

SCENARIO FORMATS



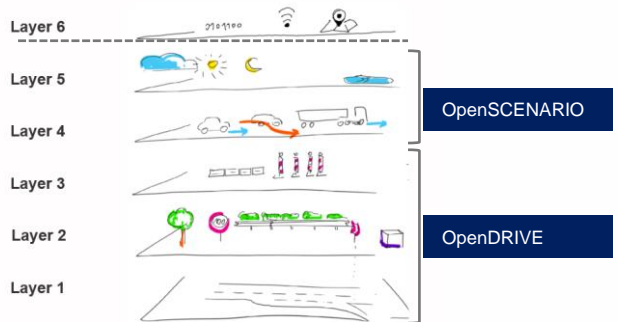
PEGASUS Method for Assessment of HIGHLY Automated Driving Functions

➔ The objective of PEGASUS Testing was to develop the PEGASUS method regarding completeness, correctness and consistency.

Standardized Formats and Interfaces are used in many cases in the PEGASUS method. This concerns in particular the exchange of scenario descriptions, which are exchanged between database and simulation or proving ground as well as simulation and proving ground.

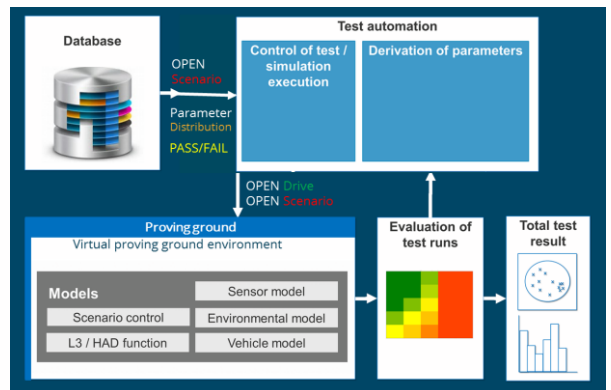


➔ The Use of OpenDRIVE and OpenSCENARIO in the scenario model



➔ PEGASUS enables the connection to existing proven tools / test instances. Motivation:

- Using a common architecture for a toolchain for safeguarding makes it easier to execute test cases.
- Standardized interfaces between and within the tools / test instances make it possible to exchange tools or modules within the proven tool chains.



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OpenSCENARIO, an open file format for the description of dynamic contents in driving simulation applications.

➔ OpenSCENARIO describes the **time-variant behavior** of entities in automotive simulations.

The basic concept is ➔ **triggering Actions by Conditions.**

➔ With a **large range of Actions and Conditions,** OpenSCENARIO allows describing very complex traffic situations.

➔ OpenSCENARIO is **tool independent and XML based.**

```

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```

Description of a cut-in maneuver on a highway entry in OpenSCENARIO



➔ OpenSCENARIO describes the dynamic content, the static content is referenced as an **OpenDRIVE** road network, optionally combined with an **OpenCRG** road surface description.

➔ OpenSCENARIO, OpenDRIVE and OpenCRG have been **transferred to ASAM**, an international standardization organization

OpenDRIVE as base layer



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Parameter Variation as a main requirement → making scenarios “logical”

➔ OpenSCENARIO provides a built-in **parameter variation** mechanism

```
<ParameterDeclaration>
  <Parameter name="$laneChangeDelay" type="double" value="0.0"/>
</ParameterDeclaration>
<Catalogs>
<RoadNetwork>
<Entities>
<Storyboard>
  <Init>
    <Story name="New Story" owner="">
      <Act name="New Act 6">
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                <Action name="New Action 1">
                  <StartConditions>
                    <ConditionGroup>
                      <Condition name="Start Condition of Event 6" delay="$laneChangeDelay" edge="rising">
```

Virtual Test Drive



Parameterized cut-in maneuver, using OpenSCENARIO's ParameterDeclaration mechanism



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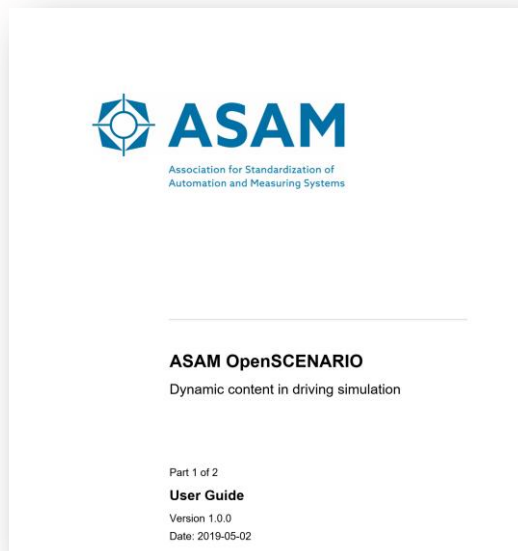


The OpenX standards are becoming “real” standards

➔ OpenDRIVE, OpenCRG and OpenSCENARIO are currently subject of ASAM Transfer projects.

➔ ASAM OpenSCENARIO 1.0.0 will be released in January 2020.

The goal of this transfer project is to create the first version of ASAM OpenSCENARIO on a quality- and completeness-level that is expected from a public standard and from ASAM members. This also includes work on a technical level to complete and enhance the currently existing specification documents, to clarify open issues and to fill specification gaps, which might be brought up by project group members during the project term.



Participating Companies

AUDI AG, AVL LIST GMBH, b-plus GmbH, BMW AG, DENSO Corporation, dSPACE GmbH, IRT SYSTEMX, Jaguar Land Rover, M&K Mess- und Kommunikationstechnik GmbH, MicroNova AG, RA Consulting GmbH, Robert Bosch GmbH, TraceTronic GmbH, Transport Systems Catapult, VIRES Simulationstechnologie GmbH, VOLVO Car Corporation, VTI - Swedish National Road and Transport Research Institute, Automotive Safety Technologies

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