

ASAM OpenTestSpecification

Concept Project

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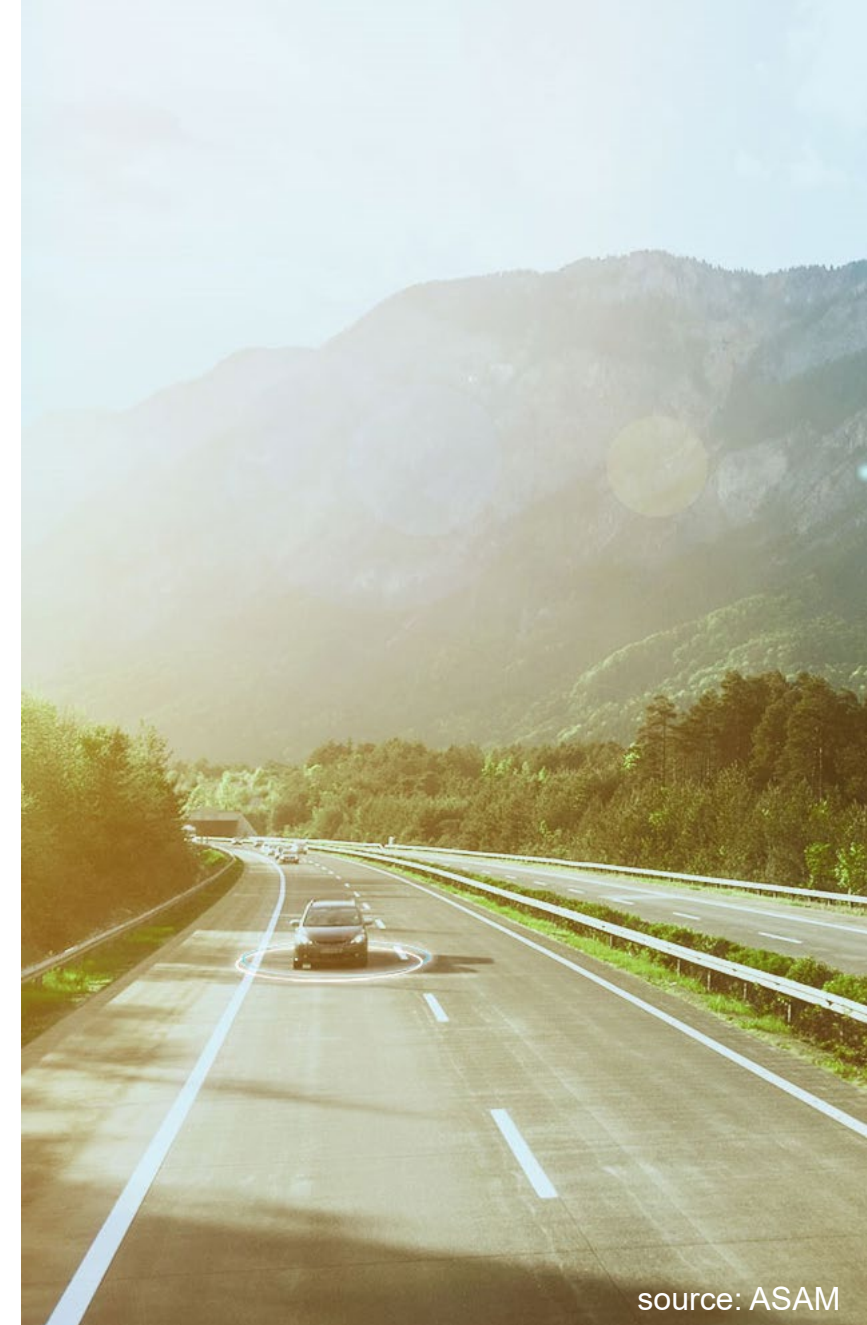
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Agenda

- Roadmap
- Definition of Scope
- Collection of Use-Cases
- Derivation of Requirements
- Call for Candidates
- Candidate Selection Results
- MVP Creation
- Proposal for Further Development (tbd)

