

This is a revision of Document 5 building from FRAV-06-05. As agreed during the 7th session, this document provides a record of FRAV discussions and decisions separated from the main text of Document 5 (resulting in this “Document 4”). Previously considered text is shaded in green, meaning that FRAV has reviewed and provisionally accepted the text under its working consensus. This status does not mean the text has been formally approved by FRAV for submission to GRVA and/or WP.29. Document 5 only reflects FRAV discussions to date pending further work.

New paragraphs and changes to the previous version of Document 5 are shaded in blue. In the case of changes to pre-existing text (whether considered by FRAV or not), the proposal for revised text is in the second column for comparison against the earlier text in the first column.

Current Text and Proposals (green = accepted, blue = new text for consideration, unshaded = not yet discussed)	Alternative text to previously considered text	<i>Explanatory remarks</i>
1. Background		
1.1. Under its Terms of Reference (WP.29/1147/Annex V), the Informal Working Group on Functional Requirements for Automated/Autonomous Vehicles (FRAV) has been established by WP.29 under the Working Party on Automated/Autonomous and Connected Vehicles (GRVA) to develop functional (performance) requirements for automated[/autonomous] vehicles, in particular, the combination of the different functions for driving: <ul style="list-style-type: none"> • longitudinal control (acceleration, braking and road speed) • lateral control (lane discipline) • environment monitoring (headway, side, rear) • minimal risk maneuver • transition demand • HMI (internal and external) • driver monitoring. 		

<p>1.2. This work should also cover the requirements for Functional Safety. FRAV has been further mandated to pursue this work in line with the following principles/elements described in the WP.29 Framework Document on Automated/Autonomous Vehicles (WP.29/2019/34/Rev.2, hereafter, the Framework Document):</p> <ul style="list-style-type: none"> • System safety • Failsafe Response • HMI/Operator information • OEDR (Functional Requirements). 		
<p>1.3. The Framework Document established one deliverable specific to functional performance requirements for automated vehicles. GRVA was requested to submit a document on “common functional requirements [based] on existing national/regional guidelines and other relevant reference documents (1958 and 1998 Agreements)” for consideration during the 180th (March 2020) session of WP.29.</p>		

<p>1.4. Although not specified in the FRAV Terms of Reference, the Framework Document implies and GRVA has requested that FRAV provide the basis for this submission to WP.29. Therefore, FRAV considered a “Comparison table of ADS Guidelines in USA, Canada, Japan, EU, Australia and China” (VMAD-01-04) prepared by OICA. At its first session (FRAV-01, 9-10 October 2019, Berlin), FRAV further considered a table of “common AV safety elements” (FRAV-01-13) whereby OICA distilled its comparison table into a single set of elements. Pursuant to an FRAV request, OICA aligned its table with the Framework Document in a revised document (FRAV-01-13/Rev.1).</p>		
<p>1.5. The basis for this present document was an effort to transpose the FRAV-01-13/Rev.1 table into a format suitable for long-term development of more detailed provisions as well as for use in FRAV meeting sessions (e.g., projection on a screen). Originally presented as FRAV-02-05, FRAV has decided to reserve the number “05” for future versions. For example, FRAV will use FRAV-03-05 for this document as considered during its 3rd session (FRAV-03, 14-15 April 2020, Paris), FRAV-04-05 during its 4th session (FRAV-04, 8-9 September 2020, Santa Clara), and so on.</p>		
<p>1.6. Due to travel and other restrictions imposed by health authorities in response to the COVID-19 pandemic, FRAV indefinitely postponed its scheduled 3rd session (April 2020) and began soliciting stakeholder input via a series of questions and emails.</p>		<p><i>Added via FRAV-03-05.</i></p>

<p>1.7. On 30 March, the Secretary, pursuant to a work plan agreed by the FRAV co-chairs, requested stakeholder input on the preamble to the ODD chapter of Document 5. The request also asked for input regarding the relationship between an ODD and a vehicle to clarify whether a vehicle can be considered to have more than one ODD (FRAV-03-05-Add.1).</p>		<p><i>Added via FRAV-03-05.</i></p>
<p>1.8. After two iterations, the Secretary distributed a third draft preamble including draft definitions for the terms “ADS”, “ADS feature”, and “ODD” (FRAV-03-05-Add.2). These terms were used in the draft to stipulate that a manufacturer should describe the ODD of each feature enabled by an ADS. Two stakeholders raised technical reservations; however, no stakeholders opposed continuing to elaborate Document 5 based upon the interim text. Therefore, the Secretary distributed an updated version of Document 5 containing the revised text (FRAV-03-05) on 8 May 2020.</p>		<p><i>Added via FRAV-03-05.</i></p>
<p>1.9. FRAV accepted a simplified definition of “ADS” because SAE J3016 presents several concepts requiring further consideration:</p> <ul style="list-style-type: none"> • Value of the DDT in drafting requirements, • Whether an ADS may not have an ODD (i.e., at Level 5), • Use of the levels of automation as a short-hand way to categorize an ADS. <p>Without prejudice, FRAV set aside these open issues until such time as they may be pertinent to drafting specific text in Document 5.</p>		

