

<u>Report of the second meeting of the Informal Working Group on Functional Requirements for Automated and Autonomous Vehicles (IWG FRAV)</u>	
Venue	Tokyo, Japan Day 1 – Japan Automotive Standards Internationalization Center, 7 th Floor Conference Room Day 2 – Japan Automotive Standards Internationalization Center, 4 th Floor Conference Room
Date	14-15 January 2020
Documents	Submissions for the session can be found on the FRAV-02 UNECE wiki page .
Status: Draft	

<i>Agenda and previous session report adopted.</i>	FRAV adopted the draft agenda (FRAV-02-01). FRAV also adopted the draft report of the previous session with editorial corrections to the second paragraph. The adopted report has been posted as document FRAV-01-02/Rev.1 on the FRAV-01 session web page.
<i>FRAV refined its scope to address Category 1 and 2 (4+ wheeled) vehicles as defined under SR1.</i>	Pursuant to the first FRAV session, the UK delivered a review of vehicle categories under Special Resolution No. 1 (SR1) of the 1998 Agreement (FRAV-02-03/Rev.1). The UK noted that SR1 Categories 1 and 2 cover all four-wheeled vehicles whereas the Consolidated Resolution on the Construction of Vehicles (RE3) under the 1958 Agreement distinguishes between quadricycles (L6-L7) and heavier M/N vehicles. In addition, SR1 defines Category 3 to cover two and three-wheeled vehicles which complicates the inclusion of three-wheeled vehicles in FRAV's work. Therefore, FRAV agreed to align its initial scope with SR1 Categories 1 and 2 (i.e., all 4+ wheeled vehicles) with the option to address three-wheeled vehicles at a later stage, if warranted.
<i>FRAV identified gaps in the SR1 definitions that may require attention.</i>	The UK also noted that SR1 Category 1-1 excludes standing positions. A vehicle coverage gap could exist because Category 1-1 includes up to eight seating positions plus "the driver's seating position" while Category 1-2 covers vehicles for more than eight passengers (hence an automated pod designed to carry eight standing passengers would fall outside any category). SR1 passenger-vehicle definitions also refer to drivers and driver seating positions which would raise a question for vehicles without driver controls. FRAV agreed to revisit these possible gaps as its work progresses.
<i>FRAV-01-13/Rev.1 aligns the safety elements matrix with the WP.29 Framework Document</i>	Pursuant to the first FRAV session, OICA provided an amended version of its synthesis of Contracting Party guidelines and policies to align with the WP.29 AV Framework Document (WP.29/2019/34/Rev.2, including the correction noted by FRAV during its first session). FRAV welcomed the resulting document FRAV-01-13/Rev.1. Given that document FRAV-02-05 (see below) was prepared to transpose the safety elements spreadsheet into a word document suitable for development going forward, FRAV elected not to hold detailed discussions of FRAV-01-13/Rev.1.

