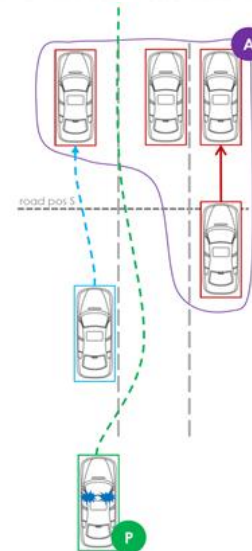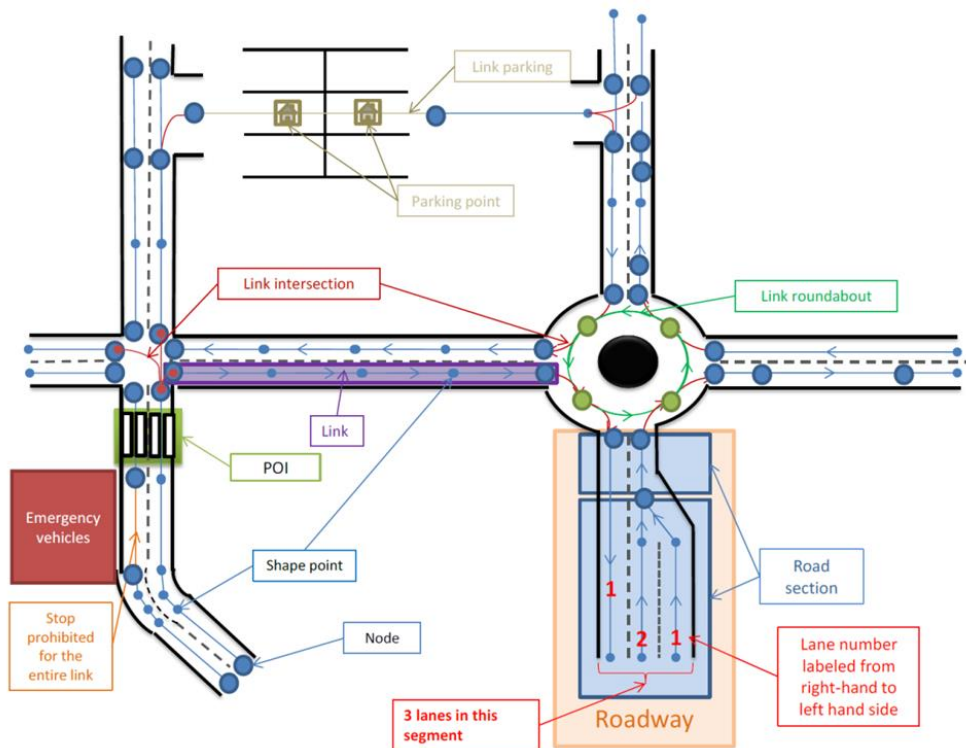# Ideation for Telematics, Highly Automated Driving …
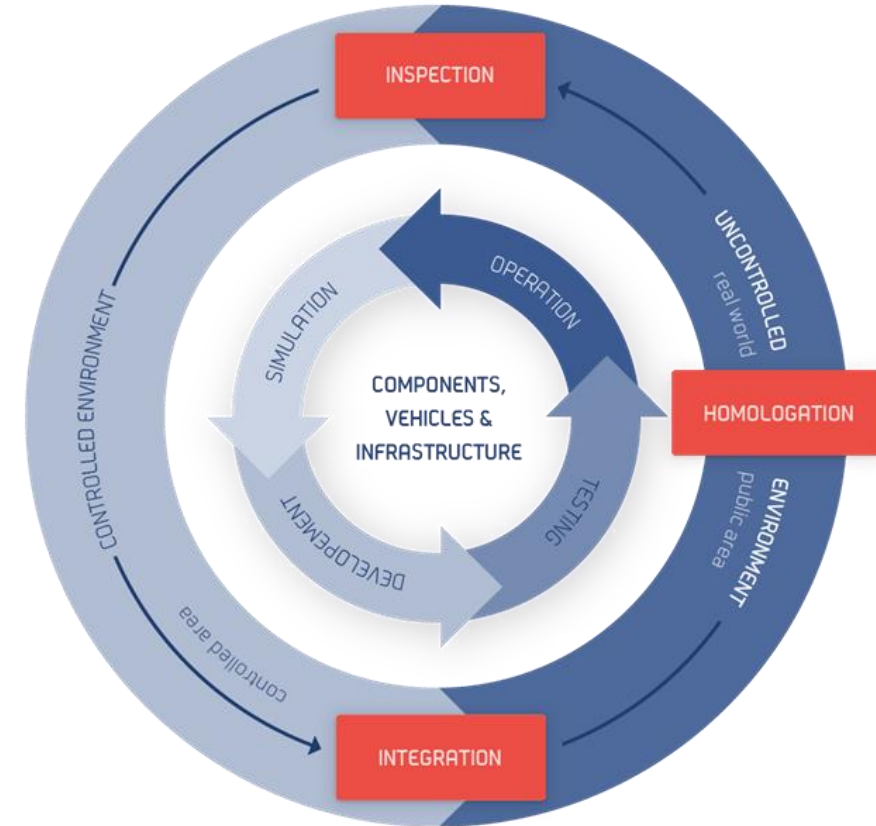
Armin Rupalla

