

The below proposed changes by the Netherlands are based on FRAV-32-04-Rev1.docx

## Proposed change

Number	Old text	Proposed text	Justification / remarks
<b>A. Driving</b>			
7	The tactical level concerns assessment of the real time driving environment and decisions on driving responses to negotiate the directly prevailing circumstances within the constraints of the general strategic goals.	<u>The tactical level involves manoeuvring the vehicle in traffic during a trip, including perceiving and assessing of the driving environment, deciding and planning on a specific manoeuvre (e.g., on whether and when to overtake another vehicle), and execute the manoeuvre.</u>	To bring this definition more in line with the general understanding of the Michon levels and in line with the SAE definitions.
8	The operational level concerns vehicle-control capabilities and the application of the capabilities to execute the tactical choice.	<u>The operational level concerns vehicle-stabilisation capabilities (e.g., making micro-corrections to steering, braking and accelerating to maintain lane position in traffic.</u>	To bring this definition more in line with the general understanding of the Michon levels and in line with the SAE definitions.
9	For example, a decision to drive from home to a workplace involves a strategic assessment of the current conditions, the risks involved in driving under those conditions, and the probability for arriving at work on time. While driving, the driver makes tactical decisions based on conditions encountered along the way such as to change lanes or turn onto another street. In changing lanes, the driver makes a tactical assessment that the lane change is feasible and actuates the direction indicators before operationally steering the vehicle while maintaining an appropriate speed, often with micro adjustments in response to changes in the behaviour of other vehicles relevant to executing the change of lane.	For example, a decision to drive from home to a workplace involves a strategic assessment of the current conditions, the risks involved in driving under those conditions, and the probability for arriving at work on time. While driving, the driver makes tactical decisions based on conditions encountered along the way such as to change lanes or turn onto another street. In changing lanes, the driver makes a tactical assessment that the lane change is feasible, actuates the direction indicators <u>and steers the vehicle while maintaining an appropriate speed, often with micro adjustments on the operational level.</u>	To bring this in line with the changes proposed in 7 and 8.
10	These behavioural levels relate to perception, information processing, and decision making. under	These behavioural levels relate to perception, information processing, and decision making.	Driving is more than risk management.

Number	Old text	Proposed text	Justification / remarks
	uncertainty. <sup>1</sup> Driving can be considered an exercise in risk management within the context of achieving strategic goals. Drivers assess and respond in real time to perceived risks in the road environment.		
11	The real-time tactical and operational functions required to operate a vehicle in on-road traffic are collectively known as the Dynamic Driving Task (DDT). As noted above, these functions may be performed within the context of strategic goals, but the DDT itself excludes such strategic functions. These functions may overlap or operate in combination such as in a tactical decision in response to road conditions to deviate from the original strategy to follow a particular route.	The real-time tactical and operational functions required to operate a vehicle in on-road traffic are collectively known as the Dynamic Driving Task (DDT). As noted above, these functions may be performed within the context of strategic goals, but the DDT itself excludes such strategic functions. These functions may overlap or operate in combination such as in a tactical decision in response to road conditions to deviate from the original strategy to follow a particular route. <u>Strategic decisions, however, can be made during a trip. For example, when deciding to leave the motorway for lesser roads.</u>	Strategic decisions can be made on-route and these may have nothing to do with road or traffic conditions. Lesser roads may be a wrong term for non-motorway roads
12	Although the DDT comprises individual functions (in some research, broken down into thousands of subtasks), the DDT itself refers to the whole of the functions required to operate the vehicle. In this aspect, performance of the DDT cannot be split or allocated. Either the ADS or the driver performs the DDT. A system that cannot perform the entire DDT can only assist the driver's performance of the DDT.	Although the DDT comprises of several subtasks <u>(sensing, cognitive processing, action) the DDT itself refers to performing the whole driving task within its Operations Design Domain (ODD). Within the ODD the ADS or the driver performs the DDT. An ADS that cannot perform the entire DDT within its ODD can only assist the driver's performance of the DDT.</u>	Without further context this statement is incorrect. Move this text to B. Since A only generally covers the driving task. And has nothing to do with ADS.
13	Tactical functions include but are not limited to manoeuvre planning, enhancing conspicuity (lighting, signalling, gesturing, etc.), and managing interactions with other road users. Tactical functions generally occur over a period of seconds.	Tactical functions include but are not limited to manoeuvre planning <u>and execution</u> , enhancing conspicuity (lighting, signalling, gesturing, etc.), and managing interactions with other road users. Tactical functions generally occur over a period of seconds.	Bring in line with earlier proposed changes.

