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.

コメント [AL21]: This has to be covered by the system from level 3 (driver is not able to react quickly enough in this use case). Otherwise it a level 2 with the full responsibility to the driver to be able to take over at any time

	Driver in the loop	Driver in the loop	Driver part of the loop	Driver out of the loop	Driver out of the loop
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 the entire dynamic driving tasks. Driver fallback.	The system operates the entire dynamic driving task in a specifc use-case. System fallback	The system operates the entire dynamic driving tasks on all road types, speed ranges and environmental conditions. System fallback
	The system offers to operate in response to the driver's/operator's request				
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 (see comment BB6necessary because the system is not able to detect all the situations in the use case. The driver shall be able to intervene immediately at any time	3 . 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.
Consideration points on development of (vehicle) 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 requires the driver's involvement in the dynamic driving tasks (e.g. "hands-off detection") even when the system is in control.	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. Furthermore, emergency maneuvers (emergency braking) are to be considered and as well data storage system.	Harmonization with the existing regulation on a driverless traffic system (on public roads) is necessary.	
Examples of the necessary system performance requirements					
Override function by the driver	O (Necessary in general)			Δ (necessity depends on the system)	X (Unnecessary)
Aspects of arrangement that ensures the driver's involvement in dynamic driving tasks (driver monitoring, etc.)	Δ (detection of hands- off i)	Δ (detection of e. g. hands-off as necessary).	d Driver presence recognition system (detection of seated/unseated, belted/unbelted) Driver availability recognition system" means a function able to assess driver's physical availability (sleep, etc.) to respond to a transition demand from the vehicle A minimal risk maneuver is initiated if the driver does not respond to transition demand (or is not present/available e. g. after warnings). The driver is however expected to takeover, since he is the fallback of the system.	O Unnecessary, since the system performs entirely the minimal risk maneuver if a final take over by the driver at the end of use-case is required but not performed by the driver. (System that depends on the driver's conditions that can resume to driving operation	X (Unnecessary)
Aspects of arrangement that ensures the driver's resumption of dynamic driving tasks (transition periods to the driver, etc.)	X (not applicable)	X (not applicable)	O (sufficient periods to allow a safe transition to manual. If applicable, the vehicle's infotainment system showing non-driving relevant content to be deactivated automatically.	O (periods that depends on the driver's conditions that can resume to driving operation)	X (Unnecessary)
System reliability (E-safety): Safety components brake/steering	Reliability considering the driver override	Reliability considering the driver override	Reliability considering the transition periods to the driver Reliability considering the driver override	Reliability of the system's performance of safe driving	

Comprehensive recognition of surrounding environment (sensing, etc.)	Direction of travel only	The area to be monitored depends on the system function (Lateral and longitudinal directions)	The system performs the OEDR (object & event detection and response – see SAE J 3016)	
Recording of system status(inc. system behavior) (DSSA-Data Storage System for ACSF, EDR, etc.)	X （Unnecessary）	X （Unnecessary）	O (the driver's operations and the system status**(inc. system behavior)**)	O (the system status**(inc. system behavior)**)
Cyber-Security (E-security)	O (Necessary if the information communication in connected vehicles, etc. affects the vehicle control)			
Summary of the current conditions and the issues to be discussed (specific use cases)				
Roads where entry is regulated except for motor vehicles (inc. a part of urban roads)	○ Already put into practice ○ To be develop standardized (guideline etc) as necessary	· ACSF Category A: Automated parking by the driver's remote control (monitoring) (RCP [Remote Control Parking],)	· ACSF CAT A: Not applicablePartially outside of the scope of discussion at WP.1 (currently possible to be discussed at WP.29)	Partially outside of the scope of discussion at WP.1(?because these are not public roads?) (currently possible to be discussed at WP.29)
Roads exclusively for motor vehicles (inc. a part of urban roads)	· LKA (draft standards) · ACC (no specific performance requirements) · ACSF Cat.B1 (Steering Function hands-on) · IPA (Intelligent Parking Assist)	· ACC+ACSF (Cat.B1, Cat.C (Basic Lane Change Assist), Cat.D [Smart LCA] for all road types)	· ACSF Cat. E ACSF Cat.B2 (Continuous Lane Guidance hands-off) limited to highwaysTo be discussed with the amendment of Conventions by WP.1 taken into account - Highway chauffeur	To be discussed with the amendment of Conventions by WP.1 taken into account
Urban roads		· ACC+ACSF Cat.B1, Cat.C (Basic Lane Change Assist), Cat.D –tbd- [Smart LCA] for all road types	ACC+ACSF Cat.E, Cat.B2 (Continuous Lane Guidance hands-off) for Urban roads to be discussed as the second phase of ACSF/new regulation	To be discussed with the amendment of Conventions by WP.1 taken into account

コメント **[AL22]:** B1 including ACC.

Otherwise Level 1.