Update on the UK scenario database project - worked examples for ALKS test scenarios in simulation

Richard Holland
Principal Engineer – Connected Places Catapult
Vision: The Scenario Based Certification Process

**UNECE**
- MUSICC Scenario Database
  - Curator
  - Incoming scenarios

**OEM & Technical Service**
- Regulatory testing
  - Simulated tests
  - Physical tests

**Type Approval Authority**
- Certification

Other Processes (audit, test drives, manufacturers’ declarations, …)
The Scenario Description Language (SDL) is a key part of MUSICC’s deliverables.

- Defines fields and format for representing scenarios
- Stakeholders will be more willing to engage given a standardised format
- CPC is an active member of ASAM OpenSCENARIO standardization groups

MUSICC’s scenario description language

1. Represent the road network

![Road network diagram]

2. Represent the actions of other road users

![Road users diagram]

3. Additions to OpenSCENARIO
   - **Metadata**
     - Search for scenarios corresponding to the ODD of the ADS under test
   - **Parameter stochastics**
     - Variables in the scenario can take randomly generated values
MUSICC scope and context

Synchronised private databases

Master regulatory database

Scenario generation (external tools)

Web Interface
- Browse
- Import
- Basic editing

Export API

Regulatory testing (external tools)
• Example Requirement text ("ACSF-23-02r4 (Chairs) Base_document_for_low_speed_ALKS")

Dynamic Driving Task, and Sensing Capabilities

2.5.1 The activated system shall keep the vehicle inside its lane of travel and ensure that the vehicle does not cross any lane marking. The system shall aim to keep the vehicle in a stable lateral position inside the lane of travel to avoid confusing other road users.

2.5.2 The activated system shall detect a vehicle driving beside and if necessary adjust speed and/or the lateral position of the vehicle within its lane as appropriate.

2.5.3.2 The activated system shall detect the distance to another road user in front located within the operating range as defined in paragraph 2.5.6.2.

While the ALKS vehicle is not at standstill, the system shall adapt the speed to adjust the distance to a vehicle in front in the same lane to be equal or greater than the minimum following distance.

• Example Test text ("ACSF-23-05 (Germany) ALKS Testing requirements")

Following Distance Test:
1) approach a slower lead vehicle which is on constant speed
Pass: No collision and no violation of safety distance

2) follow a leading vehicle which starts slightly decelerating
Pass: No collision and not performing an EM and no prolonged violation of safety distance
Identify an approved test set e.g. “ALKS_following_distance”
Scenario Parameter Randomisation
e.g. “ALKS_cut_in”

- **Example Requirement text** (“ACSF-23-02r4 (Chairs) Base_document_for_low_speed_ALKS”)

Dynamic Driving Task, and Sensing Capabilities
2.5.3.2 In case of a lead vehicle decelerating or cutting in, there shall not be an appreciable time interval between the detection of a following distance below the required minimum distance and the start of the adjustment process.

- **Example Test text** (“ACSF-23-05 (Germany) ALKS Testing requirements”)

Deceleration Tests:
1) Cutting in vehicle with short safety distance
   **Pass:** Adjust safety distance without performing an EM
2) Cutting in vehicle, followed instantly by \([\text{max. } / x \text{ m/s}^2]\) deceleration in the lane of travel
   **Pass:** No collision
Scenario Parameter Randomisation

e.g. “ALKS_cut_in”

Cut in at short distance

Same scenario, different traffic conditions, speeds and timing
Functional scenarios
Managed by tag, e.g. “ALKS-cut-in”

4 lane - GB

3 lane - FR
Next Steps