

Invitation to the 31st Session of the GRVA Informal Working Group on Functional Requirements for Automated Vehicles (FRAV)

The 31st session of the FRAV informal group is scheduled for 13-15 September 2022 in the Renaissance Center Marriott Hotel in Detroit, Michigan. Materials for the session can be found on the [session wiki page](#). Arrangements will be made to enable remote participation. The session on the 13th will run between 09:00 and 17:00 EDT. The session on the 14th will start later from 10:30 EDT and run until 17:00 EDT. The session on 15 September will start from 09:00 EDT and end around midday. We will structure the discussions to facilitate remote participation and consider limitations on availability given the different time zones. We understand that remote participants in Asia may only be available for the beginning of the morning sessions while participants from Europe may not be available for the afternoon sessions.

The discussions will cover the following topics:

- FRAV positions on external light signals for ADS vehicles
- Safety of ADS user interactions
- Alignment of DDT requirements with verifiable criteria
- DDT requirements: behavioural versus functional
- Integration of DDT framework elements into Document 5
- FRAV status report to the September GRVA session
- FRAV deliverables under the AV Framework Document
- FRAV work plan and calendar

Updates from the workstreams and stakeholder presentations, if any, will be integrated into these discussions.

External light-signalling

For the November WP.29/AC.2 session, FRAV has been tasked to provide its views and recommendations on external lighting requirements for ADS vehicles, in particular concerning the use of light-signalling to indicate the operating mode of an ADS vehicle to other road users. The secretary has prepared a draft set of recommendations reflecting the FRAV discussions to date (FRAV-31-06). Transport Canada has provided comments on the draft (FRAV-31-07).

The 31st session will aim to reach agreement on a text for submission to the September GRVA session.

Safety of ADS user interactions

The User Safety workstream leaders presented a status update (FRAV-30-08) during the last session; however, FRAV dedicated most of the session to discussions on the DDT-relevant sections of the safety recommendations. Therefore, most of the first day and the morning of the second day of the 31st session is being allocated to discuss HMI and user safety issues.

The aim of the session is to agree on a work plan and desired outcomes towards establishing objective and verifiable requirements to ensure the safety of user interactions with an ADS. The outcome should provide a framework and path to ensure that the recommendations cover:

- the specific interactions that may occur between an ADS and the user(s),
- the relevance of these interactions to different ADS configurations/use cases, and
- objective, verifiable safety specifications for ADS management of these interactions.

The outcome should enable FRAV to define objectives for each session at least through December.

DDT requirements and verifiable criteria

During the 30th session, FRAV agreed that verification of functional requirements for ADS performance of the DDT would involve assessing ADS performance under ODD-relevant scenarios relative to behavioural competencies, global requirements, and safety models. The current DDT-relevant requirements are stated in functional terms while the verification criteria are stated in behavioural terms.

For example, Document 5 contains a requirement that the ADS shall be capable of performing the entire DDT within the ODD of its feature(s). FRAV has previously concluded that defining the DDT in terms of specific functions and setting performance requirements for those functions is not appropriate because functions can involve thousands of subtasks. FRAV agreed during the last session that verification of the ADS capability to perform the entire DDT rests on verifying that the ADS demonstrates behavioural competencies associated with scenarios applicable to the ODD of the ADS feature(s). The behavioural competencies inherently require tactical and operational functions to perform the DDT and the scenarios ensure coverage of the ODD.

FRAV may wish to consider explicitly aligning the functional requirements with the criteria to be met under testing (e.g., the ADS shall demonstrate the behavioural competencies defined for the scenarios applicable to the ODD of its features). If so, FRAV would consider revised requirements during its October session.

Behavioural versus functional requirements

During the 30th session, Japan presented comments on DDT performance requirements within the context of the Careful and Competent Driver safety model and current legal frameworks governing human driver behaviours and responsibilities (FRAV-30-06/Rev.1). Throughout the session, FRAV experts referred to safe-driving principles such as collision avoidance, precautionary behaviour, defensive driving, caution under uncertainty, predictability, adapting to road conditions, anticipation of potential risks, and so on. Table 1 of Document 5 (FRAV-30-05) contains similar references to safe-driving behaviours. Japan noted that the DDT-related requirements in Document 5 address ADS-specific functions (e.g., performance of the DDT, recognition of ODD conditions, OEDR) but do not include behavioural principles applied to human drivers that could equally apply to ADS. Japan recommended that FRAV agree on such performance requirements.

