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.

	Driver in the loop	Driver in the loop (a)	Driver in the loop (b)	Driver out of the loop (Part Time)		Driver out of the loop (Full time)
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 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).	The system offers to operate the vehicle for the driver for a certain period (Long time) which the driver requests.			
Ref. SAE Level (J3016)	1		2	3	4	5
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.	The regulation needs to ensure that the driver is in a condition that enables him or her to resume operation of dynamic driving tasks when the driver must resume the driving task under other than the use cases.		Harmonization with the existing regulation on a driverless traffic system is necessary.
Examples of the necessary system performance requirements						
Override function by the driver	O (Necessary in general)	O (Necessary in general)	O (Necessary in general)	Δ (necessity depends on the system)	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 as necessary)	Δ (detection of hands-off as necessary)	O (detection of driver's distraction for driving task)	O (detection of seated/unseated, etc.)	O (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 （Unnecessary）	X （Unnecessary）	O (Periods based on the condition which the driver does not involve in sub-tasks.)	O (sufficient periods that considers the driver's performance of sub-tasks)	O (periods that depends on the driver's conditions that can resume to driving operation)	X （Unnecessary）
System reliability (E-safety)	Reliability considering the driver override	Reliability considering the driver override	Reliability considering the transition periods to the driver	Reliability considering the transition periods to the driver performing sub-tasks	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/or longitudinal directions)	The area to be monitored depends on the system function (Lateral and/or longitudinal directions)	Lateral and longitudinal directions	Lateral and longitudinal directions	
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 driver's operations and the system status**(inc. system behavior)**)	O (the system status**(inc. system behavior)**)	
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)	o Already put into practice o To be develop standardized (guideline etc) as necessary	・Automated parking by the driver's remote control (monitoring) (RCP [Remote Control Parking], to be discussed by ACSF-IWG?)		Partially 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 (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)	(Under discussion) ・Categories A-E under ACSF (amendment of R79)		To 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	
		・ACC+ACSF (Cat.B1, Cat.C (Basic Lane Change Assist), Cat.D [Smart LCA])	・ACSF Cat. E ・ACSF Cat.B2 (Continuous Lane Guidance hands-off)			
Urban roads		・To be discussed as the second phase of ACSF		To be discussed with the amendment of Conventions by WP.1 taken into account	To be discussed with the amendment of Conventions by WP.1 taken into account	