<sup>1</sup> Michon, J.A., 1979 (update 2008). "Dealing with Danger", Summary Report of the Workshop on Physiological and Psychological Factors in Performance under Hazardous Conditions with Special Reference to Road Traffic Accidents, Gieten, Netherlands, May 23-25, 1978.

Number	Old text	Proposed text	Justification / remarks
15	The DDT cannot be apportioned because these functions are interdependent and operate as a whole. Operational and tactical functions are inherent in monitoring the driving environment (object and event detection, recognition, classification, and response preparation) and in object and event response execution.	<u>Certain parts of</u> the DDT cannot be apportioned because these functions are interdependent and operate as a whole. <u>Especially</u> tactical functions require monitoring the driving environment (object and event detection, recognition, classification, and response preparation) and response execution.	The DDT can be apportioned.
<b>B. Automated Driving</b>			
18	The diversity of ADS and ADS vehicle configurations requires attention to the roles, if any, that a vehicle user may play in the use of the vehicle. ADS vehicles may, or may not, be designed to carry human occupants. They may, or may not, be designed for use by a driver. They may permit or prohibit driver activation of the ADS while the vehicle is moving.	The diversity of ADS and ADS vehicle configurations requires attention to the roles, if any, that a vehicle user may play in the use of the vehicle. ADS vehicles may, or may not, be designed to carry human occupants. They may, or may not, be <u>designed to be driven by a human being</u> . They may permit or prohibit driver activation of the ADS while the vehicle is moving.	A vehicle with ADS may still be driven by a human being (safety steward on a shuttle, maintenance personnel or remote control)
19	Safety requirements must account for the role(s) a user may have in the use of the ADS and/or ADS vehicle such as driver or passenger. These human-user roles may involve vehicle occupants, or they may be external to the vehicle.	<u>Safety related design</u> requirements must account for the role(s) a user may have in the use of the ADS and/or ADS vehicle such as driver or passenger. These human-user roles may involve vehicle occupants, or they may be external to the vehicle.	Seems a better term than just Safety requirements. Design also refers to design of the interaction. There is currently no definition for passenger. There are currently no requirements on remote operation of an ADS
20	Roles may change during the course of a trip. For example, in some configurations, when a driver activates the ADS while the vehicle is moving, the ADS becomes the sole vehicle operator (i.e., performing the DDT) and the driver shifts to the role of fallback user. For safety reasons, this fallback-user role entails an obligation to remain receptive and responsive to ADS requests to assume control over the vehicle (i.e., to return to the role of driver).	Roles may change during the course of a trip. For example, in some configurations, when a driver activates the ADS while the vehicle is moving, the ADS becomes the sole vehicle operator <u>within its ODD</u> (i.e., performing the DDT <u>within its ODD</u> ) and the driver shifts to the role of fallback user. For safety reasons, this fallback-user role <u>may</u> entail an obligation to remain receptive and responsive to ADS requests to assume control over the vehicle (i.e., to return to the role of driver).	The ADS performs the DDT within its ODD. A fall back user may also go sleep depending on the quality of automation.