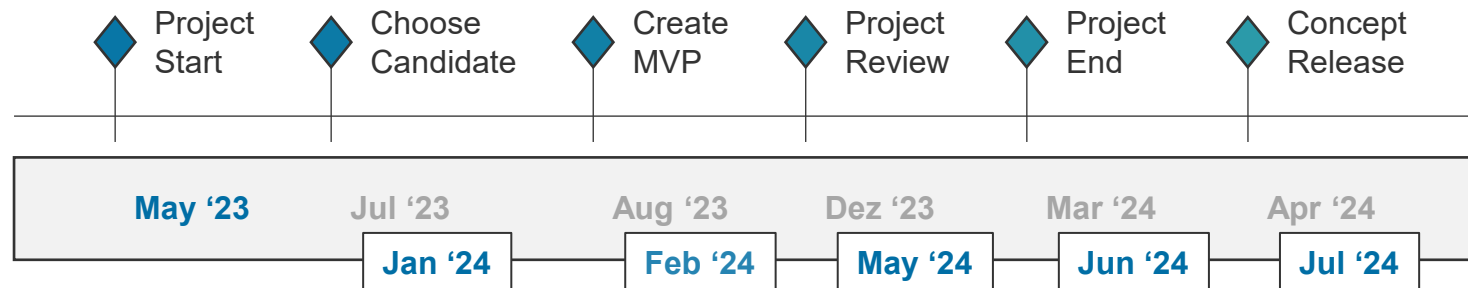


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Roadmap

- Due to the open focus of the project, the scope definition, the formulation of corresponding requirements and the identification and selection of suitable candidates for further standardization was slightly delayed.
- Since the MVP planned in the project is now created in collaboration with multiple standardization groups, the project needs to be further extended.



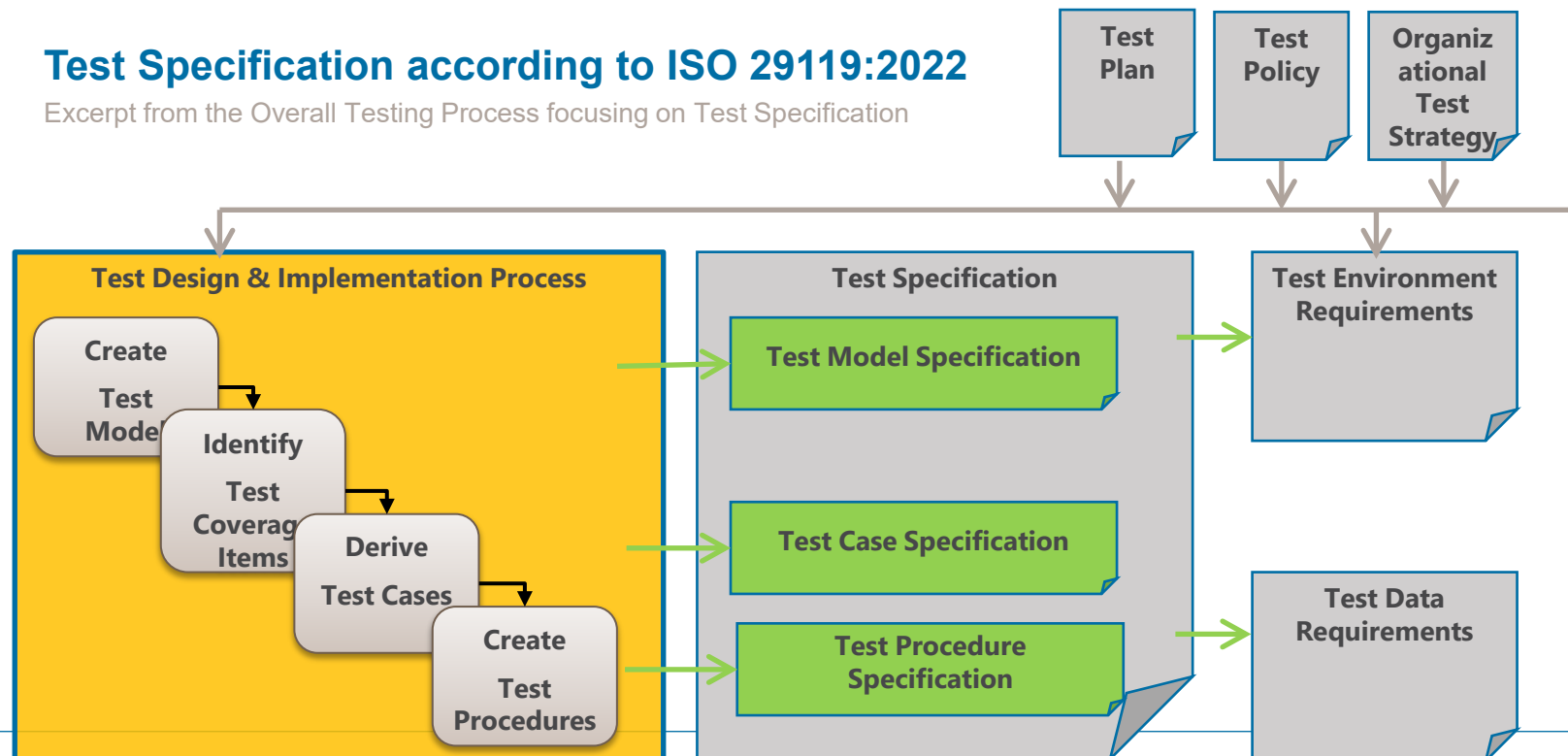
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Definition of Scope

