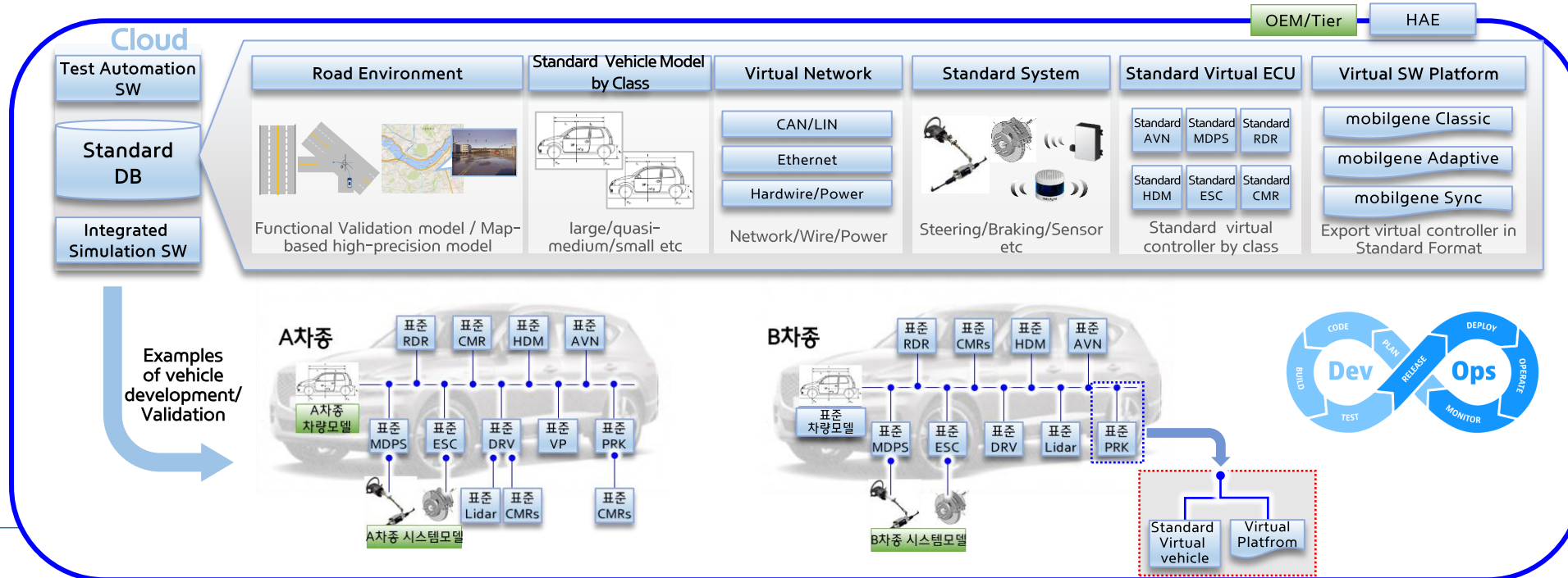
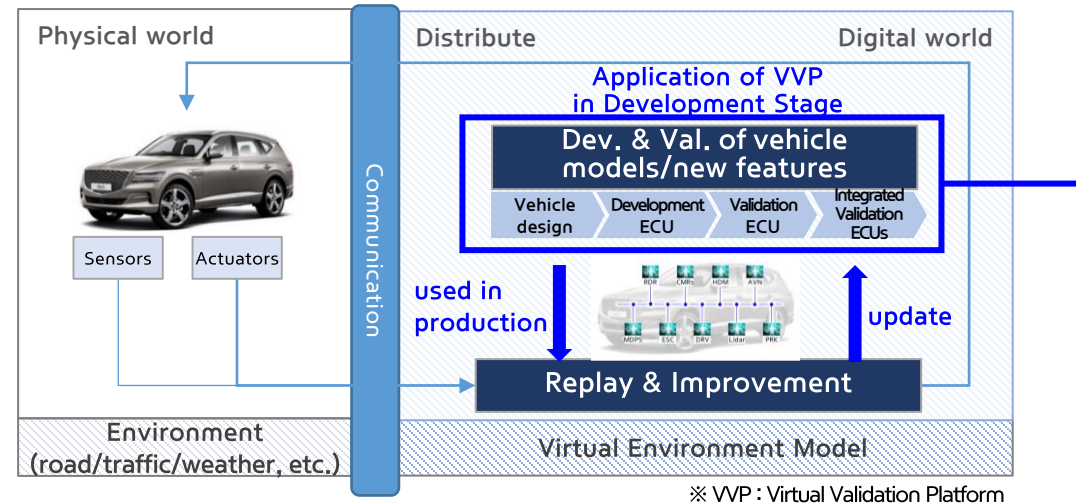


