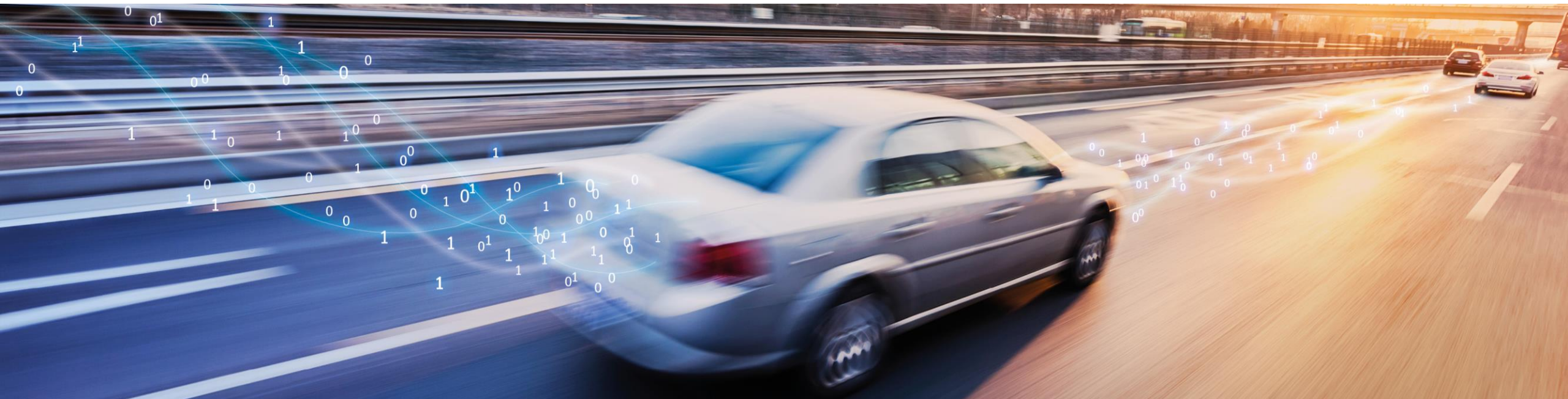


ASAM OpenSCENARIO 1.x Proposal

Current status of the standard

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30.06.2021
Munich



Agenda

- 1 Introduction to OpenSCENARIO**
- 2 New features in OpenSCENARIO v1.1.0**
- 3 Relation to other standards**
- 4 Backward compatibility**
- 5 Motivation for new project**

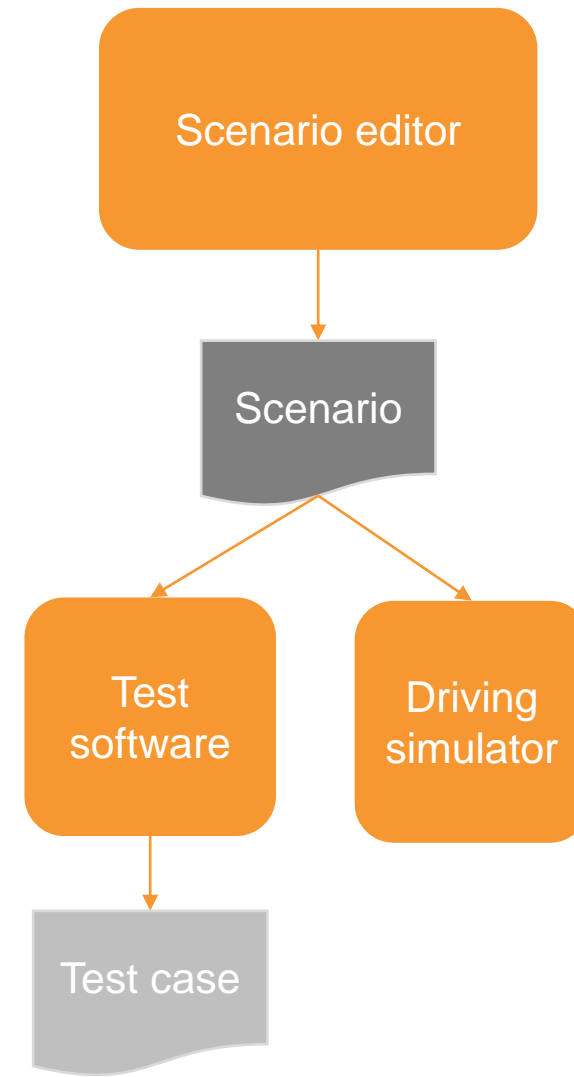
Introduction

OpenSCENARIO is used in driving simulation and in virtual development, test and validation of driving assistance, automated and autonomous driving functions.