- Based on ISO 29119 processes, areas of application of related standards and developments as well as blind spots in standardization were identified.
- The resulting map enabled the definition of the scope of (a) potentially new ASAM standard(s) for test specification.

Test Specification according to ISO 29119:2022

Excerpt from the Overall Testing Process focusing on Test Specification



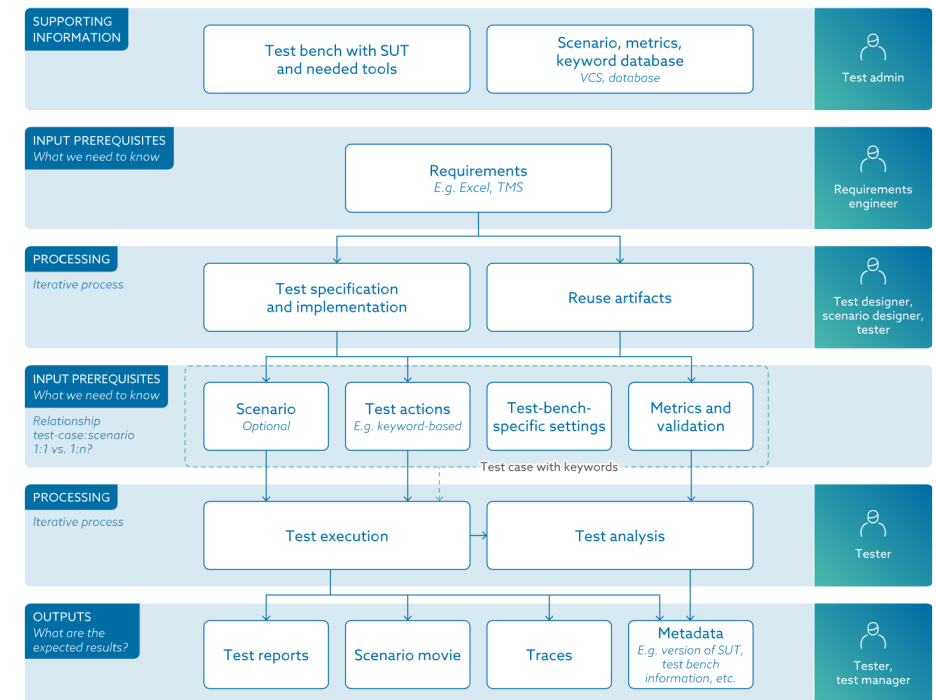
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Collection of Use-Cases

19 individual use-cases for automotive testing were identified from the results of the ASAM Test Specification Study Group and discussions within the concept project.

ID	Short Name	Test Spec Report Reference	Description
UC #1	REQ-based Test MIL	5.2.2	Requirements-based generic model-in-the-loop (MIL) testing process as applicable in model-based development processes. Intended to find flaws inside a (potentially still incomplete) functional model.
UC #2	Scenario-based Test MIL	-	Scenario-based generic model-in-the-loop (MIL) testing as applicable in model-based development processes. Intention is the validation of control components e.g. testing the ADAS/AD effect chain for different scenarios in the modelling environment.
UC #3	REQ-based Test SIL Replay (Open-Loop)	-	Open-loop test of SW functionality (e.g. object detection and tracking) by replaying recorded real world data (e.g. camera image data).

