Session C

Concept Project for OpenScenario

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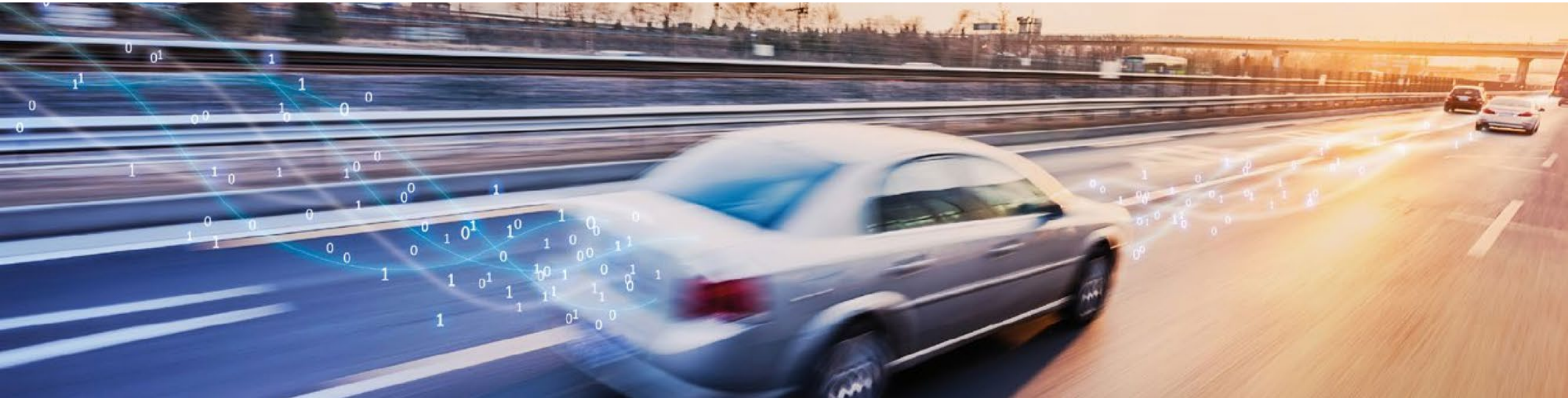

ASAM Association for Standardization of Automation and Measuring Systems

Features & Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

Features

F001: Maneuver Model

F002: Driver Model

F003: Traffic Model

F004: Weather Model

F005: Environmental Event Model

F006: Vehicle Dynamics

F007: Parameter Stochastics

F008: High-Level Maneuver Descriptions

F009: Replay of Recorded Scenarios

F010: Automatic Parameter Calculation

F011: Additional Meta Data for Parameters

Requirements for OpenScenario

Requirements

R001:	Avoid Different Ways to Model
R002:	Define Elements as Mandatory Only When Absolutely Needed
R003:	Maintain Independence and Open Linking Between Standards
R004:	Define Three Levels of Control for Ego Vehicles
R005:	Allow Tool-Vendor Specific Extensions
R006:	Allow Definition of Feature Subsets
R007:	Define Simulation Results Reproducibility
R008:	Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop
R009:	Define Parameter Boundaries
R010:	Synchronize Maneuvers and Events

Requirements

R011:	Allow Definition of Success Criteria
R012:	Suitability for Textual Editing

R001

In the current version of OpenSCENARIO, it is possible to define simple maneuvers, such as trajectories, in different ways. The standard shall be reviewed under this aspect. Definition alternatives shall be reduced to just one alternative, whenever possible.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R002

Define elements of the OpenSCENARIO data model as mandatory only when it is absolutely required to run the simulation, maintain tool interoperability and to obtain correct simulation results. All other elements shall be optional.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

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R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R003

The standards OpenDRIVE, OpenCRG and OpenSCENARIO shall be independent from each other. OpenSCENARIO shall have a generic interface to road and 3D environment description standards such as glTF.

…

Discussion R003

Questions or comments to the proposed requirements?

- Allow use of abstract road parameters in logical scenarios, which are filled by information contained in OpenDRIVE (or other standards).
- See also OTX standard, interaction with test sequences

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

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R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R004

The standard offers three modes of specifying the control of an ego vehicle (aka vehicle-under-test). The ego vehicle is controlled:

(a) completely by scenario description.

(b) partially by driver model and partially by scenario description.

(c) completely by an external vehicle controller, e.g. human driver or AD-system.