Within these use cases, OpenSCENARIO describes the dynamic content of the world, i.e. the entities acting on or interacting with the road network. OpenSCENARIO does not describe the road network, road infrastructure, road surface or a complete test case. A scenario can be created with a scenario editor and serves as input for test software or driving simulators directly.

OpenSCENARIO was transferred to ASAM by an industry consortium in late 2018. It evolved to the ASAM standard OpenSCENARIO v1.0.0 within the ASAM “OpenSCENARIO Transfer” project, which was released in March 2020.

ASAM OpenSCENARIO v1.1.0 is the result of the direct follow-up project “OpenSCENARIO 1.x”, which was released in March 2021.



New features in OpenSCENARIO v1.1.0

Support for logical scenarios

- Parameter value distributions for scenario variation / automated generation of concrete scenarios
- Stochastic and deterministic distributions
- Single- and multi-parameter distributions

More flexible maneuver modelling

- Arithmetic calculations and logical expressions
- External object referencing in road network
- Trajectory coordinate system and positions
- Distance calculations in multiple coordinate systems

Compatibility to more road network formats

- Geographic coordinate system and positions

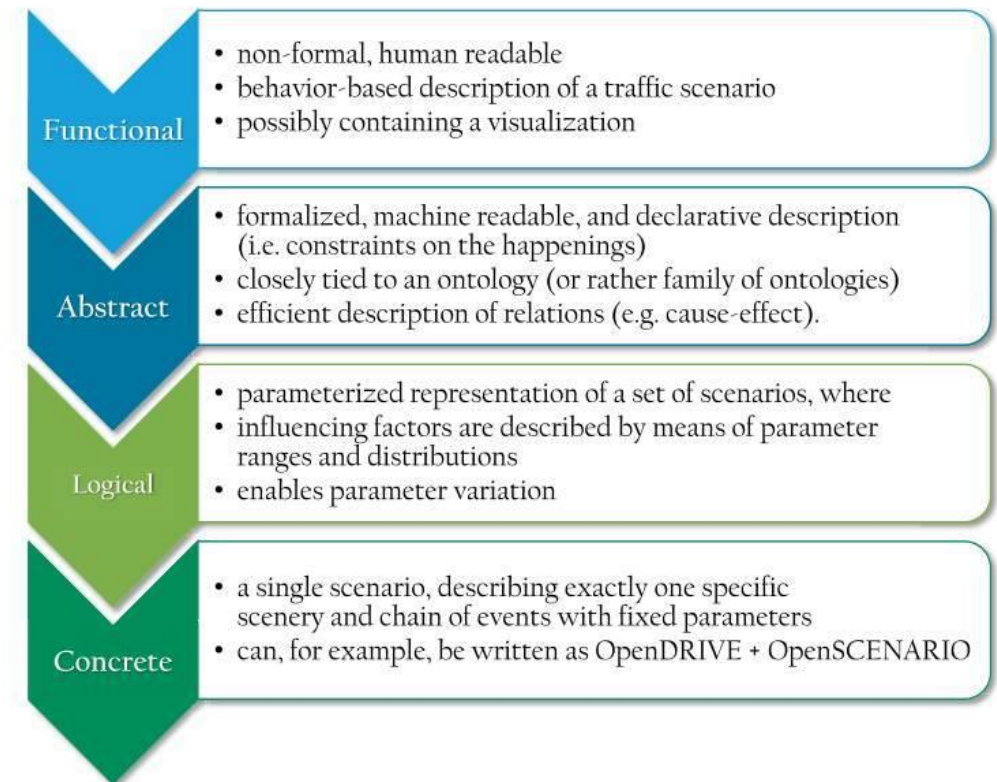


FIGURE 14. An overview of the different qualifications of scenario

Source: Publication of VVM project

Christian Neurohr, Lukas Westhofen, Martin Butz, Martin Bollmann, Ulrich Eberle, Roland Galbas: [Criticality Analysis for the Verification and Validation of Automated Vehicles](#). In: *IEEE Access*, doi: 10.1109/ACCESS.2021.3053159.

