# **ASAM** 2018 / 2019

**Dr. Klaus Estenfeld** Managing Director ASAM e.V.

June 27, 2019 Tokyo





Association for Standardization of Automation and Measuring Systems

### **ASAM - Introduction**

**Compliance Statement** 

For more than 20 years, ASAM e.V. (Association for Standardization of Automation and Measuring Systems) is actively promoting standardization within the Automotive Industry. Together with its more than 250 members worldwide, the association develops standards that define interfaces and data models for tools used for the development and testing of electronic control units (ECUs) and for the validation of the whole vehicle.

ASAM standards are recommendations, they do not have an impact on regulatory framework.

From the beginning, ASAM has requested and encouraged an open exchange among all stakeholders: manufacturers, suppliers, tool vendors and research institutes. Following this ASAM policy, technical experts from ASAM member companies worldwide commonly develop new standards in project groups. The developed standards are accessible for all interested companies and serve as basis for the development of tools and ECUs within the respective companies worldwide. Tools and products developed based on ASAM standards allow easy integration into existing value chains and seamless data exchange.

ASAM project groups do not define products or take any business decisions preventing competition.

Prof. Dr. Marcus Rieker Chairman of the Board of Directors Dr. Klaus Estenfeld Managing Director https://www.asam.net/home/about-asam/compliance.html



# **ASAM** The Organization



### **Board of Directors**

Voluntary Representatives from International Tier-1s, Tool Vendors and Research Institutes

- Prof. Dr. Frank Köster DLR
- Dr. Ralf Nörenberg HighQSoft GmbH
- Prof. Dr. Marcus Rieker HORIBA Europe GmbH
- Armin Rupalla
   RA Consulting GmbH
- Richard Vreeland
   Cummins Inc.









### **Technical Steering Committee (TSC)**

A Highly Experienced International Team of Experts from Automotive Industry

• AVL LIST GmbH Dr. Gerald Sammer



- BMW AG
   Michael Schwarzbach
- Continental AG
   Helmut Wellnhofer



- Ontinental 3
- dSPACE GmbH
   Dr. Hans-Joachim Rabe
- emotive GmbH
   Dr. Jörg Supke



emotive

- ETAS GmbH Killian Schnellbacher
- National Instruments Corp. Stefan Romainczyk (Speaker)





- Softing GmbH
   Markus Steffelbauer
- Siemens Industry Software GmbH
   Oliver Philipp
- Vector Informatik GmbH
   Dr. Christoph Dallmayr









### **ASAM Membership**

More Than 250 Member Organizations Develop and Apply ASAM Standards

OEMs												Tier-1 Su	ppliers								
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Status June 26, 2019



## **Japanese ASAM Members**

Currently 37 Members – 11 more since Regional Meeting Japan 2018

- **OEMs** ٠ NISSAN MOTOR CORPORATION OHINO TOYOTA @YAMAHA HONDA 🐼 SUBARU The Power of Dream **Tier-1 Suppliers** ٠ HITACHI Inspire the Next KEĨHIN DENSO NSK AISIN **Tool Vendors** Communication Art Cechnology Systems DTS INSIGHT GAILOGIC GAIO DXC.technology HORIBA HULINKS ▼東陽テクニカ Symphony SKYTECHNOLOGY YOKOGAWA
  - **Academics**



Status June 27, 2019



# Some Highlights (Last Twelve Months)

ASAM actively drives its evolution - inside and outside

- Services for ASAM members worldwide (members in 25 countries) New ASAM Website well received, International Conference 2019, ...
- New Standards Related Activities

New domain "Simulation" established, high interest worldwide, six ASAM OpenX projects about to start, first successful local Concept Project outside Europe, standard development on its way, ...

Next Steps towards Internationalization

Re-vitalization of North American Activities, entry in China, requests from Korea, first ASAM members in Croatia, Slovenia, Romania, Israel, Czech Republic,....