…

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

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R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R005

The standard shall allow a method to add tool-vendor specific elements and parameters to the data model, without breaking standard-compliance, schema validation and tool interoperability.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R006

Allow the definition of groups of features, aka subsets or profiles. This allows tool vendors to inform end-users, which groups of features are supported, and which are not supported.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R007 "The Well-Defined Semantics Requirement"

The standard shall define for each modeling construct, if exact reproducibility of the behavior of that part of the simulation ~~results~~ among all standard-compliant simulators is required. For all other features, different simulators are allowed to produce different simulation results.

It might also be considered to define an inexact reproducibility, i.e. defining a tolerance interval for simulation results. …

Discussion R007

Questions or comments to the proposed requirements?

- Exact formulation of this requirement might need to be revisited inside concept project!
- Obviously there are limits to exact reproducibility, and especially for numerical simulations this can be hard to achieve.
- Still some constraints on behavior are needed, otherwise scenario language does not have well-defined semantics.
- Proposal to rename requirement to be “The Well-Defined Semantics Requirement”
- Proposed wording changes as indicated in red on slide.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

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R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

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R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R008

The standard shall allow the definition of maneuvers for open-loop simulation and closed-loop simulation.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

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R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R009

Parameters shall have attributes, which define their upper and lower limits.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R010

The movement of multiple vehicles in a maneuver description can be synchronized at specific points of time, specific coordinates on the road or at the occurrence of specific events. The description shall include logical constraints. Events might be maneuver events or events related to the ego vehicle. The latter might include driver-initiated events or component failures, as described in F001.l or F001.n.

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R011 (Split into a+b for Use Cases non-DUT criteria and DUT-criteria)

Maneuver descriptions shall include success criteria, i.e. conditions that evaluate to 'true' when the maneuver was executed as intended.

…

The success criteria may be directly included in the OpenSCENARIO data model, or become part of a separate test specification with a reference to the corresponding maneuver description in OpenSCENARIO.

Discussion R011

Questions or comments to the proposed requirements?

- Decision to split the requirement into R011a & R011b (see red text on slide):
  - R011a: Use Cases where non-DUT (device under test) success criteria are formulated to ensure that the scenario has actually happened as planned
  - R011b: Use Cases where DUT (device under test) success criteria are formulated into the scenario (thereby integrating test case with scenario description)
  - Both requirements might need different solution approaches (e.g. in-scenario criteria vs. integration with test case description standard)

Requirements for OpenScenario

Requirements

R001: Avoid Different Ways to Model

R002: Define Elements as Mandatory Only When Absolutely Needed

R003: Maintain Independence and Open Linking Between Standards

R004: Define Three Levels of Control for Ego Vehicles

R005: Allow Tool-Vendor Specific Extensions

R006: Allow Definition of Feature Subsets

R007: Define Simulation Results Reproducibility

R008: Maneuver Descriptions Shall be Suitable for Open- and Closed-Loop

R009: Define Parameter Boundaries

R010: Synchronize Maneuvers and Events

Requirements

R011: Allow Definition of Success Criteria

R012: Suitability for Textual Editing

R012

Users shall be able to manually write scenario definitions in a text editor. This means that the OpenSCENARIO description format (currently XML) shall not just meet requirements for machine-readability.

Discussion

Questions or comments to the proposed requirements?

- Individual requirements where discussed and adjusted as documented on per-requirement slides
- No further general comments or discussions

Features for OpenScenario

Features

F001:	Maneuver Model
F002:	Driver Model
F003:	Traffic Model
F004:	Weather Model
F005:	Environmental Event Model
F006:	Vehicle Dynamics
F007:	Parameter Stochastics
F008:	High-Level Maneuver Descriptions
F009:	Replay of Recorded Scenarios
F010:	Automatic Parameter Calculation
F011:	Additional Meta Data for Parameters

F001

Complete the specification of maneuver descriptions in OpenSCENARIO with advanced features:

… <advanced features for maneuver model> …

The maneuver model shall furthermore allow to specify generic maneuvers, from which groups of specific maneuvers can be generated.

Note: R010 "Synchronize maneuvers and events" is related to this feature.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
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F002

The standard shall contain a model for describing driver behavior. The model describes various aspects of the driver's behavior in traffic situations. Examples are: reaction times, distance to the ahead vehicle, longitudinal and lateral acceleration, speed of steering-angle change, etc.

It might also be considered to define types of drivers, e.g. 'aggressive' or 'cautious', which bundle characteristic values of them.

…

Features for OpenScenario

Features

F001: Maneuver Model

F002: Driver Model

F003: Traffic Model

F004: Weather Model

F005: Environmental Event Model

F006: Vehicle Dynamics

F007: Parameter Stochastics

F008: High-Level Maneuver Descriptions

F009: Replay of Recorded Scenarios

F010: Automatic Parameter Calculation

F011: Additional Meta Data for Parameters

F002

The model represents either a human driver or an AI driver. The model shall support the description of typical ADAS functions, such as ACC.

