Submitted by the technical secretary

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A proposal for the Definitions of Automated Driving under WP.29 and the General Principles for developing a UN Regulation

- ○ The following table reflects the general principles for automated driving systems as WP.29. These principles will be treated as guidelines for developing a new regulation related to automated driving systems at WP.29.
  - ・The control systems that intervening in case of emergency (AEB, ESC, Deadman, etc.) are not included in these definitions of automated driving.
  - ・The control functions that avoid dangers caused by unpredictable traffic conditions (goods/luggage dropping, frozen road, etc.) or other drivers' illegal driving behaviors are not considered in this table.
- ○ The regulation on automated driving needs to have new specific performance requirements and verification tests under various conditions depending on each level.
- ○ In discussing system requirements, it is desirable to organize them by level as well as by road way type (1: limited space; 2: motorway; 3: urban road).
- ○ The following table shows the distinguish way of level of automated driving under WP.29 at this present considering the results of discussions so far and the assumed use cases. This table should be reconsidered appropriately in accordance with each concept of automated driving system to be placed on the market in the future.
- ○ The main revision points on this meeting is distinguished in blue font.

	Monitor by Driver The driver may not perform secondary tasks			Monitor by System The driver may perform secondary task		
	Monitor by Driver	Monitor by Driver (a)	Monitor by Driver (b)	Monitor by System (Return to Driver Control on System Request)	Monitor by System Full Time under defined use case	Monitor by System only
Ref. SAE Level (J3016)	1: (system takes care of longitudinal or lateral control, monitoring by the driver)	2: (the system takes care of both longitudinal and lateral control). Monitoring by driver (monitoring by system allowed?) necessary because the system is not able to detect all the situations in the use case. The driver shall be able to take over at any time		3: The system is able to cope with any situations in the concerned use case, which includes the period of transition to driver control, the system drives and monitors (specific to the use-case) the environment and is able to warn the driver sufficiently in advance if a takeover is necessary in the use case. The system detects system limits and issues a transition demand if these are reached.	4: The system is able to cope with any situations in the concerned use case (fallback included), Driver not necessarily needed during specific use-case, e. g. Vallet Parking/ Campus Shuttle. It may however request a takeover if the use case boundaries are reached (e.g. motorway exit).	5: The system is able to cope with any situations on all road types, speed ranges and environmental conditions. No driver necessary.
Outline of Classification	The vehicle cannot be driven without the driver's continuous operation.	The driver and the system share dynamic driving tasks (see SAE's definitions) under limited driving environments and conditions		The system occasionally performs all dynamic driving tasks.	The systems do not require the driver to provide fallback performance	The system always operates all dynamic driving tasks.
		The system offers to operate in response to the driver's request, or to operate the vehicle for the driver just for a limited period (short time)*. *GRRF expert group should quantify	The system offers to operate the vehicle for the driver for a certain period (Long time)* which the driver requests. *GRRF expert group should quantify	Only secondary tasks with appropriate reaction time are allowed (e.g. texting, internet surfing, video-telephony)	All secondary tasks are allowed within the use case boundaries (e.g. motorway).	
Consideration points on development of regulation	Same as current principle (manner)	Same as current principle (manner) Driver normally is forced to engage in dynamic driving tasks in order to address changes in the driving environment. The regulation needs to consider an arrangement that ensures the driver's involvement in dynamic driving tasks even when the system is in control. With respect to systems of level 2b consideration should be given to the minimum level of the data capture concerning system status. Furthermore, for system of level 2b consideration should be also given for requirement for minimal risk maneuver.		The regulation needs to require that the driver is in a condition (driver availability) that enables him or her to resume operation of dynamic driving tasks when the driver must resume the driving task (transition demand by the system) under other than the use cases. The system shall be able to detect its own functional limitations. With respect to systems of level 3 consideration should be given to the minimum level of the data capture concerning system status. Furthermore, for system of level 3 consideration should be also given for requirement for minimal risk maneuver and emergency braking.	The system is able to cope with all situations in the use case (fallback included), driver availability may be required, not necessarily needed. (OICA homework)	The system is able to cope with all situations in the use case (fallback included), driver availability is not necessary any more.
Harmonization with traffic law (WP.1)						Note: Harmonization with the existing regulation on a driverless traffic system is necessary.