- A Recognized Partner in the Standardization Community Liaison Agreements with ISO, MoU with SAE, AUTOSAR Attendee Agreement, ...
- ASAM Standards used in Non-Automotive Industries (e.g. in aviation)





# Common Standardization Agreements ASAM / ISO Existing and planned Liaison Agreements with ISO



## Liaison in ISO

Proposal of ISO Central Secretary: A or C

International Organization for Standardization

1.17.2 Different categories of liaisons

#### 1.17.2.1 At the technical committee/subcommittee level (Category A and B liaisons)

The categories of liaisons at the technical committee/subcommittee levels are:

Category A: Organizations that make an effective contribution to the work of the technical committee or subcommittee for questions dealt with by this technical committee or subcommittee. Such organizations are given access to all relevant documentation and are invited to meetings. They may nominate experts to participate in a WG (see 1.12.1).

### 1.17.2.2 At the working group level (Category C liaisons)

The category of liaisons at the working group level is:

Category C: Organizations that make a technical contribution to and participate actively in the work of a working group. This can include manufacturer associations, commercial associations, industrial consortia, user groups and professional and scientific societies. Liaison organizations shall be multinational (in their objectives and standards development activities) with individual, company or country membership and may be permanent or transient in nature.



# Liaison in ISO TC22/SC31

Data communication for vehicle applications

#### Reasons for Liaison with ISO

- Multiple standards shared between ASAM and ISO (e.g. ODX, GDI and MCD-3 D).
- Some ASAM standards are based upon ISO standards (e.g. OTX-Extensions, CERP, CPX).
- Many ASAM standards are related to other ISO standards (e.g. XCP, FIBEX, ODX).
- → ASAM must know, if relevant standards are going to be changed, i.e. know NWIP<sup>\*</sup>).
- → ASAM may provide comments on NWIPs and/or informs affected members.

### Category A liaison in ISO TC22/SC31 "Data communication for vehicle applications"

• Approved on Sep. 11, 2017.

### **Rights and Responsibilities**

- Have access to ISO general documents such as guidelines and templates.
- Have access to the ISO TC22/SC31 file repository.
- Others: tbd.



#### Topics under ISO TC22/SC31:

- Data buses and protocols
   (including dedicated sensor communication)
- V2X communication (including V2G)
- Diagnostics
- Test protocols
- Interfaces and gateways
   (including those for nomadic devices)
- Data formats
- Standardized data content



# Liaison in ISO TC184/SC5

Transfer of ASAM GDI to ISO



- ISO 20242 "Industrial automation and systems integration Service interface for testing applications"
- Category A Liaison Agreement in ISO TC184/SC5

(Interoperability, integration, and architectures for enterprise systems and automation applications)

- ASAM Contact: Prof. Patzke (until 2019), Mr. Bernd Wenzel (from 2020)
- Decision (Dec. 4, 2018): the liaison in ISO TC184/SC5 shall be continued for another 4 years. Then, based on an evaluation of the advantages for ASAM a new discussion regarding continuation should take place.



# Liaison in ISO TC22/SC33 WG9

Test scenario of autonomous driving vehicle



### Agreement between the partners to go for Category C Liaison in ISO TC22/SC33 WG9

### Reasons for Liaison with ISO

 Use synergies between the current ASAM OpenX (ASAM OpenDRIVE/OpenCRG/OpenSCENARIO) standardization activities (represented by the ASAM OpenX Steering Committee) and ISO WG9 WP 4.2 and 4.3 activities (represented by the respective leads)

