Status Report of the Informal Working Group on Validation Methods for Automated Driving (VMAD)

United Nations Economic Commission for Europe (UNECE)
Working Party on Automated/Autonomous and Connected Vehicles (GRVA)
24-28 January 2022
Hybrid

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Purpose

- To propose a second iteration of NATM; and

- To provide a status update on the work of the Validation Methods for Automated Driving (VMAD) Informal Working Group (IWG). Specifically the following:
  - Work accomplished on WP29 Guidelines for NATM
  - Open issues from Subgroups
  - Collaboration between FRAV and VMAD

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

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

Deliverables	Status
1. Second iteration of NATM addressing the "outstanding issues" identified by VMAD and the evaluation of NATM for the motorway use-case	November 2021 (information) / March 2022 (endorsement)
2. WP29 guidelines for NATM including outcome of "outstanding issues" and translation of FRAV requirements	March 2022 (information)

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VMAD IWG activities since GRVA #11

- 3 VMAD meetings and more than 20 (!) Subgroup meetings took place
  October 2021: focus on draft 2nd iteration NATM (ECE/TRANS/WP.29/GRVA/2022/2)
  November 2021: amendments for 2nd iteration NATM
  January 2022: focus on Guidelines

                  amendments for 2nd iteration NATM (GRVA-12-12)
- The 2nd iteration NATM comprises much more items and details, causing the document to grow from 46 to 103 pages…
- This development supports the added value of developing Guidelines, comprising the essential requirements for assessment and testing

Overview of proposed second iteration of NATM

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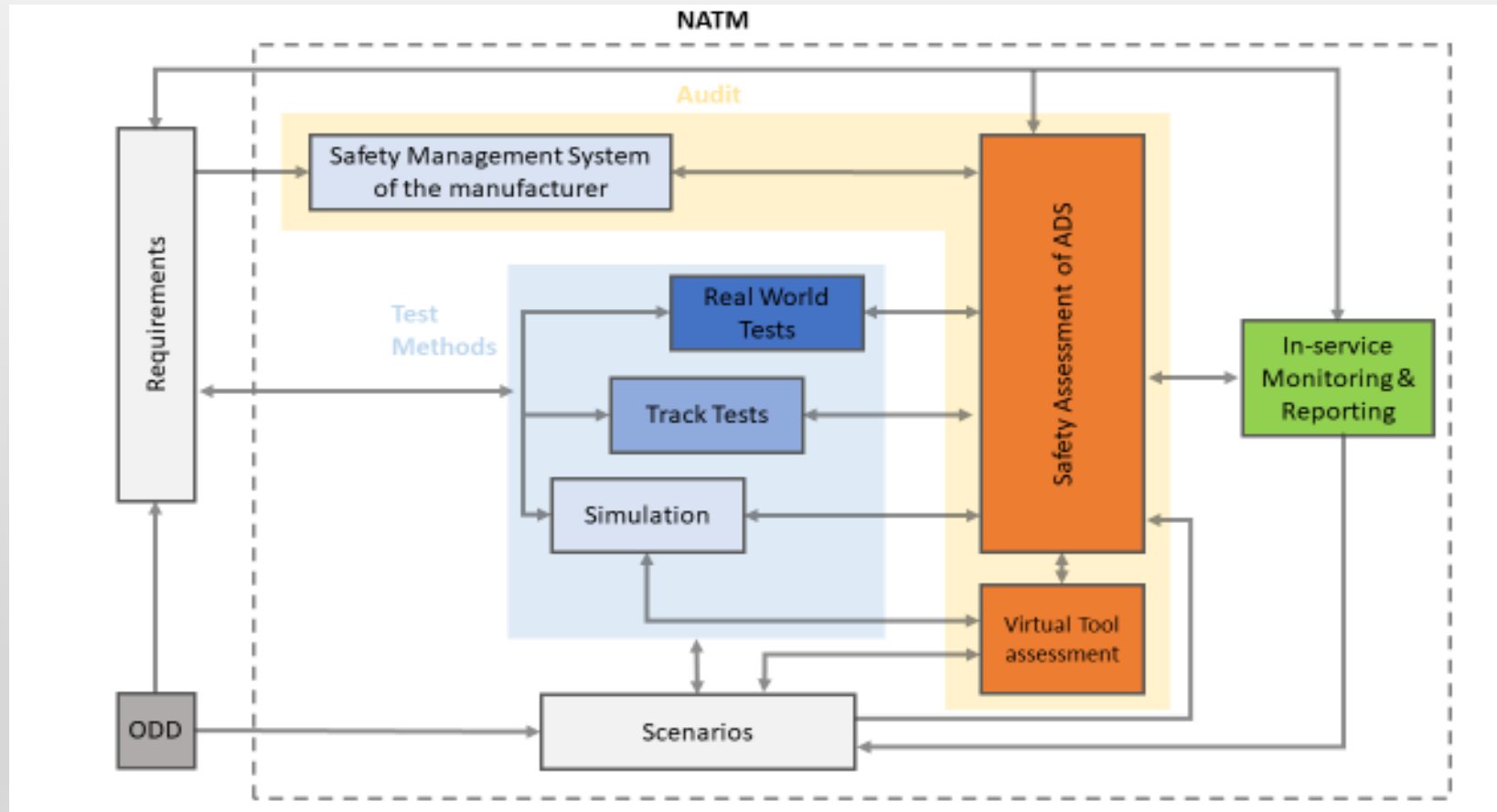
Scenarios (Section 5)