- Continuity
- Seamless
- Pipelining
- CI / CD / CT



Target Platform for SDV of HAE

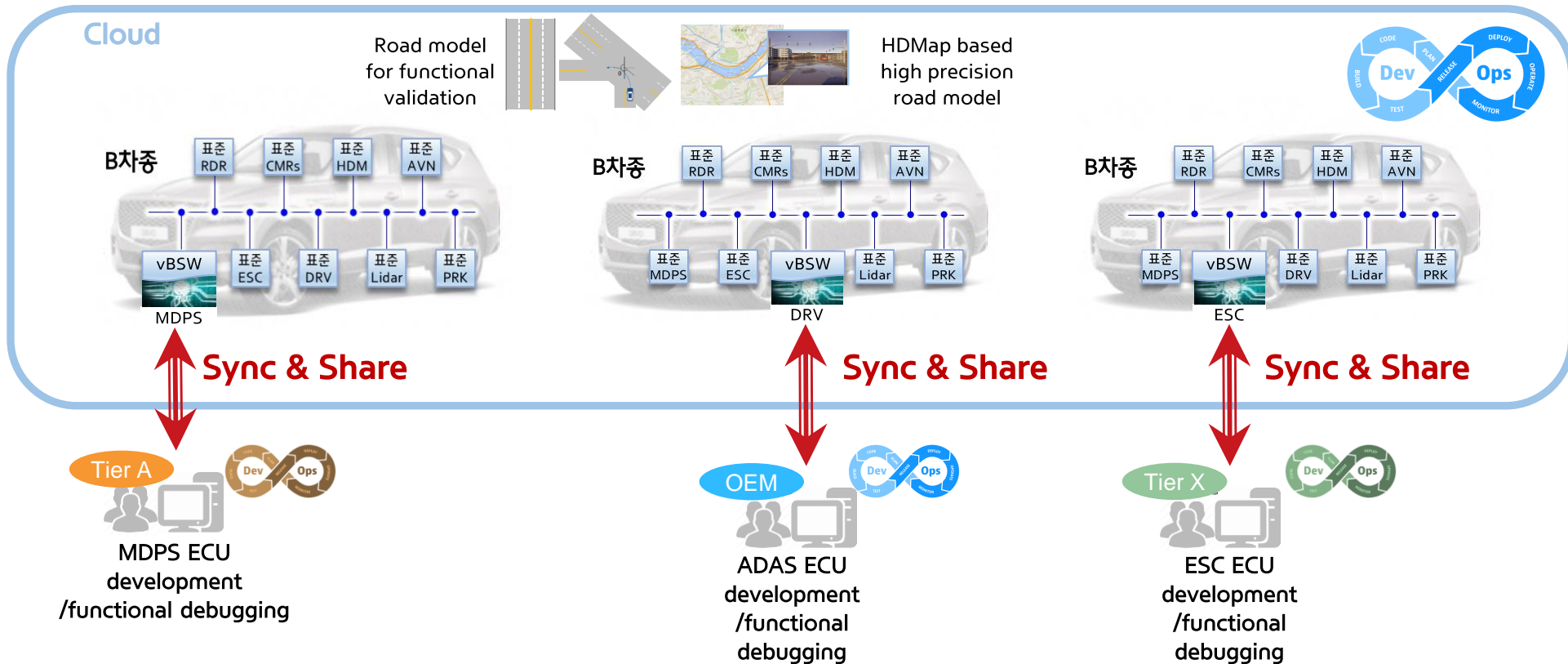
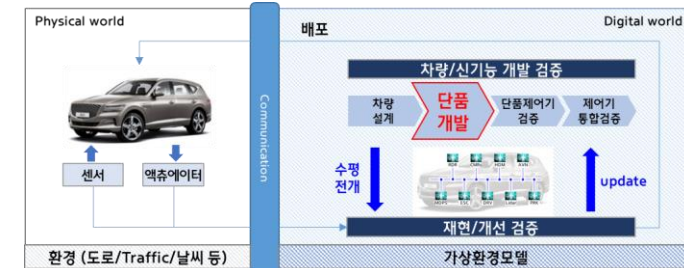
- Validation of development stage / field defects analysis and functional improvement in mass production stage
- Accelerate in a cloud environment and shorten validation time and improve quality with parallel testing
- The stability and quality of the vehicle electronic control system and autonomous driving logic are secured through the Validation of numerous driving conditions



Target Platform for SDV of HAE

Stage of Unit ECU Dev.