ASAM

ADAS development and function certification

Cost reduction by interoperability and compatibility

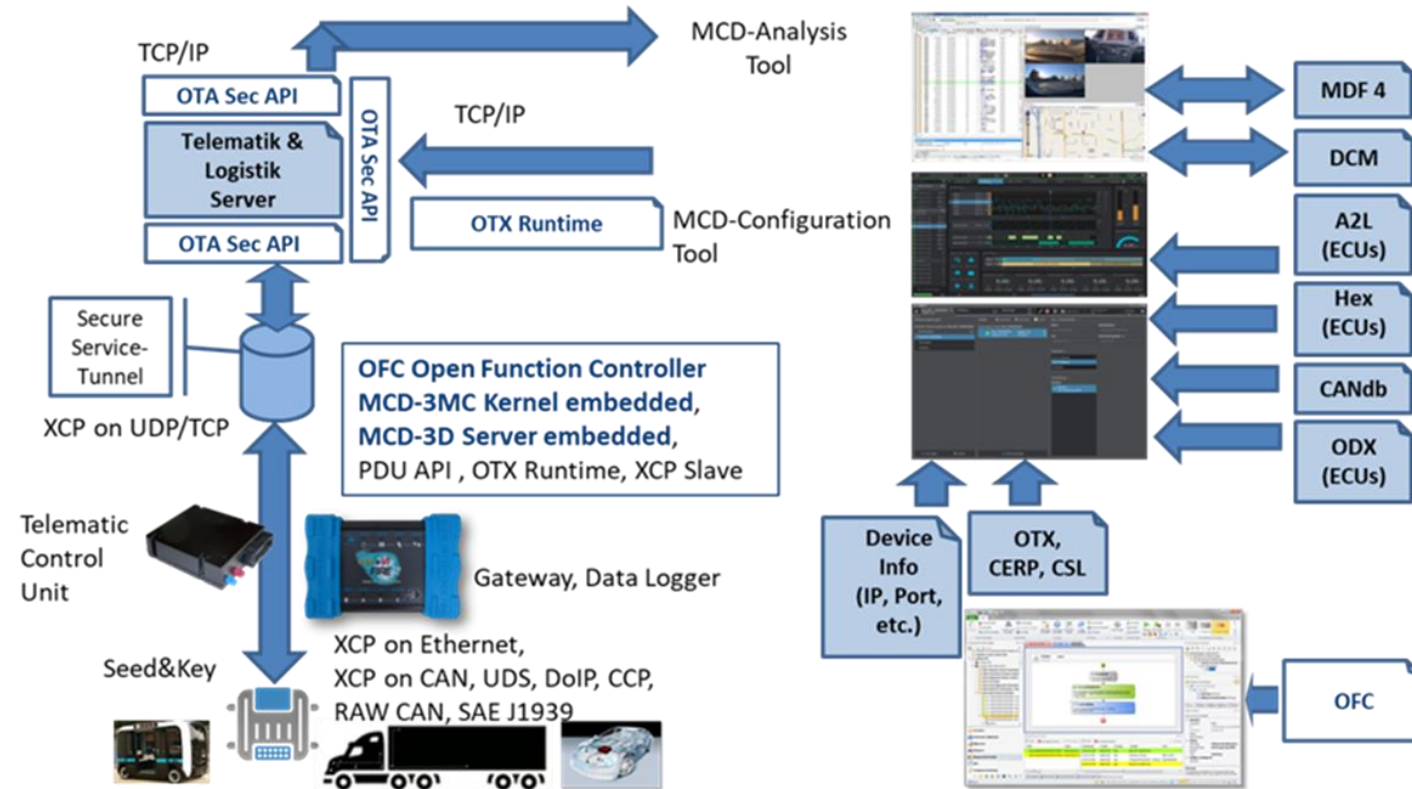**5 million maneuvers and 150 million miles driven for certification**