The maneuver model can be linked to a driver model. The specification of models shall include, which part of the maneuver is exactly executed as specified, and which part of the maneuver model is just the reference for the driver model to be followed (but not necessarily executed in an exact way).

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: Weather Model
F005: Environmental Event Model
F006: Vehicle Dynamics
F007: Parameter Stochastics
F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F003

The traffic model defines the movement of traffic participants in the surrounding of the ego vehicle. The model shall allow to automatically generate complex traffic scenarios that includes moving vehicles, pedestrians, bicycles, animals and others. The model shall include deterministic and stochastic traffic scenario definitions. The latter requires parameters for traffic densities, safe-distance rules and traffic-light rules.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: ~~Weather Model~~ Environmental Condition Model
F005: Environmental Event Model
F006: Vehicle Dynamics
F007: Parameter Stochastics
F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F004

The data model shall include elements for describing the weather, such as precipitation, fog, wind, lighting and other phenomena. This shall allow the simulation of:

- road conditions and its effect on friction between tire and surface.
- visual conditions and its effect on sensor perception.

Discussion F004

Questions or comments to the proposed requirements?

- Decision to rename the feature from the headline “Weather Model” to “Environmental Condition Model”, since this is more generic in scope (see slide)
- Take into account interface to environment descriptions

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: Weather Model
F005: Infrastructure Event Model
F006: Vehicle Dynamics
F007: Parameter Stochastics
F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F005

A data model shall be added to the standard, which allows to describe information originating from the infrastructure to influence the drive behavior of the ego car.

Discussion F005

Questions or comments to the proposed requirements?

- Decision to rename the feature from the headline “Environmental Event Model” to “Infrastructure Event Model”, to make more specific that infrastructure to vehicle communication is the intended scope.
- Note that vehicle to vehicle communication is also relevant, but should be covered under normal sensor model -> driver model approaches, and/or the maneuver description/event handling of OpenScenario.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: Weather Model
F005: Environmental Event Model
F006: Vehicle Dynamics
F007: Parameter Stochastics
F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F006

The current scope of OpenSCENARIO is primarily for drive and traffic simulation. The standard shall also be usable for vehicle dynamics simulation.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: Weather Model
F005: Environmental Event Model
F006: Vehicle Dynamics
F007: Parameter Stochastics
F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F007

Instead of just describing fixed parameter values, the standard shall also allow methods for describing parameter distributions and variations:

(a) Intervals (e.g. min, max)

(b) Stochastic distributions (e.g. linear- or gauss-distribution)

(c) Discretely defined distributions (e.g. histograms)

Features for OpenScenario

Features

F001: Maneuver Model
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F004: Weather Model
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F006: Vehicle Dynamics
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F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F008

The standard shall provide a method for maneuver descriptions on a higher level of abstraction, aka key-scenario descriptions. This shall contain only the logical description of scenarios with as few parameters as possible. The high-level description is then automatically transformed into the detailed description of the lower level.

…

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
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F005: Environmental Event Model
F006: Vehicle Dynamics
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F008

Various views/aspects on this feature possible:

- Higher-Level Data Model
- Domain-Specific Language
- Domain-API & General-Purpose Language
- Scenarios as Constraints
- …

Relationship to lower level language / concrete scenarios

Discussion F008

Questions or comments to the proposed requirements?

- Multiple approaches might be needed, interplay with other standards needs to be taken into account.
- Especially needs clear definition of key concepts (-> glossary).
- -> Taxonomies (Standardized & Library Concepts) for High-Level Maneuvers.
- Provide for Migration Path from OpenScenario 1.0 world to OpenScenario 2.0 world.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
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F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F009

Scenarios may be defined from pre-recorded trajectories, which shall be replayed during simulation. The language definition should support the process of transforming recorded data into scenario descriptions only through adequate language elements to express the resulting scenario maneuvers efficiently, without standardizing the processes and methods of data recording and transformation.

Discussion F009

Questions or comments to the proposed requirements?

- Consider how pre-recorded scenario data can be reflected into scenario primitives that fit into a higher-level scenario description.
- Also consider handling of hand-over phase between recorded phase and free-playing phase.
- Added red text to feature description (see slide) to clarify that feature does not cover defining methods and processes for recording scenario or turning that recording into a playable scenario itself, but rather should focus on language requirements for OpenScenario to enable those methods and processes to be easier to define and implement.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: Weather Model
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F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F011: Additional Meta Data for Parameters

F010

Instead of just manually setting each parameter in the data model (or from the outside), the standard shall allow to specify mathematical formulas to calculate some parameters (i.e. derived parameters). Those parameters would be automatically calculated, once the input arguments of the formula are known.