		WG 9				
		Highway Scenario	General road Scenario			
1. Sc	***General Information for Automated Driving Vehicle Test enarios	Mr. Sun				
2. So	**Engineering Framework for Automated Driving Vehicle Test enarios	Mr. Taniguchi, Mr. Mazzega				
3.' (C	*Structure for Automated Driving Vehicle Test Scenarios omplexity)					
4.	Scenario Generation and Formation					
	4.1. ** Scenario Data Sources Extraction Format	Mr. Mazzega, Mr. Taniguchi	Mr. Zhao			
	4.2. *** Scenario Parameters, Formats and Architectures	Mr. van Driesten, Mr. de Gelder	Mr. van Driesten, Mr. de Gelder			
	4.3. *Scenario Database Requirements	Mr. van Driesten, Mr. de Gelder	Mr. van Driesten, Mr. de Gelder			

- Goal: complementary, not competitive work!
- Provide a common Glossary for Scenario descriptions (as staring point) for ASAM and ISO



# Category C Liaison in ISO TC22/SC33 WG9

Test scenario of autonomous driving vehicle



### Next Steps

- Short to mid term
  - Define (and agree upon) the workflow between the parties
  - Prepare and sign a Liaison C between ASAM and ISO
  - Formation of ASAM OpenX Steering Committee
  - Set up a regular exchange between the relevant working groups in ASAM and ISO
- Mid to long term
  - Evaluate further options (e.g. Open Simulation Interface (OSI) and ISO 23150 activities) after the official transfer of OSI to ASAM is concluded

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# Standardization at ASAM Portfolio, Process, Support



### **ASAM Standards Portfolio**

A New Domain "Simulation" was Established in 2018





### **Release and Project Roadmap for 2019**



#### **Projects Currently in Acquisition:**

- HPC-Diagnostics (Proposal WS: on June 5)
- OpenCRG
- Evaluation and Selection of an OpenDRIVE Reference Visualization and Checker Tool
- Open Simulation Interface (OSI)
- Safety Concept Description Language (SCDL)



(www.asam.net/standards/; www.asam.net/active-projects/projects/)



### **ASAM Development Process for Standards**

From First Ideas to New Standards





# **ASAM Offers a Complete Environment for Standardization**

#### **Professionalism & Culture**

- Proven processes for standards development and long-term maintenance.
- Time-to-Market: Low process overhead. Fast project turn-around times.
- Legitimacy: Decisions are made by elected industry representatives.
- Neutrality: The ASAM Office guarantees unbiased support for every company (big or small).
- Non-Profit Paradigm: Our goal is to provide best-in-class technologies in E/E-development.

#### **Project Budget**

- Membership fees are invested in technical projects (ROI can be higher than 100%, if a member uses ASAM a lot).
- ASAM pays for project service providers, e.g. standard writing, code development, prototyping, benchmarking, etc.
- Relieve experts from routine work. Let them focus on requirements, concept development and reviews.

#### Tools

- IT Infrastructure: Bugzilla, SVN, Adobe Shared Review.
- Communication Infrastructure: WebEx, Video Conferencing.

#### Network

- Large, worldwide network of experts in the Automotive E/E development and in the simulation domain.
- Collaboration with ISO, SAE, AUTOSAR, other SDOs\*) and government agencies.



# **Worldwide Marketing & Distribution**

#### **ASAM Home Page**

- Specifically geared towards standard promotion and distribution.
- Download of standards for members. Sales for non-members.
- Project information.
- Technical Wiki for standards.

#### **Regional Membership Activities**

• Regular meetings in EU, US and JP.

#### **Public Relations**

- Newsletter.
- Solutions guide.
- Trade show participation in emerging markets (JSAE, ...).

### Training & Support

- Technical support for all standards (support@asam.net).
- Overview training on ASAM standard portfolio.
- Update training on new releases (upon request).