ASAM Telematics Reference architecture

Interoperability and compatibility - based on standardization

**Technical Requirements for Telematics Components:**
- Small footprint on embedded devices = OTX MC+D runtime format, ODX runtime format
- Low data transfer rates = on board preprocessing with MVCI server embedded, MC kernel embedded
- Domain specific access = OTX Open Function Controller
- Security (Authentication, Authorization, Encryption) = OTA API

ODX methodology

Consequences

ODX Runtime clears the ODX file and reduces data volume for a specific vehicle or ECU:
- Remote diagnostics access specific vehicles or ECUs because of authorization and authentication processes identify the vehicle and the build in components
- The embedded systems require the smallest footprint possible for the embedded tester
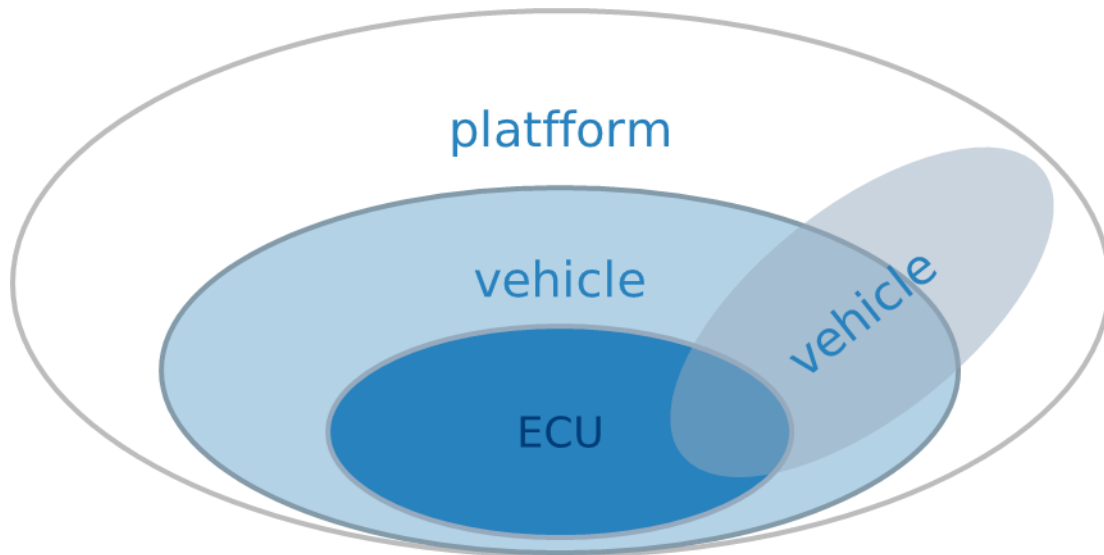
Data format	Files	Volume
Platform-PDX (all vehicle variants)	>500	> 1000 MB
Specific Vehicle (runtime format)		0,5-5 MB

ODX containers carry unused data which have no relevance for the specific vehicle or ECU:
- Due to enrichment and disinheritance
- Because of providing general calculation information and tables in ECU-SHARED-DATA

ASAM ODX Runtime format proposal

Advantages

ODX Runtime clears the ODX file and reduces data volume for a specific vehicle or ECU:
- Remote diagnostics access specific vehicles or ECUs because of authorization and authentication processes
- ODX runtime should be transformed automatically out of the original ODX file