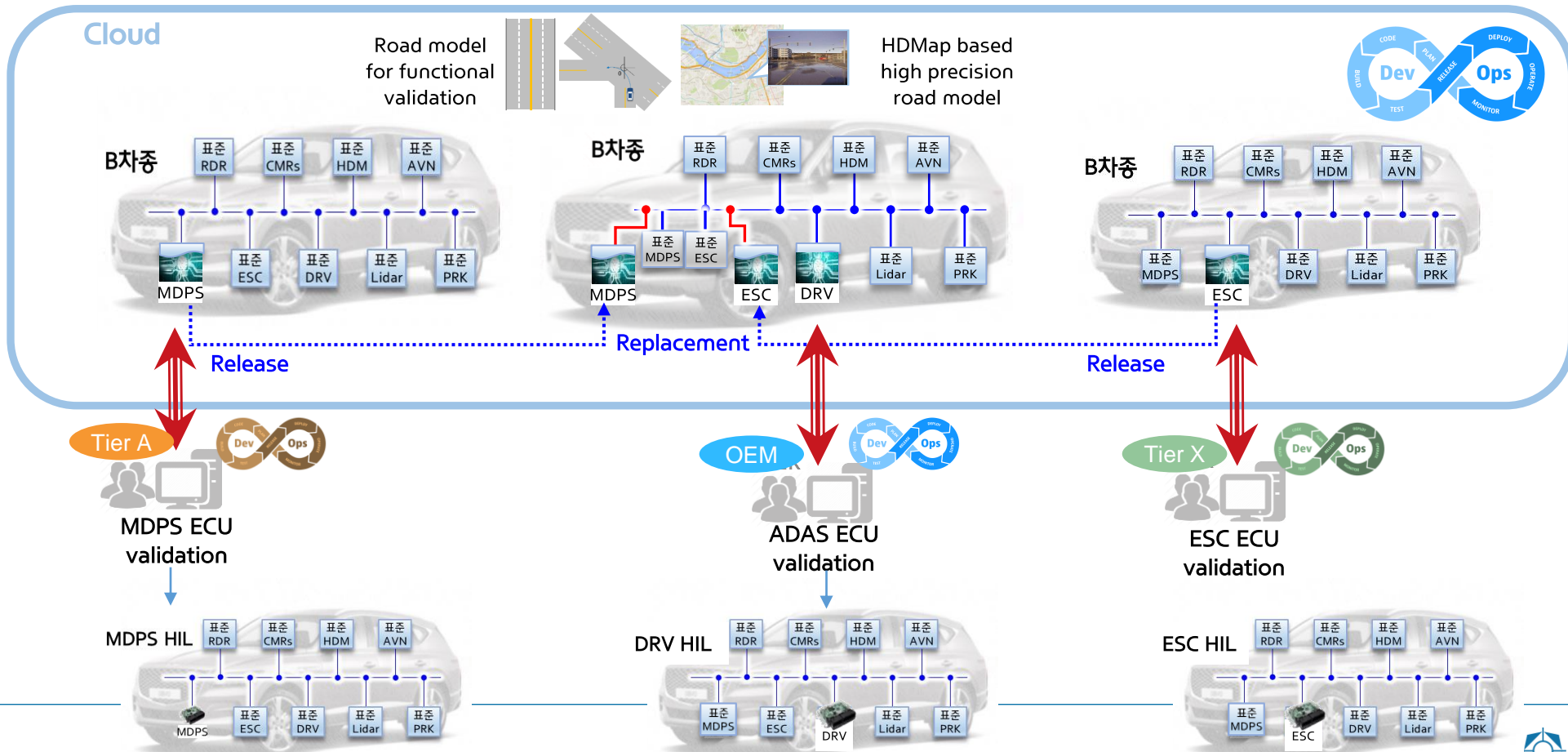
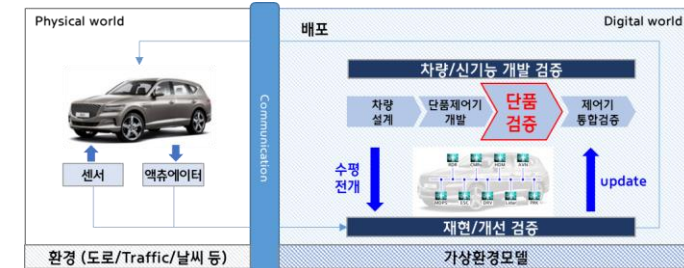
- Dev. ECU by using vECU Solution in the VVP
- Cooperating control debugging using standard ECU of Virtual Vehicle



