

<b><u>Report of the fifth meeting of the Informal Working Group on Functional Requirements for Automated and Autonomous Vehicles (IWG FRAV)</u></b>	
Venue	Web conference
Date	15 October 2020
Documents	Submissions for the session can be found on the <a href="#">FRAV-05 UNECE wiki page</a> .
Status: Draft	

<i>Agenda and previous session report adopted.</i>	FRAV adopted the draft agenda (FRAV-05-01-Rev.2) without change. FRAV also adopted the draft report of the previous session (FRAV-04-02) without revision.
<i>FRAV reviewed the status and consensus to date, requesting stakeholders to notify the secretary of any concerns.</i>	<p>On behalf of the FRAV co-chairs (China, Germany, USA), the US co-chair presented a review of the FRAV working consensus to date (FRAV-05-03).</p> <p>The FRAV leadership provided a list of 21 points, explaining that the statements are intended to ensure a common understanding on areas of agreement. The co-chair requested FRAV stakeholders review the list and notify the FRAV secretary of any concerns or reservations.</p>
<i>FRAV has agreed to describe an ADS in terms of system-level functions that enable features to operate the vehicle within an ODD.</i>	<p>The FRAV secretary presented a diagram illustrating the FRAV working consensus.</p> <p>FRAV has produced a concept for describing an ADS in terms of elements relevant to the development of safety requirements:</p> <ul style="list-style-type: none"> <li>• The ADS is the complete system including all hardware and software collectively capable of operating a vehicle in traffic for a sustained period.</li> <li>• The ADS has one or more features defined by their respective ODD.</li> <li>• The ADS has functions that continuously and collectively perform the Dynamic Driving Task.</li> <li>• The ADS functions enable the ADS features to operate the vehicle within the respective ODD.</li> </ul>
<i>FRAV will need to define the term "ADS function".</i>	FRAV noted that Document 5 does not yet have a definition for ADS function. Therefore, the group will consider a definition in the next revision of this master document. SAE explained that functions generally refer to the discrete elements of the DDT such as object and event detection and response (OEDR) or longitudinal control of the vehicle motion.
<i>FRAV intends to draft technology-neutral performance requirements applicable across ADS.</i>	FRAV has agreed to develop "high-level" performance requirements, understood to mean requirements broadly applicable across configurations of ADS. FRAV anticipates that individual ADS will differ based on manufacturer decisions regarding features, ODD boundaries, means used to perform the DDT, and other variables. The performance requirements would seek a meaningful level of detail while remaining technology neutral and avoiding unnecessary prescription of ODD or feature boundaries.
<i>Mandatory ADS descriptions would enable application of the performance requirements to each specific ADS.</i>	FRAV has agreed that the assessment of a specific ADS will require information from the manufacturer to enable correct application of the performance requirements. Therefore, FRAV will define specifications for mandatory descriptions of ODD and other points necessary to apply the requirements to an individual ADS. As FRAV drafts performance requirements applicable across ADS, the group would identify variables (such as ODD conditions) that may differ across individual ADS. FRAV would define these variables in a verifiable/measurable manner to enable objective application to an ADS.