Number	Old text	Proposed text	Justification / remarks
22	The conditions under which an ADS is designed to operate are known as the Operational Design Domain (ODD), including aspects such as roadway speed limits, road designs (surface, geometry, infrastructure, etc.), weather conditions, and traffic densities. The ODD may include constraints or limitations on ADS use such as maximum vehicle speed, maximum rate of rainfall, or road type.	The conditions under which an ADS is designed to operate are known as the Operational Design Domain (ODD), <u>which include but are not limited to</u> aspects such as roadway speed limits, road designs (surface, geometry, infrastructure, etc.), weather conditions, and traffic densities. The ODD may include constraints or limitations on ADS use such as maximum vehicle speed, maximum rate of rainfall, or road type.	Try to bring this one in line with SAE.
25	Driver performance of the DDT is based on human physical, sensory, and cognitive capabilities. ADS performance of the DDT is based on hardware and software. Therefore, the definition of DDT as applied to an ADS must be understood in these terms.	Driver performance of the DDT is based on human physical, <u>sensing</u> , and cognitive capabilities. ADS performance of the DDT is based on hardware and software <u>to achieve comparable capabilities as human drivers have</u> . Therefore, the definition of DDT as applied to an ADS must be understood in these terms <u>of hardware and software</u> .	The combination of hardware and software aim to achieve certain capabilities as well.
26	For an ADS, the operational and tactical functions of the DDT can be logically grouped under three general categories:		For an ADS a part of the DDT can also be to assess the ODD and to transfer control to the fallback user and to assess whether the user is capable of taking back control (driver monitoring). Does this need to be included.
27	ADS sensing and perception includes monitoring the driving environment via object and event detection, recognition, and classification. These functions include perceiving other vehicles and road users, the roadway and its fixtures, objects in the vehicle's driving environment, and relevant environmental conditions, including sensing ODD boundaries, if any, of the ADS feature and positional awareness relative to driving conditions.	<u>ADS' sensing and perception functions includes</u> <u>monitoring the driving environment to achieve</u> object and event detection, recognition, and classification. These functions include perceiving other vehicles and road users, the roadway and its fixtures, objects in the vehicle's driving environment, and relevant environmental conditions, including sensing ODD boundaries, if any, of the ADS feature and positional awareness relative to driving conditions.	You can't monitor the environment through object and event detection etc.

Number	Old text	Proposed text	Justification / remarks
29	Control refers to object and event response execution via lateral and/or longitudinal motion control and enhancing vehicle conspicuity via lighting and signalling.	Control refers to <del>object and event</del> response execution via lateral and/or longitudinal motion control and enhancing vehicle conspicuity via lighting and signalling.	Control is response execution for whatever reason. Clarify what is meant with signalling. Can this also be signalling to other road users?
<b>C. Automated Driving Systems</b>			
32	Driving automation systems that require human support to fulfil aspects of the DDT fall below the level of an ADS.	Driving automation systems that require human support to fulfil aspects of the DDT <u>within the ODD of the ADS</u> fall below the level of an ADS.	An ADS can only perform the DDT within its ODD.
<b>D. ADS Functions</b>			
34	ADS integrate subsets of hardware and software (i.e., functions) designed to perform aspects of the DDT.	ADS integrate subsets of hardware and software (i.e., functions) designed to perform <u>one or more</u> aspects of the DDT.	Bring in line with 36. Examples would clarify what is meant with a function. 34, 35, and 36 seem to say the same thing.
36	A function enables the ADS to perform one or more elements of the DDT.	A function enables the ADS to perform one or more elements of the DDT ( <u>e.g., sensing the environment</u> ).	Provide example
38	ADS functions may also ensure the correct use of the ADS and safe interactions with a user such as in transitions of control.		The role of functions keep expanding (see also 39). Better to revise 36.
40	However, functions that enable performance of the DDT and functions that ensure safe use, including the safety of user interactions, involve distinctly different objectives and requirements.	However, functions that enable performance of the DDT and functions that ensure safe use, including the safety of user interactions, <u>have</u> distinctly different objectives and requirements.	'Involve .... objectives' sounds weird
42	The requirements recommended in this document aim to ensure that each ADS is capable of performing the entire DDT to the extent necessary to operate the vehicle within its ODD. Because the performance of tactical and operational functions is dependent on the prevailing traffic conditions, these DDT requirements specify that the ADS must demonstrate behavioural competencies across traffic scenarios covering its ODD. The behavioural	The requirements recommended in this document aim to ensure that each ADS is capable of performing the entire DDT to the extent necessary to operate the vehicle within <u>the ODD of the ADS</u> . Because the performance of tactical and operational functions is dependent on the prevailing traffic conditions, these DDT requirements specify that the ADS must demonstrate behavioural competencies across traffic scenarios covering its ODD. The	'Its' may refer to vehicle, Just to make clear that 'its' refer to the ODD of the ADS

