Validation Methods for Automated Driving (VMAD) Informal Working Group: New Assessment/Test Method (NATM)

United Nations Economic Commission for Europe (UNECE)
Working Party on Automated/Autonomous and Connected Vehicles (GRVA)
October 09, 2020
WebEx

UNECE

Purpose

- To provide a report out-brief from GRVA on the work of VMAD IWG.

- To provide an update on Interaction-SG

- To present and engage in preliminary discussions on the revised NATM Master document.

- To outline the next steps and path forward for upcoming meetings as well as the process for further developing the NATM Master Document (including outstandings issues to be addressed by SGs and WP.29)

1- OUT-BRIEF FROM GRVA

VMAD Deliverables to the World Forum for Harmonization of Vehicle Regulations (WP.29)

Based on the Framework document, VMAD has the following deliverables to GRVA/WP.29:

Deliverables	Status
1. The test and assessment (including CEL) for Automated Lane Keeping Systems (ALKS) of SAE levels 3/4 compatible as a new UN Regulation for contracting parties to the 1958 agreement*	Completed – March 2020
2. Review of the existing and upcoming methods and a proposed way forward for the assessment of automated driving (AD)	Completed – March 2020
3. New assessment/test method (NATM) of AD	**March 2021**

Recent VMAD Sessions

- **VMAD has held regular VMAD Teleconferences**
  - Since May 2020, VMAD has held six VMAD teleconferences as well as multiple sub-groups meetings and VMAD leadership meetings
  - Approximately 80 individuals from contracting parties (CPs), NGOs and industry have attended each of these WebEx VMAD sessions
  - VMAD sessions have been focused on developing the NATM Master Document

Recent VMAD Sessions

- **VMAD Agreed Approach**
  - Agreement to develop the methodologies from high level description first then providing more details
    - description of the different pillars and elements
    - description of the relations - between these pillars and elements
    - description of the (dis)advantages of the different pillars and maturity
    - high level description of the content of the pillars
    - Integration between pillars and with the functional requirements developped by FRAV
  - Agreement on the structure of Master document
  - Start with validation of NATM for Highway systems
- **VMAD issues for further (internal) discussion e.g.**
  - How to develop in-use monitoring/evaluation
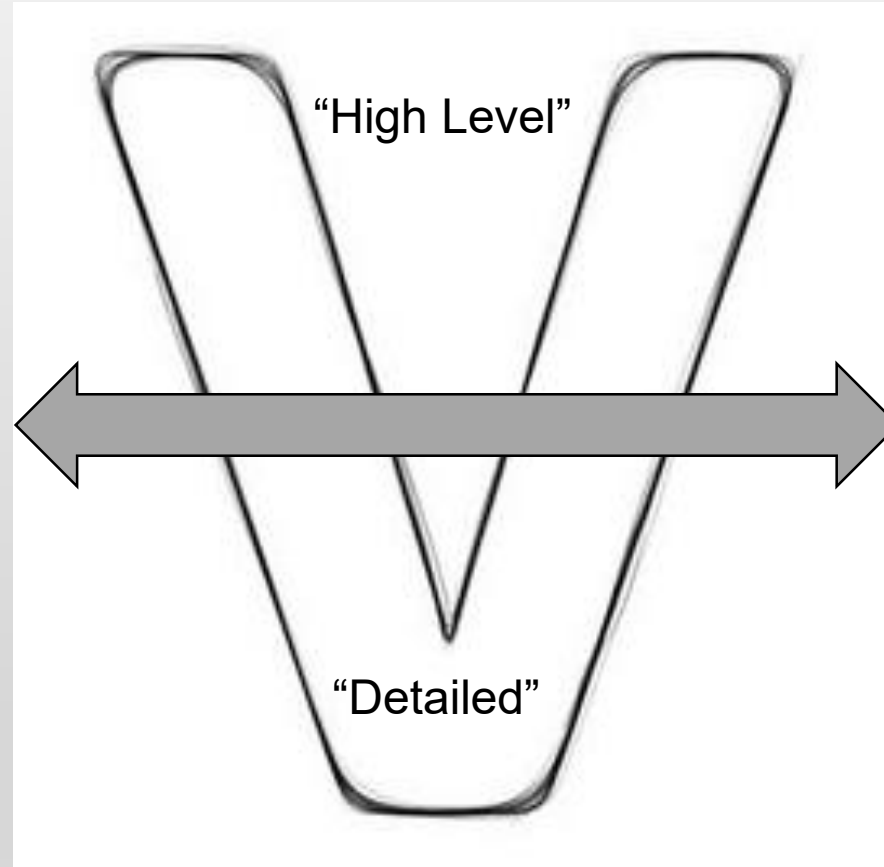 - Description of Audit which meets both 58 and 98 agreements

Relationship between FRAV and VMAD

REQUIREMENT DEFINITION

FRAV

Pass/Fail Performance Requirement(s)

"High Level"

"Detailed"

ASSESSMENT METHODOLOGY

VMAD

Test/Assessment Procedure(s)

Continued collaboration between VMAD and FRAV

- More than 90% of the participants attended both FRAV & VMAD

- Discussions and work by FRAV continues to inform VMAD's work and vice versa

- Agreement to establish regular check-ins (monthly at minimum)

- Agreement that both groups start with high level descriptions of functional requirements (FRAV) and assessments and test methods (VMAD)

- Agreement that elements of FRAV and VMAD should be similar and Annex 1 of the Framework document should be amended to reflect this in the future

- Agreement to address « system safety » first at FRAV then at VMAD

NATM Master Document

In May at VMAD-6, a draft NATM Master Document was tabled.

