

2nd GRVA workshop on scenarios 1-3 July 2024, London (UK)

The 2nd GRVA scenario workshop was held from 1-3 July as a hybrid meeting in London as agreed at the 19th GRVA, aiming to address the open items from the first workshop in Paris.

Terminology

The workshop discussed the distinction between a scenario catalogue and a scenario database.

From a pure IT perspective, the distinction is that a catalogue references (or points) to items within one or more databases.

However, the term "scenario catalogue" as used in the Integration Document (GRVA 18-50) is more related to a set of scenarios for an intended purpose.

The workshop tried to propose a definition of catalogue and database to aid further discussion. During the meeting, it was not possible to come to agreement on the text, but further work offline may present a solution.

It is important to note that there was no agreement on the definitions themselves.

It is acknowledged that the use of scenario catalogue in GRVA 18-50 may not fit with these definitions.

The UNECE CPs' and OEMs' needs for access to scenarios

Based on the explanation given by France, the need for CPs to access/exchange scenarios is:

- To support OEMs to take into account national/geographic specific situations in their design and validation
- To support effective and efficient processes for OEMs and authorities, avoiding duplication of work/storage and stimulating uniform descriptions
- The consistent evolution of scenarios, based on emerging technologies/functionalities and feedback from real world performance

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The workshop then identified a number of conditions where the contracting parties will need access to scenarios from external sources.

Broadly, these came under the topic of supporting authorities' assessment of ADS Safety through scenario-based testing.

This was subdivided into the following topics:

Providing shared access to scenarios between contracting parties

- Provides scenarios that support traffic rule compliance across countries, state boundaries or jurisdictions.

- Supports mutual recognition under the 1958 agreement.
- Serves the regulation as an enabler to a robust assessment process.

In Service Monitoring and Reporting (ISMR)

ISMR helps to identify and characterise edge cases, including specific situations and parameter combinations that lead to inappropriate vehicle behaviour. This is an important part of the continuous improvement. It is important that access is provided to scenarios that are created or modified from information generated by ISMR activities. This will include:

- Abstract / logical scenarios that retain the challenge that caused the incident but contain a more abstract description.

This access will enable:

- Manufacturers to use these scenarios as part of their approach improve safety.
- Authorities to improve their safety assessment of a manufacturer's ADS by requiring a manufacturer to check their ADS against these ISMR scenarios and report their results.

Traceability of which scenarios are used in testing (version control)

The manufacturer and the authority should track and record the scenarios and parameters that were used during any "authorities' assessment".

Diverse ODD applicable scenarios

- Where possible, -high level (functional) scenarios that are applicable to many ODDs should be produced that are useful for testing a broad range of ADSs.
- Harmonisation of descriptors helps to establish common taxonomies to be used in scenario catalogues and/or databases.

Assessing coverage

- Coverage refers both to the methodological process of a set of scenarios and to the content itself (scenarios).
- Aiding assessment of the manufacturer's scenario approach and space under the audit pillar.

Minimum set of "must have" scenarios

- Initial list of core scenarios meant to be common to all ODDs.
- Not exhaustive by design, should, in theory, be completed by scenarios suited to a specific ODD, assessing that the manufacturer's choice of scenario space is coherent with the ODD (and its frontiers) and that scenarios chosen for implementation in NATM pillars are representative of the scenario space.
- Provides an initial, but not exhaustive list of situations that shall be manageable by the ADS (e.g. avoid or mitigating the collision). It will help to identify preventable and unpreventable areas.
- However, remaining common to all ODDs and being adapted to various ODDs is likely to be challenging for this approach. Selection of a "must have" (limited by nature) list of scenarios should be made with special care, in order to avoid losing the coverage objective.
- The suitability of such scenarios and related parameters shall be determined by the manufacturer or authority depending on the ODD of the ADS.

Interoperability

- Ensures scenarios (and scenario catalogues) are compatible across scenario databases.
- Means sharing taxonomies, frames of references, intended use, templates, metadata, formats, interfaces, etc.
- Refers to both concepts and methodologies, and technical tools.
- Identifies commonalities and specifications including references, descriptors, standards, catalogs, databases, etc.

Requirements for the handling of scenarios by UNECE contracting parties

For each of these use cases, the workshop discussed what requirements would be necessary for that particular case.

- For the category “Diverse ODD applicable scenarios,” no additional requirements were needed as other categories covered everything needed to handle these scenarios.
- The use cases around “Assessing coverage of manufacturers scenario database” and “Minimum set of must have scenarios” were both agreed to be more suitable for consideration under the ADS IWG as they relate to the assessment of an ADS or regulatory requirements for mandatory testing, in particular to evaluate the completeness of performance requirements.

Based on the remaining categories, the workshop made the following recommendations to facilitate these use cases.

