Cloud Computing –
A Key Component of ADAS/AD Validation
Janek Jochheim, Munich, November 20, 2019
Benefits

**Elastic computation power**
- SiL tests will play a major role in AD validation
- Cloud computing addresses the volatile test capacity needs

**Large scale data storage**
- Massive data (>100PB) is needed as basis for data-driven development

**Collaboration**
- Efficient development by central management of data and software environments

![Diagram of collaboration and data processes]
AD development process

Series vehicles

SOP

Homologation

Results

Test drives

Data Replay

Raw Data

Algorithm

NN Training

Annotated Data

Scenario generation

Closed Loop Simulation

Scenarios

Data enrichment
AD development process

Series vehicles

SOP

Process Consulting

Data Logging (Autera)

Test drives

Data Replay Systems (SiL/HiL)

Data Replay

Raw Data

Algorithm

NN Training

Annotated Data

VEOS SCALEXIO ASM

Scenario Generation from Measurement Data

Results

Closed Loop Simulation

Scenarios
The Goal

To provide an end to end solution for AD simulation and validation with cloud computing a core component.
Software solutions of UAI

understand.ai

Cloud-native solutions for data enrichment
Enabling simulation in the cloud

- **Environment simulation**
  - ASM
  - VEOS
  - Docker

- **Sensor Simulation**
  - Camera module
  - Radar module
  - Lidar module
  - SensorSim
  - Docker

- **ESI Unit**

- **SUT**
  - AD Stack

**ESI** – Environment Sensor Interface; **SUT** – System under Test
Scenario based Testing - Scalable cloud simulation

- Automatically execute thousands of simulations
- Identify critical situations and corner cases
- Operation via web interface
Fleet Management - Efficient overview and control of test vehicles

- Access test vehicle information from anywhere
- Quick status information about vehicle fleet
- Next step: Centralized over-the-air update
Solution provider for the complete development process

- Series vehicles
- Process Consulting
- SOP

Fleet Management
OTA Updates
Data Logging (Autera)

Data Replay Systems
(SiL/HiL)

Scenario based Testing
VEOS
SCALEXIO
ASM

Test driven
NN Training
Process Consulting

Results

Annotated Data

Scenario Generation from Measurement Data
Cloud software services

- Software as a Service – Always available and ready to use
- Pay per use – Only pay for actual usage
Conclusion

Your partner in simulation and validation

Data Driven Development

Scenario based Testing

Fleet Management

Cloud Service Provider

Established automotive supplier

Hardware/Software products

Expert knowledge in simulation

Flexible payment models
With us, autonomous driving gets more drive.
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