Testing of an Automated Emergency Braking System in a HIL/SIL Environment



Tools involved: environment access (bus, diagnostic, fault injection), device under test access, test automation, requirement tool, scenario editor

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Identification of Requirements

- 140 requirements on test specification were derived from the identified use-cases.
- The requirements were generalized, grouped and documented in a requirements document.
- This document served as basis for the “Call for Candidates” (see next slide).

Requirement Groups

1. General
2. Interoperability
3. Consistency
4. Abstraction
5. Traceability
6. Intuitiveness
7. Execution and Automation
8. Preconditions, Parametrization and Configuration
9. Timing and Synchronization
10. Modeling and Virtualization
11. Hardware and Software
12. External Artifacts
13. Scenarios
14. Reporting
15. Use-Case Specifics
16. ODD

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Call for Candidates

- On September 18th, 2023, a public “Call for Candidates” was issued, inviting all interested parties to submit proposals for candidates to serve as basis for further standardization. The requirements document, a validation sheet and submission guidelines were distributed to all potential submitters.
- In a dedicated meeting series taking place in fall 2023, 8 submitters presented their candidate to the project group.
- Within the candidate selection, candidates were elected by secret ballot. Election of individual candidates per specific area of application was possible.

	Area of Application
1	Test Model Specification
2	Test Case Specification
3	Test Procedure Specification
4	Test Case Implementation
5	Test Bench Configuration
6	Test Data Management
7	Test Bench Access

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Candidate Selection Results

Test Model Specification	???
Test Case Specification	ASAM OTX
Test Procedure Specification	ASAM OTX
Test Case Implementation	ASAM OTX
Test Bench Configuration	ASAM XIL
Test Data Management	ASAM ODS
Test Bench Access	ASAM XIL
Consistency with ASAM ecosystem / Interoperability with other ASAM standards	ASAM OTX



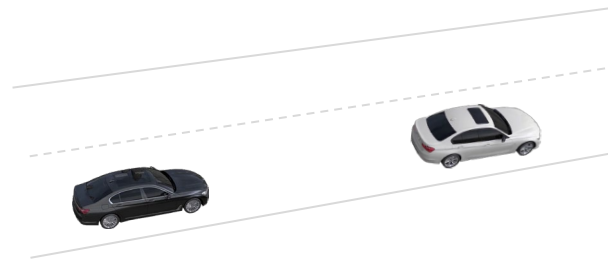
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MVP Creation

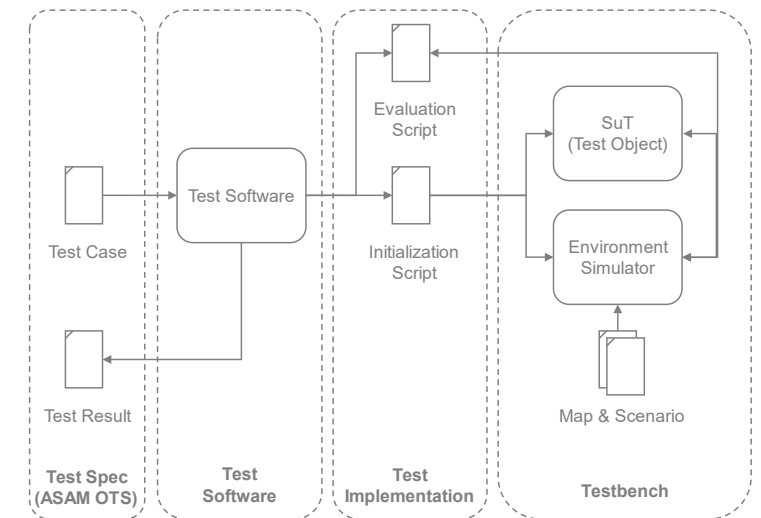
Scenario

- 2 entities: Ego vehicle (EV) equipped with active ACC (SUT) and other vehicle (OV)
- Initial positions: Both entities are in same lane of straight road (length: 2000m), OV is 200m ahead of EV
- Initial velocities: EV: 120 km/h, OV: 80 km/h
- Scenario duration: 20 s