- Scenarios should follow a standardised format.
- Scenarios should use common scenario descriptors and metadata.
- Scenario structure and descriptors should comply with relevant international standards, e.g., ISO 3450X series, ASAM Open standards.
 - Where there are contradictions, the more global standards should be used.
- Scenarios should have a common ontology or taxonomy of constituting elements.
- Scenarios should use the abstraction levels from GRVA 18-50 (functional, abstract; logical, concrete; nominal, critical and failure).
- The scenarios used should be maintained independently from a manufacturer’s scenarios to give authorities / assessors their own independent set of scenarios.
- A search / filter function for a specific feature (or ODD) should produce “lists” of relevant scenarios.
- Where scenarios are relevant to a particular national / provincial traffic rule, this should be included in the description and by the use of any appropriate identifiers in the ontology or taxonomy.
 - The description should include a rationale for why it is has been included.
- The provenance of the scenario should be specified, including country of origin, history of the scenario, e.g., ISMR, traffic rule, synthetic scenario, etc.
 - It should be possible to sort by type of scenario in case there are differing requirements for certain types (e.g., ISMR).

- Additional requirements needed for specific types of testing, for example, road furniture or equipment for track testing, should be identified.
- Access control will be needed for the various stakeholders, including contracting parties, manufacturers and suppliers.
 - This requirement may only be possible for any tool, catalogue or database within the control of the UNECE. Access to external resources will have to be agreed with the providers.
- A process should be developed to manage the scenarios and ensure they are of sufficient quality, are appropriate for inclusion and do not duplicate or overlap with existing scenarios.
 - For scenarios produced from the ISMR activities, the process needs to ensure that any resulting new or updated scenario represents the underlying reason or cause.
 - Note that producing the concrete scenario with all of the relevant features based on ISMR information may be useful, but understanding the wider issue should lead to a better safety outcome and a scenario that should improve the overall safety of existing and future vehicles.
 - A group under WP29 could be one mechanism for managing this activity.
- A capability for generic scenarios to be converted into more “specific” scenarios relevant for a jurisdiction’s road infrastructure and traffic rules would be a useful functionality. It is potentially useful to allow jurisdiction-specific items such as rules of the road to be treated as variables that would change as the country /state / etc. is specified.
 - The high-level goal of this capability is to avoid having multiple similar scenarios that are essentially the same but jurisdiction specific.
 - Once a country / region / state / etc. is chosen it would be useful that all the relevant attributes of that selection, e.g., road signs, rules of the road, etc., would be available or used as part of any resulting “concrete” scenario.
- Any new or updated scenario based on an ISMR report should incorporate the most generic understanding of the cause of the incident to ensure that future ADS are adequately tested and able to cope with the incident that prompted the ISMR report and similar situations.
 - Some functional level scenarios capturing common interactions would be appropriate.
 - Retaining the specific circumstances that generated the ISMR report may be useful either as a specific case or as a set of concrete parameters to ensure that case is no longer a problem, especially for the ADS that originally experienced the issue.
 - Problematic combinations of parameters that have been identified should be recorded and made available as part of the scenario description.
- Good management of the scenarios that result from the ISMR report should aid continuous improvement in ADS safety by providing a resource for checking and testing the safety performance of existing and future ADSs.
- Scenarios created or modified because of output from an ISMR report should reference the (ISMR) activity that led to it.
- The scenarios that are held for authorities’ assessment should cover as many aspects of the ADS’s safety and performance envelope as possible, including path planning and object detection.

- Scenarios should be identified with a version number to allow identification of the scenario version that was used during the ADS assessment.
 - Older versions of scenarios should be available to allow them to be checked or used for testing.
 - A changelog should be maintained that provides a history of the scenario and details of when and why changes were made.

Topics for the ADS IWG

Manufacturers scenario data base coverage

- This topic was addressed by various contracting parties, including in a presentation from Japan and EC/JRC.
- The ADS IWG is tackling coverage, primarily through the ODD framework and audit sections.
- Dedicated discussion would allow contracting parties to consider additional techniques which may be helpful.

Mandatory scenarios

- The EC/JRC presented on the concept of a collection of core scenarios based on other regulations that, if they are ODD appropriate, are mandatory for all ADS.
- Since it is related to regulatory requirements, this topic should be handled by the ADS IWG.

ISMR scenarios

- It is within the scope of the ADS IWG to clarify the process of how new or updated scenarios are developed from ISMR activity. In particular, who is responsible for proposing and developing these new or updated scenarios and how the quality is ensured?
- The mechanism by which ADSs that are in service should be tested against new or updated scenarios that result from ISMR activities should be described. In particular, the situation should be identified when an in-service ADS may be vulnerable to the issue that is represented by the new or updated scenario.

Interoperability

- A presentation was made by France on interoperability including a set of references, practices and standards covering taxonomy.