<p><i>The performance requirements would cover all safety aspects, including items not necessarily dependent upon the ODD such as facets of HMI.</i></p>	<p>Stakeholders expressed particular interest in the positioning of human-machine interface (HMI) and ADS interactions with the user within this schema (e.g., HMI as a function, safety benefits of uniform HMI, transitions to the human driver on ODD exits). Comments raised whether the emphasis on ODD and other operational constraints would exclude such interactions. The secretary clarified that the performance requirements are expected to cover all safety aspects (discussed in the “starting points” below). A subset of the requirements would concern ODD-related aspects where details on the intended uses and limitations on the use of a specific ADS feature would apply. FRAV intends to address all the safety concerns identified by Contracting Parties and FRAV stakeholders.</p>
<p><i>FRAV reviewed a hypothetical example regarding the application of its approach to an ADS designed to operate in rain and one not designed to operate in rain.</i></p>	<p>FRAV-05-03 considered a hypothetical example for the interaction between the high-level requirements and the ODD/ADS descriptions to enable differentiation of ADS in the application of the requirements for the purposes of an assessment. The example concerned the difference between an ADS feature designed to operate in the rain and another not designed to operate in the rain. For a feature not designed to operate in rain, this condition would be an ODD boundary subject to performance requirements limiting the use of an ADS feature. For a feature designed to operate in rain, the condition would relate to performance requirements regarding adaptation of the ADS driving behavior to road conditions. In both cases, ADS would require a function designed to detect and respond to the presence of rain.</p>
<p><i>FRAV agreed on five starting points that describe system safety and from which performance requirements can be derived.</i></p>	<p>Pursuant to its previous session, FRAV discussed the concept of “system safety” and the method for reaching consensus on the high-level performance requirements. FRAV confirmed its agreement to use a top-down approach, deriving performance requirements through an iterative, step-by-step process.</p> <p>FRAV noted 19 safety concerns derived from the WP.29 AV Framework Document (WP.29/2019/34/Rev.2). Based upon these goals, the FRAV leadership proposed a shorter list of starting points for the top-down approach.</p> <p>FRAV agreed upon the following five starting points to capture the meaning of system safety while providing the basis to derive more detailed descriptions of safety goals:</p> <ul style="list-style-type: none"> <li>• ADS should drive safely.</li> <li>• ADS should interact safely with the user.</li> <li>• ADS should manage safety-critical situations.</li> <li>• ADS should safely manage failure modes.</li> <li>• ADS should maintain a safe operational state.</li> </ul> <p>These points capture the ADS operation of the vehicle in traffic, HMI, transfers of control and disuse/misuse/abuse prevention, ADS responses to actions of other road users and emergency situations, management of malfunction or damage, and assurance of safety throughout the life of a vehicle equipped with an ADS.</p>
<p><i>FRAV to draft proposals for ±10 statements of safety goals under each starting point based upon an initial proposal from OICA/CLEPA.</i></p>	<p>The FRAV leadership requested stakeholders to provide proposals for the “next level” iteration of performance targets derived from the starting points. OICA/CLEPA provided a list of items derived from its administrative review of the WP.29 AV Framework Document, WP.1 deliberations, national/regional guidelines, and industry research (FRAV-05-06). OICA/CLEPA explained that the list was developed in late 2019 based on the safety elements discussions at FRAV-01 and FRAV-02.</p> <p>FRAV agreed to work from the OICA/CLEPA proposal in order to facilitate reaching consensus on the next-level list.</p>

<p><i>FRAV considered presentations on approaches to defining performance limits.</i></p>	<p>Japan presented its views on overall safety requirements (FRAV-05-04 based on FRAV-04-13). Japan again presented its table for assessing four approaches to setting performance limits based on six criteria (see FRAV-04-02-Rev.1-session report, page 5 for details). In document FRAV-05-04, Japan filled in the table with its assessment of the four approaches.</p> <p>Japan clarified that its C&amp;C Human Driver approach provided measurable performance criteria because it focuses on average human capabilities such as reaction times or brake pedal force inputs, not on driving behaviors that differ across cultures. Japan suggested that the “state-of-the-art” approach could lead to higher ADS prices and lower production by setting performance levels much higher than a diligent human driver level. Japan acknowledged that limits based technological feasibility have some advantages over other methods, but on balance, basing limits on competent and careful human performance levels seems more appropriate. Nonetheless, Japan welcomed information on the various approaches towards finding the optimal approach(es).</p> <p>Germany clarified its comments from the previous session on the “state-of-the-art” approach, demonstrating how existing data could define reasonable limits based on current performance levels (FRAV-05-05). Germany showed how data from Euro NCAP AEBS testing provided objective performance data for various vehicle types with regard to braking. The data quantified performance in terms of delay for threat recognition, brake activation, braking system speed (latency), and deceleration. Germany stressed that the aim of their approach is not to define exact performance limits for the ADS but rather to define the threshold between collision avoidance and crash mitigation (i.e., the point at which a collision can be prevented). Its approach would define parameters for what technical performance can be expected to determine where collisions can be avoided.</p>
<p><i>FRAV agreed to continue considering proposals and presentations on setting performance limits during its next sessions.</i></p>	<p>The Netherlands suggested that one method or the other may not be necessary. Possibly FRAV might use different methods depending upon needs and/or combine methods.</p> <p>Germany requested that the C&amp;C driver model be further explained in terms of its expected results. Germany understood Japan’s presentation to suggest a similarly quantified output as the “state-of-the-art” method. Germany expressed interest to see how the results of the two approaches might compare.</p> <p>FRAV agreed to continue consideration of methods for setting performance limits during its next session. FRAV would like to be fully informed on the options by the time the group has derived performance requirements to the level where quantification becomes the focus.</p>
<p><i>FRAV agreed to hold its next session on 29 October (submissions to be submitted by 27 October)</i></p>	<p>The 6<sup>th</sup> FRAV session is scheduled for 29 October between 13h00 and 16h00 CET.</p> <p>Stakeholders were requested to provide proposals for the “next-level” performance goals by 27 October to enable preparations for the session. <i>Secretary’s note: Per the discussion, document FRAV-06-04 based on FRAV-05-06 has been circulated to gather input).</i></p> <p>Interested stakeholders were also asked to contribute views on methods for setting performance limits.</p>