Target Platform for SDV of HAE

Stage of Unit ECU Val.

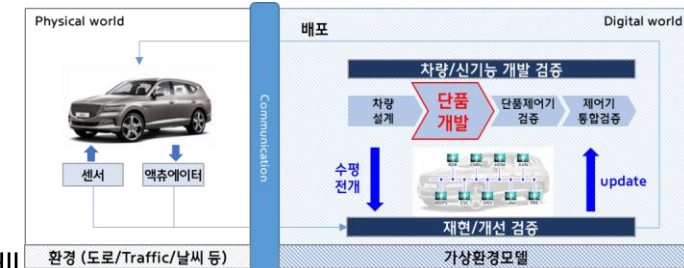
- After unit ECU validation, each vECU released to Integrated validation Env.
- Replacement standard vECU to specified vECU
- Sharing simulation data (vehicle/environment/system model) between Virtual validation Platform and HIL



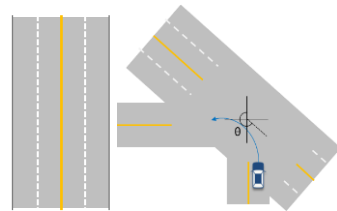
Target Platform for SDV of HAE

Stage of Unit Integ. Val.

- After integrating the released individual ECU, ECU integrated validation for each vehicle type
- Final step of development Integrated validated virtual vehicle is also used in mass production
- Sharing validation factors(vehicle/environment/system model) between VVP and HIL



Cloud

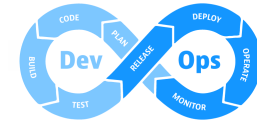
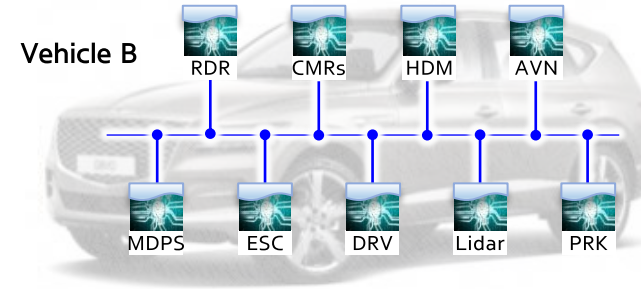


Road for individual function validation



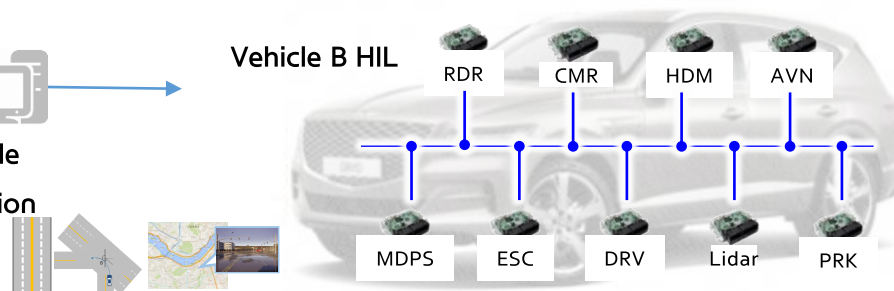
Map based high precision road (Sensor stress validation possible)

Vehicle B



Vehicle validation

Vehicle B HIL



Role of HAE

Solution Provider

Tool & Data Provider

V Studio
for vECU Generation

S Studio
for co-Simulation and
Data Bridge

X Studio
for Test Automation

H-Map
for building
simulation Env.

Solution Integrator

Heterogeneous Solutions

Seamless / Continuity
Homogeneous Way

Platform Manager

Setup & Maintenance

of DevOps Env.