Data format	Files	Volume
Platform-PDX (all vehicle variants)	>500	> 1000 MB
Specific Vehicle (runtime format)		0,5-5 MB

Telematic Scenario
ODX, OTX and MVCI on Limited Resources
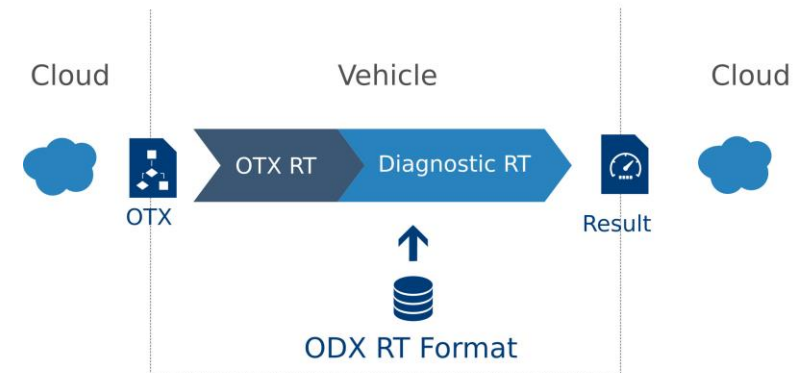
ODX Runtime Format at a Glance....

Exchangable
- Current situation: Every MVCI vendor has its own runtime format.
- The OTX runtime format will guarantee a standardized format and a comparable performance
- No new ODX standard: ODX runtime format is generated out of ASAM ODX

Small & Reducable
- Current situation: Even non embedded ODX processing exceeds modern memory resources
- Aspects not needed for runtime can be skipped (e.g.SDGs, inheritance etc.)
- ODX can be reduced due to use-case specific requirements (e.g. if one service for one ecu is needed)

Well Structured
- Current situation: ODX is stored in a hierarchical linked XML structure.
- The runtime structure is better represented by a linked graph.
- ODX Links, name referenced are resolved by precalculating edges between graph nodes

Binary Format
- Current situation: The linked XML based format does not perform well on reading.
- The ODX runtime format should be a read optimized binary format with a small IO and memory footprint.
- Small sized, IO optimized format fits well into embedded and mobile scenarios