Number	Old text	Proposed text	Justification / remarks
	competencies inherently require functional capabilities to perform the DDT.	behavioural competencies inherently require functional capabilities to perform the DDT.	
43	These recommendations intentionally omit specifications for individual DDT functions. As noted above, performance of the DDT is dependent on traffic conditions where such functions cannot be limited to representative specifications. For example, a representative crash test at 56 kph ensures safety at lower speeds. This approach cannot be applied to driving where safety involves real time tactical and operational adaptation to dynamic road conditions. Tactical and operational functions are interdependent where the complexity of their interactions needs to be assessed under diverse traffic conditions.	These recommendations intentionally omit specifications for individual DDT functions. As noted above, performance of the DDT is dependent on traffic conditions where such functions cannot be limited to representative specifications. For example, a representative crash test at <u>60</u> kph ensures safety at lower speeds. This approach cannot be applied to driving where safety involves real time tactical and operational adaptation to dynamic road conditions. Tactical and operational functions are interdependent where the complexity of their interactions needs to be assessed under diverse traffic conditions.	Strange number
44	By ensuring that an ADS will be subjected to traffic scenarios covering its ODD, the assessment of the behavioural competencies demonstrated by the ADS under those scenarios verifies the capability of the ADS to perform the entire DDT necessary to navigate its ODD.	By ensuring that <u>the assessment of the behavioural competencies of</u> an ADS will be subjected to traffic scenarios covering its ODD, <u>it can</u> be demonstrated that the ADS under those scenarios has the capability to perform the entire DDT necessary to navigate its ODD. <u>The ADS must also be subjected to scenarios outside the ODD of its features to show that they indeed cannot be activated outside the ODD.</u>	Rewrite to make it more clear
46	Trust often determines automation usage. Operators may not use a reliable automated system if they believe it to be untrustworthy. Conversely, they may continue to rely on automation even when it malfunctions. <sup>2</sup> ADS should be designed to foster a level of trust that is aligned with their capabilities and limitations to ensure proper use.	Trust often determines automation usage. <u>Users</u> may not use a reliable automated system if they believe it to be untrustworthy. Conversely, they may continue to rely on automation even when it malfunctions. <sup>3</sup> ADS should be designed to foster a level of trust that is aligned with their capabilities and limitations to ensure proper use.	Replace Operators

<sup>2</sup> Raja Parasumaran and Victor Riley. Humans and Automation: Use, Misuse, Disuse, Abuse. Human Factors, 1997, 39(2), 230-253.

<sup>3</sup> Raja Parasumaran and Victor Riley. Humans and Automation: Use, Misuse, Disuse, Abuse. Human Factors, 1997, 39(2), 230-253.