<p>1.10. On 8 May 2020, the Secretary circulated a request for input on elements to include in the ODD description (FRAV-03-05-Add.3). Stakeholder comments focused on the purpose of the ODD description and criteria for determining elements to include in the description. The comments suggested a close association between ODD elements and the high-level functional performance requirements. FRAV agreed that ODD elements enable the application of high-level requirements to specific ADS configurations. Therefore, FRAV agreed to address ODD elements in the course of defining functional performance requirements (FRAV-03-05-Add.4).</p>		
<p>1.11. On 8 June, the Secretary circulated a request for comments regarding the “System Safety” chapter of Document 5. The document proposed a scope and purpose for the chapter based on the text of the AV Framework Document. The comments showed diverse interpretations of “system safety” across FRAV stakeholders. The comments also underscored that FRAV and VMAD had mandates to address “system safety”. The diversity of views did not provide a basis for reaching consensus.</p>		

<p>1.12. The Secretary provided a revised version of the request for comments (FRAV-03-05-Add.5) explaining the outcomes of the comments and consultations with stakeholders on 16 July. This document proposed an alternative approach to addressing “system safety” under FRAV. The approach noted stakeholder input regarding ADS functions and their relation to performance of the DDT. Per J3016, the document noted that the DDT referred to continuous functions a driver must perform such as controlling the vehicle motion and monitoring the vehicle environment. The document proposed a “triangular approach” where the System Safety chapter would address ADS functions required to operate the vehicle in traffic (functional requirements), the ODD chapter would cover ODD elements plus other operational design constraints as may be identified, and the remainder of Document 5 would cover operational performance requirements.</p>		
<p>1.13. FRAV held its 3rd session via web conference on 28 July.</p>		
<p>1.13.1. FRAV confirmed its high-level understanding of ODD descriptions and their use to define an ADS feature. Subject to further discussions, FRAV agreed that ODD refers to operating conditions external to the vehicle and that an ADS may have other (e.g., internal) operational conditions to be determined.</p>		

<p>1.13.2. FRAV confirmed its view from the 2nd session that “system safety” covered broad safety aspects, including functional and operational safety. ADS integrate functions that enable the features to operate the vehicle within the ODD. The feature may share ADS functions and/or rely on functions unique to the feature.</p>		
<p>1.13.3. FRAV considered the “triangular approach” but could not reach consensus on the precise meanings and relevance to FRAV of terms such as “functional safety”, “operational safety”, “functional requirement”, “operational requirement”, and “system safety”.</p>		
<p>1.14. FRAV held its 4th session via web conference on 8 September to resolve open issues regarding the ODD and System Safety chapters of Document 5.</p>		
<p>1.14.1. FRAV confirmed its interpretation of the definition of ODD as referring to external conditions of the vehicle. Nonetheless, FRAV confirmed that additional constraints important in the description of an ADS may be warranted. FRAV agreed to proceed with work on enumerating conditions and constraints that may be important in assessing a specific ADS configuration under the ODD chapter. Once these elements have been enumerated, FRAV will consider structural changes to the ODD chapter as may be warranted.</p>		

<p>1.14.2. FRAV discussed the issues surrounding the term “system safety”. FRAV discussed the difference between requirements and methods such as in “functional requirements” and the methods described under “functional safety” standards. FRAV concluded that use of the term “functional” results in ambiguity and risks confusion between requirements and methods. As a result, FRAV preferred the term “performance requirements” to address functional and operational requirements for ADS performance.</p>		<p><i>Text revised from FRAV-06-05 to more clearly explain that FRAV is concerned with requirements, not methods such as Functional Safety. In the last sentence, “FRAV preferred the term “performance requirements” to address functional and operational safety requirements” has been modified. The meaning is that “performance requirements” = functional requirements + operational requirements.</i></p>
<p>1.14.3. FRAV concluded that system safety is a broad field of activity. The overall objective of FRAV safety requirements and the assessment methods being developed under VMAD is to ensure “system safety”. Therefore, FRAV agreed to remove “system safety” as a chapter of Document 5. Nonetheless, FRAV agreed that “system safety” required explanation as an overarching concept and starting point for requirements in Document 5.</p>		

<p>1.14.4. FRAV discussed principles for defining the overall level of safety for ADS. FRAV considered four general baselines:</p> <ul style="list-style-type: none"> • A “careful and competent human driver” • “State-of-the-art” based on technological feasibility • A “safety envelope” based on mathematical formulas, and • A statistical “positive risk balance” compared with human driving. <p>FRAV concluded that the group should begin with conceptual starting points to guide an iterative process towards defining high-level performance requirements applicable across ADS configurations. FRAV agreed to continue consideration of possible methods for defining performance thresholds.</p> <p>Japan proposed six aspects for assessing the baseline principles for ADS safety (FRAV-04-13):</p> <ul style="list-style-type: none"> • Improvement of road transport • Performance-based orientation • Technology-neutral orientation • Suitability for deriving measurable criteria • Alignment with social acceptance of ADS • Feasibility to satisfy the overall level 		
<p>1.15. FRAV held its 5th session via web conference on 15 October 2020 to discuss the description of “system safety” and starting points for the elaboration of performance requirements.</p>		

<p>1.15.1. FRAV agreed upon five starting points that each capture a key aspect of ADS safety:</p> <ul style="list-style-type: none"> • ADS should drive safely. • ADS should interact safely with the user. • ADS should manage safety-critical situations. • ADS should safely manage failure modes. • ADS should maintain a safe operational state. 		
<p>1.15.2. FRAV agreed to develop ±10 sub-elements under each starting point as a step towards defining ADS performance requirements. FRAV agreed to work from an initial review of national and regional guidelines (FRAV-05-06) prepared by OICA/CLEPA.</p>		
<p>1.15.3. Japan suggested that stakeholders rate options for agreeing on a baseline principle for overall ADS level of safety using its table of proposed criteria (FRAV-05-04).</p>		