# A New ASAM Domain for Highly Automated Driving ASAM OpenX Standards for Driving and Traffic Simulation



### **New Domain at ASAM: Simulation**



Simulation

- Standards for simulation model data exchange.
- High demand for standards for new type of simulation: Driving and Traffic Simulators.
- Public specs driven by tool vendors have emerged in recent years.
- Specs have been transferred to ASAM to:
  - Be hosted by a neutral professional organization
  - Become an official standard for the industry
  - Guarantee long-term and professional further development
- Current projects transferred to ASAM:
  - OpenDRIVE
  - OpenCRG
  - OpenSCENARIO
  - Open Simulaton Interface (OSI) (in transfer)



### **Positioning of OpenX Standards**



Static Content

**Dynamic Content** 

#### • Motivation

- Exchange of data between creation tools (e.g. road network editors) and simulators.
- Use of the data in simulators from different vendors.
- Use with other public standards.



# First Steps – ASAM OpenX Kick-Off and Proposal Workshops

High Interest from all over the World

### **OpenDRIVE/OpenCRG**

• 28.09.2018	<b>Open* Standards Training for Japanese Organizations</b>	Tokyo
• 09.+10.10.2018	Kick-Off Workshop ASAM OpenDRIVE (incl. ASAM OpenCRG)	Höhenkirchen
• 15.+16.01.2019	Proposal Workshop ASAM OpenDRIVE (incl. ASAM OpenCRG)	Höhenkirchen
OpenSCENARIO		
• 17.09.2018	Use Case and Requirements Workshop	Höhenkirchen
<ul><li>17.09.2018</li><li>13.11.2018</li></ul>	Use Case and Requirements Workshop Kick-Off Workshop ASAM OpenSCENARIO	Höhenkirchen Kaiserslautern



# OpenDrive





# Transfer of OpenDRIVE® to ASAM

Contract Signed at Driving Simulation Conference 2018, Juan les Pins



## Open Dynamic Road Information for Vehicle Environment



### **OpenDRIVE**

- OpenDRIVE: <u>Open Dynamic Road Information for Vehicle Environment</u>
- File format for the description of road networks.
- Initiative started in 2005 by Daimler and VIRES.
- Used for simulators in the area of
  - Drive simulation
  - Traffic simulation
  - Sensor simulation
- Based upon XML and a hierarchical data model.
- Basic elements:
  - Roads
  - Junctions
  - Controller
- Not covered: entities acting on or interacting with the road network.









### **Principal Design Pattern for Roads**

1: Create Reference Line

• Primitives

• Line

• Arc

Spiral

• Poly3

2: Add Lanes Along the Reference Line

Elements:

- Width
- Link
- Material
- Roadmarks

#### 3: Add Features



- Sign
- Signal
- Object
- Elevation









### **Junctions**



- Elements:
- Link to lane
- Priority
- Group



# OpenCRG





### **OpenCRG**

- OpenCRG: <u>Open Curved Regular Grid</u>
- File format and source-code for the **detailed description of road surfaces**.
- OpenCRG initiative was started in 2008 by Daimler together with AUDI, BMW, Porsche, and Volkswagen.
- The file format of OpenCRG is integrated in OpenDRIVE.
- Used for the description of patches of road surfaces in a very detailed manner, so that it can be used for:
  - Tire simulation
  - Vibration simulation
  - Driving simulation, etc.
- Source-code included:
  - C API for data read/write and evaluation
  - MATLAB API for data read/write, evaluation, generation, modification and visualization
  - Library of sample data





### **Further Development of OpenCRG**

Results<sup>\*</sup>) of pre-standardization meetings with industry-experts:

- Features
- F001: Georeferencing
- F002: Multiple Data Layers

#### **Other Topics**

• Further Development of the API Source Code

### Roadmap\*)



\*) tentative, as meetings are on-going



# OpenScenario





# What is OpenScenario?

Motivation

- ADAS functionality requires extensive testing in all sorts of situations
- A situation or scenario consists of two types of content
- For static content we have the lower level standards:
  - OpenDRIVE
  - OpenCRG
- Requirement: concisely describe a scenario by defining dynamic content and linking it to static content





### **OpenSCENARIO**

- File format for the description of dynamic content in driving simulation applications.
- Currently: focus on drive maneuver description.
- Project in an early stage (started in 2014).
- Used for drive simulators.
- Description elements:
  - Maneuver
     (complex maneuver descriptions that involve multiple cars)
  - Trajectory (polyline, clothoid)
  - Vehicle (geometry, type, axes, performance)
  - Driver (appearance)
  - Environment (weather, time of day, road condition)
- Based upon XML.