ASAM ODX Runtime format proposal
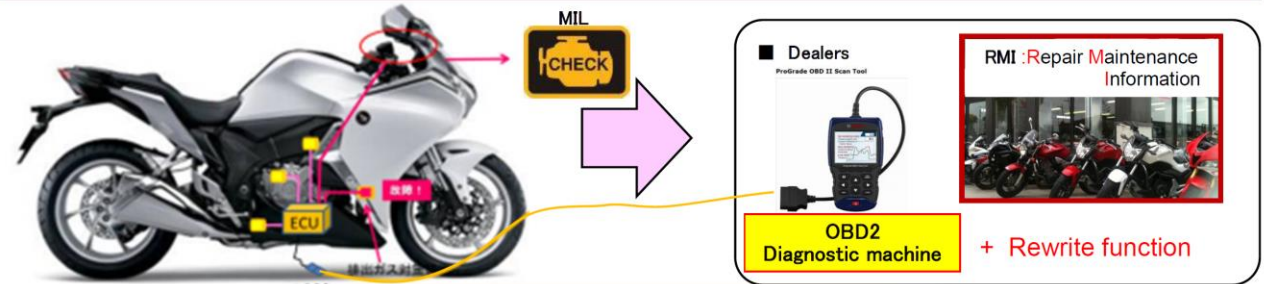
Additional Application
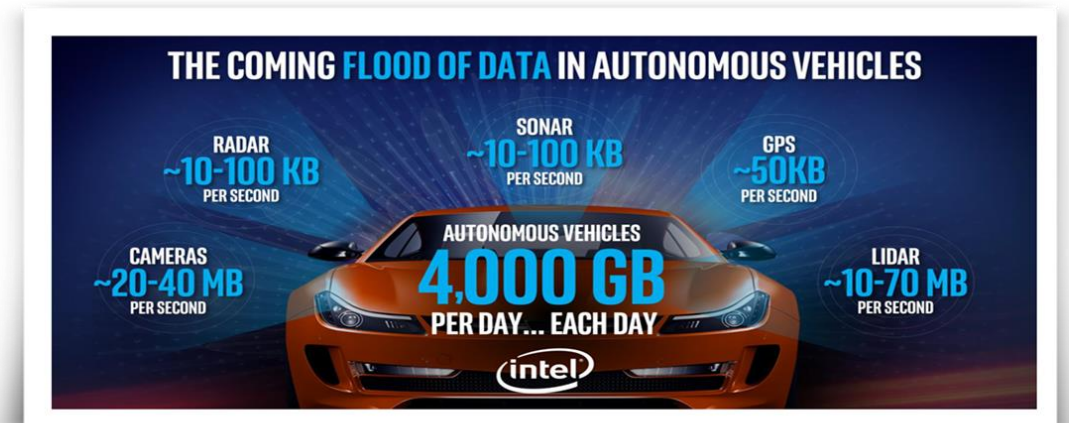
The majority of motorcycles are in-use in Asia
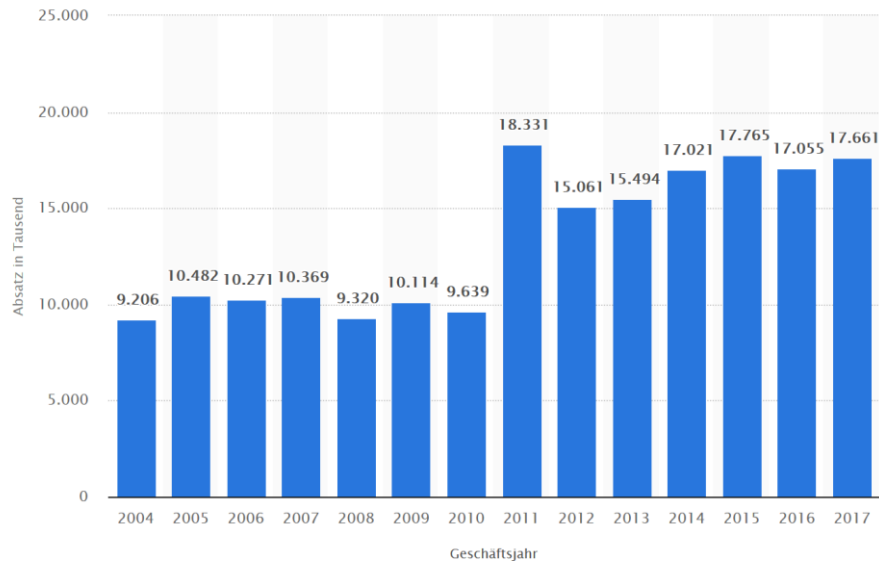
ASAM MCD-3MC embedded kernel proposal

