OpenSCENARIO

Standardisierung "auf hohem Niveau"

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Motivation

- **Fact:** De-facto standardization has been realized on lower levels

- **Result:** Road Files may be transferred between various simulation tools
Motivation – Current Situation

- ADAS functionality requires **extensive testing** in various environments
- **Feature sets** of various tools are highly different
- Each tool is well suited for its **specific purpose**
- **Migrating** scenarios from one tool to another one requires high effort
- Independent **3rd parties** (e.g. authorities) are not able to provide scenario definitions in a format compatible with multiple tools

- **Result:** Dynamic content may not yet be transferred in a standardized way and depends highly on the tools involved
Motivation

Assumption
All tools share a considerable fraction of common functionality

Conclusion
Description of dynamic content may be harmonized

OpenSCENARIO
bringing content to the road

A
B
C

Static Content
Dynamic Content
Scenario

Objection
Same dynamic content does not implicate identical results!
Objectives

- Provide transferable XML **scenario definition** for various use cases
- Use **OpenDRIVE / OpenCRG** as basic layers
- Allow for independent content provision by 3\textsuperscript{rd} parties
- Provide standardized / open **tool-sets** for validation of scenario definitions
- Establish **support** services
OpenSCENARIO initiative

Definition Phase, Stage 1

Initial Team
- VIRES
- ASC(S)
- HLRS

Results
- Format Specification

Review

Requirements

Tool Suppliers and 3rd Parties
- Tool Suppliers (dSPACE, IAV, IPG etc.)
- OEMs (Audi, BMW, Volkswagen etc.)
- Research (DLR, fka, FKFS etc.)
- Tier1 (tbd.)

Associated Partners
- Daimler
- Opel
- Porsche
OpenSCENARIO initiative

**Definition Phase, Stage 2**

**Results**
- Support/Website
- Test Tools
- Validation Tools
- Format Specification

**Core Team**
- VIRES
- Member B
- Member E
- ASC(S)
- Member C
- Member F
- Member A
- Member D
- Member G

**Requirements**

**Partners and Users**
- Tool Suppliers (dSPACE, IAV, IPG etc.)
- Assoc. Partners (Daimler, Opel, Porsche)
- OEMs (Audi, BMW, Volkswagen etc.)
- Tier 1 (tbd.)
- Research (DLR, fka, FKFS, HLRS etc.)
- 3rd parties (e.g. authorities)
OpenSCENARIO initiative

**Maintenance Phase**

**Core Services**
- Support / Website
- Format Specification

**Core Team**
- VIRES
- Member B
- Member E
- ASC(S)
- Member C
- Member F
- Member A
- Member D
- Member G

**Repositories**
- Test Tools
- Validation Tools
- Test Data

**Requirements**

**Partners and Users**
- Tool Suppliers (dSPACE, IAV, IPG etc.)
- Assoc. Partners (Daimler, Opel, Porsche)
- OEMs (Audi, BMW, Volkswagen etc.)
- Tier1 (tbd.)
- Research (DLR, fka, FKFS, HLRS etc.)
- 3rd parties (e.g. authorities)
OpenScenario DRAFT 1

Basic Layout (Mindmap)

- **Catalogs for Basic Elements**
  - `header`
  - `vehiclecatalog`
  - `drivercatalog`
  - `objectcatalog`
  - `observercatalog`
  - `pedestriancatalog`
  - `miscobjectcatalog`

- **Definition of Entities**
  - `roadNetwork`
  - `environment`
  - `entities`
  - `scenarioEnd`

- **Storyboard**
  - "actual scenario"

- **Reference to OpenDRIVE OpenCRG**

- **End Condition**
Vehicle Definition (Mindmap)

- header
  - name: string
  - refId: int
  - class: string
  - manufacturer: string
  - model: string
  - color: string
  - license plate: string

- OSCVehicle
  - dimensions
    - front
    - rear
    - (3-n)
  - axles
  - lighting
    - light (0..n)
  - eyepoints
    - eyepoint (1..n)
  - mirrors
    - mirror (0..n)
  - features
    - feature (0..n)
  - userData
  - include

- performance
  - aerodynamics
  - engine
  - cog

- gearbox
  - type: string

- maxSpeed: double
- maxDeceleration: double
- overallEfficiency: double

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Driver Definition (Mindmap)

- header
  - name (string)
  - refld (int)
  - obeyTrafficLights (bool)
  - obeyTrafficSigns (bool)
  - steeringDistance (double)
  - foresightDistance (double)
  - respondToTailgating (double)
  - urgeToOvertake (double)
  - useOfNindicator (double)
  - keepRightRule (double)
  - laneChangeDynamic (double)
  - speedKeeping (double)
  - laneKeeping (double)
  - distanceKeeping (double)
  - observeSpeedLimits (double)
  - curveSpeed (double)
  - desiredDeceleration (double)
  - desiredAcceleration (double)
  - desiredVelocity (double)

- OSCDriver

- driver

- include
- userData
Work Packages

Storyboard Definition (Mindmap)

OpenScenarioDRAFT_A

Maneuver by Actor (e.g. lane change)

Actor by Maneuver (e.g. traffic jam)
Maneuver Definition (Mindmap)
Summary

• OpenSCENARIO will serve as open file format for dynamic content
• validation tools and test data shall complement the format specification
• initial user requirements have been collected
• a first draft of the structure is under review
• a broad user base and a core-team shall contribute to the on-going development
• OpenSCENARIO is designed for becoming a de-facto standard
• Resources:
  • http://www.openscenario.org
  • mailto: openscenario@openscenario.org
  • http://tracking.vires.com (bug-/feature-tracking)
Thank you for your attention!

Questions?