### **Principal Design Pattern for Maneuvers**





# **Open Simulation Interface (OSI)**





### OSI

- OSI: <u>Open Simulation Interface</u>
- A generic interface for the environment perception of automated driving functions in virtual scenarios.
- Initiated by BMW and Technical University of Munich (TUM).
- Contains an object-based environment description using message formats based on Google Protocol Buffers for two types of data:
  - GroundTruth: gives an exact view on the simulated objects in a global coordinate system.
  - SensorData: describes the objects in the reference frame of a sensor for environmental perception.



• In preparation: code of a run-time environment based on the Open Simulation Interface, including the conversions between GroundTruth and SensorData messages.



# ASAM OpenX Projects: Status





# **Projects Defined for ASAM OpenDRIVE and ASAM OpenSCENARIO**

#### **Standard Development Projects**

- Standard Transfer Project: Write missing chapters, clarifications on semantics and syntax, formal data model.
- Standard Further Development: New feature concepts, implementation of new concepts into the standard.

#### **Concept Projects**

• Concept Development: New feature concepts.

#### **Implementation Project**

- **Tool Evaluation:** Determine evaluation criteria, evaluate & choose.
- Tool Transfer: Requirements, SW implementation, beta testing, release.
- Tool Further Development: ditto.



### **Parallel Concept Development**

Parallel standard and concept development have worked out best in similar situations

- Faster time-to-marked.
- Less coordination efford between groups.
- But: Double work effort per month for participating companies due to parallel project groups.





### **ASAM OpenX: Status**

- Two active projects for each of ASAM OpenDRIVE & ASAM OpenSCENARIO:
  - Transfer Project: move the content of existing documentation to ASAM style as a base for all further ongoing developments; Includes consolidation & creation of user & style guides; No development activity!
     Significant improvement of document quality!
  - Concept Project: address current and upcoming requirements to the standards as obtained from the full development process of autonomous vehicles and the full complexity of real-world scenarios, including complex inner-city traffic.
    - Conceptual development activity in subgroups for individual features
    - Regular Working Group (WG) meetings via Webex, organized by WG leaders
    - Regular face-to-face meetings (3 each to date)
- Implementation → Project enrollment open for a visualization & reference checker tool for OpenDrive 10+ Interested parties, project will likely take place - <u>Link</u>
   Deadline 2<sup>nd</sup> July 2019
- ASAM OpenCRG → Project enrollment open for Transfer and further development Projects Needs more participation! - <u>Link</u>
   Deadline: 2<sup>nd</sup> July 2019