The NATM Master Document outlines the various sections of the NATM. When completed, the document will be structured as follows:

1. **The first portion of the document is a high level framework of the NATM, including:**
    o Scope and general overviews of each of the pillars (scenarios catalogue, audit, simulation/virtual testing, test-track, and real-world testing); and,
    o Overall process of the NATM (e.g., how the pillars of the NATM operate together, producing an efficient, comprehensive, and cohesive process).

2. **The second portion of the document will map out the process for how specific functional requirements are assessed by the NATM.**
    o As part of this work, VMAD, in consultation with FRAV, will outline how the pillars correspond with the functional requirements indicated in the FRAV-05 document.

NATM Master Document

- Since VMAD-6, VMAD and its sub-groups have held meetings to revise and further develop the NATM Master Document. A revised version of the NATM Master Document is currently under development.
    - The new version of the NATM Master Document will work from the pillar-specific concept papers which have been advanced by the sub-groups.

- To ensure the NATM Master Document is completed in a systematic and timely fashion, VMAD and its sub-groups have initiated the development of workplans.
    - Workplans include outstanding questions and action items for further development of various technical aspects of the NATM (e.g. scenarios catalogue).

- As work progresses, the NATM Master Document will continue to evolve to a level of maturity sufficient enough for VMAD to then begin more detailed deliberations, and edits to the NATM describing how the pillars will be integrated and applied to meet the specific needs of parties under both the 1958 and 1998 Agreements.

Considerations for GRVA

- **Extension of ALKS**

  VMAD agenda is already more than full, VMAD is committed to deliver the deliverable by March 2021. It is anticipated that VMAD work may overspill after March 2021.

- **Framework Document**

  Elements for VMAD and FRAV are different in Annex 1 of the Framework Document. Annex 1 of the Framework document should be amended to reflect that elements of FRAV and VMAD should be similar

Next Steps

- **VMAD and its sub-groups will continue to work together to:**
  - Integrate the work done by each sub-group to further revise the NATM Master Document for submission to GRVA in February 2021
  - Scope out and implement workplans to further develop the NATM Master Document.

- **Recognizing the synergies between FRAV and VMAD, the two IWGs will continue to collaborate to advance our respective workplans**

- **VMAD deliverables for discussion at next GRVA**
  - Draft NATM Master Document
  - List of open issues as appropriate including possible future work

2- REPORT FROM SG ON INTERACTION

3- NATM MASTER DOCUMENT

Structure of NATM Master Document

The Master document will include the following sections (to be further developed by VMAD members):

Section	Description
1. Background	• Outline the background the NATM.
2. Purpose and Scope	• Outline the purpose, scope and path forward for developing the NATM.
3. Definitions	• Present key definitions.
4. Applying a Multi-pillar Approach to the NATM	• Explain the Multi-pillar approach and rationale behind applying the NATM for validating the safety of an ADS
5. Scenario Catalogue	• Outline the rationale for this pillar, its key design elements as well as expectations and best practices for manufacturers and testing authorities when validating the safety of an ADS. • Develop a catalogue, consisting of a baseline of relevant, critical, and complex scenarios.

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Structure of NATM Master Document (continued)

Section	Description
6. Virtual Simulation Testing	• Outline the rationale for each of these pillars, their key design elements as well as expectations and best practices for manufacturers and testing authorities when validating the safety of an ADS.
7. Track Testing	
8. Real-world Testing	
9. Audit	• Outline the rationale for this pillar, its key design elements as well as expectations and best practices for manufacturers and testing authorities when validating the safety of an ADS.
10. In-Use Monitoring	• Outline the rationale for this element, its key design elements as well as expectations and best practices for manufacturers and testing authorities when validating the safety of an ADS.
11. NATM Pillars/Element Integration	• Establish the links between the pillars of the NATM as well as the how the NATM links with the functional safety requirements developed by FRAV

Structure of NATM Master Document (continued)

Section	Description
12. VMAD NATM-FRAV Integration	• Establish how the NATM links with the functional safety requirements developed by FRAV

Revised NATM Master Document UNECE

- Changes to the revised Master Document are based on concept papers developed by sub-groups and tabled through several VMAD meetings.

- This material has been incorporated now for broader VMAD consideration.

- **Comments on this latest version are due from VMAD stakeholders by: October 23, 2020**

- Please submit comments to VMAD Secretariat and the co-chairs

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REBRANDING OF VMAD SGs

The New SGs

- In light of the current workload at VMAD, co-chairs have decided to add another SG and take the opportunity to rebrand them. As such, the SGs are now:

  - **SG1: Scenarios**

  - **SG2: Virtual/Simulation Testing**

  - **SG3: Audit (including in-use monitoring)**

  - **SG4: Track / Real world Texting**

Next steps / Outstanding Issues

Upcoming VMAD Sessions

VMAD will hold the following upcoming sessions
- 13th VMAD IWG Session – October 9, 2020 (virtual)
- 14th VMAD IWG Session – November 5-6, 2020 (virtual) - Discussion
- Possible VMAD IWG Session – December, 2020 (TBC)
- VMAD IWG Session – January 15-16, 2021

Thank you!