<p><i>FRAV agreed on the transposition of the safety elements matrix into “Document 5” as the tool for developing functional performance requirements in greater detail.</i></p>	<p>On behalf of the co-chairs, the FRAV secretary introduced document FRAV-02-05 as a tool for structuring discussions. As such, the document should not be considered as a proposal for a legal instrument. The document aims to enable FRAV to capture all stakeholder input in an orderly and logical manner. The co-chair from Germany stressed that the document aims to enable FRAV to identify priorities and manage the order of its work. FRAV reiterated that this document must adhere to the WP.29 AV Framework Document; however, FRAV recognized that its work could result in recommendations to amend the Framework Document.</p> <p>The FRAV secretary explained the intention to use FRAV-02-05 to identify areas of consensus in the short term in order to deliver a statement of common principles for functional performance requirements. This short-term effort would fulfil the Framework Document deliverable for the March 2020 WP.29 session. Longer term, the document aims to provide a structure for developing consensus on more detailed descriptions of functional performance requirements for delivery to the March 2021 WP.29 session.</p> <p>Pursuant to a proposal from the US co-chair, FRAV agreed to reserve the number “05” for all future versions of the document to facilitate tracking. As a result, the document has become known within FRAV as “Document 5”.</p>
<p><i>FRAV agreed to add background and purpose sections to Document 5.</i></p>	<p>Pursuant to a proposal from Canada, FRAV agreed that Document 5 should include a statement of its purpose to provide context. The secretary prepared FRAV-02-05/Rev.1 to include this section. Subsequent to further discussions and input, the secretary prepared FRAV-02-05/Rev.2 to provide a background section and a section describing the purpose of the document. The secretary will update the background section to maintain a record of the development of the document and FRAV decisions (similarly to the practice for GTR technical reports under the 1998 Agreement).</p>
<p><i>FRAV agreed to combine longitudinal and lateral motion control (per its terms of reference) and OEDR (per the Framework Document) in a single chapter on Execution of DDT.</i></p>	<p>Pursuant to decisions taken during the first FRAV session, FRAV-02-05 adhered to the elements identified in Framework Document. However, FRAV-02-05 reordered the elements to follow a logical progression. In addition, during the preparation of the document, the co-chairs noted that the FRAV terms of reference refer to longitudinal and lateral motion control which was not a defined element in the Framework Document. In addition, motion control falls outside the SAE J3016 definition of Object and Event Detection and Response. Therefore, FRAV-02-05 described the five major elements as follows:</p> <ul style="list-style-type: none"> a) System Safety b) Operational Design Domain c) Execution of Dynamic Driving Tasks d) Human-Machine Interface/Operator Information e) Failsafe Response <p>“Execution of Dynamic Driving Tasks” was defined to include OEDR (defined by the Framework Document) and vehicle motion control under Normal Driving and Other Driving conditions (addressing the FRAV Terms of Reference).</p>
<p><i>FRAV agreed that “system safety” includes system design and general operational performance.</i></p>	<p>During discussions of the Document 5 section on System Safety, the European Commission stressed that automated driving systems must be free of unreasonable risks. The EC stated that “system safety” addresses “general vehicle behavior”. The United Kingdom noted that system safety includes attention to system fault conditions and operational performance. FRAV agreed that system safety refers to the system design and presence of requisite capabilities and to general safety performance of the vehicle in operation. Canada highlighted the need for automated vehicles to adapt to their dynamic operating conditions.</p>

<p><i>Canada proposed to include property damage in the Framework Document Safety Vision.</i></p>	<p>The WP.29 AV Framework Document provides a “Safety Vision” stipulating, “The level of safety to be ensured by automated/autonomous vehicles implies that “an automated/autonomous vehicle shall not cause any non-tolerable risk”, meaning that automated/autonomous vehicle systems, under their automated mode ([ODD/OD]), shall not cause any traffic accidents resulting in injury or death that are reasonably foreseeable and preventable.”</p> <p>Canada proposed that “destruction of property” be added to prevention of “injury or death” as a performance criteria.</p>
<p><i>China stressed the need to address safety-critical interdependencies between the ADS and the human driver.</i></p>	<p>China introduced document FRAV-02-09 proposing the concept of “operational design condition” (ODC) to address requirements for ADS related to driver behavior or availability. China noted that the SAE J3016 definition of ODD does not include driver requirements such as keeping both hands on the steering wheel; however, such conditions could be critical to safe use of the vehicle within its ODD. China proposed ODC as a broader range of conditions than captured by ODD.</p> <p>FRAV agreed that driver involvement in the proper use of an ADS is a major aspect of functional safety. Some concern was raised that “ODC” might cause confusion with “ODD”. The HMI section includes attention to driver monitoring; however, this aspect did not seem to fully address the issues raised by China which might also relate to system design safety. FRAV agreed to include a note on China’s concept in Document 5 pending further consideration to ensure attention to the dependency of an ADS on driver behaviors for safe operation.</p>
<p><i>FRAV agreed to dispense with the term “OD” to focus on the definition of ODD. FRAV further agreed that work on ODD and VMAD work on scenarios should be aligned.</i></p>	<p>FRAV also considered the use of [OD/ODD] in the Framework Document. FRAV noted that ODD is a widely accepted term defined under SAE J3016. SAE suggested that OD referred to the vehicle’s operational environment which is limited by the manufacturer’s definition of the ODD. Canada noted that ODD defines the conditions under which the ADS can be active. Conversely, the ADS cannot be active outside the ODD. As a result, one goal of a safety assessment is to verify that the vehicle cannot be used in automated mode outside its ODD.</p> <p>FRAV considered different views on the scope of the ODD definition, including whether the ODD included fallback measures such as transition to the driver or initiation of a minimal risk maneuver. SAE confirmed that fallback measures are not considered to be part of the ODD since the definition refers to the “envelope” within which an ADS can operate. Fallbacks are responses to conditions (present or anticipated) that are outside the ODD.</p> <p>Ultimately, FRAV agreed that the term “OD” was unnecessary to the development of functional requirements. FRAV agreed to develop the Operational Design Domain section of Document 5 to ensure clear definition of the ODD scope and limits. At the same time, FRAV agreed that the ODD work should be aligned with the VMAD work on scenarios. JRC noted that the ODD definition is essential to determining the appropriate testing to carry out for each ADS, including decisions on which scenarios apply to the ADS. The FRAV co-chairs agreed to work with the VMAD co-chairs to promote a common understanding and alignment between FRAV work on ODD and VMAD work on scenarios.</p>