Number	Old text	Proposed text	Justification / remarks
50	ADS should be evaluated, particularly under real-world testing on real users (i.e., not the people who are developing the products).	ADS should be evaluated, particularly under real-world testing <u>with a representative group of naive users</u> (i.e., not the people who are developing the products).	Clarification on what is meant with real.
<b>II. Purpose</b>			
58	This document provides recommendations for ADS safety requirements intended to inform WP.29 discussions on future initiatives that may be proposed under the 1958, 1997, and/or 1998 Agreements.	This document provides recommendations for ADS <u>generic safety requirements to harmonise ADS systems coming to the market and setting a threshold for their safety</u> . This output can be used <u>for future initiatives</u> under the 1958, 1997, and/or 1998 Agreements.	Seems a better wording of the intention of this document
<b>III. Terms and Definitions</b>			
62	<i>“Automated Driving System (ADS)”</i> means the hardware and software that are collectively capable of performing the entire DDT on a sustained basis.	<i>“Automated Driving System (ADS)”</i> means the hardware and software that are collectively capable of performing the entire DDT on a sustained basis <u>regardless of whether it is limited to a specific operational design domain (ODD)</u> .	In its current definition it doesn't say that the ADS may perform the entire DDT within an ODD.
66	<i>“Behavioural competency”</i> means an expected and verifiable capability of an ADS feature to operate a vehicle within the ODD of the feature.		Verifiable is not defined. Suggestion: Verifiable means that it is possible to conclude whether a condition is fulfilled or not.
67	<i>“Critical scenario”</i> means a traffic scenario representing unusual and/or unexpected object behaviours and/or road conditions.	<i>“Critical scenario”</i> means a traffic scenario representing unusual and/or unexpected <u>objects</u> , object behaviours, and/or road conditions.	Objects and object behaviours are not the same thing.
71	<i>“Fallback user”</i> means a user designated to assume the role of driver upon completion of a transition of control.		What definition of driver does FRAV use? The definition from the Vienna or Geneva convention?
74	<i>“Nominal scenario”</i> means a traffic scenario representing usual and/or expected object behaviours and/or road conditions.	<i>“Nominal scenario”</i> means a traffic scenario representing usual and/or expected <u>objects</u> , object behaviours and/or road conditions.	Objects and object behaviours are not the same thing.
77	<i>“Other road user (ORU)”</i> means any entity using a roadway and capable of safety-relevant interaction with an ADS vehicle.	<i>“Other road user (ORU)”</i> means any <u>human being</u> using a roadway <del>and capable of safety-relevant interaction with an ADS vehicle</del> .	In the original definition a child of three years is not an

Number	Old text	Proposed text	Justification / remarks
			other road user. We also need a definition of roadway.
<b>IV. ADS Documentation</b>			
86	This section concerns the availability and/or provision of information regarding an ADS and/or ADS vehicle. Unless otherwise specified, “documentation” should be understood as agnostic regarding the form or format for substantiation of such information.	This section concerns the availability and/or provision of information regarding an ADS <u>and its features</u> and/or ADS vehicle. Unless otherwise specified, “documentation” should be understood as agnostic regarding the form or format for substantiation of such information.	An ADS can have different features.
87 - 96			Use ‘documentation’ were applicable instead of written documentation. Or delete second sentence of 86. This also relates to the question for whom is the documentation intended?
<b>V. ADS Safety Requirements</b>			
97	The following subsections recommend criteria for validating the safety of ADS and/or ADS vehicles.	The following subsections recommend <u>requirements</u> for validating the safety of ADS and/or ADS vehicles.	We don’t provide criteria.
99	Driving fundamentally involves real-time risk management under prevailing traffic conditions. Therefore, safe ADS performance of the DDT depends upon the conditions presented under each individual scenario.	Driving <u>partly</u> involves real-time risk management under prevailing traffic conditions. Therefore, safe ADS performance of the DDT depends upon the conditions presented under each individual scenario.	Driving is more than just risk management. There is social behaviour involved especially with respect to smooth traffic flow.
102	The behavioural competencies define ADS responses that comply with the following global requirements (Subsections A, B, and C) within the bounds of a relevant safety model quantifying dimensions for assessment of ADS performance (as described in Annex A). The behavioural competencies align with the layer of abstraction of the scenario to provide verifiable criteria at the functional layer down to measurable criteria at the concrete layer of abstraction		Too complex. Moreover this suggests that all criteria will be verifiable, which is not true