Use-Case, Technical Aspects and Benefits

1 Mio. autonomous vehicles generate around 1 Zetabyte data volume in one year
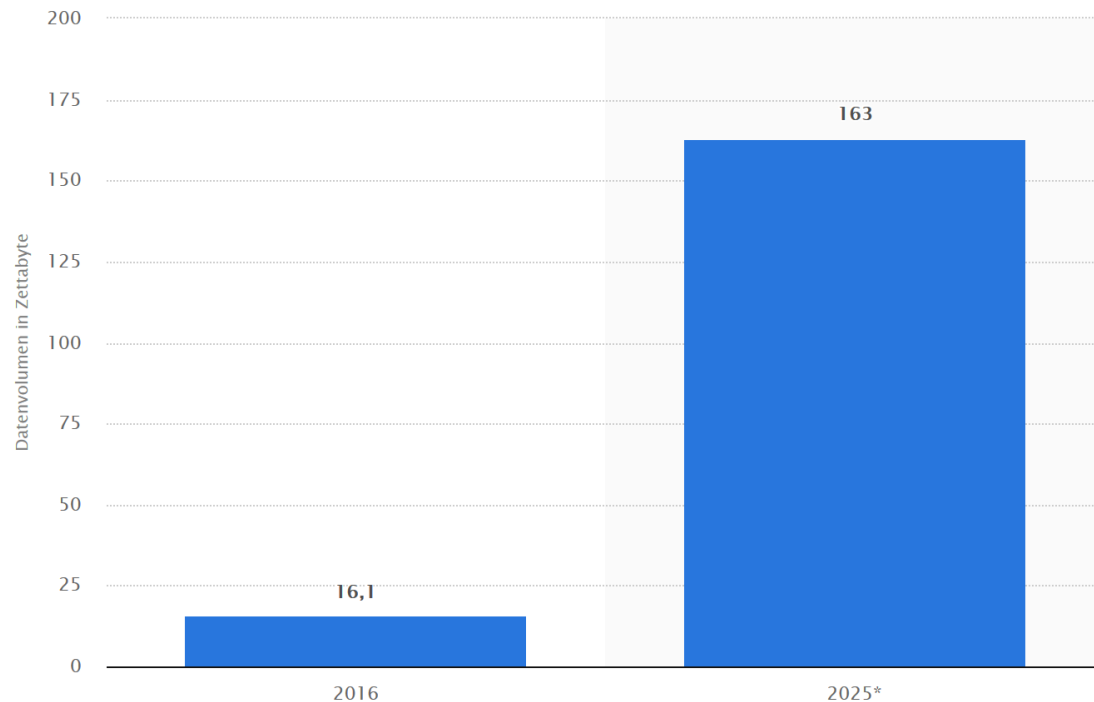
ASAM MCD-3MC embedded kernel proposal

Use-Case, Technical Aspects and Benefits

Use-Case:
- Telematics Testing, Measurement and Calibration application On-Board need small footprints on any embedded platforms.
- To get secure and reliable processes test specification should be deployed on any (standard) platform.
- New sensors shift the demands from remote diagnostics to remote measurement and calibration

Technical Environment:
- OTX Testing and Calibration Expert Rules and Programming (CERP) is not available for telematics applications on embedded systems like data logger.
- To access the on a MC kernel is specified over MCD3-MC API. Any object hierarchy accessed by Java or COM does not have the performance for future embedded requirements (measuring grid <1µs).
- To provide functions like configuration (A2L and Hex-file based), triggering, recording, selection and calibration on embedded systems (i.e. Linux) requires an embedded MC kernel.

Benefits:
- Secure and reliable test processes.
- Efficiency increase by using one time written test sequences multiple on any device.
- Reducing data volumes at real driving validation because of On-Board preprocessing (selection of events and data)

ASAM

OTX openX extensions
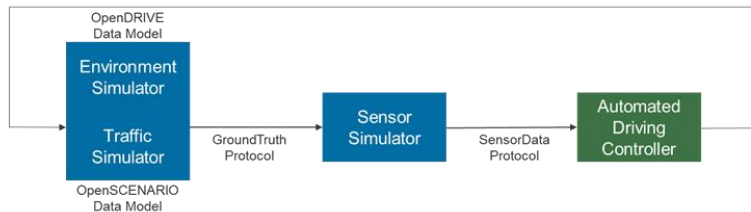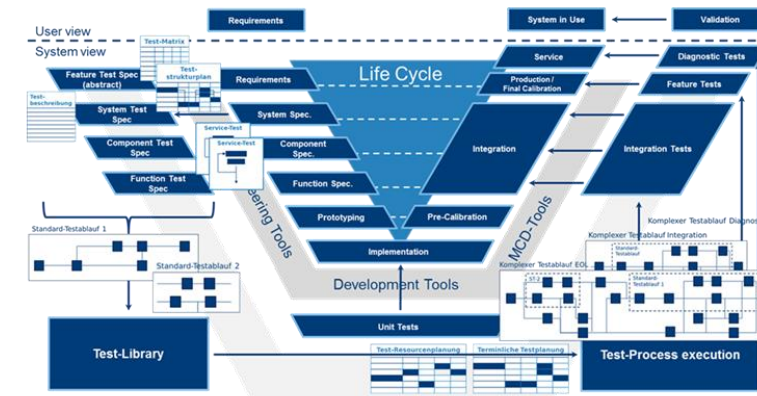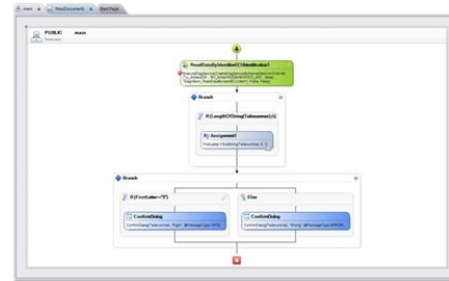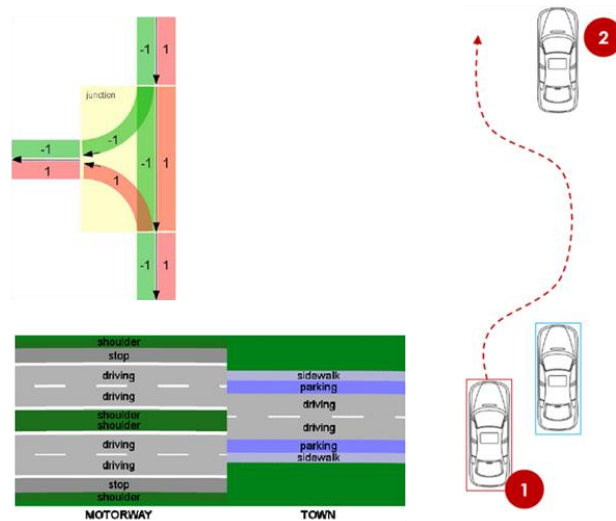
Use-Case