<p><i>FRAV agreed with the basic structure of the Dynamic Driving Tasks section of Document 5 but refined its focus to support VMAD testing methods and to limit overlap with System Safety requirements.</i></p>	<p>FRAV discussed the “Execution of Dynamic Driving Tasks” section of Document 5. CLEPA submitted that much of the section seemed redundant, suggesting that OEDR and normal driving would be covered under System Safety while emergency and other driving tasks would be covered under the Failsafe section. The EC agreed that System Safety and OEDR are interrelated. Japan noted that its guidelines and those of the EC treat System Safety and OEDR as one item.</p> <p>However, SAE noted that the Framework Document distinguishes between System Safety and the Validation of System Safety. In this regard, the EC agreed that the DDT section connects with the development of the VMAD assessment methods. The US, France, and the UK supported the separation of normal driving conditions and other driving conditions. France noted interest in ensuring appropriate interactions between automated vehicles and emergency services such as police or first responders. SAE further noted that fallback measures such as minimal risk maneuvers are not limited to system failure modes. For example, MRM include programmed responses in cases where the driver does not assume control during an ODD exit. Moreover, SAE suggested that the section would allow separate consideration of requirements for basic behavioral competencies and responses to crash scenarios.</p> <p>FRAV concluded that the DDT section would require further elaboration, especially with regard to functional performance requirements defined under the System Safety section, but that the DDT section added value in relation to VMAD’s development of physical testing methods such as track testing and a real-world test drive protocol.</p>
<p><i>FRAV identified mitigation of misuse risks, prioritized communication of information to the user, and criteria for activation, deactivation, and user override as important elements in HMI requirements.</i></p>	<p>FRAV discussed the “Human-Machine Interface/Operator Information” section of Document 5. China reiterated its interest in driver-system interactions. Manufacturers should be required to define under what conditions the ADS is designed to initiate or execute transfers of control to the driver. The system description should also explain measures designed to ensure driver compliance with safety-critical requirements (e.g., hands on the wheel) and countermeasures to cope with failures of the driver to meet these conditions.</p> <p>Canada, the UK, and France agreed that this section should address misuse risks. Japan agreed that some obligations may be imposed on the driver but cautioned against taking the concept too far. Canada agreed that FRAV is focused on the vehicle. Requirements may take the driver into account but should not extend to “regulating the driver”.</p> <p>Germany agreed but reminded FRAV that HMI should include communication of safety-related information to the user as well as addressing system activation and deactivation criteria, including driver override of the system. The Netherlands added that user information would need to be prioritized to mitigate against cognitive overload (confusing, conflicting, or excessive information) or habituation (ignoring warnings due to repetitive stimulation). Some stakeholders also proposed broadening the section to capture potential benefits of automated driving such as access for the disabled.</p> <p>FRAV agreed to incorporate these comments for further consideration in the development of this section.</p>

<p><i>FRAV agreed to use “Safe Fallback Responses” instead of “Failsafe Responses” in Document 5.</i></p>	<p>FRAV considered the “Failsafe Response” section of Document 5. SAE remarked that “failsafe” connotes responses to failures while transition demands and minimal risk maneuvers are also responses normal operations such as ODD exits. As such, SAE prefers the use of “fallback responses” given that many, if not most, instances would involve normal system operations. Sweden and Canada proposed to include “safe” to the description of fallbacks to highlight their function in ensuring full safety of ADS.</p> <p>FRAV agreed to recommend the use of “safe fallback response” in place of “failsafe response”. Safe fallback includes normal operation of the ADS and responses to system failure.</p>
<p><i>FRAV agreed to raise Framework Document open issues with GRVA.</i></p>	<p>The discussions on Document 5 raised questions regarding the work of FRAV and the current version of the Framework Document. FRAV agreed that these issues would have to be resolved by GRVA and WP29. The open issues included:</p> <ul style="list-style-type: none"> • Canada’s proposal to include property damage in the Safety Vision • Russia’s proposal to exclude the term “autonomous” per the J3016 recommended practice • FRAV’s consensus to set aside the term “OD” in favor of “ODD” • FRAV’s consensus to replace “Failsafe response” with “Safe fallback response” • Guidance on inclusion of unallocated Framework Document items regarding “vehicle maintenance and inspection”, “consumer education and training”, “crashworthiness and compatibility”, and “post-crash AV behavior”. <p>Regarding the use of “ODD”, the EC moved to stipulate that use of the term did not prejudice the establishment of minimum ODD requirements. FRAV agreed that functional performance requirements would establish minimum standards that could impact ODD definitions or boundaries. Therefore, FRAV agreed that use of ODD would not prevent requirements to ensure that ODD definitions were consistent with safe operation of automated vehicles.</p> <p>FRAV agreed that “vehicle maintenance and inspection” seemed too narrow. Broadly, FRAV agreed that this element related to in-use performance, but further discussion would be needed to more clearly define the safety needs and possible responses. In-use performance raises questions related to performance monitoring, in-use data reporting, development of scenarios (especially in response to real-world events), handling of sensitive or proprietary data, and the work of other groups (e.g., cybersecurity, DSSAD). FRAV expects its functional performance requirements to address post-crash vehicle behavior and safety (for example, vehicle does not leave scene of collision). FRAV agreed that some issues may be appropriate for inclusion within the scope of Document 5 but could be referred to other groups of experts or GR Working Parties for development.</p>