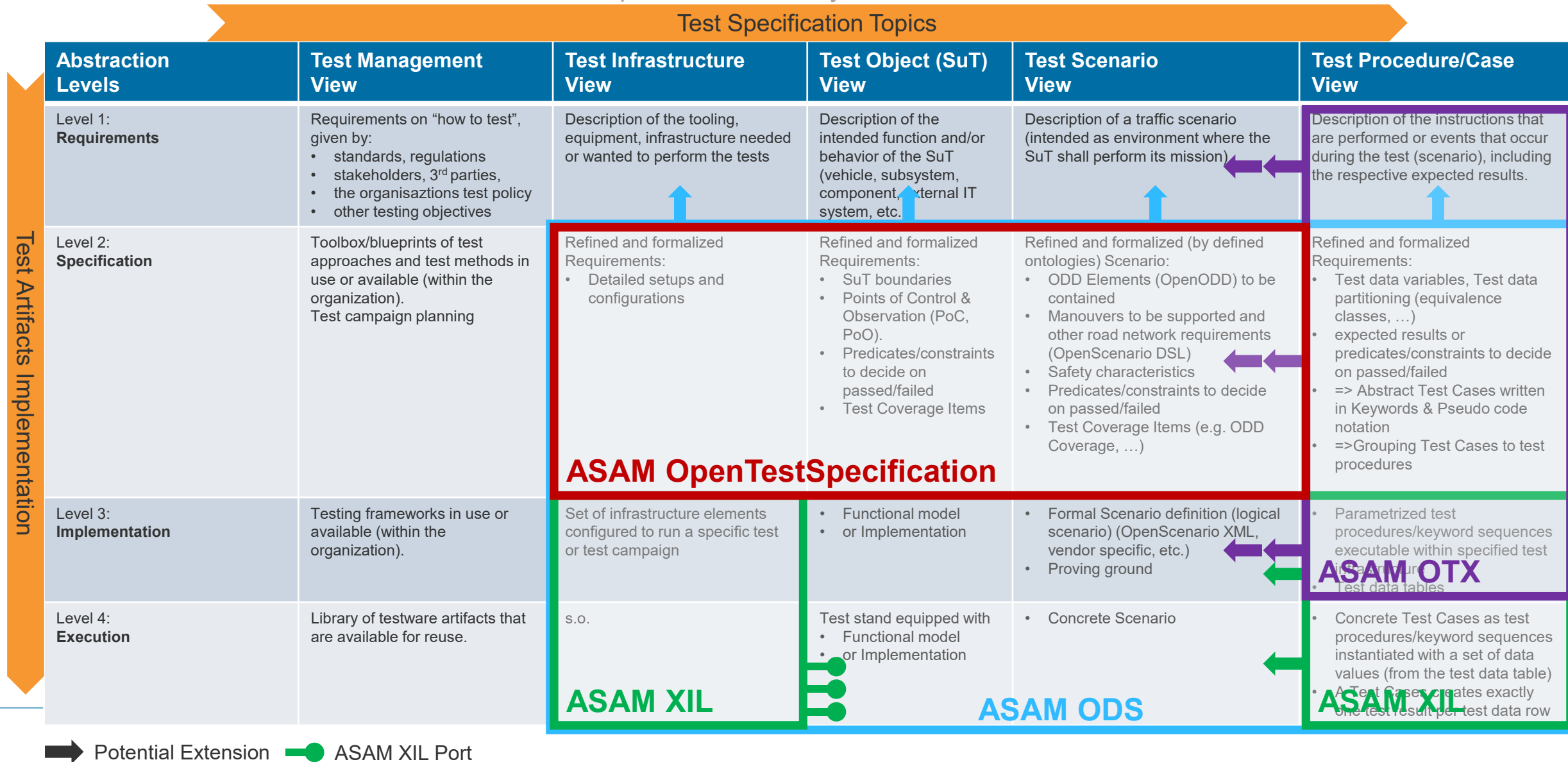
Test criteria

- Longitudinal distance D is measured between EV and OV reference points
- Success criteria: $D = \text{minDist}(\text{Ev.pos}, \text{OV.pos}) > 60 \text{ m}$ throughout test run



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MVP Creation – Interaction of the Standards depicted in the 4-Layer Reference Architecture



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Proposal for Further Development

Findings:

- Comprehensive analysis of use-cases, requirements and existing developments in the context of test specification
- Practical implementation of test specifications using ASAM standards OpenTestSpecification/OTX/XIL/ODS
- Cross-standard collaboration

Next steps:

- Initial implementation of an ASAM OpenTestSpecification umbrella standard
- Establishment of a cross-standard controlling board to synchronize ASAM OpenTestSpecification/OTX/XIL/ODS development
- Coordinated planning of project launches in 2025



source: ASAM

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