Open-Drive/-Scenario/-SimulationInterface   OTX-Authoring   OTX-runtime   Test Library

OTX based ADAS testing over the life cycle:
- OTX based portable description of ADAS-test sequences
- Certified „open" test library accessible for all ADAS shareholders

ASAM

ASAM OTX simulation extensions proposal

Use-Case, Technical Aspects and Benefits

Use-Case:
OTX based description of ADAS-specific test sequences
- reusable in the total life cycle of the vehicle
- deployable on different platforms
- automated selective recording of real driving data

Technical Environment:
- binding/interfacing of environment data (i.e. OpenDRIVE)
- binding/interfacing of single manoevers and conistent/persistent combinations of manoevers (z.B. OpenSCENARIO)
- Integration of other „Automotive Electronics" standards in multi platform loadable ADAS function tests

Benefits:
- Secure and reliable test processes.
- Efficiency increase by using one time written test sequences multiple at any phase.
- Cost reductions by reusing test sequences over the whole life-cycle of ADAS testing by any shareholder.
- Setup of a public library of certified ADAS test sequences.

◇ ASAM

ASAM Open Function Controller (OFC) proposal

Use-Case, Technical Aspects and Benefits

Use-Case:

Open Function Controller (OFC) standardizations extends OTX ISO 13209 with a formal notation for the descriptions of test functions.

These metadata support a semantic search on test libraries and the classification for test sequences. Both features are needed/used in professional test library administration.

Technical Environment:

The data model should consist out of

- hierarchical classification of functions (Project, Package, TestSuite, TestCase, Action, TestStep)
- detailed description of administrational testing data (Version, AdminData, CompanyData etc.)
- role based authoring process (i.e. specification and realization phase)
- records of meta data
- representation of the library concept in testing
- Representation of pre and post conditions and expected values
- Variables handling between test steps

Benefits:

- Secure and reliable test processes.
- Efficiency increase by using one time written test sequences multiple at any phase
- Cost reductions by reusing test sequences over the whole life-cycle of testing by any shareholder.
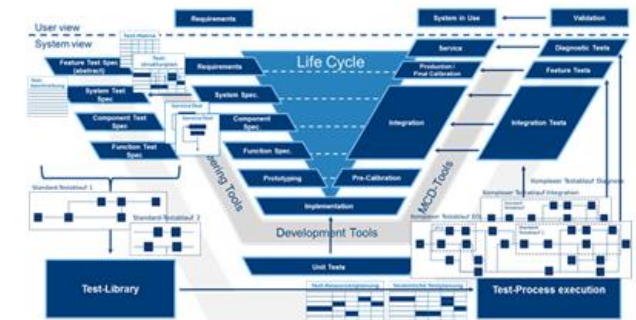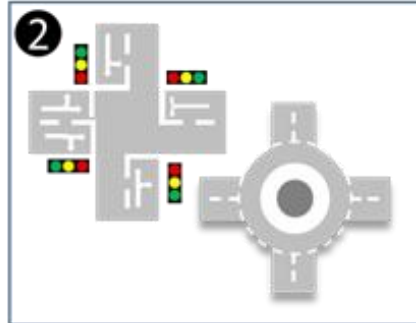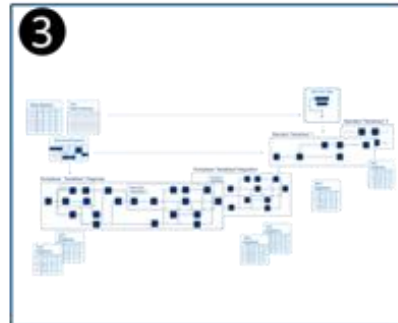
ASAM ADAS R&D applications
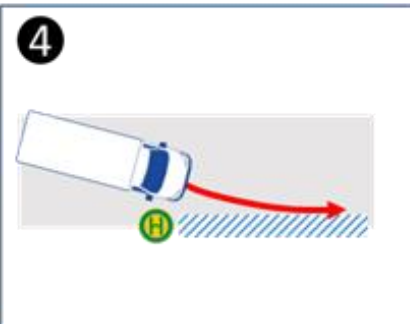
ASAM as an associated research partner

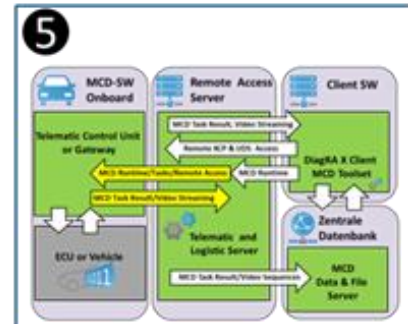**①** Setup and operation of different test fields in urban environment (Karlsruhe, Lyon)

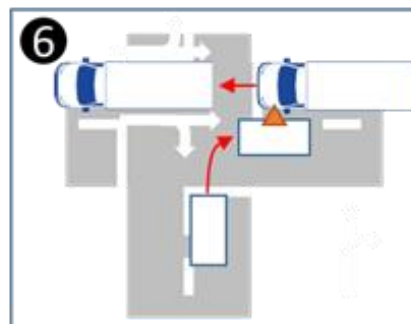**②** Assembly of different situation spezific traffic segments inside the test fields

③ Conceptualization and prototypical implementation of process secure and efficient methods of testing

④ Autonomous test drive in in different complex traffic and driving scenarios

⑤ Central recording of driving data out of testing and driving

⑥ Analytics of different complex real data of traffic and driving scenarios

Selection/reduction of ADAS data recording (6) (only unsecure driving status/situation/scenario):

- Distance to next obstacle or vehicle in front smaller than estimated braking distance
- Taking over, crossing passing, right of way,..
- Intervention of the operator
- Extreme maneuvers
- Close to an accident (stop close to obstacle or passing distance very close)

ASAM Ideation Process

Evaluation of market relevance

Please mail to Mr. Armin Rupalla one sentence if you interested in any of our new ideas!

armin.rupalla@asam.net

"We (any OEM or 1-tier) see in the standardization proposal X an interesting technical proposal. This standardization covers for our engineering tasks relevant use-cases. Establishing such a standard could increase the efficiency of our engineering process. We would recommend ASAM to set up a proposal workshop for initiating the standardization in subject area X."

◈ ASAM

ASAM Ideation Process

Evaluation of market relevance

Most important!

General Assembly + Technical Seminar
ASAM celebrating its 20th birthday!

DATE   June 13, 2018 - June 14, 2018

LOCATION   Höhenkirchen, Germany

ASAM is turning 20! To celebrate this event, ASAM will organize a Technical Seminar around the General Assembly that is open for members and non-members alike. Join us for interesting discussions and innovative solutions.

MORE INFORMATION

◈ ASAM