# ASAM OpenDRIVE Concept

#### Working Groups

	ASAM OpenDRIVE Concept Project Working Groups									
Name & _ead	Junction Model	Environment Representation	Road Geometry Models	International Signs Model	Area Model					
Description	Revise the junction model approach to simplify description of complex junctions.	Provide an approach for describing the environment around a road network (e.g. areas between lanes).	Extend the road model to describe roads with further model elements (e.g. DLM, polylines, Bezier curves).	Description of traffic signs, traffic lights, etc Provision of parameters to translate between all major jurisdictions.	Investigate the feasibility of an area-based modelling approach as an alternative to the current ODR implementation of line segments.					
Participants (companies)	<ul> <li>3D Mapping Solutions</li> <li>Daimler AG</li> <li>dSpace GmbH</li> <li>IPG Automotive GmbH</li> <li>fka GmbH</li> <li>BMW AG</li> <li>Siemens</li> <li>TESIS GmbH</li> <li>Continental AG</li> <li>VIRES</li> </ul>	<ul> <li>Daimler AG</li> <li>Mitsubishi Precision</li> <li>BMW AG</li> <li>Rheinmetall Electronics</li> <li>3D Mapping Solutions</li> <li>Mazda Motor</li> <li>e-Sync</li> <li>virtualcitySYSTEMS</li> </ul>	<ul> <li>fka</li> <li>RA Consulting</li> <li>Vires</li> <li>TESIS</li> <li>3D Mapping Solutions</li> <li>Continental AG</li> <li>Honda R&amp;D</li> <li>IPG Automotive GmbH</li> </ul>	<ul> <li>ASAM e.V.</li> <li>3D Mapping Solutions</li> <li>CATS</li> <li>e-Sync</li> <li>Honda R&amp;D</li> <li>Mazda Motor</li> <li>Toyota Motor</li> <li>Mitsubishi Precision</li> </ul>	<ul> <li>virtualcitySYSTEMS</li> <li>Daimler AG</li> <li>dSpace</li> <li>fka</li> <li>VIRES</li> <li>Rheinmetall Electronics</li> <li>BMW AG</li> <li>Mitsubishi Precision</li> <li>3D Mapping Solutions</li> <li>Continental AG</li> <li>Volkswagen AG</li> </ul>					



# **ASAM OpenDRIVE Concept**

**Concept Projects** 

- Next project meeting: 8<sup>th</sup> and 9<sup>th</sup> of October 2019 at Daimler AG in Sindelfingen, Germany
- WP01 & WP05 group meeting: 2nd & 3rd July at VIRES in Bad Aibling, Germany

#### **Current Activities & Discussions in Working Groups**

#### v1.7 – Feature improvements, Quality Improvements

- Modelling of road sections Current implementation can lead to gaps in the representation of road segments. The discussion is currently focused on alternative representations for road segments, e.g. not as lines but as splines
- Technical documentation service provider found and to start at beginning of January 2020

#### v2.0 – Long term changes to meet evolving demand of the AV industry, new features

- Area concept model Initial investigation into its feasibility and applicability to the OpenDRIVE standard
- Levels of detail Performance consideration Allow for the selection of various levels of details of objects, selected as required
- Layer approach Current OpenDRIVE is based on a single layer of information this would divide the standard into multiple layers of information – e.g. a logical road layer, static road objects, environment objects, etc.
- Junctions Current implementation is not user-friendly for creating complex junctions alternative possibilities are being investigated