<p><i>FRAV agreed to use Document 5 as the common tool for consolidating all stakeholder input and ensuring transparency going forward.</i></p>	<p>The co-chair from Germany summarized the aims of Document 5:</p> <ul style="list-style-type: none"> • Integrate the Framework Document and FRAV mandates while allowing for future refinements • Allow stakeholders to inject ideas towards reaching consensus on common proposals • Provide a means for meeting FRAV objectives but not the end or final point • Avoid jumping back and forth between the Framework Document or other earlier input • Provide a new starting point for FRAV with advantages for going forward, especially in adapting consensus outcomes to eventual legal documents or formal proposals. <p>The co-chair from the United States fully agreed, emphasizing that Document 5 resulted from previous work: from the comparison of Contracting Party guidelines through the integrated matrix of common safety elements and alignment with the Framework Document. Although not complete, Document 5 is the common working document for FRAV going forward and all issues raised within the group can go into this document. The co-chair also stressed that Document 5 is an internal tool to facilitate FRAV's work and should not be confused with future documents that FRAV expects to submit for GRVA and WP.29 consideration.</p> <p>The European Commission supported this view, noting that Document 5 ensures consideration of all stakeholder input towards reaching consensus on common positions. A separate document should be prepared for the GRVA February session to explain the status of FRAV's work.</p> <p>OICA and CLEPA presented their views on draft high-level functional requirements for automated vehicles (FRAV-02-13). Canada recommended that the EC and OICA/CLEPA input be integrated into a new version of Document 5. Canada further supported the co-chair summations, submitting that Document 5 is an "evergreen" paper not intended to produce a "final" document.</p>
<p><i>FRAV agreed to use Revision 2 of Document 5 to extract common principles for submission to GRVA and to prepare for its April session.</i></p>	<p>The co-chairs directed the secretary to prepare a second revision of Document 5 (FRAV-02-05/Rev.2) to consolidate all the views expressed during the session, including the OICA/CLEPA input. The co-chairs requested the FRAV stakeholders to provide comments on this revision towards improving the text and removing redundancies. The co-chairs confirmed their intention to work with stakeholders prior to the February GRVA session to streamline Document 5 and extract consensus elements to provide a statement of common principles for functional requirements per the March 2020 deadline imposed by the Framework Document.</p> <p>Pursuant to the outcomes of the interim discussions and input, the co-chairs directed the secretary to prepare a new version of Document 5 as FRAV-03-05 for consideration during the April FRAV session.</p>
<p><i>The next FRAV session will be held in Paris during 14-15 April.</i></p>	<p>The third FRAV informal group session is scheduled for 14-15 April 2020 in Paris. This session will coincide with the 6th VMAD session, scheduled for 16-17 April.</p> <p>Similarly, the fourth FRAV session is planned for 8-9 September 2020 in Santa Clara, California with VMAD meeting during the 10th and 11th.</p>

<i>FRAV tasks in preparation for the next session.</i>	FRAV concluded the session with agreement on consensus outcomes and action items to prepare for its next session (FRAV-02-14/Rev.1):		
	Item	Responsibility	Deadline
	1. Draft FRAV-02-05/Rev.2	Secretary	17 Jan
	2. Submit comments on FRAV-02-05/Rev.2	All	29 Jan
	3. Common principles document for GRVA	Co-chairs	7 Feb
	4. Raise Framework Document queries with GRVA	Co-chairs	10 Feb
	5. Prepare FRAV-03-05 for the April FRAV session	Secretary	1 Apr

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