- ## 1st iteration
  - The basic principles of scenarios are explained in the text, such as the need for scenario-based testing in NATM, the definition of a scenario, its classification and the fact that it consists of many relevant elements.
  - Functional scenarios for highway use-cases are listed in Annex 2.

- ## 2nd iteration
  - Based on the discussion of the 14 outstanding issues, the conclusions of them has been clarified in Ch.5.

    (ex.)
    - the need to update the scenario catalogue,
    - the need for tagging scenarios for use,
    - the need to cover sufficient ODD and to include real-world driving situations,
    - the need to include unsafe behaviour by other road users, regardless of whether ADS could prevent an accident or not, and
    - that random sampling methods are justified in assessment to avoid overfitting.

Simulation/Virtual Testing (Section 6)

- Distinction between virtual testing tool and audit in the diagram with relation between pillars

- Extensive elaboration of a credibility assessment framework (Annex III) to prove the validity of a virtual toolchain for validating ADS requirements

- Inclusion of several examples of virtual toolchains (Appendix 1), correlation methodologies (Appendix 2) and model validations (Appendix 3)

Track Testing (Section 7) and Real-World Testing (Section 8)

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- An approach for the track and real world testing methods has been delivered (Annex VII)
  - Builds on what was described and agreed upon in 1st iteration of NATM
  - Based on test matrices (new in 2nd iteration):
    - One general test matrix for physical testing;
    - Two different test matrix approaches for respectively track testing and real world testing;
  - Further elaboration required (see slide 13)

- Includes a proposal on the validation of this approach (Item III in Annex VII)

Audit (Section 9) and In-service monitoring and reporting (Section 10)

- Requirements for Safety Assessment (Annex IV)

- To be decided: inclusion/exclusion of information provisions for users (item I in Annex IV)

- Requirements for auditing the Safety Management System of the OEM (Annex V)

- Requirements for In Service Monitoring & Reporting (Annex VI). Future work on reporting from other sources and information sharing

- PS: leadership of Subgroup 3 is handed over from Antony Lagrange to Maria Cristina Galassi

Process for drafting the WP 29 Guidelines

- A draft set of guidelines was developed based on the current content of the Master Document.

- The document has been transformed into more explicit recommendations/requirements for validation by manufacturers, technical services and authorities.

- SG leaders and Co-chairs met in mid-December to discuss the content of the guidelines draft and how proceed with the development of this document.