Therefore, FRAV will discuss the inclusion of behavioural requirements (applicable to driving whether human or ADS and differentiated from ADS-specific functional requirements) in its recommendations for ADS safety requirements.

DDT framework integration

FRAV has agreed on elements to enable establish verifiable criteria for scenario-based assessments of DDT-relevant performance. These elements include:

- Manufacturer documentation of ADS feature ODD boundaries and conditions,
- Scenario generation based on ODD, OEDR, and other safety-relevant analyses,
- Traffic-rule conversions to generate ADS-applicable scenario parameters and performance limits,
- Definition of behavioural competencies applicable to scenarios, and
- Methodologies for developing safety models to quantify boundaries for vehicle-control actions and delineation between preventable and unpreventable collisions.

These elements involve procedures and methods linked to specific requirements (e.g., the manufacturer shall define the ODD conditions and boundaries of ADS features in measurable/verifiable terms).

Therefore, FRAV will consider how to integrate these methods and tools into its safety recommendations. For example, FRAV has already established a placeholder for an annex/appendix dedicated to explaining the procedures for traffic-rule conversions. For the 31st session, the aim is to similarly agree on placeholders for the other elements of the DDT framework. After the placeholders have been defined, FRAV may wish to consider summary explanations of these elements during its October session.

FRAV deliverables

Given the two-year extension of the FRAV mandate, the WP.29 AV Framework Document will be updated to set deliverables for 2023. During the last session, FRAV discussed views on its objectives for 2023-2024 and expectations for delivery of an interim document on ADS safety recommendations for the June 2023 WP.29 session. Document FRAV-30-09/Rev.1 provides the outcomes of this discussion.

The 31st session aims to reach agreement on a proposal to update the deliverables table of the AV Framework Document for submission to the September session of GRVA.

FRAV status report

FRAV will need to update GRVA on the status of its activities during the September GRVA session. FRAV will discuss and agree on the content of its presentation (and supporting documents, if any) for GRVA.

FRAV calendar

The FRAV leadership anticipates holding informal group sessions on a monthly basis through June 2023. FRAV has discussed holding a physical session in December with the geographical rotation suggesting Asia. Japan has kindly offered to host this December session. VMAD has expressed interest in holding its December session adjacent to the FRAV session dates. Since the last session, Japan has indicated the possibility to hold the session(s) during the week of 12 December in conjunction with an AV symposium in Tokyo.

WP.29 will hold its 188th session during Monday-Wednesday, 14-16 November. FRAV may wish to consider whether this schedule offers an opportunity to hold a physical session in Geneva in conjunction with the WP.29 session.

The secretary has tentatively reserved the following dates for FRAV sessions on the [GRVA calendar](#):

- October 13-14 (web conference)
- November 17-18 (Geneva)
- December 12-14 (Tokyo)

FRAV may wish to consider this tentative schedule as well as scheduling of sessions during January-March 2023. In order to meet the deadline for submission of its interim recommendations to the June WP.29 session, FRAV will need to reach agreement on the text during its March 2023 session.

The January-March sessions will include consideration of draft text for the WP.29 submission. Towards this end, one aim of the December session will be to reach agreement on the elements of Document 5 to be included in the WP.29 submission (i.e., agree on the scope and level of detail to present based on

consensus to date—updates may be made during January-March, but we want to work from a reasonably stable draft based on consensus as of year-end 2022).

If you have not done so, please confirm with the secretary whether you plan to attend the 31st session in person. If planning to participate remotely, please inform the secretary whether you will have limitations on your availability between the hours of 09:00-17:00 EDT. If experts wish time on the agenda for presentations, please notify the secretary. Submissions can be sent to the FRAV secretary (jcreamer@americanautocouncil.org).