### ASAM OpenDRIVE Roadmap





# ASAM OpenSCENARIO Concept

Working Groups

			ASAM	AM OpenScenario Concept Project Working Groups								
Name & Lead	Architecture	Glossary & Notations	Parameters & constraint handling	Measurements, grading & success	Scenario creation methods	Driver, traffic & vehicle models	Interface to topology & roads	Manoeuvre Description				
Description	Define a global architecture based on requirements of other WGs	Define the vocabulary needed to address each OSC requirement/ feature.	Methods for describing parameter distributions and variations	Methodology for determining the performance of a scenario simulation, i.e. pass/fail?	Identify requirements based on different approaches to scenario creation	Define a data interface to the above models	Define a data model with an abstracted interface to various road/topology formats	Define an approach for expressing the dynamic behavior of a scenario				
Participants (companies)	<ul> <li>PMSF IT Consulting</li> <li>ZF</li> <li>Foretellix</li> <li>Aliaro</li> <li>Rheinmetall Electronics</li> <li>Vector Informatik</li> <li>AKKA</li> <li>IASYS</li> <li>GOD</li> <li>University of Warwick</li> <li>HLRS</li> </ul>	<ul> <li>HORIBA</li> <li>CP Catapult</li> <li>ZF</li> <li>Aptiv</li> <li>M&amp;K</li> <li>Audi</li> <li>Volvo</li> <li>IRT Systemx</li> <li>U of Warwick</li> </ul>	<ul> <li>AVL</li> <li>MicroNova</li> <li>RA Consulting</li> <li>EMOTIVE</li> <li>MSC Software</li> <li>IKA Aachen</li> </ul>	<ul> <li>RA Consulting</li> <li>PMSF IT Consulting</li> <li>Univ. of Kempten</li> <li>BTC systems</li> <li>Catapult</li> <li>CATARC</li> <li>ZF</li> <li>Siemens</li> </ul>	<ul> <li>Volvo</li> <li>CATS</li> <li>AKKA</li> <li>Vires</li> <li>Jaguar / Landrover</li> <li>IASYS</li> <li>GOD</li> <li>Bosch</li> <li>Continental</li> <li>TTDC</li> <li>Audi</li> <li>Symphony</li> <li>RAC</li> <li>Univ.Warwick</li> <li>Mitsubishi</li> </ul>	<ul> <li>Daimler AG</li> <li>RA Consult.</li> <li>FZI</li> <li>BMW</li> <li>Vector</li> <li>SAIC Motor</li> <li>IPG</li> <li>Volvo</li> <li>ZF</li> <li>Rheinmetall Electronics</li> <li>TU Dresden</li> <li>Ansys</li> </ul>	<ul> <li>dSPACE</li> <li>Nvidia</li> <li>Volvo</li> <li>ZF</li> <li>Rheinmetall Electronics</li> <li>Symphony</li> <li>Univ.Warwick</li> </ul>	<ul> <li>Univ.Warwick</li> <li>OpelVauxhall</li> <li>BTC ES</li> <li>FZI</li> <li>Nvidia</li> <li>IPG</li> <li>ZF</li> <li>Aptiv</li> <li>M&amp;K</li> <li>Continental</li> <li>Vector</li> <li>IRTSystemsX</li> <li>TÜV SÜD</li> <li>HLRS</li> <li>Jaguar Land Rover</li> </ul>				



# ASAM OpenSCENARIO Concept

**Concept Projects** 

#### Next project meeting: 10<sup>th</sup> and 11<sup>th</sup> of July 2019 at Vector Informatik, Germany

#### **Current Activities & Discussions in Working Groups**

**v2.0** - should serve as the format and mechanism to supply dynamic content and functional behavior to multiple testing and execution platforms

- Primary focus: Review of currently available tools, languages & approaches. What can be used as a base for the various WGs?
- Glossary Clarification of basic naming conventions What is a scenario, an actor, an event?
- Parametrization What is a parameter and how is it exposed?
- Measurements How to capture the expected accuracy/quality of measurements in a scenario to determine pass/fail criteria?
- Models Defining the requirements of the interface to the road, driver and dynamics models



## **ASAM OpenSCENARIO Roadmap – Parallel Concept Development**





# **ASAM OpenX Steering Committee**

Concept discussed internally at ASAM - to be implemented soon

- Operative directional decisions
- Clarification of project requirements
  - E.g. summarize and clearly document target use cases of OpenX standards
- Alignment & compatibility of individual projects to use-cases
- Homogenize approach to standard extensibility
- Preparation & escalation of decisions for TSC
- Self moderation/adjudication
- Start: end of August





## **ASAM OpenX Standards**

Trademarks are registered in Europe, other counties will follow





### ASAM Website www.asam.net

Comprehensive Information about ASAM – Accessible for Everybody







### **ASAM International Conference 2019**

December 10+11, 2019

### Autonomous Driving – Standardized Virtual Development as a Key to Future Mobility

- Location: Dresden, Congress Center
- Concept: 2 days conference incl. exhibition
- Organization: In cooperation with Saxon State Ministry of Economic Affairs

- Presentations selected
- Agenda in preparation
- Invitation available soon





# Thank you!

**Dr. Klaus Estenfeld** Managing Director, ASAM e.V.

Phone: +49 151 6463 1204 Email: klaus.estenfeld@asam.net For more information on ASAM visit

www.asam.net