- Co-chairs would like to put forth this draft of the guidelines to VMAD 23 for members consideration through the subgroups
    - Subgroups to provide comments on the document in particular the section they are responsible for by Feb 4
    - VMAD co-chairs will consolidate and share to all VMAD Members by Feb 16
    - VMAD 24 is on Feb 24-25
    - **Submission to GRVA as a formal document right after**

Key changes incorporated in the guidance version of the NATM

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- Various procedures and considerations from the NATM are reframed into explicit recommendations for the readers' consideration (e.g. "it is recommended that"…).

- Some paragraphs were reordered/ regrouped to improve flow and ensure the document takes a guidance format. Some other modest edits were made to improve clarity in English.

- Some paragraphs that appeared to be internal observations for VMAD members, outlining areas for further work or how certain features of the NATM (like the scenarios catalogue) should be developed in the future were also omitted .
  - o This text has been moved to an Annex (Annex VII) at the back for now.

- All definitions have been combined into an Annex (Annex I). Words have been italicized when they first appear in the document so the reader knows they can find a definition of this term in Annex I.

- Finally, it should be noted that this document was based upon the second iteration of the VMAD Master Document submitted to GRVA (GRVA-2022-02).
  - o As such, this document does not incorporate recent deliberations on the NATM MD by any of the subgroups since submission to GRVA.
  - o The one exception is that SG2's documents for the credibility assessment (VMAD 22-04) have been added to Annex III.
  - o While SGs are examining the document, in a parallel process it will be updated with the latest amendments

Outstanding Issues VMAD (1)

- Scenarios:
  Update of functional scenarios
  Should any template for scenario's be defined? If so, how will it be?
  What is the maintenance procedure (e.g. regular update) for a scenario catalogue? By whom?

- Virtual Testing/Simulation: -

- Track/Real World Test:

  1. Further discussions, including on the possible auditing of test equipment, the necessity of remote support functions, ensuring safety during real world tests, and data analysis methods.
  2. Further development of the testing methods, including testing protocols, based on (provisional) requirements and measurable criteria, as being developed by FRAV, and scenarios, as being developed by VMAD SG1 (for track testing), as soon as they become available.

Outstanding Issues VMAD (2)

- Audit/In Use Monitoring & Reporting:
  1. data elements vs occurrences: further discuss non-critical occurrences reporting; discuss the need to identify specific data elements to be monitored (and reported) besides the high-level occurrences listed by SG3;
  2. ISMR roles and responsibilities: identify roles of national/international authorities, including (a) data accessibility/protection and (b) development and sharing of safety recommendations
  3. pending exchange with GRVA/WP29 on
  I. Reporting from other sources than the ADS manufacturers;
  II. Information sharing among safety authorities & Contracting Parties
  III. VMAD-SG3 Technical Workshop on in-use safety (SG3, FRAV, EDR/DSSAD, FGAI4AD).

Collaboration between FRAV and VMAD

- FRAV and VMAD co-chairs and Subgroup/Workstream leaders continue to meet regularly to facilitate the accomplishment of their respective deliverables.
- FRAV started to elaborate (where needed) the 24 requirements against the scenario "Lane Keeping" (including eventual subscenario's). The outcome will be used by VMAD to evaluate which pillars can be used for validation. Expected to be ready by mid February.
- Co-chairs will continue to update the GRVA members on progress.

Proposed working schedule

Second Iteration NATM
- **January 24-28:** the draft is tabled at **GRVA as formal doc.**
- **March 8-11:** the draft is tabled at **WP29 as informal doc. for endorsement**
- **June 21-24:** the draft is tabled at **WP29 as formal doc. for endorsement**

Guidelines NATM
- **May 23-27 :** the draft is tabled at **GRVA as formal doc.**
- **June 21-24:** the draft is tabled at **WP29 as formal doc*.**

*) Depending on the GRVA discussion, an informal doc amending the formal doc could be accompanied.

Summary

- Draft second iteration of the NATM has been submitted to GRVA #12 with the expectation to forward this as informal document to the March WP29
- Status update on the work Work accomplished on WP29 Guidelines for NATM has been made and feedback will be used to draft the Guidelines with an intention to submit it as a formal document to GRVA # 13
- Collaboration FRAV-VMAD is progressing

Thank you!