Position of HAE

Unique ASAM Member in HMG

Hyundai AutoEver Corp.

Tool Vendor / Service Provider

As a mobility tech leader, Hyundai Autoever provides services and solutions for all specters of the mobility industry. The only SW-specialized company within Hyundai Motor Group, Hyundai Autoever provides automotive SW for mobility and enterprise IT services for the affiliates.

ASAM related products

mobilgene X Studio

TYPE	Application Program
FUNCTIONALITIES	mobilgene X Studio is a powerful automated testing tool for electronic control systems. It supports ASAM XIL interface and can be operated regardless of the equipment manufacturers. The test case developed by mobilgene X Studio can be used immediately to any equipment with mobilgene X Studio. Since mobilgene X Studio supports C#, a proven development computer language, it is easy to develop test cases and can be extended to various testing platforms desired by the user.
SUPPORTED ASAM STANDARDS	ASAM XIL , ASAM XIL-MA

Keywords

Automotive Electronics, R&D Company (Autonomous Driving, Electrification, Powertrain, Connectivity) E/E Architecture, Electronic Control Unit, Embedded Software, Classic AUTOSAR, Adaptive AUTOSAR, Automotive Semiconductor, Evaluation(MIL/SIL/HIL)

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Overview of ASAM Standard



Measurement & Calibration

Standards for working with ECU variables and parameters. This includes read-write access to the data in ECU memory, meta-description of the data, storing the data in files and describing the Calibration process.

ARTI	CDF	CMP	CPX	HMS	MCD-1 CCP
MCD-1 POD	MCD-1 XCP	MCD-2 CERP			
MCD-2 MC	MDF				



Diagnostics

Standards for describing and testing the diagnostic subsystems of devices.

MCD-2 D	MCD-3 D	SOVD
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ECU Networks

Standards for describing and testing ECU networks.

MCD-2 NET



Software Development

Standards supporting the ECU software development and the development of functional safety features. This includes the formal description and documentation of ECU software, the description of change requests, block sets for model-based engineering and a notation to visually express the relationship between safety design and system architecture.

CC	FSX	ISSUE	LXF	MBFS	MDX	SCDL
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Test Automation

Standards for working with test systems. This includes APIs for programmatic access to sensor and actuator devices, Measurement and Calibration systems, HIL systems, DoE systems and formats for test descriptions.

ACI	ASAP 3	ATX	GDI	iLinkRT	MCD-3 MC
OTX Extensions	XIL	XIL-MA			



Data Management & Analysis

Standards for storing, retrieving and analyzing mass data captured during Simulation, testing, production and the operation of vehicles.

CEA ODS



Simulation

Standards in the domain Simulation (aka ASAM OpenX® standards) aim to provide a complete set of standards for Simulation-based testing of automated driving functions. They cover a wide range of use cases for virtual development, including hybrid testing approaches that combine virtual and physical components.

OpenCRG	OpenDRIVE	OpenLABEL	OpenODD
OpenSCENARIO	OSI		

Role of HAE

Standard Initiator

Tool & Data Provider

V Studio
for vECU Generation

Standard for v ECU
FMI + Communication network simulation api (CAN / LIN / Eth.)

S Studio
for co-Simulation and
Data Bridge

Standard for v-Vehicle
ASAM OSI + a
Sensor – ECU – Actuator – Comm. + Vehicle dynamics

X Studio
for Test Automation

Standard for Test Automation
ASAM XIL / XIL-MA + non-Standard Feature

Other Session

H-Map
for building
simulation Env.