Discussion F010

Questions or comments to the proposed requirements?

- Potentially not only statically derivable parameters but also dynamically calculated parameters. Consider impact on implementations.
- Potentially consider even bi-directional derivation through bi-directional constraints.
- Added wording to clarify that feature is not intended to place all parameter selection/calculations into the scenario, but rather allow simpler specification of dependent parameters from independent parameters.

Features for OpenScenario

Features

F001: Maneuver Model
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F011

Parameters shall have attributes for URI and name space.

Rationale: The URI would make parameters shareable. The name space allows to distinguish between standardized parameters and userdefined parameters. The name space also allows to define country-variants of parameters.

Discussion F011

Questions or comments to the proposed requirements?

- Generalize this feature request across all language features
  -> cf. R005/006 (extensions and layered standards)

Discussion

Questions or comments to the proposed features?

- Non-specified stuff (parameters, etc.) should be treatable as "Don't Care"
- F003 Traffic Model should also address (see R003) interfacing to external Traffic Models, especially for e.g. complex city traffic.
- Address the big picture that OpenScenario needs to fit in, especially regarding test execution, measuring outputs, metrics for pass/fail criteria.
- How to do country-specific variant handling efficiently by deriving regional variants from more generic scenarios? Is something more needed beside e.g. parameters, derived parameters (F10 & F011), country-specific models and maps, libraries, abstraction (F008)? "Localization is hard!"
- OpenScenario has to take internationalization and localization into account from the start.
- Concept project needs to delineate which areas should be part of the standard, and hence standardized, and which should reside outside the of the standardized area.
- It should be possible to translate currently proposed regulatory scenarios into OpenScenario.
- F012 for localization added by ~75% vote in favour.

Features for OpenScenario

Features

F001: Maneuver Model
F002: Driver Model
F003: Traffic Model
F004: Weather Model
F005: Environmental Event Model
F006: Vehicle Dynamics
F007: Parameter Stochastics
F008: High-Level Maneuver Descriptions
F009: Replay of Recorded Scenarios
F010: Automatic Parameter Calculation
F012: Language Constructs for Localization

F012

- How to do country-specific variant handling efficiently by deriving regional variants from more generic scenarios? Is something more needed beside e.g. parameters, derived parameters (F10 & F011), country-specific models and maps, libraries, abstraction (F008)? "Localization is hard!"
- OpenScenario has to take internationalization and localization into account from the start.

OpenScenario should have language constructs that enable this kind of usage; whether this needs any new specific constructs for this usage is to be determined.

Feature Prioritization

Instructions

1. Please determine your scores to features that are most important for your company (~15 min).
   - Scores: 4, 3, 2, 1
   - Higher number = higher priority
   - One company = one scoring
2. Determine a speaker for your company.
3. When being called, the speaker presents the scores and explains the reasons for his choice.

Features

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F003:	Traffic Model
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F009:	Replay of Recorded Scenarios
F010:	Automatic Parameter Calculation
F011:	Additional Meta Data for Parameters
F012:	Language Constructs for Localization