New features in OpenSCENARIO v1.1.0 (continued)

Improved overall test support

- Parameter value constraints (ranges) prevent misuse / misunderstanding of scenarios in test design
- Consistency with ASAM OSI (weather conditions)

Improved sensor test support

- 3D model referencing
- Precipitation

Improved controller test support

- Wind, atmospheric pressure, outside temperature (for external force on vehicle calculation)

Improved exchangeability of scenarios

- Licensing information can be included

Relation to other standards

Logical road network

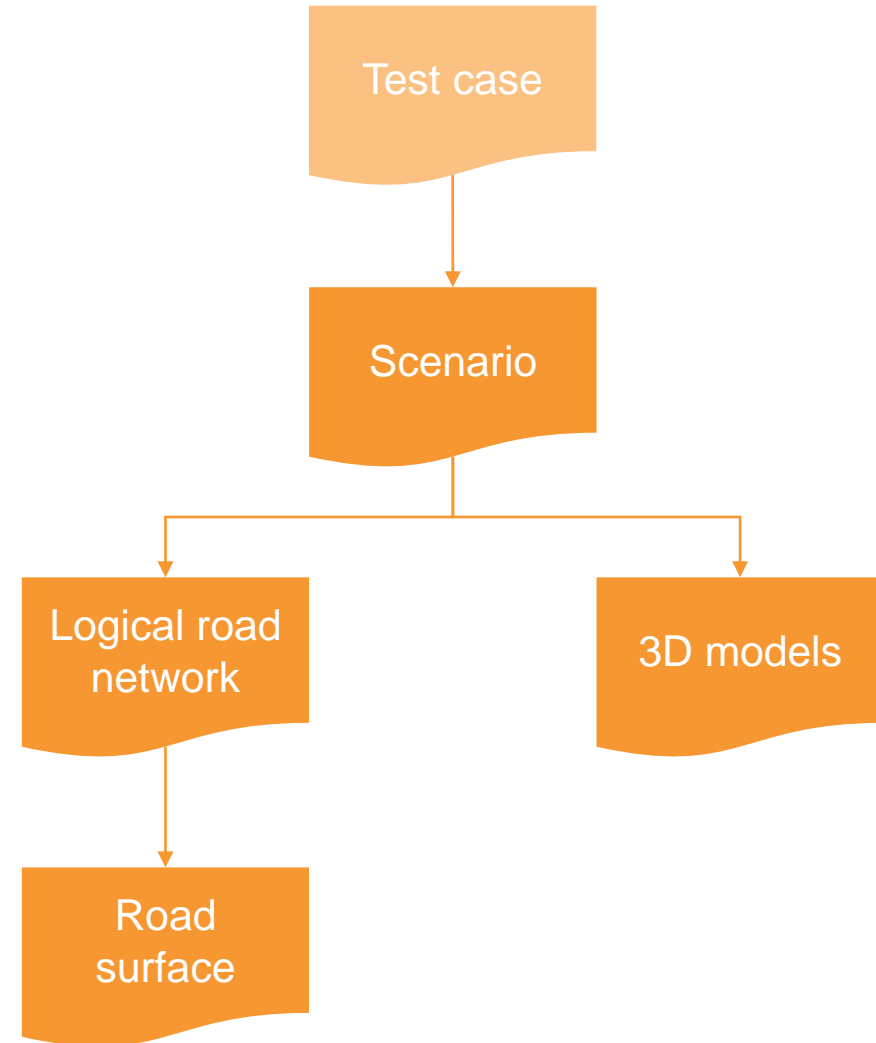
- ASAM OpenDRIVE
- HERE Navigation Data Standard (NDS)

Road surface (elevation and friction)

- ASAM OpenCRG

3D models of road, scenery and objects

- CityGML
- OpenSceneGraph
- glTF (Khronos Group)
- FBX (Autodesk)
- 3DS (Autodesk)



Backward compatibility

100% backward compatible to OpenSCENARIO v1.0.0

OpenSCENARIO v1.0.0 scenarios are still valid in the OpenSCENARIO v1.1.0 schema

Deprecation mechanism introduced

Schema without deprecated elements provided for upgrade

Motivation for new project

Many driving simulator, test software and scenario editor vendors made their tools compatible to the ASAM OpenSCENARIO v1.0.0 standard and are pursuing or already achieved compatibility with v1.1.0

The new project will serve to address the unclarities, errors and feature wishes by implementers. Examples are:

- Introduction of abstract scenarios for scenario space exploration
- Independence from / compatibility with road network formats for flexible usage
- Clarification of concepts such as distances, conditions TTC/THW for comparable execution of scenarios

Harmonization with the ASAM standard OSI the upcoming standards ASAM OpenODD, ASAM OpenXOntology and convergence with ASAM OpenSCENARIO 2.0 (in development) is also necessary