Standard for v-Environment
Specified ASAM OpenDrive / Open CRG

Role of HAE

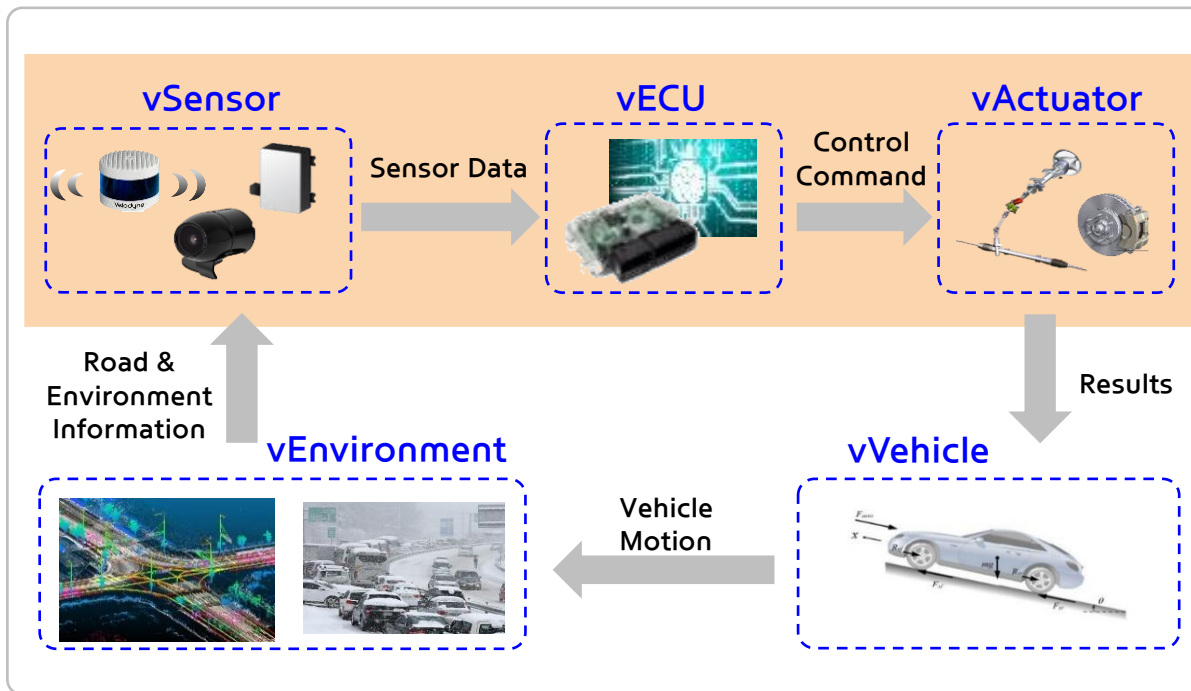
Standard Initiator

Standard for v-Vehicle

Standard included ASAM OSI

ASAM OSI (Open Simulation Interface) provides easy and straightforward compatibility between automated driving functions and the variety of driving simulation frameworks available. It allows users to connect any


→ Added interface of vECU / vActuator / vSensor (non-ADAS/AD)

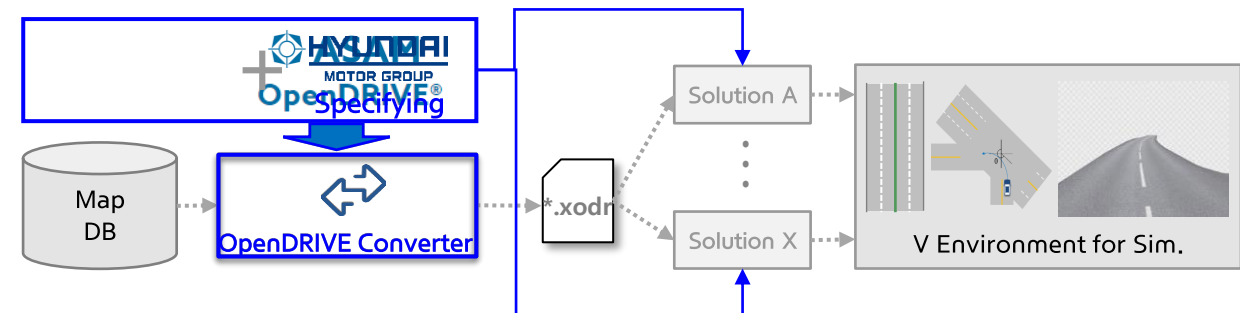


Standard for v-Environment

Specified Standard based on ASAM Opendrive

- Hierarchy & Structure is defined in ASAM Standard
- Various expressions to subscribe information
 - Detailed Specifying

Unit	Solution A	Solution B
 Expression	<pre>... id="Traffic_Sign" name="Sign_50" contry="KR" type="2" subtype="224" value="5.00e+01" unit="km/h" height="0.6" width="0.6" ...</pre>	<pre>... id="SpeedLimit" name="Limit50" contry="KR" type="1" subtype="10" value="50" unit="km/h" height="0.8" width="0.8" ...</pre>



Thank you for your attention



Successful Partner
for SDV Platform

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