Result

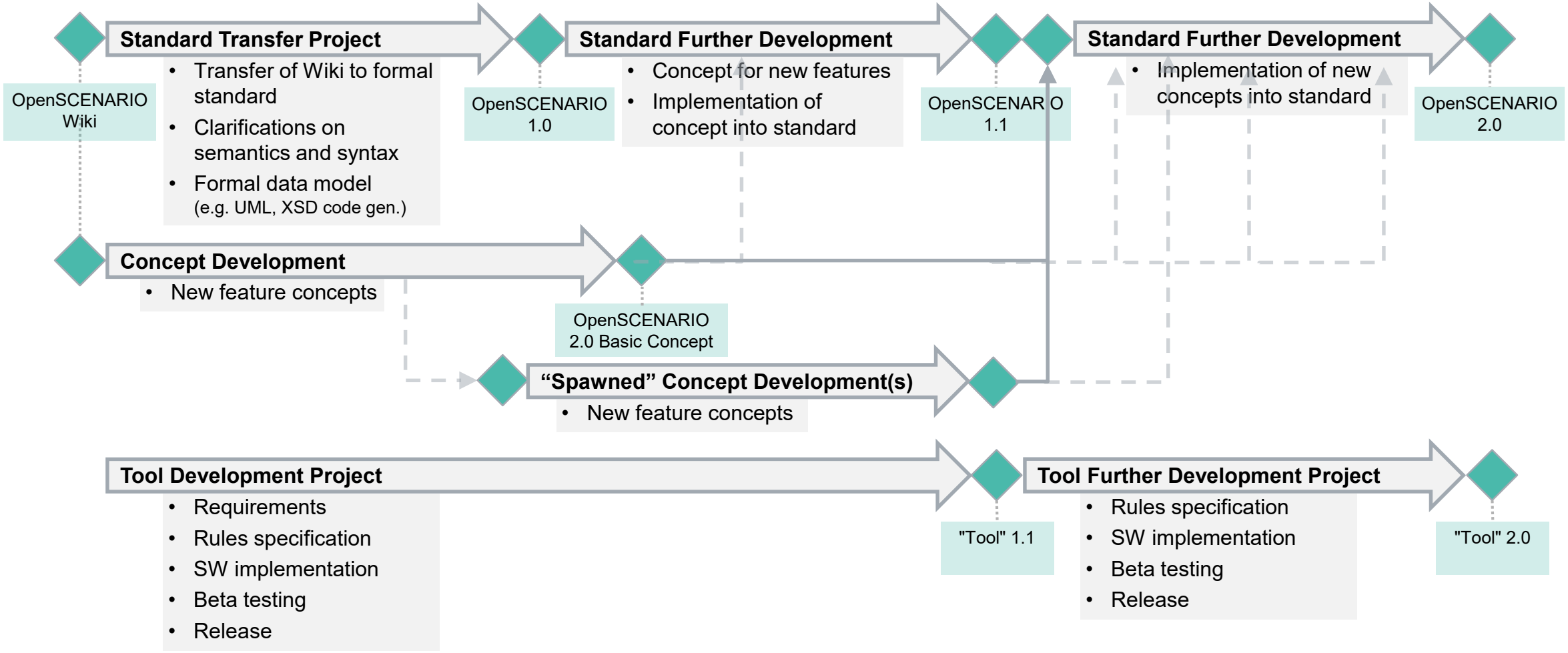
The total score will be added up per each feature. This determines its priority relative to the other features.

Results of Feature Prioritization

Features

F001	Maneuver Model	: 122
F008	High-Level Maneuver Descriptions	: 119
F003	Traffic Model	: 50
F007	Parameter Stochastics	: 44
F002	Driver Model	: 42
F004	Environmental Condition Model	: 30
F009	Replay of Recorded Scenarios	: 27
F010	Automatic Parameter Calculation	: 18
F005	Infrastructure Event Model	: 14
F006	Vehicle Dynamics	: 14
F011	Additional Meta Data for Parameters	: 10
F012	Language Constructs for Localization	: 7

ASAM OpenScenario Roadmap – Parallel Concept Development



Results of Feature Prioritization

Features

F001	Maneuver Model	: 122
F008	High-Level Maneuver Descriptions	: 119
F003	Traffic Model	: 50
F007	Parameter Stochastics	: 44
F002	Driver Model	: 42
F004	Environmental Condition Model	: 30
F009	Replay of Recorded Scenarios	: 27
F010	Automatic Parameter Calculation	: 18
F005	Infrastructure Event Model	: 14
F006	Vehicle Dynamics	: 14
F011	Additional Meta Data for Parameters	: 10
F012	Language Constructs for Localization	: 7

cut-off line

Key Points for Project Planning

Is there a heightened likelihood that your company would send an expert to this project?

- Everyone present sees that likelihood.

Key Points for Project Planning

Preferences for meeting frequency and duration?

- Initially expect 2 days every 4 weeks, potentially petering out to 1-2 days every 6 weeks
- Strong use of phone conferencing, etc. for coordination in between (mailing lists?)
- Use of sub-working group meetings in intervals in between possible

Key Points for Project Planning

Expectation for the end of project?

- Initial Deliverable: 2019-06-30 (or thereabouts)
  - Initially Glossary for Key Concepts
  - Big Picture of OpenScenario (Boundaries)
  - Initial Split Out of Concept Projects
  - OpenScenario 1.1 (Sub-)Features for next minor release
- … potentially more sync points in between? …
- Final Deliverable: 2020-12-31
- Incremental delivery of intermediate results

Key Points for Project Planning

Volunteer for document ownership?

- To be decided later on

Key Points for Project Planning

Volunteer for writing the project proposal?

- Gil Amid, Foretellix Ltd.

Thank you!

Pierre R. Mai
By Order Of ASAM e.V.

For more information
on ASAM visit

www.asam.net

ASAM