Number	Old text	Proposed text	Justification / remarks
104	These requirements shall be applied in the definition of behavioural competencies to be demonstrated under traffic scenarios.		This item can be removed as it does not add any information above the former text
<b>V.</b>			
<b>A. ADS Performance of the DDT under Nominal Traffic Scenarios</b>			
105	The following recommendations address the Framework document on automated/autonomous vehicles (ECE/TRANS/WP.29/2019/34/Rev.2) guidance that ADS vehicles shall not cause traffic accidents or disrupt traffic.	105. The following recommendations address the Framework document on automated/autonomous vehicles (ECE/TRANS/WP.29/2019/34/Rev.2) guidance that ADS vehicles shall not cause <u>foreseeable and/or preventable accidents</u> or disrupt traffic.	In line with wording FDAV
106	Compliance with this broad objective can be verified by subjecting the ADS and/or ADS vehicle to nominal traffic scenarios representing usual and expected traffic conditions and behaviours. By minimizing risk factors outside the ADS nominal performance of the DDT, the impact of the ADS driving behaviour on other road users and the flow of traffic can be isolated.		No idea what the objective is of the second sentence
107	This section recommends functional and behavioural requirements for assessing the ADS performance of the DDT under normal operational and driving conditions.	This section recommends functional <del>and behavioural</del> requirements <u>of</u> the ADS performance of the DDT under normal operational and driving conditions.	Don't see a need for assessing and a distinction between functional and behavioural requirements.
111	The ADS shall detect and respond when one or more ODD conditions are not or are no longer fulfilled.	The ADS shall detect and respond when one or more ODD conditions are not or are no longer fulfilled.	Respond how? Suggestion to split up.
111a		The ADS shall detect and respond when one or more ODD conditions are not fulfilled <u>by preventing possible activation</u> .	
111b		The ADS shall detect and respond when one or more ODD conditions are no longer fulfilled <u>by placing the vehicle in a MRC</u> .	

Number	Old text	Proposed text	Justification / remarks
114	The ADS shall detect objects in and around its path of travel that exceed a minimum size.		Can be removed is covered by 113 (or are these detailed provisions?)
115	The ADS shall recognize objects as static or mobile.		Can be removed is covered by 113 (or are these detailed provisions?)
120	The driving behaviour of the ADS shall not cause a collision.	The driving behaviour of the ADS shall not cause <u>foreseeable and/or preventable accidents</u> .	In line with 105 / FDAV
127	ADS shall comply with the traffic laws in nominal conditions, except when in specific circumstances or when necessary to enhance the safety of the vehicle's occupants and/or other road users.	ADS shall comply with the traffic laws in nominal conditions, except in specific circumstances <del>or</del> when <u>it is</u> necessary to enhance the safety of the vehicle's occupants and/or other road users.	If specific circumstances are not defined, this should not be mentioned as a separate option for non compliance
131	The ADS shall signal its operational status (active/inactive) as needed.		Can be removed. Is covered by interaction requirements (4.2.2.2.a)
<b>V.</b>			
<b>B. ADS Performance of the DDT under Critical Traffic Scenarios</b>			
132	The following recommendations address the Framework document on automated/autonomous vehicles (ECE/TRANS/WP.29/2019/34/Rev.2) guidance that ADS vehicles shall avoid collisions where preventable.	The following recommendations address the Framework document on automated/autonomous vehicles (ECE/TRANS/WP.29/2019/34/Rev.2) guidance that ADS vehicles shall avoid <u>foreseeable and/or preventable accidents</u> .	In line with FDAV
133	Compliance with this broad objective can be verified by subjecting the ADS and/or ADS vehicle to critical traffic scenarios representing unusual or unexpected traffic conditions and/or object behaviours that elevate road safety risks. By introducing foreseeable external risk factors into scenarios, the capability of the ADS to manage safety-critical events that may arise within its ODD can be assessed.	Compliance with this broad objective can be verified by subjecting the ADS and/or ADS vehicle to critical traffic scenarios representing unusual or unexpected traffic conditions, <u>objects</u> , and/or object behaviours that elevate road safety risks. By introducing foreseeable external risk factors into scenarios, the capability of the ADS to manage safety-critical events that may arise within its ODD can be assessed.	