<table>
<tr><th></th><th colspan="3">Monitor by Driver
The driver may not perform secondary tasks</th><th colspan="3">Monitor by System
The driver may perform secondary task</th></tr>
<tr><th></th><th>Monitor by Driver</th><th>Monitor by Driver (a)</th><th>Monitor by Driver (b)</th><th>Monitor by System (Return to Driver Control on System Request)</th><th>Monitor by System Full Time under defined use case</th><th>Monitor by System only</th></tr>
<tr><td colspan="7">Examples of the necessary system performance requirements</td></tr>
<tr><td>Override function by the driver</td><td>O
(Necessary in general)</td><td>O
(Necessary in general)</td><td>O
(Necessary in general)</td><td>Δ
(necessity depends on the system)</td><td>Δ
(Unnecessary during part time)</td><td>X
（Unnecessary）</td></tr>
<tr><td>Aspects of arrangement that ensures the driver’s involvement in dynamic driving tasks (driver monitoring, etc.)</td><td>Δ
(detection of hands-off)</td><td>Δ
(at least detection of hands-off as necessary).</td><td>O
(detection of driver’s readiness for driving task:
e.g. hands off detection, driver availability recognition system, head and/or eye movement and/or input to any control element of the vehicle)</td><td>O
(detection of seated/unseated, reminder to the driver to avoid that he falls asleep etc.).</td><td>O
(System that depends on the driver’s conditions that can resume to driving operation）</td><td>X
（Unnecessary）</td></tr>
<tr><td>Aspects of arrangement that ensures the driver’s resumption of dynamic driving tasks (transition periods to the driver, etc.)</td><td>X
（Unnecessary）</td><td>X
（Unnecessary）</td><td>O
(Periods based on the condition which the driver does not involve in sub-tasks.)</td><td>O
(sufficient periods that considers the driver’s performance of sub-tasks).</td><td>O
(periods that depends on the driver’s conditions that can resume to driving operation)</td><td>X
（Unnecessary）</td></tr>
<tr><td>System reliability (E-safety)</td><td>Reliability considering the driver override</td><td>Reliability considering the driver override</td><td>Reliability considering the transition periods to the driver</td><td>Reliability considering the transition periods to the driver performing sub-tasks</td><td colspan="2">Reliability of the system’s performance of safe driving</td></tr>
<tr><td>Comprehensive recognition of surrounding environment (sensing, etc.)</td><td>Direction of travel only</td><td>The area to be monitored depends on the system function (Lateral and/or longitudinal directions)</td><td>The area to be monitored depends on the system function (Lateral and/or longitudinal directions)</td><td>Lateral and longitudinal directions</td><td colspan="2">Lateral and longitudinal directions</td></tr>
<tr><td>Recording of system status(inc. system behavior) (DSSA-Data Storage System for ACSF, EDR, etc.)</td><td>X
（Unnecessary）</td><td>X
（Unnecessary）</td><td>O
(the driver’s operations and the system status(inc. system behavior))</td><td>O
(the driver’s operations and the system status(inc. system behavior))</td><td colspan="2">O
(the system status(inc. system behavior))</td></tr>
<tr><td>Security (E-security)</td><td colspan="6">O
(Necessary if the information communication in connected vehicles, etc. affects the vehicle control)</td></tr>
<tr><td colspan="7">Summary of the current conditions and the issues to be discussed (specific use cases)</td></tr>
<tr><td>Roads where entry is regulated except for motor vehicles (inc. a part of urban roads)</td><td rowspan="3">○ Already put into practice
○ To be develop standardized (guideline etc) as necessary
・LKA (draft standards)
・ACC (no specific performance requirements)
・ACSF Cat.B1 (Steering Function hands-on)
・IPA (Intelligent Parking Assist)</td><td colspan="2">・Automated parking by the driver’s remote control (monitoring) (RCP [Remote Control Parking], to be discussed by ACSF-IWG?)</td><td>Partially outside of the scope of discussion at WP.1
(currently possible to be discussed at WP.29)</td><td colspan="2">Partially outside of the scope of discussion at WP.1
(currently possible to be discussed at WP.29)</td></tr>
<tr><td>Roads exclusively for motor vehicles (inc. a part of urban roads)</td><td colspan="2">(Under discussion)
・Categories A-E under ACSF (amendment of R79)</td><td>To be discussed with the amendment of Conventions by WP.1 taken into account
・Highway chauffeur</td><td colspan="2" rowspan="2">To be discussed with the amendment of Conventions by WP.1 taken into account</td></tr>
<tr><td>・ACC+ACSF (Cat.B1, Cat.C (Basic Lane Change Assist), Cat.D [Smart LCA])</td><td>・ACSF Cat. E
・ACSF Cat.B2 (Continuous Lane Guidance hands-off)</td><td></td></tr>
<tr><td>Urban roads</td><td colspan="2">・To be discussed as the second phase of ACSF</td><td>To be discussed with the amendment of Conventions by WP.1 taken into account</td><td colspan="2">To be discussed with the amendment of Conventions by WP.1 taken into account</td></tr>
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